Evaluating the Effectiveness of a Practitioner-Designed Science-Based Interviewing and Interrogation Course: A Collaborative Training and Research Effort

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Abstract

Shifting interrogation approaches in the United States from accusatorial practices to science-based methods has been a challenge. The High-Value Detainee Interrogation Group (HIG) research program has taken a translational approach to evaluating the efficacy and effectiveness of interview and interrogation approaches and to creating training interventions for law enforcement, military, and intelligence personnel. In 2014, the HIG developed and validated a week-long training program on science-based methods of interviewing and interrogation (Russano et al., 2024). Although that HIG-delivered training has been demonstrably successful, it has been impractical for HIG personnel to provide training to law enforcement investigators across the United States. The focus of the current effort was to evaluate a practitioner-designed science-based training program that was co-developed by a practitioner-researcher team. Forty-three investigators from three state and local law enforcement agencies participated in one of four training iterations of a 5-day training course. To assess both training adherence and effectiveness, suspect interrogations conducted before and after training were evaluated. Findings suggest that investigators increased their use of science-based tactics post-training, and that the use of such techniques was associated with greater cooperation, information disclosure, and admissions/confessions. The importance of co-produced training and collaborative research efforts are highlighted.

Evaluating the Effectiveness of a Practitioner-Designed Science-Based Interviewing and Interrogation Course: A Collaborative Training and Research Effort

False confessions are a topic of interest to legal scholars and social scientists alike (Bedau & Radelet, 1987; Borchard, 1932; Drizin & Leo, 2004; Münsterberg, 1908; Wigmore, 1899). Research has demonstrated that the the use of *accusatorial interrogation techniques* that involve shutting down assertions of innocence, providing "themes" that minimize a subject's perceived culpability or consequences, and lying or bluffing about evidence can lead to a higher likelihood of false confession (see Catlin et al., 2024; Kassin et al., 2025; Meissner et al., 2014). The use of such customary interrogation tactics has persisted for decades in North America despite a scientific consensus on the issue and high-profile cases of wrongful conviction (Kelly & Meissner, 2016). In this context, scholars have sought to develop alternative, diagnostic approaches that minimize the likelihood of a false confession while promoting reliable information elicitation from the innocent and guilty (Meissner et al., 2023).

In this submission to the British Psychological Society's Landmark Special Issue on co-produced research involving scientists and practitioners, we highlight collaborative efforts to develop and evaluate the effectiveness of an alternative, science-based interviewing and interrogation framework. Our team includes psychological scientists and law enforcement professionals who have collaborated to bring theory to practice. Herein, we describe our translational approach to identifying and assessing the efficacy of interview and interrogation tactics in the laboratory, and to evaluate their effectiveness in the field when they are offered to law enforcement practitioners to train and deploy.

High-Value Detainee Interrogation Group: A Collaborative Research-to-Practice Effort

Despite mounting evidence of wrongful convictions associated with the use of accusatorial interrogation tactics, law enforcement practices in the United States have been resistant to reform. It was ultimately public debate over the effectiveness and morality of the use of so-called "enhanced interrogation techniques" in the wake of the September 11, 2001, terrorist attacks that led the U.S. Government to begin reconsidering law enforcement, military, and intelligence interrogation practices. In 2009, the Obama Administration established (via Executive Order 13491, "Ensuring Lawful Interrogations") the first research program focused exclusively on developing an evidence base to support effective elicitation and interrogation practices for the U.S. Government (for a review, see Brandon & Meissner, 2023; Meissner et al., 2017). The research program sat within an interagency entity (CIA, DoD, and FBI) and was referred to as the High-Value Detainee Interrogation Group (HIG). The program was mandated to study the effectiveness and propriety of existing interrogation practices, techniques, and strategies. The HIG also conducted strategic-level interrogations of individuals presumed to have significant threat information against the U.S. and developed training for HIG interrogators and other U.S. personnel based upon the available research and best practices it had developed.

The research program was designed as a partnership of government and citizens: "Resources should be devoted both within the U.S. government and in academic and research institutions" (Report of the Task Force on Interrogations and Transfer Policies, 2009, p. 3). The Executive Order was, in part, a response to an important 2006 report by the Intelligence Science Board (civilian advisory to the Office of the Director of National Intelligence), entitled *Educing Information* (Fein et al., 2006). This report reflected the views of interrogation professionals in the field post 9/11, and it documented that "there had been little or no development of sustained capacity for interrogation practice, training, or research" (Fein et al., 2006, p. xiii). Ultimately,

the report recommended that "a program of scientific research on eduction [interrogation] practices is both necessary and highly feasible" (p. 310).

Prior to the development of the HIG, decades of research had been conducted by psychological scientists to evaluate the relative effectiveness of law enforcement interviewing and interrogation practices (for a review, see Kassin et al., 2025; Meissner et al., 2015). For example, experimental studies (Kassin & Kiechel, 1996; Russano et al., 2005) and archival analyses (Drizin & Leo, 2004; Garrett, 2015) documented that certain law enforcement interrogation approaches, including accusatorial tactics that utilize minimization, maximization, and false evidence ploys, could increase the likelihood of *false confessions* and *false information* being provided by the innocent (Catlin et al., 2024; Meissner et al., 2014). Observational studies of law enforcement interrogations in the U.S. and Canada also documented the use of accusatorial tactics, and detailed that such tactics were associated with increased resistance (vs. cooperation) and a decreased likelihood of information disclosure (Kelly et al., 2016, 2019; Kelly & Valencia, 2021; Leo, 1994; Snook et al., 2012). Studies also noted that the questioning of witnesses, victims, and suspects often involved biased, leading, and suggestive prompts that could introduce misinformation and encourage false reporting (Fisher et al., 1987; Loftus, 2005; Newman & Garry, 2013). Taken together, this research highlighted the need for alternative, science-based practices.

The problems associated with customary interrogation practices were not only noted within North America. High-profile cases of false confessions in England and Wales in the 1980s and 1990s led to the passage of the Police and Criminal Evidence Act (1984) and ultimately to the development of the PEACE model of investigative interviewing (CPTU, 1992). PEACE is an acronym for the five stages of interviewing: planning and preparation; engage and explain;

account, clarify, and challenge; closure; and evaluation. The method incorporates a variety of evidence-based practices such as productive and mnemonic questioning, rapport-building approaches, conversation management, and effective challenges regarding inconsistencies in the account (Snook et al., 2010).

While North America was slow to adopt such a model of interviewing, research supported by the HIG beginning in 2010 has led to significant advances in science-based interviewing alternatives that are now being adopted by federal, state, and local agencies across the U.S. (Brandon & Meissner, 2023). The HIG program supported experimental laboratory research (Brimbal et al., 2019; Dianiska et al., 2021; Granhag et al., 2015; Granhag et al., 2016; Horgan et al., 2012; Hwang & Matsumoto, 2020; Luke et al., 2014; Oleszkiewicz et al., 2014, 2017; Vrij et al., 2014), interviews and surveys with interrogation professionals (Goodman-Delahunty & Howes, 2016; Goodman-Delahunty et al., 2014; Narchet et al., 2015; Redlich et al., 2014; Russano et al., 2014), observational studies of law enforcement and counterterrorism interrogations (Alison et al., 2013, 2014; Kelly et al., 2016; Oleszkiewicz, Granhag, & Luke, 2024), and training studies that focused on newly developed interrogation approaches (Hale et al., 2025; Luke, Hartwig, et al., 2016; Oleszkiewicz et al., 2017; Rivard et al., 2014; Sooniste et al., 2017; Vrij et al., 2016). Taken together, the findings from this research identified effective approaches for developing rapport and trust (Alison et al., 2013, 2014; Brimbal et al., 2019, 2021; Duke et al., 2018; Oleszkiewicz, Atkinson, et al., 2024), engaging in productive and mnemonic questioning (Evans et al., 2013; Leins et al., 2014; Rivard et al., 2014), improving assessments of deception and credibility (Evans et al., 2013; Mac Giolla & Luke, 2021; Mann et al., 2013; Shaw et al., 2013; Sooniste et al., 2016), utilizing strategic and effective methods for presenting evidence (Granhag et al., 2013; Hartwig et al., 2014; Luke et al., 2014; Oleszkiewicz

& Watson, 2021; Oleszkiewicz et al., 2023), and understanding the role of culture and the use of interpreters in investigative interviews (Ewens et al., 2016, 2017; Goodman-Delahunty & Martschuk, 2016; Goodman-Delahunty et al., 2020; Giebels et al., 2017; Hale et al., 2019, 2022a, 2022b; Houston et al., 2017; Vrij & Leal, 2020; Vrij et al., 2017, 2018, 2019). To date, HIG-supported researchers have published more than 200 publications related to the science of interviewing and interrogation.

Importantly, much of the HIG research was *co-produced by partnerships between scientists and practitioners in the law enforcement, military, and intelligence contexts*. To bridge the gap between classified HIG operations and the researchers whose work was intended to inform those operations, the HIG developed a research committee to ensure a public face of the program. The committee included practitioners, government scientists, and human rights scholars who offered guidance to program managers and scholars funded by the program. The HIG also encouraged and supported the inclusion of practitioners as consultants and co-investigators on funded projects conducted at various U.S. government facilities (e.g., the Human Intelligence Training - Joint Center of Excellence [HT-JCOE], Fort Huachuca, AZ and the Federal Law Enforcement Training Center, Glynco, GA). The program also facilitated an annual research symposium in which scientists and practitioners could share the latest research, the implications of this research for practice, and the development of research-to-practice scholarship involving both researchers and interrogation professionals (see Brandon & Meissner, 2023). These efforts led to productive collaborations that were ultimately published with authorship that included both scientists and practitioners (e.g., Brimbal et al., 2021; Evans et al., 2010, 2014; Granhag et al., 2015, 2016, 2020; Luke et al., 2016; Kelly et al., 2013, 2019, 2021, 2024, 2025; Narchet et al., 2015; Oleszkiewicz et al., 2014, 2024, 2025; Russano et al., 2014, 2024; Vrij et al., 2017).

Developing and Evaluating a Training Model for Science-Based Interview and Interrogation Approaches

The HIG Research Program, initiated in early 2010, immediately began a series of seminars for HIG "Mobile Interrogation Teams" (MITS): interrogators, analysts, and subject matter experts who deployed together. Researchers with expertise in a variety of topics relevant to interrogations, including interview methods, teaming, social dynamics, persuasion, memory, and deception, offered brief talks. Within 18 months, however, it became clear that what was needed was a training program that offered a coherent, empirically-derived model of interrogation based upon these often diverse disciplines, and that a scientist-practitioner model would be most effective: a practitioner familiar with the science to provide credibility to the audience, and a scientist familiar with HIG contexts to provide a deeper understanding of the relevant science. To that end, a two-day workshop was convened, with input from DOJ, DoD, CIA, and FBI personnel and relevant scholars (including several who had developed and trained the UK PEACE interview model) to consider the content of such a training model. A four-week training course shortly followed. Given the considerable resources expended on developing and offering in-house HIG interview and interrogation training (later shortened to a one-week "Core Course"), the HIG began inviting other federal agencies to participate. By 2015, the program was training ~1,000 practitioners each year from a variety of U.S. federal law enforcement agencies, the military, and the intelligence community, as well as international partners (see Brandon & Meissner, 2023).

An early challenge was how to evaluate the use and effectiveness of the science-based instruction being offered by the HIG. Operations were classified and not video recorded. However, interviews conducted in domestic law enforcement contexts served as a viable option

for assessment. In 2014, the U.S. Air Force Office of Special Investigations (AFOSI), a federal law enforcement agency, was seeking effective interview training to process an increasing number of sexual assault cases. The HIG formed a unique partnership with AFOSI to conduct a first-of-its-kind training evaluation and field validation study that focused on a HIG-delivered science-based interview and interrogation training program. The HIG provided four, one-week iterations of the Core Course to AFOSI investigators and subsequently delivered the same training to two groups of state and local law enforcement investigators from Arizona, Rhode Island, and Massachusetts. Instruction was provided by scientist-practitioner teams (see Russano et al., 2024). The training employed a mixture of lectures, discussions, demonstrations, and practical exercises.

The HIG training model encompassed approaches shown to be effective in the interviewing of non-cooperative individuals (suspects). Core aspects of the training included tactics to mitigate decision biases, fundamentals of impression management, the use of productive questioning strategies, developing and maintaining productive interrogator-suspect relationships via rapport-building tactics, leveraging conversational rapport principles derived from the Observing Rapport-Based Interpersonal Techniques (ORBIT) model, methods for eliciting detailed narratives (e.g., the Cognitive Interview), and instruction on the use of science-based cues to truths and lies. The core concepts that were emphasized in the HIG-delivered training are briefly described below.

Productive Questioning Tactics

Information-gathering approaches to investigative interviewing emphasize an unbiased, hypothesis-driven approach that focuses on eliciting information (not a confession), developing genuine rapport and trust with the subject, the use of productive questions, and the *avoidance* of

leading/suggestive questions or the use of deception (see Meissner et al., 2014; Russano, Kelly & Meissner, 2019). Accusatorial interrogation approaches, in contrast, often involves the use of non-productive questioning strategies such as closed-ended questions, interruptions, and leading/suggestive prompts (Kassin et al., 2010; Kassin & Gudjonsson, 2004; Leo, 2008; Meissner et al., 2014).

Research on questioning techniques (for witnesses, victims, and suspects alike) are quite clear: responses to open-ended questions (i.e., those that invite a narrative response) invite more detailed and accurate responses than closed-ended questions (i.e., those that elicit a brief one- or two-word response; e.g., Baker-Eck & Bull, 2022; Oxburgh et al., 2010; Vrij et al., 2014). Leading/suggestive questions (i.e., those that communicate what the answer might be to the person who is being asked the question), forced-choice questions (e.g., asking a person to choose between a few provided options), repetitive questioning, and interruptions, in contrast, increase the probability of eliciting inaccurate details, particularly from vulnerable individuals (e.g., Fisher & Geiselman, 1992; Mitchell & Johnson, 2000; Phillips, Oxburgh, Gavin & Myklebust, 2012; Toglia, Read, Ross & Lindsay, 2006). More generally, productive questioning can include active listening skills (i.e., nonverbal and verbal prompts that encourage responding from the subject), affirmations (i.e., positive reinforcement about an individual's behavior or qualities), reflections (i.e., repeating back something that the person has said, to include emotional labeling and echoing of key words), and summaries (i.e., brief paraphrases of what the subject has said; Miller & Rollnick, 2013). Productive questioning approaches facilitate information gain and promote accuracy of responding (e.g., Alison et al., 2014; Brimbal et al., 2021; Kelly & Valencia, 2021; Surmon-Böhr et al., 2020).

Facilitating Cooperation by Developing Rapport

Rapport is a much celebrated aspect of interrogation practice (Abbe & Brandon, 2013, 2014; Gabbert et al., 2021; Vallano & Schreiber Compo, 2015). Law enforcement investigators generally demonstrate wide support for the utility of rapport-based approaches (e.g., Goodman-Delahunty et al., 2014; Kassin et al., 2007; Redlich et al, 2014; Russano et al., 2014; Vallano, Schreiber-Compo & Kieckhaefer, 2015), and such methods generally increase perceptions of positivity and affinity toward the interviewer (Kieckhaefer, Vallano, & Schreiber Compo, 2014; Vallano & Schreiber Compo, 2011), reduce counter-interrogation strategies (e.g., Alison et al., 2014), increase cooperation and information disclosure from suspects (e.g., Brimbal et al., 2021; Dianiska et al., 2021; Surmon-Böhr et al., 2020), and facilitate more complete and accurate accounts (e.g., Collins, Lincoln, & Frank, 2002; Holmberg & Madsen, 2014; Kieckhaefer et al., 2014; Vallano & Schreiber Compo, 2011; Walsh & Bull, 2012).

Although it is difficult to agree on an exact definition of rapport (e.g., Gabbert et al., 2021; Neequaye & Mac Giola, 2022; Russano et al., 2014; Vallano et al., 2015), we adopt Brimbal et al.'s (2021; see also, Meissner et al., 2023) distinction between two approaches to developing rapport. First, *relational rapport tactics* are used to facilitate a productive and positive relationship between two people, typically by increasing perceptions of closeness and liking. Examples of relational rapport tactics include establishing *common-ground* with respect to interests, identity or attitudes; *self-disclosure* of personal information; and demonstrating *genuine concern* and *respect* for the interview subject (Abbe & Brandon, 2014; Brimbal et al., 2019, 2021; Goodman-Delahunty & Howes, 2015).

Second, *conversational rapport tactics* are designed to create an interview environment that encourages positive engagement and demonstrates active listening. In their analysis of counter-terrorism interviews in the United Kingdom, Alison and colleagues (2013, 2014;

Surmon-Böhr et al., 2020) assessed the utility of questioning approaches and principles derived from Motivational Interviewing (MI; Rollnick & Miller, 1995). MI has been shown to reduce conversational barriers between a client and therapist and lead to behavioral and cognitive change (see Rubak et al., 2005). MI seeks to minimize the power dynamic between the subject and interviewer and promote a rapport-based relationship. Alison et al. (2020) developed the ORBIT model, which proposed five categories of interviewer skills that facilitate rapport. These skills include *empathy*, recognizing a subject's *autonomy*, offering non-judgmental *acceptance* of the subject and/or their story, using *evocation* to draw out the subject's motivations, values, and beliefs, and being *adaptative* in the interviewing approach. Alison and colleagues (2013, 2014; Surmon-Böhr et al., 2020) have found that the use of ORBIT-based rapport tactics is associated with greater cooperation and verifiable information gain, and fewer counter-interrogation strategies by the subject.

The Cognitive Interview for Suspects

Understanding how to effectively elicit information from memory is of critical importance to interviewing any subject (Russano et al., 2014), yet issues of memory have been largely ignored in accusatorial-based interrogation programs (Fisher & Perez, 2007; Leins, Fisher, Pludwinski, Rivard, & Robertson, 2014). The Cognitive Interview, which is grounded in the science of human memory, is arguably the most studied interview protocol (CI; Fisher & Geiselman, 1992, 2010). The CI has been shown to produce consistent increases in recollection when compared with standard interview approaches used by many law enforcement agencies (e.g., Rivard et al., 2014). Meta-analyses of CI studies have demonstrated large, significant increases in correct recall, with no significant effects on the accuracy of responding (see Memon et al., 2010).

The CI is also effective when used within an interrogation context and has been trained as an advanced interviewing skill in England and Wales (Fisher, Milne, & Bull, 2011; Griffiths & Milne, 2006; McGrory & Treacy, 2012) and deployed effectively in real-world terrorism cases in Israel (Ashkenazi & Fisher, 2022, 2024). In addition, Geiselman (2012) has offered the CI "for Suspects" (see also Sooniste, Granhag, Strömwall, & Vrij, 2015). Studies have shown that utilizing the mnemonic approaches contained within the CI, including requesting an open-ended and uninterrupted narrative, offering a model statement, requesting reverse order recall for a timeline offered, and asking the subject to sketch while describing the narrative, not only increases the amount of detail provided by the subject but can also facilitate assessments of credibility (e.g., Evans et al., 2013; Leins et al., 2014; for a meta-analysis see Luke & Mac Giolla, 2021).

Evaluating the Effectiveness of the HIG Training Model

Russano and colleagues (2024) assessed the effectiveness of the HIG training program by evaluating suspect interrogations conducted before and after training. Interrogation transcripts were coded for the use of the newly trained science-based techniques, any use of traditional accusatorial methods, the presence of suspect counter-interrogation behaviors (Alison et al., 2014; Kelly, Miller & Redlich, 2016), and perceptions of suspect cooperation and the disclosure of investigatively-relevant information. The authors found that following training, investigators increased their use of productive questioning strategies, rapport approaches, and cognitive interview techniques, and they decreased their use of unproductive questioning techniques. Overall, the use of science-based approaches decreased suspect counter-interrogation behaviors and increased suspect cooperation and information disclosure.

The Current Study: Evaluating a Practitioner-Designed Training on Science-Based Interviewing and Interrogation Tactics

Russano et al.'s (2024) training evaluation and field validation of the HIG-delivered training course suggested that science-based methods can be effectively trained and implemented in an operational context. However, from a logistical and practical standpoint, the HIG has been largely unable to deliver its training on a widespread scale to state and local law enforcement agencies across the United States. For science-based interviewing and interrogation training to be widely implemented, training entities outside the HIG must be able to develop and deliver such training programs. Moreover, for a given training protocol to be optimally effective, it should be tailored to the relevant investigative agency. For example, while the concepts might be the same, the structure, content, and delivery of a training course that is most effective for an intelligence agency may differ from those that are most effective for a local law enforcement agency.

In the current study, we assessed a training course whose primary designer was a then-active local law enforcement practitioner (third author MSJ) who was well-versed in the research on investigative interviewing. His knowledge base was derived from taking numerous science-based training courses delivered by the HIG, reading the primary source literature, engaging directly with researchers, and collaborating on research projects. He had also recently completed a Master's degree in Forensic Psychology. He used this knowledge and background to design the course structure and determine the topics to be included in the training curriculum. The first (MBR) and third (MSJ) authors were the primary developers of the training materials and activities that formed basis of the week-long training program designed specifically to be delivered to state and local law enforcement officers, with the second (CAM) author providing feedback and support in development of training materials and last author (SEB) providing an

overview of the HIG training model and offering feedback about the content and structure of the curriculum.

The areas of overlap between the HIG training and the current training course included productive questioning, rapport-building, eliciting detailed narratives via the Cognitive Interview, and science-based credibility assessment. In comparison to the HIG course, more time was spent during the current course on active listening and questioning strategies, understanding and overcoming resistance (including science-based evidence presentation strategies), and the Cognitive Interview. In addition, an emphasis was placed on lectures, video and live demonstrations, and hands-on practical exercises designed to be relevant for local law enforcement. Another key feature and strength of the current training program was that it culminated in a full-day practical exercise that involved interviewing a suspect who had actually engaged in the events they were questioned about (rather than the more typical use of role-players or actors). This final practical exercise allowed trainees to practice and receive intensive coaching/feedback on the full range of skills taught throughout the week in a realistic context.

Research Questions and Hypotheses

This novel course was collaboratively delivered by practitioner-researcher teams to four groups of local law enforcement officers in Arizona and Kansas. To assess both adherence and effectiveness of the training, trainees submitted pre- and post-training real-world suspect interviews for coding and analysis. Our primary research questions included: 1) does training increase the use of science-based approaches and decrease the use of traditional accusatorial interrogation techniques?; and 2) how are the use of various approaches related to key outcome measures (i.e., cooperation, information gain, and admissions)? We hypothesized that following training, investigators would increase their use of science-based approaches (i.e., productive

questioning tactics, CI tactics, relational and conversational rapport tactics, and strategic evidence disclosure tactics). Based on previous research (Russano et al., 2014), we did not expect training to influence the use of accusatorial techniques. We also predicted that training would increase the use of science-based approaches, that science-based approaches would lead to increased cooperation and information gain, that cooperation would be positively associated with information disclosure, and that information gain would directly predict admissions/confessions. We also hypothesized that accusatorial approaches would increase resistance behavior and decrease cooperation. Finally, we predicted positive indirect effects of training via the use of science-based approaches on cooperation and information gain, and positive indirect effects of science-based approaches on information disclosure and confessions/admissions.

We conducted additional analyses on a subset of the data. In our initial coding, we focused on the relational and conversational rapport tactics that investigators used. To examine the extent to which such tactics might facilitate rapport with the interview subject, we conducted supplemental analyses on a subset of the interviews collected. Specifically, we focused on the coding of nonverbal or syntactic indicators of rapport development using a sub-sample of 26 pairs of pre-post interviews. The original Tickle-Degnen and Rosenthal (1990) framework was based upon the coding of nonverbal patterns of interaction. In prior work, Tickle-Degnen et al. looked at various nonverbals that correlated with an “impression” formed by the participant. Using this framework, we coded interviews for nonverbal elements of rapport using only video (no audio was provided to coders, and coders were blind to whether the interviews were conducted pre- or post-training). We also examined the extent to which Language Style Matching (LSM) in speech was associated with rapport tactics or cooperation in the sub-sample, as has been examined in recent studies (Richardson & Nash, 2022; Richardson et al., 2014,

2019). We predicted that interviews conducted after training would show higher rates of positive nonverbal rapport elements and LSM than those conducted before training. We also hypothesized that the greater use of relational and conversational rapport tactics would predict more nonverbal rapport behaviors and LSM.

Method

Transparency & Openness

This study was not pre-registered. Coding protocols, data files, and supplemental analyses are provided on the Open Science Framework (OSF; https://osf.io/r8jbn/?view_only=f627f6f0dd514604b085d98ca9d3ae8d). Due to their confidential nature, transcripts and/or recordings of interrogations conducted by investigators before and after training cannot be shared.

Participants & Design

Four iterations of the one-week training course were delivered to 48 active law enforcement investigators (34 men, 14 women) across three different police departments in Arizona and Kansas between July 2019 and December 2019. On average, they had 18.35 years of experience as a law enforcement officer, with a range of 6 to 33 years (n = 34). The third (MSJ) author served as the primary liaison with Departments A and B, and the sixth (CC) author served as the liaison with Department C. The liaisons worked with the participating police departments to coordinate access to training facilities, recruit investigators for the training, and manage the collection of pre- and post-training interrogations conducted by investigators. A pre-post (repeated-measures) design was used to evaluate the training. The liaisons had direct access to internal department databases at Departments A and C, enabling them to select and collect recordings directly. For Department B, the primary liaison worked with a single point of contact

to follow the protocol for interview selection and collection. The liaisons and point-of-contact identified pre-training (six months prior) and post-training (three to nine months post-training) suspect interviews that met our inclusion criteria for each trainee. These criteria specified that: 1) interviewees had to be criminal suspects, as opposed to witnesses or victims; 2) interviewees must have been 18 years or older; 3) interviewees must have been given their *Miranda* warnings and waived *Miranda* at the outset of the interview; and 4) no pregnant women were to be included in the sample (to the investigator's knowledge). If more than two interviews for a trainee during a data collection period met the inclusion criteria, the liaisons/point of contact randomly selected two interviews. If only one or two interviews met the inclusion criteria for a given data collection period, all available interviews were automatically included in the sample. In some cases, there were no available interviews that met the inclusion criteria for a given trainee in either the pre- or post-training data collection period.

Although 48 law enforcement officers were trained across the three departments (7 from Department A, 13 from Department B, 28 from Department C), no interviews were collected for five investigators (3 from Department A, 1 from Department B, and 1 from Department C) because they did not have any eligible pre- *or* post-training interviews. The final sample for all primary analyses consisted of 149 interviews (82 pre-training, 67 post-training) collected from 43 investigators. Four investigators from Department A provided 8 pre-training and 5 post-training interviews. Twelve investigators from Department B provided 25 pre-training and 19 post-training recordings. Finally, 27 investigators from Department C provided 49 pre-training and 43 post-training interviews. All interview recordings were transcribed by a professional transcription service.

The average interview length was 104.14 minutes (**SE** = 8.17). Post-training interviews (**M** = 107.52, **SE** = 13.37) were significantly longer than pre-training interviews (**M** = 72.37, **SE** = 6.86), χ^2 (1) = 6.78, p = .009, d = 0.42 [95% CI: 0.08, 0.75]. We were unable to estimate length for one interview. Outliers beyond +/- 3 SDs were brought to the boundary prior to analysis, and the missing interview length was replaced with the sample mean. Case type could not be reliably coded from the transcripts, and because this information was not available to the research team on a systematic basis, case type is not included in any analyses. Department C was able to provide case type data for a subset of their data, and the most common offenses were rape, aggravated burglary, aggravated battery, burglary, and robbery. Examples of other offenses included within the Department C sample were homicide, child abuse, and indecent liberties.

A supplemental analysis was conducted to assess the influence or rapport-based tactics on nonverbal and linguistic measures of rapport. A subsample of 26 pre- and 26 post-training interviews from 21 investigators were selected from Departments A (n = 3 pairs) and C (n = 23 pairs).

This study was approved and determined to be exempt by the Human Subjects Review Boards of Iowa State University and the Federal Bureau of Investigation because it involved research on educational practices and curriculum evaluation. Therefore, no informed consent was required nor obtained.

Materials & Coding of Interviews

Training Curriculum

The training curriculum included most of the core concepts discussed, although the course delivery and packaging (i.e., PowerPoint presentations, practical exercises, video examples) were novel and unique to this training. The core concepts included in the training

were: developing *relational rapport* (e.g., the use of liking, establishing common ground, self-disclosure, etc.) and *conversational rapport* (e.g., active listening strategies, motivational interviewing tactics); the use of *productive questioning tactics* (e.g., use of open-ended questions and appropriated closed questions, funnel questioning); and the use of *cognitive interview tactics* to elicit critical information stored in memory (e.g., eliciting narratives, setting ground rules, avoiding interruptions, use of a model statement, context reinstatement, and other mnemonic devices). We also included a module on the importance of planning and preparing (P&P) for the interview, although were not able to measure use of P&P strategies given the nature of the data we had access to. The module included planning and preparing for question topics, questioning structure and type, investigative information needs, recognizing and dealing with investigative biases, and evidence disclosure.

The course also included instruction on how to *strategically use and disclose evidence*. Research suggests that a suspect's perception of the evidence is an important motivational factor that predicts true confessions (Cleary & Bull, 2021; Horgan et al., 2012; Houston et al., 2014; Moston, Stephenson, & Williamson; 1992; Redlich et al., 2011), but that the method of evidence presentation is critical. For example, evidence presentation formats may vary from attempts to overwhelm the subject with strong (and sometimes false) evidence of guilt, to systematic presentation of evidence that identifies contradictions in the subject's account.

A further distinction regards the manner in which evidence is presented, with some approaches preferring a concurrent "monologue" of evidence and others suggesting the presentation of evidence gradually over time (Walsh & Bull, 2015). Experimental research has suggested that late disclosure of strong evidence is most likely to produce a confession (Sellers & Kebbell, 2009) and facilitate the elicitation of statement-evidence inconsistencies

(Oleszkiewicz & Watson, 2021). Further, a suspect's awareness of possible evidence that could be disclosed by the interrogator increases the extent to which guilty participants offer more critical disclosures (Luke, Dawson, Hartwig, & Granhag, 2014). Hartwig and colleagues (Hartwig, Granhag, Stromwall, & Doering, 2010; Hartwig, Granhag, Stromwall, & Vrij, 2005; for a review, see Hartwig, Granhag, & Luke, 2014) have further proposed that appropriate disclosure of evidence can be effective due to its influence on a suspect's information management strategy. If a suspect initiates a cooperative exchange, they will seek to maintain an appearance of credibility. If critical information must be protected, they are likely to engage in either avoidance strategies or denials until such time as it might be impossible to do so.

The 'Strategic Use of Evidence' (SUE; Hartwig et al., 2014) approach seeks to initially gain the cooperation of the subject and to elicit an open-ended narrative. After the subject has committed to an account, evidence disclosure can be used to strategically confront the subject. Taken together, this research suggests that late disclosure of evidence is superior to early disclosure; disclosure of stronger evidence is more effective than weaker evidence; and gradual disclosure of evidence appears to be more effective than a single disclosure monologue, particularly if the interrogator moves systematically from weaker to stronger evidence types. Hartwig and colleagues have also demonstrated that strategic evidence disclosure techniques can be effectively trained, and that use of the approach can significantly improve deception detection performance (Hartwig, Granhag, Stromwall, & Kronkvist, 2006; Luke et al., 2016).

Interview Tactics & Outcome Measures

Ten undergraduate students with research methods training (7 female, 3 male) served as coders for the primary analysis. Coders were trained on all interrogation approaches and suspect behavior variables. They were kept blind to condition (pre-training vs. post-training) and naive to

key hypotheses of the study (e.g., coders were not informed as to which techniques were science-based, which techniques were trained, and therefore which techniques were hypothesized to be more common post-training). Because the number of variables coded was so large, the variables for the primary analyses were divided into two coding schemes – hereafter referred to as "First Pass" and "Second Pass". In the First Pass (see Appendix A on OSF), coders evaluated: the use of traditional ***accusatorial approaches*** (including shutting down denials, minimizing the importance of the interview, offering rationalizations and face-saving excuses, minimizing potential consequences, etc.); the use of various ***productive questioning tactics*** (including use of open-ended questions, appropriate closed questions, and funnel questioning); ***active listening skills*** (i.e., affirmations, reflections, and summaries); the use of ***cognitive interview techniques*** (including setting ground rules and expectations, telling the subject to report in as much detail as possible, instructing the subject not to guess, and the use of various mnemonic devices such as context reinstatement, drawing, reverse-order recall, and model statement); and relevant ***outcome measures*** that address the effectiveness of the various methods (to include how forthcoming, cooperative, and resistant the subject was, how detailed and complete the statement was, and whether the subject provided incriminating admissions). All variables were measured on a 3-point scale (0 = no use, 1 = moderate use, 2 = extensive use), except for the outcome variables. Cooperativeness, resistance, forthcomingness, level of detail, and completeness were measured with 5-point scales (1 = not at all; 5 = extremely), and admissions were measured with a categorical scale (1 = did not make any incriminating statements, 2 = made a partial admission, 3 = made a full confession).

In the Second Pass (see Appendix B on OSF), coders evaluated: the use of ***relational rapport tactics*** (including liking, establishing common ground, self-disclosure, etc.);

conversational rapport tactics (i.e., autonomy, acceptance, evocation, adaptation, and empathy), ***evidence disclosure*** variables (e.g., timing of disclosure, method of disclosure, interviewer affect/tone during disclosure), and suspect ***counter-interrogation strategies***. Specifically, we assessed the extent to which suspects invoked certain counter-interrogation tactics using the framework utilized by Kelly et al. (2016) and in a manner consistent with Alison et al. (2014). We coded such verbal behaviors as denying involvement in the alleged crime, withdrawing or retracting prior admissions, offering monosyllabic responses or rehearsed responses, claiming a poor memory for events surround the crime, or providing only well-known information regarding the event, silence, and invocation or rights. Most items were operationalized with a 3-point scale (0 = no use, 1 = moderate use, 2 = extensive use; see Appendix B for full details of scales for all items). All variables were coded at the interview level from transcripts of the interviews (not audio or video recordings).

Coders were trained on the use of science-based interrogation methods, as well as accusatorial interrogation methods that have historically served as the foundation of interrogation training. Following discussions of background reading materials related to the various interview techniques and expected outcomes, multiple training sessions (totaling approximately 10 hours of time) were held in which the first author (MBR), third author (MSJ), and fourth author (JNR) reviewed the coding scheme in detail with the coders, providing examples for each variable to be coded. Thereafter, all coders were asked to independently assess the same initial transcript. Coders and the research team met to review the coded responses in order to provide clarifying examples, identify areas of disagreement, and reach agreement amongst the coders. This process was repeated with additional transcripts, until it appeared that agreement was being consistently reached.

Interrater reliability was then established by having all coders code two previously un-coded transcripts (see Supplemental Table 1 on OSF). Average ICC and Kappa reliability was 0.86, with two item having low estimates of 0.17 (Evocations) and 0.25 (Demonstrating Respect), and the remaining items ranging between 0.50 and 1.00. Average percent agreement was 83%, with one item having low reliability (25%, Reflective Responses) and the remainder ranging between 50% and 100%. Additional discussions led to improved interrater reliability, after which the remaining transcripts were assessed by dividing coders into pairs and randomly assigning sets of transcripts to each pair. Coding pairs were asked to identify and resolve discrepancies where values differed by more than 2 points or when one coder indicated that a behavior occurred and the second coder indicated that it did not.

Nonverbal Indicators of Rapport

Four undergraduate students with research methods training (3 female, 1 male) served as coders for the secondary analysis. As outlined in Appendix C on OSF, coders were primarily focused on coding facial expressions that could act as indicators of rapport. For instance, coders evaluated the extent to which the interviewee completed behaviors such as ***eye gaze*** toward the interviewer, ***smiling*** at the interviewer, and ***nodding their head*** as an act of engagement with what the interviewer was saying. In addition, coders assessed the extent to which the interviewee appeared ***bored*** throughout the interview. Coders viewed the interview recording with audio removed. Each interview was parsed into 3-minute segments, and coders assessed each variable at the end of each segment. All variables were coded on a 4-point scale (0 = the behavior did not occur, 1 = infrequent use, 2 = moderate use, 3 = extensive use).

All coders were trained on the use of non-verbal indicators of rapport. Following discussions of background reading materials related to the various multiple training sessions, the

research team reviewed the coding scheme in detail with the coders, providing examples for each variable to be coded. Thereafter, all coders were asked to independently assess the same initial video. Coders and the research team met to review the coded responses in order to provide clarifying examples, identify areas of disagreement, and reach agreement amongst the coders. This process was repeated with additional videos until agreement was consistently reached. The remaining videos were then assessed by dividing coders into pairs and randomly assigning sets of videos to each pair. Coders were blind to condition (pre- vs. post-training), and following independent initial coding attempts, coding pairs were asked to resolve all discrepancies.

Language Style Matching

Consistent with Richardson et al. (2014), we examined the role of language mimicry using an established measure known as Language Style Matching (LSM). Specifically, we calculated three LSM related measures: (1) the extent of matching within 3-minute interaction periods; (2) the *r* derived from regressing LSM on interaction period for each interrogation; and (3) the extent of matching at the turn-by-turn level (cf. Taylor & Thomas, 2008). Each form uses the same metric but compares different granularity of speech from the interrogation and suspect. Turn-by-turn LSM considers the extent to which a suspect's response to an interrogator's cue shows matching. An analysis at this level captures the ebb-and-flow of a conversation, but it also delivers large oscillations in values because the data being sampled in each utterance pair is small. Comparing across 3-minute interactions reduces the turn-by turn oscillations and still allowed us to capture changes in LSM across the interrogation.

For each interview, LSM was calculated as follows. First, we segmented the transcripts by speaker and by interaction period, to produce a set of interrogator and suspect text files. These files were then submitted to the text analysis software Linguistic Inquiry and Word Count using

the 2015 dictionary set (LIWC, Pennebaker, Booth, & Francis, 2007; a 2022 version of LIWC did not change the function word categories; see Table 4, Boyd, Ashokkumar, Seraj & Pennebaker, 2022). LIWC calculates the percentage of words within a text file that match defined linguistic categories, including nine function word categories that are used to calculate LSM (i.e., Adverbs, Articles, Auxiliary verbs, Conjunctions, Indefinite Pronouns, Negations, Personal Pronouns, Prepositions, and Quantifiers). Scores for each category are used to create a measure of LSM, using the formula (articles as the example): $1 - [(|articles^{I} - articles^{S}|)/(articles^{I} + articles^{S} + .0001)]$, where $articles^{I}$ is the percentage of articles used by the interrogator, $articles^{S}$ the percentage used by the suspect, and the addition of .0001 to the denominator used to prevent division by zero.

The formula delivers a score between 0.00 and 1.00 for each interrogation segment in each category. These are averaged to derive a single LSM score. The higher an LSM score for an interaction segment, the more matching the interrogator and suspect showed in their language choices. For the segment measure, we averaged the LSM scores for each interrogation and used this as a measure of the average LSM across the interrogation. For the trend measure, we regressed these average LSM scores onto the interaction period to derive a single Person *r* for each interrogation. An *r* below/above 0.00 would indicate decreasing/increasing LSM over the periods of the interrogation. For the turn-by-turn measure, we followed Richardson et al. (2014) and averaged all turn-by-turn LSM across each interrogation; this minimizes the impact of variability found at the individual score level.

Results

Assessment of Training Effects

Our primary analyses assessed whether the training program affected the use of various interrogation techniques. Here we focused on the use of five clusters of interrogation techniques: ***accusatorial techniques*** that are commonly taught to investigators (i.e., shutting down denials,

minimizing the importance of the interview, offering rationalizations and face-saving excuses, minimizing potential consequences, etc.), and five science-based approaches that served as the focus of the training effort: ***productive questioning tactics*** (a combination of good questioning tactics and active listening skills), ***cognitive interview tactics*** (e.g., including setting ground rules and expectations, telling the subject to report in as much detail as possible, instructing the subject not to guess, and the use of various mnemonic devices such as context reinstatement, drawing, reverse-order recall, and changing perspectives), ***relational rapport tactics*** (e.g., liking, establishing common ground, self-disclosure), ***conversational rapport tactics*** (e.g., empathy, autonomy, adaptation, evocation, acceptance), and ***strategic evidence disclosure*** tactics (e.g., timing of disclosure, method of disclosure). We also assessed suspect ***counter-interrogation tactics***, the degree of ***cooperation*** of the subject, ***information disclosure***, and the extent of ***admissions*** made.

To assess training effects, we used Generalized Estimating Equations (GEE; see Ghisletta & Spini, 2004) and controlled for variance attributable to participant-level variance and the arbitrarily assigned transcript number (for those who had two interviews at one or more data points). We also controlled for department location and length of the interview by including these variables in the model. Figure 1 depicts the effects of training on the use of various interrogation approaches, and Figure 2 depicts effects of training on suspect behaviors.

Interrogation Approaches

Accusatorial Techniques. A single component score operationalizing the use of accusatorial tactics was created by combining the use of direct accusations, shutting down denials, use of a choice question, face-saving excuses, blaming the victim, suggesting the offense is common, and explicit and implicit threats and promises. Consistent with our conceptualization of this as a single construct, a principal components analysis produced a single component explaining 28.87% of the variance. There

was no significant effect of training on the use of accusatorial tactics, χ^2 (1) = 0.17, p = .68, d = -0.05 [95% CI: -0.38, 0.27], with pre-training (**M** = -0.03, **SE** = 0.14) and post-training (**M** = -0.10, **SE** = 0.16) use of such tactics being comparable. Departments significantly varied in the use of accusatorial tactics, χ^2 (2) = 9.26, p = .01. Sidak pairwise comparisons revealed a marginally significant effect, such that investigators from Department B (**M** = -0.08, **SE** = 0.09) used more accusatorial techniques than Department C (**M** = -0.46, **SE** = 0.10), p = .049, d = 0.44 [95% CI: -0.08, 0.81]). Length of interview was not significantly related to the use of accusatorial tactics, χ^2 (1) = 3.47, p = .062, r = 0.15 [95% CI: -0.01, 0.31].

Productive Questioning Tactics. A single component score representing the use of productive questioning tactics was created by combining the use of open-ended questions, initial free narratives, subsequent free narratives, funnel questioning, appropriate closed questions, affirmations, reflectives, and summaries. A principal components analysis supported a single component solution explaining 29.89% of the variance. A non-significant effect of training on productive questioning tactics was observed, χ^2 (1) = 3.24, p = .072, d = 0.25 [95% CI: -0.07, 0.58], although training led to the hypothesized increase in productive questioning post-training (**M** = 0.19, **SE** = 0.15) when compared with pre-training (**M** = -0.08, **SE** = 0.10). A non-significant effect of department location was also observed, χ^2 (1) = 5.06, p = .079. Length of interview was significantly and positively related to the use of productive questioning tactics, χ^2 (1) = 7.01, p = .008, r = 0.22 [95% CI: 0.06, 0.37].

Cognitive Interview Tactics. We created a single factor score representing the use of cognitive interview tactics by combining items that assessed the use of providing ground rules, emphasizing providing detail, a do not guess instruction, a close eyes instruction, and mental context reinstatement prompts. A principal components analysis indicated that the items functioned as a single component explaining 45.62% of the variance. There was a significant

effect of training on the use of Cognitive Interview techniques, χ^2 (1) = 6.51, p = .011, d = 0.40 [95% CI: 0.08, 0.73], such that investigators increased their use of CI techniques post training (**M** = 0.25, **SE** = 0.16) compared to pre-training (**M** = -0.23, **SE** = 0.12). Department location was not significantly associated with the use of cognitive interview techniques, χ^2 (2) = 1.67, p = .434. Length of interview was significantly and positively related to the use of cognitive interview tactics, χ^2 (1) = 6.19, p = .013, r = 0.20 [95% CI: 0.04, 0.35].

Relational Rapport Tactics. A single component score representing the use of relational rapport tactics was created by combining items assessing the use of liking, establishing common ground, self-disclosure, respect, expressing genuine interest, humor, and concern for the suspect's well-being. A principal components analysis supported a single component solution explaining 44.33% of the variance. Investigators used significantly more relational rapport-building tactics post-training (**M** = 0.74, **SE** = 0.19) than pre-training (**M** = 0.18, **SE** = 0.15), χ^2 (1) = 15.41, p < .001, d = 0.39 [95% CI: 0.06, 0.71]. The effect of department on the use of relational rapport-building techniques was also significant, χ^2 (2) = 6.07, p = .048. Sidak *post hoc* comparisons revealed a marginal difference in the use of relational rapport tactics between Department A (**M** = 1.07, **SE** = 0.44) and Department C (**M** = 0.05, **SE** = 0.10), p = .066. Length of interview was not significantly related to the use of relational rapport tactics, χ^2 (1) = 1.61, p = .205, r = 0.10 [95% CI: -0.06, 0.26].

Conversational Rapport Tactics. A single component score representing the use of conversational rapport tactics was created by combining items assessing the extent to which the investigator behaved in ways that were consistent with the ORBIT-based rapport skills of empathy, evocation, autonomy, acceptance and adaptation. A principal components analysis indicated that the items functioned as a single component, which explained 41.27% of the

variance. There was no significant effect of training on the use of conversational rapport skills, χ^2 (1) = 0.18, p = .674, d = 0.06 [95% CI: -0.27, 0.38], with pre-training (**M** = 0.08, **SE** = 0.15) and post-training (**M** = 0.14, **SE** = 0.14) use of these rapport skills being quite comparable. There was a significant effect of department, χ^2 (2) = 26.36, p < .001. Sidak pairwise comparisons revealed that while there was no difference in the use of conversational rapport tactics between Department A (**M** = 0.62, **SE** = 0.37) and Department B (**M** = 0.26, **SE** = 0.11), investigators from Department C (**M** = -0.56, **SE** = 0.10) used such rapport tactics less frequently than investigators from both Department A (p = .005) and Department B (p < .001). Length of interview was marginally significant and positively related to the use of conversational rapport tactics, χ^2 (1) = 3.82, p = .051, r = 0.16 [95% CI: -0.001, 0.31].

Evidence Disclosure Techniques. A single component score was created to represent the use of science-based methods of evidence disclosure by combining four items: timing of disclosure, method of disclosure, the extent to which the investigator attempted to lock a suspect into a story before disclosing evidence, and the investigator's tone while presenting evidence (calm and inquisitive vs. confrontational/accusatorial). Consistent with our conceptualization of this as a single construct, a principal components analysis produced a single factor explaining 45.82% of the variance. Higher scores represented a more evidence-based approach (i.e., strong attempt at story-lock, later disclosure, incremental disclosure, calm/inquisitive tone). There was a non-significant effect of training, χ^2 (1) = 3.17, p = .075, d = 0.27 [95% CI: -0.05, 0.60], although training led to the hypothesized increase in the use science-based approaches to evidence disclosure post-training (**M** = 0.85, **SE** = 0.17) as compared to pre-training (**M** = 0.51, **SE** = 0.13). There was no significant difference in the use of science-based evidence disclosure strategies across departments, χ^2 (2) = 0.84, p = .656. Length of interview was marginally

significant and positively related to the use of science-based methods of evidence disclosure, χ^2 (1) = 3.29, p = .07, r = 0.15 [95% CI: -0.01, 0.30].

Suspect Behavior Outcome Variables

Counter-Interrogation Tactics. A single component score was created to represent the use of counter-interrogation tactics by the suspect by combining the following items: denying involvement in the alleged crime, offering monosyllabic responses, providing a rehearsed statement, claiming a poor memory for events surrounding the crime, providing only well-known information, and seeking information about the crime or possible disposition. A principal components analysis supported a single component solution explaining 28.76% of the variance. There was no significant effect of training on suspect counter-interrogation tactic use, χ^2 (1) = 1.34, p = .246, d = 0.21 [95% CI: -0.11, 0.53], though the trend was such that the use of such tactics by the suspect appeared to increase from pre-training (**M** = -0.16, **SE** = 0.07) to post-training (**M** = 0.01, **SE** = 0.12). Department location was significantly associated with suspect counter-interrogation tactics, χ^2 (2) = 9.59, p = .008, such that suspects interviewed by Department B used more counter-interrogation strategies (**M** = 0.25, **SE** = 0.12) than suspects interviewed by Department C investigators (**M** = -0.31, **SE** = 0.10) (p = .006). Length of interview was not significantly related to the presence of counter-interrogation tactics, χ^2 (1) = 0.30, p = .587, r = 0.04 [95% CI: -0.12, 0.20].

Cooperation. Each interview was coded for the extent to which interrogators achieved cooperation from the suspect, and the degree to which the suspect generally resisted engaging with the interrogator. A single component score was derived by combining these two estimates (explaining 83.60% of the variance). The measure of cooperation was significantly associated with the measure of counter-interrogation tactics (r = -0.32, p < .001), suggesting that increased

counter-interrogation behaviors were associated with lower levels of cooperation (greater resistance). No significant effect of training on cooperation was observed, χ^2 (1) = 0.000, p = .995, d = 0.00 [95% CI: -0.32, 0.32] with pre-training (**M** = -0.20, **SE** = 0.12) and post-training (**M** = -0.20, **SE** = 0.18) showing no shifts in cooperation. There was no significant effect of department location on suspect cooperation levels, χ^2 (2) = 0.73, p = .70. Length of interview was not significantly related to cooperation, χ^2 (1) = 0.12, p = .729, r = 0.02 [95% CI: -0.13, 0.19].

Information Disclosure. We also coded the amount of information that suspects provided during the interview, focusing on the amount of detail and the completeness of information provided, as well as how forthcoming the suspect appeared. A principal components analysis indicated that the items functioned a single component, which explained 86.30% of the variance. There was no effect of training on information disclosure, χ^2 (1) = 0.77, p = .381, d = 0.13 [95% CI: -0.20, 0.45], with pre-training (**M** = -0.43, **SE** = 0.13) and post-training (**M** = -0.27, **SE** = 0.17) estimates of information disclosure suggesting a small increase following training. Information disclosure also did not vary by department location, χ^2 (2) = 0.789, p = .674. Length of interview was not significantly related to information disclosure, χ^2 (1) = 0.000, p = .999, r = 0.00 [95% CI: -0.16, 0.16].

Admissions and Confessions. Finally, interviews were coded for whether suspects made no admissions, a partial admission to the crime, or a complete confession. Across these categories, 22.8% of suspects made no incriminating statements, whereas 53.0% made a partial admission and 24.2% made a full confession. No significant differences in the rate of admissions or confessions were observed as a function of training, χ^2 (1) = 0.059, p = .809. Admission/confession rates did, however, differ as a function of department, χ^2 (2) = 22.21, p <

.001. Follow-up chi-square analyses revealed that Department A [χ^2 (2) = 17.17, p < .001] and Department B [χ^2 (2) = 18.70, p < .001] had significantly higher rates of *full confession* than Department C (Department A - 53.8%; Department B - 43.2%; and Department C - 10.9%). Length of interview was not significantly related to the elicitation of an admission/confession, χ^2 (1) = 1.72, p = .189.

Modeling the Influence of Interrogation Tactics on Key Outcomes

From our coding of science-based tactics (productive questioning, cognitive interview skills, relational rapport tactics, and conversational rapport skills), accusatorial techniques, and counter-interrogation tactics by the suspect, we created a path model to explain key outcomes of cooperation, information disclosure, and admissions/confessions. Figure 3 displays the predicted structural equation model with significant paths, controlling for interrogations conducted pre- vs. post-training.

An initial model with all possible direct and indirect paths was estimated. The final model, which included only significant paths, provided a good fit to the data with χ^2 / df = 1.57, CFI = 0.96, RMSEA = 0.062. The model accounted for 27.5% of the variance in cooperation, 56.0% of the variance in information disclosure, and 5.1% of the variance in admissions/confessions. As expected, science-based techniques significantly increased cooperation (b = .19, p = .007) and information disclosure (b = .22, p < .001), likely due to the use of both relational and informational tactics (see Meissner et al., 2023). Cooperation directly predicted information disclosure (b = .69, p < .001), and information disclosure directly increased confessions/admissions (b = .23, p = .004). In contrast to this pattern, the use of traditional accusatorial tactics significantly increased counter-interrogation tactics by the suspect (b = .21, p = .010) and reduced cooperation (b = -.38, p < .001). Counter-interrogation tactics

also directly decreased cooperation (b = -.29, p < .001). Training produced significant positive indirect effects on cooperation (b = 0.05, p = .039), information disclosure (b = 0.09, p = .009), and confession (b = 0.02, p = .019). Further, the use of science-based tactics led to positive indirect effects on both information disclosure (b = 0.13, p = .035) and confessions (b = 0.08, p = .029).

Supplemental Analysis - Nonverbal and Linguistic Similarity Measures of Rapport

A single factor score was created to represent nonverbal rapport by combining the following items: eye contact, smiling, nodding, and appearing bored. A principal components analysis produced a single factor explaining 53.5% of the variance. Although interviews conducted post-training showed greater rates of positive nonverbal behaviors when compared with those conducted pre-training (pre-training: **M** = -0.20, **SE** = 0.22; post-training: **M** = 0.28, **SE** = 0.23), the training effect in this subsample was non-significant, χ^2 (1) = 3.41, p = .065, d = 0.42 [95% CI: -0.13, 0.97]. Generalized Linear Modeling (GLM) was used to examine the extent to which the use of rapport-based tactics – relational rapport tactics and conversational rapport tactics – might predict nonverbal rapport behaviors. While relational rapport tactics were significantly associated with greater nonverbal rapport behaviors, b = 0.33, χ^2 (1) = 5.10, p = .024, conversational rapport tactics were non-significant, b = 0.04, χ^2 (1) = 0.001, p = .981.

Language Style Matching (LSM) and the aforementioned nonverbal measure of rapport were not significantly correlated, r = 0.07 [95% CI: -0.23, 0.42], p = .65. Once again, post-training interviews demonstrated greater LSM when compared with pre-training interviews (pre-training: **M** = .855, **SE** = .005; post-training: **M** = .872, **SE** = .005); however, this training effect proved non-significant, χ^2 (1) = 3.68, p = .055, d = 0.57 [95% CI: 0.01, 1.12]. A GLM demonstrated that neither of the rapport-based tactics directly predicted LSM: relational rapport

tactics, $b = 0.04$, χ^2 (1) = 0.68, $p = .409$; or conversational rapport tactics, $b = -0.003$, χ^2 (1) = 0.20, $p = .652$.

General Discussion

Summary of Findings

A previous training evaluation involving a sample of AFOSI investigators and state/local law enforcement officers from Rhode Island and Massachusetts showed promising results for the effectiveness of a 1-week training program delivered by the HIG (Russano et al., 2024). The current effort assessed the effectiveness of a novel science-based interviewing and interrogation training program that was co-developed by an active law enforcement practitioner and scholarly experts. The key research questions were, first, when trained on science-based methods of interrogation, will investigators increase their use of the newly trained methods in subsequent real-world cases? Put another way, does the training "work" to increase use of science-based approaches? Secondly, will an increased use of the evidence-based methods be associated with decreased use of traditional, accusatorial methods? Finally, what are the relationships between various methods (both evidence-based and accusatorial approaches) on suspect counter-interrogation tactics, cooperation, information gain, and admissions/confessions?

Consistent with the findings from Russano et al. (2024), the results of this study confirm that science-based methods can be effectively packaged and trained to law enforcement investigators, and when used, can improve interview outcomes. The data from this study are especially noteworthy because they suggest that the success of previous training efforts was not unique to the specific structure, packaging, or instruction methods of the particular course being assessed. Rather, this study suggests that other entities can successfully deliver and train science-based methods for investigative interviewing.

Specifically, in the current study, we found that trained investigators were significantly more likely to utilize relational rapport-building tactics and cognitive interview tactics post-training. We also observed a marginal effect of training on the use of productive questioning tactics as well as science-based evidence disclosure techniques, an area that has not been a significant focus of previous training evaluations (see also, Oleszkiewicz et al., 2023). In contrast to Russano et al. (2024), we did not find an effect of training on conversational rapport skills, which could be explained, in part, by the challenges of training, practicing, and coding these more conceptual skill sets.

With respect to the question of whether training in the use of science-based interviewing methods might organically lead to decreased use of traditional accusatorial methods, we did not find support for such an effect (similar to Russano et al., 2024). Fostering change in law enforcement practices without shifts in policy or law is challenging, particularly in jurisdictions as diverse as those in the United States. Research suggests that law enforcement organizations that foster a climate of promoting procedural justice and fairness are more likely to incorporate the use of science-based methods of interviewing (see Brimbal et al., 2020). We discuss this issue further when considering the implications for training and practice below.

Contrary to our hypotheses, training did not significantly increase non-verbal rapport behaviors and language style matching (LSM). The marginal effects observed were in the expected direction and may be the result of low power, given the moderate effect sizes. In terms of the effects of training on suspect behaviors, there were no direct effects of training on a suspect's use of counter-interrogation strategies, cooperation, information disclosure, or admissions/confessions, consistent with prior studies (see Brimbal et al., 2021; Russano et al., 2024). The absence of direct effects on suspect behavior is not particularly surprising, as it is not

the training itself that should influence suspect outcomes but rather the techniques used during an interrogation. In other words, indirect effects of training on suspect behavior via the tactics used by investigators are the key to understanding the impact of training.

To assess this, we conducted a structural equation modeling analysis to examine the relationships between various methods (both science-based and accusatorial approaches) and suspect behaviors (counter-interrogation strategies, cooperation, information disclosure, and admissions/confessions). We found that science-based approaches directly increased both cooperation and information disclosure. These direct effects are likely the product of the relational and informational tactics encompassing the science-based approach, such that relational tactics facilitate a decision to cooperate, while informational tactics can directly (rather than indirectly) increase the amount of information yielded (see Meissner et al., 2023). The model also suggested that training indirectly increased cooperation, information disclosure, and admissions/confessions. Furthermore, the analysis indicated that accusatorial methods were *counterproductive* for investigators – such methods both *increased* the use of counter-interrogation tactics by suspects and directly *decreased* cooperation. Taken together, our results are consistent with previous research linking rapport-based techniques with increased cooperation and accusatorial techniques with increased resistance (e.g., Alison et al., 2013, 2014; Brimbal et al., 2021; Russano et al., 2024). Further, the data strongly support the use of science-based techniques and should encourage investigators to reduce their reliance on traditional accusatorial techniques.

Limitations of the Current Study

Although the current study suggests that science-based interview and interrogation approaches can be successfully taught to and adopted for use by law enforcement investigators –

and that those approaches are associated with greater cooperation and information gain – our analyses and conclusions are always tempered by limitations of the methodology and data set. One limitation is that our sample size from each department was quite variable – Department A provided 13 interviews from 4 investigators, Department B provided 44 interviews from 12 investigators, and Department C provided 92 interviews from 27 investigators. In this context, we did observe some departmental effects (e.g., that Department C investigators generally used fewer rapport-building and accusatorial approaches, and elicited fewer admissions than investigators from the other departments). These departmental effects could represent a variety of factors that we did not assess, including differences in pre-existing customary practices, prior training or policy and practice directives that the department supported, or the types of investigations that investigators from each course worked on (e.g., we were not able to control for or track crime type or investigative division). In addition, while we exerted some controls over the sampling process for interviews, we have little insight into how departments selected investigators to enroll in the course (which could relate to personal motivations, interests, and skill sets of the investigators). We controlled for departmental effects to account for this variability, but future training studies could measure and control for departmental, investigator, and case-level factors that may influence the effectiveness of the training intervention.

A second limitation of this data set was our inability to know (and therefore analyze) ground truth, final case outcome, and communicative intent. On ground truth, the research team was unable to obtain case materials that may have assisted with establishing ground truth, nor were we privy to a complete, systematic accounting of case outcomes (given confidentiality concerns). As such, this study cannot speak to the reliability of the admissions or confessions obtained, nor can we know with certainty whether increased cooperation, information gain, and

admissions/confessions are associated with case disposition. With respect to communicative intent, our LIWC analyses consider only the occurrence of language, giving no weight to the context in which it is used. The weaknesses of these analyses, such as being ignorant of cultural differences in use and variations in intent (e.g., sarcasm, irony), are well documented elsewhere and apply to our findings (Hunter & Grant 2025).

Other limitations of our study provide fertile ground for future research. For example, we assessed the use of interrogation approaches and relevant outcome measures at the interview level, rather than at time-delineated intervals throughout the interview. Future researchers might consider assessing these variables at a more granular level, taking into account the dynamic nature of a suspect interview and the temporal order of the approaches used (see Kelly et al., 2016). Similarly, future research might consider different operationalizations of some of our variables. For example, rather than using a global subjective measure of information gain, the type, quality, and/or frequency of details could be assessed. Finally, we assessed the short-term effects of our training (up to 9 months post-training). As such, our data cannot speak to the persistence of the training effects over time. While prior studies suggest that "skill decay" is common when acquiring new skills (Arthur et al., 1998; Russano et al., 2024), future research should examine the circumstances under which training effects might be mitigated.

Implications for Training & Practice

The findings of this research provide important information for those involved in future training efforts. We have clear evidence that training in science-based methods of interviewing and interrogation is effective. More importantly, the current findings also validate that a novel course can be designed in concept by a practitioner with significant knowledge of the science. As

such, the current study provides support for the notion that the science can be "given away" and effectively adapted for training.

One noteworthy caveat, of course, is that research scientists played an integral part in developing and delivering the training program. Consistent with the original HIG model, we believe this involvement is critical for practitioner-developed training programs to avoid drift away from the research literature and to ensure that the curriculum remains current with advances in the science. The challenge remains of how best to integrate researchers and practitioners into a sustainable and broad training effort. One possibility is for researchers to engage early in the development and delivery of the training, then pull-back their involvement, with periodic reviews and assessments for curricular revision and instructor training.

With respect to lessons from this version of the training, the science-based methods that have been effectively trained in the past (e.g., Russano et al, 2024), namely productive questioning, relational rapport-building skills, and cognitive interview skills, were also successfully trained to this sample of investigators. In addition, this course effectively trained the use of science-based evidence disclosure tactics – to our knowledge, the first empirical demonstration of science-based evidence disclosure being successfully integrated into a broader week-long interviewing and interrogation training course.

One area in which we found no effect of training was on conversational rapport skills that focused on ORBIT-based principles. We believe there are several possible explanations for this lack of effect. First, ORBIT-based principles (e.g., acceptance, adaptation) are more theoretical than, for example, teaching relational rapport-building skills (e.g., establishing common ground, self-disclosure). Second, we did not offer a specific practical exercise focused solely on deploying these skills (although there was an opportunity to practice them alongside other

rapport skills). If training is to have an impact on investigator behavior, sufficient time and practice must be provided for each component. A third possibility is that the lack of an effect may reflect the difficulty of coding some of these concepts (i.e., evocation, empathy), and that more could be done to better prepare coders to reliably assess these concepts.

Finally, consistent with Russano et al. (2024), there was no effect of training on the use of accusatorial tactics. Unlike previous training studies, a more deliberate effort was made during this training to address and discourage investigators' use of accusatorial tactics, yet there was still no reduction in the use of such tactics. However, this lack of an effect should be interpreted with caution given that accusatorial techniques were used with low frequency (**M** = 0.16, **SD** = 0.19). As such, any effect of training may have been masked by a lack of variability in the sample. Future assessment efforts should investigate the extent to which it is necessary to actively discourage investigators from using accusatorial tactics, as well as the most productive manner for doing so.

Conclusions

The results of this training and field evaluation project provide strong support for the effectiveness of training investigators in science-based methods of interviewing and interrogation. Moreover, the practitioner-designed course evaluated here demonstrates that the science of interrogation can be “given away” – an important step in the translation of science to practice. Training increased investigators’ use of science-based methods, and the use of those methods was related to greater cooperation, information disclosure, and admissions/confessions. As additional courses are developed by different entities or significant curricular changes are made to existing courses, it will be important to conduct additional training evaluation and field validation studies, both to ensure that interventions have the expected impact and to improve our

understanding of how best to transition research findings to the field. Finally, this study would not have been possible absent a collaboration between scientists and practitioners. Such partnerships are vital to the effective translation of science-to-practice.

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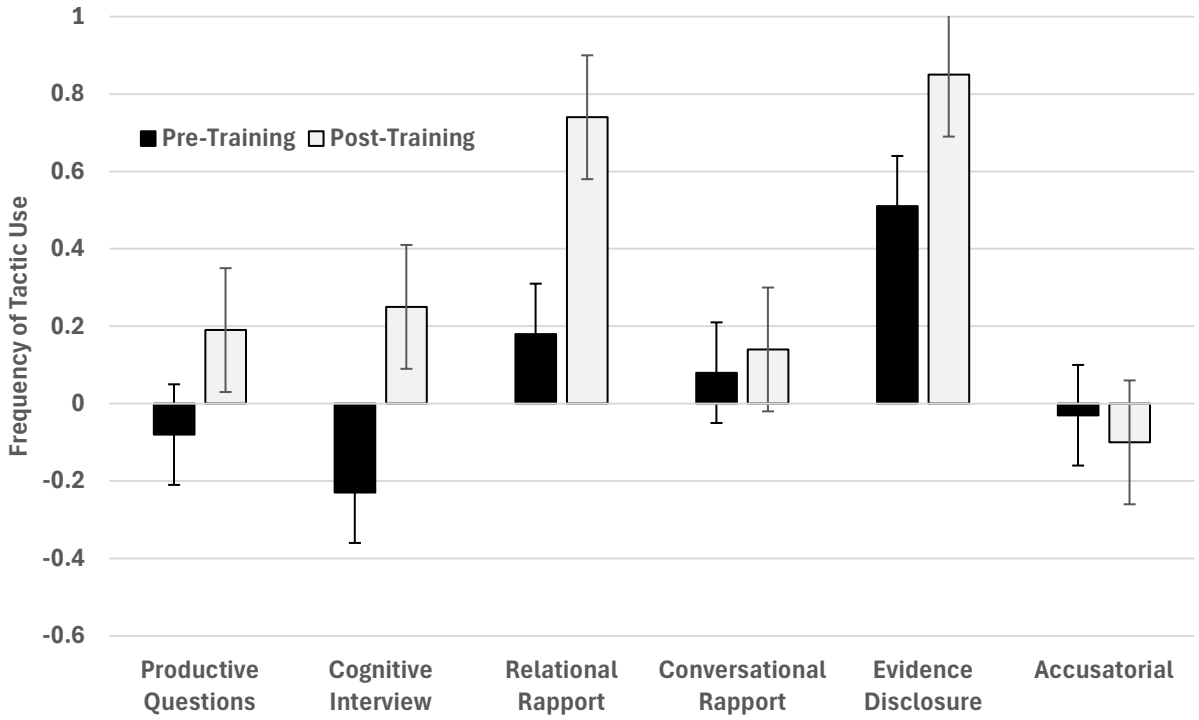
Figure 1

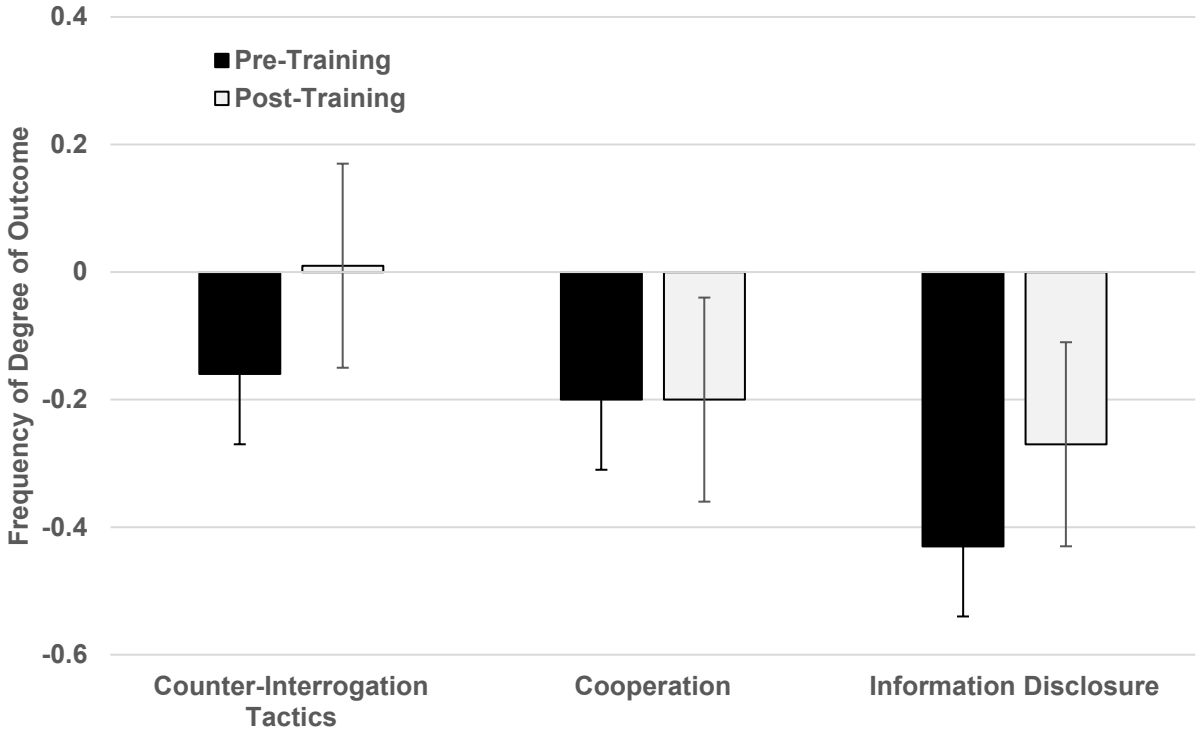
Training effects on the use of interrogation approaches.



Note: Error bars denote mean factor scores and SEs.

Figure 2

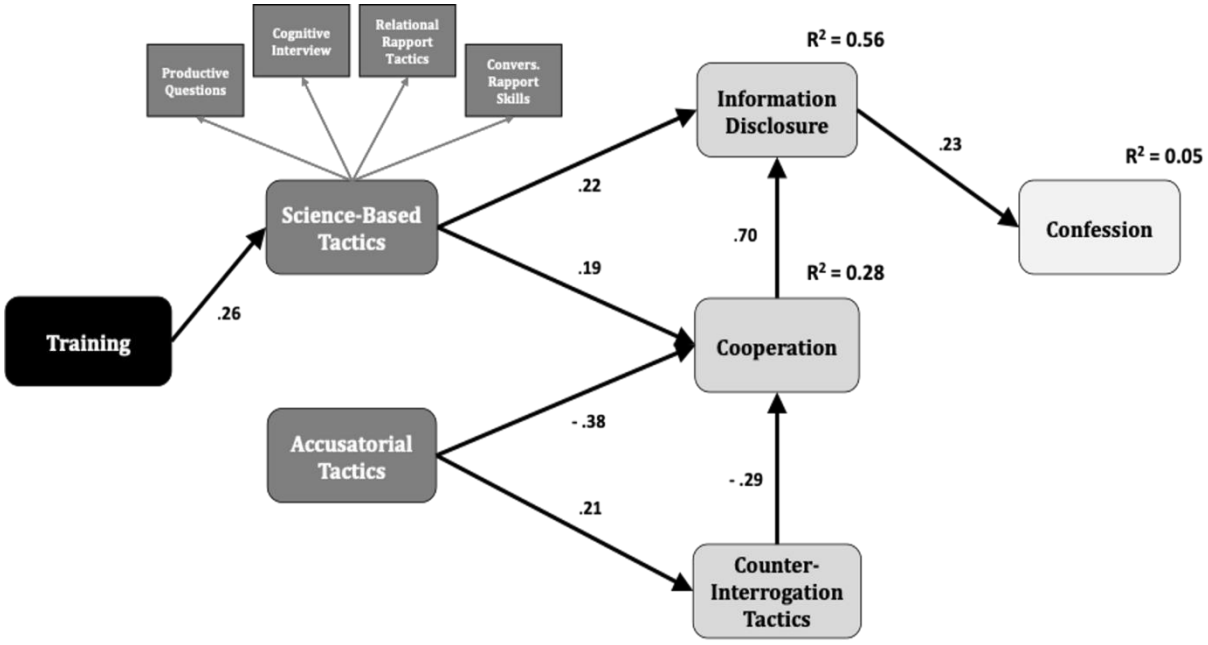
Training effects on the use of interrogation approaches on suspect behaviors.



Note: Error bars denote mean factor scores and SEs.

Figure 3

Final structural equation model assessing the influence of a science-based training course on the use of interrogation approaches and their influence on suspect behaviors (counter-interrogation tactics, cooperation, information disclosure, and admission/confession).



Note: Significant direct effects are displayed with standardized regression coefficients (*b*) and variance explained (R^2) for key outcome measures.