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## Initial evidence for the assimilation hypothesis

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### ABSTRACT

The assimilation hypothesis dictates that knowledge of prior evidence makes legal decision makers assign more weight to subsequent evidence. For example, the evidentiary power of a line-up identification is perceived to be stronger if the decision maker knows that the suspect has confessed, compared to when knowledge of the confession is absent. In three studies, the assimilation hypothesis was tested. As expected, knowledge of DNA-evidence inflated the estimated strength of subsequent eyewitness identification evidence (Study 1), and also inflated overall conviction and conviction rate (Study 2). A similar assimilation effect was found with knowledge of the suspect's dangerous psychopathology (i.e. psychopathic and anti-social personality traits). Such knowledge inflated the estimated strength of fingerprint evidence. In conclusion, the assimilation effect is a threat to rational legal decision making in both lay (Study 2) and professional judges (Studies 1 and 3).

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Assimilation; evidence; cross-over-effect; coherence-based reasoning; CSI-effect

## Introduction

A crucial topic in legal decision making is the question whether the suspect has committed the crime of which he is suspected. Generally, the judge or jury answer this question by looking for incriminating evidence in the case file. Oftentimes, this process of fact finding is quite problem-free. For example, if the suspect confesses voluntarily and undisputedly, his DNA is secured at the crime scene, and two independent witnesses testify that they saw the suspect commit the crime, there is little doubt that the suspect is indeed guilty. In other instances however, when the evidence is not that strong, fact finding becomes more difficult. In the literature, it has been argued that in such cases, fact finders might unjustly come to the conclusion that the suspect has committed the crime. Such a miscarriage of justice can be due to flaws in the evidence (Saks & Koehler, 2005), but also to biased reasoning by judge or jury. A primary cause of biased legal decision making may well be tunnel vision (Findley & Scott, 2006; Nickerson, 1998). For example, decision makers will strive to seek information that confirms their initial assessment of the case (see Schmittat & Englich, 2016). As another example, decision makers may have too little eye for alternative scenarios in which the suspect is innocent

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after all (Ask & Granhag, 2005). Another problem is that decision makers are influenced by non-content aspects of the evidence. For example, decision makers are more readily convinced of the suspect's guilt, if photographic evidence of the crime is more explicit compared to when it is less explicit (Douglas, Lyon, & Ogloff, 1997).

A quite different, and rather subtle potential problem is that different pieces of evidence may one way or another cognitively interact with each other in an undue manner. For example, the order in which different pieces of evidence are processed may affect the conclusion (Englich, Mussweiler, & Strack, 2005). Particularly, there may be a primacy effect, in that the evidence considered first is weighed more heavily than evidence considered later on.

According to the theory of coherence-based reasoning, the perceived strength of individual pieces of evidence can be affected by the context in which the evidence is placed (Simon, 2004). Recent research suggests for example, that if the decision maker is convinced of the suspect's guilt, he will consider the evidence to be stronger, compared to when he judges the strength of the evidence outside of the context of a specific case. Greenspan and Scurich (2016) found that people who are convinced of the suspect's guilt perceive a disputable confession to be more voluntary than those who are not convinced. The evaluation of evidence strength may not only be influenced by the decision maker's conviction, but also by the presence of other pieces of evidence. Imagine that a suspect confesses. Will this confession be perceived as stronger once the evaluator learns that the suspect's DNA was secured at the crime scene? And will the confession be considered less reliable if two independent witnesses provide a strong alibi for the suspect?

At first sight, there might seem nothing wrong with the mutual influence that independent pieces of evidence have on their perceived power. However, Kassin and Sukel (1997) argued convincingly that this mutual influence can be misplaced and damaging. Imagine that a suspect confessed but the judge comes to the conclusion that the interrogators placed undue pressure on the suspect during the pertinent interrogation. Hence, the confession has to be left out of the decision making process. Is it possible to leave the confession out? What if knowledge of the confession makes the judge or jury perceive the other evidence as stronger, compared to if there were no confession? In that case, the confession keeps on affecting the decision. Kassin and Sukel dubbed the effect that evidence has on the evaluation of other evidence assimilation. Notably, while the authors found that deeming a confession inadmissible did not reduce conviction rates, they failed to find direct support for their assimilation hypothesis. That is, the presence of a confession (whether undisputed or disputed) did not affect decision makers' perception of the other evidence.

The purpose of the present research was to further test the assimilation hypothesis. Study 1 was an initial experiment with professional judges. Study 2 was a replication in an undergraduate sample. Study 3 was an extension with another sample of professional judges.

## **Study 1. Assimilation in a sample of professional judges**

The assimilation hypothesis dictates that the perceived strength of a single piece of evidence is influenced by knowledge of the presence of other evidence. Whereas Kassin and Sukel (1997) explored whether knowledge of the presence of a confession affects

the evaluation of the other evidence, in the present study another piece of evidence was chosen as the starting point of the decision making process. In recent years, technical-forensic evidence has become increasingly important for judicial fact finding (see Saks & Koehler, 2005). In fact, some authors have defined a CSI-effect. That is, the popular tv-show may have affected people's beliefs about criminal investigation in various ways (Tyler, 2006). For one thing, if it takes the CSI-team (on tv) only one hour to do a DNA-test, people are rather disappointed to find out that in reality such a test takes several days or even weeks. Another manifestation of the CSI-effect is that if there is technical-forensic evidence in a particular case, the suspect is very likely to get convicted (try talking your way out of fingerprint and DNA evidence). Mirrored to this is a hypothesised reluctance to convict the suspect in cases where technical evidence is lacking. That is, decision makers might get spoiled by the perceived strength of technical evidence, and subsequently become insecure in its absence. A slightly weird manifestation of the CSI-effect is that forensic experts in the real world become inspired by the tv-show, and try to imitate the fictive procedures in their real work.

The importance of technical-forensic evidence fuelled the hypothesis that technical evidence may well assimilate the strength of other evidence. Therefore, in the present study, it was hypothesised that the perceived strength of non-technical evidence (i.e. a line-up identification and a confession, which are completely unrelated to technical evidence, see Saks & Koehler, 2005) is affected by the presence (versus absence) of DNA-evidence.

## **Method**

### **Participants**

Eighty-four professional judges participated in this study. The mean age was 40.9 years ( $SD = 10.6$ ). There were 40 women and 26 men; 18 participants failed to register their age and gender. Participants were recruited at conferences. They completed the procedure in small groups of approximately 15 persons. There were two conditions (respective  $n$ s 46 and 38). The two groups did not differ with respect to age ( $t[64] < 1.0$ ), gender ( $\chi^2[1] < 1.0$ ), or number of missing values ( $\chi^2[1] < 1.0$ ).

### **Measures and procedure**

Participants were given the following information.

A storage facility is burgled at night. € 75.000 cash is stolen. After interviewing neighbourhood inhabitants, the police find suspect E. Below you will find information about E. Every piece of information is written on a separate page. Please indicate how strong you find each piece of information as independent incriminating evidence against E. Do so by filling in a number between 0 (*not at all strong*) and 100 (*absolute proof*).

Participants ( $n = 46$ ) in the DNA first condition received the following information.

The suspect's DNA is found in the storage facility. Initially, E declares that he has never been in the facility. When confronted with the forensic report about his DNA being found at the crime scene, he tells the interrogators that he recently visited the storage to buy something. The secured DNA-traces must stem from that visit. Rate the strength of the DNA evidence with a number from 0 through 100.

On the next page, the following information was written.

A witness has seen the burglar run from the storage facility. This witness undergoes a line-up in which the suspect is placed between five foils. The witness identifies the suspect from the line-up. Rate the strength of the identification evidence with a number from 0 through 100.

On the final page, the following was written.

E is interrogated several times. During the final interrogation, he confesses to the burglary. While the interrogation takes several hours, the police do not unduly pressure the suspect. Rate the strength of the confession evidence with a number from 0 through 100.

Participants ( $n = 38$ ) in the DNA last condition underwent the same procedure. However, these participants were first presented with the identification evidence, second with the confession evidence, and lastly with the DNA evidence. On the page with the DNA evidence, an extra line was added at the end of the information, namely: 'It is not before the final interrogation that E will confess the burglary'. This sentence was added to synchronise the information with the previous piece of evidence, namely the confession.

## Results and discussion

All participants rated the strength of the three pieces of evidence. Half of them did so in the order DNA-identification-confession; the other half in the order identification-confession-DNA. The mean strength estimates are presented in Table 1. As can be seen, participants who had knowledge of the DNA evidence judged the identification evidence to be stronger than those who did not yet know that the suspect had left his DNA at the crime scene ( $t[82] = 3.92, p < .001$ , Cohen's  $d = 0.85$ ). Thus, the perceived strength of the identification was clearly assimilated by the DNA. Interestingly, the evaluation of the confession evidence was not significantly assimilated. At first sight, the confession was rated higher in the DNA first condition than in the DNA last condition, but the difference was not significant ( $t[82] = 1.14, p = .26$ ). This suggests that the assimilation effect wore off rapidly.

It is noteworthy that the DNA evidence itself was rated relatively modest. This may be due to the fact that the suspect provided an alternative account, namely that he had visited the facility previously as a regular customer. Nonetheless, as mentioned, the DNA did assimilate the identification. It is also noteworthy that the DNA evidence was not evaluated differently between the two conditions. If the confession caused some assimilation, the DNA might have been expected to be rated higher in the DNA last condition, but this was not the case. Thus, these findings are in line with those of Kassin and Sukel (1997).

The findings confirm the assimilation hypothesis, in that knowledge of the DNA evidence made participants rate the strength of the confession evidence higher. Thus, the order in which the evidence is processed may affect the eventual conclusion (see for

**Table 1.** Perceived strength of evidence (0–100; and standard deviations) as a function of presentation order.

	DNA first	DNA last
DNA	57.5 (23.4)	58.3 (22.5)
Line-up identification	67.6 (16.0)*	52.0 (20.6)
Confession	74.3 (17.6)	69.6 (20.5)

\* $p < .001$ .

order effects, English et al., 2005). That is, the mean estimated strength calculated over the three pieces of evidence was 66.5 ( $SD = 14.2$ ) in the DNA first condition and 60.0 ( $SD = 12.2$ ) in the DNA last condition ( $t[82] = 2.2, p < .03$ , Cohen's  $d = 0.49$ ). Participants in this study did not rate their eventual conviction of the suspect's guilt, and therefore it cannot be concluded that the order actually would have influenced the verdict. This evidently is a limitation of the present study.

## Study 2. Replication in a student sample

The findings in Study 1 supported the assimilation hypothesis, in that DNA evidence can cognitively inflate the strength of other, unrelated evidence that is processed next in line (i.e. the identification evidence). The purpose of the present study was to replicate the findings in a student sample, and to extend findings by including a measure of the ultimate conviction about the suspect's guilt. It is evidently unwanted that assimilation can actually affect the conviction.

### Method

#### Participants

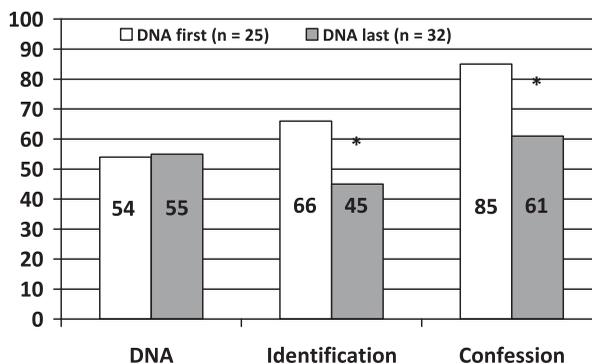
Fifty-seven undergraduate students (36 women) participated in this study. The mean age was 23.1 years ( $SD = 6.7$ ). Participants were tested individually, and participated in return for course credits. There were two conditions (respective  $n$ s: 25 and 32). The two groups did not differ with respect to age ( $t[54] < 1.0$ ), or gender ( $\chi^2[1] = 1.9, p = .17$ ).

#### Measures and procedure

The materials were the same as in Study 1. At the end of the procedure, two extra questions were included. The first one was 'How convinced are you that suspect E committed the burglary?'. Participants answered this question by circling a number between 0 (*not at all*) through 100 (*completely*) with increments of 10. The final question was: 'Would you convict suspect E for the burglary? (*yes/no*).'

### Results and discussion

The mean evaluations of the three pieces of evidence are displayed in Figure 1. As can be seen, the data resemble those obtained with the professional sample in Study



**Figure 1.** Perceived strength of evidence (0–100) as a function of presentation order. \* $p < .001$ .

1. Particularly, knowledge of the DNA evidence inflated perceived strength of the subsequent identification evidence ( $t[55] = 3.72, p < .001$ , Cohen's  $d = 1.0$ ) but also that of the confession evidence ( $t[55] = 4.45, p < .001$ , Cohen's  $d = 1.14$ ). The latter finding diverged from that in Study 1. Hence, there was a strong assimilation effect. As in Study 1, the DNA evidence was considered to possess limited strength, in spite of its apparent ability to assimilate subsequent evidence. Also in line with previous findings, the confession did not assimilate the evaluation of the subsequent DNA evidence ( $t[55] < 1.0$ ).

When comparing the mean perceived strength of the three pieces of evidence between the two groups, participants in the DNA first condition estimated this to be 68.2 ( $SD = 15.2$ ), while those in the DNA last condition got stuck at 54.0 ( $SD = 21.4$ ;  $t[55] = 2.8$ ;  $p < .01$ , Cohen's  $d = 0.78$ ). Hence, as in Study 1, the order in which the evidence was presented affected the overall strength of the evidence. The mean conviction that E committed the crime was 89.6% ( $SD = 8.9$ ) in the DNA first condition, and 71.9% ( $SD = 22.1$ ) in the DNA last condition ( $t[55] = 3.8, p < .001$ , Cohen's  $d = 1.05$ ). Conviction rate was 96% in the DNA first condition, and 53% in the DNA last condition ( $\chi^2[1] = 12.8, p < .001, Eta = 0.47$ ). The latter findings confirm that assimilation not only causes an inflation of the perceived strength of subsequent evidence, but also actually affects the eventual outcome of the decision making process. Particularly, assimilation may make judge and jury more willing to convict the suspect.

Interestingly, calculated in the whole sample ( $N = 56$ ), the mean evidence strength was 60 (out of possible 100), while the mean estimated probability of guilt was 80%. This suggest that participants take a cognitive leap from the cumulated strength of the evidence to an overall impression (and in some cases a subsequent leap to conviction). Given that the overall impression (conviction) exceeded the strength of the evidence, on a similar scale from 0 to 100, there seems to be an implicit process that makes the whole more than the sum of the parts. The difference can be understood in that decision makers will and should not only consider the strength of each piece of evidence, but also have eyes for the surplus of the pieces of evidence occurring in conjunction.

### Study 3. Assimilation by irrelevant information

The findings in the previous studies suggest that knowledge of the presence of DNA evidence makes decision makers (both professionals and lays) assimilate (i.e. inflate) the strength of other, unrelated evidence. In the current study, replication and extension of these findings was sought. Particularly, it was tested whether negatively laden information about the suspect, that is not strictly evidence, can assimilate unrelated evidence. There is reason to believe that the assimilation effect is not limited to information that qualifies as incriminating evidence. For one thing, psychological processes, including biases are not restricted by legal rules that define evidence. There are numerous examples of cross-over effects between unrelated information. For example, English, Mussweiler, and Strack (2006) found that the selection of the punishment can be affected by the (evidently completely unrelated) number of eyes thrown with a dice.

In the present study, information about the suspect's psychopathic traits was chosen as information that may assimilate subsequent evidence. In many legal systems, including the one from which participating judges in this study were drawn, psychopathy does not construe evidence, but is merely a factor that may influence sentencing (see for an

interesting application, Aspinwall, Brown, & Tabery, 2012). Nonetheless, it cannot be excluded that knowledge of the suspect's severe psychopathy makes the judge or jury weight the evidence more heavily. Therefore, some Western legal systems employ a two-stage trial, in which information relevant for sentencing is presented not before the suspect is convicted. If the judge and jury receive all relevant information (both for fact finding and sentencing) at the same time, the hypothesised assimilation effect may occur. Hence, it was hypothesised that participants would weight evidence more heavily and be more readily convinced of the suspect's guilt, if they had knowledge of the suspect's psychopathic personality, compared to when such knowledge was absent.

## Method

### Participants

Fifty-three criminal trial judges (mean age 41.3 years,  $SD = 10.1$ ) participated in this study. There were 34 women and 14 men; five participants failed to register their age and gender. Participants were recruited at conferences. They completed the procedure in small groups of approximately 15 persons. As in Study 1, this caused unequal sample sizes between the two conditions (respective  $n$ s: 24 and 29). The two groups did not differ with respect to age ( $t[46] < 1.0$ ), gender ( $\chi^2[1] < 1.0$ ), or number of missing values ( $\chi^2[1] = 1.4, p = .23$ ).

### Materials and procedure

All participants received the following case vignette, adopted from Ask and Granhag (2005).

A woman is found dead in an apartment. A second woman, Eva, is encountered in the apartment, and is hence a suspect in the case. The victim is a psychiatrist who was acquainted with Eva and who had her office in the apartment. Eva's partner was a client of the victim, and hence (the partner and the victim) had regular contact. According to the victim's assistant, Eva had expressed suspicion about a sexual relationship between the victim and Eva's partner and was deeply jealous. The following observations have been made thus far in the investigation. The crime was committed at lunch time. When the victim's assistant returned from lunch she found the apartment door locked from the inside. The assistant got worried and decided to call the police. Two policemen arrived within a few minutes. They also found the door locked from the inside. After a few minutes of pounding on the door and ringing the doorbell the suspect opened the door. The suspect had cuts in her hands and signs of beating in the face. She also had bloodstains on her clothes. She was in a state of shock. The police found the victim's body in the apartment. The police found a knife next to the body. The only fingerprints found on the knife belonged to the suspect. The suspect denies all guilt. She claims that an unknown, male intruder attacked the victim with the knife. She allegedly tried to stop the offence and took the knife from the perpetrator. She also claims that she got hurt at that same moment. She says that the intruder knocked her down and fled through the apartment door.

Participants in the psychopathy condition ( $n = 29$ ) additionally received the following information. The suspect has previously been examined by a psychiatrist. She turned out to have a severe psychopathic personality and an antisocial personality disorder'.

Finally, all participants completed three questions: (1) 'Rate the strength of the fingerprint evidence with a number from 0 (*not at all strong*) through 100 (*absolute proof*),' (2) 'How convinced are you that suspect E committed the murder?' (participants answered

this question by circling a number between 0 [*not at all*] through 100 [*completely*] with increments of 10), and (3) 'Would you convict suspect E for the murder? (*yes/no*)'.

## Results and discussion

The perceived strength of the fingerprint evidence, mean conviction, and conviction rates in the two groups are displayed in Table 2. As can be seen, participants who were informed about the suspect's psychopathy and personality disorder perceived the evidence as stronger ( $t[51] = 3.14, p < .01$ , Cohen's  $d = 0.86$ ), were more readily convinced ( $t[51] = 2.15, p < .05$ , Cohen's  $d = 0.58$ ), and convicted the suspect more often ( $\chi^2[1] = 6.4, p < .02, \text{Eta} = 0.35$ ). This confirms the assimilation hypothesis: Apparently, knowledge of the clinical personality disposition affected the evaluation of the evidence, and the process of becoming convinced.

Notably, the effect was modest, though significant, that is, 11% points on the perceived strength, and 7 point on the conviction variable. By contrast, the difference in conviction rate was considerable (i.e. 33%). Therefore, it can be concluded that the cut-off score on the conviction scale lies somewhere between 70% and 80% for many participants in the current sample. Interestingly, when asked explicitly how much certainty a criminal conviction requires, participants of Kassin and Sukel (1997) came up with a higher threshold of 91%.

It should be noted that participants in the psychopathy condition learned about the suspect's psychiatric history after having been informed about the fingerprint evidence. However, they gave their evaluation of the fingerprint after they had learned about the psychiatric history. This suggests that the assimilation effect also works backwards: Processing seemingly incriminating information (i.e. the suspect's psychiatric history) makes evidence already processed (i.e. fingerprint evidence) gain in perceived strength.

## General discussion

The present findings confirm that knowledge of evidence affects the evaluation of other evidence. In Study 1, participants perceived the evidentiary power of an eye-witness identification to be greater when they knew that the suspect's DNA was secured at the crime scene, compared to when such DNA evidence was absent. In Study 2, these findings were replicated and extended in that the DNA evidence not only affected the evaluation of the subsequent identification and the suspect's confession, but also inflated conviction and conviction rate. In Study 3, knowledge of the suspect's dangerous mental condition (i.e. psychopathy and anti-social personality disorder) had a similar inflating effect, in that it increased the perceived power of fingerprint evidence, conviction, and conviction rate. In sum, the findings confirm the assimilation hypothesis postulated by Kassin and Sukel (1997).

**Table 2.** Perceived strength of fingerprint evidence, conviction, and conviction rate, as a function of knowledge of the suspect's psychopathy.

	No psychopathy	Psychopathy
Fingerprint evidence (0–100)	70.0 (13.5)*	80.9 (11.7)
Conviction of guilt (0–100)	74.0 (13.8)*	80.7 (8.8)
Conviction rate (%)	46%*	79%

\* $p < .05$ .

Interestingly, in Studies 1 and 2, the strength of confession evidence was rated relatively high, at least higher than that of the eye-witness identification and the presence of DNA. This confirms that a confession remains a strong piece of evidence in decision makers' perception. By contrast, experimental research suggests that confession evidence is not that strong, because innocent individuals can be brought to confess to a crime quite easily (see for overviews, Kassin, 2005; Rassin & Israëls, 2014).

While the present data are the first to confirm Kassin and Sukel's (1997) assimilation hypothesis, they do not completely stand on their own. First, whereas Kassin and Sukel failed to find clear support for the hypothesis, Kukucka and Kassin (2014) found that knowledge of the suspect's confession makes decision makers more readily conclude that the suspect's handwriting matches that of the perpetrator. Thus these findings are in line with what has been dubbed a forensic confirmation bias (Kassin, Dror, & Kukucka, 2013). Notably, the findings pertain to the readiness to see information as incriminating evidence, not to the perceived strength of the evidence per se. More broadly, cross-over effects between different types of information have been well-documented in the literature. For example, Asch (1946) found that the evaluation of personality traits is oftentimes tainted by the subject's other known personality traits (cf. a halo-effect; see Nisbett & Wilson, 1977 for an overview of various striking cross-over effects).

Given the ubiquity of mental cross-over effects, it is not surprising that mutual influencing of different pieces of evidence occurs in the process of becoming convinced of the suspect's guilt. As such, the assimilation effect may well be part of the story-model hypothesis (Pennington & Hastie, 1992), or the coherence-based reasoning hypothesis mentioned earlier (see Greenspan & Scirich, 2016). In fact, the hypotheses at hand (assimilation, story-model, coherence-based reasoning) stipulate the difficulty of thinking about whether or not the suspect has committed the crime. On the one hand, the decision maker should not limit himself to the evaluation of each piece of evidence in isolation, because the evidence must be seen in its context and co-occurrence. On the other hand, too much emphasis on context is claimed to bias the evaluation, either by the story-model (i.e. decision makers are more readily convinced if the evidence is easily construed into a coherent story), coherence-based reasoning (i.e. evidence is evaluated in the light of the other evidence and the conclusion), or assimilation (i.e. evidence inflates the evaluation of subsequent evidence). How can three pieces of evidence be cumulated into an overall conviction without affecting each other? Imagine three pieces of evidence with a perceived isolated power of 60, 80, and 70, respectively. If the decision maker gives assimilated weight to these pieces of evidence, the scores might become 60, 85 (in isolation 80), and 90 (in isolation 70). As argued before, such assimilation is unwanted, for one thing because it disturbs the reasoning if one of the former pieces of evidence comes to fall, and should no longer be included in the equation (see Ecker, Lewandowsky, & Tang, 2010). But then, how should the three pieces of evidence be integrated rationally? Should they be averaged into one? Or should they be summed? Without any guidelines or statistical protocol (which are evidently lacking in regular decision making by judge and jury), this must be a difficult challenge.

Against this background, some have proposed a Bayesian approach to criminal evidence (e.g. Fenton, Neil, & Lagnado, 2013). In this approach, each piece of information is given a likelihood ratio (i.e. the likelihood under the primary hypothesis, divided by the likelihood under the alternative hypothesis). If a likelihood ratio can be estimated, the evidence will

maintain that value. Finally, the likelihood ratios of all pieces of evidence are multiplied, and construed (preferably together with a prior odds) the posterior odds. In this way, by multiplication, different pieces of evidence can be evaluated in conjunction, while their individual value (likelihood ratio) remains unaltered. Evidently, while the Bayesian approach to criminal evidence has its advantages, research on its application is yet in its beginning, and flip-sides are identified. For example, many judges and jury members are not enthusiastic about and equipped to carry out Bayesian analyses, and it remains to be seen how sensible likelihood ratios for various kinds of information really are.

Some limitations of the current studies deserve attention. For one thing, all stimulus materials stemmed from research, and may not reflect legal decision making in its natural context. For example, the evidence was described in small case vignettes, whereas actual dossiers tend to be quite lengthy (even if their content can be stated briefly). Further, participants were instructed to do things that judges and juries may normally not do, such as the expressing of perceived strength of evidence and conviction as a percentage. The studies also have some strengths such as the inclusion of professional judges, the inclusion of DNA as the starting point of the assimilation (Studies 1 and 2), and the inclusion of psychopathology, which should be irrelevant, as an assimilator (Study 3).

In conclusion, the present findings confirm Kassin and Sukel's (1997) assimilation hypothesis. Particularly, decision makers seem to be influenced by the order in which criminal evidence is presented to them. The perceived strength of later evidence is inflated by previous knowledge of other evidence. Particularly, in the current studies, DNA evidence and severe psychopathology seemed to inflate the perception of subsequent incriminating evidence. It remains to be seen whether and how such assimilation effects can be eliminated or even reduced.

## Disclosure statement

No potential conflict of interest was reported by the author.

## References

- Asch, S. E. (1946). Forming impressions of personality. *The Journal of Abnormal and Social Psychology*, 41, 258–290.
- Ask, K., & Granhag, P. A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of Investigative Psychology and Offender Profiling*, 2, 43–63.
- Aspinwall, L. G., Brown, T. R., & Tabery, J. (2012). The double-edged sword: Does biomechanism increase or decrease judges' sentencing of psychopaths? *Science*, 337, 846–849.
- Douglas, K. S., Lyon, D. R., & Ogloff, J. R. P. (1997). The impact of graphic photographic evidence on mock jurors' decision in a murder trial: Probative of prejudicial? *Law and Human Behavior*, 21, 485–501.
- Ecker, U. K. H., Lewandowsky, S., & Tang, D. T. W. (2010). Explicit warnings reduce but do not eliminate the continued influence of misinformation. *Memory and Cognition*, 38, 1087–1100.
- Englich, B., Mussweiler, T., & Strack, F. (2005). The last word in court: A hidden disadvantage for the defense. *Law and Human Behavior*, 29, 705–722.
- Englich, B., Mussweiler, T., & Strack, F. (2006). Playing dice with criminal sentences: The influence of irrelevant anchors on experts' judicial decision making. *Personality and Social Psychology Bulletin*, 32, 188–200.
- Fenton, N., Neil, M., & Lagnado, D. A. (2013). A general structure for legal arguments about evidence using Bayesian networks. *Cognitive Science*, 37, 61–102.

- Findley, K. A., & Scott, M. S. (2006). The multiple dimensions of tunnel vision in criminal cases. *Wisconsin Law Review*, 2, 291–397.
- Greenspan, R., & Scurich, N. (2016). The interdependence of perceived confession voluntariness and case evidence. *Law and Human Behavior*, 40, 650–659.
- Kassin, S. M. (2005). On the psychology of confessions: Does innocence put innocents at risk? *American Psychologist*, 60, 215–228.
- Kassin, S. M., Dror, I. E., & Kukucka, J. (2013). The forensic confirmation bias: Problems, perspectives, and proposed solutions. *Journal of Applied Research in Memory and Cognition*, 2, 42–52.
- Kassin, S. M., & Sukel, H. (1997). Coerced confessions and the jury: An experimental test of the 'harmless error' rule. *Law and Human Behavior*, 21, 27–46.
- Kukucka, J., & Kassin, S. M. (2014). Do confessions taint perceptions of handwriting evidence? An empirical test of the forensic confirmation bias. *Law and Human Behavior*, 38, 256–270.
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2, 175–220.
- Nisbett, R. E., & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231–259.
- Pennington, N., & Hastie, R. (1992). Explaining the evidence: Test of the story model for juror decision making. *Journal of Personality and Social Psychology*, 62, 189–206.
- Rassin, E., & Israëls, H. (2014). False confessions in the lab: A review. *Erasmus Law Review*, 7, 219–224.
- Saks, M. J., & Koehler, J. J. (2005). The coming paradigm shift in forensic identification science. *Science*, 309, 892–895.
- Schmittat, S. M., & Englich, B. (2016). If you judge, investigate! responsibility reduces confirmatory information processing in legal experts. *Psychology, Public Policy, and Law*, 22, 386–400.
- Simon, D. (2004). A third view of the black box: Cognitive coherence in legal decision making. *The University of Chicago Law Review*, 71, 511–586.
- Tyler, T. R. (2006). Viewing CSI and the threshold of guilt: Managing truth and justice in reality and fiction. *The Yale Law Journal*, 115, 1050–1085.