



Re: Letter to the Editor re: Dror and Kukucka, Linear Sequential Unmasking–Expanded (LSU-E): A general approach for improving decision making as well as minimizing noise and bias

Dear Dr. Houck,

We were quite interested to read Dror and Kukucka's recent paper, "*Linear Sequential Unmasking–Expanded (LSU-E): A general approach for improving decision making as well as minimizing noise and bias.*" [1] The authors suggest a practicable approach to minimizing cognitive bias and reducing noise in forensic decision making, by focusing on actual data or evidence prior to considering contextual information. The technique was originally directed at CSI procedures such as fingerprint analysis, so that the potential bias of additional relevant, but potentially biasing, information such as the identity of a suspect, would only be considered after the quality, strength, and relevance of the direct evidence was evaluated. The "expanded" version of the LSU model is intended to have broader application, so that it may have application in a wide variety of tasks and analyses encountered in the forensic realm, both medical and scientific.

The authors note that, in the context of a death in custody investigation, sequential unmasking of some information may actually impede an investigation. They refer to, as an example, the investigation of the murder of George Floyd, in which the forensic pathologist who carried out the autopsy declined to first view the widely circulated video of the circumstances preceding Mr. Floyd's death, claiming that do so would avoid bias during the post-mortem examination. The episode provided a highly publicized example demonstrating 1) the importance of bias in death in custody investigations, 2) the use of linear sequential unmasking to avoid or minimize bias, and 3) the potentially disastrous consequences of selecting inappropriate information to unmask. While an example of appropriate information for linear sequential unmasking may be the race of the decedent or assailant, evidence of the circumstances preceding a sudden death in custody is a pivotal starting point for a death investigation and autopsy, and should not be hidden from view or ignored at any time during the investigation.

We propose that the *prospective* LSU-E approach should be complemented by a *retrospective* counterfactual approach as a means of identifying which information is most likely to bias the results of an investigation. This approach, which is a primary operating principal guiding forensic epidemiologic (FE) investigations [2], can be illustrated with the established fact pattern from the above-referenced death of Mr. Floyd. George Floyd went into cardiopulmonary arrest during a total of 9 minutes in a prone position, with his hands handcuffed behind his back, and a police officer applying most of his body weight directly onto Mr. Floyd's neck with his knee for the entire 9 minutes. At autopsy Mr. Floyd was not found to have any overt evidence of airway injury consistent with strangulation, and a therapeutic level of illicit fentanyl in his system, as well as age-appropriate asymptomatic coronary artery disease. The FE counterfactual approach would ask "what's the probability that Mr. Floyd would have suddenly died from fentanyl toxicity and coronary artery disease had he not been restrained in the same

manner?" as a means of indirectly evaluating the lethality of the restraint. Because the competing explanations are viewed as the complement of each other (i.e. they total 100% of the explanation for the death), the *less* likely the death was in the absence of the restraint, the *more* likely the restraint was the cause of the death.

The same type of approach allows for evaluation of the elements of the investigation that carry the highest potential for bias. Instead of a police officer kneeling on a suspect's neck, we can hypothetically change the identities of the victim and assailant, while leaving the salient fact pattern the same: A large and well-muscled black man is observed kneeling on the neck of a prone and slight white woman who has her hands cuffed behind her. A crowd gathers and people tell the man to get off the woman, who is struggling and saying that she can't breathe at first, but after a couple of minutes she stops speaking, and then she stops moving completely. The man continues to kneel on her neck for several more minutes while people in the crowd beg the man to check the woman's pulse. She is later declared dead. Was the manner of her death a homicide? Would the finding that she had fentanyl in her blood (for which she had a prescription), be included as a cause of her death?

The counterfactual hypothetical exercise helps highlights the elements in the investigation that are most susceptible to biasing of the result. The fact that Derek Chauvin, the man who was convicted of killing Mr. Floyd, was a police officer, or that Mr. Floyd was a large muscular black man, or that the fentanyl in his system was obtained illegally, should not have been a factor in the determination that the manner and cause of his death was a homicide, secondary to a cardiopulmonary arrest triggered *solely* by restraint-related asphyxia, and that the presence of fentanyl or coronary artery disease was unnecessary to explain his death.

We suggest an approach that combines elements of LSU-E and counterfactual reasoning as a means of identifying and neutralizing elements leading to artifactual bias as a potential next step in advancing the methods described by Dror and Kukucka in their intriguing paper.

References

- [1] I.E. Dror, J. Kukucka, "*Linear Sequential Unmasking–Expanded (LSU-E): a general approach for improving decision making as well as minimizing noise and bias,* *Forensic Sci. Int. Synerg.* 3 (2021) 100161.
- [2] M.D. Freeman, M.P. Zeegers, *Forensic Epidemiology: Principles and Practice,* Elsevier, 2016.

Michael Freeman, Med.Dr., Ph.D., MSc.FMS, MPH, Associate Professor of Forensic Medicine and Epidemiology*, Ellen Strömmer, MPH
Maastricht University, Maastricht, the Netherlands

* Corresponding author.

E-mail address: m.freeman@maastrichtuniversity.nl (M. Freeman).

<https://doi.org/10.1016/j.fsisy.2021.100195>