Differential Effects of Confirming Post-Identification Feedback on Eyewitness Testimony-Relevant Judgments

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Table of Contents

Abstract

Many studies have found that while the majority of eyewitnesses' testimony-relevant judgments (e.g., certainty, attention, view) were vulnerable to the confirming post-identification feedback effect, time-in-view and distance judgments appeared to be immune to this effect (see meta-analysis by Steblay, Wells, & Douglass, 2014). To date, there has not been any explanation as to why these two judgments were not affected by confirming feedback while the rest of the judgments were. The main aim of this thesis was to investigate this issue.

Experiments 1 and 2 tested two possible reasons for these differential feedback effects. First, time-in-view and distance judgments might be protected from the influence of confirming feedback due to strong internal cues (i.e., the accessibility hypothesis). Second, confirming feedback might only be useful for informing judgments that focus on the target person's face or the identification decision (e.g., certainty, attention, view), and hence irrelevant to estimations of actual time and distance. Two variables were manipulated between-participants: feedback type (confirming feedback, confirming-specific feedback, no feedback) and retention interval (immediate, delay between viewing an event and making judgments). The confirming-specific feedback was made relevant to the judgments by pairing confirming feedback alongside specific information associating time and distance with a correct identification decision. This feedback was found to affect time-in-view (Experiments 1 and 2) and distance judgments (Experiment 2) in the immediate condition, while confirming feedback by itself did not affect these judgments even in the delay conditions when internal cues were weaker. These results suggested that weak internal cues alone were not enough for judgments to be

affected by feedback; the relevance of feedback information to the judgments also played an important role in determining whether or not judgments would be affected.

Experiment 3 further investigated the effects of confirming-specific feedback on time-in-view and distance judgments by modifying the wording of the specific feedback. The results indicated that confirming-specific feedback affected time-in-view and distance judgments in Experiments 1 and 2 because the specific feedback provided a reference point for these two judgments. When this reference point was removed in Experiment 3, the specific feedback (that associated viewing time and distance with a correct identification) no longer affected time-in-view and distance judgments. These results suggested that people might not infer their viewing time and distance from a correct identification decision.

Factor analysis was then conducted to investigate the factor structure of testimony-relevant judgments and found that time-in-view and distance judgments fell into a factor independent from the rest of the factors that were related to the identification process. Findings from basic research on time and distance estimations were then reviewed, with these suggesting that eyewitnesses' sources of internal cues for making time-in-view and distance judgments might be different than those of other judgments. Finally, the thesis also investigated the relative accuracy of witnesses' time-in-view and distance judgments. This research made a contribution to the development of the current theoretical framework of the post-identification feedback effects and the practical use of time-in-view and distance judgments in the legal system.

Declaration

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CHAPTER 1: Introduction

This chapter starts by providing introductory information on eyewitness identification evidence, the problem of mistaken identification, and the criteria that are used in courts to assess the reliability of an eyewitness identification (Section 1.1). It highlights that the validity of these criteria has been questioned in the literature, specifically because eyewitnesses' responses to these criteria (known as testimony-relevant judgments) have been found to be influenced by post-identification feedback (Section 1.2). However, there are two testimony-relevant judgments (i.e., time-in-view and distance) that have consistently been found to be unaffected by post-identification feedback effects (Section 1.3). The purpose of this research was to investigate why feedback has such a powerful influence on some testimony-relevant judgments, yet has little impact on these two judgments.

1.1 Eyewitness Identification

In many criminal investigations where there is no trace of physical evidence left at the crime scene (e.g., DNA or fingerprints of the criminal), eyewitnesses may be the only source of evidence available. In such cases they become important in the criminal investigation process. Even when there is trace evidence, the eyewitness is the one who puts the physical evidence into perspective, reporting on how it got there and what the actions of the people involved actually were. When obtaining information about the identity of the perpetrator, eyewitnesses are often shown a photo lineup and asked to identify the perpetrator from the lineup. If eyewitnesses make a positive identification of the suspect (and especially if the person identified is a police suspect), the chances of prosecution increase substantially (Brewer, Weber, & Semmler, 2005). In fact, in the United States alone, every year 77,000 individuals become criminal defendants based on eyewitness identifications (Scheck, Neufeld, & Dwyer, 2003).

However, despite eyewitnesses' best intentions to assist police, their memory is prone to error. Mistaken identifications often occur and they have been found to be the primary cause of wrongful convictions (see Lindsay, Ross, Read, & Toglia, 2007; Wells et al., 1998). For instance, post-conviction DNA testing revealed that mistaken identification occurred in 72% of DNA exoneration cases in the United States (see innocenceproject.org for an up-to-date count of these cases). In response to this, courts around the world have developed a set of criteria to assess the reliability of eyewitness identification evidence. These criteria are used in the United States, United Kingdom, and Australia, and are discussed below.

1.1.1 In the United States

The U. S. Supreme Court suggested a two pronged approach (*Manson v. Braithwaite,* 1977) to assess the reliability of an eyewitness identification. The first involves inquiring as to whether the identification procedure was unnecessarily suggestive. Suggestive procedures include lineups that contain a suspect that stood out, biased instructions where the eyewitness was not informed that the criminal might not be in the lineup, showing a photo of a suspect to the eyewitness prior to the lineup procedure, or giving feedback to the eyewitness about his or her identification performance. If the identification procedure was suggestive, the second prong of the approach would be implemented[1] to decide whether the identification was nevertheless reliable. Its reliability would be assessed through five criteria ruled by the U. S. Supreme Court in *Neil v. Biggers* (1972; also known as the *Biggers*

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[1] If the lineup was not unnecessarily suggestive, the second prong approach would not be pursued and the identification evidence should not be excluded.

criteria). The first of these criteria is the extent to which the eyewitness was certain regarding the accuracy of their identification (certainty). The second criterion is whether the eyewitness had a good opportunity to view the criminal (view); and this is often determined by the duration of view (time-in-view; Marsh & Greenberg, 2006). The third criterion is whether the eyewitness had paid sufficient attention to the criminal when the crime occurred (attention).[2] The fourth criterion is whether the amount of time between witnessing the crime and making an identification was reasonable. Finally, the fifth criterion is whether the eyewitness's description of the criminal matched with the appearance of the defendant. These criteria have been adopted in most lower courts in the United States since 1972 (Wells & Murray, 1983). Essentially, an identification is deemed reliable and should not be excluded if eyewitnesses' testimony-relevant judgments (their responses to these criteria) were convincing (e.g., certainty was high, view was good, etc.). Studies have also found that judges and jurors were more likely to convict the person identified by the eyewitness if his or her testimony-relevant judgments were convincing (e.g., Bradfield & Wells, 2000).

Recently, a report issued by the National Academies in the United States has recommended guidelines for strengthening the value of eyewitness identification evidence (Committee on the Scientific Approaches to Understanding and Maximizing the Validity of Eyewitness Identification in Law Enforcement and the Courts, 2014). For example, it is recommended that a judge should make basic enquiries about the manner in which the identification evidence was gathered and the procedure that was used. More specifically, inquiries should be made regarding prior lineups, the instructions that were used to conduct the lineup, the witness's

[2] These keywords (i.e., certainty, view, time-in-view, attention, etc.) will be used in later sections to refer to these questions.

confidence report at the time of the identification, the recordings of the identification procedure when available, and whether a double-blind lineup procedure was used. The report also recommended that the presentation of evidence in court is accompanied by scientific expert testimony on eyewitness memory and identification. These recommendations may change the assessment of eyewitness identification evidence. However, although these recommendations have not been adopted, it is expected that they will make a large difference to the rate of wrongful convictions.

1.1.2 In the United Kingdom

In the United Kingdom, the Court of Appeal set down a similar set of criteria to decide whether an eyewitness identification was reliable (*R v. Turnbull and Others,* 1976): (a) whether the eyewitness had a reasonable time to view the criminal when the crime occurred (time-in-view); (b) whether the criminal was viewed from a reasonable distance from the eyewitness (distance); (c) whether the criminal was viewed under reasonable lighting conditions (view); (d) whether there was any obstruction that occurred during viewing, and whether the eyewitness had seen the criminal before; (e) whether there was any particular reason for the eyewitness to remember the criminal; (f) whether the amount of time between witnessing the crime and making an identification was reasonable; and (g) whether the eyewitness's description of the criminal matches the appearance of the defendant. These criteria are subsequently known as the Turnbull Guidelines (*R v. Turnbull and Others,* 1976).

1.1.3 In Australia

In Australia, there are no definitive authority guidelines with regards to assessing the reliability of eyewitness identification evidence (Semmler, Brewer, &

Douglass, 2011). However, in *Domican v. The Queen* (1992) the court elaborated on a few criteria, which has since become the most often cited ruling for the admissibility of eyewitness identification evidence (Semmler et al.). These include: (a) whether the eyewitness had previously seen or known the defendant, (b) whether the eyewitness had a clear view of the criminal when the crime occurred (view), (c) whether the amount of time between witnessing the crime and making an identification was reasonable, (d) whether the circumstances and the nature of the first identification was untainted, (e) whether the criminal was viewed from a reasonable distance from the eyewitness (distance), and (f) whether the eyewitness had a reasonable time to view the criminal when the crime occurred (time-in-view).

On the whole, the *Biggers'* (United States), *Turnbull's* (United Kingdom), and *Domican's* (Australia) criteria overlap with one another and address similar issues. However, as illustrated in the next section below, the validity of some of these criteria has been questioned in the literature, as it has been found that eyewitnesses' responses to the majority of these criteria can be easily distorted by the presence of confirming post-identification feedback (e.g., Wells & Bradfield, 1998, 1999).

1.2 The Malleability of Eyewitness Testimony-Relevant Judgments to Post-Identification Feedback

It is common practice among police officers to give eyewitnesses feedback that confirms that they have made the correct choice (Garrioch & Brimacombe, 2001; Skagerberg & Wright, 2008; Wells & Quinlivan, 2009). Such feedback has been known to influence the certainty of the witnesses' identification decisions. In a similar case before the District Court of New South Wales (*R v. Bakir*, 2009), an eyewitness made an identification through narrowing her choice to two photographs.

Although she was initially uncertain as to which of these two photographs was the gunman, she became certain that one of the photographs was definitely the guy after being told that the other photo was a filler (i.e., not a suspect, nor a person of interest to police). It was clear in this case that the witness would have inferred that that photograph must have been the person the police was after, since she was told that the other photograph was not a suspect. This information had inflated her certainty regarding her identification decision. Similar cases have been reported in both the United States (Wells, 1993) and the United Kingdom (Skagerberg, 2007; Skagerberg & Wright, 2009), with various types of feedback being provided to witnesses.

Feedback that confirms that a witness's identification decision was correct has been found to affect the witness's subsequent testimony-relevant judgments. The broad effects of post-identification feedback were first demonstrated in Wells and Bradfield's (1998) seminal paper. They found that when participant-eyewitnesses who made incorrect identification decisions[3] were given confirming feedback (e.g., "Good, you identified the actual suspect"), this feedback increased their identification confidence and willingness to testify in court, resulted in them reporting that identifying the target person from a lineup was an easy task that took almost no time, that they had a good basis to make an identification, paid attention to the target person's face when the crime occurred, and had a good view and a clear image of the target person in their memory. Since then, numerous studies have replicated these effects (e.g., Bradfield, Wells, & Olson, 2002; Charman & Wells, 2008; Neuschatz et al., 2007; Semmler & Brewer, 2006; Semmler, Brewer, & Wells, 2004; Wells & Bradfield, 1998; 1999; Wells, Olson, & Charman, 2003; see meta-analyses by Douglass & Steblay, 2006; Steblay, Wells, & Douglass, 2014).

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[3] Incorrect identifications were obtained from a target-absent lineup where the actual target person was removed from the lineup.

The post-identification feedback effects have also been found to generalise across different study conditions: under target-present (Semmler et al., 2004) and sequential lineups (Douglass & McQuiston-Surrett, 2006), when delay was introduced between receiving feedback and answering testimony-relevant questions (Neuschatz et al., 2005; Wells et al., 2003), when eyewitnesses were asked to make voice (instead of person) identifications (Quinlivan et al., 2009), when eyewitnesses were children (Hafstad, Memon, & Logie, 2004), when eyewitnesses were elderly (Neuschatz et al., 2005), when the feedback was administered by a non-authoritative figure such as a naive co-witness (Skagerberg, 2007), and when eyewitnesses received unbiased instructions during the identification or were made aware that the target person may not be present in the lineup (Semmler et al., 2004). Furthermore, the effects have been shown to occur in actual eyewitness cases (Wright & Skagerberg, 2007) and in those (non-eyewitnesses) who observed an actual eyewitness making an identification under the influence of feedback (Douglass, Neuschatz, Imrich, & Wilkinson, 2010). Taken together, these results suggest that eyewitnesses may provide seemingly reliable testimony-relevant judgments based on confirming feedback alone. This could be a problem as it is extremely difficult to minimise the impact of distorted testimony-relevant judgments even when it is apparent that they may be unreliable (see Semmler et al., 2011, for a review).

However, it is noteworthy that findings from the post-identification feedback studies have consistently shown that confirming feedback does not affect two particular judgments, namely time-in-view and distance (see meta-analysis by Steblay et al., 2014). Researchers have acknowledged these differential post-identification feedback effects, and Douglass and Steblay (2006) have labelled them as *objective judgments*, as further described below.

1.3 The Differential Effects of Post-Identification Feedback on Testimony-Relevant Judgements

The majority of testimony-relevant judgments are subjective. Douglass, Brewer, and Semmler (2010) defined *subjective judgments* as judgments that do not have correct answers (i.e., eyewitnesses' judgments regarding their certainty, attention, view, etc.). On the other hand, *objective judgments* are those judgments that do have correct answers. There are three judgments under this category: (a) time-in-view (i.e., estimation of time that the target person was in view), (b) distance (i.e., estimation of distance between the eyewitness and the target person), and (c) identification-time (i.e., the time taken to make an identification decision at the lineup). A recent meta-analysis indicated that the identification-time judgment was the only objective judgment that is affected by confirming feedback (Steblay et al., 2014). To date, there has not been any explanation why time-in-view and distance judgments are the only two judgments that are unaffected by confirming feedback.

In the only study examining this issue, Douglass, Brewer, et al. (2010) hypothesised that the differential feedback effects on subjective and objective judgments[4] may be due to a difference in (a) response format, (b) verifiability of the judgments, and (c) difficulty in making judgments. First, response format was tested because most prior research used different formats to measure subjective and objective judgments (i.e., Likert scale and open-ended response, respectively). It has been demonstrated that response format has a significant impact on the answers that participants provide. For example, when participants were asked to evaluate the average height of men and women using an open response format (i.e., providing an

[4] Note that they did not specifically investigate time-in-view and distance judgments, but all objective judgments in general (i.e., time-in-view, distance, and identification-time).

estimate in feet and inches), men were evaluated as taller; but no difference was found when participants were asked using a Likert scale (i.e., providing a rating from *very tall* to *very short*; Biernat, Manis, & Nelson, 1991). Second, verifiability was also examined because differential feedback effects could be due to participants being aware that the experimenter could verify their objective judgments. In many situations, witnesses are very sensitive to the possibility that their answer can be contradicted (Douglass, Brewer, et al.), and this awareness can affect both their identification confidence (e.g., Shaw, Applo, Zerr, & Pontoski, 2007; Shaw, Zerr, & Woythaler, 2001) as well as their actual report accuracy (Vicario & Tomat, 1998). Third, difficulty in making judgments was explored because participants might find it more difficult to make objective judgments, thus leading them to concentrate more when generating the objective judgments.

To test the three hypotheses, Douglass, Brewer, et al. (2010) manipulated three variables: feedback (confirming vs. none), response format (fill-in-the-blank vs. Likert scale); and verifiability of objective judgments (yes vs. no). The verifiable judgment was distance (the experimenter put a piece of tape on the ground to mark the distance between the participants and the target person); an example of non-verifiable judgment was the time the participants spent looking at a photo that they studied the longest (out of all other photos in the lineup). All variables were manipulated between-participants, except for the verifiability variable. The study was conducted in a real-world environment (i.e., public locations) rather than in a lab setting.

More specifically, in Douglass, Brewer, et al.'s (2010) study participants were told that another experimenter (i.e., a target person) would appear and they were instructed to pay attention to the target person because they would be asked questions about that person afterward. Participants were then asked to identify the person from a target-absent photographic lineup. Following the identification, they were either given confirming feedback (i.e., "I see you have identified #__. Just so you know, that is the person you saw, so you are correct") or no feedback. Finally, the experimenter read a series of questions to the participants about their witnessing experience (e.g., asking for their testimony-relevant judgments) and participants were instructed to indicate their preferred response by pointing to a number on a scale or providing an answer for the fill-in-the-blank questions. To check the effectiveness of the manipulations, participants were also asked whether they thought the experimenter could verify their answers to the non-verifiable objective judgments. These manipulation checks were successful, with the verifiable objective judgments rated as significantly more verifiable than the non-verifiable objective judgments. However, the results of Douglass, Brewer, et al.'s study did not support the three hypotheses regarding response format, verifiability, and difficulty. Specifically, response format and verifiability did not produce changes in the judgments, nor did they interact with feedback to distort objective judgments. Participants' self-reports also revealed that they did not perceive subjective questions to be easier to answer than objective questions. These results suggest that there were likely other factors (aside from verifiability, judgment difficulty, and response format) accounting for differential effects of feedback, and this was investigated in the present research.

1.3.1 Major Aims and Outline

This thesis continued the line of research on the differential feedback effects pioneered by Douglass, Brewer, et al. (2010). That is, the thesis investigated why time-in-view and distance judgments were not affected by confirming feedback while other testimony-relevant judgments were affected. The starting point for the investigation was a review of current theoretical explanations that have been offered to account for the post-identification feedback effects (Chapter 2). Then a series of experiments (Experiments 1 to 3) tested whether these accounts could explain the lack of post-identification feedback effects on time-in-view and distance judgments—or whether there were other possible explanations for the differential feedback effects (Chapters 3 and 4). To shed further light on the differential feedback effects, the factor structure of testimony-relevant questionnaire was examined (Chapter 5). In addition, participants' reports regarding the influence of confirming feedback on their testimony-relevant judgments were also examined. Together, findings presented in Chapters 2 to 5 have theoretical implications for understanding the mechanisms underlying the post-identification feedback effects and the differential effects of feedback. Chapter 6 investigated the accuracy of eyewitnesses' time-in-view and distance judgments and reviewed basic research on estimation of time and distance. These findings have practical implications for courts that use time-in-view and distance judgments as criteria to determine the reliability of eyewitness identification decisions. Finally, Chapter 7 concluded the thesis with a general discussion, summary of key findings and their contributions to the post-identification feedback literature, and suggestions for future research.

1.4 Summary

Confirming feedback has been found to affect a wide a range of testimony-relevant judgments (e.g., Wells & Bradfield, 1998, 1999). Some of these judgments are being used in courts in the United States, United Kingdom, and Australia as a reliability assessment for eyewitness identification evidence (*Domican v. The Queen,* 1992; *Neil v. Biggers*, 1972; *R v. Turnbull and Others,* 1976). Time-in-view and distance judgments, however, were the only two judgments that were found to be unaffected by confirming feedback. This thesis aimed to investigate why these differential confirming feedback effects occur. In particular, this thesis addressed what makes time-in-view and distance judgments immune to confirming feedback, what differentiates them from the rest of the judgments, whether current theories of post-identification feedback effects can be used to explain these differential feedback effects, and whether eyewitnesses' time and distance judgments can be trusted.

CHAPTER 2: Literature Review on Post-Identification Feedback Studies

This chapter first presents an overview of past research on post-identification feedback studies that have tested the effects of confirming feedback on both subjective and objective testimony-relevant judgments (Section 2.1). The chapter then reviews current theoretical explanations that have been offered for the post-identification feedback effects, along with past findings that have supported these accounts (Section 2.2). Finally, the last section of this chapter highlights a gap in the literature that this thesis will address (Section 2.3).

2.1 Past Research on Post-Identification Feedback Studies: Overview

The first study that tested the post-identification feedback effects (Wells & Bradfield, 1998) used a set of testimony-relevant questions containing 10 items on subjective judgments (certainty, attention, view, features, basis, ease, testify, trust, strangers, clarity) and three items on objective judgments (time-in-view, distance, identification-time; see Table 2.1). These questions were selected based on the criteria used in the legal environment at that time that were used to assess the reliability of eyewitness identification decisions (e.g., the *Biggers'* criteria). Although these criteria may change, it is important to investigate them in a manner that is consistent with the literature.

At the time of writing this thesis, there have been 22 published studies and two meta-analyses (Douglass & Steblay, 2006; Steblay et al., 2014) that have replicated the key findings of Wells and Bradfield's (1998) original study that

Table 2.1

Thirteen Testimony-Relevant Questions Used in Wells and Bradfield (1998)

Questions	Scale
"At the time that you identified the person in the photospread, how certain were you that the person you identified from the photos was the gunman that you saw in the video?" (certainty)	1 *(not at all certain)* to 7 *(totally certain)*
"How much attention were you paying to the gunman's face while viewing the video?" (attention)	1 *(none)* to 7 *(my total attention)*
"How good of a view did you get of the gunman?" (view)	1 *(very poor)* to 7 *(very good)*
"How well were you able to make out specific features of the gunman's face from the video?" (features)	1 *(not at all)* to 7 *(very well)*
"To what extent do you feel that you had a good basis (enough information) to make an identification?" (basis)	1 *(no basis at all)* to 7 *(a very good basis)*
"How easy or difficult was it for you to figure out which person in the photos was the gunman?" (ease)	1 *(extremely easy)* to 7 *(extremely difficult)*
"On the basis of your memory of the gunman, how willing would you be to testify in court that the person you identified was the person in the video?" (testify)	1 *(not at all willing)* to 7 *(totally willing)*
"Assume that an eyewitness had about the same view of the gunman that you had from the video. Do you think that an identification by this eyewitness ought to be trusted?" (trust)	1 *(definitely should not be trusted)* to 7 *(definitely should be trusted)*
"Generally, how good is your recognition memory for faces of strangers you have encountered on only one prior occasion?" (strangers)	1 *(very poor)* to 7 *(excellent)*
"How clear is the image you have in your head of the gunman you saw in the video?" (clarity)	1 *(not at all clear)* to 7 *(very clear)*
"How many seconds would you estimate that the gunman's face was in view?" (time-in-view)	Open response
"What would you estimate was the distance between the camera-eye view and the gunman's face?" (distance)	10 feet to 70 feet in 10-foot increments
"After you were first shown the photos, how long do you estimate it took you to make an identification?" (identification-time)	1 (*I needed almost no time to pick him out)* to 7 (*I had to look at the photos for a long time to pick him out)*

Note. Words in parenthesis are shorthand terms used in the text to refer to questions.

confirming feedback largely affects eyewitnesses' subjective judgments. Objective judgments, however, have received less attention. Of these 22 studies, six (27%) excluded all three questions on objective judgments from the original set of testimony-relevant questions (Bradfield & Wells, 2005; Charman & Wells, 2008; Dysart, Lawson, & Rainey, 2012; Quinlivan, Wells, & Neuschatz, 2010; Skagerberg & Wright, 2009; Wells et al., 2003). Of the remaining 16 studies that included objective judgments in their set of testimony-relevant questions, (a) only seven (44%) included all three questions (i.e., time-in-view, distance, and identification-time) on objective judgments (Charman, Carlucci, Vallano, & Gregory, 2010; Douglass, Brewer, et al., 2010; Hafstad et al., 2004; Lampinen, Scott, Pratt, Leding, & Arnal, 2007; Neuschatz et al., 2005; Wells & Bradfield, 1998, 1999); (b) three (19%) included both distance and identification-time (Neuschatz et al., 2007; Quinlivan, Neuschatz, Douglass, Wells, & Wetmore, 2012; Quinlivan et al., 2009), and (c) six (38%) included identification-time only (Bradfield et al., 2002; Charman & Wells, 2012; Douglass & McQuiston-Surrett, 2006; Douglass, Nueschatz, et al., 2010; Skagerberg, 2007; Smalarz & Wells, 2014).

It is clear from the above review that the two most ignored objective judgments were time-in-view and distance (included in seven [32%] and ten studies [45%], respectively, out of the 22 post-identification feedback studies; cf. 16 studies [73%] that included objective identification-time judgments). It is interesting to speculate as to why this is the case. It is possible that researchers did not wish to include judgments that were estimates of quantities and thus measured on a different scale (an open response format instead of a Likert scale). It is also possible that they were omitted from research because distance and time-in-view were the only two judgments that were not significantly affected by confirming feedback; in the most recent meta-analysis by Steblay et al. (2014), the reported effect sizes for time-in-view and distance judgments were the smallest among other testimony-relevant judgments (*d*s = 0.04 and 0.00, respectively; the next smallest effect size was attention, *d* = 0.48). Finally, it is also possible that the omission of these judgments was a result of the type of research paradigm typically used to investigate the effects. Post-identification feedback studies often use lab based paradigms where an event is shown to participants through a video. While this type of paradigm allows for efficiency of data collection, it also limits the opportunity for assessing objective judgments, in that distance judgments in particular are not representative of those that might be made by a real witness experiencing an event first hand. This point will be further explored in later chapters.

In summary, of all the post-identification feedback studies that have tested the effects of confirming feedback on all three objective judgments, only time-in-view and distance judgments were found to be immune to the effects of confirming feedback (cf. identification-time judgments). So far, the post-identification feedback literature has not offered an explanation for these differential effects. Hence, the following section reviews explanations that have been offered for the typical post-identification feedback effects.

2.2 Theoretical Explanations for Post-Identification Feedback Effects

The dominant explanation for the post-identification feedback effect on eyewitnesses' testimony-relevant judgments has been encapsulated into what is broadly known as the accessibility hypothesis. The accessibility hypothesis has also been referred to in the literature as the accessibility/inference hypothesis (Quinlivan et al., 2010), the cues hypothesis (Charman et al., 2010), the cues-based inference conceptualization (Charman & Wells, 2012), and the cue-accessibility hypothesis (Steblay et al., 2014).

2.2.1 The Accessibility Hypothesis: Internal Cue Strength and Inference

The accessibility hypothesis was derived from theories of self-perception (Bem, 1967, 1972) and social comparison (Festinger, 1954). First, Bem's self-perception theory suggests that our attitudes, emotion, and other internal states are formed by observing our own overt behaviour and/or the circumstances in which this behaviour occurs. When our internal cues are weak or ambiguous, we are no different than an outside observer and rely on external cues to infer our own internal states. Self-perception theory has been used to understand the post-identification feedback effects (e.g., Wells & Bradfield, 1999). Based on this theory, post-identification feedback effects occur because eyewitnesses have weak internal cues about their testimony-relevant judgments. Specifically, when eyewitnesses are unsure about their own testimony-relevant judgments about certainty, view, and attention, they rely on an external cue (confirming feedback) to infer these judgments, the same way an outside observer would. In this circumstance, an outside observer would judge the eyewitness to have high certainty in their identification upon hearing confirming feedback, because their certainty judgment was inferred from their identification performance (their identification was correct and therefore they must have been certain).

Second, in a similar vein, social comparison theory by Festinger (1954) also suggests that people use external cues (e.g., by seeing how other people perform in relation to their own) when they are unsure about their internal cues (e.g., their own abilities). According to Festinger, when an ability is not directly testable (e.g., evaluating a person's ability to write poetry), the person's ability is evaluated based on other people's opinions (e.g., about how well the person writes poetry); and when an ability can be evaluated by means of "objective reality," the evaluation depends on actual comparison of others' performance (e.g., one's ability to run will be evaluated by comparing one's running time with others' running times). In an eyewitness context, as with self-perception theory (Bem, 1972), social comparison theory predicts that, in a state of uncertainty, eyewitnesses rely on external cues such as confirming feedback to make testimony-relevant judgments (as in a state of uncertainty, this was the only source available that they could use to inform their own judgments).

Wells and Bradfield (1998, 1999) were the first to contribute to the formation of the accessibility hypothesis by postulating that the post-identification feedback effect occurs because eyewitnesses did not form an on-line impression of their testimony-relevant judgments; instead, they formed these impressions only when they were asked to produce them. Furthermore, the robust and strong effects of post-identification feedback indicate that eyewitnesses have weak internal cues about their testimony-relevant judgments. Later researchers attributed the malleability of eyewitness judgments to the limited or no (direct) access that eyewitnesses have to their cognitive or memory trace regarding testimony-relevant judgments (Wells et al., 2003; Quinlivan et al., 2010).

Essentially, the accessibility hypothesis proposed that eyewitness testimony-relevant judgments are not formed at the time when the judgments are said to occur (e.g., at the time of identification for certainty judgments, and at the time of view for attention and view judgments). Rather, they are formed when eyewitnesses are asked to provide them (retrospectively after the event and identification have occurred). In addition, eyewitnesses have little to no access to their memory traces that may have been present at the time of occurrence (e.g., at the time of identification for certainty judgment, at the time of view for attention and view judgments), therefore their internal cues regarding these judgments are weak or non-existent. As a result, they seek external cues (e.g., confirming feedback) to help them make sensible judgments. These judgments are then inferred from this feedback (e.g., "I must have been confident since I made a correct identification;" Wells & Bradfield, 1998, 1999) and, consequently, their judgments become erroneously inflated. In short, according to the accessibility hypothesis, the post-identification feedback effects occur when: (a) eyewitnesses have weak internal cues and (b) they rely on confirming feedback to make judgments. In this thesis, these will be referred to as the internal cue strength explanation and the inference explanation, respectively.

2.2.1.1 *Support for the accessibility hypothesis*

There have been a number of studies supporting the internal cue strength and inference explanations. These studies have used various manipulations, all of which will be described in the sub-sections below.

2.2.1.1.1 *Internal cue strength*

2.2.1.1.1.1 Testimony-relevant judgments are formed retrospectively

As mentioned earlier, it has been postulated that eyewitnesses do not form, for example, a certainty judgment at the time of identification, nor do they form an attention judgment at the time of viewing the target person (e.g., Wells & Bradfield, 1998, 1999). Instead, these judgments are formed at the time of questioning, and so after the identification, and after they have viewed the target person. According to the accessibility hypothesis, when internal cues (the memory trace to these judgments) are weak, they will draw from available external cues (e.g., confirming feedback) to make judgments. Therefore when internal cues are weak, the judgments would depend heavily on the presence of external cues—the presence of confirming feedback would result in an inflation of certainty judgments.

The strongest support for this (that judgments are formed retrospectively) comes from studies where eyewitnesses are made suspicious about the validity of the feedback information. Neuschatz et al. (2007) divided participants into three groups: participants either received no feedback, confirming feedback ("Good, you selected the actual suspect in the case"), or confirming feedback with information that made them suspicious about the validity of the feedback (after hearing the confirming feedback, participants were taken to a different room and were told, "This experiment is being funded by a Tennessee District Attorney's office. They're trying to prove the accuracy of eyewitness identifications. Did she tell you that you picked the right person, [s]he's telling everyone that"). They found that the suspicion information mitigated the post-identification feedback effects (this is referred to as suspicion effects) suggesting that participants were able to discredit the confirming feedback that they initially received. Quinlivan et al. (2010) strengthened these results by including post-feedback private thought manipulation (i.e., allowing participants to process the confirming feedback information even further prior to the feedback being discredited), and found that this manipulation did not mitigate the effect of suspicion. Specifically, participants in Quinlivan et al.'s study were asked to watch a video, make an identification, and were given either confirming feedback or no feedback. They then either reviewed the 14 testimony-relevant questions (post-feedback private thought condition) or sat quietly for 5 minutes (post-feedback no private thought condition). Afterwards, participants who had received confirming feedback were given either suspicion information (e.g., participants were told that the person administering the feedback actually had no way of knowing whether or not they had made a correct identification) or no information. The post-feedback private thought manipulation did not change the impact of suspicion, presumably because the suspicion information had already been taken into account by the time participants reported their judgments. These results suggest that eyewitnesses' testimony-relevant judgments continue to be updated until these judgments are sought and reported. At the time eyewitnesses were required to report their testimony-relevant judgments, these eyewitnesses took into account all external cues that were available to them (including the information that the confirming feedback they received was false).

2.2.1.1.1.2 Weak internal cues and feedback effects

According to the accessibility hypothesis, eyewitnesses have limited access to their memory trace about their testimony-relevant judgments, which makes their internal cues about these judgments weak. Evidence for this comes from studies that asked participants to report the influence of confirming feedback on their testimony-relevant judgments. A number of studies have asked participants whether they thought the confirming feedback they received influenced their certainty judgments; these studies found that participants who reported that they were not influenced were in fact as affected by the feedback as those participants who correctly reported that they were influenced by the confirming feedback (Wells et al., 2003; Wells & Bradfield, 1998). These results indicate that participants did not have any insight into the effect of feedback on their judgments, consistent with the idea that eyewitnesses do not have a strong trace for their retrospective certainty judgment. If they had remembered how certain they were at the time they made an identification, they would have been able to say that feedback did influence their judgments. Furthermore, Semmler et al. (2004) tested whether people were able to remember their retrospective certainty judgment (their unaffected judgment before receiving confirming feedback). After receiving confirming feedback, these participants were asked about their retrospective certainty judgment ("How confident were you at the time you identified...") and their current certainty judgment ("How confident are you right now...?"). Semmler et al. found that eyewitnesses' retrospective certainty judgments did not differ from their current certainty judgments, supporting the idea that eyewitnesses have limited access to their memory trace concerning these judgments, and this makes their judgments vulnerable to the influence of feedback.

Another line of evidence for weak internal cues comes from the following two studies. First, Wells et al. (2003) found that giving confirming feedback to an eyewitness either immediately following an identification or after a 48-hour delay produced the same post-identification feedback effect on their testimony-relevant judgments. The conclusion from this result is that delay did not affect the strength of internal cues because these internal cues were already weak to begin with. Second, Neuschatz et al. (2005) compared the effect of feedback between groups of young (17-36 years old) and elderly witnesses (57-97 years old). They tested the recognition memory of both groups by asking them to respond 'yes' to the items that they remembered seeing in the video and 'no' to the items that they did not remember seeing in the video. They found that although the younger group performed significantly better at the recognition test than the older group (indicating that they had a stronger memory trace for the event), both groups were found to be equally affected by feedback. These results suggest that testimony-relevant judgments were constructed only at the time of questioning. Additionally, replicating Wells et al.'s

(2003) findings, these results did not change when a week-long retention interval (between receiving feedback and answering questions) was introduced (Neuschatz et al.; Experiment 2).

2.2.1.1.1.3 Strong internal cues and feedback effects

Further supporting the internal cue strength of the accessibility hypothesis, a number of studies have found that when these cues are strengthened, feedback had little to no effect. A recent meta-analysis by Steblay et al. (2014) reported that four studies have attempted to mitigate the effects of confirming feedback by strengthening the internal cues of eyewitnesses' testimony-relevant judgments (Neuschatz et al., 2007; Quinlivan et al., 2009; Wells & Bradfield, 1998, 1999). The results from these studies suggest that the post-identification feedback effects can be mitigated though may not be fully eliminated. For example, Wells and Bradfield (1999) manipulated the strength of internal cues of some participants by creating a pre-feedback memory trace of their testimony-relevant judgments. All participants were asked to watch a video, make an identification from a target-absent lineup, were given either confirming or no feedback, and answered a set of testimony-relevant judgments. However, prior to receiving feedback, some participants were asked to think privately about judgments of clarity, attention, ease, strangers, and certainty. The purpose of this pre-feedback thought was to retrieve memory traces of these judgments, thus strengthening their internal cues. Wells and Bradfield (1999) found that the feedback effects were mitigated (i.e., for judgments of view, features, attention, identification-time, ease, testify, strangers), and was eliminated for certainty judgments (also see Bradfield & Wells, 2005). Their findings are consistent with those of Wells and Bradfield's original study (1998; Experiment 2); which found that participants' certainty judgments were protected against the feedback effect when participants had been asked to make a certainty judgment immediately after making an identification and prior to receiving feedback—this was referred to as the confidence prophylactic effect. Both studies have successfully demonstrated that the feedback effect could be mitigated by strengthening the internal cues of these judgments (that is, by requesting participants to report these judgments prior to receiving feedback). When these internal cues were strengthened, participants did not have to rely on confirming feedback to make judgments, and hence their judgments were not affected by feedback.

Furthermore, in line with the internal cue strength explanation, research found that the confidence prophylactic effect found in Wells and Bradfield's (1998, 1999) studies did not last long. Neuschatz et al. (2007; Experiment 3) tested the confidence prophylactic effect using the same procedure as Wells and Bradfield's (1998; Experiment 2) with the exception that half of their participants were allocated to a delay condition. In Neuschatz et al.'s study, participants viewed an event, made an identification from a target-absent lineup, were asked about their certainty judgments, received either confirming feedback or no feedback, and answered a set of testimony-relevant judgments either immediately or after one week. The results from Neuschatz et al.'s study replicated those of Wells and Bradfield's; when participants were asked to produce judgments immediately after making an identification (in the immediate condition), their testimony-relevant judgments were not affected by confirming feedback. However, this was not the case when delay was introduced; the confidence prophylactic effect no longer protected certainty judgments after a duration of 1-week. This was thought to be because the trace for the original (unaffected) certainty judgments was weakened after 1-week and, therefore, what was left in eyewitnesses' memory was the confirming feedback information (Neuschatz et al.; see Wells et al., 2003 for evidence that feedback can still be remembered after long retention intervals). Supporting the internal cue strength explanation, these results suggest that feedback only affects eyewitnesses' testimony-relevant judgments when their internal cues to these judgments are weak.

The interpretation of Neuschatz et al.'s (2007) findings, however, was questioned by Quinlivan et al. (2009) due to the following study limitations: (a) Neuschatz et al. did not test whether participants indeed remembered the feedback after the 1-week interval, and (b) there was no control condition where participants' certainty judgments were not asked prior to receiving feedback. Nonetheless, having addressed these limitations, Quinlivan et al. found the same results. Asking witnesses to make certainty judgments prior to receiving feedback protected these judgments from the influence of feedback *only* when there was no delay between receiving feedback and producing judgments. These results indicate that people remembered the feedback after one-week but did not remember their original (unaffected) judgments that they initially produced because internal cues to these original judgments have weakened as a result of delay (supporting Wells et al.'s [2003] findings).

In summary, the internal cue strength of the accessibility hypothesis postulates that the post-identification feedback effects occur because eyewitnesses do not have strong internal cues to their testimony-relevant judgments. There are three major lines of research that support this account. First, witnesses display little insight into the impact of feedback on their judgments and that they are unable to provide accurate indications of their retrospective certainty before the feedback was delivered. These indicate that eyewitnesses do not form a strong impression of their testimony-relevant judgments at the time of the event or when making an identification decision (instead, they only form these judgments at the time of questioning). Second, attempts to further weaken cues to testimony relevant-judgments have been unsuccessful, indicating that they are weak to start with. And third, strengthening these cues diminish (or at least) mitigate the post-identification feedback effects.

2.2.1.1.2 *Inference*

The accessibility hypothesis not only postulates that the post-identification feedback effects occur because eyewitnesses have weak internal cues (i.e., the internal cue strength explanation), but also because eyewitnesses rely on confirming feedback to make judgments (i.e., the inference explanation). According to the inference explanation, when eyewitnesses rely on confirming feedback to make judgments they go through an inference process to make these judgments and these inferences are drawn from confirming feedback they received. For example, they make an inference that they must have been confident at the time of identification since they made a correct identification, that they must have had a good view of the target person and paid attention to the target person's face at the time of view (Wells & Bradfield, 1998; 1999), and that this inference process is triggered by the questions relating to these judgments (Quinlivan et al., 2010).

Additional support for the inference explanation comes from studies that have demonstrated the mitigating effects of post-identification feedback on eyewitnesses' testimony-relevant judgments. Wells and Bradfield (1999) asked some participants to think about five testimony-relevant judgments prior to receiving feedback (i.e., clarity, attention, ease, strangers, and certainty). They found that this manipulation not only protected these five judgments from being influenced by confirming feedback, but also protected other judgments that would normally be affected by confirming feedback (i.e., view, features, basis, identification-time, testify). Similarly, Neuschatz et al. (2007; Experiment 3) found that asking participants to make certainty judgments prior to receiving confirming feedback protected all other testimony-relevant judgments from being affected by this feedback (also see Bradfield et al., 2002). At present, the inference explanation is the only explanation offered as to why the robust effects of confirming feedback were found on a wide range of eyewitness testimony-relevant judgments (not just on certainty judgments, but also on other judgments such as view, attention, ease, etc.).

2.2.2 Refinements to the accessibility hypothesis

As it stands, the accessibility hypothesis has its limitations. Accordingly, a few refinements have been made to the accessibility hypothesis, as illustrated in the sections below.

2.2.2.1 *Ecphoric similarity: Cues to testimony-relevant judgments*

The first limitation of the accessibility hypothesis is that it has not been able to define the "cues" that eyewitnesses use to make testimony-relevant judgments (i.e., what are these internal cues and why do eyewitnesses have weak internal cues to these judgments). Bradfield et al. (2002) suggested that eyewitnesses' internal cues are drawn from their ecphoric experience (Tulving, 1981); and therefore, weak internal cues are a result of low ecphoric similarity (as a consequence of being presented with a target-absent lineup—all of the post-identification feedback studies presented above used a target-absent lineup or inaccurate eyewitnesses as participants). According to Tulving, ecphoric similarity is a subjective memory judgment that is based on perceived similarity between a stimulus and a person's memory. Based on this view of ecphoric similarity, Bradfield et al. postulated that when eyewitnesses were presented with a target-present lineup, those who made accurate identifications should have strong internal cues to their judgments and therefore should not be affected by feedback. This is because, according to this view, ecphoric similarity gives an important internal cue not only in deciding whether a number of stimuli have been observed previously (recognition memory), but also in deciding the certainty of one's recognition memory (certainty judgment). High ecphoric similarity indicates one's recognition of the stimuli (a high match between the photo of the target person in the lineup and the image of the target person in memory) and, therefore, high certainty judgments, which should be characteristic of accurate eyewitnesses. In contrast, inaccurate eyewitnesses should have low certainty judgments due to a low degree of match between the image of the target person they had in memory and the photo of the suspect they have chosen. In sum, based on this reasoning, accurate eyewitnesses should have stronger internal cues to accuracy (in terms of recognising the target person) and higher certainty judgments than inaccurate eyewitnesses. Ecphoric similarity may also provide a cue for other testimony-relevant judgments, as discussed further below.

To test this, Bradfield et al. (2002) used a target-present lineup to compare the post-identification feedback effect between accurate and inaccurate eyewitnesses. As predicted; in the absence of feedback, accurate eyewitnesses provided higher certainty judgments compared to inaccurate eyewitnesses (also see Leippe, Eisenstadt, & Rauch, 2009). Furthermore, Bradfield et al. found that certainty judgments of accurate eyewitnesses were not influenced by confirming feedback. These results were replicated in a similar study conducted by Charman and Wells (2012). Additionally, it is important to note that although high ecphoric similarity gives internal cues only to confidence (only to certainty judgments and not to other testimony-relevant judgments), Bradfield et al. found that accurate eyewitnesses also scored higher in other testimony-relevant judgments. These results suggest that eyewitnesses may use the ecphoric experience as a cue to make inferences about these other judgments too (Bradfield et al.; Charman & Wells). These findings are in line with the most recent meta-analysis reported by Steblay et al. (2014) that found that the mean effect size of the post-identification feedback effects for accurate witnesses across all testimony-relevant judgments was significantly smaller than that for inaccurate witnesses (except for judgments of time-in-view, distance, and identification-decision). Additionally, there has also been evidence that when these cues were weakened over the period of 1-week (when testimony-relevant judgments were not asked until after 1-week of viewing the event and making an identification), accurate eyewitnesses were influenced by confirming feedback (Quinlivan et al., 2012). This makes sense from the view of ecphoric similarity; eyewitnesses who made an accurate identification had high ecphoric similarity (high match between the photo they saw and the image that they had in their memory). However, if certainty judgments were asked after a period of delay, eyewitnesses became less certain regarding the stimuli (i.e., the target person) that they observed previously. Consequently, they became vulnerable to the effects of post-identification feedback.

In summary, according to the accessibility hypothesis, eyewitnesses have little or no access to their internal cues regarding their testimony-relevant judgments. Bradfield et al. (2002) suggested that this was true only when eyewitnesses' ecphoric similarity was low (e.g., either because eyewitnesses were presented with a target-absent lineup or made an incorrect choice in a target-present lineup).

2.2.2.2 *The Selective Cue Integration Framework (SCIF)*

The second limitation of the accessibility hypothesis is that it has not been able to explain some of the post-identification feedback findings such as why eyewitnesses' suspicion to feedback information mitigated the post-identification feedback effects. Charman et al. (2010) addressed this limitation by extending the accessibility hypothesis into a framework called the Selective Cue Integration Framework (SCIF). The SCIF has three stages. The first two stages were essentially the same as the accessibility hypothesis. Specifically, in the first stage (the assessment stage) eyewitnesses assess the strength of their internal cues to their judgments. When internal cues are weak, eyewitnesses search for an external cue on which to base their judgments. This search stage is the second stage of the SCIF. In the third stage (the evaluation stage), eyewitnesses then assess the credibility of this external cue. According to the evaluation stage, the post-identification feedback effects would only occur if the external cue is deemed reliable by the eyewitness (which explains why the suspicion post-identification feedback effects occur).

Note that this thesis will mainly focus on the first two stages of the SCIF (i.e., the accessibility hypothesis) when making predictions about the effects of post-identification feedback on eyewitness testimony-relevant judgments. This is because the SCIF's evaluation stage (the third stage) is not applicable to the research questions presented in this thesis, as the present study was not designed to manipulate the credibility of feedback information. Accordingly, the term accessibility hypothesis will be used for the purpose of the present research. The following section will now outline a gap in the literature that the thesis will address.

2.3 Addressing a Gap in the Literature

The accessibility hypothesis has predominantly been used to explain the robust post-identification feedback effects. However, despite the refinements of the accessibility hypothesis, questions regarding the effect of feedback on the many judgments that a witness can make remain unanswered. First, it is still unknown why time-in-view and distance judgments have been the only two judgments unaffected by confirming feedback. Second, it is not known whether the current theoretical explanation for the post-identification feedback effects, namely the accessibility hypothesis, can be used to explain the immunity of time-in-view and distance judgments to confirming feedback. And third, the process by which eyewitnesses' make time-in-view and distance judgments after an event is still unknown. This thesis will address the first two questions in Chapters 3 to 5, and the third question in Chapter 6.

More specifically, to determine whether the accessibility hypothesis explains the differential feedback effects, Chapter 3 will test the first component of the accessibility hypothesis (i.e., the internal cue strength explanation) by manipulating internal cue strength for time-in-view and distance judgments. Chapter 4 will test the second component of the accessibility hypothesis (i.e., the inference explanation) by manipulating feedback information. Additionally, to further investigate the differential feedback effects and why confirming feedback has robust effects on a wide range of testimony-relevant judgments, Chapter 5 will examine the structure of testimony-relevant questions. This will help determine whether these judgments share the same or have a different basis. Eyewitnesses' reports regarding the influence of confirming feedback on their testimony-relevant judgments will also be examined to better understand the mechanisms behind the post-identification feedback effects. Finally, to understand the process by which eyewitnesses make time-in-view and distance judgments, Chapter 6 will review basic research on estimation of time and distance, and assess the validity of eyewitnesses' time-in-view and distance judgments. Key findings and contributions of the various studies will be discussed in the final chapter, Chapter 7.

CHAPTER 3: Can Strong Internal Cues Explain the Differential Confirming Feedback Effects?

The accessibility hypothesis is currently the most predominant explanation for the post-identification feedback effects. Experiments 1 and 2 presented in this chapter tested whether the first component of the accessibility hypothesis (i.e., the internal cue strength) can explain why time-in-view and distance judgments were unaffected by confirming feedback, or whether there is another possible explanation for the lack of effects.

Experiments 1 and 2 will be presented in a publication format. As this thesis follows a combined conventional/publication format, this chapter contains a paper that is to be submitted for publication. Because the paper is part of the thesis work, it contains an abstract and an introduction section that is largely based on the first two chapters of this thesis. As a consequence of this, there will be some repetition in the paper's introduction section leading to the study hypotheses. Implications of Experiments 1 and 2 results will also be presented early in this thesis (i.e., at the end of the paper) following a publication format. The statement of authorship detailing each author's contribution to the paper is outlined on the next page.

Statement of Authorship

Title of Paper	Why confirming post-identification feedback does not affect eyewitnesses' time-in-view and distance judgments
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Author Contributions

By signing the Statement of Authorship, each author certifies that their stated contribution to the publication is accurate and that permission is granted for the publication to be included in the candidate's thesis.

Name of Principal Author (Candidate)	Adella Bhaskara		
Contribution to the Paper	Initiated the conception and design of the study, responsible for setting up experiments (e.g., XML scripting, preparing questionnaires), conducting the experiments, recruiting participants, collecting and entering data, performing analysis and interpreting data, and writing the manuscript.		
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3.1 Abstract

Confirming post-identification feedback exerts robust effects on the majority of eyewitness judgments (e.g., certainty, view, ease of identification) but not on time-in-view and distance judgments. We tested two possible explanations for this unexplained discrepancy. First, these judgments might be protected from the influence of confirming feedback due to strong internal cues to the judgments (i.e., the accessibility hypothesis). Second, confirming feedback might only be useful for informing judgments that focus on the target person's face or the identification decision (e.g., certainty, view, ease), and hence irrelevant to estimations of actual time and distance. In two experiments we tested these possibilities using between-participants manipulations of feedback type (confirming feedback, confirming-specific feedback, no feedback) and retention interval (immediate, delay between viewing an event and making judgments). The specific feedback was made relevant to the judgments and was found to affect time-in-view (Experiments 1 and 2) and distance judgments (Experiment 2) in the immediate condition, while confirming feedback did not affect these judgments even in the delay conditions when internal cues were weaker. The results suggest that the lack of post-identification feedback effects on time-in-view and distance judgments may not be due to strong internal cues per se, but the relevance of feedback also plays a role in determining whether judgments would be affected.

3.2 Introduction

In many criminal investigations where no trace of evidence is left at the crime scene (e.g., DNA or fingerprints of the criminal), police rely heavily on eyewitness identifications and testimony, although their accuracy is often unknown. In assessing the accuracy of an eyewitness identification, several criteria are recommended and used by courts in the United States (US), United Kingdom (UK), and Australia: for example, (a) the eyewitness's certainty, (b) the attention paid by the eyewitness, (c) the eyewitness's view of the target person (i.e., the perpetrator), (d) the time that the target person was in view, and/or (e) the distance between the eyewitness and the target person (*Alexander v. Queen,* 1981; *Domican v. The Queen,* 1992; *Manson v. Braithwaite,* 1977; *Neil v. Biggers,* 1972; *R v. Turnbull and Others,* 1976). Eyewitnesses' reports against these criteria are referred to as testimony-relevant judgments (Wells & Bradfield, 1998).

However, a large amount of research has found that eyewitnesses' testimony-relevant judgments are unreliable and often malleable. Confirming feedback given to eyewitnesses following an identification (e.g., "Good, you identified the actual suspect") alters a wide range of these judgments, a phenomenon known as the post-identification feedback effect (e.g., Douglass & Steblay, 2006; Wells & Bradfield, 1998). For example, after hearing feedback, eyewitnesses reported (a) higher confidence in the identification, (b) that the task in identifying the target person from a lineup was easy and took almost no time, (c) that attention was paid to the target person's face, (d) having had a good basis for making an identification, and (e) having had a clear image of the target person in their memory. Post-identification feedback effects have been found across a variety of conditions: in target-absent and -present lineups (Semmler, Brewer, & Wells, 2004), in sequential lineups (Douglass

& McQuiston-Surrett, 2006), when delay was introduced between receiving feedback and answering testimony-relevant questions (Neuschatz et al., 2005; Wells, Olson, & Charman, 2003), when making voice (instead of person) identifications (Quinlivan et al., 2009), when eyewitnesses were children (Hafstad, Memon, & Logie, 2004) and elderly (Neuschatz et al., 2005), when the feedback was administered by a non-authoritative figure such as a naive co-witness (Skagerberg, 2007), and when eyewitnesses received unbiased instructions during the identification or were made aware that the target person may not be present in the lineup (Semmler et al., 2004). In addition, feedback effects have been detected in actual eyewitness cases (Wright & Skagerberg, 2007) and in people who observed an actual eyewitness making an identification under the influence of feedback (Douglass, Neuschatz, Imrich, & Wilkinson, 2010). Instances have also been reported in the US (Wells, 1993), UK (Skagerberg, 2007; Skagerberg & Wright, 2009), and Australia (*R v. Davies*, 2005) where lineup administrators (such as police officers) have given eyewitnesses feedback about their identification performance.

Post-identification feedback effects, however, were not found on judgments about time-in-view (i.e., the amount of time that the target person was in view) and distance (i.e., the distance between the eyewitness and the target person). According to the recent meta-analysis by Steblay et al. (2014), these two judgments were the only testimony-relevant judgments that were not significantly affected by confirming feedback (ds = 0.04 and 0.00, respectively). To date, there is no compelling explanation for the lack of post-identification effects on these two judgments.

In the only study examining this issue, Douglass, Brewer, et al. (2010) tested three possible explanations. Firstly, they tested whether response format moderated feedback effects on objective judgments. Time-in-view and distance judgments are considered objective because they have a correct answer.[5] The remaining testimony-relevant judgments (e.g., certainty, attention, view, etc.; see Table 3.1 for the full wording of these judgments) are categorised as subjective because there is no correct answer. Douglass, Brewer, et al. tested response format as it has been shown to have a significant effect on the answers that participants provide (e.g., Biernat, Manis, & Nelson, 1991). Secondly, they examined whether the perceived verifiability of the objective judgments protected participants from being influenced by confirming feedback. In many situations, witnesses are very sensitive to the possibility that their answer can be contradicted and this awareness can affect both their identification confidence (e.g., Shaw, Appio, Zerr, & Pontoski, 2007; Shaw, Zerr, & Woythaler, 2001) as well as their actual report accuracy (Vicario & Tomat, 1998). Thirdly, they investigated whether objective judgments were perceived to be more difficult to provide than subjective judgments, and accordingly led participants to concentrate more when generating them (thereby creating stronger internal cues). Douglass, Brewer, et al. did not find support for these explanations. The current study investigated other possible reasons for the specific lack of post-identification feedback effects on time-in-view (hereafter referred to as "time") and distance judgments. Investigating the differential post-identification feedback effects is important to fully understand the mechanism behind the post-identification feedback effects. It may also provide some insight into the validity of these judgments; and whether the courts should rely more on these judgments as other judgments are malleable (Douglass, Brewer, et al.). We start this investigation by reviewing the dominant explanation for post-identification feedback effects, the accessibility hypothesis.

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[5] The identification-time judgments are the only other judgments that are objective, but they were not immune to confirming feedback ($d = 0.54$; Steblay et al., 2014).

Table 3.1
Testimony-Relevant Questions Adapted from Wells & Bradfield (1998)

Questions	Scale
"At the time that you identified the target from the photo lineup, how certain were you that the person you identified from the photo lineup was the target you saw earlier?" (certainty)	1 *(not at all certain)* to 7 *(totally certain)*
"How good of a view did you get of the target?" (view)	1 *(very poor)* to 7 *(very good)*
"How well were you able to make out specific features of the target's face at the time of view?" (features)	1 *(very well)* to 7 *(not at all)*
"How much attention were you paying to the target's face while she was in view?" (attention)	1 *(none)* to 7 *(my total attention)*
"To what extent do you feel that you had a good basis (enough information) to make an identification?" (basis)	1 *(no basis at all)* to 7 *(a very good basis)*
"How easy or difficult was it for you to figure out which person in the photo lineup was the target?" (ease)	1 *(extremely easy)* to 7 *(extremely difficult)*
"From the time you were shown the photo lineup, how long do you estimate it took you to make an identification?" (identification-time)	1 *(almost no time)* to 7 *(a long time)*
"On the basis of your memory of the target, how willing would you be to testify in court that the person you identified was the same person you saw earlier?" (testify)	1 *(not at all willing)* to 7 *(totally willing)*
"Assume that a person had about the same view of the target that you had earlier. Do you think that an identification by this person ought to be trusted?" (trust)	1 *(should not be trusted)* to 7 *(should be trusted)*
"Generally, how good is your recognition memory for the faces of strangers you have encountered on only one prior occasion?" (strangers)	1 *(very poor)* to 7 *(excellent)*
"How clear is the image you have in your memory of the target you saw earlier?" (clarity)	1 *(not at all clear)* to 7 *(very clear)*
"How many seconds would you estimate that the target's face was in view? Please type the number in the box below." (time)	Open response (e.g., in either seconds, minutes, etc.)
"What would you estimate was the distance between you and the target's face?" (distance)	Open response (e.g., in either metres, feet, etc.)

Note. Questions were asked in the order presented. Words in parenthesis are shorthand terms used in the text to refer to questions.

3.2.1 The Accessibility Hypothesis

The accessibility hypothesis has been referred to as the accessibility/inference hypothesis (Quinlivan, Wells, & Neuschatz, 2010), the cues hypothesis (Charman, Carlucci, Vallano, & Gregory, 2010), the cue-accessibility conceptualization Steblay et al., 2014), and the cues-based inference conceptualization (Charman & Wells, 2012). The accessibility hypothesis was derived from theories of self-perception (Bem, 1967, 1972) and social comparison (Festinger, 1954). Bem's self-perception theory suggests that when internal cues (to judgments such as certainty, view, ease, and so on) are weak eyewitnesses will infer judgments from their own behaviour according to the context in which the behaviour occurs. Wells and Bradfield (1998, 1999) postulated that eyewitnesses do not form on-line impressions of their testimony-relevant judgments. Instead, they form these impressions only when they are asked to produce them. Later researchers attributed the malleability of these judgments to witnesses having limited or no (direct) access to the memory trace left by the event or the identification process (Quinlivan et al., 2010; Wells et al., 2003). As a result of having weak internal cues to these judgments, eyewitnesses seek external cues (e.g., confirming feedback) to help them make sensible judgments. When eyewitnesses rely on this confirming feedback, an inference process takes place (e.g., "I must have been confident since I made a correct identification;" Wells & Bradfield, 1998, 1999) and, consequently, their judgments become erroneously inflated. Similarly, Festinger's social comparison theory suggests that when people are uncertain about their own performance, they will seek external information to guide their judgments. Taken together, according to the accessibility hypothesis, the post-identification feedback effect occurs when eyewitnesses: (a) have weak internal cues and (b) rely on feedback to make judgments.

3.2.2 The Current Study

Based on the accessibility hypothesis, we proposed strong internal cues and the relevance of feedback as two possible reasons for the lack of post-identification feedback effects on time and distance judgments.

3.2.2.1 *Strong internal cues*

Eyewitnesses are known to have weak internal cues to judgments such as certainty, view, and attention; and this is especially true for inaccurate eyewitnesses (see Bradfield, Wells, & Olson, 2002). One line of evidence for this comes from studies that have manipulated retention interval between viewing an event and eliciting judgments, and found that confirming feedback produced the same effects on these judgments regardless of retention interval, indicating that their internal cues were weak to begin with (e.g., Wells et al., 2003; Quinlivan, Neuschatz, Douglass, Wells, & Wetmore, 2012). However, only two studies have tested this on time and distance judgments, and the results were inconsistent. Neuschatz et al. (2005; Experiment 2) did not find an interaction effect between feedback and retention interval on both time and distance judgments; these judgments were not affected by confirming feedback regardless of the retention interval conditions. In contrast, Quinlivan et al. (2012) found an interaction effect but only on distance judgments (time judgments were not tested). Specifically, they found a confirming feedback effect only in the delay condition when internal cues were expected to be weaker or less accessible. Given these inconsistent results, it is still unclear whether strong internal cues protect time and distance judgments from being influenced by confirming feedback.

There are reasons to predict that strong internal cues may explain the lack of post-identification feedback effects on time and distance judgments. In most post-identification feedback studies, retention interval was not manipulated and kept short (see meta-analysis by Steblay et al., 2014). According to the accessibility hypothesis, strong internal cues protect judgments from being influenced by post-identification feedback effects (Wells & Bradfield, 1999; Quinlivan et al., 2009). It is therefore possible that time and distance judgments were not affected by confirming feedback due to strong internal cues encoded at the time of witnessing the event. Particularly because it has been suggested that memory processes are involved in making retrospective judgments of duration[6] (e.g., Block & Reed, 1978; Frankenhaeuser, 1959; Ornstein, 1969). Additionally, context dependent memory effects suggest that distance cues are likely to make it into long-term memory (Smith & Vela, 2001).

To test whether the lack of post-identification feedback effects on time and distance judgments were due to strong internal cues, our study manipulated retention interval between viewing an event and making judgments. Based on the accessibility hypothesis, we predicted an interaction effect between feedback and retention interval. That is, time and distance judgments should not be affected by confirming feedback when internal cues are strong (in the immediate condition) but should be affected when the internal cues are weaker (in the delay condition).

3.2.2.2 *The relevance of feedback*

Our second prediction for the lack of post-identification feedback effects on time and distance judgments stems from the idea that confirming feedback may not be useful to inform time and distance judgments. The majority of testimony-relevant questions require the witness to retrieve information and base their judgments on

[6] We noted that identification-time judgments also involved estimating duration; we postulated that confirming feedback affects identification-time judgments, but not time judgments, because confirming feedback is relevant to the identification-time judgments (both are related to the identification performance).

their *identification* performance and on information related to the *target person's face* (particularly questions on certainty, view, identification-time, features, attention, basis, ease, testify, trust, and clarity [see Table 3.1]). Hence, from the perspective of an eyewitness, confirming feedback indicating a correct identification may be a cue to being certain in their identification and having a good view of the target person's face, but holds little relevance to their estimation of time and distance.

Intuitively, judgments of time and distance can be made without the eyewitnesses having a good view of the target person's *face* or making a correct identification (i.e., the target's face is not a crucial element for making time and distance estimates). On the other hand, it is impossible for eyewitnesses to make, for example, certainty judgments without having made an identification and without viewing the target person's face (these are also the bases for making other judgments such as view and attention). Accordingly, eyewitnesses may associate correct identifications with certainty judgments and make inference as suggested by Wells and Bradfield (1998, 1999), "I must have been confident since I made a correct identification;" but they may not spontaneously associate correct identifications with long viewing time and short distance. There is evidence that people tend to associate identification accuracy to variables such as certainty and view, but not to time and distance. Douglass, Neuschatz et al. (2010) found that people evaluating eyewitnesses were most persuaded by those who are certain, independent of actual statements of certainty and view. Further, even when viewing distance of the event was directly manipulated, it did not result in significant changes to testimony-relevant judgments, nor interact with confirming post-identification feedback (MacLean, Brimacombe, Allison, Dahl, & Kadlec, 2011).

We proposed that the lack of post-identification feedback effects on time and distance judgments is due to confirming feedback being irrelevant to these judgments. Our study manipulated feedback by using confirming feedback alongside specific information associating time and distance with a correct identification decision (i.e., participants were explicitly informed that long viewing time and short distance are associated with correct identifications). We predicted that participants who were given this confirming-specific feedback would report their viewing time to be longer and distance to be shorter than participants who were given just the confirming feedback or no feedback. Additionally, we also tested to see whether this effect would only be detected on time and distance judgments when internal cues were weaker (in the delay condition), as would be predicted by the accessibility hypothesis. For the remaining testimony-relevant judgments (e.g., certainty, attention, etc.), we predicted that there should be no interaction effect between feedback (no feedback, confirming feedback, confirming-specific feedback) and retention interval (immediate, delay), as confirming feedback should affect judgments in both the immediate and the delay conditions (Wells et al., 2003; Neuschatz et al., 2005). Furthermore, given confirming feedback was also present when the specific feedback was given, these remaining judgments should be equally affected in both the confirming feedback condition and the confirming-specific feedback condition.

3.3 Experiment 1

3.3.1 Method

3.3.1.1 *Participants*

Participants (109 females, 72 males; age range: 18 to 64; *M* = 23.4 years; *SD* = 5.7 years) were recruited through flyers advertised on University noticeboards and through the research pool of first-year undergraduate psychology students; they were compensated with $15 and course credit, respectively.

3.3.1.2 *Design*

A 3 (confirming feedback, confirming-specific, and no feedback) × 2 (immediate, 1-week delay) between-participants design was used. The dependent variables were participants' responses to the 13 testimony-relevant questions (see Table 3.1).

3.3.1.3 *Procedure*

Following Wells and Bradfield (1998), participants were led to believe that the study was about perceptions of others, and would involve viewing a target person and answering a few questions about the target. Participants were asked to meet the experimenter before being walked to the viewing location in a university building, which was a 40-metre windowless corridor (see Appendix A for a photo of the viewing location). A live target (instead of a video) was used so that participants had appropriate conditions for making distance judgments. Participants (tested in groups between one and four) were asked to stand on assigned spots so that they would be 30 metres away from the target (participants were not aware of this intent). They were then told that their task was to study the target carefully as questions would be asked about her afterwards. They were instructed to stand still, remain silent during viewing, and ignore any distractions. The target person was called to appear using a mobile phone and the experimenter stood behind them during the viewing (with 30s monitored using a stopwatch without participants' knowledge). The experimenter gave a hand signal to the target to return to the hiding place. Participants were instructed to remain silent and were escorted to the computer lab to be allocated randomly to either the immediate or delay condition. Participants in the delay condition were asked to come back on the same day the following week and not to discuss the experiment with anyone.[7]

Participants in the immediate condition proceeded with the rest of the experiment using a computer in a private cubicle. The instructions indicated that the goal of the study was to see if they could identify the target from a photo lineup (Wells & Bradfield, 1998). They were required to make an identification by clicking on a photo. The target-absent lineup consisted of six coloured images matching the description of the target. To increase the likelihood of a positive identification, they were not warned that the target might not be in the lineup. They could not advance to the next screen before choosing a photo. Once they had chosen a photo, they were told to wait while their decision was being assessed. They were then presented with either (a) no feedback, "Please wait until the next screen loads," (b) confirming feedback, "Your identification decision was correct," or (c) confirming-specific feedback, which was the same as the confirming feedback, but with the addition of specific feedback presented in the next screen:

[7] Although this may still result in participants thinking about the viewing event during the 1-week interval, participants were not aware that they were participating in an eyewitness study or that they were required to recall time and distance later on. Furthermore, Experiment 2 was later designed to eliminate this possible bias and produced the same pattern of results as Experiment 1.

> The results from our experiment so far indicate that people are more likely to make a correct identification when they have had sufficient time to view the target's face and when the distance was not too far.

Following this, the testimony-relevant questions (see Table 3.1) were presented.

Finally, all participants responded to a number of manipulation checks. They were asked to recall the information they were given by choosing from one of three options (*I was correct*, *I was incorrect*, or *I was given no information*). Participants in the confirming-specific condition were asked to freely recall the additional information they were given (i.e., the specific information on time and distance). Prior to debriefing, all participants were asked whether they had been suspicious about any of the experimental manipulations.

3.3.2 Results and Discussion

3.3.2.1 *Data screening and exclusion*

Participants were excluded from analysis because they had done a similar eyewitness study (n = 11), were not able to correctly recall the absence or presence of confirming feedback (n = 26, relatively equal across conditions),[8] had distractions during viewing, or were suspicious about the target-absent lineup or the feedback information (n = 6). A total of 137 participants were included in the analysis (there were 19 to 27 participants per condition).

Time judgments were converted to seconds prior to analysis (M = 98.84, SD = 209.36, range: 2-2400 seconds) and distance judgments were converted to metres

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[8] The majority of participants in the confirming-specific condition misunderstood the free recall question. Instead of recalling the specific feedback (i.e., that sufficient time and distance are associated with correct identifications), they recalled other information presented during the experiment. However, they were not excluded from analysis because (a) they were able to correctly recall the confirming feedback, and (b) their time and distance judgments did not differ between those participants who provided full and accurate recall and those who did not.

(*M* = 30.33, *SD* = 62.38, range: 0.91-700 metres). Tests of parametric assumptions (i.e., *z*-scores of skewness and kurtosis, the Kolomogorov-Smirnov [K-S], and the Levene's tests) were significant, indicating violations of normality and homogeneity of variance (variance ranged from 870.36 to 199342.17 for time, and from 281.31 to 21301.98 for distance). Histograms and P-P plots confirmed these tests, and some of these distributions appeared to be more positively skewed than others. These assumptions were still violated following data transformation.[9]

Due to these violations, non-parametric bootstrap confidence intervals were calculated using the bias-corrected and accelerated method (Efron & Tibshirani, 1993) to estimate the difference between means of the conditions that were compared (with 5,000 bootstrap replications per sample). This method overcomes problems with small samples and samples that deviate from normality by using resampling to obtain a stable estimate of the statistic in the population, in this case, the difference between means (see Moore & McCabe, 2006). The alpha level was set at .05 and Bonferroni correction was applied to correct for family wise error rate (i.e., by dividing the alpha by the number of comparison made for each individual prediction), and more conservative confidence intervals were used accordingly (i.e., 97.5%, 98%, and 99% CIs). To provide more stable confidence interval estimates, outliers (z-scores ≥ 3.29) were changed so that their scores were within three standard deviations from the means. There were two outliers on time judgments ($3.43 \leq z$-scores ≤ 3.61) from the (a) no feedback-immediate condition and (b) confirming-specific-immediate condition; and one outlier on distance judgments (z-score = 4.12) from the confirming feedback-delay condition. These outliers were not

[9] Violations of parametric assumptions on time and distance data prevented us from using a mixed-design Analysis of Variance (ANOVA) which compares all testimony-relevant judgments in the same analysis.

removed from analysis to reflect the population, as a few participants reported that they were naturally very poor at making time and distance estimates. Finally, since equal sample sizes were required for the bootstrapping method (our sample sizes ranged from 19 to 27 per condition), 19 participants were randomly selected from each condition ($N = 114$).

3.3.2.2 *Strong internal cues*

If strong internal cues explained the lack of post-identification feedback effects on time and distance judgments, confirming feedback should affect time and distance judgments in the delay condition, but not in the immediate condition. In line with past studies (see meta-analysis by Steblay et al., 2014), we found no difference between the confirming feedback-immediate condition and the no feedback-immediate condition on time judgments, as indicated by the 97.5% CI for the difference between means, which contained zero, [-23.45, 14.37], $d = -0.32$, and no difference was found on distance judgments, [-20.00, 13.89], $d = -0.18$ (small, medium, and large effect sizes are respectively 0.20, 0.50, 0.80; Cohen, 1992). However, comparing between the delay conditions, the confirming feedback condition also did not differ from the no feedback condition in terms of time judgments, 97.5% CI [-52.37, 25.00], $d = -0.16$, and distance judgments, [-37.85, -4.89],[10] $d = 0.15$. These results suggest that the lack of post-identification feedback effects on time and distance judgments may not be due to strong internal cues. However, we noted the possibility that a week delay might not be enough to weaken these internal cues; therefore, Experiment 2 addresses this issue by lengthening the duration of the delay.

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[10] Although the confidence intervals did not cross zero, the effect size was small. It is apparent that this was due to the large variance in the confirming feedback-delay condition depicted in Figure 3.2 (despite the adjustment of outliers).

3.3.2.3 *The relevance of feedback*

Our second prediction tested whether the lack of post-identification feedback effects on time and distance judgments was simply due to confirming feedback being irrelevant to these judgments. Three feedback conditions (confirming-specific feedback, confirming feedback, no feedback) were compared and collapsed across retention interval conditions. In line with our prediction, participants who were given confirming-specific feedback made longer time judgments than participants who were given either confirming feedback, 98% CI [6.70, 70.78], $d = 0.66$, or no feedback, [1.30, 62.06], $d = 0.51$. Participants also made shorter distance judgments in the confirming-specific feedback condition than in either the confirming feedback condition, [-11.07, 7.31], $d = -0.20$, or the no feedback condition, [-26.16, 0.63], $d = -0.38$, however, the difference was not statistically significant. Nonetheless, consistent with past findings, we found no difference between the confirming feedback condition and the no feedback condition on time judgments, [-31.89, 13.45], $d = -0.19$, and on distance judgments, [-22.93, 0.29], $d = 0.08$. These results lend some support to the notion that the lack of post-identification effects on time and distance judgments may be due to the irrelevance of confirming feedback. When additional information about time and distance was presented alongside confirming feedback, at least time judgments were affected. Experiment 2 tests whether distance judgments would also be affected when a stronger feedback manipulation was used.

Finally, we wanted to see whether confirming-specific feedback affected time and distance judgments differently depending on the retention interval conditions. The accessibility hypothesis would predict that these effects should be more pronounced in the delay condition (i.e., when internal cues are expected to be weaker or less accessible) than in the immediate condition. Contrary to this prediction, the effect of confirming-specific feedback on time judgments was only found in the immediate condition. Specifically, in the immediate conditions, participants who received confirming-specific feedback made longer time judgments compared to participants who received confirming feedback, 99% CI [6.84, 95.06], $d = 0.86$, or no feedback, [13.33, 90.46], $d = 0.74$, but this was not the case in the delay conditions, [-28.69, 80.76], $d = 0.50$, and [-30.79, 78.31], $d = 0.34$, respectively (see Figure 3.1). These results are at odds with the accessibility hypothesis which suggests that strong internal cues protect judgments from being influenced by feedback. Experiment 2 tests whether lengthening the delay to 2-weeks results in detecting the effect in the delay conditions.

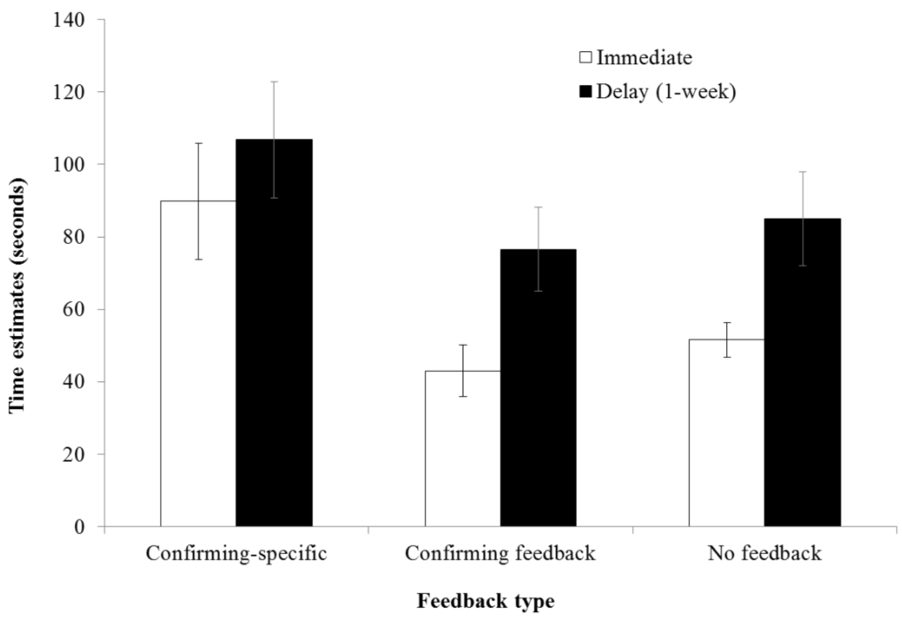

Figure 3.1. Mean time judgments in Experiment 1 for each feedback condition at different retention intervals. Error bars represent standard errors. The actual time was 30 seconds.

Additionally, confirming-specific feedback had no effect on distance judgments in either the immediate conditions, 99% CI [-26.21, 9.32], d = -0.24, and, [-30.79, 8.48], d = -0.43 or the delay conditions, [-5.15, 14.35], d = -0.24, and, [-39.08, 6.78], d = -0.35, when it was compared with confirming feedback and no feedback, respectively (see Figure 3.2).

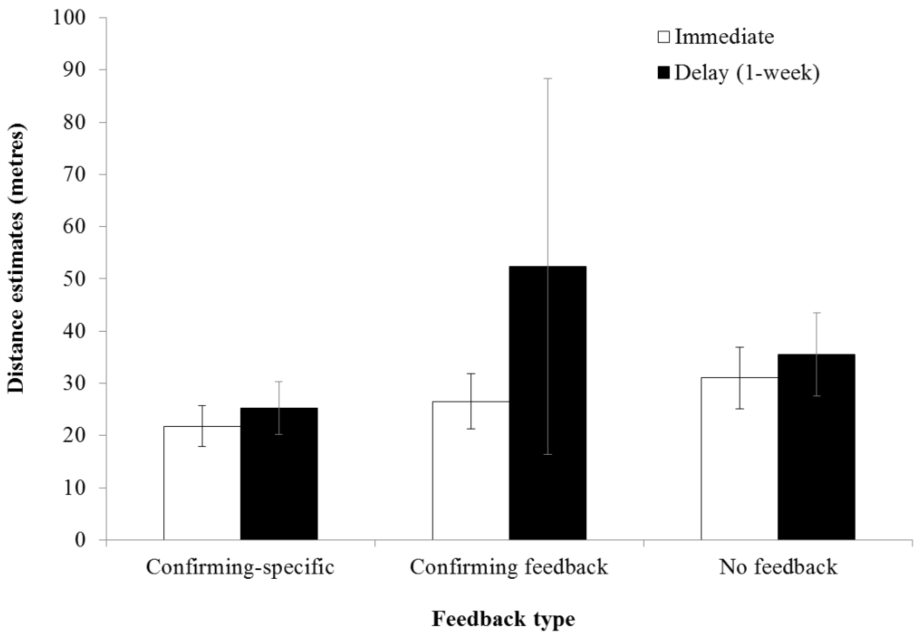

Figure 3.2. Mean distance judgments in Experiment 1 for each feedback condition at different retention intervals. Error bars represent standard errors. The error bar in the confirming feedback-delay condition remained large despite the adjustment of outliers. The actual distance was 30 metres.

3.3.2.4 *Other testimony-relevant judgments*

For the other testimony-relevant judgments (e.g., certainty, attention, view), confirming feedback should affect judgments in both the immediate and the delay conditions, as internal cues of inaccurate eyewitnesses are known to be weak to begin with (Bradfield et al., 2002; Wells et al., 2003). Additionally, we predicted that since confirming-specific feedback also contained confirming feedback, these judgments should be affected in both the confirming feedback condition and the confirming-specific feedback condition.

A Multivariate Analysis of Variance (MANOVA) revealed a significant effect of feedback on nine[11] judgments, $F(18, 246) = 1.77$, $p = .03$, $\eta_p^2 = .12$, but no main effect of retention interval, $F(9, 123) = .75$, $p = .75$, $\eta_p^2 = .05$, and no interaction effect between feedback and retention interval were found, $F(18, 246) = 1.04$, $p = .41$, $\eta_p^2 = .07$. Separate follow-up Analysis of Variances (ANOVAs) indicated a significant effect of feedback on seven judgments (i.e., certainty, basis, ease, identification-time, testify, strangers, and clarity judgments), Fs$(2,131) \geq 3.17$, ps $< .05$, $0.21 \leq r$s ≤ 0.34 (small, medium, and large effect sizes are respectively 0.10, 0.30, 0.50; Cohen, 1992), 95% CIs [≥ 0.04, ≤ 0.48]. As predicted, Bonferroni-adjusted post hoc tests showed no difference between confirming feedback and confirming-specific feedback on all of the nine judgments (see Table 3.2 for more information).

3.4 Experiment 2

Experiment 1 results suggested that the lack of post-identification feedback effects on time and distance may not be due to strong internal cues, but to the irrelevance of confirming feedback. When confirming feedback was given alongside specific feedback that associated viewing time and distance with correct identifications, we found that participants' time judgments were affected. However, although the pattern of results on distance judgments was in the expected direction,

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[11] View and attention judgments were excluded from analysis because they violated assumptions of univariate tests; additionally, attention was also the only variable that did not correlate with the other dependent variables (Tabachnick & Fidell, 2007).

Table 3.2

Mean Testimony-Relevant Judgments in Experiment 1 for Each Feedback Type

	Confirming feedback	Confirming-specific	No feedback
Certainty	66.36 (3.43)[a]	69.00 (3.27)[a]	52.02 (3.46)[b]
	[59.58, 73.15]	[62.54, 75.46]	[45.18, 58.87]
Features	3.84 (0.22)	3.69 (0.21)	3.42 (0.22)
	[3.41, 4.27]	[3.28, 4.10]	[2.98, 3.85]
Basis	4.71 (0.19)[a]	4.53 (0.18)	3.97 (0.19)[b]
	[4.33, 5.08]	[4.17, 4.90]	[3.58, 4.35]
Ease	4.16 (0.21)[a]	4.25 (0.20)[a]	3.14 (0.21)[b]
	[3.75, 4.57]	[3.89, 4.63]	[2.73, 3.55]
Identification	3.98 (0.20)[a]	4.22 (0.19)[a]	3.29 (0.20)[b]
-time	[3.59, 4.37]	[3.85, 4.60]	[2.89, 3.68]
Testify	3.64 (0.25)[a]	3.67 (0.24)[a]	2.78 (0.25)[b]
	[3.15, 4.12]	[3.21, 4.13]	[2.30, 3.28]
Trust	3.30 (0.22)	3.52 (0.21)	3.05 (0.22)
	[2.86, 3.73]	[3.11, 3.94]	[2.61, 3.49]
Strangers	5.27 (0.23)[a]	4.80 (0.22)	4.46 (0.23)[b]
	[4.82, 5.73]	[4.37, 5.24]	[4.00, 4.91]
Clarity	4.57 (0.22)[a]	4.50 (0.21)[a]	3.46 (0.23)[b]
	[4.12, 5.01]	[4.07, 4.92]	[3.01, 3.91]

Note. Certainty was measured on a 0-100 scale. All other measures were measured on a 1-7 scale. Standard errors and 95% confidence intervals are in parentheses and brackets, respectively. Means that differ at $p < .05$ were indicated with different superscripts.

the effect of confirming-specific feedback on distance judgments was not as strong. One possible reason for this is that the specific feedback about distance may have been less salient than the specific feedback about time (as it was presented last). To address this issue, Experiment 2 separated the specific feedback into two conditions, so that participants received confirming feedback alongside the specific feedback that was either about time (i.e., confirming-time condition) or distance (i.e., confirming-distance condition). This feedback would also be delivered personally by the experimenter.

We also found that confirming-specific feedback only affected time judgments in the immediate conditions. The graph in Figure 3.1 showed that participants had a tendency to overestimate time and this overestimation increased following a 1-week delay. This might make it harder to detect the effect in the delay condition (the means for the no feedback-delay condition and the confirming-specific feedback-delay condition were 85 seconds and 106.84 seconds, respectively). Experiment 2 addressed this issue by making each piece of feedback more specific: "Eyewitness research[12] has shown that people who get to see the criminal's face for about 45 seconds (or from 3 metres distance) can usually pick them out of the lineup." These particular numbers were chosen, using a one-sample *t*-test, to ensure that they were longer and shorter, respectively, from the mean estimates of participants in the no-feedback delay condition in Experiment 2, ps < .01. This was done to detect the effect of confirming-specific feedback in the delay condition. If participants were affected by the specific feedback in the delay conditions, their time and distance judgments should be longer and shorter, respectively, than the

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[12] The term "eyewitness research" was used to imply that the information presented was not referring to their viewing time and distance, but rather a generic association between identification accuracy and these judgments.

judgments of participants who were not given feedback. For this reason, in Experiment 2, the no feedback-delay condition was tested first, so that these numbers could be obtained (random allocation followed for the rest of the conditions).

Finally, in Experiment 1, distance judgments were not affected by confirming-specific feedback in either the immediate condition or the delay condition. According to the accessibility hypothesis, judgments should be affected when internal cues are weak. However, looking at Table 3.3, it is possible that strong internal cues were available for distance. The data suggest that on average, participants' estimates of distance were close to the actual distance both in the immediate condition and the delay condition (cf. estimates of time). We speculated that participants' ability to estimate distance was due to the viewing location that was used (i.e., a narrow corridor that contained a lot of distance cues such as side corridors, office doors and exposed bricks alongside the corridor). These cues might have helped participants gauge their estimates and provided stronger cues to distance. Hanyu and Itsukushima (1995) have also found that when participants were asked to estimate distance in a 46-metre long corridor, their estimates were very close to the actual distance (M = 44.74 metres). However, when distance cues were less available (i.e., when viewing took place in various outdoor settings), participants' distance estimates varied (Lindsay, Semmler, Weber, Brewer, & Lindsay, 2008). Experiment 2 tested whether reducing distance cues (by using a video instead of a live target) and lengthening the delay interval (to 2-weeks) would result in feedback effects. In sum, Experiment 2 tested the same predictions as in Experiment 1, using stronger manipulations.

Table 3.3

Mean Time and Distance Judgments Obtained Immediately and After Delay for the No Feedback Condition

	Immediate	Delay	Cohen's *d*
Time	51.55 (21.01) [41.43, 61.68]	85.00 (56.32) [57.85, 112.15]	0.79
Distance	31.00 (25.65) [18.63, 43.36]	35.56 (34.70) [18.83, 52.28]	-0.15

Note. Time and distance judgments were measured in seconds and metres, respectively. Standard deviations and 95% confidence intervals are in parentheses and brackets, respectively. Actual time and distance were 30 seconds and 30 metres, respectively.

3.4.1 Method

3.4.1.1 *Participants*

Participants (192 females and 118 males; age range: 17 to 61; $M = 22.2$ years; $SD = 6.2$ years) were recruited using the same procedure as in Experiment 1.

3.4.1.2 *Design*

A 4 (confirming feedback, confirming-time, confirming-distance, and no feedback) × 2 (immediate, 2-week delay) between-participants design was used. The same dependent variables were recorded as in Experiment 1.

3.4.1.3 *Materials*

The video showed a Caucasian male (the target person) attempting to break into a car. The entire video lasted for 15 seconds (the target was in view for 10 seconds and his face was directed at the camera for 5 seconds). The distance between the target and the camera was approximately 8 metres. He was the only person in the video.

3.4.1.4 *Procedure*

The study was advertised with 2-parts; all participants were aware that Part 2 was to be completed 14 days after the completion of Part 1. Participants in the immediate conditions only found out during debriefing that they had completed both parts and did not need to come back.

Participants were tested one-at-a time with all instructions given via computer. They were informed that they were about to watch a video and instructed to watch carefully and to pay close attention, as questions would be asked later. They were then presented with a filler task consisting of 10 items (taken from the Big Five Personality Test, John & Srivastava, 1999) describing the target person they just saw (e.g., to what extent was the target talkative, reserved, and reliable, measured on a 5-point Likert scale). Participants in the delay condition were told to come back 14 days later for Part 2 and were not provided with further information.

Participants in the immediate condition were asked to move from their computer cubicle to an empty cubicle nearby. The experimenter informed them that this was actually an eyewitness study and that their task was to try to identify the person they saw in the video from a photo lineup. They were provided with a blank piece of paper to write down the number attached to their chosen photo. The target-absent lineup consisted of six coloured photos (laminated on a sheet of paper) matching the description of the target, and as in Experiment 1, participants were under the impression that the target was in the lineup. Once they had chosen a photo, participants in the confirming feedback condition were told, “Good, you correctly identified the target person." Participants in the confirming-time condition were given the same confirming feedback but were also told:

> Maybe I'm not supposed to tell you this,[13] but—eyewitness research has shown that people who get to see the criminal's face for about 45 seconds can usually pick them out of the lineup.

Participants in the confirming-distance condition were given the exact same confirming feedback, but the specific feedback information "for about 45 seconds" was substituted with "from about 3 metres distance." In the no feedback condition, the experimenter collected their answers and asked them to wait. Following this, participants were asked to fill out the testimony-relevant questionnaire using paper and pen; the order of these questions was counter-balanced (see Appendix B).

The rest of the procedure was the same as in Experiment 1 except, instead of free recall, participants in the confirming-time and the confirming-distance conditions were asked whether or not they were told that people who saw a person's face for a certain number of seconds and distance, respectively, could usually identify the person later from the lineup; and were given three options (*Yes I was given this information, No I was not given this information,* or *Unsure*). They then had to provide the number of seconds (or the number of metres) that the experimenter mentioned.

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[13] The first few participants tested in this condition were not paying attention to the specific feedback information; this sentence was therefore added to catch the attention of participants.

3.4.2 Results and Discussion

3.4.2.1 *Data screening and exclusion*

The same exclusion criteria as Experiment 1 applied, 52 participants were excluded from analysis and a further 18 participants were excluded as they did not return in 2 weeks to complete the study. Their data were replaced to ensure that we had 30 participants in each condition ($N = 240$).

Time judgments ranged from 1 to 300 seconds ($M = 21.91$, $SD = 35.62$) and distance judgments ranged from 0.10 to 100 metres ($M = 7.38$, $SD = 11.76$). As with Experiment 1, these judgments violated assumptions of parametric tests (e.g., variance ranged from 72.14 to 4495.67 for time, and from 0.34 to 313.47 for distance) and the same bootstrap confidence intervals method was used. There were two outliers on time judgments ($3.49 \leq z$-scores ≤ 4.77) from the (a) confirming-time-delay condition, and (b) confirming-distance-delay condition; and six outliers on distance judgments ($3.30 \leq z$-scores ≤ 5.10) from the (a) no feedback-immediate condition, (b) no feedback-delay condition, (c) confirming feedback-immediate condition, (d) confirming feedback-delay condition, (e) confirming-time-delay condition, and (f) confirming-distance-immediate condition. These outliers were changed so that their scores were within three standard deviations from the means. Bonferroni correction was applied to correct for family wise error rate, as in Experiment 1.

3.4.2.2 *Strong internal cues*

Experiment 1 results did not support the prediction that the lack of post-identification feedback effects on time and distance judgments may be due to strong internal cues. Again in line with past findings, the confirming feedback-immediate condition did not differ from the no feedback-immediate condition in terms of time judgments, 97.5% CI [-5.23, 5.44], *d* = 0.06. However, distance judgments were found to be shorter in the confirming feedback-immediate condition than in the no-feedback immediate condition, [-4.61, -0.04], *d* = -0.51, although the confidence interval was close to zero. Consistent with Experiment 1 results, no difference was found between the confirming feedback-delay condition and the no feedback-delay condition on time judgments, [-21.51, 38.58], *d* = 0.08, and on distance judgments, [-4.74, 4.00], *d* = -0.03. These results again suggest that the lack of post-identification feedback effects on time and distance judgments may not be due to strong internal cues.

3.4.2.3 *The relevance of feedback*

In Experiment 1, when the data were collapsed across the retention interval conditions, confirming-specific feedback affected time judgments but not distance judgments. The opposite results were found in Experiment 2; no effect of confirming-time feedback was found on time judgments, but confirming-distance feedback affected distance judgments. Specifically, time judgments did not differ between participants who were given confirming-time feedback and participants who were given either (a) no feedback, 99% CI [-7.93, 11.36], *d* = 0.18, (b) confirming feedback, [-19.62, 12.45], *d* = 0.06, or (c) confirming-distance feedback, [-8.35, 11.56], *d* = 0.17. However, participants who were given confirming-distance feedback made shorter distance judgments than participants who were given either (a) no feedback, [-6.17, -1.21], *d* = -0.67, (b) confirming feedback, [-5.11, -0.36], *d* = -0.48, or (c) confirming-time feedback, [-3.99, -0.69], *d* = -0.56. Again, consistent with past findings, no difference was found between the confirming feedback condition and the no feedback condition on time judgments, [-12.01, 23.74], *d* = 0.07, and on distance judgments, [-4.09, 1.47], *d* = -0.18.

In Experiment 1, the effects of confirming-specific feedback on time judgments were only found in the immediate condition. In line with Experiment 1 findings, participants who were given confirming-time feedback made longer time judgments than participants who were given either (a) confirming feedback, 99% CI [3.65, 19.44], *d* = 0.87, (b) confirming-distance feedback, [-3.99, -0.69], *d* = 0.42, or (c) no feedback, [2.91, 20.10], *d* = 0.89, in the immediate condition, but not in the delay condition, [-47.83, 13.00], *d* = -0.18, [-22.45, 13.15], *d* = 0.01, and, [-22.99, 9.02], *d* = -0.13, respectively (see Figure 3.3).

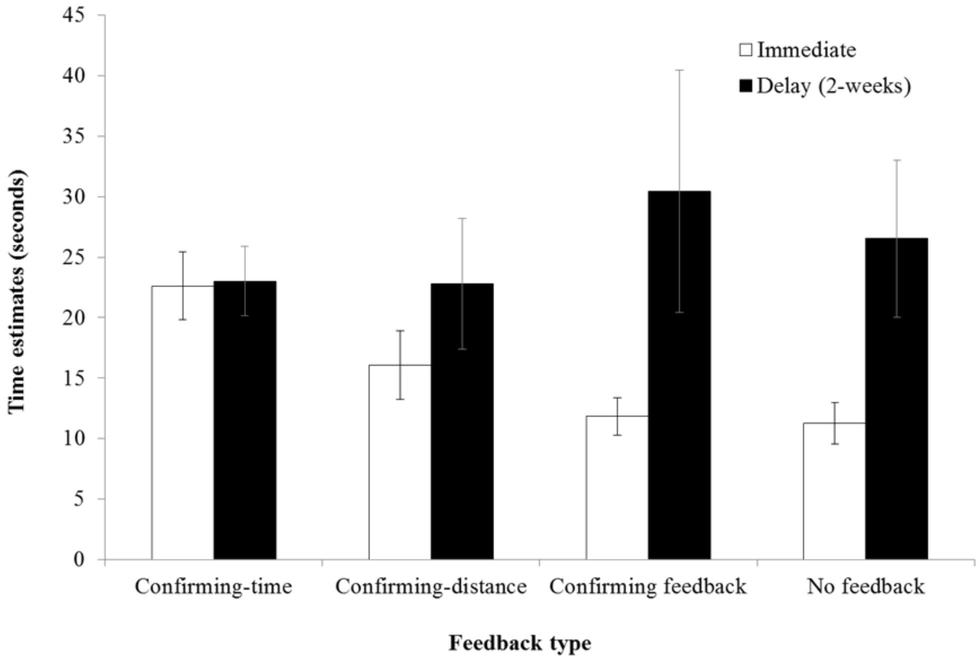

Figure 3.3. Mean time judgments in Experiment 2 for each feedback condition at different retention intervals. Error bars represent standard errors. The error bar in the confirming feedback-delay condition remained large despite the adjustment applied to outliers. The actual time was 5 seconds.

In Experiment 1, confirming-specific feedback did not affect distance judgments in either the immediate or delay condition. In Experiment 2, the effects of confirming-distance feedback on distance judgments were found only in the immediate condition. These results were in line the results on time judgments found in Experiments 1. Specifically, participants made shorter distance judgments in the confirming-distance feedback condition than in either (a) the confirming feedback condition, [-3.16, -0.24], *d* = -0.70, (b) the confirming-time feedback condition, [-4.16, -0.48], *d* = -0.76, or (c) the no feedback condition, [-6.29, -1.55], *d* = -0.97, but only in the immediate condition. The effects of confirming-distance feedback in the delay conditions were not as strong, [-8.14, 0.53], *d* = -0.50, [-5.07, 0.13], *d* = -0.48, and, [-8.01, 0.61], *d* = -0.52, when it was compared with confirming feedback, confirming-time feedback, and no feedback, respectively (see Figure 3.4).

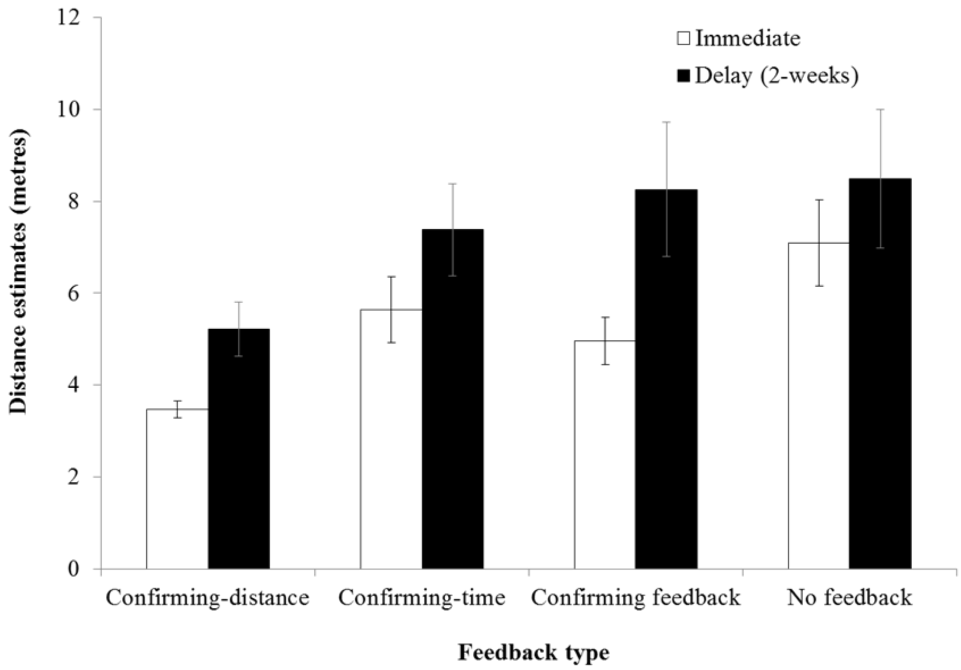

Figure 3.4. Mean distance judgments in Experiment 2 for each feedback condition at different retention intervals. Error bars represent standard errors. The actual distance was approximately 8 metres.

3.4.2.4 *Other testimony-relevant judgments*

As in Experiment 1, the other testimony-relevant judgments should be affected when confirming feedback was present (i.e., in the confirming-time feedback condition, confirming-distance feedback condition, and confirming feedback condition) regardless of retention interval (Wells et al., 2003; Neuschatz et al., 2005).

A 4 Feedback (confirming-time feedback, confirming-distance feedback, confirming feedback, no feedback) × 2 Retention Interval (immediate, delay) MANOVA was conducted on the remaining 10 testimony-relevant judgments.[14] We found a main effect of feedback, $F(30, 655.23) = 3.73$, $p < .001$, $\eta_p^2 = .14$, a main effect of retention interval, $F(10, 223) = 2.70$, $p = .004$, $\eta_p^2 = .11$, and no interaction between feedback and retention interval, $F(30, 655.26) = 1.30$, $p = .14$, $\eta_p^2 = .06$.

Separate univariate ANOVAs indicated significant feedback effects on all 10 judgments, $F\text{s}(3, 232) \geq 3.54$, $p\text{s} < .02$, $0.21 \leq r\text{s} \leq 0.46$, 95% CIs [≥ 0.09, ≤ 0.55]. Bonferroni-adjusted post hoc tests showed that judgments in the no feedback condition were significantly lower than the other three feedback conditions (except for identification-time, see Table 3.4). As predicted, participants' testimony-relevant judgments did not differ between the three feedback conditions (i.e., confirming feedback, confirming-time, confirming-distance), $p\text{s} \geq .23$. Additionally, separate univariate ANOVAs indicated no significant retention interval effects, except for basis and clarity judgments, $F\text{s}(1, 232) \geq 8.44$, $p\text{s} < .02$, $r\text{s} \leq 0.19$, 95% CIs [≥ 0.003, ≤ 0.31], where participants in the delay conditions scored lower on these judgments than participants in the immediate condition.

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[14] Certainty judgments were excluded from analysis due to violations of homogeneity of variance (i.e., the Hartley's F_{Max} was significant).

Table 3.4

Mean Testimony-Relevant Judgments in Experiment 2 for Each Feedback Type

	Confirming feedback	Confirming-time	Confirming-distance	No feedback
View	5.02 (0.16)[a]	5.08 (0.16)[a]	5.25 (0.16)[a]	3.88 (0.16)[b]
	[4.70, 5.33]	[4.77, 5.40]	[4.93, 5.57]	[3.57, 4.20]
Features	4.45 (0.17)[a]	4.45 (0.17)[a]	4.63 (0.17)[a]	3.37 (0.17)[b]
	[4.11, 4.79]	[4.11, 4.79]	[4.30, 4.97]	[3.03, 3.70]
Attention	5.35 (0.16)[a]	5.72 (0.16)[a]	5.35 (0.16)[a]	4.63 (0.16)[b]
	[5.03, 5.67]	[5.40, 6.04]	[5.03, 5.67]	[4.32, 4.95]
Basis	4.67 (0.16)[a]	4.57 (0.16)[a]	4.95 (0.16)[a]	3.27 (0.16)[b]
	[4.36, 4.98]	[4.26, 4.88]	[4.64, 5.26]	[2.96, 3.58]
Ease	4.52 (0.17)[a]	4.72 (0.17)[a]	4.40 (0.17)[a]	3.17 (0.17)[b]
	[4.18, 4.86]	[4.38, 5.06]	[4.06, 4.74]	[2.83, 3.51]
Identification-time	4.57 (0.18)[a]	4.78 (0.18)	4.55 (0.18)	4.00 (0.18)[b]
	[4.22, 4.92]	[4.34, 5.13]	[4.20, 4.90]	[3.65, 4.35]
Testify	4.20 (0.21)[a]	3.88 (0.21)[a]	4.28 (0.21)[a]	2.55 (0.21)[b]
	[3.79, 4.61]	[3.48, 4.29]	[3.88, 4.69]	[2.14, 2.96]
Trust	4.78 (0.17)[a]	4.43 (0.17)[a]	4.78 (0.17)[a]	3.47 (0.17)[b]
	[4.46, 5.11]	[4.11, 4.76]	[4.46, 5.11]	[3.14, 3.79]
Strangers	5.20 (0.18)[a]	5.45 (0.18)[a]	4.92 (0.18)[a]	4.23 (0.18)[b]
	[4.84, 5.56]	[5.09, 5.81]	[4.56, 5.27]	[3.88, 4.60]
Clarity	4.45 (0.17)[a]	4.75 (0.17)[a]	4.50 (0.17)[a]	3.18 (0.17)[b]
	[4.11, 4.79]	[4.41, 5.09]	[4.16, 4.84]	[2.85, 3.52]

Note. All measures were measured on a 1-7 scale. Standard errors and 95% confidence intervals are in parentheses and brackets, respectively. Means that differ at $p < .05$ were indicated with different superscripts.

3.5 General Discussion

A lack of post-identification feedback effects has been consistently found on time and distance judgments (Steblay et al., 2014). Two possible explanations were investigated. First, strong internal cues may protect these judgments from being influenced (as predicted by the accessibility hypothesis). Second, confirming feedback or information about being correct may not be relevant to judgments about time and distance. We found support for the second explanation. Specifically, when confirming feedback was presented alongside specific feedback that associated time and distance with a correct identification decision, time judgments (Experiments 1 and 2) and distance judgments were affected (Experiment 2) in the immediate condition. In line with Neuschatz et al. (2005), confirming feedback alone did not affect time and distance judgments in either of the retention interval conditions (Experiment 1). However, in Experiment 2, confirming feedback affected distance judgments in the immediate condition, but not in the delay condition. Participants in the immediate condition receiving confirming feedback made shorter distance judgments than those receiving no feedback. A small number of post-identification feedback studies also found similar results, but often the difference was marginal (e.g., Lampinen et al., 2007). These results contradict Quinlivan et al.'s (2012) findings which found the effect in the delay condition but not in the immediate condition. The direction of this effect, however, is unclear as the mean distance for the confirming feedback-delay condition and the no feedback-delay condition were equal (*M*s = 3.1, *SD*s = 1.60; Quinlivan et al. [Table 1]). Regardless, our results suggest that the lack of post-identification feedback effects on time and distance judgments may be due mainly to confirming feedback being irrelevant to these judgments.

Note that we found no effects of confirming-specific feedback on time and distance judgments in the delay condition. We suggested that it may be difficult to detect these effects in the delay condition because, even without the influence of feedback, these judgments tend to increase naturally (i.e., see Figures 3.3 and 3.4). Hence, these results do not invalidate the accessibility hypothesis because, when cues specific to distance were weakened (by using a video paradigm in Experiment 2), confirming-distance feedback affected distance judgments in the immediate condition. Therefore, our results suggest that the relevance of feedback information also plays an important role in determining whether or not judgments would be affected.

The finding that the removal of distance cues affected distance judgments in Experiment 2 indicate that the source of internal cues for making distance judgments may be different than that of other judgments. Bradfield et al. (2002) suggested that eyewitnesses use their ecphoric experience (Tulving, 1981) when making certainty judgments; and that strong internal cues are a result of high ecphoric similarity. Ecphoric similarity is a subjective memory judgment that is based on perceived similarity between a stimulus and a person's memory; high ecphoric similarity indicates a high match between the photo of the target person in the lineup and the image of the target person in memory, which leads to high certainty judgments. Bradfield et al. suggested that eyewitnesses may use their ecphoric experience as a cue to make inferences about other judgments (view, attention, basis, etc.). Our results suggest that distance cues (such as depth) are important for making distance judgments. Future research needs to investigate the specific cues that govern time and distance judgments, to further understand the mechanism behind the post-identification feedback effects.

Our results suggest that participants only relied on external cues if they were relevant to the judgments in question. This new finding has important implications for theoretical accounts of the post-identification feedback effect and the practical use of these judgments in the legal system. Further theoretical frameworks should explore mechanisms that can explain what witnesses pay attention to when searching and integrating feedback into their judgments. This may be further informed by studies examining different types of feedback in comparison with the standard confirmatory feedback. Additionally, we need to test the effect of specific feedback on subjective judgments that are reliably affected by confirming feedback (e.g., testing the effect of feedback that states that confidence is highly associated with accuracy, on certainty judgments). Such research would further explain the mechanism behind the post-identification feedback effects, and may point to specific interventions to limit the influence of feedback (aside from the obvious recommendations to use blind testing procedures).

3.5.1 Practical Implications

Our research found that although time and distance judgments were consistently found to be unaffected by confirming feedback, they were not completely immune to feedback influence. Hence, the courts should be mindful of the vulnerability of time and distance judgments to external influences, especially to information involving time and distance. Specific feedback of this type may be unheard of in case reports; however, it is possible for eyewitnesses to be aware of this kind of information. Upon receiving specific feedback, one participant in our study reported that he was aware of this information from reading and watching documentaries about eyewitnesses. Another participant in our study was a co-witness to a real crime and reported that she had heard police make similar comments (i.e., that the other witness was able to make an identification because she had seen the perpetrator for half a minute). Our research shows that eyewitnesses' time and distance judgments can be affected just by knowing this information.

Our findings also have implications for the methodology used in eyewitness research. In Experiment 2 we were able to show the effect of specific feedback on distance judgments by removing distance cues (i.e., using a video instead of a live paradigm). Therefore, it is possible that the removal of distance cues (e.g., using a video) shaped whether or not these judgments would be affected. Videos were commonly used in post-identification feedback studies (e.g., Bradfield et al., 2002; Neuschatz et al., 2005; Quinlivan et al., 2012; Wells et al., 2003; Wells & Bradfield, 1998, 1999). Future research should investigate whether the use of videos is appropriate to measure eyewitnesses' distance judgments under the influence of feedback.

3.5.2 Summary and Conclusion

Our research advances the understanding of the lack of post-identification feedback effect on time and distance judgments. We found that the presence of a strong internal cue was not the only reason for the lack of effects; in other words, the accessibility hypothesis alone cannot be used to fully explain the lack of these effects. We found that the relevance of feedback was also important to determine whether or not judgments would be affected. Our research highlights the importance of following recommendations suggested by past research; namely, to reduce delay between occurrence of a crime and the report of testimony-relevant judgments whenever possible (to negate any external influences), and to use double-blind lineup procedures to prevent feedback of any sort from being delivered to eyewitnesses (Douglass & Steblay, 2006; Wells & Bradfield, 1998).

CHAPTER 4: Can Inferences Be Made About Time-in-View and Distance Judgments?

Experiments 1 and 2 results suggest that the lack of post-identification feedback effects on time and distance may mainly be due to confirming feedback being irrelevant to these judgments. Time and distance judgments were only affected when participants were given confirming feedback alongside specific information that associated time and distance with a correct identification decision (i.e., the confirming-specific feedback). However, although the effect of confirming-specific feedback on time judgments was found in Experiment 1, its effect was not found on distance judgments. One possible reason for this is the viewing location contained a lot of distance cues, which might have helped participants gauge their estimates and provided stronger cues to distance. Experiment 2 addressed this issue and found that when distance cues were removed (i.e., by using a video to show the target person), distance judgments were affected by confirming-specific feedback.

However, there is another possible reason why distance judgments were not affected by confirming-specific feedback in Experiment 1. During debriefing, participants in Experiment 1 often commented that the distance from which they viewed the target (i.e., 30 metres) was too far. The fact that they were able to correctly identify the target person despite the long viewing distance contradicted the specific feedback information that suggested otherwise:

> Your identification decision was correct. The results from our experiment so far indicate that people are more likely to make a correct identification when they have had sufficient time to view the target's face and when the distance was not too far.

Consequently, participants might have ignored the information.

Experiment 3 was conducted to test this possibility by using the same live paradigm as was used in Experiment 1, but reducing the viewing distance to 15 metres (cf. 30 metres). However, the viewing time of the target person was also reduced to 15 seconds (cf. 30 seconds) in order to minimise the possibility of participants rejecting the target-absent lineup (due to a shorter viewing distance). Additionally, the wording of the confirming-specific feedback in Experiment 3 was modified as follows:

> The current results of our ongoing experiments indicate that the longer somebody views the target person, and the shorter the distance from the target person, the more likely it is that a correct identification is made. And you made a correct identification.

This feedback (i.e., called the *specific-confirming feedback*) still contains information associating viewing time and distance with a correct identification decision (as the confirming-specific feedback in Experiments 1 and 2), but it just does not specify how long the viewing time or how short the viewing distance needs to be. This was done so that the specific feedback about time and distance would not contradict participants' viewing experiences.

As in Experiment 1, participants were either given the specific-confirming feedback, confirming feedback, or no feedback. Based on Experiments 1 and 2 results, it was predicted that specific-confirming feedback would affect time and distance judgments but confirming feedback alone would not affect these judgments. Retention interval (between viewing an event and making judgments) was again manipulated to test the accessibility hypothesis, to see whether the effects of feedback on time and distance judgments were more pronounced in the delay condition (i.e., when internal cues were weaker or less accessible) than in the immediate condition. However, for the remaining judgments (e.g., certainty, attention, etc.), confirming feedback should have an effect regardless of retention interval, as internal cues about these judgments were weak to begin with (Wells et al., 2003; Neuschatz et al., 2005). Finally, given confirming feedback was also present when the specific feedback was given, these remaining judgments should be equally affected in both the confirming feedback condition and the specific-confirming feedback condition.

4.1 Experiment 3

4.1.1 Method

4.1.1.1 *Participants*

Participants (142 females, 63 males; age range: 17 to 55, $M = 23.0$ years; $SD = 7.3$ years) were recruited through flyers advertised on universities' noticeboards and through the research pool of first-year undergraduate psychology students; they were compensated with $15 and course credit, respectively.

4.1.1.2 *Design*

As with Experiment 1, a 3 Feedback (confirming feedback, specific-confirming feedback, and no feedback) × 2 Retention Interval (immediate, 1-week delay) between-participants design was used. The dependent variables were participants' responses to the 13 testimony-relevant questions.

4.1.1.3 *Procedure*

Similar to Experiments 1 and 2, participants were led to believe that the study was about perceptions of others and would involve viewing a target person, answering personality questions about the target, and solving a simple puzzle task for a different experiment either immediately or on the same day the following week (this was done to prevent participants from rehearsing the witnessed event).

Participants were tested alone or in pairs, and viewed the target person from 15 metres and for 15 seconds. The viewing procedure and the target person were the same as in Experiment 1. Following this, they were escorted to an individual room to complete a short personality questionnaire concerning the target (the same questionnaire that was used in Experiment 2). They were then randomly allocated to either the immediate or the delay condition. Participants in the delay condition were asked to come back on the same day the following week to complete a puzzle task.

Participants in the immediate condition proceeded with the puzzle task in an individual room. The task was a simple maze puzzle, which was to find a route through the maze from the starting point to the finish point. Participants were asked to solve the puzzle as fast as they could and they were generally able to solve it in under 2-minutes. Afterwards, the experimenter revealed the true intent of the study; participants were told that this was actually an eyewitness study and that their task was to identify the person they saw earlier (they were given the same target-absent photo lineup used in Experiment 1). Participants were under the impression that the target was in the lineup and were asked to write down the number attached to their chosen photo on a blank piece of paper. The experimenter then left the room until the participants had made an identification decision. Participants in the no feedback condition were asked to place their answers in an envelope so that it remained unknown to the experimenter. Participants in the confirming feedback condition were told, “Good, you identified the target.” Participants in the specific-confirming feedback condition were told:

> Okay, I'm going to tell you information about this study in more detail. We are interested to see whether or not optimal viewing time and distance affected your ability to correctly identify the target person. The current results of our ongoing experiments indicate that the longer somebody views the target person, and the shorter the distance from the target person, the more likely it is that a correct identification is made. And you made a correct identification.

Participants subsequently completed the testimony-relevant questionnaire followed by a number of manipulation checks using paper and pen. The rest of the procedure was the same as in Experiment 1. Participants in the specific-feedback were asked to freely recall the additional information they were given (i.e., the specific feedback about time and view). If participants were unsure about which information to recall, they were told that the additional information was about "the viewing time and distance information" that was mentioned earlier by the experimenter. Prior to debriefing, all participants were asked whether they had been suspicious about any of the experimental manipulations.

4.1.2 Results

4.1.2.1 *Data screening and exclusion*

Participants were excluded from analysis if they did not provide full and accurate recall of the specific feedback (n = 12),[15] rejected the target-absent lineup, made more than one identification, were suspicious about the feedback, missed completing the questionnaire, or reported that they had seen the target person prior to

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[15] Participants who were unsure about the recall question (n = 5) were included in analysis as they were able to provide full and accurate recall after being prompted that the question referred to "the viewing time and distance information" that the experimenter mentioned earlier.

experiment (n = 33). A total of 172 participants were included in the analysis; there were 27 to 30 participants per condition.

Time judgments were converted to seconds prior to analysis (M = 46.63, SD = 58.85, range: 5-600 seconds) and distance judgments were converted to metres (M = 16.06, SD = 22.53, range: 1-250 metres). As in Experiments 1 and 2, tests of parametric assumptions were significant, indicating violations of normality and homogeneity of variance (variance ranged from 1358.22 to 12196.70 for time, and from 86.48 to 1958.19 for distance). Accordingly, non-parametric bootstrap confidence intervals were used (with 27 participants randomly selected from each condition, as equal sample sizes were required by this method, N = 162). As in Experiments 1 and 2, a Bonferroni correction method was applied to correct for family wise error rate and outliers were adjusted to scores within three standard deviations from the means to provide more stable estimates. There were four outliers on time judgments ($3.73 \leq z$-scores ≤ 4.68) from the (a) no feedback-immediate condition, (b) confirming feedback-delay condition, (c) specific-confirming feedback-immediate condition, and (d) specific-confirming feedback-delay condition; and five outliers on distance judgments ($3.79 \leq z$-scores ≤ 4.94) from the (a) no feedback-immediate condition, (b) no feedback-delay condition, (c) confirming feedback-immediate condition, (d) confirming feedback-delay condition, and (e) specific-confirming feedback-delay condition.

4.1.2.2 ***Time and distance judgments***

When collapsed across the retention interval conditions, the effect of confirming-specific feedback was found on time judgments in Experiment 1 and on distance judgments in Experiment 2. However, in Experiment 3, no effect of specific-confirming feedback was found on either time or distance judgments.

Specifically, the specific-confirming feedback condition did not differ from either the confirming feedback condition, 98% CI [-24.14, 8.56], *d* = -0.20, or the no feedback condition, [-25.39, 6.66], *d* = -0.23 on time judgments, and on distance judgments, [-8.25, 2.33], *d* = -0.20, and [-3.23, 4.91], *d* = -0.06, respectively. Nonetheless, consistent with the post-identification feedback findings, confirming feedback alone did not affect either time judgments, [-18.44, 16.17], *d* = -0.03, or distance judgments, [-1.03, 8.19], *d* = 0.25.

When the retention interval conditions were not collapsed, the effects of confirming-specific feedback on time judgments (Experiments 1 and 2) and distance judgments (Experiment 2) were found in the immediate condition but not in the delay condition. In Experiment 3, no effects of confirming-specific feedback were found on time and distance judgments in either the immediate condition or the delay condition. Time judgments in the specific-feedback condition did not differ from either the confirming feedback condition, 99% CI [-20.00, 19.44], *d* = -0.03, or the no feedback condition, [-20.34, 23.73], *d* = 0.11, in the immediate condition, and also in the delay condition, [-46.33, 16.05], *d* = -0.33, and [-50.37, 6.01], *d* = -0.51, respectively (see Figure 4.1). Similarly, distance judgments in the specific-confirming condition did not differ from either the confirming feedback condition, [-3.35, 8.50], *d* = 0.21, or the no feedback condition, [-5.22, 8.83], *d* = 0.12, in the immediate condition, and also in the delay condition, [-18.92, 1.00], *d* = -0.50, and [-5.79, 4.82], *d* = -0.01, respectively (see Figure 4.2).

Finally, time and distance judgments of participants who were given confirming feedback were compared with time and distance judgments of participants who were given no feedback in each of the retention interval condition. In Experiment 1, confirming feedback alone did not affect time and distance

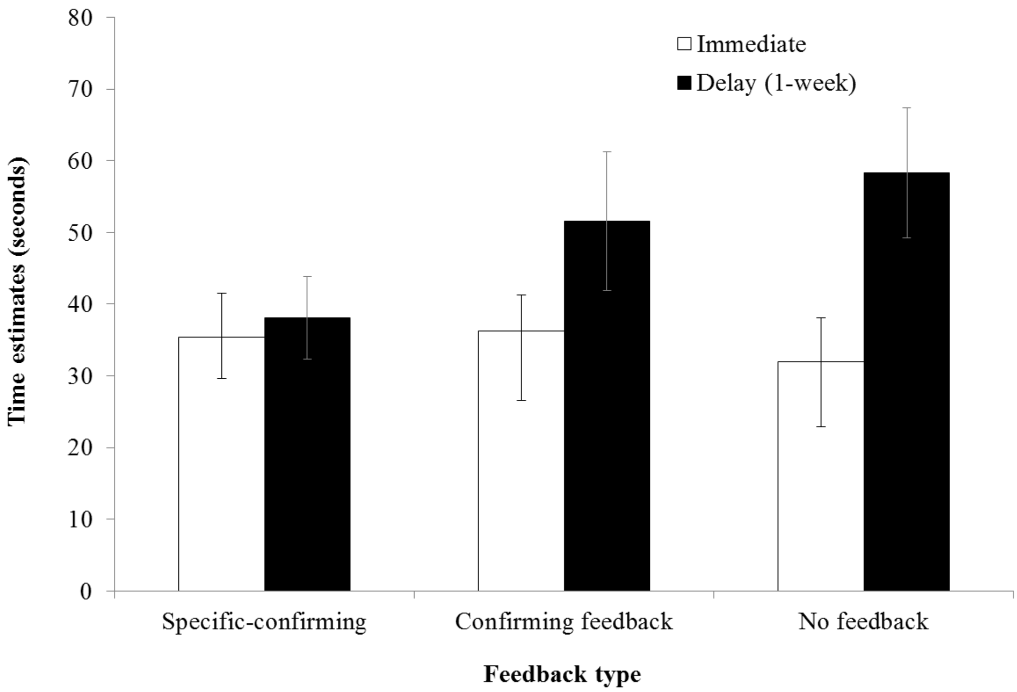

Figure 4.1. Mean time judgments for each feedback condition at different retention intervals. Error bars represent standard errors. The actual time was 15 seconds.

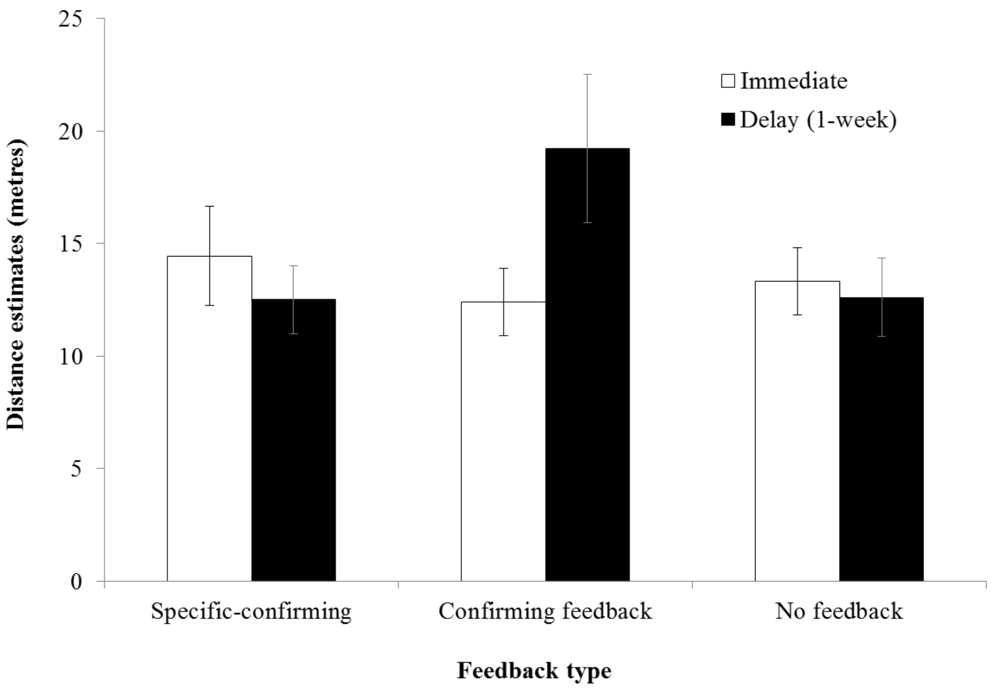

Figure 4.2. Mean distance judgments for each feedback condition at different retention intervals. Error bars represent standard errors. The actual distance was 15 metres.

judgments in either the immediate or the delay condition. The same results were found in Experiment 2, except that confirming feedback affected distance judgments in the immediate condition. In Experiment 3, however, the effect of confirming feedback was found on distance judgments, but only in the delay condition. Specifically, no effect of confirming feedback was found on either time judgments, 97.5% CI [-16.16, 22.75], d = 0.15, or distance judgments, [-5.98, 3.79], d = -0.12, when these judgments were obtained in the immediate condition. However, in the delay condition, although participants' time judgments in the confirming feedback condition did not differ from the no feedback condition, [-32.68, 21.23], d = -0.14, participants made larger distance judgments when they were given confirming feedback compared to when they were given no feedback, [1.15, 15.99], d = 0.48. Only one other study has found similar result (Quinlivan et al., 2012). Note that the effect size of the difference might not have been large, as the mean distance for the confirming feedback-delay condition and the no feedback-delay condition were equal (*M*s = 3.1, *SD*s = 1.60; Quinlivan et al. [Table 1]). So far, there has not been strong empirical support that confirming feedback affects time and distance judgments, either in the immediate condition or the delay condition (see Steblay et al., 2014; Neuschatz et al., 2005).

4.1.2.3 *Other testimony-relevant judgments*

As in Experiments 1 and 2, a 3 Feedback (specific-confirming feedback, confirming feedback, no feedback) × 2 Retention Interval (immediate, delay) MANOVA was conducted on the remaining 11 judgments. The results revealed a main effect of feedback, $F(22, 312) = 2.14$, $p = .003$, $\eta_p^2 = .13$, no main effect of retention interval, $F(11, 156) = 1.23$, $p = .27$, $\eta_p^2 = .08$, and no interaction between feedback and retention interval, $F(22, 312) = 1.17$, $p = .28$, $\eta_p^2 = .08$.

Separate follow-up ANOVAs indicated a significant effect of feedback on nine judgments (i.e., certainty, view, basis, ease, identification-time, testify, trust, strangers, clarity), $F\text{s}(2, 166) \geq 3.13$, $p\text{s} < .05$; $0.22 \leq r\text{s} \leq 0.35$, 95% CIs [≥ 0.07, ≤ 0.48]. In line with previous post-identification feedback studies, Bonferroni-adjusted post hoc tests showed that participants scored higher on these nine judgments when they were only given confirming feedback as compared to when they were given no feedback ($p\text{s} \leq .04$). As predicted, judgments did not differ between the confirming feedback condition and the specific-confirming feedback condition, $p\text{s} \geq .13$ (except a marginal effect was found on clarity judgment, $p = .048$). However, it is noteworthy that compared to participants who were given no feedback, participants who were given the confirming feedback alongside the specific feedback only scored higher on three judgments (i.e., certainty, basis, and ease, $p\text{s} \leq .04$). These results suggest that the modified wording of the specific feedback might have mitigated the effects of confirming feedback on these judgments. As shown in Table 4.2, the specific-confirming feedback condition had means that were higher than the no feedback condition but lower than the confirming feedback condition.

4.1.3 Discussion

Distance judgments were not affected by confirming-specific feedback in Experiment 1. The aim of Experiment 3 was to test whether this was due to the contradictory information presented in the specific feedback (i.e., the specific feedback stated that people were more likely to make a correct identification when the viewing distance was not too far—where in fact the viewing distance in Experiment 1 might have been too far). Experiment 3 tested this by reducing the viewing distance and modifying the wording of the specific feedback (so that the length of viewing distance and time was not specified).

Table 4.2

Mean Testimony-Relevant Judgments in Experiment 3 for Each Feedback Type

	Confirming feedback	Specific-confirming	No feedback
Certainty	5.70 (0.18)[a]	5.22 (0.19)[a]	4.56 (0.18)[b]
	[5.33, 6.06]	[4.85, 5.60]	[4.20, 4.93]
View	5.54 (0.14)[a]	5.46 (0.15)	5.03 (0.14)[b]
	[5.27, 5.82]	[5.18, 5.75]	[4.76, 5.31]
Features	4.25 (0.17)	4.37 (0.18)	3.97 (0.17)
	[3.91, 4.59]	[4.01, 4.73]	[3.63, 4.31]
Attention	4.63 (0.18)	4.80 (0.19)	4.51 (0.18)
	[4.28, 4.98]	[4.43, 5.16]	[4.15, 4.86]
Basis	4.83 (0.19)[a]	4.54 (0.19)[a]	3.73 (0.19)[b]
	[4.47, 5.20]	[4.16, 4.92]	[3.37, 4.10]
Ease	5.22 (0.20)[a]	4.89 (0.21)[a]	4.06 (0.20)[b]
	[4.83, 5.61]	[4.48, 5.30]	[3.67, 4.44]
Identification-	5.15 (0.18)[a]	4.96 (0.19)	4.53 (0.18)[b]
time	[4.80, 5.50]	[4.59, 5.33]	[4.17, 4.88]
Testify	4.87 (0.22)[a]	4.24 (0.23)	3.51 (0.22)[b]
	[4.44, 5.30]	[3.79, 4.69]	[3.08, 3.94]
Trust	4.49 (0.19)[a]	3.93 (0.20)	3.71 (0.19)[b]
	[4.12, 4.87]	[3.53, 4.32]	[3.33, 4.09]
Strangers	5.31 (0.20)[a]	4.91 (0.21)	4.53 (0.20)[b]
	[4.92, 5.70]	[4.50, 5.31]	[4.14, 4.91]
Clarity	5.32 (0.17)[a]	4.74 (0.17)[b]	4.31 (0.17)[b]
	[4.99, 5.65]	[4.40, 5.08]	[3.98, 4.63]

Note. All measures were measured on a 1-7 scale. Standard errors and 95% confidence intervals are in parentheses and brackets, respectively. Means that differ at $p < .05$ were indicated with different superscripts.

It was found that, although the specific-confirming feedback in Experiment 3 still associated viewing time and distance with a correct identification decision (as the confirming-specific feedback in Experiments 1 and 2), it did not affect time and distance judgments, irrespective of internal cue strength. These results are at odds with the findings from Experiments 1 and 2, which found that in the immediate condition, confirming-specific feedback affected time judgments (and affected distance judgments in Experiment 2). It is therefore possible that the modified wording of the specific feedback might have caused these conflicting results.

In Experiments 1 and 2, the specific feedback specified the length of time and distance; specifically, the confirming-specific feedback in Experiment 1 was as follows:

> Your identification decision was correct. The results from our experiment so far indicate that people are more likely to make a correct identification when they have had sufficient time to view the target's face and when the distance was not too far.

In Experiment 2, the confirming-specific feedback was as follows:

> Good, you correctly identified the target person. Maybe I'm not supposed to tell you this, but—eyewitness research has shown that people who get to see the criminal's face for about 45 seconds (or from about three metres distance) can usually pick them out of the lineup.

Consequently, participants who were given the confirming-specific feedback in Experiments 1 and 2 might have used an anchoring-and-adjustment heuristic when making time and distance judgments (Tversky & Kahneman, 1974). According to Tversky and Kahneman, when people are asked to provide an estimate of a quantity (an absolute judgment), they adjust their estimate based on the initial value that was presented, and use this value as an anchor for their estimate. Anchoring occurs due to the activation of information that is consistent with the anchor value, resulting in the assimilation of one's absolute judgment into the anchor value (Chapman & Johnson, 1999; Furnham & Boo, 2011; Mussweiler & Strack, 1999; Strack & Mussweiler, 1997).

For example, participants in Experiment 2 were provided with a value of 45 seconds when they were given specific feedback about time. Accordingly, participants might have used this value as a reference point for their judgments, resulting in them producing judgments that were closer to this anchor value. In Experiment 1, although the specific feedback did not contain any numerical values, the feedback mentioned that *sufficient* viewing time was associated with a correct identification decision, which might in turn trigger the activation of information related to sufficient viewing time. Consequently, participants might self-generate a value that they considered sufficient for viewing time, and generated their time judgments based on this value.

Distance judgments were not affected by confirming-specific feedback in Experiment 1. One possible reason for this is that the presence of strong distance cues at the viewing location might have protected distance judgments from anchoring effects; as it has been found that anchoring effects can be moderated by people's knowledge or information stored in their long-term memory (Chapman & Johnson, 1994; Wilson, Houston, Etling, & Brekke, 1996). Accordingly, when distance cues (such as depth) were removed in Experiment 2, distance judgments might have been affected by confirming-specific feedback because participants did not have sufficient information to make distance judgments, and as a result, they relied on the anchor value that was presented in the confirming-specific feedback to make these judgments. Note that when this anchor value was removed from the specific feedback in Experiment 3, time or distance judgments were no longer affected, because the feedback no longer specified a reference point that could be used as an anchor for these judgments. These results suggest that the effects of confirming-specific feedback on time judgments (in Experiments 1 and 2) and distance judgments (in Experiment 2) may simply have been due to anchoring effects. Furthermore, these suggest that eyewitnesses may not infer their viewing time and distance judgments from a correct identification decision, despite being given this information.

Additionally, the specific feedback in Experiment 3 was found to mitigate the effects of confirming feedback on the remaining testimony-relevant judgments (e.g., view, identification-time, testify, etc.). Participants who were given the specific-confirming feedback scored lower on these remaining judgments compared to participants who were only given the confirming feedback. Although the aforementioned differences were not significant, participants who were given specific-confirming feedback did not differ from participants who were given no feedback, except on three judgments (participants who were only given confirming feedback differed on *nine* judgments compared to participants who were given no feedback). These results suggest that participants might have inferred their judgments (i.e., of view, identification-time, testify, clarity, etc.) from both the specific feedback and the confirming feedback. Supporting this, during debriefing a few participants mentioned that—had they been given the opportunity to view the target for a longer period of time and from a shorter distance, they would have found the identification task to be easier. Similarly, one participant wrote, “I was informed by the experimenter that people had a better view (and recall the person) if viewing time was longer and the viewing distance was shorter," when they were asked to recall the specific feedback; and another participant wrote, "Results are beginning to show that facial recognition improves with shorter distances and longer lengths of time." These results suggest that these judgments (i.e., view, identification-time, testify, clarity, etc.) can also be affected by types of information other than confirming feedback.

So far, the mitigating effects of confirming post-identification feedback on eyewitnesses' testimony-relevant judgments have only been found in studies involving suspicion, for example, when eyewitnesses were told that the confirming feedback information might have been false (e.g., Neuschatz et al., 2007; Quinlivan et al., 2010). The results presented above suggest that the effect of confirming feedback can also be mitigated by other types of information that do not undermine the credibility of confirming feedback. Further, these suggest that the inference processes by which judgments are made might be more complex than was postulated by the accessibility hypothesis (e.g., "I was correct, therefore I must have been confident"). Nonetheless, according to the present findings, such inference processes may not occur when participants make time and distance judgments. The next section investigates this issue further.

4.2 Do Eyewitnesses Infer Their Time-in-View and Distance Judgments from a Correct Identification Decision?

The results presented in the earlier section suggest that (a) participants might not infer their viewing time and distance from a correct identification decision, and (b) that time judgments (in Experiments 1 and 2) and distance judgments (in Experiment 2) might be affected by confirming-specific feedback due to anchoring effects (due to the anchor value presented in the specific feedback). To test whether participants inferred their viewing time and distance from a correct identification decision, two additional conditions were run where participants were only given either the specific feedback about time (i.e., time-only feedback) or the specific feedback about distance (i.e., distance-only feedback). These time-only feedback condition and distance-only feedback condition were identical to the one used in Experiment 2, except that they were not paired with confirming feedback. They were only tested in the immediate testing condition because the effects of confirming-specific feedback were not detected in the delayed testing condition (Experiments 1 and 2). The time-only and distance-only feedback conditions were then compared with the confirming-specific feedback conditions already obtained in Experiment 2 (i.e., the confirming-time feedback-immediate condition and the confirming-distance feedback-immediate condition).

It was postulated that, if participants' time and distance judgments in Experiments 1 and 2 were affected solely because of the information presented in the specific feedback, then, time judgments should be equally affected and should not differ between the time-only feedback condition and the confirming-time feedback-immediate condition, as they both contain the specific feedback. Similarly distance judgments should not differ between the distance-only feedback condition and the confirming-distance feedback-immediate condition. However, if participants' time and distance judgments in Experiments 1 and 2 were affected because they inferred their viewing time and distance from their identification performance (e.g., "I was correct, therefore I must have seen the target for a long time"), then their time and distance judgments would only be affected when the confirming feedback was given alongside the specific feedback. That is, their time and distance judgments should be longer and shorter, respectively, as compared to participants who were only given the specific feedback. For this second prediction, however, one could argue that such inferences could still occur even when participants were not given confirming feedback—because participants might still think that they made a correct identification decision even when they were not given confirming feedback. To resolve this issue, participants who were only given the specific feedback were asked to report whether or not they thought they made a correct identification decision. If they believed that their identification decision was incorrect and yet their judgments were as affected as those participants who thought that they were correct, then this would suggest that inference processes may not occur when making time and distance judgments in the presence of confirming feedback and that the effects of confirming-specific feedback found in Experiments 1 and 2 might solely be due to the specific feedback.

4.2.1 Method and Procedure

Participants for the time-only feedback condition (31 females, 11 males; age range: 17 to 55; $M = 21.5$ years, $SD = 7.4$ years) and the distance-only feedback condition (25 females, 14 males; age range: 18 to 62; $M = 25.1$ years, $SD = 9.36$ years) were tested at two different time intervals by two different experimenters.[16] They were recruited through the research pool of first-year undergraduate psychology students and through flyers advertised on University noticeboards, and were compensated with course credit and $10, respectively.

The materials and procedure were identical to Experiment 2. Participants were tested individually, watched the car theft video, made an identification from a target-absent lineup, and were given the specific feedback. Participants who were

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[16] I was one of the experimenters and was responsible for conducting all other experiments presented in this thesis.

given the time-only feedback were told, “Maybe I’m not supposed to tell you this, but—eyewitness research has shown that people who get to see the criminal’s face for about 45 seconds can usually pick them out of the lineup.” Participants who were given the distance-only feedback were told the exact same information, except that “for about 45 seconds” was substituted with “from about 3 metres distance.” They then completed the testimony-relevant questionnaire, and were asked an additional question regarding whether or not they think they picked the right person from the lineup (they were given two options: *Yes* or *No*) before completing a number of manipulation checks. Namely, they were asked whether or not they were told that people who saw a person’s face for a certain number of seconds or distance could usually identify the person later from the lineup; and were given three options (*Yes I was given this information, No I was not given this information,* or *Unsure*). They then had to provide the number of seconds or the number of metres that the experimenter mentioned.

4.2.2 Results

4.2.2.1 *Data screening and exclusion*

A total of 23 participants (12 from the time-only feedback condition and 11 from the distance-only feedback condition) were excluded from analysis because they either incorrectly responded to the manipulation checks, did not believe the feedback, had done a similar eyewitness study, or failed to answer the additional question. In total, 30 participants from the specific-time feedback condition and 28 participants from the specific-distance feedback condition were included in analyses.

4.2.2.2 *Time and distance judgments*

Time judgments from the time-only feedback condition ranged from 3 to 45 seconds (*M* = 22.00, *SD* = 12.60) and were compared against time judgments from the confirming-time feedback-immediate condition obtained in Experiment 2. Distance judgments from the distance-only feedback condition ranged from 1 to 10 metres (*M* = 4.11, *SD* = 2.24) and were compared against distance judgments from the confirming-distance feedback-immediate condition obtained in Experiment 2.

The same bootstrap confidence intervals method was used to estimate the difference between means of the conditions that were compared. It was found that time judgments did not differ between participants who were given the time-only feedback (*M* = 22.00, *SD* = 12.60) and those who were given the confirming-time feedback (*M* = 22.60, *SD* = 15.34), 99% CI [-10.47, 7.79], *d* = -0.04. Similarly, distance judgments did not differ between participants who were given the distance-only feedback (*M* = 4.11, *SD* = 2.24) and those who were given the confirming-distance feedback (*M* = 3.54, *SD* = 0.96), [-1.83, 0.42], *d* = 0.33. These results indicate that participants might not use confirming feedback to infer their viewing time and distance judgments, and that these judgments were only affected by the specific feedback (confirming feedback had no effect on these judgments).

To provide further support for the above results, time judgments of participants who were only given the specific feedback were compared for those who believed that they were correct in their identification decision (*n* = 18) and those who believed they were incorrect (*n* = 12); and time judgments did not differ between these two groups ([*M* = 20.58, *SD* = 15.64] and [*M* = 19.17, *SD* = 8.79], respectively), 95% CI [-9.92, 14.17], *d* = 0.11. Distance judgments of participants who were only given the specific feedback were also compared for those who believed that they were correct in their identification decision (n = 17) and those who believed they were incorrect (n = 11);[17] and again, distance judgments did not differ between these two groups ([M = 4.05, SD = 1.74] and [M = 4.34, SD = 2.95], respectively), 95% CI [-2.82, 1.56], d = -0.12. These results suggest that the effects of confirming-specific feedback on time judgments (in Experiments 1 and 2) and distance judgments (in Experiment 2) might be due to the information mentioned in the specific feedback.

4.2.3 Discussion

This section investigated whether the effects of confirming-specific feedback on time judgments (in Experiments 1 and 2) and distance judgments (in Experiment 2) were due to inferences made based on a correct identification decision (e.g., “I was correct, therefore I must have seen the target for a long time”) or whether it was simply due to the presence of specific feedback. The results showed that participants’ time and distance judgments were still affected by specific feedback even when confirming feedback was not present alongside it; furthermore, specific feedback affected these judgments even when eyewitnesses believed that they made an *incorrect* identification decision. These results suggest that eyewitnesses do not infer their time and distance judgments from the accuracy of their identification decision, even when they are told that viewing time and distance are associated with a correct identification decision.

It was demonstrated here that time judgments (in Experiments 1 and 2) and distance judgments (in Experiment 2) were only affected by specific feedback. This

[17] Since the bootstrapping analysis requires equal sample sizes, only 12 randomly selected participants from the time-only feedback condition and 11 from the distance-only feedback condition were analysed.

was presumably due to the anchor value that was provided in the specific feedback. When this anchor was removed from the specific feedback (in Experiment 3), the feedback no longer had an effect on time and distance judgments. However, it should be noted that the current study was not a direct test for the anchoring effect, as the specific feedback that contained and did not contained an anchor were not compared directly. Future research may want to test this to further investigate the mechanisms underlying the effects of specific feedback on time and distance judgments. Regardless, the present results demonstrated that although eyewitnesses' time and distance judgments were immune to the influence of confirming feedback, they were not immune to other external influences. More specifically, feedback that specified the witnesses' time and distance could possibly anchor and bias the witnesses' judgments.

4.3 Summary

Experiments 1 and 2 found that pairing confirming feedback with specific feedback (that associated viewing time and distance with a correct identification decision) affected time and distance judgments. However, Experiment 3 found that specific-confirming feedback no longer affected time and distance judgments when the specific feedback no longer provided a reference point for time and distance judgments. These results suggested that confirming-specific feedback affected time and distance judgments in Experiments 1 and 2, not because the specific feedback contained information associating viewing time and distance with a correct identification, but because the specific feedback provided a reference point for time and distance judgments. The results demonstrated that participants' time and distance judgments tended to anchor towards the value that was provided by the specific feedback. Furthermore, this feedback still affected time and distance judgments even when participants believed that they made an *incorrect* identification decision. These findings help explain the lack of effect of confirming feedback on time and distance judgments, suggesting that people do not infer their viewing time and distance from a correct identification decision. Perhaps knowing that they were correct in their identification decision had no relevance to their time and distance judgments. The next chapter continues to investigate the issue of differential confirming feedback effects by investigating the factor structure of all testimony-relevant questions.

CHAPTER 5: Investigating the Factor Structure of Testimony-Relevant Questionnaire

The testimony-relevant questionnaire was originally put together by Wells and Bradfield (1998) to measure the broad effects of post-identification feedback on eyewitnesses' testimony-relevant judgments. It contained 13 questions that were typically measured on a 1-7 Likert scale. This questionnaire has since been used in studies involving post-identification feedback effects (e.g., Bradfield et al., 2002; Neuschatz et al., 2007; Wells & Bradfield, 1999; see meta-analyses by Douglass & Steblay, 2006; Steblay et al., 2014). However, the factor structure of this testimony-relevant questionnaire has never been properly investigated.

It was postulated in Chapter 3 that confirming feedback does not affect time and distance judgments because confirming feedback may not be relevant to these judgments. This reasoning was based on the fact that eyewitnesses can still make time and distance judgments without making a correct identification or having a good view of the target person's face. In contrast, eyewitnesses would have to rely on their memory of the target person's face or the identification processes to make other judgments like certainty. As a result, although eyewitnesses may use confirming feedback as a cue to being certain in their identification, this feedback holds little relevance to their estimation of time and distance. The main aim of this chapter was to directly test whether these judgments have the same or different basis, and whether the malleability of judgments to confirming feedback depends on the degree of relevance of the feedback to the judgments.

Factor analysis has only been conducted in one post-identification feedback study (i.e., Wells et al., 2003); however, it was conducted only to see whether the eyewitnesses' testimony-relevant judgments could be combined into a single composite score (i.e., to reduce the number of variables in subsequent analyses). Hence, although Wells et al. reported a two-factor solution, they did not report which questions fall onto which particular factors. Additionally, Wells et al. only included nine questions in their factor analysis (i.e., view, features, attention, basis, ease, time, testify, strangers, clarity) and excluded four questions (i.e., time, distance, certainty, and identification-time). Accordingly, the latent variables that underlie the 13 testimony-relevant questions are still unknown.

Wells and Bradfield (1998) initially grouped the testimony-relevant questions into three categories: (1) *reports of the qualities of the witnessed event itself* (attention, distance, features, time, and view), (2) *qualities of the identification task* (certainty, ease, and identification-time), and (3) *summative qualities of the witnessing experience* (testify, trust, and basis). However, given the lack of information regarding the factor structure of the testimony-relevant questionnaire, later researchers have continued to group these questions into three categories, but with some inconsistencies. For example, Douglass and Steblay (2006) put the *basis* question in the first category instead of the third, and the *clarity* and *strangers* questions in the first and second category, respectively, whereas Steblay et al. (2014) put (a) the *basis* question in the third category (in line with Wells and Bradfield but in contrast with Douglass and Steblay), (b) the *strangers* question in the third category (in line with Douglass and Steblay), and (c) the *clarity* question in the second category (cf. Douglass & Steblay). Steblay et al. also labelled these categories as: (1) *memory acquisition judgments*, (2) *memory retrieval judgments*, and (3) *summative judgments.* Given these inconsistencies, a proper evaluation of these questions is needed to ensure that these categories accurately reflect the latent variables underlying the 13 testimony-relevant questions.

5.1 Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was conducted to examine the intercorrelations among the 13 testimony-relevant questions and to identify the underlying latent variables (or factors) that explain these intercorrelations. The EFA was conducted based on data from Experiments 1-3. Only participants from the no feedback conditions were included in the analysis. This was to ensure that participants' responses to the testimony-relevant questions were free from any feedback influence. Additionally, the data were combined across three experiments to achieve a larger sample size ($N = 163$), which is recommended for a stable factor solution (e.g., Tabachnick & Fidell, 2007).

The same 13 testimony-relevant questions were used in all three experiments, and were all measured on a 1-7 point Likert scale for the purpose of factor analysis, except for time and distance questions in Experiment 2. Participants in Experiments 1 and 3 answered time and distance questions on a Likert scale, before they were asked to provide their estimates (e.g., in seconds and metres, respectively).[18] It was possible that asking the same question twice (albeit using a different response format) might have affected participants' time and distance estimates. For this reason, participants in Experiment 2 were only asked to provide time and distance judgments in an open response format. However, the pattern of results in Experiment 1 did not indicate that this was the case, as the effects of feedback on time judgments were replicated in Experiment 2. Therefore, both response formats were again used to measure time and distance questions in Experiment 3.

[18] Time and distance questions (measured in a Likert scale format) were presented third and fifth, respectively, in the questionnaire. Time and distance questions (measured in an open response format) were presented last in the questionnaire.

Since participants in Experiment 2 were only asked to provide time and distance judgments in an open response format (e.g., in seconds), their judgments were converted into a 1-7 Likert scale prior to analysis, using the following procedure. First, all judgments were converted to *z*-scores so that the highest and lowest judgments in the distribution could be identified (*z*-scores above 3.29 were outliers and were not identified as the highest judgment). For example, the highest *z*-score for time judgments was 1.53 (60 seconds) and the lowest *z*-score was -0.63 (2 seconds). The difference between these judgments was then divided by seven so that each judgment would correspond to each Likert point (i.e., [60−2 seconds] ÷ 7 = 8.29, where 8.29 represents the interval between two Likert points). Accordingly, judgments between 2 (i.e., the lowest judgment) and 10.29 seconds (i.e., from 2 + 8.29 seconds) were coded as 1 point, judgments between 10.29 and 18.87 seconds (i.e., from 10.29 + 8.29 seconds) were coded as 2 points, and so on until the highest judgments (i.e., between 51.71 and 60 seconds) were coded as 7 points. Outliers (i.e., *z*-scores above 3.29) were also coded as 7 points. This procedure not only improved the normality of the distribution, but also maintained the pattern of correlations with other judgments, as the correlation between the two response formats were high for both time and distance judgments (*r*s = .90 and -.86, respectively).[19]

5.1.1 Results

As a preliminary analysis, the feasibility of factor analysis of the 13 testimony-relevant questions was examined. The majority of these questions were found to correlate with each other. Specifically, ten questions (i.e., certainty, view, features, basis, ease, identification-time, testify, trust, strangers, and clarity)

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[19] The correlation for distance judgments was negative because of reverse scoring.

significantly correlated with nine to 11 other questions (.19 ≤ *r*s ≤ .78, *p*s < .05); two questions (i.e., time and attention) significantly correlated with seven to eight other questions (.17 ≤ *r*s ≤ |-.56|, *p*s < .05); and one question (i.e., distance) significantly correlated with three other questions (|-.18| ≤ *r*s ≤ |-.56|, *p*s < .05, see Appendix C). With these in mind, a principal component analysis was conducted on the 13 testimony-relevant questions.

The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis, KMO = .84, which was above the recommended value of .50 (Field, 2009). Bartlett's test of sphericity indicated that correlations between items were sufficiently large for the analysis, χ^2 (78) = 969.54, $p < .001$. The first three components had eigenvalues over Kaiser's criterion of 1 and in combination explained 62.64% of the total variance (the variance of the first three factors were 40.05%, 13.60%, and 8.99%, respectively). Accordingly, three factors were extracted using principal axis factoring with oblimin (oblique) rotation.[20]

The EFA results revealed a clear three-factor solution. As shown in Table 5.1, 10 of the 13 questions loaded highly on a single factor: ease, certainty, testify, identification-time (Factor 1); time, distance (Factor 2); and features, basis, view, attention (Factor 3); while the other three questions (i.e., clarity, trust, strangers) loaded on both Factors 1 and 3.

The wording of these questions was examined. The questions that loaded on Factor 1 (Identification) specifically direct the eyewitness back to the identification process: "How easy or difficult was it for you to figure out which person in the photo lineup was the target?" (ease), "At the time that you identified the target from the

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[20] Varimax (orthogonal) rotation was not used as there was no theoretical reason for the factors (within the testimony-relevant questionnaire) to be independent of each other (Field, 2009).

Table 5.1

Summary of Exploratory Factor Analysis Results for the Testimony-Relevant Questionnaire

	Rotated Factor Loadings		
Question	Identification	Event	Target Person
Ease	**1.00**	-.04	-.12
Certainty	**.77**	-.13	.06
Testify	**.73**	-.07	.08
Identification-time	**.73**	.15	-.02
Clarity	**.45**	-.06	**.42**
Trust	.38	.11	.37
Strangers	.30	-.04	.26
Distance	-.08	**.96**	.22
Time-in-view	-.02	**-.58**	.23
Features	.03	.07	**.73**
Basis	.15	-.08	**.62**
View	.07	.11	**.61**
Attention	-.06	-.22	.38
Cronbach's α	.89	.71	68[a]

Note. N = 163. Factor loadings > .40 are in boldface.

[a]Internal consistency improved to .73 if the attention question was deleted.

photo lineup, how certain were you that the person you identified from the photo lineup was the target you saw earlier?" (certainty), "On the basis of your memory of the target, how willing would you be to testify in court that the person you identified was the same person you saw earlier?" (testify), and "From the time you were shown the photo lineup, how long do you estimate it took you to make an identification?" (identification-time).

The questions that loaded on Factor 2 (Event) require the eyewitness to think back more generally to the event they had witnessed: "How long would you estimate that the target's face was in view?" (time) and "How far away was the target?" (distance). They relate to the event particularly because it has been suggested that making an estimate of time is dependent upon the amount of information one remembers about the event (Ornstein, 1969); and that making an estimate of distance is dependent on a number of cues (such as lighting and occlusion) that are available in the viewing environment (e.g., Cavallo, Colomb, & Doré, 2001; Cohen & Weatherford, 1980, 1981).

The questions that loaded on Factor 3 (Target Person) require the eyewitnesses to think back to the target person's face that they had witnessed: "How well were you able to make out specific features of the target's face at the time of view?" (features), "How good of a view did you get of the target?" (view), "How much attention were you paying at the target's face while s/he was in view?" (attention), and "To what extent do you feel that you had a good basis [enough information] to make an identification?" (basis).

Finally, the correlations among the three factors were examined. The results revealed a substantial correlation between Factor 1 (Identification) and Factor 3

(Target Person), $r = .55$; however, Factor 2 (Event) was only weakly correlated with either Factor 1, $r = -.01$, or Factor 3, $r = -.21$.

5.1.2 Discussion

The aim of investigating the factor structure of the testimony-relevant questionnaire was to shed some light on the issue of differential confirming feedback effects. It was found that judgments that are typically affected by confirming feedback (i.e., all judgments except time and distance) fell into either or both the Identification and the Target Person factors. Time and distance judgments, on the other hand, fell into a factor that did not correlate with either of these two correlated factors. Based on the factor analysis results, time and distance judgments seem to be measuring a different dimension than the rest of the judgments (i.e., they did not fall into factors that are vulnerable to confirming feedback effects).

Presumably, the majority of testimony-relevant judgments may have been vulnerable to confirming feedback effects because confirming feedback (e.g., "Your identification decision was correct") contains feedback about the witnesses' identification. According to the factor analysis results, the majority of these judgments either directly measured the identification dimension (Identification) or measured a different dimension that is related to the identification (Target Person). Accordingly, the factor analysis results would therefore suggest that confirming feedback should have more effect on judgments that fell into the Identification factor (i.e., ease, certainty, testify, and identification-time) than on judgments that fell into the Target Person factor (i.e., features, basis, view, and attention).

To investigate this, effect sizes were calculated. The four judgments representing either the Identification factor or the Target Person factor were combined and averaged separately for the confirming feedback condition and the no feedback condition. Indeed, the pattern of results across Experiments 1 to 3 showed that the effect sizes for judgments relating to the identification was slightly higher than for judgments relating to the target person (see Table 5.2). Although some of the confidence intervals overlap, this was not surprising because the two factors positively correlated with each other. As a result, feedback that affected judgments in the Identification factor was also likely to affect judgments in the Target Person factor. A similar pattern of results was also reported in a recent meta-analysis by Steblay et al. (2014). They found that the effect sizes for confirming feedback tended to be higher for identification-time, ease, certainty, and testify judgments (*d*s = 0.54, 0.86, 0.98, and 0.98, respectively; 95% CIs [0.40, 0.68], [0.71, 1.01], [0.84, 1.12], and [0.85, 1.11], respectively) than for attention, view, features, and basis judgments (*d*s = 0.48, 0.58, 0.65, and 0.90, respectively; 95% CIs [0.39, 0.57], [0.48, 0.68], [0.52, 0.80], and [0.76, 1.04], respectively). These results suggest that although all of these judgments were affected by confirming feedback, the extent to which they were affected may depend on what these judgments measure and the extent to which they relate to the feedback information. The majority of testimony-relevant judgments—particularly those that fell on the Identification factor—were affected by confirming feedback because they were most relevant to the confirming feedback information. However, these results do not explain how post-identification feedback affects eyewitnesses' testimony-relevant judgments. For example, were eyewitnesses aware that confirming feedback influenced their judgments? This issue is further investigated in the next section.

Table 5.2

Participants' Scores Collapsed Across the Four Judgments Representing Either the Identification Factor or the Target Person Factor

		Identification (ease, certainty, testify, identification-time)				Target Person (features, basis, view, attention)			
		Confirming Feedback	No Feedback	Cohen's *d*		Confirming Feedback	No Feedback	Cohen's *d*	
	n	*M (SD)*	*M (SD)*		95% CI	*M (SD)*	*M (SD)*		95% CI
Experiment 1	176	4.20 (1.58)	3.33 (1.61)	0.55	[0.38, 0.71]	4.66 (1.65)	4.23 (1.72)	0.26	[0.08, 0.43]
Experiment 2	240	4.58 (1.30)	3.32 (1.50)	0.90	[0.77, 1.03]	4.87 (1.38)	3.79 (1.35)	0.79	[0.67, 0.92]
Experiment 3	236	5.23 (1.38)	4.16 (1.68)	0.70	[0.56, 0.84]	4.81 (1.42)	4.31 (1.38)	0.36	[0.23, 0.48]

Note. All judgments were measured on a 1-7 scale. ID-time = identification-time. Small, medium, and large effect sizes are 0.10, 0.30, 0.50, respectively (Cohen, 1992).

5.2 Eyewitnesses' Awareness of the Influence of Post-Identification Feedback

Investigating the issue of awareness of the influence of feedback is important to further understand how confirming feedback operates to influence testimony-relevant judgments. Wells and Bradfield (1998) were the first to investigate this issue. Participants in their study (i.e., the eyewitnesses in their study) were asked to report whether or not confirming feedback had any influence on the way they answered the testimony-relevant questions (they were provided with a *Yes* or *No* option). Prior to this question, participants watched a crime video, made an identification (from a target absent-lineup), were given confirming feedback ("Good, you identified the actual suspect"), and asked to make a number of testimony-relevant judgments before being asked whether the feedback had any influence on their judgments. Wells and Bradfield found that the percentages of eyewitnesses who denied the influence of confirming feedback were as follows: 90% for distance, 88% for time-in-view and identification-time, 78% for view, 73% for attention, 70% for ease and features, 58% for certainty, 57% for basis, 55% for testify, and 52% for trust judgments. Wells and Bradfield further compared the five judgments that had roughly equal number of yes and no responses (i.e., features,[21] certainty, basis, testify, and trust judgments), and found that those who denied the influence of feedback were no less influenced than those who said "yes" (note that Wells et al., [2003] also tested this on certainty judgments and found the same results). From these results Wells and colleagues concluded that eyewitnesses have no introspective

[21] Features judgment was also analysed, although the yes and no responses (i.e., 70%) were not as equal as the other four judgments (Wells & Bradfield, 1998).

awareness of their cognitive processes; and suggested that eyewitnesses who responded yes to these questions merely did so because it seemed reasonable that confirming feedback would influence such judgments.

In a similar vein, Semmler et al. (2004) examined the issue of awareness of feedback influence by testing whether eyewitnesses were able to remember their retrospective certainty judgment (i.e., their unaffected judgment before receiving confirming feedback). In their study, participants watched a robbery video, made an identification from a target-absent lineup, and were given confirming feedback before they were asked to provide their retrospective certainty judgment ("How confident were you at the time you identified...") and their current certainty judgment ("How confident are you right now...?"). Semmler et al. found that eyewitnesses' current certainty judgments did not differ from their retrospective certainty judgments, supporting the notion that eyewitnesses may have limited access to their memory trace concerning these judgments. If they had remembered how certain they were at the time they made an identification, their current certainty judgment would have been higher than their retrospective judgment.

However, using an actual/counterfactual paradigm, Charman and Wells (2008) found that eyewitnesses were actually able to report the influence of confirming feedback on certainty, attention, and view judgments. In their study, participants viewed a crime video, made an identification from a target-absent lineup, were either given confirming feedback or no feedback, and were asked to make certainty, attention, and view judgments (on a 1-10 scale). These eyewitnesses were then asked to provide counterfactual responses concerning these three judgments (i.e., counterfactual responses were responses that they would have made had they been in the alternate condition). For example, eyewitnesses who were not given feedback were asked how they would have responded to the certainty question had they been given confirming feedback. Charman and Wells found that the counterfactual responses of eyewitnesses who were not given feedback (i.e., their responses to certainty, view, and attention judgments had they been given confirming feedback) were at least as high as the responses of those witnesses who were actually given confirming feedback. These results therefore indicate that eyewitnesses were actually aware that confirming feedback could have affected their certainty, attention, and view judgments.

However, it is important to note that Charman and Wells (2008) did not directly ask the witnesses (who were given confirming feedback) to report the influence of feedback on their judgments (cf. Wells & Bradfield, 1998). Instead, the actual/counterfactual paradigm asked what their judgments would have been had they been in the *alternate* condition (i.e., had they not been given confirming feedback). Therefore, although it was clear from Charman and Wells' results that eyewitnesses were aware that confirming feedback could have influenced their certainty, attention, and view judgments (i.e., as eyewitnesses who were not given feedback provided counterfactual responses that were at least as high as the actual responses of witnesses who were given feedback), they did not test whether the witnesses' reports (regarding the influence of feedback) correlated with their actual judgments. That is, whether eyewitnesses who were highly affected by confirming feedback were able to report that they were highly influenced. If there is a relationship between awareness and actual influence, this would counter the claim that eyewitness lack insight into their judgements.

To investigate this issue using the data from this thesis, eyewitnesses in Experiments 1 and 3 were asked to report the degree of influence of feedback on the judgments they had just provided. Since both confirming feedback and confirming-specific feedback affected eyewitnesses' judgments, eyewitnesses who were given confirming feedback were asked to rate the extent to which confirming feedback affected each judgment (e.g., for the certainty judgment: 1 = *It decreased my confidence*; 4 = *It had no effect*; 7 = *It increased my confidence*); and eyewitnesses who were given confirming-specific feedback were asked to rate the extent to which specific feedback affected each of their judgments (they were not asked to rate the influence of confirming feedback). These questions were rated on a 1-7 Likert scale (cf. yes/no responses [Wells & Bradfield, 1998]) as it has been suggested that using a categorical scale may not be appropriate for measuring a continuous variable such as estimates of influence (Charman & Wells, 2008). In Experiments 1 and 3, participants viewed an event, made an identification from a target-absent lineup, received either confirming feedback or confirming feedback alongside specific feedback about time and distance (i.e., confirming-specific feedback), and were asked to make 13 testimony-relevant judgments before being asked to report the influence of feedback on their judgments.

There were two aims of this analysis: First, to investigate whether eyewitnesses were aware that feedback influenced their judgments and, second, whether eyewitnesses' reports regarding the influence of feedback positively correlated with their actual judgments. To address the first aim, eyewitnesses' influence ratings of the confirming feedback were compared with eyewitnesses' influence ratings of the specific feedback. Experiment 1 found that confirming feedback affected the majority of judgments (e.g., certainty, view, ease, etc.) but that it did not affect time and distance judgments. In Experiment 1, time judgments were only affected by confirming-specific feedback; more specifically, the data presented in Chapter 4 demonstrated that time judgments were only affected by specific feedback (i.e., confirming feedback had no effect). The opposite was also true—the majority of judgments (e.g., certainty, view, ease) were only affected by confirming feedback (i.e., specific feedback had no effect).[22] Based on these results, it was predicted that if eyewitnesses were able to see the influence of feedback on their testimony-relevant judgments (as was found in Charman and Wells's [2008] study), then, eyewitnesses' ratings on the influence of confirming feedback should be higher, compared to the ratings of specific feedback, on judgments that were affected by confirming feedback (e.g., certainty, view, ease, etc.). Conversely, eyewitnesses' ratings of the influence of specific feedback should be higher, compared to the ratings of the influence of confirming feedback, on time judgment—as this was the only judgment affected by specific feedback in Experiment 1. The same predictions were made for Experiment 3—except that the influence ratings on time and distance judgments should not differ between confirming feedback and specific feedback (as the specific feedback in Experiment 3 did not affect these two judgments).

Finally, the second aim of this analysis was to investigate whether eyewitnesses were able to accurately report the influence of feedback on their judgments. To address this aim, the correlations between eyewitnesses' influence ratings and their actual judgments were observed. Based on previous findings (e.g., Wells & Bradfield, 1998), eyewitnesses may not have insight into how much

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[22] Using data presented in Chapter 4, a MANOVA was conducted to test for differences on 11 judgments (i.e., all judgments except time and distance) between the four feedback conditions (i.e., confirming feedback only, specific feedback only, confirming-specific feedback, no feedback). The overall feedback effect on these judgments was significant, $F(33, 313) = 3.46$, $p < .001$, $\eta_p^2 = 0.26$. Separate univariate ANOVAs revealed a significant effect of feedback on each of 11 judgments, Fs$(3, 116) \geq 8.82$, ps $\leq .001$; $0.35 \leq r$s ≤ 0.63, 95% CIs [≥ 0.13, ≤ 0.75]. Bonferroni post hoc tests showed that these judgments did not differ between the specific feedback only condition and the no feedback condition (ps > .47), and that judgments in the specific feedback only condition was significantly lower than judgments in either the confirming feedback only condition or the confirming-specific feedback condition. These results indicate that the specific feedback alone had no effect on these 11 judgments (i.e., these judgments were only affected by confirming feedback).

confirming feedback affected their judgments; accordingly, significant positive correlations between the influence ratings and the actual judgments were not expected.

5.2.1 Results

First, independent sample *t*-tests were performed to compare the influence ratings between confirming feedback and specific feedback on each judgment. The results from Experiment 1 showed that the influence ratings for confirming feedback were significantly higher compared to specific feedback on all subjective judgments (except for trust judgment and a marginal effect was found on ease judgment; see Table 5.3). However, eyewitnesses' influence ratings on the objective judgments (i.e., time and identification-time) between confirming feedback and specific feedback did not differ. The same results were observed in Experiment 3: The influence ratings for confirming feedback were significantly higher compared to specific feedback on all subjective judgments, and no difference was found on all objective judgments (see Table 5.4). These results suggest that eyewitnesses were aware of the influence of feedback on their subjective judgments (in line with the findings of Charman and Wells, 2008), but not on their objective judgments. More specifically, eyewitnesses were not aware that confirming feedback affected their identification-time judgments (Experiments 1 & 3), nor were they aware that specific feedback affected their time judgment (Experiment 1).

Second, separate correlation analysis was performed for each subjective judgment[23] to see whether eyewitnesses could accurately report the influence of

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[23] This analysis was only performed on subjective judgments because eyewitnesses were not aware of the influence of feedback on objective judgments.

Table 5.3

Self-Report on the Influence of Feedback (Confirming vs. Specific) on Each Judgment Collapsed Across Retention Interval Conditions for Experiment 1

	Confirming (n = 44)	Specific (n = 49)				
	M (SD)	M (SD)	t(91)	p	95% CI	Cohen's d
Ease	4.64 (1.35)	4.10 (1.30)	-1.95	.05	[-0.53, 0.27]	0.41
Certainty	5.73 (1.39)	4.29 (1.00)	-5.70	<.001**	[-1.95, -0.94]	1.19
Testify	4.70 (1.50)	3.47 (1.46)	-4.02	<.001**	[-1.85, -0.63]	0.83
ID-time	4.05 (1.33)	3.94 (1.23)	-.40	.69	[-0.63, 0.42]	0.09
Clarity	4.93 (1.52)	4.20 (1.41)	-2.40	.02*	[-1.33, -0.12]	0.50
Trust	3.91 (1.40)	3.49 (1.56)	-1.36	.18	[-1.03, 0.19]	0.28
Strangers	5.32 (1.38)	4.39 (1.57)	-3.03	.003*	[-1.54, 0.32]	0.63
Features	4.70 (1.21)	4.10 (1.31)	-2.29	.02*	[-1.12, -.08]	0.48
Basis	5.02 (1.34)	4.06 (1.36)	-3.43	.001**	[-1.52, -0.41]	0.71
View	4.86 (1.31)	4.00 (1.37)	-3.11	.003*	[-1.42, -0.31]	0.64
Attention	5.18 (1.33)	4.57 (1.29)	-2.24	.03*	[-1.15, -0.07]	0.47
Time	4.61 (1.15)	4.78 (1.25)	.65	.52	[-0.33, 0.66]	-0.14
Distance	3.82 (1.04)	3.49 (1.39)	-1.3	.20	[-0.83, 0.17]	0.27

Note. Judgments were measured on a 1-7 Likert scale. ID-time = identification-time; CI = confidence interval. Small, medium, and large effect sizes are 0.20, 0.50, 0.80, respectively (Cohen, 1992).

Table 5.4

Self-Report on the Influence of Feedback (Confirming vs. Specific) on Each Judgment Collapsed Across Retention Interval Conditions for Experiment 3

	Confirming (n = 59)	Specific (n = 54)				
	M (SD)	M (SD)	t(111)	p	95% CI	Cohen's d
Ease	5.12 (1.21)	4.17 (1.06)	-4.44	<.001**	[-1.38, -0.53]	0.84
Certainty	5.86 (1.07)	4.43 (1.11)	-7.00	<.001**	[-1.85, -1.03]	1.31
Testify	5.25 (1.35)	3.69 (1.52)	-5.83	<.001**	[-2.10, -1.04]	1.09
ID-time	4.47 (1.01)	4.15 (1.12)	-1.63	.11	[-0.72, 0.07]	0.31
Clarity	5.31 (1.18)	4.33 (1.05)	-4.62	<.001**	[-1.39, -0.56]	0.88
Trust	4.76 (1.26)	3.59 (1.24)	-4.97	<.001**	[-1.64, -0.70]	0.94
Strangers	5.41 (1.18)	4.89 (1.25)	-2.27	.03*	[-0.97, -0.07]	0.43
Features	4.88 (1.07)	4.06 (1.14)	-3.98	<.001**	[-1.24, -0.41]	0.74
Basis	5.41 (1.04)	4.13 (1.35)	-5.68	<.001**	[-1.72, 0.83]	1.06
View	5.07 (1.08)	4.19 (1.12)	-4.27	<.001**	[-1.29, -0.47]	0.80
Attention	4.69 (1.02)	4.07 (1.15)	-3.04	.003*	[-1.03, -0.22]	0.57
Time	4.29 (0.72)	4.50 (0.99)	1.29	.20	[-0.11, 0.54]	-0.24
Distance	4.39 (0.70)	4.17 (1.23)	-1.18	.24	[-0.60, 0.15]	0.22

Note. Judgments were measured on a 1-7 Likert scale. ID-time = identification-time; CI = confidence interval. Small, medium, and large effect sizes are 0.20, 0.50, 0.80, respectively (Cohen, 1992).

confirming feedback. If eyewitnesses could accurately report the influence of confirming feedback on their judgments, then there should be a positive correlation between their influence ratings and their actual judgments. That is, higher influence ratings should be associated with higher subjective judgments. Experiment 1 results ($n = 44$) revealed significant positive correlations on five of 10 subjective judgments (i.e., testify, trust, features, attention, ease, and clarity), $.39 \leq r\text{s} \leq .55$, $p\text{s} \leq .009$; a marginal positive correlation on strangers judgment, $r = .30$, $p = .05$; and no significant correlations on the remaining three judgments (i.e., certainty, view, basis), $r\text{s} \geq .13 \leq .27$, $p\text{s} \leq .41$. Experiment 3 results ($n = 59$) revealed significant positive correlations on four of 10 subjective judgments (i.e., again on testify and trust judgments, but also on strangers and basis judgments), $.33 \leq r\text{s} \leq .43$, $p\text{s} \leq .012$; a marginal positive correlation on ease judgment, $r = .26$, $p = .046$; and no significant correlations on the remaining five judgments (i.e., again on certainty and view judgments, but also on clarity, features, and attention judgments), $.11 \leq r\text{s} \leq .20$, $p\text{s} \leq .40$. Taken together, the pattern of results indicates that although eyewitnesses were aware of the influence of confirming feedback on their subjective judgments, they were not necessarily able to correctly report how much the feedback influenced their judgments (i.e., otherwise a significant positive correlation would have been consistently found on, at least, most of these subjective judgments across Experiments 1 and 3). It should also be noted that comparing so many correlations may inflate Type-1 error rate, such that significant correlations are simply the result of chance rather than reflecting real associations in the population.

5.2.2 Discussion

The current section aimed to investigate (a) whether eyewitnesses were aware of the influence of feedback on their judgments, and if so, (b) whether they could correctly report how much it influenced their judgments. The results extend the findings of Charman and Wells (2008) by demonstrating that eyewitnesses were aware of the influence of confirming feedback on the majority of testimony-relevant judgments (i.e., not limited to certainty, attention, and view judgments). However, it was found that eyewitnesses were only able to see the influence of feedback on their subjective, but not their objective, judgments. Furthermore, although they were able to see the influence of feedback on their subjective judgments, eyewitnesses were not able to correctly report how much the feedback had influenced their judgments. In line with past findings (Semmler et al., 2004; Wells & Bradfield, 1998), these results suggest that eyewitnesses may not have introspective awareness of their cognitive processes.

How can eyewitnesses report the influence of feedback without having introspective awareness of their cognitive processes? Charman and Wells (2008) suggested that eyewitnesses use implicit theories to determine how their judgments should change in response to confirming feedback. In their study, eyewitnesses overestimated the influence of confirming feedback on certainty judgments, but not on view and attention judgments. They found that when eyewitnesses (who were not given confirming feedback) were asked to give counterfactual responses concerning these three judgments, eyewitnesses' responses concerning view and attention judgments were as high as the actual responses of witnesses who were given confirming feedback, but their responses concerning certainty judgments were higher. According to Charman and Wells, this occurred because attention and view judgments might be perceived to be more objective, and therefore, it might seem to be less intuitively plausible that confirming feedback would affect these judgments (also see Wells & Quinlivan, 2009).

In line with Charman and Wells' (2008) results, in Experiments 1 and 3, the mean influence ratings of confirming feedback appeared to be higher for certainty judgments than for view and attention judgments (see Tables 5.3 and 5.4 presented in the results section earlier). The results from the present study suggest that it may be easier for eyewitnesses to form an implicit theory that associate a correct identification decision with high certainty (cf. view and attention) because certainty judgment tapped into a factor that directly reflects the identification. As demonstrated in the factor analysis results presented in the first section of this chapter, certainty judgment (along with ease and testify judgments) fell into the Identification factor; whereas view and attention judgments (along with features and basis judgments) fell into the Target Person factor. Accordingly, the effect sizes for the influence of confirming feedback were generally higher for certainty, ease, and testify judgments (e.g., in Experiment 3, $0.83 \leq d\text{s} \leq 1.19$) than for features, basis, view, and attention judgments (e.g., in Experiment 3, $0.47 \leq d\text{s} \leq 0.71$; as shown in Tables 5.3 and 5.4). A similar pattern of results was also obtained in Wells and Bradfield's (1998) study. They found that eyewitnesses were less likely to deny the influence of confirming feedback on certainty (58%), testify (55%), and ease judgments (70%); than on view (78%), attention (73%), features (70%), and basis judgments (57%). Taken together, the present results suggest that eyewitnesses were more able to see the influence of confirming feedback on judgments that directly measured the identification, such as those judgments that fell into the Identification factor (i.e., certainty, ease, testify), as compared to judgments that fell into the Target Person factor (i.e., view, attention, features, basis).

Additionally, the present study also found that, although eyewitnesses were aware of the influence of feedback on subjective judgments, they were not aware of the influence of feedback on objective judgments. Namely, they were not aware of (a) the influence of confirming feedback on their identification-time judgments, and (b) the influence of specific feedback on their time judgments. These results are again in line with Wells and Bradfield's (1998) findings; they found that eyewitnesses were most likely to deny the influence of confirming feedback on objective judgments such as identification-time (88%). Other studies involving objective judgments have also found the same results. For example, in the anchoring literature, people find it difficult to recognise the influence of an anchor on their answers. Studies on anchoring effects typically require participants to answer objective questions involving general knowledge or factual questions such as: (a) "What is the mean length of a whale (m)?" (b) "The weight of Roman Emperor Julius Caesar," and (c) "Estimate the exact length of the Mississippi river" (Epley & Gilovich, 2001; Furnham & Boo, 2011). Wilson et al. (1996) have also found that forewarning people about the anchoring effects did not eliminate these effects. These results are in contrast with the findings involving subjective judgments. In particular, post-identification feedback studies have demonstrated that when participants were warned that the confirming feedback was randomly generated by the computer, the warning was found to mitigate the effects of feedback on subjective judgments (i.e., certainty, view, features, attention, basis, ease, testify, strangers, clarity) but not on objective judgments (e.g., identification-time; Lampinen et al., 2007; also see Charman et al., 2010; Quinlivan et al., 2010).

In summary, the present results showed that eyewitnesses were able to see the influence of feedback on subjective judgments not because they had insight into their cognitive processes, but presumably because they relied on implicit theories about how their judgments should change as a result of confirming feedback. It has been suggested that it might be harder to form implicit theories on judgments that are objective (Charman & Wells, 2008), and this might be why eyewitnesses did not seem to be able to report the influence of feedback on objective judgments. This means that eyewitnesses could appear confident in their objective judgments, even when their answers were heavily influenced by an anchor provided by police or a co-witness. These results again highlight the importance of protecting eyewitnesses' judgments from the influence of feedback by ensuring that these judgments are obtained in private and by an officer who is blind to the details of the case (e.g., Wells et al., 1998).

5.3 Summary

Confirming feedback has been known to affect all testimony-relevant judgments, except time and distance judgments (see Steblay et al., 2014 for results of a meta-analysis). Factor analysis results showed that time and distance judgments measured a dimension that is independent from all other dimensions measured by the rest of the judgments. These other dimensions either directly relate or relate to an extent to the identification dimension. The factor analysis results suggest that judgments that directly measure the identification (i.e., ease, certainty, testify, and identification-time judgments) are most likely to be affected by confirming feedback. Furthermore, it was found that confirming feedback was seen to be highly relevant to these judgments; and that this might be due to the implicit theories that witnesses had about the effects of feedback on these judgments. In general, these results support the idea that confirming feedback affects the majority of judgments because it may provide a useful cue for making these judgments, as these judgments relate to their *identification* performance and to the information concerning the *target person's* *face*. Confirming feedback does not affect time and distance judgments because these judgments are not related to the identification dimension, and hence confirming feedback or confirming that the witnesses' were correct in their identification may not be useful for their estimation of time and distance judgments. The next chapter reviews findings from basic research to further investigate the cues that people use when making time and distance judgments.

CHAPTER 6: What Do We Know about Time-in-View and Distance Judgments?

Confirming feedback has been found to affect a wide range of testimony-relevant judgments except time and distance (e.g., Douglass & Steblay, 2006; Steblay et al., 2014; Wells & Bradfield, 1998; 1999). The thesis so far has suggested one possible reason for this, namely that confirming feedback may only be relevant to the rest of the judgments but irrelevant to time and distance judgments. The results from the present research found that eyewitnesses do not infer their viewing time and distance judgments from their identification accuracy (e.g., see Chapter 4). These results further suggest that eyewitnesses may be using different cues (i.e., other than their identification performance) to make time and distance judgments. The first aim of the current chapter was to investigate how eyewitnesses make these judgments by reviewing basic research in time and distance estimation. This investigation would further contribute to our understanding of the differential post-identification feedback effects.

Equally important is the investigation of the accuracy of witnesses' estimates of time and distance. This is important not only because courts often use witnesses' time and distance judgments as a reliability assessment for eyewitness identification evidence (e.g., *R v. Turnbull*, 1976; *Domican vs. The Queen*, 1992), but also because these judgments have been found to be immune to the robust effects of confirming feedback. As discussed in previous chapters, investigating the differential feedback effects has theoretical importance. However, it also has practical importance; Douglass, Brewer, et al. (2010) pointed out that if time and distance judgments are immune to confirming feedback, then courts may want to rely on these judgments instead of the other more malleable judgments (especially when confirming feedback had been administered). Yet, there have only been a few studies that have looked at the accuracy of witnesses' estimates of time and distance. If the courts were to rely specifically on time and distance judgments (especially when the rest of the judgments had been affected by confirming feedback), it is important to know the validity of these judgments. The second aim of this chapter was to fill this gap in the literature by reviewing studies that have looked at the accuracy of eyewitnesses' time and distance judgments, along with other studies that have investigated or manipulated variables that could influence the accuracy of these estimates. Later in this chapter, it will also be discussed whether people in general are equally good at estimating time and distance. The focus of the following sections will therefore move from understanding the processes behind making time and distance judgments to assessing the accuracy of these judgments.

6.1 Time-in-View Judgments

This section starts by reviewing basic research in remembered duration, to provide insight into how time judgments are made.

6.1.1 Basic Research in Estimating Remembered Duration

It has been suggested that memory is involved in making retrospective judgments about the duration of an event (e.g., Block & Reed, 1978; Frankenhaeuser, 1959; Ornstein, 1969); and a few theoretical accounts have been offered to explain how duration estimates are made. Three of the most used accounts are discussed in turn below, namely, the storage size hypothesis (Ornstein, 1969), the contextual-change model (Block & Reed, 1978), and the reconstruction processes (Burt, 1992).

The storage size hypothesis (Ornstein, 1969) postulates that the remembered duration of an event is dependent on the amount of information stored in memory about that event. Specifically, the more information remembered, the longer the duration would seem to be. The storage size hypothesis has been supported by a number of studies. For example, longer duration estimates were reported when an interval contained complex, less predictable, or more numerous components than when an interval of similar length contained simpler (e.g. Block, 1978, Experiment 2; Ornstein, 1969; Schiffman & Bobko, 1974), more predictable (e.g. Frankenhaeuser, 1959; Ornstein, 1969), or fewer components (e.g. Buffardi, 1971; Burnside, 1971; Frankenhaeuser, 1959; Ornstein, 1969; Roeloefs & Zeeman, 1951; Schiffman and Bobko, 1977; Thomas & Brown, 1974). Ornstein explained that since storing additional information requires more space, the increase in stimuli complexity increases storage size (which in turn lengthens the experience of duration in retrospect).

However, Block's (1978, 1990; Block & Reed, 1978) contextual-change model argues that remembered duration is not just based on the individual events, but also on the situations or cognitive contexts that are attached to the event. For example, Block (1992, Experiment 1) found that duration judgments were not influenced by task difficulty (i.e., tasks that are more attentionally demanding or require more cognitive processing). Yet, duration judgments lengthened when participants performed different kinds of processing tasks (cf. to when they performed an individual task; Block, 1992, Experiment 2; Block & Reed, 1978, Experiment 2). Moreover, inconsistent with Ornstein's storage size hypothesis (1969), Block (1992, Experiments 1 & 2) did not find a relationship between memory for the presented stimulus and duration judgment. Hence, the contextual-change model suggests that changes in cognitive context (e.g., processing context, environmental context, and other contextual elements; Block, 1982; Block & Reed,

1978) have more impact in lengthening remembered duration than the number of encoded events that could be retrieved. Accordingly, when events are encoded into memory, contextual associations are automatically encoded along with the encoding of each event; therefore, when these judgments are requested, the events are retrieved together with their relevant context. Time judgments are then made based on the number of different contextual associations that are retrieved.

Other evidence suggests that duration judgments are based on reconstructive processes (Burt, 1992, 1993; Burt & Kemp, 1991, 1994) and that they can be influenced by post-event information (Burt & Popple, 1996; Harris, 1993; Yarmey, 1990; also see Loftus & Palmer, 1974). For example, Burt and Popple (1996) had undergraduate students watch an incident that occurred during a lecture. These students—who were unaware that they were participating in an experiment—saw a confederate walk into the lecture theatre, stand in front the lectern, say, “Repent spawn of saint [*sic*], and you, you nest of vipers, you can’t keep me here,” and run to the exit. The duration of the confederate walking and running were about equal; and the total duration of the incident was 25 seconds. Approximately two weeks after the incident, these students were asked questions about the confederate’s characteristics and the duration of the incident. Participants were asked using either of the following verbs, “How long did it take the person to *walk/run/pass* through the lecture theatre?” Burt and Popple found that duration estimate was significantly larger when the verb *walk* was used (M = 79.60, SD = 62.80), as compared to when the verb *run* was used (M = 47.80, SD = 33.10). Similarly, Loftus and Palmer (1974) showed participants films of traffic accidents and afterwards these participants were asked to estimate the speed of the cars using verbs such as *smashed* and *hit*, for example, “About how fast were the cars going when they *smashed/hit* into each other?” They found that estimates were higher when the verb *smashed* was used instead of *hit.* These results suggest that the duration estimate was reconstructed based on the verb the participants was given.

Furthermore, Burt and Popple's (1996) results did not support Ornstein's (1969) storage hypothesis; they did not find a significant difference in recall scores between the group that was given the verb *walk* and the group that was given the verb *run*. Finally, Burt (1999, Experiment 2) found that when people described a past event (i.e., a video of a bank robbery) using a lot of action words (e.g., running around, being pushed), they estimated that the event seemed to have lasted for a shorter duration. These findings suggest that the process behind duration estimation may be reconstructive and that duration estimates can be influenced by external sources (e.g., the phrasing of the question); although further investigation is needed to explain how these reconstructive processes occur (Pedersen & Wright, 2002; Wright, 2006).

In summary, research on remembered duration suggests that memory about an event, particularly in relation to the action of the target person, can influence a person's time judgments. If a witness's remembered that the target person was moving slowly, they would provide a relatively longer estimate than if they had remembered that the target was moving at a quick pace. The section below reviews studies that have investigated the accuracy of eyewitnesses' time judgments.

6.1.2 How Accurate Are Eyewitnesses at Making Time-in-View Judgments?

The importance of time judgments for courts has been noted since the early 1900s. A pioneer researcher in psychology and law, Hugo Münsterberg (1909), came across a case where it was essential for the court to know the time that had passed between a whistle signal from the street and the noise of an explosion. The two eyewitnesses of this event, however, gave substantially different time judgments (i.e., less than 10 seconds vs. more than 1 minute); as demonstrated here, the discrepancy in eyewitnesses' time judgments can be quite large (e.g., at least by 6 to 1 ratio in this case). Unfortunately, in the absence of CCTV or security camera footage, courts would often have to rely on eyewitnesses' judgments for this information.

Evidently, time judgments can be crucial for the outcome of trials. Loftus (1974) reported a case involving a young woman who killed her boyfriend with a gun. The incident started with a heated argument between the couple, which triggered the woman to run into the bedroom to grab a gun and shoot her boyfriend six times. While the prosecutor called it first-degree murder, the defense lawyer argued that it was an act of self-defense. For this case, it was crucial to know how much time had elapsed between obtaining the gun and the first shot—with the implication being that if it was an act of self-defence, the shot would have occurred suddenly and out of fear. The reports from the two eyewitnesses were again inconsistent (i.e., 2 seconds vs. 5 minutes). However, in general, how accurate are eyewitnesses at estimating time? The subsection below investigates this issue by reviewing past and present studies that have been conducted in a controlled setting.

6.1.2.1 *Past studies on time-in-view judgments*

In the laboratory, eyewitnesses have been found to overestimate time. For example, Neuschatz et al. (2005) showed participants a slow motion video of a gunman for 8 seconds after watching a 3-minute video taken from a department store security camera. These eyewitnesses were then asked to estimate the viewing time of the gunman. On average, viewing time was estimated to be around 36% longer than the actual duration; and the estimate was almost twice as high when a 1-week delay was introduced between viewing the video and producing the estimates. In Loftus, Schooler, Boone, and Kline's (1987) Experiments 1 and 2, participants were shown a 30-second video involving a simulated bank robbery; participants' estimates of viewing time was on average about five times longer than the actual duration. Additionally, only two (3%) participants from Experiment 1 (Loftus et al.) produced an estimate that was equal to or less than the actual duration of 30 seconds. Furthermore, Marshall (1966) had participants to estimate the duration of a 42-second film involving a young man rocking a baby carriage, a week after seeing the film. The average duration reported by these participants was 1.5 minutes (or at least twice as long).

Overestimation occurs not just in laboratory but also in field settings. Yarmey (1993) tested participants in public places where they were unaware that they were participating in a psychology experiment. These participants were approached by a confederate (an adult woman) who was asking for directions. The woman was standing about 1.5 metres away and was in contact with the participants for 15 seconds. Afterwards, participants were asked a series of questions about the characteristics of the woman they just encountered and to estimate the duration that she was in view. Yarmey found that both female and male participants overestimated time (with a ratio of 3:1 and 2:1, respectively). These findings were replicated by Yarmey and Yarmey (1997). Using the same procedure as was used in Yarmey's (1993) study, these researchers found that both females and males overestimated the actual duration of 15 seconds, about three times longer (*M*s = 50.48 and 41.77 seconds, respectively). Additionally, they found that 61% of the men and 79% of the women overestimated the actual duration (Yarmey & Yarmey). Similarly, Pigott et al. (1990, as cited in Yarmey, 1993) conducted a staged crime of 90-seconds duration in front of bank tellers and found that on average, these tellers overestimated time almost three times longer (M = 4.20 minutes); and that 62% of them overestimated time by at least twice the actual duration. Finally, Buckhout (1974) staged an assault on a university campus where a student attacked a professor in front of 141 witnesses. The event was recorded and lasted for 32 seconds. Following the attack, sworn statements were taken from each witness and a few questions about the attack were asked including its duration. Buckhout found that these witnesses overestimated time by a factor of almost two and a half to one.

In summary, past studies have demonstrated that eyewitnesses have a tendency to overestimate the duration of an event—both in laboratory and field settings. The duration of the events presented in the above studies lasted from 8 seconds to 90 seconds, and eyewitnesses were found to overestimate time by at least twice as much as the actual duration.

6.1.2.2 *Present studies on time-in-view judgments*

Similarly, eyewitnesses in Experiments 1 to 3 were also found to overestimate time by about twice the actual duration (see Table 6.1). Overestimation was even higher following a delay (e.g., it went up to 5:1 ratio when these estimates were obtained 2-weeks after witnessing the event). More specifically, across the three experiments, over half the participants overestimated time (i.e., 52%-74% from the immediate condition and 63%-84% from the delay condition), and only a small proportion of eyewitnesses underestimated time (i.e., 10%-19% from the immediate condition and 11%-23% from the delay condition). Additionally, 16% to 30% of eyewitnesses from the immediate condition actually produced an estimate that was equal to the actual duration; and that the chance of making accurate estimates decreased when these estimates were produced after a period of delay (i.e., 0%-13%). These results are therefore consistent with past findings that showed that eyewitnesses had a tendency to overestimate time and that overestimation was more pronounced in the delay condition compared to the immediate condition (e.g., Neuschatz et al., 2005).

Table 6.1.

Mean Time Judgments (seconds) from the No Feedback Condition Obtained Immediately and After Delay in Experiment 1, 2, and 3.

	Actual time	Immediate	Delay[a]
Experiment 1	30	51.55 (21.01) [41.43, 61.98)	85.00 (56.32) [57.85, 112.15]
Experiment 2	5	11.27 (9.41) [7.75, 14.78]	26.53 (35.47) [13.29, 39.78]
Experiment 3	15	31.93 (31.92) [19.30, 44.55]	58.33 (47.19) [39.66, 77.00]

Note. Standard deviations and 95% confidence intervals are in parentheses and brackets, respectively.

[a]The duration of delay was one-week for Experiments 1 and 3; and two-weeks for Experiment 2.

6.1.2.3 *Confidence in time-in-view judgments*

The previous section demonstrated that eyewitnesses' time judgments are rarely accurate, and this was even more so following a period of delay. In instances where the actual viewing time is unknown, the question that follows is whether there is a way for the courts to determine the accuracy of eyewitnesses' time judgments, especially if two witnesses of the same crime provided substantially different estimates. A number of studies have investigated whether confidence can be used as an indicator of accuracy. Specifically, whether eyewitnesses who were more accurate in their time judgments were also more confident in their judgments. For example, Yarmey and colleagues (Yarmey, 1993; Yarmey & Yarmey, 1997) conducted separate studies in public places where participants (who were not aware that they were participating in a psychology experiment) were approached by a confederate who asked for directions. Afterwards, these participants were asked to estimate the duration that the confederate was in view, and were then asked to rate their confidence in their answers on a 7-point scale. Yarmey and colleagues calculated the accuracy of time estimates by subtracting the witnesses' estimates from the actual durations. In both studies, the accuracy of time estimates was not found to correlate with the confidence ratings (also see Yarmey, 1990, where no significant correlation was also found, $r = -.04$).

The experiments conducted in this thesis also investigated this issue by asking participants to rate on a 7-point scale, "How confident are you with your time estimate?" (1 = *not at all*; 7 = *totally*) immediately after they had provided their time estimate. This question was asked as part of Experiments 2 and 3. Absolute error[24] in time estimates was calculated for the correlation analysis. It was predicted that if confidence was a good indicator of accuracy, then a negative correlation should be found between the absolute error and confidence ratings—that is, smaller error in time judgments should associate with higher confidence in time estimates. However, no significant correlation was found in both experiments regardless of whether time judgments were obtained immediately ($r = -.31$, $p = .10$, 95% CI [-0.60, 0.06], Experiment 2; $r = .07$, $p = .74$, 95% CI [-0.32, 0.44], Experiment 3), or after a delay ($r = .07$, $p = .72$, 95% CI [-0.30, 0.42], Experiment 2; $r = .14$, $p = .49$, 95% CI [-0.25,

[24] Absolute error = |estimated time – actual time|

0.49], Experiment 3). Together, these results suggest that confidence may not be a good indicator of accuracy in time judgments.

If confidence is not a good indicator of accuracy, is there a way to improve the accuracy of eyewitnesses' time judgments? A number of studies have shown that eyewitnesses' accuracy in time judgments can be improved through imagery rehearsal strategy. For example, using a within-participants design, Pigott et al. (1990, as cited in Yarmey & Yarmey, 1997) found that the average time judgments of witnesses to a 90-second non-violent staged crime were closer to the actual time when they reconstructed the event with imagery rehearsal (M = 67 seconds) as compared to when they had no-rehearsal or provided a free response (M = 260 seconds). Using a between-participants design, Yarmey and Yarmey replicated Pigott et al.'s findings. In their study, participants (who were unaware that they were participating in an experiment) were approached in a public place by a confederate asking for directions for 15 seconds. Half of these participants were asked to estimate the duration that the confederate was in view; the other half were first asked to mentally rehearse the event by imagining it in their mind's eye as if it was on a videotape before providing their duration estimate. Yarmey and Yarmey found that both women and men gave relatively accurate duration estimates with the imagery rehearsal (Ms = 13.75 and 18.30 seconds, respectively), as compared to the free response strategy (Ms = 50.48 and 41.77 seconds, respectively). Additionally, although women were found to significantly overestimate the actual duration as compared to men in the free response condition, their duration estimates did not differ in the imagery rehearsal condition. Further, it is noteworthy that in Yarmey and Yarmey's study, participants in the free response strategy reported significantly higher confidence in their estimates (measured on a 7-point Likert scale; M = 5.53) as compared to participants in the imagery rehearsal strategy condition (*M* = 4.90). These results further support the earlier findings that confidence may not be a useful indicator of the accuracy of time judgments.

If confidence is not a good indicator of accuracy, is there a better way to predict the accuracy of eyewitnesses' time judgments? Research on individual differences have shown that people differ in their ability to estimate time (e.g., Block, Hancock, & Zakay, 2000; Brown, 1998; Espinosa-Fernandez, Miro, Cano, & Buela-Casal, 2003; Fink & Neubauer, 2005). However, it was only recently that this was investigated within the eyewitness setting.

In Attard and Bindemann's (2013) study, participants were asked to estimate the duration of view of two crime videos of a short and long duration. The crime videos were a non-violent burglary staged crime, with a different perpetrator shown in each video, and the video lasted for either 32 seconds (short version) or 64 seconds (long version). Additionally, participants were also shown 10 non-crime videos of varied duration (i.e., about car chases and recordings of fish tanks), lasted from 16 to 80 seconds, and participants were asked to estimate the duration of these videos. Attard and Bindemann investigated whether the accuracy of participants' time judgments could be determined by their performance in estimating time in the non-crime videos. More specifically, they asked participants to first watch the crime video (either the short or long version), estimate its duration, and complete a filler task before identifying the perpetrator from a lineup. This procedure was then repeated for the second showing of the crime video (the long version if they had just seen the short version, or vice versa). Afterwards, the participants were then shown the 10 non-crime videos and asked to estimate the duration of the footage after watching each video. Attard and Bindemann found substantial variation in time estimates across participants. Furthermore, they found that participants who had a tendency to underestimate, overestimate, or correctly estimate duration of crimes also maintain this tendency when estimating the duration of non-crime videos. This study is worth future investigation as it may be possible to assess the accuracy of witnesses' time judgments from their ability to estimate time in other settings.

6.1.3 Summary

A few theories have been proposed to explain how time judgments are made. Although these theories explain why estimates of duration are longer in certain conditions (when the eyewitness remembered the target was walking slowly [vs. running], for example), these theories have not explained why people have a tendency to overestimate duration in the first place, or why delay further exacerbates this overestimation. This is a concern because time judgment is part of the reliability test that the courts use for assessing eyewitness identification evidence, and yet there seems to be no systematic framework that could be used to predict the accuracy of time judgments. Future research needs to identify factors that drive time estimation errors, as this would be useful to inform the actual validity of eyewitnesses' time judgments in court cases.

Past and present studies have shown that eyewitnesses tend to overestimate time and that overestimation is even higher when delay was introduced. This may be a problem in the real world because it may not always be possible to obtain judgments from an eyewitness immediately after an event had just occurred. Additionally, these studies have demonstrated that confidence in time estimates may not be a good indicator of accuracy in time estimates. Furthermore, the data that were presented here were obtained from the no feedback conditions. As demonstrated in Chapter 3, time judgments were distorted even further when specific feedback about time was given. Hence, the courts would need to be mindful of the powerful effect of such specific feedback and its influence in distorting these estimates; and to treat these estimates with caution and that these estimates should not be taken at face value.

6.2 Distance Judgments

Compared to studies on remembered duration, there have not been many studies on remembered distance. Hence, the review below was mainly taken from research on perceived distance.

6.2.1 Basic Research in Distance Estimation

Mathematical formulas have been developed to examine the relationship between the actual and perceived distance (e.g., Gillinsky, 1951; Gogel, Hartman, & Harker, 1957; Stevens, 1957). For example, Stevens' power law ($Y = kX^n$) enables researchers to generate exponents (n) from knowing the actual distance (Y) and the average distance estimates obtained from multiple observers (X), with k as the constant unit of measurement; hence, an exponent of 1.0 indicates that the estimates and the actual distance are proportional. Exponents have been calculated for both perceived and remembered distance, for example, Wiest and Bell (1985) reviewed 70 studies and indicated that remembered distance has a smaller exponent than perceived distance, suggesting that participants' estimates of distance are generally smaller for remembered distance than perceived distance. According to one hypothesis, this is due to the degradation of information in memory storage, which causes distance to appear smaller over time (see Radvansky, Carlson-Radvansky, & Irwin, 1995).

Estimates of perceived distance are known to be dependent on a number of cues (Witmer & Kline, 1998); namely, cues that are associated with the vision of the observer (e.g., accommodation, convergence, binocular disparity, and stereopsis) and cues that are available at the scene (e.g., linear perspective, occlusion, and relative brightness). For example, Cavallo et al. (2001) found that distance perception relied on a large number of depth cues, and that people were less accurate at estimating distance when depth cues were less available (e.g., in a foggy weather environment). Furthermore, angularity (Herman, Norton, & Kelin, 1986; Sadalla & Magel, 1980; Staplin & Sadalla, 1981), slope (Cohen, Baldwin, & Sherman, 1978; Okabe, Aoki, & Hamamoto, 1986); visibility of destination (Cohen & Weatherford, 1980, 1981; Nasar, Valencia, Omar, Chueh, & Hwang, 1985), familiarity (Allen, Siegel, & Rosinski, 1978; Briggs, 1973; Lundberg, 1973; Nasar et al., 1985), sex (Canter & Tagg, 1975; Cohen & Weatherford, 1980, 1981; Lee, 1970; Nasar et al.), and age (Cohen et al.; Cohen & Weatherford, 1980, 1981), have been found to cause distortion in distance estimation.

Distance estimates have also been found to vary between indoor and outdoor settings. For example, greater exponents (i.e., greater estimates) have been found for indoor distances than outdoor distances (Teghtsoonian & Teghtsoonian, 1970, as cited in Wiest & Bell, 1985). Furthermore, overestimation has also been found when estimating distance for a stairway compared to a flat surface (Hanyu & Itsukushima, 1995). The information storage hypothesis (Milgram, 1973) has been used to explain these findings. According to this hypothesis, distance estimates represent the amount of information stored about the environmental properties; hence, the more information is stored (i.e., a complex pathway for a stairway; more objects filling in an indoor space), the longer the distance estimates (similar to the storage size hypothesis outlined for time estimation).

In short, there has not been much research on remembered distance; however, the literature on perceived distance indicates that there are a lot of factors that can influence the accuracy of distance estimates. These factors (such as brightness or occlusion) should be taken into account when assessing the validity of these judgments. Additionally, it has also been acknowledged that individuals vary in their ability to estimate distance; nonetheless, there still needs to be a systematic examination of eyewitnesses' ability to provide distance estimates (see Sporer, 1996). Further research is therefore warranted to understand the mechanisms responsible for producing (remembered) distance judgments, and the cues that people use to recall these judgments.

6.2.2 How Accurate Are Eyewitnesses at Making Distance Judgments?

Investigating the accuracy of witnesses' distance judgments is also important because the reliability of an eyewitness identification is often determined by how far the perpetrator was standing from the eyewitnesses (e.g., *R v. Turnbull*, 1976; *Domican vs. The Queen*, 1992). For example, if the distance was considered to be sufficient to allow the eyewitness to make out features of the perpetrator's face, then the court were less likely to question the eyewitness identification evidence (Loftus & Harley, 2005; Marsh & Greenberg, 2006). However, in the absence of all other evidence (e.g., CCTV or security camera footage), courts often would have to rely on estimates provided by the witnesses. Accordingly, it is worth investigating whether or not eyewitnesses are relatively accurate in providing these estimates.

6.2.2.1 *Past studies on distance judgments*

There have not been many eyewitness studies that have looked into this issue. However, within the post-identification feedback literature, distance judgments are often measured as part of the testimony-relevant questionnaire. Although the majority of these studies have used a Likert scale format to measure distance judgments (i.e., Hafstad et al., 2004; Lampinen et al., 2007; Neuschatz et al., 2005, 2007; Quinlivan et al., 2009, 2012; Wells & Bradfield, 1998, 1999), two of these studies have used an open response format (Douglass, Brewer, et al., 2010; Lindsay et al., 2008).

In Douglass, Brewer, et al.'s study (2010), participants viewed a target person from 10 metres away (for the duration of 10 seconds) in a public location. These participants were then asked a series of questions about what they just viewed and asked to estimate the distance between them and the target person. Douglass, Brewer, et al. found that participants' average of distance estimates were very close to the actual distance (M = 10.97, SD = 11.20). In Lindsay et al.'s (2008) study, participants also viewed a target person for 10 seconds in a public location; however, the target was viewed from either a short distance (ranged from 5 to 15 metres; M = 9.97, SD = 3.22) or a long distance (ranged from 20 to 50 metres; M = 33.42, SD = 8.21). Participants were then asked to estimate the distance either immediately or after delay (i.e., between 30 minutes to 48 hours). Absolute and relative errors (i.e., where the estimated distance was subtracted from the actual distance and divided by the actual distance) were calculated prior to analysis. Lindsay et al.'s found that absolute error was smallest in the short distance groups (i.e., 5-8 m and 9-12 m); and within the long distance group, absolute error was significantly smaller in the 31-35 m group than in the 43-50 m group. Additionally, they found that relative error was significantly greater in the delay condition (*M* = -.11, *SD* = .54) than the immediate condition (*M* = .03, *SD* = .61). In sum, Lindsay et al. found that participants' distance estimates were less accurate in the long distance condition (cf. the short distance condition) and in the delay condition (cf. the immediate condition).

Lindsay et al.'s (2008) results (presented in Table 6.2) also showed a pattern of underestimation when the mean of actual distance was less than 31 metres, but an overestimation when the mean of actual distance was greater than 35 metres. However, note that participants in Lindsay et al.'s study were tested from various distance points within a specified range (i.e., short [5-15 metres] vs. long [20-50 metres]); this makes it difficult to compare participants' estimates with the actual distance (cf. Douglass, Brewer, et al., 2010). In Lindsay et al.'s study, the difference between the mean of actual distance and the estimated distance was as little as 2.62 metres (when the actual distance was 31 metres), but also as high as 31.31 metres (when the actual distance was 34.63 metres). This large variability (i.e., between 2.62 and 31.31 metres) may be due to the variability in the actual distance and also due to the inclusion of data from the delay condition (where errors of estimates were found to be the largest).

Marsh and Greenberg (2006) found that eyewitnesses' estimates of distance were on average closer to the actual distance (than eyewitnesses' estimates of time to the actual time), even when the event was shown through a video as compared to a live event. In particular, participants in their study were shown a video of a simulated street robbery and were then asked (a) to provide estimates of the minimum and maximum distance between the criminal and the victim, and (b) to estimate the duration of the incident. The actual distance ranged from 0 to approximately 8 feet, and the actual time ranged from 2.05 to 2.67 seconds (*M* = 2.33). On average,

Table 6.2.

Taken from Lindsay et al. (2008): Mean of Actual Distance and Estimated Distance (metres) Collapsed across All Conditions

N	Mean of actual distance	Estimated distance
333	10.71 (7.58)	5.50 (1.68)
232	14.64 (9.05)	10.30 (0.87)
121	21.55 (11.98)	14.74 (0.67)
142	26.48 (10.95)	19.64 (1.34)
178	31.15 (9.36)	28.53 (2.94)
36	36.12 (7.69)	39.81 (0.82)
133	34.63 (10.33)	65.94 (24.71)

Note. Standard deviations are in parenthesis.

participants' distance estimates were found to be closer to the actual distance, both for the estimates of the minimum distance (M = 0.99 feet, SD = 0.95) and the maximum distance (M = 8.12 feet, SD = 11.12); as compared to participants' estimates of time (M = 7.53 seconds, SD = 5.55). However, note that the variability was still large for both types of estimates.

6.2.2.2 *Present studies on distance judgments*

In line with Douglass, Brewer, et al.'s (2010) finding, on average, eyewitnesses' estimates of distance in Experiments 1 to 3 were close to the actual distance (see Table 6.3). Additionally, these results are also consistent with findings from basic research: Hanyu and Itsukushima (1995) had participants stand in a hallway and asked them to verbally report the distance of the hallway (the actual distance was 46 metres); participants' estimates were nearly identical to the actual distance (M = 44.74 metres).

Table 6.3.

Mean Distance Judgments (metres) from the No Feedback Condition Obtained Immediately and After Delay in Experiment 1, 2, and 3.

	Actual distance	Immediate	Delay[a]
Experiment 1	30	31.00 (25.65)	35.55 (34.70)
		[18.63, 43.36)	[18.83, 52.28]
Experiment 2	8	7.09 (5.18)	8.49 (8.26)
		[5.16, 9.03]	[5.41, 11.58]
Experiment 3	15	13.32 (7.79)	12.61 (9.09)
		[10.24, 16.40]	[9.02, 16.21]

Note. Standard deviations and 95% confidence intervals are in parentheses and brackets, respectively.

[a]The duration of delay was one-week for Experiments 1 and 3; and two-weeks for Experiment 2.

Similar to Lindsay et al.'s (2008) findings, across the three experiments, over half the participants underestimated distance (i.e., 52%-63% from the immediate condition and 53%-60% from the delay condition); and only a small proportion of eyewitnesses overestimated distance (i.e., 22-27% from the immediate condition and 26-33% from the delay condition). Additionally, 10 to 27% of eyewitnesses from the immediate condition actually produced an estimate that was equal to the actual distance, however the number slightly decreased when these estimates were produced after a period of delay (i.e., 6-21%).

As with time judgments, these results suggest that the courts may want to be cautious when interpreting eyewitnesses' distance judgments. Eyewitnesses were found to have a tendency to underestimate distance, and as result, eyewitnesses may appear to be more believable in their identification decision (e.g., Marsh &

Greenberg, 2006). However, it is noteworthy that across Experiments 1 to 3, distance estimates did not differ between the immediate condition and the delay condition (see Chapters 3 and 4). These results suggest that distance judgments may be more reliable than time judgments when they are obtained after a period of delay. However, these results should be interpreted with caution because, as shown in the previous paragraph, the eyewitnesses' distance estimates varied and that in actuality, there was only a minority who was able to make an accurate estimate of distance.

6.2.2.3 *Confidence in distance judgments*

The relationship between accuracy and confidence in distance estimates has never been investigated in eyewitness literature. However, basic research suggests that there may be a correlation between the two. Specifically, Radvansky et al. (1995) found that high-confidence estimates were more accurate than low-confidence estimates. However, in Radvansky et al.'s study, participants were asked to estimate distance between letters that were placed in individual quadrant on a computer screen (where estimates were measured in pixel squares). Accordingly, these findings may not generalise to eyewitness settings.

Eyewitnesses' confidence in distance judgments was investigated as part of Experiments 2 and 3. Participants were asked to rate on a 7-point scale, "How confident are you with your distance estimate?" (1 = *not at all*; 7 = *totally*) immediately after they had provided their distance estimate. Absolute errors in distance judgments were calculated and it was predicted again that, if confidence was a good indicator of accuracy, then a negative correlation should be found between absolute error and confidence ratings—in other words, smaller error in distance judgments should associate with higher confidence in distance estimates. However, no significant correlation was found in both experiments regardless of whether distance judgments were obtained immediately ($r = -.25$, $p = .18$, 95% CI [-0.56, 0.12], Experiment 2; $r = .34$, $p = .09$, 95% CI [-0.05, 0.64], Experiment 3) or after delay ($r = -.06$, $p = .75$, 95% CI [-0.41, 0.31], Experiment 2; $r = .32$, $p = .10$, 95% CI [-0.07, 0.62], Experiment 3). As with time judgments, these results suggest that confidence may not be a good indicator of accuracy in distance judgments.

6.2.3 Summary

The pattern of results from this research suggests that people have a tendency to underestimate distance. However, when participants' distance judgments were averaged, they were quite close to the actual distance; and this has been consistently found across past and present studies involving eyewitness (e.g., Experiments 1-3; Douglass, Brewer, et al., 2010) and basic research (e.g., Hanyu & Itsukushima, 1995). Furthermore, compared to time estimates, distance estimates seemed to be remembered better following a one-week and two-week delays. Regardless, there was still variability within the individual estimates. Additionally, as with time judgments, confidence in distance estimates were not found to relate to accuracy in distance estimates. Hence, further research is needed to assess factors that could help determine the accuracy of these estimates, before courts could confidently rely on eyewitnesses' distance judgments.

CHAPTER 7: General Discussion

Courts in the United States, United Kingdom, and Australia rely on eyewitnesses' testimony-relevant judgments (such as certainty, view, time, and distance) to assess the reliability of their identification decision (*Alexander v. Queen,* 1981; *Domican v. The Queen,* 1992; *Manson v. Braithwaite,* 1977; *Neil v. Biggers,* 1972; *R v. Turnbull and Others,* 1976). Over the last 16 years, post-identification feedback studies have shown that while the majority of these judgments are malleable to the effect of confirming feedback, time and distance judgments are immune to this confirming feedback effect (Douglass, Brewer et al., 2010; Hafstad et al., 2004; Neuschatz et al., 2007; Steblay et al., 2014; Wells & Bradfield, 1998, 1999). The aims of this thesis were to investigate why these differential feedback effects occur, identify factors that protect these judgments from being influenced by feedback, and evaluate the extent to which these judgments can be trusted. Investigating this issue is important to contribute to our understanding of the mechanism and the limits of the post-identification feedback effects.

To address these aims, this thesis made several predictions about the differential feedback effects (Experiments 1-3), investigated the factor structure of the 13 testimony-relevant judgments, reviewed basic research in time and distance estimation, and examined the accuracy of eyewitnesses' time and distance judgments. This chapter presents theoretical (Section 7.1) and practical contributions of this research (Section 7.2), limitations and directions for future research (Section 7.3), summary and conclusions (Section 7.4).

7.1 Theoretical Contributions

There were two main theoretical contributions of this thesis. First, it provided explanations as to why confirming feedback does not affect time and distance judgments (Section 7.1.1), and why it affects the rest of the judgments (Section 7.1.2). Second, it suggested a theoretical framework that takes into account the differential confirming feedback effects on eyewitnesses' testimony-relevant judgments (Section 7.1.3). These points will be discussed in turn below, followed by some considerations for future research (Section 7.1.4).

7.1.1 Why Confirming Feedback Does Not Affect Time-in-View and Distance Judgments

According to the present research, confirming feedback does not affect time and distance judgments because eyewitnesses do not infer that viewing time and distance can indicate a correct identification decision. The results presented in Chapter 4 showed that specific feedback about time and distance affected time and distance judgments regardless of whether or not eyewitnesses thought that they made a correct identification decision. These results indicate that time and distance judgments are made independently from the eyewitnesses' knowledge of their identification performance. These results were supported by the factor analysis findings, that time and distance judgments fell into a factor independent from the rest of the factors that were related to the identification (Chapter 5).

Findings from basic research (reviewed in Chapter 6) have also suggested that people use different cues to make time and distance judgments. For example, participants' reconstructive memory of the action of the target person has been shown to be an important cue for making time judgments (Burt & Popple, 1996; Loftus & Palmer, 1974); and that viewing cues such as depth, brightness, and occlusion have been shown to affect distance judgments (e.g., Cavallo et al., 2001). These cues are clearly distinct from the cues that are drawn from an ecphoric experience when making an identification decision, which is then used to make other testimony-relevant judgments (see Bradfield et al., 2002). For example, Bradfield et al. suggested that eyewitnesses use ecphoric similarity (a subjective memory judgment that is based on perceived similarity between a stimulus and a person's memory) as a cue for making certainty judgments. Accordingly, confirming feedback or informing the eyewitness that they made a correct identification provides a cue that indicates high ecphoric similarity (i.e., high recognition of the target person) and high certainty judgments. Bradfield et al. also suggested that eyewitnesses use this cue to make inferences about other judgments, which explains the broad post-identification feedback effects on a wide range of eyewitnesses' testimony-relevant judgments (also see Charman & Wells, 2012).

To date, the post-identification literature has not provided an explanation for the differential confirming feedback effects. The present research made a contribution in this regard by showing that confirming feedback does not affect time and distance judgments because a correct identification decision is not a useful cue for making time and distance judgments.

7.1.2 Why Confirming Feedback Affects the Rest of the Judgments

Factor analysis results found that most testimony-relevant judgments fell into: (a) a factor that relates to the identification, and (b) a factor that relates to the target person. It was demonstrated in Chapter 5 that judgments that fell into the Identification factor were most affected by confirming feedback because these judgments were a direct reflection of the identification performance. Judgments that fell into the Target Person factor were also affected by confirming feedback because eyewitnesses' identification performance was dependent on their viewing of the target person. Accordingly, eyewitnesses might infer that they had a good view of the target person's face from the confirming feedback they received. Supporting these findings, Bradfield and Wells's (2000) study found that outside observers inferred the accuracy of a witness's description of the target person (i.e., whether it matched the appearance of the target person) from the witness's certainty, view, and attention judgments. That is, a witness who was certain, had a good view, or paid attention was evaluated as being more likely to have given a description that matched the appearance of the target person than a witness who was not certain, had a poor view, or did not pay attention. These results suggest that correct identification decisions (e.g., correct descriptions of the target person) are typically associated with variables such as certainty, view, and attention in the minds of jurors and in the minds of eyewitnesses.

Additionally, in Experiment 2, a few participants (who were given both confirming feedback and specific feedback about time and distance) reported during debriefing that they were suspicious that the specific feedback might have been false because they did not believe that people's ability to make a correct identification could only be determined by their viewing time and distance alone. Instead, there were a lot of factors that could contribute to making a correct identification decision; for example, they reported that it would depend on whether the witnesses paid attention to the target person's face, whether they had a good view of the face, and whether they had the ability to remember faces. These reports again suggest that eyewitnesses tend to associate correct identification decisions with these variables that have been found to be vulnerable to confirming feedback effects. In short, results from the factor analysis have provided insights into why eyewitnesses might have different views on these many testimony-relevant judgments, and in particular, why they view time and distance judgments differently from the rest of the judgments that are affected by confirming feedback.

The identification-time judgment was also found to fall into the Identification factor (Chapter 5). This is an important finding because so far the post-identification feedback literature has not been able to explain why identification-time judgment was the only objective judgment affected by confirming feedback (Steblay et al., 2014). This finding suggests that the null effects of confirming feedback on time and distance judgments are not simply due to these judgments being objective (also see Douglass, Brewer, et al., 2010). Rather, they were not affected because these judgments measured a dimension that was not related to the identification (i.e., they loaded on a factor independent from the rest of the factors measured by the rest of the judgments).

7.1.3 Theoretical Explanations for Post-Identification Feedback Effects

The findings from the present research have contributed to the development of a theoretical framework for post-identification feedback effects.

7.1.3.1 *The accessibility hypothesis*

The accessibility hypothesis has predominantly been used to explain the robust effects of post-identification feedback (Charman & Wells, 2012; Charman et al., 2010; Quinlivan et al., 2010; Steblay et al., 2014; Wells & Bradfield, 1998, 1999). According to the accessibility hypothesis, confirming feedback affects testimony-relevant judgments because eyewitnesses have weak internal cues about these judgments (Neuschatz et al., 2007; Quinlivan et al., 2009; Wells & Bradfield, 1998). Post-identification feedback studies have demonstrated that when eyewitnesses had strong internal cues to their testimony-relevant judgments, their judgments were protected from the influence of confirming feedback (e.g., Bradfield et al., 2002; Wells & Bradfield, 1999). Since time and distance judgments were consistently found to be unaffected by confirming feedback, the accessibility hypothesis would postulate that this occurred because eyewitnesses have strong internal cues about their time and distance judgments. This was tested in Experiments 1 and 2 (Chapter 3). It was found that eyewitnesses' judgments were malleable to the influence of feedback when internal cues were weak, but only when the feedback was relevant to the judgments (i.e., irrelevant feedback did not influence these judgments).

Additionally, the accessibility hypothesis also postulates that confirming feedback affects judgments because when internal cues are weak, eyewitnesses rely on external cues such as confirming feedback, and make inferences about their judgments based on this feedback (e.g., "I must have been confident since I made a correct identification;" Wells & Bradfield, 1998, 1999). However, the present research found that although confirming feedback may provide a useful cue for making the majority of testimony-relevant judgments, eyewitnesses did not use confirming feedback to make time and distance judgments. Rather, eyewitnesses used different cues for making time and distance judgments and accordingly, the presence or absence of confirming feedback did not make a difference on these judgments. In its current form, the accessibility hypothesis cannot explain these findings.

7.1.3.2 *Refinements to the accessibility hypothesis*

The accessibility hypothesis has been refined and extended into a framework called the Selective Cue Integration Framework (SCIF). This framework was developed by Charman et al. (2010) and contained three stages explaining the processes in which eyewitnesses make certainty judgments. Charman et al. also found that this framework applies to the rest of testimony-relevant judgments (i.e., not limited to certainty judgments). However, they tested this by combining the remaining judgments (including time and distance) into a composite score. Accordingly, this framework does not address the issue of the differential post-identification feedback effects. Nevertheless, the present research suggests that the SCIF can be adapted to explain the post-identification feedback effects, including the differential post-identification feedback effects. Drawing from the findings of the current research, the SCIF could be adapted by incorporating the following considerations into the framework: (a) eyewitnesses' internal cues may differ across judgments and (b) the external cues that are available to eyewitnesses (e.g., feedback) can either be relevant or irrelevant to the judgments (see Figure 7.1).

The first stage of the SCIF is the assessment stage, which is essentially the same as the accessibility hypothesis (Charman et al., 2010). In this first stage, eyewitnesses assess their internal cues at the time they are asked to provide their testimony-relevant judgments. To the extent that their internal cues are highly accessible, eyewitnesses will immediately produce their judgments; however, to the extent that their internal cues are not highly accessible, they will seek for external cues and enter the second stage of the SCIF, the search stage. Additionally, note that the adapted framework shows that eyewitnesses' internal cues may differ across judgments and as a result of this, external cues that are applicable to these judgments may also differ.

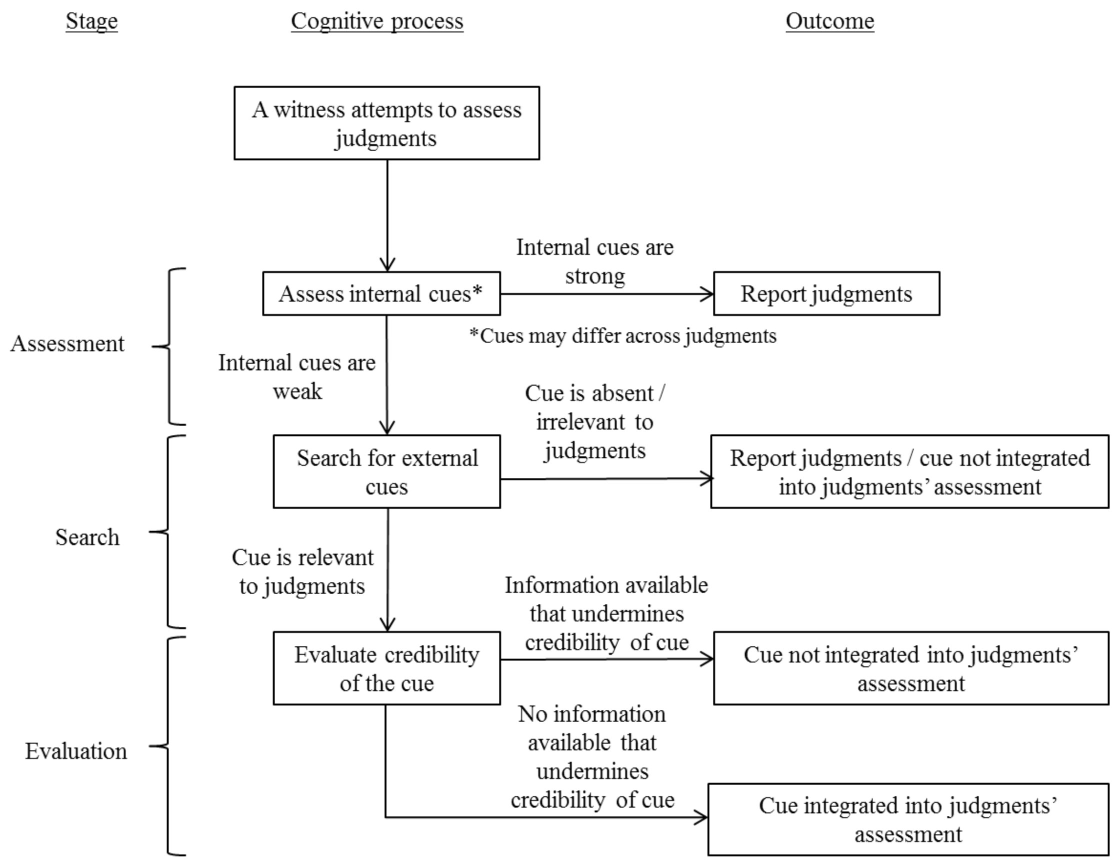

Figure 7.1. A framework for the post-identification feedback effects adapted from the Selective Cue Integration Framework (Charman et al., 2010).

In the search stage, the SCIF stated that the external cues could be either confirming feedback (i.e., witnesses were told that they were correct in their identification decision) or disconfirming feedback (i.e., witnesses were told that they were incorrect in their identification decision). However, the present research has demonstrated that witnesses' external cues may not always be limited to feedback about the identification performance. For example, police or a co-witness may provide a comment regarding the witnesses' viewing time and distance; further, this type of feedback has also been found to influence eyewitnesses' time and distance judgments (e.g., Experiments 1 and 2). Accordingly, the external cues depicted in this adapted framework are not specified and these cues include any information that the witnesses have encountered prior to making judgments. However, this information can either be relevant or irrelevant to the judgments. To the extent that the external cues are irrelevant to the judgments (e.g., confirming feedback to time and distance judgments), these cues will be ignored and hence will not affect judgments. Conversely, to the extent that the external cues are relevant to the judgments (e.g., confirming feedback to certainty judgments), eyewitnesses will evaluate the credibility of these cues; and only if the cues are deemed credible (e.g., if there is no reason to believe that the cues might be false) will these judgments be affected.

It is important to note that according to the search stage of this adapted framework, eyewitnesses may receive more than one type of feedback information, and that not all feedback will affect all judgments the same way. For example, in Experiments 1 and 2, even when participants were given confirming feedback alongside specific feedback, time and distance judgments were only affected by specific feedback (i.e., confirming feedback did not have an effect on these judgments). Similarly, the rest of the judgments were only affected by confirming feedback (i.e., specific feedback did not affect these judgments). These results suggest that eyewitnesses are selective in their reliance on external cues, and that they would only integrate cues that are relevant to their judgments. In sum, by incorporating the relevance of cues into the SCIF, this framework is able to explain the differential post-identification feedback effects while maintaining the general structure of the SCIF, and still explains the robust post-identification feedback effects.

However, this adapted framework has one limitation in that it does not provide information about what these relevant cues should be. In fact, this may be difficult to predict, not only because of the many possibilities of feedback information that eyewitnesses may come across, but also because feedback may produce counterintuitive effects. For example, confirming feedback and disconfirming feedback are both feedback about the identification performance; theoretically, both types of feedback should be equally relevant and have the same magnitude of effect on witnesses' testimony-relevant judgments (i.e., on all judgments except time and distance). However, although confirming feedback has been shown to reliably affect witnesses' testimony-relevant judgments, disconfirming feedback only has had weak and unreliable effects on these judgments (see meta-analysis by Steblay et al., 2014). These results showed that eyewitnesses only integrated confirming feedback and did not take into account disconfirming feedback into their judgments. Charman et al. (2010) suggested that this occurred because, according to the attitude change literature, people tend to look for evidence that confirms, rather than disconfirms, their pre-existing beliefs (Nickerson, 1998), and that people tend to accept confirming information, but critically scrutinize disconfirming information in attempt to reject it (Edwards & Smith, 1996; Lord, Ross, & Lepper, 1979). Accordingly, because people do not readily seek or accept feedback that disconfirms their behaviour, from the adapted framework perspective, disconfirming feedback is irrelevant to witnesses' judgments; as a result, disconfirming feedback does not get integrated into the witnesses' judgments. Nevertheless, although this adapted framework cannot be used to predict what type of feedback will or will not affect judgments, it does provide guidelines as to how eyewitnesses make testimony-relevant judgments, and provides insights into why some judgments are immune to the influence of feedback while others are not.

So far, the post-identification feedback literature has not provided an explanation for why time and distance judgments were the only judgments unaffected by confirming feedback. The present research has made a contribution in this regard by proposing several reasons for the differential post-identification feedback effects. It further suggested that an adapted framework (based on the SCIF model; Charman et al., 2010) can be used to explain these differential feedback effects. In summary, according to this adapted framework, when internal cues are weak, time and distance judgments are as vulnerable as the rest of the judgments to the influence of external cues such as feedback; however, as with the rest of the judgments, time and distance would only be affected by feedback that is relevant to them, as irrelevant feedback would not be integrated into judgments.

7.1.4 Considerations for Future Research

Time and distance judgments have often been excluded in post-identification feedback studies (e.g., Bradfield et al., 2002; Charman & Wells, 2012; Douglass & McQuiston-Surrett, 2006; Douglass, Nueschatz, et al., 2010; Skagerberg, 2007; Smalarz & Wells, 2014; see Chapter 2 for a review). Additionally, when these judgments were included, researchers have often combined individual judgments into a single composite score for purposes of analysis (e.g., Charman et al., 2010; Quinlivan et al., 2010; Wells et al., 2003). As demonstrated throughout the thesis, these practices limit our understanding of the differential post-identification feedback effects. Future research should therefore always endeavour to include time and distance judgment when testing the post-identification feedback effects, and avoid combining these judgments into a composite score.

Future research may also want to consider conducting a factor analysis on the testimony-relevant questionnaire to replicate the current findings, to see whether the same factor structure would emerge. So far there has only been one other study that has conducted a factor analysis. Wells et al. (2003) found a two-factor solution (while the present study found a three-factor solution), however, they did not include time and distance judgments in their factor analysis. It is therefore possible that Wells et al. would have found a three-factor solution had they included time and distance judgments in the analysis—as time and distance were the only two judgments that were found to load on a single factor independent from the rest (see Chapter 5). Additionally, a few researchers have subjectively grouped these testimony-relevant judgments into categories (Douglass & Steblay, 2006; Steblay et al., 2014; Wells & Bradfield, 1998); however, these were not categorised based on factor structure. Accordingly, these categories might not accurately reflect the latent variables underlying these judgments. For example, although Wells and Bradfield grouped certainty, ease, and identification-time judgments into *the qualities of the identification task* category (as identified by the factor analysis results); they categorised time and distance judgments along with features, attention, and view judgments into *the qualities of the witnessed event itself*; and categorised testify, trust, and basis judgments into *the summative qualities of the witnessing experience.* It was clear from the factor analysis results that time and distance judgments did not load on the same factor as the one shared by the rest of these judgments (i.e., features, attention, view, and basis).

In summary, the following considerations are suggested for future research. First, researchers should endeavour to always include time and distance judgments when testing the post-identification feedback effects. This would advance our knowledge regarding the differential post-identification feedback effects and this is especially important because time and distance judgments are two of the few criteria that the courts use to assess the credibility of eyewitness identification evidence (e.g., *Alexander v. Queen,* 1981; *Domican v. The Queen,* 1992; *R v. Turnbull and Others,* 1976). Second, when testing the effect of post-identification feedback, researchers should avoid combining witnesses' time and distance judgments along with the rest of the judgments into a composite score, particularly because confirming feedback has been shown to have differential effects on these judgments. Finally, future research may want to consider categorising testimony-relevant judgments according to its factor structure obtained through factor analysis.

7.2 Practical Contributions

Given that time and distance judgments are being used in courts to assess the credibility of eyewitness identification evidence (e.g., *Alexander v. Queen*, 1981; *Domican v. The Queen*, 1992; *R v. Turnbull and Others*, 1976), and despite the relative immunity of these judgments to confirming feedback, there are some practical considerations that need to be taken into account.

First, eyewitnesses' time and distance judgments should not be taken at face value. As reported in Chapter 6, although a small number of eyewitnesses from Experiments 1 to 3 produced an accurate estimate, in general, there was a large variability in the witnesses' time and distance estimates. Second, eyewitnesses have a natural tendency to overestimate time and underestimate distance. If viewing time and viewing distance are important determinants of eyewitnesses' identification accuracy, then, an overestimation of time and an underestimation of distance would make an eyewitness appear to be more confident and credible in their identification decision than they actually are. Third, eyewitnesses' confidence in their time and distance judgments was not found to correlate with the accuracy of their estimates (Experiments 1 to 3; Yarmey, 1990; Yarmey, 1993; Yarmey & Yarmey, 1997). These results suggest that confidence may not be a good indicator of accuracy in witnesses' time and distance estimates. Fourth, eyewitnesses' estimates of time and distance were found to be less accurate when there was a delay between witnessing the event and producing the estimates (see Chapter 6). For example, across Experiments 1 to 3 witnesses' means estimate of time were about twice as high as the actual time when these estimates were obtained immediately following witnessing an event; however, witnesses' means estimates were about three times as high when these estimates were produced after at least 1-week delay. Similarly, across Experiments 1 to 3 witnesses' means estimate of distance were closer to the actual distance when these estimates were obtained immediately as compared to after at least a week delay. All in all, these issues are important to consider when weighing witnesses' time and distance judgments, especially when no other evidence is available to support the witnesses' estimates (e.g., CCTV or security camera footage).

7.2.1 Recommendations for the Legal System

Despite the variability in eyewitnesses' time and distance judgments and the vulnerability of these judgments to specific feedback, there are still recommendations that could be implemented. First, the present research suggest that the time delay between occurrence of a crime and the elicitation of these judgments should be reduced whenever possible. Second, given that time and distance judgments are not entirely immune to feedback influence, it is also important that these judgments are obtained in private and by an officer who is blind to the case, to prevent feedback of any sort from being delivered to eyewitnesses.

Past research, including the recent report issued by the National Academies, has made similar recommendations for improving an eyewitness identification procedure; namely, (a) that the identification procedures must be blind and performed by an officer who is unaware of the identity of the suspect (e.g., Committee on the Scientific Approaches to Understanding and Maximizing the Validity of Eyewitness Identification in Law Enforcement and the Courts, 2014; Technical Working Group for Eyewitness Evidence, 1999), (b) that they should limit the information given to eyewitnesses subsequent to making identifications (Committee on the Scientific Approaches to Understanding and Maximizing the Validity of Eyewitness Identification in Law Enforcement and the Courts; Wells et al., 1998), and (c) that witnesses should be separated from co-witnesses whenever possible to avoid discussion and influence in their identification decision (Skagerberg & Wright, 2008). Furthermore, the recent report issued by the National Academies recommended that all law enforcement officers in eyewitness identification should be trained to minimise contamination, avoid suggestiveness, and minimise interactions among witnesses. For example, officers should avoid communications that might affect witnesses' confidence level and should not provide feedback to witnesses following an identification procedure. Furthermore, officers should document witnesses' confidence judgments at the time when the suspect was identified, and to videotape the identification process to obtain evidence of the conditions associated with the initial identification; finally, jury should be made aware of variables that might affect confidence (Committee on the Scientific Approaches to Understanding and Maximizing the Validity of Eyewitness Identification in Law Enforcement and the Courts). The research presented in this thesis suggests that these recommendations can also protect time and distance judgments from distortion.

7.3 Limitations and Directions for Future Research

One limitation of the present research is that it only tested one type of manipulation (i.e., retention interval) to weaken the internal cues for time and distance judgments (Experiments 1-3). As discussed in Chapter 3, this type of manipulation may not be suitable for weakening internal cues because these judgments tend to inflate naturally following a delay (even without the influence of feedback), making it difficult to detect feedback effects. Experiment 2 results suggest that distance cues may be weakened by removing depth cues that are available in the viewing environment (i.e., by showing the event through a video instead of live). Future research may want to investigate this further by comparing distance judgments of witnesses who viewed the event via a video and those who viewed the event live, to see whether feedback effects are more pronounced in the video condition.

It has also been acknowledged that the use of videos in eyewitness studies might challenge the ecological validity of lab-based experiments (Ihlebæk, Løve, Eilertsen, & Magnussen, 2003; but see Lindsay & Harvey, 1988). According to Tollestrup, Turtle, and Yuille (1994), witnessing an event through a video involves a passive role and that the video provides only a uniform view of the event. Additionally, some crimes are traumatic and they might generate higher emotional arousal than crimes shown through a video. Even if a traumatic video was shown, the experience is different because it is watched in a safe and quiet environment (Yuille & Daylen, 1998). Pozzulo, Crescini, and Panton (2008) tested this by randomly allocating participants to either a live crime or a video condition. All participants witnessed the same staged theft involving a male confederate (posing as another participant) who grabbed a purse of the experimenter and ran out of the room, the only difference was that participants either experienced it live or witnessed it through a video. They found that witnesses of a live crime reported significantly higher levels of stress and arousal than witnesses who viewed the crime through a video. This could potentially have an influence on witnesses' time estimates. Loftus et al. (1987) found that witnesses who were shown a video of a stressful event produced higher overestimates than witnesses who were shown a less stressful version of the event. These results indicate that witnesses' time estimates may vary depending on their experience and involvement in the event. Consequently, witnesses in the real world might produce even greater overestimates than have been shown in the lab. Since videos are commonly used in post-identification feedback studies (e.g., Bradfield et al., 2002; Neuschatz et al., 2005; Quinlivan et al., 2012; Wells et al., 2003; Wells & Bradfield, 1998, 1999), future research should investigate whether the use of videos is appropriate to measure time and distance judgments.

Finally, it has been suggested that people are generally consistent in their direction of estimation (Attard & Bindemann, 2013). Specifically, it was found that people who had a tendency to underestimate, overestimate, or correctly estimate duration of crime videos also maintained this tendency when they estimated the duration of non-crime videos. Future research on post-identification feedback effects may want to investigate whether feedback (that affects time and distance judgments) is more likely to influence judgments of those participants who are generally less able to produce accurate estimates. Such research would further explain how the post-identification feedback effects occur on time and distance judgments. Furthermore, future research should also investigate whether eyewitnesses' accuracy in time and distance judgments can be assessed by the witnesses' general ability in estimating time and distance in other settings; such research would be useful to determine the relative accuracy of the witnesses' judgments.

7.4 Summary and Conclusions

For the past 16 years the post-identification feedback literature has demonstrated the robust effects of confirming feedback on the majority of eyewitnesses' testimony-relevant judgments. Little attention, however, had been paid to determining why the effects of confirming feedback do not extend to time and distance judgments. This thesis contributed to the literature by investigating why these differential confirming feedback effects occur and providing a better understanding of the overall post-identification feedback effects. Furthermore, this thesis also found that although time and distance judgments were immune to confirming feedback, they were not entirely immune to distortion. This research therefore suggests that the courts should not take eyewitnesses' time and distance judgments at face value when using these judgments to assess the credibility of eyewitness identification evidence. As the courts consider better ways of evaluating eyewitness identification evidence, more than ever, research is required to inform the limits of the conclusions that can be drawn about the factors that influence the reliability of eyewitness testimony.

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Appendices

Appendix A. Photo of the Viewing Location (Experiment 1)

Figure A. Participants' view of the target person from a 30-metre distance, the target person was standing at the end of the corridor.

Appendix B. Counterbalancing Orders of the Testimony-Relevant Questions

Order	Categories			
1	A	B	C	D
2	C	A	D	B
3	D	B	A	C
4	B	C	D	A

Note. The order of the testimony-relevant questions was counterbalanced into four randomly-selected orders based on categories suggested by Wells and Bradfield (1998): A = qualities of the witnessed event (*view, time-in-view, features, distance, attention*); B = qualities of the identification task (*certainty, ease, identification-time*); C = summative qualities of the witnessing experience (*testify, trust, basis*); and D = memory for faces (*strangers, clarity*).

Appendix C. Correlation Matrix for the 13 Testimony-Relevant Questions (Experiments 1-3)

Question	Certainty	View	Time	Features	Distance	Attention	Basis	Ease	ID-Time	Testify	Trust	Strangers	Clarity
Certainty	1.00	.31**	.19*	.38**	-.07	.24**	.45**	.78**	.55**	.62**	.43**	.39**	.64**
View		1.00	.23**	.56**	.08	.10	.40**	.35**	.33**	.32**	.39**	.25**	.43**
Time			1.00	.24**	-.56**	.26**	.24**	.10	.04	.14	.06	.11	.20*
Features				1.00	.04	.25**	.47**	.39**	.30**	.36**	.37**	.29**	.53**
Distance					1.00	-.18*	-.08	.004	.18*	-.07	.10	-.02	-.05
Attention						1.00	.38**	.09	.02	.13	.17*	.19*	.232**
Basis							1.00	.40**	.27**	.44**	.53**	.33**	.52**
Ease								1.00	.70**	.69**	.48**	.40**	.59**
ID-Time									1.00	.54**	.38**	.24**	.45**
Testify										1.00	.64**	.35**	.53**
Trust											1.00	.24**	.43**
Strangers												1.00	.52**
Clarity													1.00

Note. $N = 163$. $*p < .05$. $**p < .01$.