

Finding the Truth: Interview and Interrogation Training Simulations

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ABSTRACT

In order for investigators to conduct effective interviews and interrogations they must carefully interpret the verbal and non-verbal communication of their subjects. When investigators can interpret both types of communication they are said to be able to “see” the “whole picture” or the “whole truth.” The interpretation of non-verbal communication such as body language, facial expressions and gestures is called Kinesics. Studies have shown that Kinesics account for 55-93% of all communication. For instance, sometimes investigators can “see” that a subject may be lying if the subject's words and Kinesics do not agree. Studies have also shown that interpretation of Kinesics can improve with practice.

This paper will present a visual, interaction and instructional design approach employed to develop interview and interrogation Immersive Learning Simulations (ILS). We will provide examples of the use of Kinesics within the interview and interrogation simulations being developed for the United States Army Criminal Investigation Command (USACIDC) Military Police Investigators.

The paper will discuss concurrent research of body language, facial expression and Proxemics relative to the interview and interrogation process. Within the area of facial expression we will discuss brief (1/25th of a second), involuntary facial expressions called “micro expressions” and how they are portrayed to learners within the simulation. A study of the interpretation of micro expressions by Ekman and O’Sullivan has shown that only 50 out of 20,000 participants, or 0.25% of the study’s population, were able to successfully interpret these expressions with an accuracy of 80%.

ABOUT THE AUTHORS

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INTRODUCTION

This paper will present a visual, interaction and instructional design approach employed to develop interview and interrogation Immersive Learning Simulations (ILS). The goals of the simulations were to provide depiction and detection of Kinesics exhibited by subjects within an ILS in order to train learners in effective interview and interrogation techniques.

Definitions

Facial Animation Coding System (FACS). FACS is a system to taxonomize human facial expressions by providing a common standard to systematically categorize the physical expression of emotions (Ekman and Friesen, 1978).

Kinesics. Kinesics is the study of nonlinguistic bodily movements, such as gestures and facial expressions, as a systematic mode of communication (American Heritage® Dictionary eReference, 2011).

Micro expression. A micro expression is a brief, involuntary facial expression (1/25 – 1/15 of a second) shown on the face of humans according to emotions experienced (Ekman, 2001).

Proxemics. Proxemics is the study of the cultural, behavioral, and sociological aspects of spatial distances between individuals, (American Heritage® Dictionary eReference, 2011).

Needs

Two training priorities identified through review of the United States (U.S.) Army Maneuver Support Center of Excellence's (MSCoE) included:

1. Develop an immersive criminal investigator trainer for investigations of child abuse, which acts as a capability to assist in addressing child physical and sexual abuse within the DoD.

2. Develop a prototype immersive system to aid in the training of interrogation techniques with an Investigator Virtual Training System.

Two prototype systems were developed in support of these priorities. The first system was designed to enable investigators to experience a virtual interview with a victim of child abuse. This system shall be referred to as the "interview training system." The second system was designed to enable investigators to experience a virtual interrogation of a subject suspected of sexual assault. This system shall be referred to as the "interrogation training system."

In regard to interrogation, agencies today rely upon a variety of investigative techniques and tools to assist criminal investigators in identifying those persons attempting to deceive them. Skilled investigators develop deception indicators during repeated interrogations. The skills required to identify these deception indicators range from verbal communication to non-verbal cues to assist investigators in their discovery of the truth, the ultimate goal of any criminal investigation. This process is time consuming and can only be accomplished through hands-on interrogation technique application with known suspects of crimes committed. Government agencies are beginning to develop tactics, techniques, and procedures (TTPs) to assist them in identifying deception indicators, especially for suspects of serious crimes against persons.

Interview Training System Goals

The goals of the interview training system were as follows:

1. Develop a proof-of-concept simulation to train investigators to conduct interviews of child abuse victims.
2. Develop a training scenario to benefit interagency organizations for both military and civilian applications.

3. Provide a virtual interactive training module avatar system, with all necessary motion and appearance to project the behavioral indicators of abuse.
4. Enable investigators to practice interviewing child abuse victims and to receive feedback after the training has reached completion.

Interrogation Training System Goals

The goals of the interrogation training system were as follows:

1. Develop a proof-of-concept simulation to train investigators to conduct interrogation of criminals suspected of sexual assault.
2. Develop scenarios that can be manipulated to provide challenging interrogation exercises that are real and relevant to the current threat of perpetrators of serious crimes against persons.

Audience

The interview training system was designed as capstone experience where as the interrogation training system was designed in support of learners who may have no prior experience before working with ILS.

Since partaking in the interview training system is intended as a capstone experience and although some learners may already have experience conducting interviews, some of these learners do not have children and may not be familiar with the special dimension of interviewing young children who are victims of abuse.

The interrogation training system was designed to support the curriculum of the interviews and interrogations class which is taught through two different courses including the Criminal Investigations course and the Military Police Investigations (MPI) course. The audience profile for the Criminal Investigations course includes individuals with a minimum of 21 years of age and who possess either a minimum of one year of military police experience or two years of civilian police experience (sometimes this is waived). The audience profile for the MPI course includes attainment of the military rank of Specialist and a minimum of 18-19 years of age. Learners for both courses may possess little or no experience interviewing or interrogating suspects of major crimes.

A key implication of this audience upon system design was that the majority of learners would be considered Millennial learners (1982-2002) who grew up with electronic media from television to Ataris. Many studies have shown that for Millennial learners the predominant training question to answer is "how do we do it" (Coomes and DeBard, 2004). Learners in this group need to achieve, have a relatively short attention span, are used to multitasking, prefer to have a structure enforced and to tend to have high regard for objective testing. Instructional design considerations for both systems were selected in order to support the following Millennial needs as described by Svinicki (1999):

1. Provide reinforcement for activities you wish to encourage such as praise and positive feedback.
2. Emphasize internal reinforcement and motivation.
3. Set challenging yet attainable goals for learning, and provide feedback on progress.

Figure 1 is an example of the learner's view point while interviewing a suspect in the interrogation training system.



Figure 1. Example interrogation point-of-view

A key demographic aspect of both audiences is that the learners are predominantly male. One of the well known facts around video games and gaming is that men like competition and "winning." In regard to these demographics, additional instructional strategies were employed in the design of the interrogation training system to provide a separate point score in addition to the scored training aspect for passing or failing in order to provide a record of achievement. By providing the learner a score, the system would provide learners the opportunity to replay the interrogation scenario multiple times in order to improve their score, not just to pass the lesson.

KINESICS RESEARCH

A key challenge for the systems design was to identify and synthesize relevant research from the field of Kinesics and the practical Kinesics-related work experience of Criminal Justice Subject Matter Experts (SMEs) for effective implementation into systems functionality. In order to do so, we focused our research and SME consulting efforts around depiction and detection of body language, facial expression and proxemics exhibited by subjects.

Body Language

Gestures have been studied since the early Greek and Roman societies when both Cicero (106–43 BC) and Quintilian (c. 35–100 AD) considered body language as important as the other four categories of oratory. In the 1950's, anthropologists, sociolinguists, and social psychologists began scientifically studying non-verbal communication. Ray Birdwhistell defined "Kinesics" as the study of communicative body movements. Edward T. Hall, used the term "Proxemics" to describe the distance people keep between themselves when talking, the term "haptics" to describe the study of the way they touch each other during the conversation, and the currently common term of "social space" (Blakemore and Jennett, 2001).

Albert Mehrabian (1967) conducted two studies on communication patterns and proposed that communication is 55% non-verbal expression, 38% tonality and 7% words. Since then many researchers have argued against the percentages in Mehrabian's rule, but in general all agree the words are a small part of the communication equation. The current research of John Borg supports the conclusion that communication is 93% body language and paralinguistic cues (including pitch, volume and tone), and that the words only provide 7% of the communication. (Borg, 2009).

Today, individual gestures have been broken down and documented. David Efron created ideographs tracing how people use their hands. Efron's studies showed that hands are used like a conductor to illustrate or emphasize in about 8 different ways. (Hall, 1966). The way people use their hands can reflect a person's ethnic background and the rate of movement of the hands can show if a person is under stress. The changes in rate may be meaningful. For instance, fewer movements are exhibited when a person is careful about what they say – the rate of illustrators goes down.

Facial Expression

The Facial Action Coding System (FACS) is taxonomy of human facial expressions, originally developed by Ekman and Friesen in the 1970's and that is continuing to be expanded with additional empirical research. The identification of commonality among human facial expression of emotions across many cultures had begun in the 1930's, but Ekman and Friesen were the first to develop a scoring methodology for facial expressions.

The FACS taxonomy distinguishes 44 Action Units (AUs). These are the minimal units of facial activity that are anatomically separate and visually distinguishable. Scoring of an expression involves decomposing a facial movement into the particular AU that produced it, either singly or in combination with other units. In addition, FACS scoring incorporates an intensity rating for each action (Appelman and Wilson, 2005). Judy Forman of the New York Times reported, "The FBI, the Central Intelligence Agency and state and local police forces have turned to Dr. Ekman for help learning to read subtle emotional cues from the faces, voices and body language of potential assassins, terrorists and questionable visa applicants" (Forman, 2003).

The interview and interrogation training systems have been designed to apply FACS and other "hard" science to engage the learners emotionally as well as cognitively within an ILS environment.

Proxemics

Proxemics is the reactions of an individual or groups of individuals with relation to the immediate surrounding area including the animate or inanimate objects within that area. Edward Hall described four aspects of space (Figure 2.) in his seminal work, *The Hidden Dimension*, including: Intimate space, personal space, social distance and public distance (Hall, 1966).

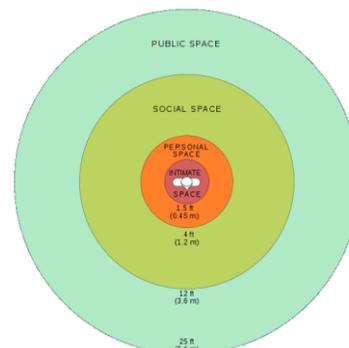


Figure 2. Hall Proxemics Diagram

An individual's personal space ("comfort zone") varies but in the U.S. it may range around 2 feet (varies in an individual side, front and back). One thing people in all cultures have in common is that if an interrogator enters the "comfort zone" the biological reaction is stress. Police officers may use this natural reaction as part of an interrogation technique. To accomplish this in the interrogation training system the simulation has been designed to enable the learner to move closer to the suspect within the virtual environment. While moving, the visual perspective moves with the learner.

DESIGN

Interview Training System Instructional Design

The interview training system design was built on three colored, parallel "event sequence paths" running through five acts including a green path, yellow path and a red path. Each path began as a separate script or story with its own, unique subject animations, subject voiceover, events and outcomes.

The green path is designed to move the learner through the optimum scenario in which the interviewer will have made all the right decisions in regard to interviewing the child subject. The yellow path is designed to move the learner into some tangles and will meet with some resistance from the subject. The red path is designed to be a halting path of strong resistance, even hostility towards the learner, from the subject. Depending on how far down the red path the learner goes (based on his/her own poor decision making) the result could be a dramatic behavioral breakdown or psychological decompensation on the part of the child subject and an abrupt end to the scenario.

In each act the three path scripts run in parallel and intersect at decision points in which the learner must synthesize and analyze information from the virtual environment in order to make a decision for how best to proceed with the in-process interview. This information may include observation of simulated subject body language, Proxemics, facial expression, verbal cues and recall of prior intelligence and confessions.

The learner may start on the green path and make a poor decision regarding a technique or line of questioning and be subjected to dropping to the yellow path as a result. The interview training system is designed to allow the learner to recover to more optimum paths in some cases by making better decisions at subsequent decision points. However, in

some cases, as described for the red path, the learner may be subject to premature termination of the interview due to reaching a terminal condition in the path. In this case, the system is designed to simulate an unrecoverable state in which the subject is unable or unwilling to proceed further with the investigation. As a specific instance, if the child has psychologically decompensated and is sobbing uncontrollably, her behavior has been designed to not be brought back abruptly to a path that does not show a continuation of that emotion (i.e., she can't go back to playing happily on the green path) without some remediating decision on the part of the learner to move to the yellow path first.

Interrogation Training System Instructional Design

The interrogation training system has been designed such that the interrogation is driven by the learner and that the learner is responsible for setting the tone and maintaining pressure on the suspect. This psychological approach requires the learner to watch for information such as verbal cues and to take note of speech quality and content. This information is then used to assess whether the simulated subject is telling the truth or being deceptive. In addition to discerning whether the simulated subject is being truthful, experts can recognize certain behaviors that indicate guilt, known as confession behaviors.

The interrogation training system scenario consists of three acts and works using the same colored path design as the interview training system. The first act was designed to enable the learner to ask questions to the suspect that supports a baseline of the subject's response tendencies. These are non-threatening questions that require memory as well as creative thinking.

Throughout the simulation the learner is tasked to look for many non-verbal signs as well as micro expressions. For instance, when the simulated suspect is remembering something, his physical behavior has been designed to move to the right. This is an outward manifestation of his brain activating the memory center. When the simulated subject is thinking about something, his eye movement has been designed to move upward or to the left, reflecting activation of the cognitive center.

Micro expressions may assist the learner in uncovering key facts about the crime through administering questions about the victim. While the questioning might be presented with a positive overtone, the learner is required to make a mental note of a strong micro

expression of contempt or disgust. In practice, the subject of an interrogation may often feel he or she has hid the truth, however micro expressions can help investigators better see the “whole picture” or “whole truth” and find effective interrogation techniques and lines of questioning for continuing the interrogation effectively. In the design of the system, how the learner adapts their choices about which questions to ask and how to ask the questions are directly related to the application of the learner’s knowledge of the suspect’s micro expressions and the baseline of the subject’s non-verbal language.

Commonalities of Instructional Design

According to a study by Appelman and Wilson (2005): simulations have different weights of six characteristics including: challenges, models, control, manipulation, authenticity, and consequences. The allocation of these characteristics to the subject systems has been designed as follows:

1. **Challenges:** Interview an abused child and reorganization of behavioral indicators of abuse; Interrogation of a subject and reorganization of Kinesic indicators of truth or deception.
2. **Models:** The interview training system scenario was modeled after a session by an experienced investigator and expert instructor. The correct answers are based on real-life experiences and consequences.
3. **Controls:** System’s graphical user interfaces (GUIs) were designed to include a number of controls that will be discussed in the next section; briefly however, in the interrogation training system an additional control was added where the learner can acquire points to increase the motivation to “win” by obtaining the most points.
4. **Manipulation:** The learner controls the interview and interrogation by asking the right question, reading the non-verbal indicators correctly and then asking the next question correctly. Depending on how poorly the learner asks the question, the consequences become more severe.
5. **Authenticity:** The interview and interrogation training systems were written from

case material, reviewed by the internal SMEs and the client for authenticity of content and interaction.

6. **Consequences:** An example of consequences is depicted within the interrogation training system. Just as a real suspect can ask for their lawyer, if the learner does not pay attention to and adapt their line of questioning to the suspects non-verbal signs, the subject avatar is designed to shut down the interview and ask for a lawyer. To the learner, the course consequences are passing or failing.

Simulation of Decision Points

Decision points are presented in three ways including initiation of dialogue with the subject; responding to subject dialogue or introspective dialogue. When a decision point has been reached the learner is presented with an on-screen menu of possible numbered responses. Each response is assigned a weighted score and is associated with a color that corresponds to the “event sequence path” (red, yellow or green) that the response is a part of. In this way all “red” responses are part of the “red” path, for example.

The learner selects their response by clicking on the desired response with a mouse. After a response has been selected the interview scenario continues to execute by producing the subsequent subject body language, Proxemics, subject facial expression and subject voice acting and verbal cues that have been authored for the selected response. The interview scenario intersects and diverges at selected decision points, as previously discussed, based upon the response selected allowing for alternate exploration and experience of the scenario paths.

In addition to linear and branching based decision making designed to provide the learner with a structured learning experience, the system also provides opportunities to ask the subjects questions in any order they desire and to mark when they believe a micro expression has occurred. These interactions were designed to provide the learner with an environment in which they feel they are in control of the interview. Recursive paths have been incorporated into the design to allow learners to revisit areas they may be struggling with. Several different event sequence paths and associated decision points are illustrated in Figure 3.

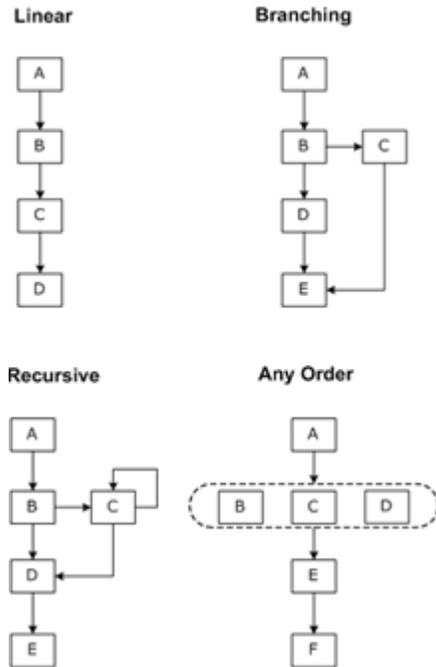


Figure 3 Example Event Sequence Paths

As in real-life, decisions are often made with imperfect information which is a result of the practical limits of time and resources available to make a fully-informed decision. The interview and interrogation scenario decision points work similarly such that the learner has opportunities to make decisions based upon imperfect intelligence. The learner also has the opportunity to make decisions based upon the “Whole Truth” or “Whole Picture” as intelligence and confessions culminate near the end of investigations. In these instances, the learner may use several corroborating pieces of information in order to make more confident responses as the interview or interrogation matures.

In order to prevent cheating through rote memorization of response numbering, the bank of possible responses for each decision point are randomized each time the simulation is executed.

Simulation of Body Language

The virtual subjects depicted in the interview and interrogation training systems were designed to realistically communicate the range of psychological and behavioral indicators typically observed within real-life interviews and interrogations. There is the risk that the simulated subjects not be believable no matter the level of visual fidelity if the rest of the simulated elements do not reach the same level of fidelity as

observed in laboratory tests of virtual avatars (Preece, Rogers, and Sharp, 2002).

The subject animations used in the interview training system had been designed to depict a child’s physical and behavior attributes and consisted of 28 unique types displayed in the list below:

1. Smile/happy/excited/enthusiasm
2. Frown/sad
3. Head look down/hangs head
4. Turn head away from Jamie
5. Cross arms
6. Shirk/lean back
7. Rocking back-and-forth; hands on face
8. Crying
9. Eyes look left
10. Angry/mad/defensive/clench teeth/makes fist
11. Shrug shoulders
12. Sitting under table
13. Sits up startled
14. Yelling/screaming/cries out
15. Sigh/yawn/bored
16. Tilts head to show earrings
17. Rocks side-to-side in chair
18. Indignant
19. Agitated/frustrated/shifts uncomfortably
20. Shakes head no
21. Shakes head yes
22. Colors with crayons
23. Confused
24. Points to picture/Points to doll
25. Wrinkles nose
26. Covers ears
27. Shaking/afraid
28. Ashamed

An example of poses is shown in Figure 4.



Figure 4. Depiction of a virtual interview subject

The subject character animations in the interrogation training system had been designed for depiction of deception and consisted of 44 unique types displayed in the list below:

1. Shrugs shoulders
2. Shrugs one shoulder
3. Runs hand through hair/hands rub on lap
4. Runs hand behind neck/Scratches behind ear
5. Pounds fist on table/pounds fist on leg
6. Clenches fists
7. Clenches jaw
8. Stop hand gesture
9. Smile/happy/excited/enthusiasm
10. Yelling/screaming/cries out
11. Anxious/nervous
12. Puzzled/confused
13. Stares ahead only moving mouth
14. Eyes move upper right
15. Eyes move down left
16. Eyes move quickly up left
17. Eyes squinting
18. Eyes side to side/Eyes up and down
19. Eyes blink excessively
20. Looks away from investigator
21. Looks down and left
22. Looks down and right
23. Looks up and left
24. Looks at investigator sideways
25. Shakes head yes
26. Shakes head no
27. Crosses arms
28. Crosses arms and legs
29. Looks disgusted
30. Crosses arms, legs and sits on hands (protective stance)/hands under thighs
31. Leans over covering face (sprinter's stance)
32. Stands up in sprinters stance with fists clenched
33. Pulls head down and shoulders up to hide
34. Covers mouth
35. Dips head down/dips head down and looks sideways
36. Taps foot impatiently
37. Drooping shoulders
38. Micro expression: sadness
39. Micro expression: fear/afraid
40. Micro expression: anger/angry
41. Micro expression: contempt/sarcastic grin
42. Micro expression: disgust/disgusted
43. Micro expression: happiness
44. Micro expression: surprise

Figure 5 shows an illustration of contempt and anger on the interrogation subject character's face.

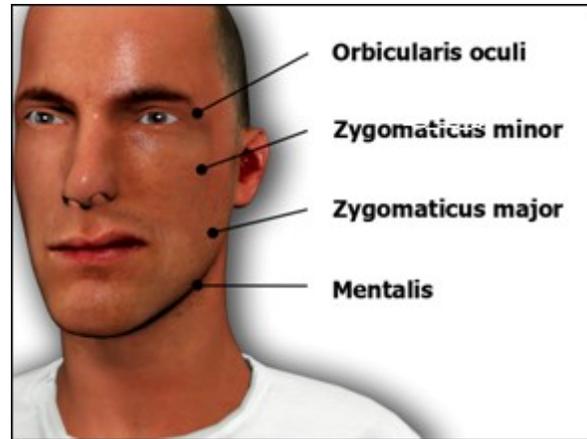


Figure 5. Virtual interrogation subject contempt and anger expression

Simulation of Proxemics

The virtual environments of the interview and interrogation training systems were designed to realistically portray the real-world physical constraints of interview and interrogation environments. The child's interview environment has been designed around a metaphor that is conducive to interview of child subjects and included papers, crayons and furniture for both adults and children. The first decision point encountered by the learner in the interview training scenario presents an opportunity to sit down in a child's chair, in order to build rapport with the child, or to sit far away in an adult's sofa or chair. In a direct demonstration of the relevance of Proxemics in this decision point the learner is rewarded for sitting in the child's chair to begin conducting the interview and is penalized for sitting far away from the child. By sitting near the child and, importantly, at the child's level the interviewer is demonstrating proper Proxemics for conducting the interview with the child.

The interrogation subject's interview environment is depicted within a very small room typical of real-world interrogation training rooms. The room is non-descript and contains cameras, two chairs and a table. The room is designed to maximize the effects of Proxemics upon the subject. The close proximity enforced by the room structure between the investigator and subject provides an environment in which the interviewer is close enough to touch the subject for comfort. Close proximity is also helpful to investigators while presenting incriminating information to create the impression that the subject is running out of opportunities to hide their crime or for recourse. The interrogation training system has been designed to incorporate gesture recognition capability through a

Microsoft® Kinect as an input device that enables the learner to physically indicate that they are moving closer or further from the subject. This is important for reasons of comfort to the subject and to motivate the subject to divulge more information. In this way, the learner may simulate moving their chair and person close to the subject and patting the subject on the shoulder for comfort and reassurance.

Simulation of Facial Expression

All facial animations are designed to trace to FACS AUs where within the scope of the emotions to be portrayed for the interview and interrogation simulations. Figure 6 depicts the application of key muscle groups in support of an anger FACS-based expression.

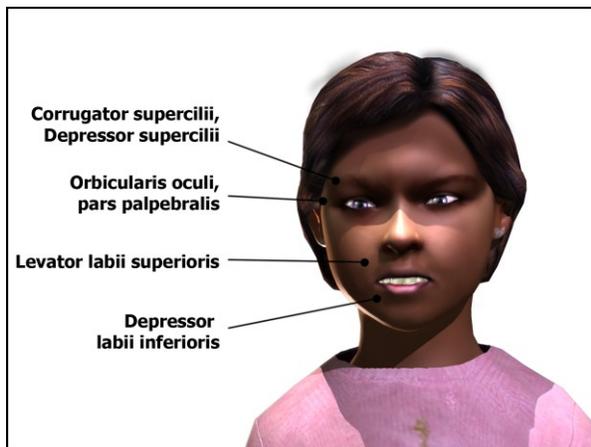


Figure 6. Virtual interview subject anger expression

A list of behaviors believed to be caused by sexual abuse has been widely publicized with the instruction to look for sexual abuse when a behavior on the list is observed (Underwager, Hollida, and Thomas, 2011). The facial animations depicted within the interview training system portray these behaviors, and the decisions of the learner in response to those depictions affect the severity of the disturbance caused by the manifestation of the abused child's behavioral indicators.

The interrogation training system's facial expressions design, especially micro expressions design, is critical to helping learners understand what the subject is truly thinking. In the first act of the interrogation scenario the learner is tasked with observing micro expressions in order to help identify the "whole picture" or "whole truth" in regard to the subject's story. Because micro expressions are involuntary and brief physical

manifestations of the subject's emotions the interrogation simulation has been designed to provide an accurate reproduction showing a micro expression within the standard 1/25 to 1/15 second timeframe (Ekman, 2001).

DISCUSSION

As discussed, the scope of the development of the prototype systems is focused upon interview of a victim of child abuse and the interrogation of a suspected sexual offender. However, the underlying design of the character animation and rigging has been designed to provide the requisite body language animations and several of the FACS animations required for investigators in any field to learn about Kinesics. Broader applicability for this system may apply to training law enforcement and intelligence agency staff. Corporations, academia and industry may also benefit from employing interview ILS for training staff in entrance and exit interviews for employees. The extent to which these possibilities may be exploited are dependent upon practical application of such technology including traditional constraints such as time and cost. In addition, acceptance of ILS as a valid and accepted tool within organizational cultures may be interpreted as a threat to current training as interviews and interrogations are heavily and inherently soft-skill driven occupations that are rigorously trained in real-world mock scenarios. A suggested approach to mitigate this threat would be to use interview and interrogation ILS as a supplement to and not a replacement for real-world training.

The scope of the development of the prototype systems does not include formative assessment of training effectiveness. A practical next step will be to pursue the requisite partnerships, contextual inquiries, surveys and evaluations required to verify and validate the training effectiveness of the systems and the associated technical, visual and instructional design approach presented in this paper.

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