

Norwegian Judges' Knowledge of Factors Affecting Eyewitness Testimony: A 12-Year Follow-Up

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Abstract

Eyewitness evidence plays an important role in criminal trials, often influencing decisions made by triers of fact. To evaluate eyewitness testimonies more accurately, judges must be aware of factors that can contaminate this type of evidence. In 2008, a survey of judges in Norway revealed a lack of awareness of several factors that affect eyewitness testimony. However, little is known about judges' current knowledge of this topic and how this knowledge has evolved over time. In the current study, a survey was administered to judges in Norway ($N = 98$) to evaluate their knowledge of factors that affect eyewitness testimony. Results showed that judges' overall knowledge scores were similar to those reported in 2008, but substantial increases and decreases in knowledge were observed for specific factors. Additional analyses indicated that increased uncertainty regarding some eyewitness factors led to a decline in accuracy when compared to responses observed in 2008. The current study provides an updated assessment of judges' knowledge of eyewitness factors and highlights the need for comprehensive training for judges regarding factors that can impair eyewitness testimony.

Keywords: eyewitness testimony; estimator variables; system variables; survey; judges

Introduction

Eyewitness evidence plays a critical role in the criminal justice system, however inaccurate testimony can impact investigations and potentially leads to miscarriages of justice. Data from the Innocence Project (2019) shows for instance that eyewitness misidentification was involved in approximately 70% of more than 300 wrongful convictions overturned using DNA evidence. Although eyewitness evidence is not inherently unreliable (Wixted, Mickes, & Fisher, 2018), it can be contaminated by several factors that affect eyewitness accuracy, such as biased line-up procedures or suggestive interviewing (Toglia, Read, Ross, & Lindsay, 2007). Research has generally indicated that laypeople, judges and legal professionals alike have limited knowledge of several factors that affect eyewitness testimonies (Benton, Ross, Bradshaw, Thomas, & Bradshaw, 2006; Desmarais & Read, 2011; Lindholm, 2008). In one study, Wise and Safer (2010) found judges in the United States to be less knowledgeable about factors affecting eyewitness testimony than law students. Similarly in Norway, Magnussen et al. (2008) found that judges were unaware of some important factors that can negatively impact the quality of eyewitness evidence. Since then, eyewitness research has grown extensively and has influenced policy guidelines in different countries (National Research Council, 2014; Police and Criminal Evidence Act, 2017; Technical Working Group for Eyewitness Evidence, 2003). However, whether developments in this line of research are reaching decision-makers in legal settings is yet to be examined. The current study aims to assess the extent of Norwegian judges' current knowledge of factors that can affect eyewitness testimony, thereby providing an updated assessment of judges' knowledge of this topic, as well as a comparison with the results obtained by Magnussen et al. (2008).

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3 Numerous factors can negatively impact eyewitness evidence, and these are often
4 categorised as estimator or system variables (Wells, 1978). Estimator variables refer to factors
5 that cannot be controlled by the legal system, such as the crime duration, characteristics of the
6 perpetrator or the conditions of the crime scene. In relation to estimator variables, it has been
7 found that judges and legal professionals are not always aware of the detrimental effects of the
8 presence of a weapon (Benton et al., 2006; Houston, Hope, Memon, & Read, 2013) and the use
9 of disguises such as a hat (Magnussen, Safer, Sartori, & Wise, 2013; Wise & Safer, 2004).
10 Knowledge related to the rate of memory loss after an event has also been found to be lacking
11 among judges (Benton et al., 2006). Additionally, an eyewitness's ability to recall minor details
12 about a crime has been erroneously perceived by legal professionals to be a reliable indicator of
13 accurate testimonies in several studies (Magnussen et al., 2013; Wise & Safer, 2004).
14 Knowledge of other estimator variables has also been assessed among legal professionals, for
15 instance the impact of the eyewitness's attitudes and expectations and the impact of stress on the
16 accuracy of eyewitness testimony (Magnussen et al., 2008; Wise & Safer, 2004).
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35 System variables refer to factors that can be controlled within the legal system, such as
36 how line-up identification procedures are conducted and the interviewing techniques used
37 (Wells, 1978). It has been found that judges and legal professionals also have limited knowledge
38 of several system variables that can impair eyewitness accuracy. For example, Jiang and Luo
39 (2016) reported that a number of legal professionals were unaware of the dangers of exposing
40 eyewitnesses to post-event information that may contaminate their memory of the event.
41 Furthermore, system variables (such as receiving positive feedback after a line-up identification)
42 can influence witnesses to be mistakenly more confident in their identification at the time of trial
43 (Douglass & Steblay, 2006; Steblay, Wells, & Douglass, 2014; Wells & Bradfield, 1998).
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3 Inattention to potential sources of confidence inflation is problematic as eyewitness confidence
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5 in court is often mistakenly perceived as being an indicator of identification accuracy by legal
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7 professionals (Magnussen et al., 2013; Magnussen et al., 2008; Wise, Gong, Safer, & Lee, 2010).
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10 Studies have also found limited knowledge of other important system variables such as bias in
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12 the format and presentation of line-up identifications (e.g., Wise & Safer, 2004). In contrast, a
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14 higher level of knowledge regarding the effects of exposure to mugshots ('mugshot-induced
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16 bias') among legal professionals has been found in some studies (Magnussen et al., 2013;
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18 Magnussen et al., 2008; Wise & Safer, 2010).
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22 In 2007, Magnussen et al. (2008) investigated judges' knowledge of eyewitness factors in
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24 a sample of Norwegian judges ($N = 157$). The authors adapted a survey developed by Wise and
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26 Safer (2004) containing 'True or False' statements about well-established factors that can affect
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28 eyewitness testimony (including many estimator and system variables). Across all items, the
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30 percentage of correct responses in the Norwegian sample ranged from 31% to 98%. Only five of
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32 the 15 eyewitness statements were answered correctly by at least 80% of participants.
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36 Magnussen et al. (2008) compared their findings to those of Wise and Safer's (2004) sample of
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38 judges in the United States ($N = 160$), and found Norwegian judges to be somewhat more
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40 knowledgeable than US judges, but knowledge in both samples was nonetheless limited.
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43 Judges' limited awareness of important factors that may contaminate eyewitness
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45 evidence is of concern, as judges in many countries have the power to prevent and minimise the
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47 negative consequences of erroneous eyewitness testimonies (Granhag, Strömwall, & Hartwig,
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49 2005; Wise & Safer, 2004). As in many other European countries, Norwegian judges play a
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51 critical role in delivering verdicts in most criminal cases. Judges in the Norwegian criminal
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53 justice system are employed at the level of the District Court ('tingretten'), the Court of Appeal
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3 ('lagmannsretten'), or the Supreme Court. A recent reform saw the abolition of the traditional
4 jury system in appeal cases in Norwegian courts (Borghan, 2017; Regjeringen, 2017). In criminal
5 cases the courts are composed of both one or more professional judges, as well as lay judges.
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7 Practising judges in Norway include both judges and deputy judges, with deputy judges
8 generally handling less serious criminal court cases.
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12 In recent years, discussions related to memory and factors that may affect the accuracy of
13 eyewitness testimonies have been visible in the public sphere and media in Norway (Biørnstad,
14 2017; Støstad & Gilberg, 2017), however updated data on legal professionals' awareness of these
15 factors is lacking. Worldwide, there has been increasing support for the notion that eyewitness
16 evidence can be contaminated and must be assessed via appropriate procedures (e.g., National
17 Research Council, 2014; Technical Working Group for Eyewitness Evidence, 2003). Currently,
18 the training in this area for Norwegian judges and deputy judges includes a lecture on eyewitness
19 psychology. Moreover, short courses in witness psychology are available for legal professionals,
20 offered through the Norwegian Bar Association (Juristenes Utdanningscenter, 2019).
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36 The current study assesses the knowledge of factors that may affect the accuracy of
37 eyewitness testimony in a sample of practising Norwegian judges and deputy judges, using the
38 methods and materials adopted by Magnussen et al. (2008). In doing so, this study provides an
39 updated assessment of Norwegian judges' knowledge of eyewitness issues, and investigates how
40 this knowledge has changed in the last 12 years through a comparison with the findings of
41 Magnussen et al. (2008).
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49 **Method**

50 *Participants*

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3 The sample was comprised of 98 practising judges and deputy judges in Norway (52%
4 female, which is representative of the total population; The Norwegian Courts Administration,
5 n.d.). The mean age of participants was 47.7 years ($SD = 11.0$) and the mean number of years of
6 experience practising as a judge and/or deputy judge was 9.3 years ($SD = 7.5$). Most participants
7 (78%) were currently working as trial judges at the level of the District court ('tingretten'), with
8 a small proportion of judges (22%) working at the level of the Court of Appeal
9 ('lagmannsretten'). With regard to experience prior to becoming a judge, 20% reported having
10 worked as a prosecutor, 15% as a defence attorney, 12% as both a prosecutor and defence
11 attorney, and 52% indicated that they had no previous experience working as a prosecutor and/or
12 defence attorney.
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26 Judges in Norway are required to register with the Norwegian Courts Administration
27 ('Domstoladministrasjonen'). All Norwegian judges, a total of around 700 individuals, were
28 invited to participate via an email containing a link to the online survey, distributed by The
29 Norwegian Courts Administration. A reminder email was sent three weeks after the original
30 invitation. Data collection began in June 2019 and ended at the end of August 2019. The study
31 was approved by the Norwegian Centre for Research Data (NSD project number 993725).
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40 **Materials**

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42 Participants were asked to complete an online questionnaire adapted from Magnussen et
43 al. (2008) and Wise and Safer (2004). The questionnaire consisted of statements regarding
44 factors that are known to influence eyewitness testimony. Five questions from Magnussen et al.
45 (2008) related to judges' views on how jurors would respond to eyewitness statements were
46 removed to reduce the length of the survey. One item from Magnussen et al. (2008) was not
47 reported in sufficient detail in the original paper to be replicated in the current study. Two
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3 additional items on the topics of recovered memories and repression of traumatic memories were
4 adopted from Magnussen and Melinder (2012) in order to evaluate Norwegian judges' beliefs
5 related to these topics. Therefore, all items used in the current survey were identical to those used
6 by Magnussen et al. (2008), except for the two additional items from Magnussen and Melinder
7 (2012). The 15 items evaluating knowledge of eyewitness factors are presented in Table 1.
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17 [Table 1 near here]
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21 ***Procedure***

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24 Participants were first asked to respond to the eyewitness knowledge questionnaire,
25 consisting of the 15 statements about eyewitness factors that can influence testimony accuracy
26 (e.g., 'A police officer who knows which member of the line-up or photo array is the suspect
27 should not conduct the line-up or photo array'). Similarly to Magnussen et al. (2008), the
28 response format for items 1-6 and 12-15 was 'agree', 'disagree' or 'neither agree nor disagree',
29 while the response format for items 7-11 was 'generally true', 'generally false' and 'don't
30 know'. Participants then responded to a statement that only in exceptional circumstances should a
31 defendant be convicted of a crime solely on the basis of eyewitness testimony (with the response
32 alternatives 'agree', 'disagree' and 'neither agree nor disagree'). Next, participants were asked
33 to respond to the two items adapted from Magnussen and Melinder (2012) related to recovered
34 memories and repression of traumatic memories. Participants were subsequently asked to
35 estimate the number of wrongful felony convictions (out of 100) that would have been at least
36 partly influenced by eyewitness error. Following this, participants were asked to report whether
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3 they had previously read literature on eyewitness testimony or attended lectures, speeches or
4 seminars on the topic.
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8 Finally, participants were asked to provide demographic information related to their
9 gender, age, years of experience as a judge, whether they work as a trial judge at the District
10 court ('tingretten') or as an appellate judge at the Court of Appeal ('lagmannsretten'), and their
11 experience practising law prior to becoming a judge.
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16 ***Analysis Plan***

17 *Performance on the Knowledge Scale and Comparison with 2008*

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19 Similar to Magnussen et al. (2008), answers to the 15 eyewitness knowledge items were
20 coded as either correct (coded as 1) or incorrect (coded as 0), and a mean number of correct
21 responses was calculated for the 15-item knowledge scale. Descriptive statistics were computed
22 to examine the percentage of correct responses for each statement, and Pearson's chi-squared
23 tests were conducted to compare the accuracy of judges' responses in the current study with the
24 responses obtained by Magnussen et al. (2008). In addition, an exploratory analysis using
25 Pearson's chi-squared tests was run on the three types of responses judges could choose from
26 (namely 'agree', 'disagree', or 'neither' for items 1-6 and 12-15; or 'generally true', 'generally
27 false' or 'don't know' for items 7-11) in order to assess whether response choices differed from
28 2008 in other ways than in terms of accuracy. Alpha levels were set at .05 and *Cramér's V* was
29 used as a measure of effect size.
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46 *Correlates of Judges' Knowledge*

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48 A point-biserial correlation coefficient was calculated to examine the association
49 between judges' knowledge and whether they believed in convicting a defendant solely on the
50 basis of eyewitness testimony. Pearson correlation coefficients were computed to examine the
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3 relationship between the 15-item eyewitness knowledge scale score and the estimation of
4 wrongful convictions due to eyewitness error, as well as with the number of years practising law.
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6 T-tests were used to compare the knowledge scores of judges who had previously been exposed
7 to information about eyewitness testimony and those who had not. Finally, ANOVAs were used
8 to assess whether knowledge scores differed between groups with different legal backgrounds.
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10 All analyses were conducted using the statistical software R (R Core Team, 2018).
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17 Results

18 *Performance on the Knowledge Scale*

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20 Table 2 presents the main descriptive statistics for the 15 eyewitness factor knowledge
21 items, including the responses reported by Magnussen et al. (2008). In the current sample,
22 accurate responses ranged from 22% to 98% with a mean accuracy of 67% across all items. The
23 mean score on the 15-item knowledge scale was 10.08 ($SD = 2.25$) out of 15. Six of the 15 items
24 were answered correctly by at least 80% of respondents (items 3, 4, 5, 7, 9 and 14). The impact
25 of attitudes and expectations, post-event information and confidence malleability on eyewitness
26 testimonies were all known by the vast majority of judges (98%, 97% and 92% respectively). In
27 contrast, only a small percentage of judges were aware of the effects of a hat and of the
28 forgetting curve (31% and 34% respectively).
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46 *Comparing Norwegian Judges' Knowledge in the 2008 and 2019 Samples*

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48 In the current survey, the mean proportion of correct responses was 67%, compared to
49 63% in the 2008 sample, $\chi^2(1) = 0.32$, $p = .57$, $V = 0.04$. The results for the chi-squared tests
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3 comparing accuracy scores for each eyewitness knowledge item in the 2008 and 2019 samples
4 are reported in Table 3. Five items (items 2, 6, 13, 14 and 15) showed significant increases in
5 accuracy in the 2019 sample when compared to the 2008 sample. Disagreement with the
6 statement that a witness's ability to recall minor details about a crime is a good indicator of a
7 reliable testimony (item 2) increased by 16%. Disagreement with the statement that an
8 eyewitness's confidence at trial is a good predictor of accuracy in identifying the defendant as
9 the perpetrator (item 6) increased by 47%. Furthermore, a 30% increase in disagreement with the
10 statement that attorneys know how most eyewitness factors affect eyewitness accuracy (item 13)
11 was observed. Disagreement with the statement that jurors know how most eyewitness factors
12 affect eyewitness accuracy (item 14) increased by 12% , and disagreement with the notion that
13 jurors can distinguish between accurate and inaccurate eyewitnesses (item 15) increased by 22%.

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Four items (items 1, 8, 10 and 11) showed significant decreases in accuracy compared to the 2008 sample. Agreement with the statement that it is harder for a witness of a crime to recognise a perpetrator who is wearing a hat than one that is not (item 1) decreased by 24%. Agreement with the statement that the presence of a weapon can impair an eyewitness's ability to accurately identify a perpetrator's face (item 8) decreased by 16%. Agreement with the statement that the rate of memory loss is greatest right after the event (item 11) decreased by 17%. Furthermore, agreement with the statement that sequential line-ups produce fewer misidentifications than simultaneous line-ups (item 10) decreased by 16%.

[Table 3 near here]

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3 Responses for six items did not appear to differ greatly from the responses observed in
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5 Magnussen et al. (2008). The same proportion of accurate responses was observed for the
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7 statement that an eyewitness's perception of an event is influenced by their attitudes and
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9 expectations (item 3), and for the statement that being exposed to mugshots biases the witness
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11 towards a suspect (item 9). No differences between the 2008 and 2019 samples were observed
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13 for the statement that a policeman should not know whether or not the suspect is in the line-up
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15 (item 4), for the statement that post-event information affects an eyewitness's testimony (item 5),
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17 and for the statement that very high stress at the time of observation has a negative impact on the
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19 accuracy of eyewitness testimony (item 12). Correct answers to the statement that an
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21 eyewitness's confidence can be influenced by factors that are unrelated to identification accuracy
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23 (item 7) increased by 7% in the 2019 sample, but this difference was not statistically significant.
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28 *Exploratory Analyses of Response Patterns*

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31 For the main analysis, knowledge scores were evaluated by contrasting accurate
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33 responses (e.g., 'agree') against the two inaccurate alternatives (e.g., 'disagree' and 'don't
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35 know'). A further exploratory analysis was conducted on all three possible responses in order to
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37 obtain further insights into the changes of response choices from judges in the 2019 and 2008
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39 samples. This analysis was conducted using Pearson's chi-squared tests in a 3 (answer choice:
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41 e.g., 'agree', 'disagree' and 'don't know') by 2 (sample: 2008 vs. 2019) model. Subsequent
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43 analyses of the standardised residuals were conducted to examine which of the three answer
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45 choices showed greater changes between 2008 and 2019 (Sharpe, 2015).
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49 Overall, this analysis shows a similar pattern of results as described in the main analysis
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51 with regard to increases and decreases in accuracy for the knowledge scale items (see Figure 1).
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53 Analyses of the residuals of the significant chi-squared tests showed that for three items
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3 (confidence-accuracy, attorneys' knowledge, and jurors distinguishing eyewitnesses) the
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5 improvement in accuracy occurred due to a decrease in both inaccurate responses and 'neither'
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7 responses. Regarding the knowledge improvement in item 2 (minor details), the increase in
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9 accuracy occurs almost exclusively due to fewer inaccurate responses, with little change in
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11 'neither' responses. In contrast, items that showed a decline in accuracy (effects of a hat, weapon
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13 focus, line-up presentation format and forgetting curve) presented an increase in 'neither'/'don't
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15 know' responses, with little changes in inaccurate responses. For item 1 (the effects of a hat), for
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17 example, a significant change compared to 2008 was observed, $\chi^2(2) = 14.87, p < .001, V = 0.24,$
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19 and this change was accounted for by a decrease in correct responses (55% in 2008 versus 31%
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21 in 2019) and an increase in 'neither' responses (34% in 2008 versus 55% in 2019). Therefore, for
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23 item 1, there was a negligible change of 3% in the proportion of judges that provided an
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25 inaccurate response (i.e., 'disagree').
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38 ***Correlates of Judges' Knowledge*** 39

40 Additionally, the relationships between judges' knowledge and several other variables
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42 were examined. Pearson correlations and point-biserial correlations revealed non-significant
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44 relationships between judges' knowledge scores and three other variables: i) the belief that only
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46 in exceptional circumstances should a person be convicted solely on the basis of eyewitness
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48 testimony, $r(60) = 0.15, p = .26$; ii) participants' estimates for the number of wrongful
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50 convictions (out of 100) that are at least partly influenced by eyewitness error, $r(96) = 0.15, p =$
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52 $.14$; and iii) years of experience practising as a judge and/or deputy judge, $r(96) = -0.12, p = .22.$
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3 A between-subjects *t*-test revealed no significant differences in knowledge scores between
4 judges who had read literature about eyewitness factors ($M = 10.2, SD = 2.2$) and those who had
5 not ($M = 9.5, SD = 2.5$), $t(30) = 1.16, p = .26$. Most judges (90%) reported having attended a
6 seminar about eyewitness testimony, therefore it was not feasible to conduct comparisons with
7 this variable. Additionally, a one-way ANOVA revealed no effect of previous type of legal
8 experience (e.g., prosecutor, defence attorney) on knowledge scores, $F(3,94) = 0.47, p = .70, \eta^2 =$
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18 19 *Additional Items*

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21 Finally, responses for the two additional items concerning recovered memories and
22 traumatic memories were examined. The first item evaluated judges' beliefs about recovered
23 memories in psychotherapy. No judges reported that they believed all recovered memories in
24 psychotherapy about traumatic events from childhood are real, 28% reported that most are real,
25 20% reported that most are false, 1% reported that are all false, and 51% responded that they did
26 not know. The second item evaluated judges' beliefs related to the repression of adult traumatic
27 memories. Most judges (43%) responded that a perpetrator who has committed murder and
28 claims they have no memory of the crime is lying, 37% responded that they did not know, and
29 20% responded that they believed that the perpetrator is telling the truth.
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42 **Discussion**

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44 The current study provides an updated assessment of Norwegian judges' knowledge of
45 factors that can affect eyewitness testimony, and compares the results with the findings of
46 Magnussen et al. (2008). The overall accuracy observed for the 15-item knowledge scale in the
47 current sample (67%) was comparable to the overall accuracy observed in 2008 (63%).
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3 However, substantial increases and decreases in judges' knowledge were observed for specific
4 items representing factors that can affect the accuracy of eyewitness testimonies.
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8 One of the most notable improvements in judges' knowledge was observed for the item
9 stating that confidence is not necessarily a reliable indicator of testimony accuracy. Participants'
10 performance in the current survey (78% accuracy) showed an increase for this item not only
11 when compared to previous performance in Norway (31%; Magnussen et al., 2008), but also in
12 comparison to judges' accuracy in the United States (32%; Wise & Safer, 2004), and to a similar
13 item administered to judges in China (42%; Jiang & Luo, 2016). It is also worth noting that
14 judges' knowledge in the current sample with regard to the eyewitness confidence-accuracy
15 relationship is comparable to that observed among experts in eyewitness psychology. For
16 example, Benton et al. (2006) found an agreement of 87% among experts with the statement that
17 confidence is not a good predictor of an eyewitness's identification accuracy among experts.
18 Interestingly, there has been extensive research on the eyewitness confidence-accuracy
19 relationship in recent years, enhancing the understanding of factors that can inflate eyewitness
20 confidence (e.g., Palmer, Brewer, Weber, & Nagesh, 2013; Wixted & Wells, 2017). These recent
21 developments may have contributed to increased awareness of issues concerning eyewitness
22 confidence inflation, as reflected by an increase in correct responses regarding the diagnostic
23 value of confidence at the time of trial. A recent review and synthesis of the existing research
24 found that there is a strong relationship between confidence and accuracy, but that the relation is
25 dependent upon the identification procedures (e.g. line-up fairness; Wixted & Wells, 2017).
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49 Additionally, judges were less likely to believe that jurors have adequate knowledge of
50 factors affecting eyewitness testimony and that jurors can accurately distinguish accurate from
51 inaccurate eyewitness testimonies, compared to Magnussen et al. (2008). In the current sample,
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3 77% of judges disagreed that attorneys know how most eyewitness factors affect eyewitness
4 accuracy (compared to 47% in 2008). These findings indicate that scepticism towards jurors' and
5 attorneys' knowledge of these topics has increased among Norwegian judges since 2008. These
6 results are interesting in light of the recent changes in the Norwegian criminal justice system,
7 particularly with regard to the abolition of the traditional jury system in appeal cases in courts
8 (Borghan, 2017; Regjeringen, 2017).
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17 Significant decreases in correct responses were observed for four items. Less than 35% of
18 the current sample correctly agreed with the statement that the use of a hat by a perpetrator has a
19 negative impact on eyewitness identifications (compared to 55% correct responses in 2008).
20 Furthermore, only 52% agreed that the presence of a weapon can impair an eyewitness's ability
21 to identify a perpetrator (compared to 68% in 2008). These items refer to effects that have been
22 extensively researched in eyewitness psychology literature (e.g., Fahsing, Ask, & Granhag,
23 2004; Fawcett, Russell, Peace, & Christie, 2013; Mansour et al., 2012), thus the current findings
24 highlight a discrepancy between the literature and the knowledge of judges in Norway. Similar
25 surveys have also found that judges provide few correct responses to items concerning both the
26 effects of a hat (e.g., Wise & Safer, 2004) and the presence of a weapon (e.g., Houston et al.,
27 2013) on eyewitness testimony. Several factors may underlie this finding, including judges'
28 limited training and access to eyewitness psychology research.
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45 Significant declines in knowledge were observed for an additional two items, namely the
46 items related to the forgetting curve (less than 35% correct) and the line-up presentation format
47 (less than 25% correct). Other evaluations of judges' knowledge of the forgetting curve have
48 yielded mixed results, with both higher (Jiang & Luo, 2016) and slightly lower proportions of
49 correct responses reported (Granhag et al., 2005; Wise & Safer, 2004). A lack of knowledge
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3 among judges for the line-up presentation item has been found elsewhere (Jiang & Luo, 2016;
4 Wise & Safer, 2004). However, the supposed correct answer for the line-up presentation format
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6 statement is somewhat less clear. Recent research has found that identifications from sequential
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8 line-ups may be more diagnostic of guilt, but may also lead to witnesses being more
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10 conservative, that is, less likely to identify culprits (and less likely to make any selection at all)
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12 from a sequential line-up (Steblay, Dysart, & Wells, 2011; Valentine & Fitzgerald, 2016).
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17 With regard to the four items for which a decline in knowledge was observed, a close
18
19 inspection of the data revealed a substantial increase in the ‘*don't know*’ or ‘*neither*’ responses,
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21 when compared to the 2008 sample. This finding suggests that the decrease in knowledge of
22
23 well-established factors that affect eyewitness testimony is partly reflected by increased
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25 uncertainty about these factors. There are a number of potential reasons for this finding. Notably,
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27 judges could have a non-specific awareness that various circumstantial factors contribute to
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29 eyewitness reliability, or an over-reliance on anecdotal cases, both of which have been shown to
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31 hinder one’s ability to apply knowledge objectively (Papailiou, Yokum, & Robertson, 2015;
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33 Tversky & Kahneman, 1973). Further research investigating the way in which judges justify
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35 their answer choices could provide empirical insights into the response patterns observed. In
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37 contrast, increases in knowledge appeared to be matched with a decrease in ‘*don't know*’ or
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39 ‘*neither*’ responses and inaccurate responses.
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45 It is worth noting that six items produced very similar responses to those described by
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47 Magnussen et al. (2008), namely, the items concerning post-event information, conducting line-
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49 ups, mugshot-induced bias, attitudes and expectations, the impact of stress and confidence
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51 malleability. For all six of these items the proportion of correct responses was high in both the
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53 current sample and the 2008 sample (from 70% to 98%; Magnussen et al., 2008). High accuracy
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3 among judges for many of these items has also been reported in other studies, such as for the
4 impact of stress (Benton et al., 2006) and post-event information (Benton et al., 2006; Wise &
5 Safer, 2004).
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10 Norwegian judges in the current sample appear to have better knowledge of the potential
11 impact of system variables (i.e., variables within the control of the judicial system and related
12 proceedings), as opposed to estimator variables (i.e., variables beyond the control of the criminal
13 justice system) on the accuracy of eyewitness testimony (Wells, 1978). This is of interest as
14 enhanced knowledge of system factors can lead to the development of more adequate procedures
15 and policies when dealing with eyewitness evidence. However, a lack of awareness of estimator
16 variables is of concern as it may indicate that judges may not be sufficiently considering
17 important factors that can impair eyewitness evidence (e.g., presence of a weapon or the effects
18 of a hat). Other studies have also found higher knowledge of system variables among judges and
19 law enforcement personnel (Benton et al., 2006), as well as among jurors and laypeople (Benton
20 et al., 2006; Desmarais & Read, 2011). Desmarais and Read (2011) argue that a potential reason
21 for this finding may be that the processes through which system variables influence eyewitness
22 accuracy are more concrete, and thus these factors may be easier to understand.
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40 For the item evaluating beliefs about recovered memories during psychotherapy, 20% of
41 participants reported that they believed most recovered memories are false, the response deemed
42 most correct according to current research (Magnussen & Melinder, 2012; Patihis, Ho, Loftus, &
43 Herrera, 2018). This is a slightly lower proportion when compared with the responses of a
44 sample of Norwegian psychologists and psychiatrists, all of whom had previously served as
45 expert witnesses in court (Melinder & Magnussen, 2015). Participants in the current sample were
46 also more uncertain (51%) compared to the psychologists and psychiatrists (14%) surveyed by
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3 Melinder and Magnussen (2015). A similar proportion of correct responses to that observed for
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5 the current sample of judges was also reported for French psychologists and psychiatrists who
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7 regularly serve as expert witnesses in a recent study (Dodier, Melinder, Otgaar, Payoux, &
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9 Magnussen, 2019). For the item evaluating beliefs about the repression of adult traumatic
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11 memories in perpetrators of murder, a slightly higher proportion of the current sample responded
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13 that the perpetrator is lying when compared with the Norwegian psychologists and psychiatrists
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15 that had served as expert witnesses (43% and 39%). A higher proportion of correct responses for
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17 this item was observed both in the current sample of judges and the sample of psychologists and
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19 psychiatrists with courtroom experience (Melinder & Magnussen, 2015), when compared with
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21 French psychologists and psychiatrists (11.7%; Dodier et al., 2019). Although the debate
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23 concerning repressed memories continues (see Brewin & Andrews, 2014; McNally, 2017;
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25 Otgaar et al., 2019; Patihis, Ho, Tingen, Lilienfeld, & Loftus, 2014), a recent survey found that
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27 most memory experts considered it implausible that traumatic memories are often repressed, and
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29 also disagreed that repressed memories can accurately be retrieved in therapy (Patihis et al.,
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31 2018). The findings of the current study suggest that these topics are not widely known by judges
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33 in Norway, similar to results previously found among Norwegian psychologists and psychiatrists
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35 (Magnussen & Melinder, 2012; Melinder & Magnussen, 2015).
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42 The current study provides an updated assessment of Norwegian judges' knowledge of
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44 factors affecting eyewitness evidence in 2019. The mean number of correct responses was 67%
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46 across all items (representing a non-significant increase of 4% compared to the 2008 sample).
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48 Although it is difficult to make direct comparisons with other studies due to variations in items
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50 and response options, this result is generally consistent with similar surveys assessing legal
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52 professionals' knowledge of eyewitness factors in several countries. Houston et al. (2013), for
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3 example, found exactly the same mean of correct responses (67%) among Scottish judges. Wise
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5 and Safer (2004) found the mean percentage of correct responses to be 55% for judges in the
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7 U.S., using a similar 14-item knowledge scale. Jiang and Luo (2016) assessed 216 judges in
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9 China and found that the mean number of correct responses was 58%. Other legal professionals
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11 have also been surveyed, with Italian defence attorneys achieving a knowledge score of 71%
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13 (Magnussen et al., 2013). Thus, the overall results for Norwegian judges' in the current study
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15 appear to be consistent with similar studies evaluating the knowledge of legal practitioners in
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17 several other countries. Interestingly, Magnussen, Melinder, Stridbeck & Raja (2010) found a
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19 mean percentage of correct responses of 57.5% among Norwegian jurors, which is a level of
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21 knowledge comparable to that of judges observed in some other studies (e.g., Jiang & Luo, 2016;
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23 Wise & Safer, 2004).

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28 Similarly to Magnussen et al. (2008), no significant relationships were observed between
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30 the knowledge of eyewitness factors and correlates such as the type of legal experience that
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32 judges had, the number of years they had been practising, and their exposure to eyewitness
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34 testimony literature. Currently, the training for Norwegian judges and deputy judges includes a
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36 lecture (two and three hours in length, respectively) on eyewitness psychology, which covers
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38 basic cognitive phenomena, research on eyewitness testimony, false confessions, and their
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40 relation to known legal cases. However, given the importance of judges as triers of fact in the
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42 legal system and the potentially detrimental consequences of eyewitness error in the courtroom,
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44 the current results support a call for comprehensive education and training in eyewitness research
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46 for judges (Kovera & McAuliff, 2000; Magnussen et al., 2008; Wise, Sartori, Magnussen, &
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48 Safer, 2014), and may serve as a useful indication of knowledge gaps to be considered in future
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50 training.
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Limitations

The current study has some limitations. Firstly, the literature has shown that multiple-choice type surveys may not reflect actual knowledge application during trials, given the lack of contextual and case-specific details that would be present in a trial setting (Houston et al., 2013). Secondly, the current survey did not include an exhaustive list of factors that can affect eyewitness testimony, however factors that were included had extensive empirical support and frequently appear in other surveys examining knowledge of eyewitness psychology (e.g., Kassin, Tubb, Hosch, & Memon, 2001). Finally, the present study had a relatively low response rate. The final sample ($N = 98$) represents only a portion of the population of judges in Norway (which is estimated to be more than 700 affiliated with the Norwegian Courts Administration). Although this limitation is difficult to address, it should be taken into account when generalising the findings to the population of judges in Norway.

Conclusion

In conclusion, the current study offers an updated assessment of Norwegian judges' knowledge of factors affecting eyewitness testimony, as well as a comparison with the results of Magnussen et al. (2008). Overall, judges in Norway appear to have a relatively high level of knowledge of several factors that may affect eyewitness testimony, but a low level of knowledge was still observed for several relevant variables. When compared to the 2008 sample, both increases and decreases in knowledge were observed for items evaluating various eyewitness factors. The findings of the current study indicate, as suggested by Magnussen et al. (2008), that comprehensive educational programmes for judges and other legal professionals should be implemented to further increase awareness of factors that can affect eyewitness testimonies and

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3 cope with eyewitness error. Furthermore, future research may seek to provide an evaluation of
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5 the existing training that has been implemented for deputy judges in Norway in recent years.
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26 **Declaration of interest statement**

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28 The authors of the current study have no potential conflicts of interest to report.
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Tables With Captions

Table 1.

English Versions of the 15 Items Composing the Eyewitness Knowledge Scale

Topics	Statements	Response Format
1. Effects of a hat	It is significantly harder for a witness of a crime to recognise a perpetrator who is wearing a hat during the commission of a crime than a perpetrator who is not wearing a hat.	Agree*/Neither/Disagree
2. Minor details	A witness's ability to recall minor details about a crime is a good indicator of the accuracy of the witness's identification of the perpetrator of the crime.	Agree/Neither/Disagree*
3. Attitudes and expectations	An eyewitness's perception and memory for an event may be affected by his or her attitudes and expectations.	Agree*/Neither/Disagree
4. Conducting line-ups	A police officer who knows which member of the line-up or photo array is the suspect should not conduct the line-up or photo array.	Agree*/Neither/Disagree
5. Effects of post-event information	Eyewitness testimony about an event often reflects not only what a witness actually saw but information obtained later on from other witnesses, the police, the media etc.	Agree*/Neither/Disagree
6. Confidence-accuracy	An eyewitness's confidence is a good predictor of his or her accuracy in identifying the defendant as the perpetrator of the crime.	Agree/Neither/Disagree*
7. Confidence malleability	An eyewitness's confidence can be influenced by factors that are unrelated to identification accuracy.	Generally true*/Generally false/Don't know
8. Weapon focus	The presence of a weapon can impair an eyewitness's ability to accurately identify the perpetrator's face.	Generally true*/Generally false/Don't know
9. Mugshot-induced bias	Exposure to mugshots of a suspect increases the likelihood that the witness will later choose that suspect from a line-up.	Generally true*/Generally false/Don't know
10. Line-up presentation format	Witnesses are more likely to misidentify someone in a culprit-absent line-up when it is presented in a simultaneous (members of a line-up are present at the same time) as opposed to a sequential procedure (members of a line-up are presented individually).	Generally true*/Generally false/Don't know

11. Forgetting curve	The rate of memory loss for an event is greatest right after the event and then levels off over time.	Generally true*/Generally false/I don't know
12. Impact of stress	Very high stress at the time of the observation has a negative effect on the accuracy of testimony.	Agree*/Neither/Disagree
13. Attorneys' knowledge	Attorneys know how most eyewitness factors affect eyewitness accuracy.	Agree/Neither/Disagree*
14. Jurors' knowledge	Jurors know how most eyewitness factors affect eyewitness accuracy.	Agree/Neither/Disagree*
15. Jurors distinguish eyewitnesses	Jurors can distinguish between accurate and inaccurate eyewitnesses.	Agree/Neither/Disagree*

Note. *Indicates the response alternative believed to be most correct according to current research in legal and witness psychology

Table 2.

Distribution of Judges' Responses to Eyewitness Statements in 2008 and 2019.

Topics	2019	2008	2019	2008	2019	2008
	Agree %		Neither %		Disagree %	
1. Effects of a hat	31*	55	55	34	14	11
2. Minor details	11	30	42	40	47*	31
3. Attitudes and expectations	98*	98	2	1	0	1
4. Conducting line-ups	86*	84	9	9	5	8
5. Effects of post-event information	97*	94	1	6	2	0
6. Confidence/accuracy	2	22	20	48	78*	31
	Generally true %		Don't know %		Generally false %	
7. Confidence malleability	92*	85	7	14	1	1
8. Weapon focus	52*	68	44	27	4	5
9. Mugshot-induced bias	84*	84	15	13	1	3
10. Line-up presentation format	22*	38	70	55	7	7
11. Forgetting curve	34*	51	40	25	27	24
	Agree %		Neither %		Disagree %	
12. Impact of stress	65*	70	26	19	9	11
13. Attorneys' knowledge	2	12	21	41	77*	47
14. Jurors' knowledge	1	3	14	24	85*	73
15. Jurors distinguish eyewitnesses	0	8	38	52	62*	40

Note. Correct answers are indicated by *.

Table 3.

χ^2 Tests Comparing Accuracy Scores for Each Eyewitness Knowledge Item in the 2008 and 2019 Samples.

Topics	$\chi^2(1)$	p	V	Accuracy % 2019	Accuracy % 2008
1. Effects of a hat***	13.61	< .001	0.23	31	55
2. Minor details*	6.09	.01	0.15	47	31
3. Attitudes and expectations	0	1	0	98	98
4. Conducting line-ups	0.16	.69	0.02	86	84
5. Effects of post-event information	0.46	.50	0.04	97	94
6. Confidence/accuracy***	51.15	< .001	0.45	78	31
7. Confidence malleability	2.18	.14	0.09	92	85
8. Weapon focus*	5.98	.01	0.15	52	68
9. Mugshot-induced bias	0	1	0	84	84
10. Line-up presentation format*	6.17	.01	0.16	22	38
11. Forgetting curve*	6.62	.01	0.16	34	51
12. Impact of stress	0.43	.51	0.04	65	70
13. Attorneys' knowledge***	20.27	< .001	0.28	77	47
14. Jurors' knowledge*	4.24	.04	0.13	85	73
15. Jurors distinguish eyewitnesses***	11.24	< .001	0.21	62	40

Note. V = Cramer's V ; * p < .05; ** p < .01; *** p < .001.

Figures

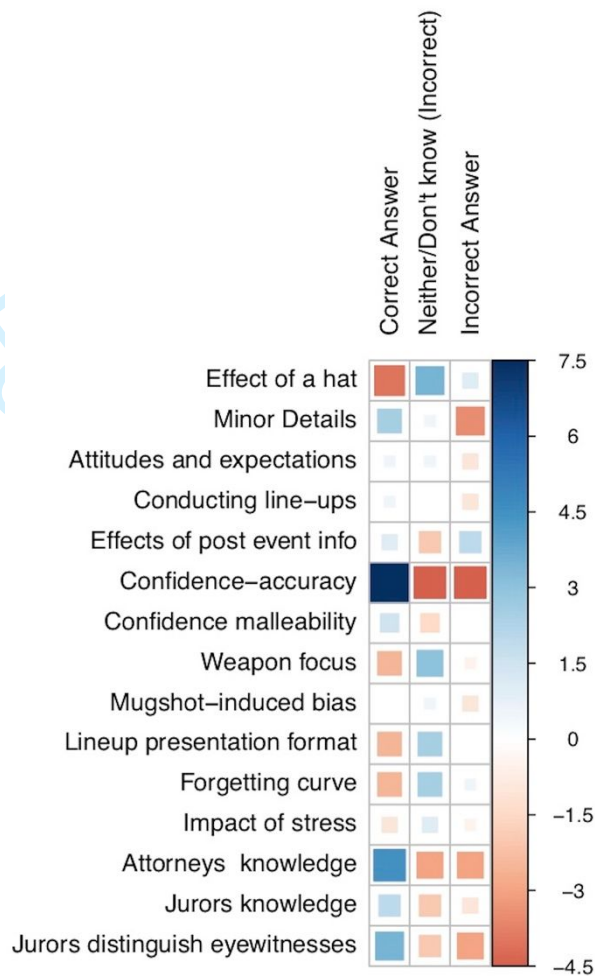


Figure 1. Distribution of residuals from the Pearson's χ^2 tests comparing judges' responses in 2019 and 2008. Positive residuals (in blue) represent an increase in the proportion of judges that chose a particular response alternative, and negative residuals (in red) represent a decrease. The colour bar shows the span of residuals (-4.5 to 7.5). The left-hand column shows improvements (blue) and declines (red) in overall accuracy. The middle column shows changes in how frequently the 'neither' or 'don't know' options were chosen. The right-hand column shows increases and decreases in the proportion of judges choosing incorrect answers.

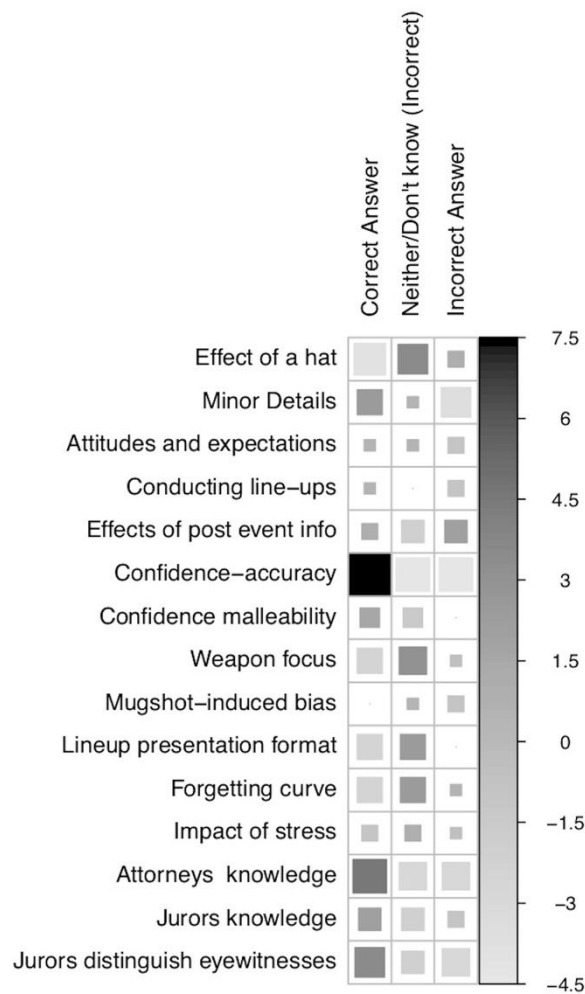


Figure 1. Distribution of residuals from the Pearson's χ^2 tests comparing judges' responses in 2019 and 2008. Positive residuals (dark grey and black) represent an increase in the proportion of judges that chose a particular response alternative, and negative residuals (light grey and white) represent a decrease. The colour bar shows the span of residuals (-4.5 to 7.5). The left-hand column shows improvements (dark grey and black) and declines (light grey and white) in overall accuracy. The middle column shows changes in how frequently the 'neither' or 'don't know' options were chosen. The right-hand column shows increases and decreases in the proportion of judges choosing incorrect answers.