Simultaneous vs. Sequential Photo Arrays:

Sorting out the Scientific Controversy

Presented at the 2015 Joint Symposium on Evidence-Based Crime Policy

Karen L. Amendola, PhD
Police Foundation

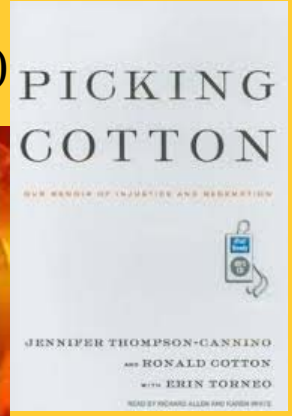
August 17, 2015

45 YEARS
POLICE FOUNDATION
Celebrating 45 Years of Improving Policing

GEORGE MASON UNIVERSITY

Why are Photo Arrays Important?

Currently 330 DNA Exonerations for wrongful conviction (and claims and findings of actual innocence) continue to rise (Innocence Project, 2015)



Eyewitness evidence played a significant role in **nearly 75%** of these wrongful convictions.[1]

Presentation Methods for Photo Arrays

While there have been many recent improvements in photo array and lineup procedures, one is particularly controversial, the ***presentation method***:

How should photos be shown to witnesses/victims in police investigations?

Simultaneous vs. Sequential?

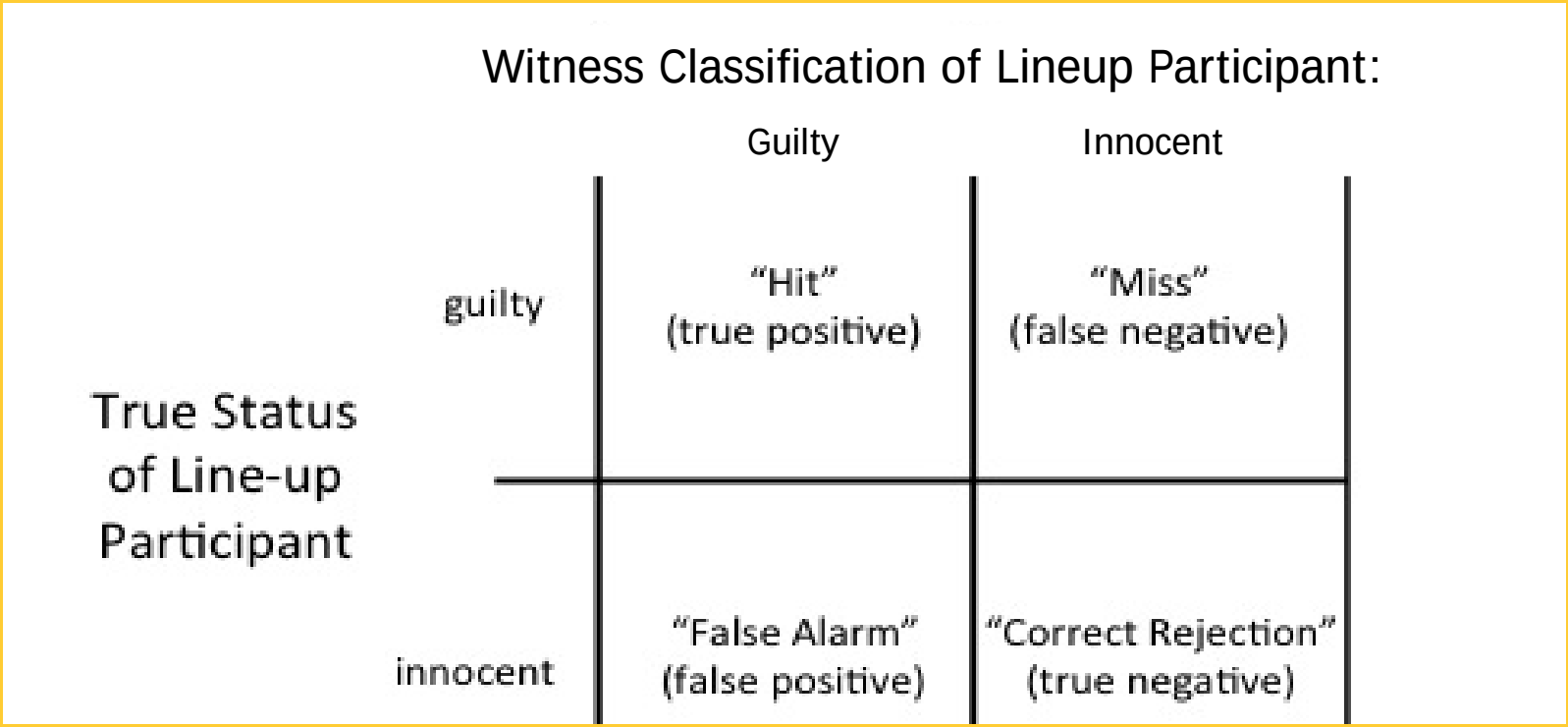
Simultaneous Method of Presentation

Shown at the same in “6 pack” (or 9)

One new innovation is administering photo arrays on a computer, a method allowing for standardization of instructions.

Sequential (in sequence)

Contingency Table for Possible Eyewitness Identification Outcomes



SOURCE: Courtesy of Thomas D. Albright, NAS Report (2014).

Witness either picks the "suspect," a "filler," or fails to make a pick.

Old Science, New Policies

- Numerous state and local agencies have made changes to policy, i.e. **requiring the sequential method,** likely resulting from advocacy based on 30 years of laboratory studies indicating the "apparent" superiority of sequential presentation.
- Authors of a 2011 meta-analysis (Steblay, Dysart, & G. Wells) noted that "The ***posterior probability of guilt*** is higher for the sequential lineup."
- At that time, field research (in which guilt is unknown), had not yet been done.
- **However, advocacy** by many groups, the media, and professional associations have **not** kept pace with the rapidly changing evidence, probably due to the nuances of past and current research. It is complicated!

Laboratory vs. Field Studies

- **How do we know who is actually guilty?**
  - In lab studies, the "guilty person" is decided by the researcher
  - In the real world (field studies), we don't know who is actually guilty

Importantly, lab studies do not reflect how lineup procedures are typically administered in the field, especially for the sequential method.

Laboratory Studies vs. Field Studies

Until very recently, the research was focused exclusively in laboratory settings; however, ***consider the following:***

Ground truth must be known to assess eyewitness accuracy.

Unknown

Witness Classification of Lineup Participant

True Status of Line-up Participant	guilty	innocent
~~guilty~~	"Hit" (true positive)	"Miss" (false negative)
?		
~~innocent~~	"False Alarm" (false positive)	"Correct Rejection" (true negative)

Sorting out the Controversy

- To overcome limitations of laboratory studies, and assess which method was better, numerous scientists agreed that a field test of sequential and simultaneous procedures should be conducted using “best practices” (e.g., double blind presentation, standardized instructions, laptops, etc.)
- The American Judicature Society (AJS) and its lead scientist, Gary Wells designed a test of these methods.
- The Police Foundation was asked to conduct an outcome analysis designed to approximate ground truth.
- In 2011, G. Wells, Steblay, and Dysart published findings from the first comprehensive field study they conducted in four agencies (known as the AJS Field Studies).

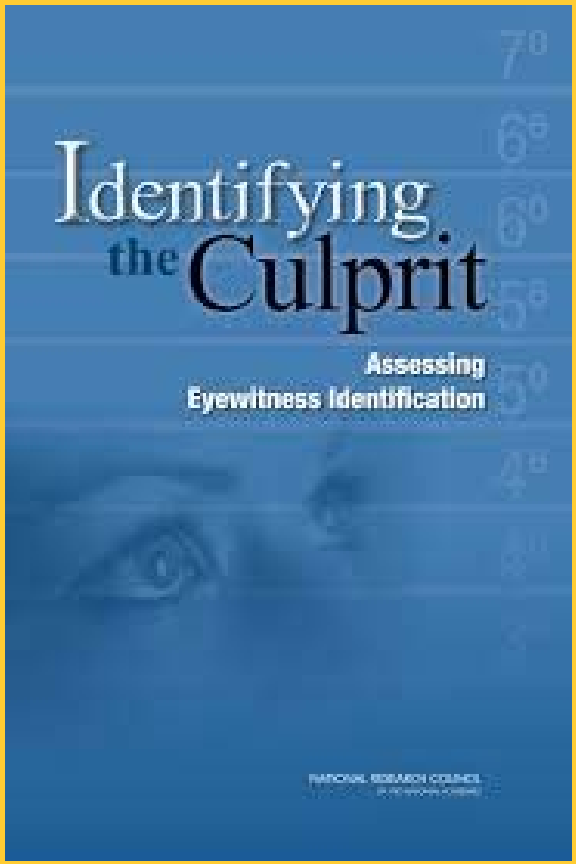
*Key finding: the sequential method resulted in fewer picks of innocent suspects (“fillers”); we believe this was misinterpreted and misrepresented!

Recent Turning Points: New Research

New research (past 3 – 5 years) suggests that the method for determining "posterior probability of guilt"– the **diagnosticity ratio** is **problematic**; AND the conclusion that sequential presentation is superior is **flawed**:

- There are 2 aspects to identification: discriminability (actual ability to distinguish the actually guilty person), and response bias (the likelihood of making a pick).
- Scientists have argued that use of the diagnosticity ratio only allows for the assessment of discriminability of witnesses, but NOT RESPONSE BIAS.
- Instead, many propose the use of receiver operating characteristic (ROC) analysis which considers both factors (Gronlund, 2014; Gronlund, et al., 2014; Wixted and Mickes, 2012);
- Receiver Operating Characteristic analysis is a method for examining signal strength (signal detection theory) associated with human perception and memory, and used in diagnostic medicine, and having its origins in military operations in WWII)
- New field study by Bill Wells & Colleagues (2015) in Houston also found no evidence of a sequential superiority effect.

National Academy of Sciences Report: October, 2014



Some of these facts have now been confirmed by the National Academy of Sciences (National Research Council, 2014). The panel on eyewitness identification declared that:

"ROC analysis is a positive and promising step, with numerous advantages." (NRC, p. 59); and

"ROC analysis represents an improvement over a single diagnosticity ratio..." (NRC, p. 80)

The NRC did caution that ROC analysis is not without criticism, and encourages examination of potentially better measures.

Turning Point Two: The AJS Follow Up Study
Police Foundation

- To overcome the "ground truth" problem, Amendola & colleagues (2014) conducted a follow up to the AJS Field Study (Wells, Steblay, Dysart, 2011) to assess *independent evidence* of guilt.

  Methods: Actual police, prosecutors, judges, and defense attorneys rated the **strength of the evidence** in the actual cases from Austin using a newly developed, objective rating scale as ***a proxy for actual guilt*** *(Amendola & Slipka, 2011).**

- Further analysis by Amendola Wixted (2015) confirmed that evaluators rated the strength of the evidence higher for suspects identified from **simultaneous** lineups them compared to suspects identified from sequential lineups. These data indicate that **simultaneous** lineups are more ***diagnostic of actual guilt*** than are sequential lineups; the opposite of what has been advocated based on lab research until recently.

***DNA too makes for a strong proxy of guilt (when available).**

Diagnosticity Ratio (DR) vs ROC analysis

- Response bias can be manipulated; e.g. it can occur when instructions are changed (e.g. “only pick someone if you are absolutely certain” etc.) or based on the individual’s confidence in making a choice.

- ROC curves, according to Gronlund et al. (2014) allow researchers to assess discriminability across levels of response bias for each procedure (simultaneous and sequential).

- In recent studies, researchers comparing simultaneous and sequential lineup procedures using ROC analyses have shown **that the *simultaneous* procedure may be diagnostically superior** (Carlson & Carlson, 2014; Carlson & Gronlund, 2011; Clark, 2005; Clark, 2012; Dobolyi & Dotson, 2013; Gronlund, et al., 2009; Gronlund, et al., 2012; Gronlund, et al., 2014; Wells, Bender, & Morrison, 2015; Wixted & Mickes, 2014; Wixted, Gronlund, & Mickes, 2014).

Conclusions

- New research & the NAS/NRC report: the use of diagnosticity ratios is inappropriate for determining superiority. As such, all prior lab studies over 30+ years suggesting a sequential superiority effect ought to be set aside.
- New laboratory AND real world (field) research using ROC analysis (an improved and more comprehensive measure) has begun to suggest an opposite conclusion.
- The AJS outcome study (Amendola & Wixted, 2015 a,b) suggested a simultaneous superiority effect, despite the original authors' contention of a sequential one (Wells, et al. 2011), a subject of ongoing dispute (Wells, et al., 2015, Steblay, et al., 2015).
- More outcome research is needed using proxy methods similar to Amendola, DNA proxies, ROC analysis, and other potentially useful methods.
- The media, states and local jurisdictions, advocacy, and membership organizations **need to catch up on the last 3 – 5 years of research on this topic**, given rapidly building findings of a simultaneous superiority effect.
- The switch to sequential methods was done before new scientists began addressing the issue with improved methods.

References

Amendola, K.L., & Slipka, M.G. (2009). Strength of evidence scale. Unpublished instrument. Police Foundation, Washington, DC.

Amendola, K. L., & Wixted, J. T. (2015a). Comparing the diagnostic accuracy of suspect identifications made by actual eyewitnesses from simultaneous and sequential lineups in a randomized field trial. Journal of Experimental Criminology, 11(2), 263-284.

Amendola, K. L., & Wixted, J. T. (2015b). No possibility of a selection bias, but direct evidence of a simultaneous superiority effect: a reply to Wells et al. Journal of Experimental Criminology, 1-4.

Carlson, C. A., & Carlson, M. A. (2014). An evaluation of perpetrator distinctiveness, weapon presence, and lineup presentation using ROC analysis. Journal of Applied Research in Memory and Cognition, 3, 45–53.

Carlson, C. A., & Gronlund, S. D. (2011). Searching for the sequential line-up advantage: A distinctiveness explanation. Memory, 19(8), 916-929.

Carlson, C. A., Gronlund, S. D., & Clark, S. E. (2008). Lineup composition, suspect position, and the sequential lineup advantage. Journal of Experimental Psychology: Applied, 14, 118–128.

Clark, S. E. (2005). A re-examination of the effects of biased lineup instructions in eyewitness identification. Law and Human Behavior, 29, 395–424.

References (continued)

Clark, S. E. (2012). Costs and benefits of eyewitness identification reform: Psychological science and public policy. Perspectives on Psychological Science, 7, 238–259.

Dobolyi, D. G., & Dodson, C. S. (2013). Eyewitness confidence in simultaneous and sequential lineups: a criterion shift account for sequential mistaken identification overconfidence. Journal of Experimental Psychology: Applied, 19, 345–357.

Gronlund, S. D., Carlson, C. A., Dailey, S. B., & Goodsell, C. A. (2009). Robustness of the sequential lineup advantage. Journal of Experimental Psychology: Applied, 15, 140–152.

Gronlund, S. D., Carlson, C. A., Neuschatz, J. S., Goodsell, C. A.,Wetmore, S. A.,Wooten, A., & Graham,M. (2012). Showups versus lineups: An evaluation using ROC analysis. Journal of Applied Research in Memory and Cognition, 1, 221–228.

Gronlund, S. D., Wixted, J. T., & Mickes, L. (2014). Evaluating eyewitness identification procedures using ROC analysis. Current Directions in Psychological Science, 23, 3–10.

Innocence Project. (2015). http://www.innocenceproject.org/

Lindsay, R. C. L., & Wells, G. L. (1985). Improving eyewitness identifications from lineups: Simultaneous versus sequential lineup presentation. Journal of Applied Psychology, 70, 556–564.

References (continued)

McQuiston-Surrett, D. E., Malpass, R. S., & Tredoux, C. G. (2006). Sequential vs. Simultaneous lineups: a review of methods, data, and theory. Psychology, Public Policy, and Law, 12, 137–169.

Mickes, L., Flowe, H. D., & Wixted, J. T. (2012). Receiver operating characteristic analysis of eyewitness memory: Comparing the diagnostic accuracy of simultaneous and sequential lineups. Journal of Experimental Psychology: Applied, 18, 361–376.

National Academy of Sciences, see National Research Council.

National Research Council, National Academies of Science (2014). Identifying the Culprit: Assessing Eyewitness Identification. Washington, DC: The National Academies Press.

Steblay, N. K., Dysart, J. E., & Wells, G. L. (2011). Seventy-two tests of the sequential lineup superiority effect: A meta-analysis and policy discussion. Psychology, Public Policy, and Law, 17, 99–139.

Steblay, N. K., Dysart, J. E., & Wells, G. L. (2015c). An unrepresentative sample is unrepresentative regardless of the reason: a rejoinder to Amendola and Wixted. Journal of Experimental Criminology, 1-4.

Wells, G. L. (1984). The psychology of lineup identifications. Journal of Applied Social Psychology, 14, 89–103.

References (continued)

Wells, G.L., Steblay, N.K., & Dysart, J.E. (2011). A test of the simultaneous vs. sequential lineup methods: An initial report of the AJS national eyewitness identification field studies. Des Moines, Iowa: American Judicature Society. Retrieved from: http://www.popcenter.org/library/reading/PDFs/lineupmethods.pdf

Wells, G. L., Steblay, N. K., & Dysart, J. E. (2015a). Double-blind photo lineups using actual eyewitnesses: An experimental test of a sequential versus simultaneous lineup procedure. Law and human behavior, 39(1), 1.

Wells, G. L., Dysart, J. E., & Steblay, N. K. (2015b). The flaw in Amendola and Wixted's conclusion on simultaneous versus sequential lineups. Journal of Experimental Criminology, 11(2), 285-289.

Wells, G.L., Steblay, N.K., & Dysart, J.E. (2014). Double-Blind Photo-Lineups Using Actual Eyewitnesses: An Experimental Test of a Sequential versus Simultaneous Lineup Procedure. Law and Human Behavior.

References (continued)

Wells, W., Bender, L., and Morrison, S. (2015, August). Research in Brief: The Houston Police Department Eyewitness ID Project. http://www.policechiefmagazine.org/magazine/index.cfm?fuseaction=display_arch&article_id=3793&issue_id=72015

Wixted, J. T., Gronlund, S. D., & Mickes, L. (2014). Policy regarding the sequential lineup is not informed by probative value but is informed by Receiver Operating Characteristic Analysis. Current Directions in Psychological Science, 23(1), 17-18.

Wixted, J. T., & Mickes, L. (2012). The field of eyewitness memory should abandon "probative value" and embrace Receiver Operating Characteristic analysis. Perspectives on Psychological Science, 7, 275–278.

Wixted, J. T., & Mickes, L. (2014). A signal-detection-based diagnostic feature-detection model of eyewitness identification. Psychological Review, 121, 262–276.