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EYEWITNESS IDENTIFICATION: VICTIMS *VERSUS* BYSTANDERS

Master's thesis

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Running head: VICTIMS *VS* BYSTANDERS

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Eyewitness identification: Victims *versus* bystanders**ABSTRACT**

The study was conducted to analyze the differences in eyewitness identification between the role of the witness (bystander, victim, involved victim) using mock-crime videos. There were 828 (6 excluded) subjects between the ages of 18 and 54 ($M = 25.8$). The participants watched 5 videos of staged theft from either the bystander or the victim perspective. After each video they had to identify the suspect(s) (one or two) seen in the video and describe what they saw. In the involved victim test group there was the addition of instructed involvement. The results showed that bystanders were less accurate in their identifications than victims, however involved victims were not different from either group. Line-up type (simultaneous *vs* sequential) did not have an effect on identification accuracy, however there was an interaction with the number of perpetrators presented in the video. The subjects in the one perpetrator condition were more accurate than the subjects in the two perpetrator condition. In addition, there were no differences in the confidence-accuracy relationship between different roles of the witness, however for choosers higher confidence was related to higher accuracy. Finally, instructed involvement affected the use of first person form in the descriptions of the event. It was concluded that instructed involvement is beneficial for the descriptions, however further research is required to better understand if and how involvement influences eyewitness identification. Future research should also focus more on how to create involvement in laboratory situations.

Keywords: witnesses, victims, bystanders, eyewitness identification, accuracy, confidence, descriptions of events

Kahtlusluse tuvastamine: Ohvrid *versus* pealtnägijad**LÜHIKOKKUVÕTE**

Uurimuse eesmärk oli analüüsida tunnistaja rolli (pealtnägija, ohver, kaasatud ohver) kahtlusluse äratundmise puhul kasutades lavastatud kuritegude videoid. Uurimuses oli 828 (6 jäeti välja) katseisikut vanusega 18 kuni 54 eluaastat ($M = 25.8$). Katseisikud vaatasid viit videot lavastatud vargusest, kas pealtnägija või ohvi perspektiivist. Peale igat videot pidid katseisikud identifitseerima kahtlusluse(d) (üks või kaks), kes oli(d) videos esitatud ja kirjeldama, mida nad nägid. Kaasatud ohvri katsegrupis paluti võtta videos nähtud isiku roll ehk lisandus instrueeritud kaasatus. Tulemusteks saadi, et pealtnägijad olid vähem täpsed kui ohvrid kahtlusluse äratundmises, kuid kaasatud ohvritega polnud statistiliselt olulisi erinevusi. Kahtlusluse esitamise rea tüüp (samaaegne vs järjestikune) ei mõjutanud äratundmise täpsust, kuid esines oluline interaktsioon kahtlusluse arvuga, kes videos olid. Ühe kahtluslusega katsegrupi katseisikud olid täpsemad äratundmises kui katseisikud kahe kahtluslusega katsegrupis. Lisaks polnud erinevusi kindlushinnangu ja täpsuse suhtes eri tunnistaja rollide korral, aga valijate kõrgem kindlushinnang oli seotud ka suurema täpsusega. Viimasena, instrueeritud kaasatus mõjutas minavormi kasutamist sündmuste kirjeldamisel. Järeldati, et instrueeritud kaasatus on kasulik kirjelduste kogumiseks, kuid tulevikus on vaja lisaks uurida, kas ja kuidas kaasatus mõjutab kahtlusluse äratundmist. Lisaks tasuks uurida, kuidas tekitada kaasatust laboritingimustes.

Märksõnad: tunnistajad, ohvrid, pealtnägijad, kahtlusluse tuvastamine, täpsus, kindlushinnang, olukorra kirjeldused

INTRODUCTION

There are 375 exonerations listed on the Innocence Project's webpage (2021), 21 of which are of people on the death row. Out of all the incorrect convictions about 70% have been related to eyewitness identification errors (Megreya, 2009, Innocence Project, 2021). Wells (1978) identifies two types of variables that can influence identification decisions: system and estimator variables. System variables are within the control of the legal system. Estimator variables relate to the crime event and are not within the control of the legal system. The purpose of this research is to find if estimator variables such as showing mock-crime videos from bystander and victim perspectives influences line-up decision accuracy, using both one and two perpetrator videos.

Role of the witness

One estimator variable that has been largely overlooked in the eyewitness identification research is the role of the witness. There are two main types of witnesses. First, there are bystanders that view the situation from a distance and are usually not involved in the event. Second, there are victims who are a part of the situation and experience it firsthand. The role of the witness in a laboratory situation has not been extensively studied before. Therefore, I propose that there are three key components that are related to the role of the witness: perspective as in the viewpoint the witness sees the situation from, involvement as in whether or not the witness feels as a part of the situation and emotionality as in how impacted the witness is by the event.

Viewpoint

Victims experience the situation close-up, but bystander eyewitnesses usually view the situation from far away, thus their perspectives are different. It has been found that eyewitness' descriptions can be quite reliable up to 50 meters away (Lindsay et al, 2008). However Rose and Beck (2014) found that for every 1.5 meters that the distance from the event increased, the likelihood of giving accurate information decreased about 6%. Nyman et al (2019) also found that at 40 meters away the participants were 50% less accurate than at 5 meters away. The closer the witness is to the event, the more likely they are to give accurate information about what they saw. As victims are usually closer than the bystanders, they should be more accurate in their line-up decisions.

Victims and bystanders usually view the situation from different angles. For example, it is possible that the victim faces the perpetrator but the bystander does not. While viewing a dynamic event, a viewpoint dependent mental representation of the event is developed.

Because of that it is easier to recognize stills from the event that are from the same viewpoint, rather than from differing viewpoints (Garsoffky, Schwan & Hesse, 2002). That would also suggest that it would be easier to identify a suspect from a line-up that consists of faces that are towards the participant if the participant has seen the face directly as opposed to seeing the face from the side. A line-up that consists of faces that are toward the participant, would most likely be better suited for the angle that the victim saw the perpetrator from.

Viewing the situation from a victim's perspective compared to a bystander's perspective can affect line-up choices because victims and bystanders differ in what they see and therefore remember of the event. Since victims are usually closer to the perpetrator and more likely to face them, victims should also be better at identifying the perpetrator from a line-up.

Involvement

Personal involvement meaning either feeling as a part of the situation or not can also influence memory. Bystanders and victims differ in involvement, for example, victims are usually participating in an event, however bystanders are not, they just need to notice that an event is taking place. It would therefore be likely that the victims remember more information since the victims are more often closer to the crime event, participating in it and notice it taking place sooner.

Thus far there are mixed results on how involvement influences eyewitness identification. Davies & Alonso-Quecuty (1997) found that people personally involved in the crime remember their feelings, thoughts and opinions more than anything else. Bystanders usually remember time, space, colors and voices better (Davies & Alonso-Quecuty, 1997; Alonso-Quecuty, 1990). However, Gobbo, Mega and Pipe (2002) found that children were more accurate in remembering information when they participated in the event when compared to observing or listening to a narrative. They were also less impacted by misinformation. The authors proposed that experiencing an event directly results in the formation of stronger memory traces. Rudy and Goodman (1991) also found that participation reduced the susceptibility to suggestion for children, however they did not find any significant effects for participation. Tobey and Goodman (1992) also found that participation increased accuracy for children.

Based on the research stated above, it is likely that involvement affects eyewitness identification, however it is somewhat unclear how. It would be likely that the bystanders are more accurate in their identifications since they remember facts about the situation better and are not affected by their feelings as much. However, involvement could also create stronger

memory traces making it more likely that the people personally involved would remember more information and therefore also be better at identifying the suspects from a line-up.

Emotionality

Emotionality and stress can influence memory. It has been found that directly observing or participating in an event that is considered to be arousing, can cause emotional involvement and produce vivid memories (Sharot et al., 2006). Hoscheidt and colleagues (2014) found that experiencing stress during a negative event enhances memory and they concluded that arousal and stress while witnessing a crime event results in enhanced memory. However, experiencing stress during the crime has previously been proven to hinder memory for negative and positive items more than neutral ones (Shields et al, 2017). Also, it has been found that stress has a negative effect on eyewitness identification accuracy (Deffenbacher et al., 2004). Therefore, emotions and stress experienced during a crime event can both improve or hinder memory.

Focusing either internally or externally can also influence what the witness remembers. Yuille and Tollestrup (1992) highlighted that if the witness is externally focused it is more likely that they will remember core details of the event because their attention is narrowed due to impact. They also stated that other than witnessing minor incidents like traffic accidents, many crimes are likely to impact the witness. However, if the witness focused internally, for example on the emotions experienced during the event, such as fear, hatred or rage, they would not remember most other details about the event. Thus, focusing internally will lead to remembering less information about the event itself. Bystanders and victims most likely experience different emotions and different levels of stress during crime situations and due to that their memory can also be influenced differently. Victims are more likely to focus on their emotions since they are involved in the event, thus they might remember less information about the event.

Research on role of the witness in eyewitness identification experiments

Laboratory situations

There are two studies that have assessed differences in identification for victims and bystanders in a laboratory situation and found conflicting results (Hosch & Cooper, 1982; Kassir, 1984). In both studies a theft was staged where the participants were in pairs and a third person entered the room, took something and left. In Kassir's (1984) study the whole situation lasted about 3.5 second but in Hosch and Cooper's (1982) study about 75 seconds.

The results in the studies were opposite. Hosch and Cooper (1982) found that victims in their study were more accurate in identifying the suspect but the results were not statistically

significant. In Kassir's (1984) study 53% of the bystanders managed to correctly identify the suspect out of a line-up. None of the victims were able to do so. The results can be explained through the three components of the role of the witness mentioned above.

Firstly, Kassir's (1984) and Hosch and Cooper's (1982) studies differed in perspective. In Kassir's (1984) study, there was a victim that faced the third person and a bystander that saw the third person from the side. Thus, they saw the perpetrator from different viewpoints. In Hosch and Cooper's (1982) study the third person entering the room was introduced to both of the participants so both the victim and the bystander had a chance to face and look at her. It could be that there were no significant differences in Hosch and Cooper's (1982) study because all of the participants had a very similar view of the perpetrator.

Secondly, the studies differed in involvement. In Hosch and Cooper's (1982) study, the subjects in the victim condition were asked to bring watches with them which were taken. In Kassir's (1984) study, the experimenters gave money to the participants as a part of a game which was taken. Because of that, it could be that participants in the victim condition in Hosch and Cooper's (1982) study felt more involved in the situation because their own property was taken, not something they had just received. Because of that, it is possible that the victims were more invested in the line-up decision process than bystanders and due to that identified the perpetrator more accurately than bystanders. In Kassir's (1984) experiment the participants were filmed and because of that it became evident that bystanders were more focused on the perpetrator's face than victims, who were more focused on the perpetrator's hands. Due to that, it is also understandable that the bystanders were better at identifying the suspect because they were more focused on the face of the perpetrator. Therefore, involvement in the crime situation affects what the participants view.

Thirdly, the studies also differed in emotionality. For Kassir's (1984) study it is possible that the participants felt more impacted by what they saw because the bystanders saw the victim, a fellow participant, being stolen from. It could also be that the victims in Kassir's (1984) study felt more stress during the event, because the man yelled at them and not at the bystanders. Since stress can negatively affect people's memory in eyewitness identification (Deffenbacher et al., 2014), it would also explain why victims were less accurate in their line-up decisions. In Hosch and Cooper's (1982) study the victim in the bystander condition was the experimenter, and because of that it is possible that the bystanders felt less impacted by what they saw and also paid less attention to the perpetrator. That could explain why there was no statistically significant difference between victims and bystanders.

Live situations

Live situations where the subjects are part of the situation, have also been used to study eyewitness identification. One example is Yuille and colleagues (1994) experiment of 110 recruits from the Metropolitan Police Training Center at Hendon, England, where one third of the participants were active participants in the event and two thirds were observers. All the participants were put in either stress or no-stress situations for standard “stop-and-search” scenarios.

The authors found that the participants remembered more information than the observers after the 12 week delay, which could mean that a higher level of participation resulted in more lasting memory traces. However, in the study the participants knew that they might be questioned later about what happened and the observers knew that the participants were being evaluated and also were aware of the fact that they themselves will be evaluated later as well. Because of that, it is possible that both the participants and the observers paid close attention to everything that happened.

Yuille and colleagues (1994) also found that the subjects that had taken part in the stress situation remembered the event more accurately after a 12 week delay than the subjects that had taken part in the no-stress situation. The authors proposed that the stressful situation had most likely been interesting and unique to the recruits, which could explain why they remembered the situation better. However, the recruits in the stressful situation also remembered less amount of information about the event. The authors stated that this could be due to narrowing of attention during a stressful event which reduces the amount of information that is remembered.

Since the participants interacted with both the witness and the suspect, it is more likely that they spent more time facing them than observers. Thus, they saw the interaction from a different angle. However, the authors did not specify where the observers were during the experiment.

Investigating the effect of role of the witness using mock-crime videos

There are benefits to conducting experiments that use videos of events as stimuli. Horry and colleagues (2014) found that viewing quality can be affected by both exposure duration and distance. By showing videos to participants the exposure duration is the same for every participant. Thus, by showing videos the events are identical between subjects and all the participants would have the same information presented to them, which also leads to less confounding variables. Videos are also a cheaper and a less resource intensive way to conduct research because they do not require the event to be staged over and over again.

By showing mock-crime videos to participants, it is more complicated to create involvement than in live staged events. Even though victims view the situation from a different perspective than bystanders, if the victim does not realize that a crime is taking place, the victim might not feel involved in the situation. Therefore, both the perspective and the realization of a crime taking place and subsequent personal involvement in the crime might alter the victim's perception of the event. Even if a video is filmed from the victim's perspective, the participant might not relate to the perspective, because the video can create distance from the event. One option to create involvement is to ask the participant to take on the role of the person whose perspective is presented in the video (Davies & Alonso-Quecuty, 1997). That would help to create a situation where by watching the video the participant still feels somewhat involved in the situation, compared to just watching the video. Therefore, it could create involvement and a similar cognitive process as when seeing a real crime event, but might not lead to a heightened emotional state.

Number of perpetrators

Most studies have focused on single-perpetrator crimes (Kassin, 1984; Hosch & Cooper, 1982; Ahola, 2012; Nyman et al., 2019; Rose & Beck, 2014; Christiaansen, Sweeney & Ochalek, 1983), however many crimes have more than one perpetrator. Clifford and Hollin (1981) found that identification accuracy decreased as the number of perpetrators increased. In their study they used either 1, 3 or 5 perpetrators that were identified for two types of incidents: violent and nonviolent. They did not find significant differences between violent and nonviolent incidents. However, for 1 perpetrator the subjects were accurate 35%, for 3 perpetrators 30% and for 5 perpetrators 15% of the time. For 5 perpetrators, the accuracy was about the same as would have been on the basis of chance. Therefore, the more perpetrators there are, the less likely the witnesses are to accurately identify them.

The results can be explained through having to divide attention between multiple people in crimes involving more than one perpetrator. There is a disadvantage to having to divide attention between two people rather than focusing on one perpetrator in a single-perpetrator crime. Megreya and Bindemann (2012) called it a double-perpetrator disadvantage. Therefore, if a person sees only one perpetrator they can focus their attention on just them. However, if there are multiple perpetrators they most likely cannot focus on all of them at once. In addition, they also have more information to remember to be able to identify all of the perpetrators when there are more than one. Thus, it would most likely be more difficult to identify multiple perpetrators.

The current study

The main goal of this study is to find if by using mock-crime videos there is a significant difference between victims and bystanders in line-up decision accuracy and if instructed involvement also makes a difference. Involvement for the victim perspective in laboratory experiments of eyewitness identification has previously not been researched.

The videos shown in this experiment are filmed from either the victim's or the bystander's perspective. The participants in the victim perspective test group will see the situations from a first person perspective and the participants in the bystander perspective test group from the third-person perspective filmed from about 1 to 2 meters away. Involvement is created by asking the participant to take on the role of the person presented in the video, as suggested by Davies & Alonso-Quecuty (1997). The realization that a crime is taking place is also important for creating involvement. Because of that the participants in the involvement study will be informed after each of the videos that they suspect that the woman/women seen in the video took their phone. Adopting the role of the person presented in the video is assessed by whether or not the participant describes what they see in the singular first person.

It is important to analyze the involvement of the subject during the viewing of the situation to see if taking on the role of the person by instructed involvement causes differences in event descriptions and line-up decisions compared to not being involved in the situation. If people are more involved they tend to be better at remembering what they saw (Hosch & Cooper, 1982), therefore their line-up choices should also be more accurate.

In the current study the line-up decisions are gathered through both simultaneous and sequential line-ups, with the line-ups being either target-present or target-absent. Based on the line-up choices and the stated confidence of those decisions a confidence-accuracy analysis is also conducted to see if there is a relationship between confidence and accuracy.

Line-ups: simultaneous vs sequential

There are two main ways to present the line-ups to the participants: a simultaneous or a sequential line-up (Wells & Olson, 2003). For the simultaneous line-up all line-up members are shown at the same time and for the sequential line-up the members are presented one at a time. For the sequential line-up the witness needs to respond "yes" or "no" to every line-up member presented, so they have to make a decision without comparing the line-up members to each other (Wixted & Mickes, 2014). Line-ups are also either target-present or target-absent, which imitates real-life situations. In real life line-ups are either culprit-present or culprit-

absent. The suspect is always in the line-up, but the two line-up types differ in terms of whether the suspect is actually the culprit.

Simultaneous line-ups have been linked to relative judgements and sequential line-ups to absolute judgements (Weber & Brewer, 2004). Relative judgement means choosing the person that resembles the memory of the suspect the best out of the line-up members while knowing that the suspect may or may not be presented in the line-up. The line-up members are compared to each other and the person most similar to the memory of the suspect is chosen. For absolute judgements the similarity between a line-up member and the recollection of the suspect has to reach a certain threshold for an identification response to be made. To make a line-up choice each face is compared to the memory trace. (Wells, 1984)

There have been studies that have found sequential line-ups to be more accurate than simultaneous line-ups (Stebly et al., 2001; Clark et al., 2015; Van Hollen, 2009) and vice versa (Amendola & Wixted, 2015; Wixted et al., 2016; Wixted & Mickes, 2018). For the simultaneous line-up the witness may identify the person who looks the most like the perpetrator compared to the other people in the line-up (Van Hollen, 2009), therefore making a relative judgement. Steblay and colleagues (2001) found that the subjects in the simultaneous line-up condition made more correct and more false positive choices than the subjects in the sequential line-up condition. Thus, they were more likely to also choose an innocent person from a target-absent line-up. However, Wixted and Mickes (2014) proposed a theory that for the simultaneous line-up the witness might realize that all of the line-up members share features based on which the line-up was compiled. Therefore, for the simultaneous line-up the witness will not attach as much weight to those shared features as they would for the sequential line-up, making it easier to discriminate the culprit from the others in the line-up. Since there have been mixed results and both simultaneous and sequential line-ups are in use, it is important to research both line-ups.

I propose that there may be an interaction between the line-up type and the number of suspects in the videos. For the two perpetrator condition the subjects do not know which line-up is compiled for which perpetrator. However, if the subject is presented with simultaneous line-ups it should be easier to realize which person the line-up is compiled for by noticing shared features between the suspects, as proposed by Wixted and Mickes (2014). Therefore, it would also be easier to identify the suspect since it is less likely that the subject has to compare the face to the memory of both suspects. Thus, I propose that it is easier to make an accurate line-up decision in the two perpetrator condition when presented with simultaneous line-ups.

Confidence-Accuracy Characteristic

It is important to take into account the self-reported confidence for the identification decision. In brain imaging studies it is possible to discriminate between true and false memories when focusing exclusively on high-confidence of the subjects. Medial temporal lobe which is associated with recollection is linked to high-confidence true recognition and frontoparietal activity which is associated with familiarity to high-confidence false recognition (Kim & Cabeza, 2007). Therefore, recollection, i.e. remembering details, and familiarity stem from different parts of the brain. It has also been found that people are usually more confident in their recollections when compared to familiarity-based responses (Reinitz, Peria, Séguin & Loftus, 2011; Heathcote, Bora & Freeman, 2010) and that confidence in the line-up choice is somewhat of a good indicator of the accuracy of the identification (Clark et al., 2015; Wixted & Wells, 2017; Mickes, 2015). Clark and colleagues (2015), Wixted and Wells (2017) and Mickes (2015) all concluded that high confidence is a good indicator of accuracy, when the lineup is administered appropriately for the initial identification and the confidence is given immediately after the identification. Therefore, self-reported confidence can indicate how accurate the subject is and should be taken into account in eyewitness identification research.

One way to analyze the relationship between accuracy and confidence is by using Confidence-Accuracy Characteristic (CAC) analysis. CAC is used to analyze estimator variables that affect discriminability and the identification accuracy is plotted for each level of confidence (Mickes, 2015). The CAC analysis shows how the accuracy varies as confidence changes (Wixted & Wells, 2017). The accuracy is calculated by the outcomes of target-present and target-absent line-ups. For the target-present line-up there are three possible outcomes: correct suspect identification, foil identification and an incorrect rejection of the line-up. For the target-absent line-up there are also three possible outcomes: incorrect suspect identification, foil identification or a correct rejection of the line-up. Specific calculations for the CAC analysis are explained in the method. However it is important to note that other aspects, such as personal perceived objectivity, can affect the confidence rating, regardless of the accuracy of the identification (Geiselman et al., 2000). The main reason for using the CAC analysis in the current study is to see if there are differences between the role of the witness in the confidence-accuracy relationship.

Research questions

1. Does the perspective of the witness (bystander, victim) have an effect on the line-up decision accuracy?

2. Does the accuracy between the role of the witness (bystander, victim and involved victim) differ between the line-up types (sequential, simultaneous) and number of suspects presented in the videos?
3. How do the confidence-accuracy relationships differ between the types of the role of the witness (bystander, victim and involved victim)?

Hypotheses

1. The subjects in the one perpetrator condition are more accurate than the subjects in the two perpetrator condition.
2. The subjects presented with the simultaneous line-ups are more accurate in the two perpetrator condition when compared to subjects presented with sequential line-ups.
3. The subjects in the instructed involvement condition use first person form more in their descriptions of the event compared to the subjects in the victim condition.

METHOD

Design

This study uses a 3 (involvement: bystander, victim or involved victim perspective) x 2 (number of perpetrators: one or two) x 2 (line-up type: simultaneous or sequential) x 2 (presentation of the suspect in the line-up: target-present or target-absent) mixed design. The data used in the current study was collected in two studies: “Eye movements as markers of distinguishing seen and novel faces in identifying perpetrators” (main study) and “Eyewitness identification: Victims *versus* bystanders” (involvement study).

Main study

The main study consisted of three parts (videos, cut-outs, memory), however only the first part (videos) was relevant to this study. Thus, the second and third part are not described in the method section and were excluded from analyses, however they are presented in the appendices (Appendix A and B).

The first part of the main study was a 2 (involvement: bystander or victim perspective) x 2 (number of perpetrators: one or two) x 2 (line-up type: simultaneous or sequential) x 2 (presentation of the suspect in the line-up: target-present or target-absent) mixed design. Involvement, number of perpetrators and line-up type varied between subjects and the presentation of the suspect in the line-up within subjects.

Involvement study

The involvement study also consisted of the same three parts. In the involvement study the data was collected using a 1 (involvement: involved victim perspective) x 2 (number of

perpetrators: one or two) x 2 (line-up type: simultaneous or sequential) x 2 (presentation of the suspect in the line-up: target-present or target-absent) mixed design. Involvement, number of perpetrators and line-up type varied between subjects and the presentation of the suspect in the line-up within subjects. As in the main study, the subjects participated in all three parts of the study but only the results from the first part i.e. the videos were relevant to the current study.

Participants

A total of 828 subjects were gathered by convenience sampling. In the main study there were 668 participants (250 male, 418 female) and in the involvement study 160 (33 male, 127 female). 101 subjects in the involvement study were gathered by the author of this research paper. The participants in the two studies did not overlap. In the main study the subjects' age ranged from 18 to 54 years of age, with the average age of the subjects being 26.1 years. In the involvement study the subjects' age ranged from 18 to 50 years of age, with the average age being 24.6 years. Overall average age was 25.8 years.

Materials

Videos

The videos were the same in both studies and were filmed from two perspectives: the bystander perspective and the victim perspective. For the bystander perspective the videos were filmed so that both the victim and the perpetrator are visible on screen. For the victim perspective the videos were filmed so that only the perpetrator is visible and is presented facing the subject as if they are interacting. For the bystander perspective in the present study the participants view the situation from a distance of about 1 to 2 meters to prevent a decline in accuracy.

There were 20 videos based on five different scenarios where one or two women stole a phone from someone. Each scenario was filmed with one and two perpetrators and from both the bystander's and the victim's perspective. For each scenario, there were different people portraying the perpetrators, however the people remained the same in each scenario for both the bystander and the victim condition. For the two perpetrator condition one of the perpetrators was the same as in the same scenario for the one perpetrator condition. Videos were made in different places and the theft took place in different ways. In one of the five videos the theft did not take place even though there was a possibility for it. Each video was about 30 seconds long and the order of the videos varied between subjects.

Line-ups

For each target a line-up was compiled of 6 fillers, out of whom one substituted the perpetrator in the target-absent line-ups. For every target in the videos there were 720 simultaneous and 720 sequential target-present and target-absent line-ups, to cover every possible sequence of the photos. However, not all of them were used due to there being less subjects than line-up possibilities. For the simultaneous line-ups all 6 line-up members were presented to the subject at the same time with corresponding numbers from 1 to 6. For the sequential line-ups the line-up members were presented one at a time.

Photos of the women shown in the line-ups were taken by Canon EOS 70D and Canon EOS 6d cameras during the open doors day at the University of Tartu and the University of Tallinn. All of the women in the photos were wearing a black shirt and had their hair up. All of the photos were corrected for saturation, brightness and luminescence and shown with a light gray background. The size of the photos was 285x315 pixels.

Set-up

Both of the studies were conducted using a Dell Precision M6500 computer at the University of Tartu. The participants were shown videos, line-ups, instructions and questions from a 23" LG Flatron screen with a refresh rate of 60 Hz. During the study the computer's sound was at 60%. The study was conducted using a program called Tobii Studio and eye movements and pupil size were tracked by Tobii X120 Eye Tracker. However, the eye movements and pupil size are not relevant for this study.

Additional participants were gathered in the University of Tallinn laboratory. In the University of Tallinn the experiment was conducted using a Lenovo ThinkPad T470 Signature Edition laptop, which was connected to an HP EliteDisplay E232, 23", 60 Hz screen. An eye movement tracking device (Tobii Pro X3-120) was attached to the bottom edge of the screen, which enabled the eye movements to be tracked for the videos, photos and line-ups. The subject sat about 70 cm away from the device. Tobii Studio program was used during the study.

Procedure

Main study

Prior to taking part in the experiment, as much information as possible was divulged to the participants without revealing the purpose, research questions and hypotheses of the experiment. The purpose of viewing the video, research questions and hypotheses were kept secret, to not influence the participant's answers. The participants were asked to sign an informed consent form. They were also informed of the right to opt out of the study at any moment.

After the initial instructions the eye movement tracking technology was fixed to track the participants' eyes. Then the participant was asked to evaluate how good they are at recognizing faces, how well they are feeling and how capable they are to concentrate at the given moment.

The subjects were presented with five videos. After each video, either a sequential or a simultaneous line-up was presented to the participant. Since post-event information can influence the participants' memory (Christiaansen, Sweeney & Ochalek, 1983), descriptions and line-up choices were gathered without delay.

For the simultaneous line-up the participants were shown all of the line-up members together and had to make one choice, either to state the number of the person they chose or to say that the person is not in the line-up. For the sequential line-up the participants saw the line-up members one-by-one and had to make a choice after every photo whether or not the person presented to them is the person seen in the video. The participant was assured that the experimenter does not know whether or not the participant's choice is a correct one and that the correct decision will not be revealed to the subject. The person shown in the video appearing in and in which place in the line-up was systematically varied within subjects.

For the one perpetrator condition the subject was shown one line-up after the video and for the two perpetrator condition the subject was shown two line-ups after the video, therefore the subject had to make separate decisions for both of the people seen in the video. For the two perpetrator condition the participant had to also indicate which person they tried to identify in the line-up by describing one of the two people in the video. They could also state if they could not tell which line-up was for which person.

To make the line-up decision the participant needed to press a key on the keyboard and to say their decision out loud. The key needed to be pressed to measure the time it took to make the decision.

After making the line-up decision the participant was asked to evaluate how certain they were in their decision. The certainty of the decision was measured on a 0 to 100 scale where 0 meant that the participant knew that they made a wrong decision, 50 meant that the participant just guessed what could be correct and 100 meant that they were completely sure that they made the right decision.

In addition, the participant was asked if any of the people presented in the photos was someone that they knew. They were also asked to describe in their own words what happened in the video. The procedure was repeated five times. After seeing all of the five videos and the line-ups for those videos the subject was once again asked to evaluate how good they are at

recognizing faces, how well they are feeling and how capable they were to concentrate at the given time.

In addition there were two extra parts in the main study that were not relevant to the overall study. At the end of those two additional parts the subjects were presented with a short questionnaire about the study and their prior experience with line-ups. The purpose of the study was revealed to the subject and asked not to be disclosed to anyone.

Involvement study

The test subjects were invited to participate in the experiment under a slightly altered version of the name of the experiment. The name used was “The impact of inclusion on eye movements and cognitive processes.”

The procedure was almost identical to the main study, except for additional instructions before and after the videos, to create involvement. Before seeing each of the videos the participants were told that they will be seeing the video from the first-person perspective and were asked to take on the role of that person. After seeing the stimulus video the participant was first asked if the person they saw in the video was familiar to them, as in the main study. Then they were told: “You suspect that the woman/women seen in the video took your phone.” After that they were presented with the line-up as in the main study.

After taking part in the experiment the participants were given a short questionnaire and informed of the purpose of researching the role of the victim. The researcher and the participant also discussed thoughts and emotions that arose during the experiment. The purpose of informing the subject was to deal with any possible negative emotions that could have come forth during the study, if the subject decided to continue on despite those negative emotions. The participant was also asked to keep the purpose of the study a secret.

Statistical analyses

To investigate if bystanders were more accurate than victims and involved victims an independent samples T-test was used. The accuracy percentage was calculated for each subject by dividing the number of correct responses with the number of line-ups presented to the subject multiplied by 100. For the one perpetrator condition the accuracy formula was $(\text{correct responses} / 5) * 100$ and for two perpetrators $(\text{correct responses} / 10) * 100$. All subjects who were missing either one or more responses were excluded from the analysis ($N = 6$). All assumptions were met for the independent samples T-test. Since the presence of the suspect in the line-up varied within subjects, it was not accounted for in the average accuracy.

The differences in accuracy were compared between the role of the witness (bystander, victim, involved victim) by using a factorial analysis of variance, including the line-up type and the number of perpetrators seen in the videos. The role of the witness, line-up type (simultaneous, sequential) and the number of perpetrators (one, two) were all measured on nominal scale.

A chi-square test was used to see, if instructed involvement had an effect on the use of first person form. Assumptions were met for the chi-square test. Two variables were used: the use of first person form and victim *versus* involved victim condition. If the participant described what they saw in the singular first person, for example: "I was walking in a building." the participant was classified as using the first person form, as opposed to describing what they saw in third person form, for example: "The person was walking in a building." First person form was divided into three categories: used for every video, used for some of the videos and did not use first person form. The use of first person form was compared between victims and involved victims.

A Confidence-Accuracy Characteristic analysis (CAC) was used for two reasons: first to describe the confidence-accuracy relationship and second to compare the accuracy between the roles of the witness for different levels of confidence. For the Confidence-Accuracy Characteristic analysis the average percentage of correct decisions was calculated for each subject. For choosers the formula was $(\text{correct selections} / \text{target-absent replacement selections}) * 100$. For non-choosers the formula was $(\text{correct rejections} / \text{incorrect rejections}) * 100$. The mentioned formulas have been found to be the most straightforward way to analyze the confidence-accuracy relationship (Wixted & Wells, 2017), since in real life there is one suspect in the line-up. However, the suspect in real life might be the perpetrator as in the correct selection for the target-present line-ups or the suspect can be innocent as in the target-absent replacement selection. Therefore, a filler selection is not relevant for real life situations. The accuracy was plotted for 5 levels of confidence: 0% to 20%, 21% to 40%, 41% to 60%, 61% to 80% and 81% to 100%. In previous research, some have opted for grouping together the lower end of the confidence, for example 0-60% (Mickes, 2015; Nyman et al., 2019), however the confidence has also been divided more evenly (Wixted & Wells, 2017) which was also the chosen method in the current study.

Ethical aspects

The Research Ethics Committee of the University of Tartu approved both the main study (276/M-17) and the involvement study (291/T-7) prior to conducting the research.

Gathered data was saved and analyzed in a non-personalized manner, based on assigned codes. Each participant's code was marked on the informed consent form. The consent forms were kept in a locked cabinet in the Psychology Institute of the University of Tartu. The consent forms were not accessible to unauthorized people. All materials, based on which the identification of the participants would be possible, will be destroyed at the end of the research. The coded data was analyzed in the researchers' computers.

RESULTS

Descriptive statistics

2 subjects from the involvement study and 4 from the main study were excluded from the analysis, based on having either one or more answers missing. There were 158 subjects in the involvement study with an average accuracy of about 48.5% ($SD = 21.44$) and 664 subjects in the main study with a similar average accuracy of about 48.4% ($SD = 22.30$). The overall accuracy was 48.5% ($SD = 22.12$).

Bystanders versus victims

An independent samples T-test was done to compare accuracy percentages of subjects in the bystander condition with subjects in the victim and involved victim condition. The results showed that subjects in the bystander condition ($M = 44.92$, $SD = 21.56$) were significantly less accurate than subjects in the victim conditions ($M = 50.88$, $SD = 22.20$) ($t(820) = 3.819$, $p < 0.001$).

Bystanders, victims and involved victims

A factorial ANOVA was used to explore the effects of the role of the witness, line-up types and the number of suspects presented in the videos on line-up decision accuracy. The design of the between groups ANOVA was 3 (role of the witness: bystander, victim, involved victim) x 2 (line-up type: simultaneous or sequential) x 2 (number of suspects: one or two). The dependent variable was decision accuracy. The role of the witness had an effect on line-up decision accuracy ($F(2, 810) = 9.105$; $p < 0.001$; $\eta^2 = 0.020$). Post hoc comparisons using Tukey's test indicated that there was a significant difference in overall accuracy between the victim and the bystander conditions ($p < 0.001$) with victims being more accurate than bystanders. However, there was not a significant difference between involved victim and victim ($p = 0.203$) or involved victim and bystander ($p = 0.199$) conditions.

The number of suspects shown in the videos also had a significant effect on accuracy ($F(1, 810) = 62.784$; $p < 0.001$; $\eta^2 = 0.070$), with subjects in the one suspect condition being about 12.4% more accurate. However, line-up type did not have a significant effect on accuracy

($F(1, 810) = 0.002$; $p = 0.961$; $\eta^2 < 0.001$). Means and standard deviations of the accuracy between the role of the witness, including the line-up type and the number of perpetrators are presented in table 1.

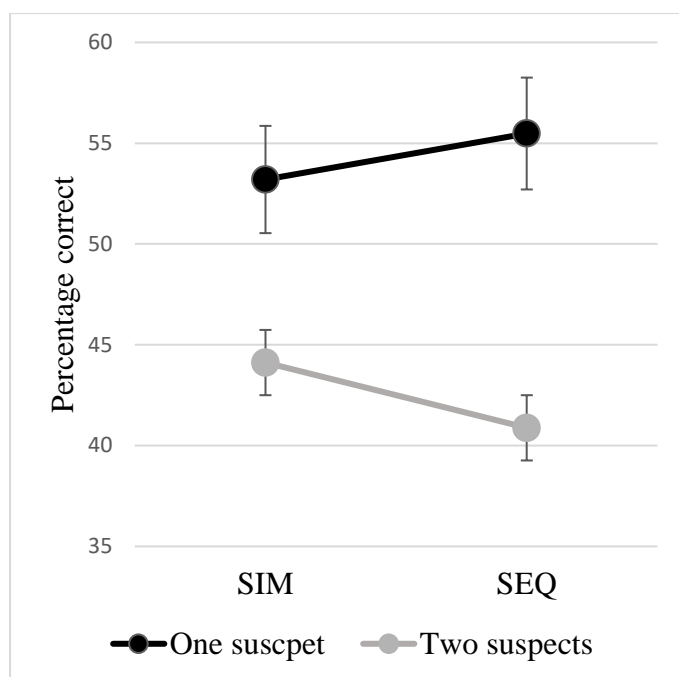
Table 1

Line-up decision accuracy for the role of the witness including line-up type and the number of suspects presented in the videos

Role of the witness	Line-up type	Number of suspects	<i>M</i>	<i>SD</i>	<i>N</i>
Involved victim	Sequential	1	60.00	21.24	40
		2	38.68	17.27	38
Victim		1	57.14	25.82	84
		2	44.46	15.32	83
Bystander		1	51.67	27.20	84
		2	38.31	16.29	83
Involved victim	Simultaneous	1	52.00	23.88	40
		2	43.00	16.52	40
Victim		1	59.52	23.84	84
		2	46.50	19.88	80
Bystander		1	47.32	23.20	82
		2	42.38	16.84	84

Note. M – mean; SD – standard deviation; N – number of subjects

There was also a significant interaction between line-up type and the number of suspects presented in the video ($F(1, 810) = 4.728$; $p = 0.03$; $\eta^2 = 0.005$). Overall, the subjects in the one suspect group were more correct in their line-up decisions. However, in the one suspect group, the subjects were less accurate in the simultaneous line-up type compared to the sequential line-up, and vice versa for the two suspects group. Other interactions were not statistically significant. Results are presented in Figure 1. All of the interactions and main effects are presented in Table 2.

**Figure 1**

Interaction between line-up type and the number of suspects in the video

Table 2

Between groups ANOVA main effects and interactions of the role of the witness (bystander, victim, involved victim), line-up types (simultaneous, sequential) and the number of suspects presented in the video (one or two) with the dependent variable decision accuracy

	Sum of squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	η^2
LT	1.056	1	1.056	0.002	0.961	2.631e.6
RW	8100.922	2	4050.461	9.105	< .001	0.020
nS	27930.493	1	27930.493	62.784	< .001	0.070
LT*RW	492.992	2	246.496	0.554	0.575	0.001
LT*nS	2103.551	1	2103.551	4.728	0.030	0.005
RW*nS	1123.994	2	561.997	1.263	0.283	0.003
LT*RW*nS	1339.588	2	669.794	1.506	0.223	0.003
Residuals	360344.139	810	444.869			

*Note. LT – lineup type; RW – role of the witness (bystander, victim, involved victim); nS – number of suspects (1, 2). *df* – degrees of freedom, *F* – *F* value, *p* – significance, η^2 – eta squared.*

Confidence-Accuracy Characteristic analysis

CAC analysis was used to explore if there is a difference between the role of the witness in line-up decision accuracy for the same confidence ratings. The confidence ratings in the experiment were measured on a 0 to 100 scale, however for the CAC the confidence was divided into five categories: 0-20, 21-40, 41-60, 61-80 and 81-100. For the CAC analysis the correct suspect choice and the replacement choice are used for choosers and the correct line-up rejection and the incorrect rejection are used for non-choosers.

For choosers, the accuracy for each level of confidence was calculated by dividing all correct selections with the sum of correct selections and target-absent replacement selections and multiplied by 100%. As shown in Figure 2 and Table 4, for each level of confidence the accuracy was similar between the role of the witness for choosers. The lower end of confidence varied more between the role of the witness. However, there was a steady rise in accuracy from the 41-60 level of confidence forward. Therefore, the higher the confidence, the more accurate the subjects also were.

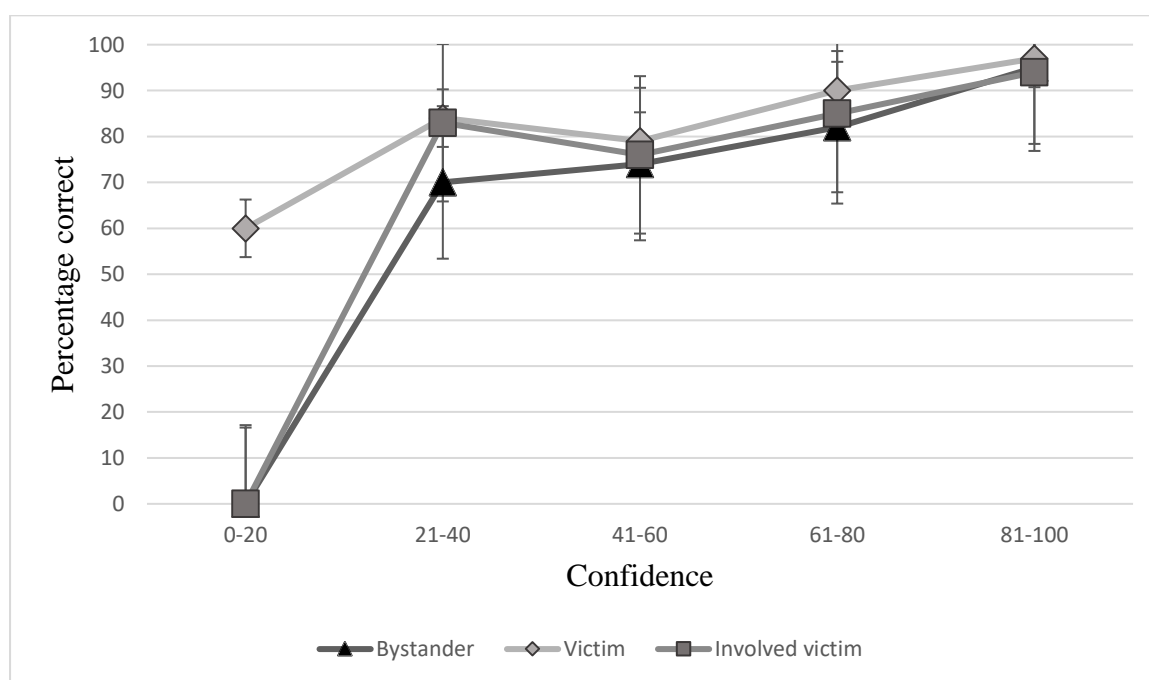


Figure 2

CAC results between the role of the witness for choosers

Table 4

Percentage of correct answers for each level of confidence for choosers

	Confidence				
	0-20	21-40	41-60	61-80	81-100
Bystander	0%	70%	74%	82%	95%
Victim	60%	84%	79%	90%	97%
Involved victim	0%	83%	76%	85%	94%

For non-choosers the accuracy for each level of confidence was calculated by dividing all correct line-up rejections with the sum of correct and incorrect rejections and multiplied by 100%. For each level of confidence the accuracy was also similar between the role of the witness as shown in Figure 3 and Table 5. For non-choosers the accuracy varied less than for choosers, with the average incline from the lowest to the highest confidence being about 13.3%. Therefore, for non-choosers the confidence score is less of an indicator of accuracy than for choosers.

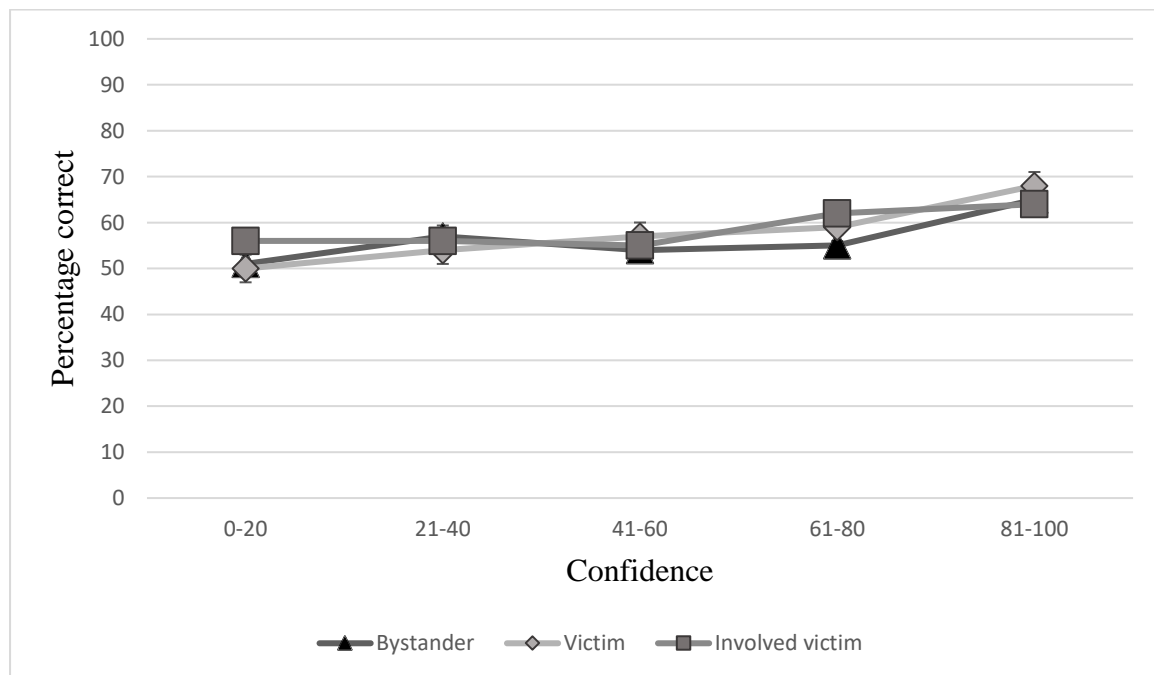


Figure 3

CAC results between the types of the role of the witness for non-choosers

Table 5*Percentage of correct answers for each level of confidence for non-choosers*

	Confidence				
	0-20	21-40	41-60	61-80	81-100
Bystander	51%	57%	54%	55%	65%
Victim	50%	54%	57%	59%	68%
Involved victim	56%	56%	55%	62%	64%

Instructed involvement

A chi-square test was used to explore if instructed involvement has an effect on the use of either first person or third person forms in the descriptions of the event. The use of first person form was divided into three categories: used for every video, used for 1 to 4 videos and did not use first person form. The test showed that instructed involvement did have an effect on the use of first person form in the descriptions of the event ($\chi^2(2) = 230.667, p < 0.001$). Nearly half of the subjects in the involved victim condition used first person form after every video, however only 2.4% did so in the victim condition. The use of the first person form is presented in the table below (table 3), showing the number of subjects and their respective overall percentage within the types of the role of the witness.

Table 3*The use of first person form (FPF) in descriptions of the event*

	Used FPF for every video	Used FPF for 1 to 4 videos	Did not use FPF
Involved victim	77 (48.7%)	35 (22.2%)	46 (29.1%)
Victim	8 (2.4%)	13 (3.9%)	312 (93.7%)

DISCUSSION

The main purpose of the research was to study how the role of the witness affects eyewitness identification accuracy. Additionally, to understand how the number of perpetrators and line-up type affect identification accuracy as well as how instructed involvement and confidence relate to eyewitness identification in mock-crime situations. All findings are discussed in their respective sections.

Accuracy between victims, involved victims and bystanders

As in previous research, bystanders and victims differed in their accuracy (Kassin, 1984; Hosch & Cooper, 1982), however there were no significant differences in accuracy when compared to involved victims. Like in Hosch and Cooper's (1982) study, the victims in the current experiment were more accurate than bystanders. It is possible, that the victims were more accurate since the targets in the victim perspective faced towards the subject. Therefore, the victims had the possibility to see the people from a similar angle in the line-up photos when compared to seeing them in the videos.

The current study focused on the theft of a person's phone, where it was possible that the subject did not realize that a theft took place. Only the involved victim condition was specifically told that a theft occurred. It is possible, that instructed involvement or an aspect caused by it lowered identification accuracy for the involved victim condition. That would explain, why there is a difference between bystanders and victims, but not when compared to the involved victim. Tracking the participants' eye movements would most likely reveal important information about how bystanders, victims and involved victims differ in what they view and for how long, which can be addressed in the main study. That would reveal if, for example, there are differences between what the victims and involved victims view. Due to that, future research should focus on analyzing how realizing that a crime is taking place in mock-crime videos influences the subjects line-up decisions.

The lack of difference from the involved victim condition in accuracy can be explained through previous research in involvement. For the involved victim condition it is possible that they experienced more emotions than the subjects in the victim condition which could have affected their accuracy. Previous research has found that people personally involved in the situation remember their feelings more than facts about the situation (Davies & Alonso-Quecuty, 1997). Therefore, if the subjects in the involved victim condition were affected in that way, their accuracy would most likely decrease. That would explain why the involved victim condition was not discernible from the bystander and the victim conditions.

Considering the fact that instructed involvement did not affect line-up decision accuracy, it is unclear how useful instructed involvement is in eyewitness identification research. It is possible, that mock-crime videos create a distance from the event making it harder to feel involved in it and therefore making it more difficult to relate to the perspective. In previous research bystanders and victims have been found to differ in accuracy (Kassin, 1984; Hosch & Cooper, 1982). However, it is unclear how victims in live situations differ from victims in mock-crime experiments and if the involved victim condition is more like the bystander or the victim condition when it comes to accuracy. Future research should focus on

proving if creating involvement is necessary for line-up decision accuracy to be like in real-life situations.

Number of perpetrators

As in previous research (Clifford and Hollin, 1981; Megreya and Bindemann, 2012), the number of perpetrators shown in the videos had an effect on line-up decision accuracy. Subjects who saw only one person were significantly more accurate than subjects who saw two people in the video. Since the subjects that saw two perpetrators had to divide their attention between two people but viewed the situation for as long as the subjects in the one perpetrator group, they had less time to focus on each perpetrator. That would explain, in line with previous research (Megreya and Bindemann, 2012) why the subjects in the two perpetrator group are less accurate, since they most likely had double-perpetrator disadvantage.

Line-up type

Line-up type on its own did not have a significant effect, however it did have a significant interaction with the number of perpetrators shown in the videos. Previous research has found mixed results for the benefits of both line-up types (Stebly et al., 2001; Clark et al., 2015; Van Hollen, 2009; Amendola & Wixted, 2015; Wixted et al., 2016; Wixted & Mickes, 2018) and there was not a clear benefit to either of the line-up types in the current research. It could be that there was not a distinguishable difference, because the line-up types were actually similar in their accuracy. There could be additional factors that influence whether or not the subjects are more accurate for each line-up type, like for example in the current research the number of perpetrators presented in the videos.

It is noteworthy that the sequential line-up type yielded more accurate results for one perpetrator and simultaneous for two perpetrators. Wixted and Mickes (2014) suggested that for the simultaneous line-up the subject could realize that there are features on which the line-up was compiled. Due to that, like I proposed, it could also be that in the two perpetrator condition, it is easier to realize who the line-up was compiled for, since the subjects are not told which of the two people they are identifying. Realizing who they are identifying could be more difficult for the sequential line-up, since the similar features of all line-up members are not visible to the subjects at the same time. Therefore, future research could focus on better understanding if the subjects in the simultaneous line-up type realize who the line-up is compiled for in multiple perpetrator mock crimes better than the subjects presented with sequential line-ups.

Since line-up type and the number of perpetrators had a significant interaction, future research could also focus on analyzing how the number of perpetrators influences different

line-up type accuracy. Also, future research could focus on what implications these results have on real life situations of crimes where there is a single perpetrator or multiple perpetrators.

CAC analysis

The CAC analysis did not indicate differences in the confidence-accuracy relationship between the bystander, victim and involved victim conditions. The lower end of the Confidence-Accuracy Characteristic is found to vary more than the higher end (Wixted & Wells, 2017) which is also visible in the figure for choosers in the CAC analysis (Figure 1).

For choosers the accuracy varied between 0 and 97%, with choosers being between 94 and 97% accurate for the highest level of confidence. For non-choosers the accuracy varied between 50 and 68%. Therefore, confidence for the choosers was a good indicator of accuracy, like found in previous research (Clark et al., 2015; Wixted & Wells, 2017; Mickes, 2015). However, the confidence for non-choosers did not indicate accuracy as well as for choosers. Therefore, it is somewhat likely for a non-chooser to not choose the suspect when they are actually in the line-up even if the subject is highly confident in their line-up rejection.

Instructed involvement

Instructed involvement did have a significant effect on the use of first person form in descriptions. The subjects in the involved victim condition had explicit instructions to take on the role of the victim, thus it was expected that they would use the first person form significantly more than victims. By doing so, the subjects in the involved victim condition were more alike actual victims who most likely describe what they experience in first person form. Therefore, instructed involvement improves the laboratory conditions in which eyewitness identification is researched and makes bystanders and victims more comparable to real life situations.

In the victim condition the participants saw the hands and the body of the first person as if it was them themselves moving in the situations, which could be why they sometimes used the first person form as well but not as much as the subjects in the involved victim condition. Since most subjects in the victim condition did not use first person form, it would be beneficial for future researchers to adopt a form of instructed involvement. However, since the hands and the body of the first person in the video portrayed the characteristics of a man, it could be that women have more difficulty taking on the role of the first person. Future research should focus on if the gender of the first person influences involvement in laboratory situations.

Since instructed involvement influenced first person form but not line-up decision accuracy, future research should also focus on better understanding creating involvement in eyewitness identification. In the current study the subjects in the victim and involved victim

conditions were similar in identification accuracy. Thus, future research could focus on analyzing instructed involvement or finding new and better ways of creating involvement for victims in laboratory situations using mock-crime videos. For example, using short stories so that the subject would relate better to what they see in the videos. Future research should also work on proving if instructed involvement is a useful tool for gathering descriptions of events from victims in laboratory situations.

Limitations

In the current study emotionality was not analyzed. The participants were asked in free form at the end of the study if any emotions arose and what those emotions were, however, in the current research those answers were not coded and analyzed. Another limitation with emotionality is that for mock-crime videos, it is more difficult to create the same kind of stress and emotionality as in live situations and real life event. Future research should focus on if it is possible to create similar emotionality for mock-crime videos as in live situations. For that it is important to find how emotionality influences subjects in live situations and what causes the emotionality, so that it could possibly be replicated in studies with mock-crime videos. Since emotionality can influence memory (Hoscheidt et al., 2014; Shields et al., 2017) and also eyewitness identification accuracy (Deffenbacher et al., 2004), it would be beneficial to find out how emotionality influences bystanders and victims in eyewitness identification research when using mock-crime videos.

The subjects in the study did not see anything being taken, however the actor in the video acted as if they were searching for something – checking their pockets etc. That could have also influenced the results in the study, since some participants in both the victim and bystander conditions might not have realized that a theft was taking place. The subjects in the involved victim condition were told that they have the suspicion that their phone was taken, however the bystanders and victims were not told that about the theft. Therefore, bystanders and victims might have viewed and experienced the experiment differently than involved victims, since it was less obvious that a theft took place. That could have also influenced what the pay attention to, their emotionality and their memory of the event.

Conclusion

The current study assessed the effects of the role of the witness on eyewitness identification and creating involvement for subjects viewing mock-crime videos. As found in the study, instructed involvement can influence the subjects' descriptions to be more alike the descriptions of victims in real life situations using first person form. However, the accuracy for line-up decisions did not differ when the involved victim group was compared to bystanders

and victims. Therefore, future research should focus on better understanding involvement in laboratory situations assessing eyewitness identification.

In line with previous studies, when the number of perpetrators seen increased, identification accuracy decreased, providing proof for the double-perpetrator disadvantage. In addition, the line-up type had a significant interaction with the number of perpetrators presented. Therefore, in real life situations when the number of perpetrators differs, it could also be beneficial to consider different line-up types. However, future research should provide proof to if a certain line-up type is better for multiple perpetrators.

Finally, the confidence for choosers is quite a good indicator of accuracy. Thus, in real life situations it is likely that when a suspect is chosen with high confidence, the suspect actually is the culprit. Nevertheless, it would be beneficial to further research the aspects mentioned above to analyze different factors that might influence the results and to provide evidence for the results in the current study.

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APPENDICES

Appendix A: Part two - Cut-outs

The second part of the experiment was analogous with the first part, only instead of the videos the participants saw cut-outs of the suspects from the videos. Only the face and upper body of the suspect was shown, not the whole image from the video. Each cut-out was on screen for six seconds after which the subjects saw the same exact line-ups as in the first part of the study and had to make the line-up decisions in the same way.

Appendix B: Part three - Memory

In the third part of the experiment there was a study phase where the subjects were presented with 8 sets of 4 novel photos one by one. All of the photos were of women just as in the first and second parts, however the subject had not been presented with these women in the study thus far. There were two types of sets. One where the subject had to choose out of five possibilities if the women they were presented with work as or study to become a dentist, a teacher, a genetic technologist, an actress or a lawyer which was deep processing. The other type was where the subject had to choose if the women in the current set are the first, second, third or fourth shown which was shallow processing. The two types of sets alternated with there being four of each. Each photo was shown for 3 seconds after which the choices appeared on the computer screen. Once the subject made a decision by clicking the answer the next photo appeared in the set. Before each set the subjects were presented with the instruction of what to do in each set.

After the subjects had seen all 8 sets of photos, 32 photos in total, they were presented with 64 photos one by one where they had to make the decision if they had seen the photo in the study phase or not for each photo. That was the test phase. The added 32 photos had not been presented to the subject in any part of the study before. Therefore, half of the photos they had just seen and half they had not. The subjects could now look at each of the photos as long as they wanted to. The subjects indicated whether or not they had seen the photo by choosing either the left or right mouse button. After they had made their choice with a click two options appeared on screen: know and remember. Know represented the knowledge that they had or had not seen the photo. Remember represented that they both know and also have the mental image of having seen the photo before. After the subjects had seen all 64 photos they were asked if any of the people shown were familiar to them from outside of the experiment.

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