

Perceptions of Credibility for a Memory Report of a Single versus Repeated Event

by

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Abstract

When a person experiences an event that has multiple similar instances (i.e., a *repeated* event), memories for details that change across instances can be challenging to recall (e.g., Fivush, 1984). We expected that third parties would perceive memory reports of instances of repeated events as less credible than unique (i.e., *single*) events. Undergraduates participated in a single or repeated event, during which critical details were presented. Participants were asked to recall the session 2-days later, and memory reports were video recorded. New participants then viewed one video and evaluated the credibility of the speaker's memory report. Despite the reports being equally accurate, repeated-event reports were seen as less credible than single-event reports. Although credibility research in the context of repeated events has focused exclusively on child populations, a range of applications exists for adults (e.g., criminal and industrial eyewitnesses, asylum-seekers); we discussed our findings in these areas.

Keywords: Perceived credibility; repeated events; script theory; memory testimony

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Glossary

Continuous Deviation	An unpredictable or unexpected change/interruption in an instance of a repeated event that affects how the entire instance is experienced (e.g., <i>when at a restaurant, a server is in training; the entire experience is different compared to other times at a restaurant</i>)
Deviation	An unpredictable or unexpected change/interruption in an instance of a repeated event (e.g., <i>after being seated, you are moved to a new table at a restaurant</i>)
Discrete Deviation	An unpredictable or unexpected change/interruption in an instance of a repeated event, but that does not affect the remainder of the instance (e.g., <i>a server spills a tray of water; once the water is cleared, everything continues as usual</i>)
Event Frequency	The number of times similar instances of an event have been experienced
Fixed Details	Details that are always experienced the same way in every instance of a repeated event (e.g., <i>a menu is always provided when going to a restaurant</i>)
Instance	A single episode or experience within a repeated event (e.g., <i>going to a [Japanese, Mexican, Greek, Italian] restaurant</i>)
Linked Deviation	Where a deviation is connected to changes in the experience (e.g., <i>finding out that a server was in training during one of the times at the restaurant and this explains why the service was unusual</i>)
Repeated Event	Multiple similar or schematically linked instances that follow the same pattern (e.g., <i>the experience of "going to a restaurant"</i>)
Schema	A cognitive framework containing categories and exemplars that characterize and organize information in memory (e.g., <i>what a typical dessert looks and tastes like</i>)
Script	A type of schema, or general event representation, that describes what typically happens in a familiar and complex event (e.g., <i>an abstract idea about what it is like to go to a restaurant</i>)
Single Event	A unique experience that has only one instance
Variable Details	Details that are expected to change across instances of a repeated event (e.g., <i>the type of drink ordered at a restaurant</i>)
Variable Options	A series of different experiences that is associated with a variable detail (e.g., <i>water, juice, pop, tea, and coffee were all types of drinks ordered at a restaurant</i>)

Chapter 1.

Introduction

When attempting to understand an event that was not experienced personally, we often rely upon the verbal reports of others (e.g., eyewitness testimonies). The quality of an individual's memory, what that individual was able to perceive, their sincerity, along with how the individual communicates this information, will affect perceptions of a person's worthiness of belief (i.e., *credibility*; Black's Law Dictionary, 1910). Human imperfections (in memory, perception, sincerity, and communication) sway the degree of trust we place in another individual's verbal report, and the value assigned to that testimony (Delisle & Dufraimont, 2009). When assessing credibility, the expectation is that positive perceptions of credibility will discriminate *accurate* reports (i.e., correct information about true events) from *inaccurate* reports (i.e., incorrect or false information about events). Problems arise when perceptions of credibility are incongruent with report accuracy (e.g., statements seem credible, but are not actually accurate, and vice versa; Sweeney, 2009). When base truth is unknown, evidence of truth might come only from our own perceptions of fact; unfortunately, however, there is often a gap between perceived and objective truth (Bennett, 2015).

1.1. Evaluating Credibility

Credibility assessment is often subjective, affected by both deliberate considerations on the part of the evaluator (e.g. consistency among statements; National Judicial Institute, 2013), and unintentional or even subconscious factors (e.g., demographic variables of the person making the statement; Nagle, Brodsky, & Weeter, 2014). Typically, an individual's memory report of a past-experienced event is the basis for assessing credibility. Thus, part of the evaluation process relies on what others believe a person ought to be able to remember of their personal past. In the literature on

children's credibility, perceived honesty and perceived cognitive competence have been identified as the primary factors underlying judgments of credibility (Connolly, Price, Lavoie, & Gordon, 2008; Ross, Jurden, Lindsay, & Keeney, 2003). Behaviours of the speaker that reflect sincerity and truthfulness are used as markers of honesty, and cues that are judged to reflect an individual's ability to understand, encode, store, and retrieve a memory or knowledge of an event mark cognitive competence. Depending on the circumstances, one factor may be more salient than the other. For example, evaluating the credibility of a complainant of sexual abuse might be driven by perceived honesty, whereas evaluating the credibility of a witness to a unique and complex event might be driven by perceived cognitive competence (Bottoms & Goodman, 1994; Connolly, Coburn, & Yiu, 2015). In general, the cognitive skills required to remember details of an event may vary in different contexts, setting certain expectations for an evaluator in that situation.

1.1.1. Applications in Adult Populations

Eyewitnesses

"The soul of the civil and criminal justice systems [...] is the ability to ferret out truth from falsehood. At bottom, trials are simply an attempt to recreate past events through exhibits and witnesses' memories" (Bennett, 2015, p. 1332). Although credibility does not speak to the admissibility of evidence, perceived credibility will almost certainly determine the weight of person evidence. Triers of fact often rely on witnesses' testimony to piece together events, and when cases include competing testimonies and a lack of physical or corroborating evidence, legal cases will likely turn on credibility. In that sense, credibility can be determinant of judicial outcome. Indeed, Bennett (2015) asserted that fact disputes between witnesses are at the "epicenter of virtually every trial" (p. 1333). Moreover, it has been argued that in children, perceived credibility is as predictive of judicial outcome as actual accuracy (Castelli, Goodman, & Ghetti, 2005). Laboratory studies have shown that positive perceptions of a complainant have been associated with negative perceptions of the accused, and subsequently higher guilt ratings; conversely, negative impressions of a complainant have been associated with positive impressions of the accused, and subsequently lower guilt ratings (Connolly &

Gordon, 2011). Certainly, the legal consequences of credibility assessments are high-stakes and require that truth be reliably correlated with markers of credibility, on which we rely.

Asylum-Seekers

In 2014, there were more than 1.2 million asylum-seekers who sought international protection, globally (United Nations High Commissioner for Refugees [UNHCR], 2016). In the asylum-adjudication process, the goal is to understand the circumstances that have led individuals to flee their country of residence, to determine whether applications meet criteria for asylum status (UNHCR, 2013). Often, however, asylum-seekers lack documentary evidence of their circumstances and credibility assessment becomes the primary tool used to adjudicate applications for international protection. Without supporting documentation, the UNHCR specifies that credibility is determined by applicants' statements that are *consistent, detailed, potentially verifiable, and as complete with relevant information as possible* (2013, p. 90). Byrne (2007) estimated that up to 90% of all rejected asylum applications, worldwide, are dismissed on the grounds of adverse credibility findings. In Sweden, 38% of claims between 2009 and 2011 were denied due to claimants' lack of credibility (UNHCR, 2013). The pattern continues across the globe, in the United States (48%; Anker, 1992), Germany (75%; UNHCR, 2013), Egypt (77%; Kagan, 2003), and Canada (90%; Rousseau, 2002), where rejections were attributed to unfavorable outcomes of the credibility assessment. Although refugees' documented records are beneficial to evaluators, the UNHCR has made it clear that, in practice, apparent credibility constitutes the primary source of evidence for substantiating asylum claims (2013, p. 90).

Industrial Investigations

The Canadian Centre for Occupational Health and Safety (CCOHS, 2016) has outlined investigative strategies so that when workplace accidents occur, the cause of an accident can be identified and its recurrence prevented. Foremost, industrial investigators, similar to fact finders in civil and criminal contexts, seek to gather information that describes the sequence of events leading up to an accident (CCOHS, 2016; Kelloway, Stinson, & MacLean, 2004; Livingston, Jackson, & Priestley, 2001). But

often there are multiple challenges in obtaining physical evidence from the scene of an accident. First, investigators might not be able to attend the scene immediately following an event. Physical evidence that exists initially after an accident occurs is often vulnerable to rapid change or destruction in industrial settings (CCOHS, 2016). As a result, physical evidence is not commonly available for investigators once they arrive on scene, and the primary source of information must come from witnesses to an event (CCOHS, 2016; Kelloway et al., 2004). In the same way that legal procedures and asylum adjudications rely on individuals' memory to understand past events, each has a mutual goal to ensure that assessments of credibility reliably predict true events.

1.1.2. Credibility Assessment of Repeated Events

Wells (1995) likens human memory to physical evidence, highlighting that both are traces that can be used to reconstruct past events. Of concern, evidence that comes from memory (in the form of memory testimony) is vulnerable to error, distortion, decay, and even destruction (Kelloway et al., 2004; Wells, 1995). Assumptions about memory for past events, and understanding possible limitations of memory, are closely tied to judgments of credibility. Event frequency (i.e., the number of times a similar event is experienced) is particularly influential in how an event is remembered and how that memory is reported. For eyewitnesses in the legal context, certain offences tend to occur repeatedly rather than in isolation (e.g., domestic violence, criminal harassment, child sexual abuse). Accordingly, witnesses and complainants are likely to testify about events that have occurred as part of a series of victimizations. Likewise, it may be generalized or recurring violence that causes asylum claimants to seek international protection (UNHCR, 2016). When providing a narrative of events during the adjudication process, asylum-seekers may be recalling recurring events (UNHCR, 2013). Many occupational training regimes are similarly built on routine, with habitual practices and repetitive behaviours that develop over time (e.g., in medicine, factory work, the military; Kelloway et al., 2004). When occupational accidents occur, employees may be required to report what they saw one particular time when the accident happened, often with a host of expectations for "how things usually go." In these cases, multiple instances of similar, conceptually linked experiences are known as *repeated* events. Repeated events contrast *single* unique events that occur in isolation and outside routine. Although

research commonly involves memory for single-instance experiences, autobiographical memory (or memories of our personal past) involves largely familiar and recurring experiences (Tulving, 2001). Thus, how adults remember and recall instances of repeated events, and how credible their reports are perceived to be have important real-world applications, not only in the above contexts, but also in everyday applications.

We surveyed the literature on credibility in the context of repeated events and found that much of the extant research is grounded to some extent in script theories of memory. Script theory posits that both children's and adults' memory for recurring (i.e., repeated) events is organized according to a general event representation (Hudson & Mayhew, 2009). A cognitive framework or *schema* contains the recurring characteristics of familiar events and guides the retrieval of information from memory in a hierarchical fashion (Brewer & Nakamura, 1984; Hudson & Mayhew, 2009). Details of experiences that are encountered throughout a recurring event are incorporated into the schema, with preference to recall details in a chronological or temporal sequence (Hudson & Mayhew, 2009). Within a repeated event, some details are likely to be identical across each instance (i.e., details are *fixed*), and the general event representation includes those fixed details as part of the script. Within the same event, some details can change predictably across instances (i.e., details are *variable*), with specific details represented as a list of experienced options, or *variable options*, that are only loosely associated with a particular instance (Fivush, 1984). That is, a variable detail recalled about an instance of a repeated event will have a number of possible associated experiences, but perhaps without memory for when that specific detail was experienced (Gomes, Sheahan, Fitzgerald, Price, & Connolly, 2015). For example, an individual may recall that when at a restaurant they typically order a drink (i.e., a variable detail). But because the drink can differ (e.g., water, juice, wine, and beer were ordered on separate occasions), knowing that at a particular instance *wine* was ordered may be remembered apparently randomly. Put another way, an individual may remember *what* happened; they just may not remember *when* it happened.

Importantly, when individuals experience multiple instances of a similar nature, memory reports are likely to differ based on episodic details that are accessed as part of the script itself (as with fixed details) or as a general or typical representation with

options accessed randomly (as with variable details). Numerous other factors including event frequency, time since the last experience, and retrieval instructions will also affect the specificity of the description of an event (Abelson, 1981; Fivush, 2002; Hudson & Nelson, 1986; Schneider, Price, Roberts, & Hedrick, 2011). Albeit limited, the credibility literature suggests divergent patterns in whether reports of repeated or familiar events are seen as more versus less credible than reports of single or unfamiliar events.

Predicting High Credibility

Criterion-Based Content Analysis (CBCA) was developed from the assumption that statements derived from self-experienced events will differ qualitatively from fabricated statements (the *Undeutsch* hypothesis; Steller, 1989). Accuracy is subsequently inferred by analyzing the form, quality, and verbal content of written statements. The following general characteristics represent a truthful or credible report: *logical structure* (statements are coherent and consistent), *unstructured delivery* (statements are not in chronological order), and *detail* (statements are rich in content). Specific characteristics of credible reports include content or details that are situated in time and space: details that *integrate* the context, *behaviours of others*, unusual or *peripheral* information, *misunderstood* details, and descriptions of *mental states* (Connolly & Lavoie, 2015; Strömwall, Bengtsson, Leander, & Granhag, 2004). Studies that have used CBCA sometimes include an honesty manipulation where participants lie or tell the truth, and transcripts are evaluated using CBCA criteria. In general, events that are familiar to the speaker have scored highly using CBCA, suggesting that reports of familiar (e.g., repeated) events may be more credible than reports of unfamiliar (e.g., single) events (e.g., Blandon-Gitlin, Pezdek, Rogers, & Brodie, 2005; Pezdek et al., 2004; Strömwall et al., 2004).

Pezdek et al. (2004) interviewed children who had experienced an invasive medical procedure either once (i.e., the unfamiliar condition) or more than once (i.e., the familiar condition). Children's memory interviews for single versus familiar events were then analyzed using CBCA. CBCA scores were higher in the familiar-event condition (vs. unfamiliar-event condition), indicating that reports of familiar events were more credible than unfamiliar events. The researchers reasoned that because familiar events have more script-relevant knowledge than unfamiliar events, memory reports of familiar

events likely contain more information and have a more coherent structure compared to reports of unfamiliar events; consequently, the verbal report of a familiar event would likely receive high CBCA ratings.

Strömwall et al. (2004) invited children to a pretend doctor's visit where they experienced one or four visits over a 4-week period. Each examination involved the same sequence of events (e.g., listened to heartbeat, looked inside throat, took temperature). One week after the final examination, children were asked to describe what had happened, and their reports were analyzed using CBCA. Consistent with Pezdek et al. (2004), the researchers found that children who had experienced four visits had significantly higher CBCA ratings than children who had experienced a single visit (i.e., repeated-event reports were seen as more credible than single-event reports). Interestingly, this effect occurred when the event was actually experienced and when the event was simply imagined on one or four occasions.

Blandon-Gitlin et al. (2005) also found that reports of repeated events were more credible than reports of single events. Researchers trained children in either sewing a button to a shirt (i.e., a familiar event) or not (i.e., an unfamiliar event). Next, a series of other tasks were completed that either included the button task (i.e., a true event) or did not include the button task (i.e., a false event). All children were then asked to recall the instance of how they sewed a button to a shirt, even if they had not actually completed the task. No significant differences were found for the true- versus false-event conditions, but, overall, children who practiced the button task received significantly higher ratings than those who had not practiced; that is, familiar-event reports were more credible than unfamiliar events, regardless of whether the report described a true or false event. Because the false-event condition could not be discriminated from the true-event condition, the researchers recommended that checks on actual veracity of statements be combined with investigations of perceived credibility. The researchers noted that the effect of familiarity on CBCA ratings was largely driven by general characteristics of the CBCA profile (e.g., logical structure, detail), and cautioned that greater perceived credibility of familiar versus unfamiliar events might be due to prior knowledge about the typicality of a routine, rather than actual truth.

Predicting Low Credibility

In Strömwall et al. (2004), two competing hypotheses were provided for possible credibility outcomes. The first (supported) hypothesis predicted that a repeatedly experienced event would lead to stronger memory for the event and, subsequently, higher credibility reports compared to reports of unique events. The second (unsupported) hypothesis predicted that repeated-event reports would be less credible than single-event reports because, in line with script theory, descriptions of routines might contain fewer distinctive details than memories of unique events (e.g., Hudson & Nelson, 1986). Important to the current study, we suspect that reports of routines will contain few distinctive details when individuals experience many predictable changes across instances of a routine event. In contrast, reports that are constructed from routines where an event occurs at the same time and place with infrequent or no variation might appear to be stronger memories than memories of unique events that were experienced one time only. Indeed, when there were only minor variations in details across instances (e.g., a topic of conversation between the child and doctor), Strömwall et al. found that children's reports of repeated events were more credible than reports of unique events. Because the paradigm in Strömwall et al. (2004) contained mainly fixed details, it is unclear whether children were recalling detailed episodic instances, or simply the general event representation that contained precise details as part of the script, itself—both of which would lead to greater perceived credibility for repeated- versus single-event reports.

A number of other factors might predict that, alternatively, reports of an instance of a repeated event may be seen as less credible than reports of single or unique events. If an event is recalled with high confidence it is more likely to be believed, by both the rememberer and the evaluator. A repeated event that contains mainly fixed details is likely to be recalled with greater confidence than memory for an event that contains mainly variable details (Roberts & Powell, 2005). Consequently, in the case that a repeated event includes primarily variable details, the report may be recalled with low confidence, and may be seen as less credible than a report of a single event. The chronological and temporal nature of script memories provide another reason why, when evaluated using CBCA, the characteristics of script memory (e.g., that details are

generic, delivery is structured) may indicate low credibility for repeated events relative to single or unique events.

Consistent with these alternative explanations, other research has found that children's reports of instances of repeated events may be perceived as less credible than children's reports of single events. Connolly et al. (2008) had undergraduates and community members evaluate videotapes of children reporting the same target play session that was experienced either once or in a series of four similar, but variable, sessions. Children who experienced a single event (one play session) were consistently judged to be more honest, more cognitively competent, and overall more credible than children who experienced a repeated event (four play sessions). Notably, even repeated-event children who were as accurate as single-event children were judged as less honest, less cognitively competent, and overall less credible.

Connolly and Lavoie (2015) examined differences in CBCA scores and intuitive perceptions of credibility based on children's reports of a single, repeated, or fabricated event. In the real-play conditions, children participated in either one play session (the single-event condition) or four play sessions (the repeated-event condition) that all followed the same sequence of experiences. Critical details within the repeated event changed across sessions in predictable ways. Unlike both single- and repeated-event conditions, in the fabricated-event condition, children were coached to fabricate a report containing the same details that were experienced by the single- and repeated-event children. For example, children listened to one instrument in a single event, or a different instrument in each of the four sessions of a repeated event. In the fabricated condition, children did not listen to any instrument but were asked to create a convincing story that involved listening to an instrument. All children then described the same event. Overall, children who reported on a single event received significantly higher CBCA ratings than children who reported on a fabricated event. Reports of an instance of a repeated event, however, did not differ from either single events or fabricated events. Similarly, intuitive judgments of credibility that were evaluated without CBCA criteria revealed similar findings in that single-event reports appeared more credible than fabricated reports, but repeated-event reports could not be discriminated.

Whether children's reports of an instance of a repeated event are seen as more credible versus less credible than children's reports of a single event seems to depend on the type of event that is being recalled. When instances of a repeated event are nearly identical, children reporting on a repeated experience appear more credible than children reporting on a unique experience. But when details of the experience differ predictably between instances, children reporting on a repeated event appear less credible than children reporting on a single event.

1.1.3. Memory for a Deviation

Even when predictable changes occur in the context of a repeated event, the event can maintain its cohesive pattern. An unpredictable change or *deviation* that occurs within a repeated event, by definition, is unexpected. Some theories suggest that violating the expectancy of a script-based event results in distinctive encoding and better memory for the isolated, script-discrepant information (e.g., the *von Restorff* effect; Taylor & Fiske, 1978; Davidson, 2006). Likewise, ongoing research suggests that the experience of a deviation in a repeated event increases correct recall of details in the event. In some studies, memory for all instances has been improved when one instance contains a deviation (a general effect; Connolly, Gordon, Woiwod, & Price, *in press*). In other studies, memory has been improved for the deviation instance only (a targeted effect; Connolly & Cox, 2011; Connolly, Gordon, Chong, & Woiwod, 2016). Importantly, in most studies, memory for the deviation instance was better when a deviation was present than when a deviation was not present.

The strength of the memory improvement has also differed depending on the type of deviation that occurs. If the unpredictable change in routine affects how the rest of the event is experienced it is considered a *continuous* deviation, whereas an unpredictable change that does not affect the remainder of the event is considered a *discrete* deviation and is often a weaker effect. Research has shown that, additionally, when an individual *links* the details of a deviation to changes in the experience, this may further facilitate learning, retention, and/or rehearsal of the instance, resulting in a robust memory improvement (Connolly & Cox, 2011; Lee, Woiwod, Coburn, & Connolly, 2016). Whether or not this memory advantage affects single and repeated events equally is still

under investigation, but we suspect that a continuous and linked deviation instance might only be advantageous for repeated-event memory. Single events, unlike repeated events, cannot contain actual deviations—a deviation in the context of a single event is the entire event, itself. That is, a deviation may improve memory for a repeated event, but not a single event, with subsequent benefits in perceived credibility for reports of an instance of a repeated event.

In research on repeated events, the target instance (i.e., the instance being asked about) occurs as part of a typical routine. In practice, however, there may be instances that deviate from the routine. With the intent to facilitate and particularize memory, witnesses, complainants, and asylum-seekers who have experienced repeated events may be asked to report a time that was different from the others. If a deviation instance of a repeated event is experienced and remembered differently from the other routine instances, or if a deviation instance changes how the event is remembered as a whole (e.g., Connolly et al., *in press*), the memory report might be similarly affected. Should the quality of a memory's description be changed by a deviation, perhaps others' perceptions of the report will also differ.

1.2. Present Study

Findings of children's credibility in the context of repeated events have been mixed (e.g., Blandon-Gitlin et al., 2005; Connolly et al., 2008; Connolly & Lavoie, 2015; Pezdek et al., 2004; Strömwall et al., 2004). Moreover, perceptions of credibility for single versus repeated events have not been considered in adult contexts. In an extension of Connolly et al. (2008), the present research broadened the scope of repeated-event studies to include an adult population. The present research also investigated scenarios in which a deviation occurred in the context of a repeated event.

Due to the nature of script memory when events contain primarily variable details, instances of repeated events (compared to single events) may be more likely to be reported in a structured, script-like manner, with fewer details attributed to correct instances, less confidence, and perhaps inconsistently (e.g., Connolly et al., 2008; Connolly & Price, 2013; Hudson & Mayhew, 2009; Roberts & Powell, 2005)—a form

uncharacteristic of a credible report using either CBCA or subjective measures. When evaluations of credibility are made under real-world circumstances, often individuals will be judged on an intuitive basis without explicit criteria for what evaluators ought to attend to. In the present research, we relied upon a questionnaire that probed for various subjective perceptions concerning credibility (see Connolly et al., 2008).

We were also interested in possible explanations for differences in evaluations of credibility between single- and repeated-event reports. We first examined the perceived *confidence* of the speaker as an explanatory variable. Confidence has long been associated, to some extent, with actual and perceived accuracy (e.g., Sporer, Penrod, Read, & Cutler, 1995). Importantly, even when confidence does not predict actual accuracy, confidence may still predict the perception of accuracy (i.e., credibility). Similarly, *consistency* has been commonly used as an indicator of reliability, or proxy for accuracy (Fisher, Brewer, & Mitchell, 2009; Memon, 2012). Specifically, inconsistent statements may be believed to indicate flaws in witnesses' memory or in honesty—that at least one of the statements is inaccurate, or that an individual was being deceptive in at least one report (Fisher, Brewer, & Mitchell, 2009). Given that reports of an instance of a repeated event may be less consistent than reports of single events, perceived consistency should be particularly salient to evaluators of repeated-event reports. In the deception-detection literature, apparent *effort* exhibited by a speaker has been used as a way to discriminate truth-telling from lie-telling (Zuckerman, DePaulo, & Rosenthal, 1981). Based on the assumption that being honest is less effortful than creating and maintaining a lie, individuals who display a lot of effort when providing information may be perceived as less trustworthy than individuals who report with less effort or greater ease (Levine et al., 2011). We also considered how perceptions about how good of a *rememberer* the speaker appeared might partially explain overall credibility. In legal contexts, courts may instruct juries to consider "the quality of the witness's memory" and "how good the witness's memory seemed to be" (Bennett, 2015, p. 8). An assumption about having a "good memory" may reflect jurors' beliefs about the reliability of the testimony; consequently, an individual who appears to be skilled at remembering may seem more credible than an individual who does not appear to be a good rememberer. Last, we explored how perceived *cooperation* influences evaluations. Some police interview techniques (e.g., *Behavior Analysis Interview*; Inbau, Reid, Buckley, & Jayne,

2011) rest on the assumption that an innocent suspect (vs. a guilty suspect) may expect to be cleared of suspicion, and is, therefore, more willing to assist investigators (e.g., Hartwig, Granhag, Strömwall, & Kronqvist, 2006; Kassin & Norwick, 2004). Likewise, coworkers may perceive cooperative behaviours among colleagues as evidence of trustworthiness (vs. deceitfulness; Grover, 1997). In this way, we considered that apparent helpfulness or cooperativeness of the speaker might explain differences in credibility.

There are memory differences between experiences of single and repeated events; moreover, memory differences affect what an individual reports. To the extent that other individuals, as evaluators, are sensitive to particular qualities in memory reports, these qualities may be interpreted as signs of credibility. The primary objective of this research was to explore how perceived credibility differed between reports of single events and instances of repeated events: Are there differences in credibility for adults who have experienced a target instance once versus as part of a routine? In addition, we investigated whether the type of deviation in the context of a repeated event would affect perceived credibility by making the reported instance more memorable. The underlying proposition in this research was that whether an individual is seen as more versus less credible may be contingent, at least in part, upon the number of times an event is experienced.

1.2.1. Predictions

Hypothesis 1. We adapted the paradigm from Connolly et al. (2008) whereby critical details varied in predictable ways across instances of a reported event. Accordingly, we expected to replicate Connolly et al. and find that individuals reporting on an instance of a repeated event would be seen as less honest, less cognitively competent, and overall less credible than individuals reporting on a single event.

Hypothesis 2. To the extent that a continuous deviation makes a target instance more memorable compared to a discrete deviation, we expected that memory reports of an instance that contained a continuous deviation would be seen as more credible than memory reports of an instance that contained a discrete deviation. Because a deviation

can only be an unpredictable change when it is in the context of a repeated event, we expected to observe this effect in an interaction, such that the increase in credibility in the continuous-deviation condition (vs. discrete deviation) would occur for repeated-event participants but not for single-event participants.

Hypothesis 3. Finally, we predicted that five factors would mediate the relationship between event frequency and perceived credibility: perceived confidence, consistency, effort, remembering, and cooperation of the speaker. The exploratory nature of these items precluded specific hypotheses about the relative contributions of each predictor; however, based on assumptions outlined in the literature, we expected that single-event speakers would be perceived as more confident, more consistent, less effortful, better rememberers, and more cooperative than repeated-event speakers. In turn, we expected that each of these qualities would help explain why perceived credibility would be greater for single-event speakers than repeated-event speakers.

Chapter 2.

Method

Stimuli were gathered using methodology akin to Connolly et al. (2008), and Leippe, Manion, and Romanczyk (1992). Specifically, memory reports of single and repeated events were obtained from a first study that used a modified Wells paradigm (Wells, Lindsay, & Ferguson, 1979), and credibility was evaluated in a second experiment.

2.1. Study 1: Food Study

2.1.1. Participants

Undergraduate students were recruited for a two-part study using the research participation system at Simon Fraser University. In total, 124 students participated in exchange for course credit. Students with food allergies or sensitivities were not eligible to participate. Participants were tested in groups of up to 12 for the food-tasting session, and were interviewed individually at follow-up.

2.1.2. Design

The purpose of the Food Study was to evaluate participants' memory for critical details of a single event or an instance of a repeated event. A 2 (event: single vs. repeat) \times 2 (deviation: discrete vs. continuous) between-groups design was used. Most of the repeat-event data (78%) was collected in advance of gathering data for the single-event condition, precluding random assignment between groups. However, all participants were randomly assigned to discrete- or continuous-deviation conditions within their respective event groups.

2.1.3. Procedure

Food-Tasting Session

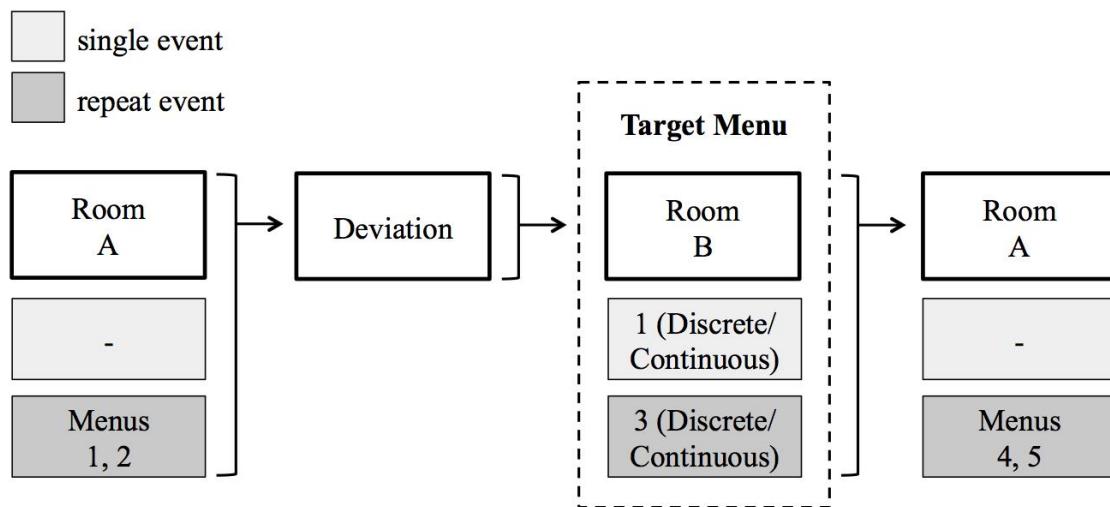
The food-tasting procedure is outlined in Figure 2.1, below. Participants were assigned to either a single or a repeated food session. Participants in the single-event condition tasted only the target food menu during the session. Conversely, participants in the repeat-event condition tasted a total of five different food menus in the session, with the target menu always occurring in the third serial position. Each food-tasting menu contained 11 variable details (e.g., the *vegetable* course) that each had five variable options (e.g., *broccoli, carrot, cauliflower, celery, cucumber*; Appendix A). Participants were presented with one option for each detail in each menu, which served as the critical details for the session. To encourage participants in the repeat-event condition to view each menu as a separate instance of the repeated event, each instance was identified with a different poster and title (e.g., the *Yoda* menu), and separated by a 3-minute filler task (a word search) that was completed following each food-tasting menu.

Participants first arrived in Room A at the beginning of the session. The principal investigator collected consent and informed participants that they would be participating in a food-tasting menu. The principal investigator then left, and Research Assistant A entered to conduct the tasting. For participants in the repeat-event condition, the first two menus were conducted in Room A. Immediately after the research assistant began the target tasting session (the third menu for repeat-event participants and the only menu for single-event participants), the principal investigator interrupted the session and announced that there was a room change requiring participants to move to another testing room with Research Assistant B (i.e., the deviation for repeat-event participants). Research Assistant B conducted the target food tasting in Room B as either a discrete or a continuous deviation. Half of the participants experienced a discrete deviation whereby, following the room change, the target food tasting continued as usual with each critical detail announced to participants (e.g., “*We will be listening to classical music*”). For the other half of participants, a continuous deviation occurred whereby the research assistant fumbled throughout the tasting session (e.g., dropped the poster while putting it on display; left the session to carry the juice over after forgetting it in the original room). Given that participants in the single-event condition experienced the

deviation as the event itself, only for participants in the repeat-event condition was the deviation an actual deviation from routine.

Following the target food tasting, the principal investigator returned and announced that participants could return to Room A where they completed the remainder of the study with Research Assistant A. For participants in the repeat-event condition, they completed two more food-tasting menus. For participants in the single-event condition, this was the end of the first session of the experiment. The principal investigator debriefed participants and provided post-event information to the group. Here, all participants were told that Research Assistant B was on lab probation and that there had been reports of unprofessional and inappropriate conduct during the food-tasting sessions. The purpose of the post-event information was to link the deviation to the experience of the target tasting menu.

Figure 2.1. Food-tasting procedure for single-event groups (target menu only) and repeat-event groups (menus 1–5), including discrete- and continuous-deviation conditions.



Interview Session

Two-days following the food tasting, participants returned for individual interviews. Interviews were audio and video recorded with consent. During the interview, participants were asked cued-recall questions on the critical details for all food tasting menus (e.g., *what was the vegetable course during the Hello Kitty tasting menu?*), with

the order of the menus counterbalanced. In free recall, participants were asked for all details they could remember about the Yoda menu (i.e., the target menu). After free recall, the interviewer asked manipulation-check questions and fully debriefed participants. Recall questions can be found in Appendix B.

2.1.4. Video Selection

In total, 124 participants completed the Food Study ($n = 70$ and $n = 54$ in the single- and repeat-event conditions, respectively). Forty-eight participants in the single-event group and 36 participants in the repeat-event group consented to have their interviews video recorded and used in future research. Of participants who consented, 28 from the single-event condition and 7 from the repeat-event condition failed the check on whether they remembered that the research assistant was on lab probation (i.e., they did not demonstrate an understanding that the probation information could explain the fumbling in the continuous-deviation instance). These participants were then excluded from selection.

Accuracy was calculated as a proportion based on cued-recall responses for the target instance [(number correct in target instance + number experienced in non-target instances) / total possible correct]. Because participants in the single-event condition only experienced the target instance, non-target responses did not contribute to the numerator when determining accuracy of single-event groups. Only participants who reached 60% accuracy were considered. In the single-event condition, all 20 participants remained ($n = 9$ and $n = 11$ in the discrete- and continuous-deviation conditions, respectively). In the repeat-event condition, 18 participants remained ($n = 10$ and $n = 8$ in the discrete- and continuous-deviation conditions, respectively).

Seven videos were selected from each of the four conditions that had been matched on an overall accuracy score for each group. Where possible, videos were selected so that the gender ratios were similar in each group; there were two male speakers in all groups, except for the discrete condition of the single event, which had three males. Otherwise, if a video did not change the overall accuracy of the group, random selection was used.

Overall accuracy ranged from 78–86%. A 2 (event: single vs. repeat) \times 2 (deviation: discrete vs. continuous) ANOVA was conducted and confirmed that the groups did not statistically differ from one another in terms of accuracy. There was no main effect of event, $F(1, 24) = 1.35, p = .257$, or deviation, $F(1, 24) = 1.35, p = .257$, and the interaction was not significant, $F(1, 24) = 1.35, p = .257$. Mean accuracy levels for each group can be found in Table 2.1.

Table 2.1. Mean Proportion Correct (SD) of Cued-Recall Responses

	Single event		Repeat event	
	Discrete	Continuous	Discrete	Continuous
Overall correct	.86 (.09)	.86 (.09)	.86 (.09)	.78 (.09)
Target instance	.86 (.09)	.86 (.09)	.34 (.07)	.32 (.25)
Non-target instances ^a	--	--	.52 (.09)	.45 (.22)

^aNon-target instances (repeat event only) included responses that were experienced in other menus in the session, but were not from the target menu.

2.2. Study 2: Credibility Study

2.2.1. Participants

Undergraduates from Simon Fraser University were recruited using the research participation system. In total, 405 students participated in exchange for course credit, and completed the study in groups of up to 10 per session. Students were restricted from participation if they had previously completed a Food Study. The mean age of participants was 19.41 years ($SD = 2.00$ years), 77% were female, and 94% had identified English as a first language or that they had been speaking English for at least 10 years. Forty-three percent of participants identified as East Asian, 25% as Caucasian, 14% as South Asian, and 18% as another ethnicity, mixed-racial group, or did not identify

2.2.2. Design

Twenty-eight videos were selected from the Food Study ($n = 7$ per group). Each video showed a speaker recalling details about the same target food-tasting experience

in response to cued- and free-recall questions. Participants were randomly assigned to evaluate one video, shown on a 58-inch television screen. Between 14 and 15 raters evaluated each video, totalling between 99 and 103 ratings per condition.

2.2.3. Materials

Primary Dependent Measure

A credibility questionnaire from Connolly et al. (2008; Appendix C) was the primary tool used to assess perceptions of credibility. Speakers were evaluated using 13 items along a 6-point scale, ranging from 1 (*not at all*) to 6 (*very*), with higher scores indicating greater credibility¹. Item 7 (suggestibility) was not applicable to the current study and was removed from analyses. Items 8 (consistency) and 10 (confidence) were used as mediators and did not contribute to the final credibility scores. Consistent with Connolly et al. (2008), items from the questionnaire were grouped onto three dimensions, labeled: *perceived honesty* (honesty; truthfulness; fabrication), *perceived cognitive competence* (intelligence; accuracy; understanding; correct items), and *overall credibility* (believability; likeability; credibility). Each dimension served as a dependent variable in subsequent analyses.

Exploratory and Ancillary Measures

In an open-ended question, participants were asked to identify the most important factor they had considered in determining credibility. In addition, five items were used to explore explanations for credibility ratings. Two items were taken from the credibility questionnaire (perceived confidence and perceived consistency) and three exploratory questions were asked about the speaker in the video: perceived effort exhibited by the speaker, how good of a rememberer they thought the speaker was, and how cooperative the speaker appeared. A final item asked raters to evaluate the speaker's attractiveness. This measure was included to control for potentially extraneous influences on perceived credibility. Measures are included in Appendix D.

¹ Item 11 (fabrication) was reverse-coded. Item 9 (correct answers) was recoded into 6 groups for credibility analyses, and kept in its original form for mediation analyses.

Chapter 3.

Results

We screened for outliers and removed two responses from the *honesty* item in the credibility questionnaire that were more than three standard deviations from the mean. All other data points remained. Participant evaluations ($N = 405$) were averaged across each video in a nested design, such that each video ($N = 28$) had one mean rating for each item (10 credibility questionnaire items, 5 explanatory items, 1 covariate). The nested dataset was used for all primary analyses.

Groups did not differ on perceived attractiveness. The main effects of event frequency, $F(1, 24) = 0.83, p = .372$, and deviation, $F(1, 24) = 1.11, p = .301$, were not significant, nor was the interaction, $F(1, 24) = 0.26, p = .613$. Therefore, attractiveness was not included as a covariate in analyses.

3.1. Hypotheses 1 & 2

3.1.1. Credibility

For each video, scores on the credibility questionnaire were averaged across items within their respective dimensions (honesty, cognitive competence, overall credibility) and a mean score for each dimension was computed (see Connolly et al., 2008 for a similar strategy). A 2 (event: single vs. repeat) \times 2 (deviation: discrete vs. continuous) between-subjects ANOVA was conducted on each credibility dimension. A 95% confidence interval (CI) represents the mean difference for main effects. Mean ratings are presented in Table 3.1.

The main effect of event frequency on perceptions of honesty approached but did not reach statistical significance, $F(1, 24) = 4.01, p = .057$, 95% CI [-0.01, 0.47], $\eta^2 = .14$. Mean honesty evaluations were numerically higher for single-event speakers than repeat-event speakers. There was no statistically significant effect of the deviation, $F(1, 24) = 0.14, p = .716$, 95% CI [-0.20, 0.20], $\eta^2 < .01$, and no interaction, $F(1, 24) = 0.39, p = .538, \eta^2 = .01$.

There was a significant main effect of event frequency on perceptions of cognitive competence, $F(1, 24) = 32.24, p < .001$, 95% CI [0.52, 1.12], $\eta^2 = .57$, where, overall, single-event speakers were seen as more cognitively competent than repeat-event speakers. The main effect of deviation was not significant, $F(1, 24) = 0.07, p = .796$, 95% CI [-0.33, 0.26], $\eta^2 < .01$, nor was the interaction, $F(1, 24) = 0.09, p = .762, \eta^2 < .01$.

Last, there was a significant main effect of event frequency on perceptions of overall credibility, $F(1, 24) = 28.78, p < .001$, 95% CI [0.50, 1.12], $\eta^2 = .53$. Overall, single-event speakers were seen as more credible than repeat-event speakers. The main effect of deviation was not significant, $F(1, 24) = 0.71, p = .409$, 95% CI [-0.18, 0.44], $\eta^2 = .01$, nor was the interaction, $F(1, 24) = 0.66, p = .425, \eta^2 = .01$.

Table 3.1. Mean (SD) Ratings for Each Credibility Dimension

Dimension	Single event			Repeat event		
	Discrete	Continuous	Overall	Discrete	Continuous	Overall
Honesty	4.84 (0.29)	4.87 (0.16)	4.86 (0.22)	4.68 (0.41)	4.57 (0.31)	4.63 (0.35)
Cog. Comp.	4.33 (0.26)	4.41 (0.40)	4.37 (0.33)	3.55 (0.54)	3.55 (0.24)	3.55 (0.40)
Credibility	4.27 (0.30)	4.26 (0.40)	4.27 (0.34)	3.58 (0.52)	3.33 (0.34)	3.46 (0.44)

Note. Ratings were made on a 6-point scale (1 = low, 6 = high). Means for the main effects of event frequency are bolded.

3.2. Hypothesis 3

3.2.1. Mediation Analyses

To determine the associations among all potential explanatory items prior to mediation analyses, correlation analyses were conducted for each variable of interest. *Remembering* was highly associated with multiple variables, indicating that it was measuring non-unique or redundant variance. Following Kline's (2005) recommendation to remove a collinear variable from a model where $r > .80$, remembering was removed as a mediator in the subsequent analyses. The correlation matrix is presented in Table 3.2.

Table 3.2. Zero-Order Correlations between the Independent Variable (Event Frequency), Dependent Variable (Total Credibility), and Mediators (Confidence, Consistency, Effort, Remembering, Cooperation)

	1	2	3	4	5	6	7
1. Event frequency	–						
2. Total credibility	-.73**	–					
3. Confidence	-.69**	.88**	–				
4. Consistency	-.65**	.82**	.70**	–			
5. Effort	-.55**	.56**	.44*	.22	–		
6. Remembering	-.78**	.92**	.90**	.79**	.46*	–	
7. Cooperation	-.64**	.85**	.65**	.65**	.69**	.78**	–

Note. * $p < .05$. ** $p < .01$.

Mediation analyses were conducted to examine the extent that the relationship between event frequency (i.e., reporting a single event vs. an instance of a repeated event) and credibility was mediated by perceived confidence, consistency, effort, and cooperation of the speaker. The independent variable (event frequency) was dummy coded as single event (1) and repeated event (2). The dependent variable (credibility) was computed as a single total score that was the sum of 10 items from the credibility questionnaire. The permissible range of the credibility score was from 9 to 56 (9 items with anchors 1–6; 1 item with anchors 0–11), with higher scores indicating greater credibility. In accordance with the mediation procedure outlined by Baron and Kenny (1986) and Preacher and Hayes (2004), the following assumptions were met: (a) the

independent variable significantly predicted the dependent variable; (b) the independent variable significantly predicted each mediator; and (c) mediators (confidence, consistency, and cooperation) significantly predicted the dependent variable after controlling for the effects of the independent variable. Because the relationship between perceived effort and credibility was not significant beyond the effects of event frequency, perceived effort was not considered a mediator and will not be discussed further.

The indirect effects of event frequency on credibility were analyzed using mediation models that regressed the dependent variable on each mediator individually, resulting in three separate models (Figure 3.1). Partial or complete mediation was inferred by the change in the unstandardized beta coefficient (b) for the independent variable in a regression model that included both the independent variable and mediator as predictors (vs. a model with only the independent variable predicting the dependent variable). A bias-corrected bootstrap 95% confidence interval (CI) using 5000 samples was then used to test significance of the indirect effect of event frequency on credibility, via each mediator (see Hayes & Scharkow, 2013; Preacher & Hayes, 2004; Preacher & Hayes, 2008).

Total Effect

The total effect of event frequency on perceived credibility explained 51% of the variance in the model (adjusted R^2), $F(1, 26) = 29.42, p < .001$. Specifically, repeat-event speakers were associated with less perceived credibility than single-event speakers, $b = -7.15, t(26) = 5.42, p < .001$.

Confidence

Including perceived confidence in the model explained 79% of the variance, $\Delta R^2 = .28, F(1, 25) = 36.18, p < .001$. When controlling for confidence, the relationship between event frequency and credibility decreased ($b = -7.15, SE = 1.32$ vs. $b = -2.22, SE = 1.19$), and event frequency no longer predicted credibility, $t(25) = 1.87, p = .073$. This suggested that perceived confidence fully mediated the relationship between event frequency and credibility, $b = -4.93, 95\% \text{ CI } [-8.37, -2.78], \kappa^2 = .55$.

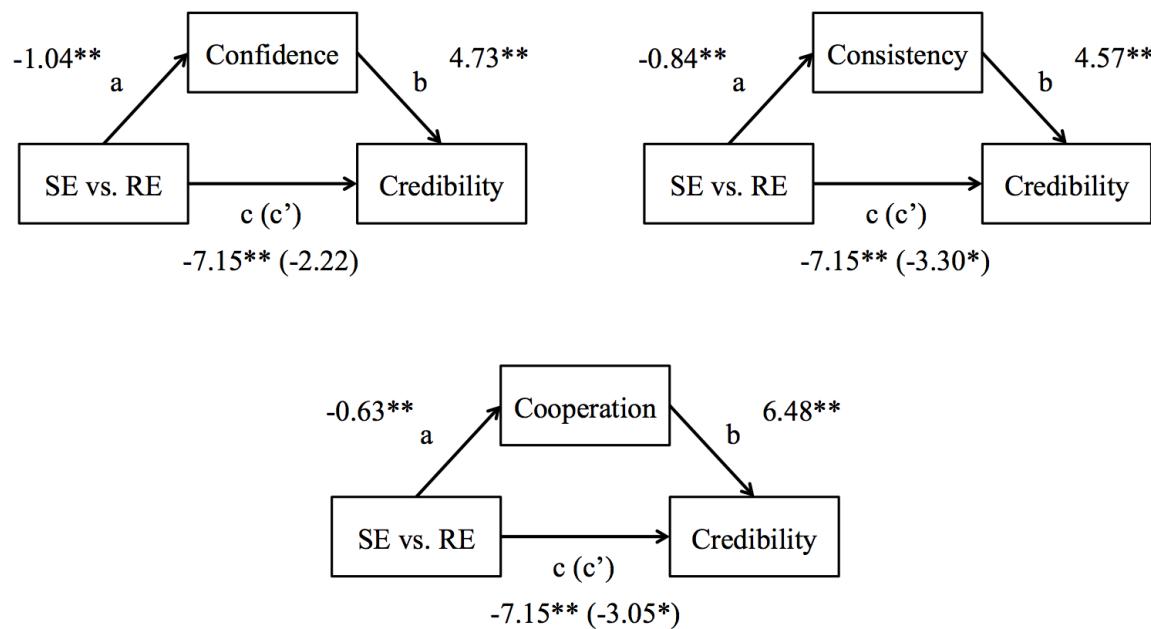
Consistency

When consistency was included in the model, the independent variable and mediator explained 72% of the total variance, $\Delta R^2 = .21$, $F(1, 25) = 20.88$, $p < .001$. The relationship between event frequency and credibility decreased after controlling for consistency ($b = -7.15$, $SE = 1.32$ vs. $b = -3.30$, $SE = 1.30$), but was still significant, $t(25) = 2.53$, $p = .018$. This indicated that perceived consistency partially mediated the relationship between event frequency and credibility, $b = -3.85$, 95% CI [-7.08, -1.94], $\kappa^2 = .44$.

Cooperation

The last model included perceived cooperation as a mediator and resulted in 76% variance explained, $\Delta R^2 = .25$, $F(1, 25) = 28.41$, $p < .001$. The relationship between event frequency and credibility decreased after controlling for perceived cooperation ($b = -7.15$, $SE = 1.32$ vs. $b = -3.05$, $SE = 1.20$). However, the relationship remained statistically significant, $t(25) = 2.54$, $p = .018$, suggesting that perceived cooperation of the speaker partially mediated the effect of event frequency on credibility, $b = -4.10$, 95% CI [-7.40, -1.98], $\kappa^2 = .48$.

Figure 3.1. Indirect effects of event frequency (single event [SE] or repeat event [RE]) on perceptions of credibility via each mediator.



Note. Unstandardized beta coefficients are reported for a-, b-, c-, and c'-pathways, where b controls for the effect of event frequency, and c' is the effect of event frequency on credibility when the mediator is controlled. * $p < .05$. ** $p < .01$.

3.2.2. Reasons for Credibility

A preliminary set of categories was adapted from Connolly et al. (2015) that described the most important factors evaluators considered in their credibility judgments. The principal investigator and a research assistant developed additional categories from the extant literature, and definitions for coding were agreed upon through discussion. In total, 12 categories were used to code 405 reasons for credibility: *admissions to memory flaws*, *confidence*, *consistency*, *cooperation*, *demeanor*, *detail*, *effort*, *honesty*, *memory/cognitive ability*, *motive to fabricate*, *speech pattern*, and *other* (including no response or not captured in another category). Figure 3.2 depicts the cumulative percentages of each category, and Table 3.3 describes the three most frequent categories used by evaluators. Two independent raters each coded all 405 responses using the 12 categories, and discrepancies were discussed until a final category was agreed upon. Cohen's kappa (κ) was used as a measure of inter-rater agreement ($\kappa = .96$, $p < .001$).

Nearly 75% of all evaluators identified the speaker's speech pattern, demeanor, or confidence as the most important factor in their credibility decision. No other factor captured more than 7% of responses; therefore, analyses were conducted using the top three categories only. To determine whether responses were associated with event frequency, reasons for credibility were examined separately for single-event reports and repeat-event reports. No differences emerged, $\chi^2(2, N = 301) = 2.20, p = .334$; that is, evaluators considered speech pattern, demeanor, and confidence equally often, regardless of whether a speaker had reported on a single or a repeated event.

Figure 3.2. Cumulative percentages for each category coded as a reason for credibility.

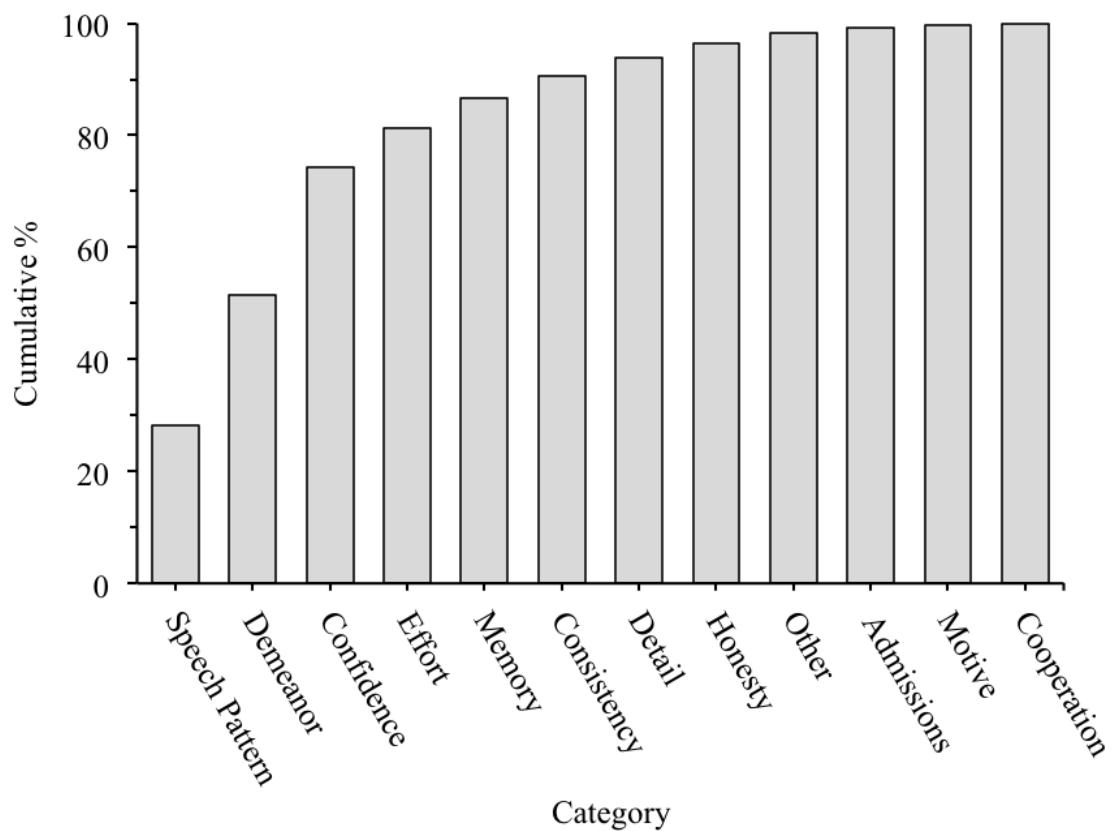


Table 3.3. Proportion of Responses in the Three Most Frequent Categories

	Overall	Single	Repeat	Examples
Speech pattern	.28	.32	.25	"Amount of time it took to answer"
Demeanor	.23	.22	.25	"Defensive/aloof posture"
Confidence	.23	.22	.23	"Responses had a high degree of uncertainty"

Note. Proportions of responses for all reports (overall) are bolded.

To investigate the possibility that perceived credibility differed depending on the factor that evaluators focused on, three one-way ANOVAs were conducted using category code as the independent variable and ratings for each dimension of credibility as the dependent variables (Table 3.4). There were significant differences between groups on all dimensions, including perceived honesty, $F(2, 298) = 13.64, p < .001, \eta^2 = .08$, perceived cognitive competence, $F(2, 298) = 5.85, p = .003, \eta^2 = .04$, and overall credibility, $F(2, 298) = 3.45, p = .033, \eta^2 = .02$. Multiple comparisons between categories were conducted using Tukey's follow-up tests. Compared to evaluators who focused on the speaker's demeanor, evaluators who focused on speech pattern rated the honesty ($p < .001$) and cognitive competence ($p = .003$) of the speaker as significantly higher. Ratings of overall credibility, however, did not differ between demeanor and speech pattern ($p = .101$). Evaluators who focused on the speaker's confidence consistently rated the honesty ($p < .001$), cognitive competence ($p = .031$), and overall credibility ($p = .038$) of the speaker as significantly higher than evaluators who focused on demeanor. There were no significant differences in ratings between evaluators who identified speech pattern versus confidence as the most important factor in perceived honesty ($p = .861$), perceived cognitive competence ($p = .821$), and overall credibility ($p = .856$).

Table 3.4. Mean (SD) Ratings for the Three Most Frequent Reasons for Credibility

	Honesty	Cognitive competence	Overall credibility
Speech pattern	4.84 (0.88)	4.09 (0.79)	3.99 (0.98)
Demeanor	4.33 (0.93)	3.72 (0.86)	3.71 (1.01)
Confidence	4.90 (0.79)	4.02 (0.85)	4.06 (0.93)

Note. Ratings were made on a 6-point scale (1 = low, 6 = high).

Chapter 4.

Discussion

4.1. Summary of Findings

Undergraduate students experienced one or five similar food-tasting instances. During the target instance an interruption occurred, participants moved to a different room, and the research assistant was replaced. Then, the new research assistant either continued the food session as usual (a discrete deviation), or fumbled throughout the session (a continuous deviation). Students were later asked to recall details of the same target instance and their memory reports were video recorded. When other undergraduates evaluated the credibility of the memory reports, differences emerged even though the reports were equally accurate. We replicated Connolly et al. (2008) and found that event frequency affected perceptions of credibility in the predicted direction: Speakers who reported on an instance of a repeated event were seen as less honest, less cognitively competent, and overall less credible than speakers who reported on a single event. In addition, repeat-event speakers were perceived as less confident, less consistent, less effortful, worse remembers, and less cooperative than single-event speakers. Results from the mediation analyses demonstrated that perceived confidence, consistency, and cooperation of the speaker explained large proportions of the demonstrated differences in credibility between single- and repeat-event speakers ($\kappa^2 = .55, .44$, and $.48$, respectively). Not only did perceived confidence fully mediate the effect of event frequency on credibility, but exploratory analyses also suggested that evaluators *thought* confidence was an important determinant of credibility. Other explorations into the metacognitive judgments made by evaluators showed that when asked to provide a reason for their judgments, evaluators indicated that the speaker's speech pattern and demeanor were similarly important in determining credibility. These reasons did not differ for single- and repeat-event reports, but for evaluators who

focused on demeanor, credibility ratings were generally lower than when confidence or speech pattern was identified as most important. To investigate the possibility that most comments identifying speech pattern, demeanor, and confidence as the reasons for credibility came from only a small subsection of videos, we visually examined the distribution of reasons across each video. Each category of reasons was distributed approximately evenly across all 28 videos. Every video accounted for 1–7% of the reasons provided in each category, suggesting that there were no videos biasing the results.

In contrast to our predictions, speakers who reported on a repeated event that contained a continuous deviation were not perceived as more credible relative to their discrete-deviation counterparts. In addition, perceived effort of the speaker acted in the opposite direction than predicted, and it did not mediate the effect of event frequency on perceptions of credibility. First, we consider the pattern of results from the present study in light of the mixed findings in the extant literature on perceptions of credibility for repeated events. Next, we offer possible explanations for our unexpected and nonsignificant results.

4.1.1. Contrasting Credibility Outcomes

Whether reports of an instance of a repeated event are seen as more credible or less credible than reports of single events has been mixed. Repeat-event reports have scored higher (i.e., more credible) than single-event reports using CBCA, but only when the details of each instance of the event were experienced in the same way across most experiences (details were mainly fixed; e.g., Blandon-Gitlin et al., 2005; Pezdek et al., 2004; Strömwall et al., 2004). Conversely, other research has shown that reports of an instance of a repeated event may be less credible than reports of a single event when the repeated events contain critical details that change between instances (details were mainly variable; e.g., Connolly et al., 2008; present study). When repeated events contain details that change predictably across experiences, research has also shown that repeated events might not be discriminable from fabricated events (e.g., Connolly & Lavoie, 2015). Connolly and Lavoie (2015) proposed that repeated events that contain primarily fixed details help learners to construct consistent, coherent, and specific

reports of repeated events; but, when details are primarily variable, the general event representation is more complex and the subsequent report may be inconsistent, incoherent, or general (2015, p. 9). Specifically, Connolly and Lavoie hypothesized that when repeated events contain fixed details, the fixed details are represented in the script itself. When the speaker accesses either the script or a specific instance, the memory report will be detailed, accurate, and seen as very credible. Conversely, variable options associated with predictable variations may be represented as a kind of *list* of experienced details that are not linked to specific instances (e.g., Fivush, 1984). Reports of instances of repeated events will contain general details from the script (the fixed details), and any specific details that come to mind (the variable options); likely, reports with many variable details will be less specific, more inconsistent, and perceived as less credible than reports of unique events or reports of repeated events that are largely fixed. Although, to our knowledge, no study has specifically tested whether the presence of fixed or variable details in repeated events leads to higher or lower credibility ratings, we suspected that this is the primary reason for the inconsistencies in the literature. That is, variable details may be more challenging to attribute to the correct instance than fixed details in a repeated event, and consequently, reports of an instance of a repeated event may be perceived as less credible overall, consistent with our findings in the present study. It may not be that previous studies necessarily conflict; there may just be a qualitative difference between contexts that lead to contrasting outcomes.

4.1.2. Unexpected Findings

Even though single-event speakers were found more credible than repeat-event speakers, single-event speakers also seemed more effortful. This is inconsistent with our prediction and with the literature that finds truth-telling to be associated with less perceivable effort than lie-telling. We offer several explanations for this unexpected finding. First, no definitions were given to evaluators regarding the meaning of “effort,” and it is possible that evaluators used effort synonymously with “trying.” To the extent that putting forth effort was interpreted as a positive quality, a speaker who was effortful may have appeared to be trying, characteristic of a *good* and *likeable* participant. Post-hoc analyses showed that effort was strongly positively correlated with likeability, $r(26) = .68$, $p < .001$, and that single-event speakers were indeed more likeable than repeat-

event speakers ($M = 4.22$, $SD = 0.32$ vs. $M = 3.68$, $SD = 0.57$, respectively), $t(26) = 3.08$, $p = .005$. Alternatively, we suspect that due to the design of the study, repeat-event speakers were more fatigued than single-event speakers during recall. Repeat-event speakers were asked cued-recall questions about five instances, sometimes with the target instance reported last. Compared to single-event speakers who only recalled one instance, it is possible that repeat-event speakers were actually putting forth less effort during recall of the target instance due to fatigue. Had cued recall for the target instance always been asked first for repeat-event speakers, or had single-event speakers been matched on recall duration, perhaps the finding would have been different. Our prediction was also based on the empirical deception-detection literature. Perhaps perceptions of effort have different influences in a deceptive context versus a repeated-event context. Evaluators in this study were not cued to expect or look for signs that the speaker may be lying, nor were speakers motivated to intentionally deceive interviewers. Future research might explore the effects of variations in perceived effort within differing contexts of the credibility assessment.

Next, we expected that a deviation that occurred within a repeated event that changed the experience of a target instance (i.e., a continuous deviation) would make the instance more memorable than a deviation that did not affect the experience of the target instance (i.e., a discrete deviation). Subsequently, we predicted that a repeat-event report of a continuous deviation would be delivered in a more believable manner compared to a report of a discrete deviation. However, no significant effects of the deviation were found. First, it is possible that there were no differences between discrete and continuous deviations in the memory reports themselves. Our hypothesis was based on the premise that a continuous deviation would cause the target instance to be more memorable compared to a discrete deviation. In terms of accuracy, analyses of the cued-recall data for the target instance showed that there were no actual differences between discrete and continuous groups in the repeat-event condition prior to video selection, $t(39) = 1.55$, $p = .130$. Because the data suggest that the instance that contained a continuous deviation was not actually more memorable than the instance that contained a discrete deviation, at least in terms of accuracy, this might explain why we did not find significant effects of the deviation on others' perceptions of memory ability. In addition, during the video-selection process, it is possible that any other

differences that existed between discrete and continuous groups may have been removed after matching videos on accuracy of the report and gender of the speaker, and reducing the sample size. Although our sample size was small, the variability in the nested design was also small; however, if the difference between a discrete and continuous deviation is a small effect size, perhaps there was not enough power to detect these differences in third parties' evaluations of credibility. We also consider the possibility that the nature of the deviation manipulation was not strong enough to impact the verbal reports in a way that other individuals were able to detect. Last, we were surprised that we did not find any significant differences between deviation groups—neither in actual accuracy nor evaluations. It is possible that there were not any true differences for evaluators to perceive, and so we consider that the deviation instance may have been a true null effect.

4.2. Limitations and Future Research

Before continuing the discussion on the practical implications of these findings, we will discuss how our study limitations influence the generalizability of this research. Foremost, participants in the present study reported on neutral events. In this way, our results may not generalize to contexts that involve emotionally- or physically-demanding experiences. Similarly, the evaluators in this context judged credibility in a low-stakes environment, and were guided by the study questionnaire to attend to certain qualities of the memory report (e.g., intellectual ability, likeability). In real-world contexts, it is likely that evaluators of credibility will be attuned to the high-stakes nature of such evaluations (e.g., criminal court cases, asylum applications), and may not be given specific criteria on which to judge credibility. With these considerations in mind, future research would benefit from investigations into adults' credibility when reporting on repeated emotional events in high-stakes circumstances.

Because credibility is tied closely to assumptions about memory, it is possible that, had evaluators known the frequency manipulation, expectations about a speaker's report may have shifted accordingly (e.g., knowing that an individual experienced and reported five instances may have influenced perceptions). To determine how evaluators' knowledge of the circumstances surrounding a reported event might affect perceived

credibility, research that includes instruction manipulations prior to making evaluations would also be beneficial. That is, when evaluators are given additional information about the event being reported, or are trained to understand how individuals remember repeated events, do perceptions of credibility differ compared to when instructions are not provided?

Next, the internal validity of the current study was limited. Random assignment did not occur between the single- versus repeat-event groups. In addition, the principal investigator was different for the single-event condition and the repeat-event condition. Efforts were made to minimize the potential influence of these factors (e.g., single and repeated conditions were run simultaneously for one semester; the principal investigator of the repeated condition trained the principal investigator of the single condition; research assistants were counterbalanced and similar across all conditions; events occurred in the same location for all conditions). In order to draw more precise comparisons and conclusions across conditions, however, full randomization is recommended for future investigations.

As noted as a possible explanation for the differences in perceived effort, participants in single- and repeat-event groups were not matched on interview duration during recall. Single-event participants recalled only one instance, whereas repeat-event participants recalled five. This affected the total duration of the interviews and resulted in unequal interview experiences. Although these procedural differences should be explored, Connolly et al. (2008) observed the same pattern of results as in the present research when participants in the repeat-event group were asked to report the target instance only.

In the present study, evaluators viewed memory reports that mirrored the interview procedure (i.e., responses to cued-recall questions were shown first, followed by responses to the free-recall portion). This sequence is not in line with proper interviewing recommendations (e.g., Geiselman et al., 1984); further, it is common in real-world applications to use free-recall narratives to assess credibility. However, we decided to show both free and cued recall because it appeared that, as cued questions were asked first, the responses in free recall were limited in quality, depth, and duration

(compared to had the free-recall portion been asked first during interview). In order to provide evaluators with a richer evaluative experience, the speakers' cued-recall responses were shown in the videotapes, recognizing that this type of questioning would be unlikely to occur in the real world. Because this procedure occurred in both single- and repeat-event interviews, it was a risk to external validity but not internal validity.

Finally, we propose that future investigations use scientifically rigorous investigations to follow up findings from our exploratory analyses. We found that evaluators' metacognitive judgments identified a small subset of factors that were commonly perceived as important determinants of credibility. Despite any mention to evaluators to attend to specific cues, nearly half of evaluators identified speech pattern and demeanor as paramount in their credibility decisions. Finding differences in credibility ratings based on the identified factor suggests that, perhaps, drawing evaluators' attention towards or away from certain cues (e.g., demeanor) may affect credibility outcomes. Future research might consider using these exploratory results to investigate experimentally how attending to different qualities of a memory report may influence a speaker's perceived credibility. We also consider that, because evaluators were asked to identify the most important factor after completing the credibility questionnaire, it is possible that the specific questions asked (e.g., *how confident was the speaker?*) had primed evaluators when deciding which factor was most important in determining credibility. Additionally, we acknowledge that there is often a gap between knowing what *actually* influenced evaluators' ratings and what evaluators *thought* influenced their ratings. Given the ubiquity of using dispositional cues such as a witness's demeanor to determine credibility, however, we think that this is an important area for researchers and legal players, alike, to continue to consider.

4.3. Implications

We demonstrated that when an adult experiences multiple schematically similar instances of an event—but where details change in predictable ways across instances—others judge those memory reports to be less believable on a variety of dimensions than when adults report on a single event. Even though repeat-event speakers were just as accurate as single-event speakers who recalled the same proportion of details that had

been experienced throughout the event, repeat-event speakers were seen as less honest, less cognitively competent, and overall less credible. Ideally, when evaluating memory reports, credibility aligns with actual accuracy; but we saw in the present research that misalignment between credibility and accuracy can occur. This can have profound practical implications. When evaluating credibility, the context of the event in question must be carefully considered. Incorrect conclusions may be drawn if valuable information is dismissed as inherently unreliable because it is delivered as a memory report of a repeated event.

In some contexts, knowing that a detail occurred at any point in a sequence of instances may be adequate to make an informed and fair decision (e.g., an experience of a claimant seeking asylum). In other contexts, a report may need to be particular; in such cases, knowing that a specific detail occurred at a specific instance is paramount (e.g., what had occurred directly prior to an industrial accident). Reconciling the limitations of event memory with the demands of evaluators who seek to understand others' experiences is a practical problem that requires balancing competing factors; for example, in the criminal justice system, one must balance the need for triers of fact to understand the experiences of a complainant versus the need for a case to be particular enough so that an accused can form a proper defence.

4.4. Conclusion

We wondered whether third-party evaluators perceived memory reports of repeated events as less credible than reports of single events. Indeed, a report of an instance of a repeated event was less believable than a report of a single event, on all dimensions, despite the reports being equally accurate. This has implications for how memory reports are interpreted in applied contexts—for example, who or what to believe in criminal court, whether or not to approve asylum requests for international protection, and understanding what occurred leading up to an industrial accident. Although adults' memory for repeated events have intrigued researchers for decades, this was a first demonstration of the effects of event frequency on judgments of credibility with an adult population. There is ample opportunity to investigate how memory for repeated events might be enhanced or hindered, and how to better ensure that, when attempting to

understand an event that was not personally experienced, evaluators or investigators make fair judgments about the credibility of a report. This study highlights that there are multiple factors that influence the perceived credibility of a memory report, beyond actual accuracy, and that reports of instances of repeated events may be particularly vulnerable to those factors. Consequently, the unusual context of repeat-event experiences must be recognized if we are to fully understand how event memory affects credibility assessment.

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Appendix A.

Counterbalancing Options

Variable Details (in Bold) and Options for Tasting Menus

		Tasting menu				
Options		1	2	3	4	5
Music		Classical	Country	Electronica	Jazz	Reggae
Fruit		Apple	Banana	Grapes	Orange	Pear
Vegetable		Broccoli	Carrot	Cauliflower	Celery	Cucumber
Chip		Barbecue	Dill Pickle	Ketchup	Salt & Vinegar	Sour Cream & Onion
Cookie		Chocolate Chip	Maple	Oatmeal Raisin	Oreo	Vanilla Wafer
Cereal		Alpha-Bits	Lucky Charms	Mini Wheats	Raisin Bran	Shreddies
Juice		Apple	Blueberry	Cranberry	Grape	Orange
Apron		Black	Grey	Red	White	Yellow
Instrument		Bells	Clapper	Recorder	Shaker	Triangle
Magazine		Decorating	Food	New Yorker	National Geographic	Science
Writing		Crayon	Pen	Pencil	Pencil Crayon	Sharpie

Appendix B.

Recall Questions

Do you remember the [Yoda] tasting session? I am now going to ask you questions about the tasting, okay? (**When participant agrees**) Before we begin, can you please describe everything you can remember about the [Yoda] poster that you saw during the session? (**If the participant accurately describes the poster**) Now when you answer all of the following questions, I want you to answer while thinking about the [Yoda] taste-testing session.

- 1) There was music playing. Can you remember what type of music was playing during the Yoda session? _____
- 2) The first course served was a fruit course. Can you remember what type of fruit was served during the Yoda session? _____
- 3) The second course served was a vegetable course. Can you remember what type of vegetable was served during the Yoda session? _____
- 4) The third course served was a potato chip course. Can you remember what type of potato chip was served during the Yoda session? _____
- 5) The fourth course served was a cookie course. Can you remember what type of cookie was served during the Yoda session? _____
- 6) The fifth and last course served was a cereal course. Can you remember what type of cereal was served during the Yoda session? _____
- 7) Juice was served. Can you remember what type of juice was served during the Yoda session? _____
- 8) The research assistant wore an apron. Can you describe the apron worn by the research assistant during the Yoda taste test? _____
- 9) The research assistant used a noise maker every time (s)he indicated that it was time for the next food course. Do you remember which noise maker the research assistant used in the Yoda session? _____
- 10) The research assistant was reading a magazine during the taste test. Do you recall the type of magazine the research assistant was reading during the Yoda session? _____
- 11) After tasting each food you rated your enjoyment of the food with a writing utensil. Can you remember what type of utensil you used during the Yoda testing session? _____

[†] 12) On a scale on 0 (which is not at all confident) to 100 (which is extremely confident) how confident are you that all the things you told me happened during the Yoda taste test? _____

Free-Recall

This is the last question I have for you today. Can you please think back to the taste test, and in your own words, tell me everything you remember about the Yoda session. Describe the Yoda session from the beginning as if I am a blind person.

Ask the participant three non-specific prompts to exhaust his/her memory for the instance.

For example: “*What else can you tell about that time?*”

“*What else do you remember doing?*”

“*Can you think of anything else that happened?*”

[†]On a scale on 0 (which is not at all confident) to 100 (which is extremely confident) how confident are you that all the things you told me happened during the Yoda taste test?

Note. [†]Confidence measures were not included in the memory reports shown to evaluators.

Appendix C.

Credibility Questionnaire

Please answer all of the following questions based on your memory of the person's report.

1. How **intelligent** do you think the individual was?^b

Not at all intelligent	1	2	3	4	5	6	Very intelligent
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2. How **honest** do you think the individual was?^a

Very dishonest	1	2	3	4	5	6	Very honest
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3. How **accurately** do you think the individual recalled the event?^a

Very inaccurately	1	2	3	4	5	6	Very accurately
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4. How **believable** was the individual?^c

Not at all believable	1	2	3	4	5	6	Very believable
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5. How well did the individual **understand** the events they described?^b

Not at all understood	1	2	3	4	5	6	Fully understood
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6. How **truthful** was the individual?^a

Not at all truthful	1	2	3	4	5	6	Very truthful
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7. How susceptible do you think the individual was to misleading or **suggestive** questions?

Not at all susceptible	1	2	3	4	5	6	Very susceptible
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8. How **consistent** was the individual?^d

Not at all consistent 1 2 3 4 5 6 Very consistent

9. The individual was asked 11 specific questions about the event. How many questions do you think the individual answered **correctly?**^b

0 1 2 3 4 5 6 7 8 9 10 11

10. How **confident** was the individual?^d

Not at all confident 1 2 3 4 5 6 Very confident

11. How likely is it that the individual **fabricated** the event?^a

Not at all likely 1 2 3 4 5 6 Very likely

12. How **likeable** was the individual?^c

Not at all likeable 1 2 3 4 5 6 Very likeable

13. Overall, how **credible** was the individual?^c

Not at all credible 1 2 3 4 5 6 Very credible

Note. ^{a, b, c} Represent items on each dimension of credibility (^aperceived honesty, ^bperceived cognitive competence, ^coverall credibility). ^d Represents a mediator.

Appendix D.

Explanatory Items

Please answer the following questions based on your perceptions of the speaker in the video.

- 1) Please identify the **most important factor** you used in determining the speaker's credibility, overall:

- 2) How much **effort** did the speaker put into recalling the event?

No effort	1	2	3	4	5	6	A lot of effort
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- 3) How good of a **rememberer** was the speaker?

Not at all good	1	2	3	4	5	6	Very good
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- 4) How **cooperative** was the speaker?

Not at all cooperative	1	2	3	4	5	6	Very cooperative
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- 5) How **attractive** was the speaker?

Unattractive	1	2	3	4	5	6	Very attractive
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