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**Learning to Decode Nonverbal Cues
in Cross-Cultural Interactions**

Shatha N. Samman
Global Assessment, LLC.

Michael Moshell
University of Central Florida

Bryan Clark
Global Assessment, LLC.

Chantel Brathwaite
University of Central Florida



Fort Leavenworth Research Unit
Stanley M. Halpin, Chief

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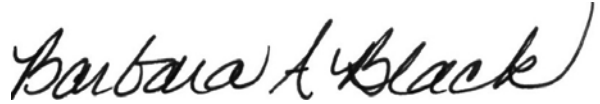
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**BARBARA A. BLACK, Ph.D.
Research Program Manager
Training and Leader Development**



**MICHELLE SAMS, Ph.D.
Director**

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Technical review by
Sena Garven, U.S. Army Research Institute
Bruce W. Knerr, U.S. Army Research Institute

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Shatha Samman
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Stanley M. Halpin, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
2511 Jefferson Davis Highway, Arlington, Virginia 22202-3926

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NONVERBAL LEARNING TO DECODE CUES IN CROSS-CULTURAL INTERACTIONS

EXECUTIVE SUMMARY

Research Requirement:

When US military forces are deployed to foreign countries, their security and mission success is dependent on their understanding of the complex cultural interactions within that particular population. To optimize cross-cultural communication, it is imperative to have cultural awareness. When Soldiers are required to interact with Arab natives who are culturally different, it is necessary not only to understand the verbal language but also decipher cross-cultural interactions. To understand communication, nonverbal cues play a major role in translating the meaning especially when Soldiers possess minimal Arabic language skills. While these signals may seem inconsequential, nonverbal communication is responsible for approximately two-thirds of the information received between individuals (Spoelstra, 2006). These skills are required in building rapport, seeking cooperation between military personnel and Arab coalition partners or native Arabic speaking civilians, in opportunities to persuade individuals, or in negotiation situations.

To optimize cross-cultural interaction, the primary technical objective of this STTR Phase I project was to design a conceptual prototype of a dynamic, interactive computer-based training tool to improve Soldiers' ability to decode nonverbal cues and behavior. Nonverbal behavior encoding was not part of the objective and therefore beyond the scope of this effort. The nonverbal decoding tool will assist Soldiers to exhibit effective cross-cultural communication skills and prepare them to interpret and predict behavior more accurately in cross-cultural environments. The feasibility of developing and testing such a tool will be explored in Phases II and III.

Procedure:

The current effort focused on designing a low-fidelity prototype of a dynamic, interactive, computer-based training tool to improve Soldier's nonverbal decoding abilities and behavior. To optimize the conceptual design and development of this nonverbal training tool, this research endeavor involved these primary tasks:

- Conducted a comprehensive review of the background of nonverbal communication and synthesized the nonverbal communication literature to gather universal and culture-specific (Iraqi) nonverbal cues.
- Examined the factors influencing the reliability of nonverbal cues through the exploration of nonverbal communication taxonomies.
- Synthesized the nonverbal decoding, learning, and training literature relevant to developing the training tool.
- Examined current nonverbal training tools available to Soldiers and performed a competitive feature analysis.
-

- Developed a conceptual design for a NOnVerbal Learning tool (NOVEL) to train Soldiers in recognizing and understanding cross-cultural nonverbal communication.

Findings:

Identifying and reviewing the existing literature helped guide the conceptual design of a mockup prototype of a dynamic, computer-based interactive nonverbal training tool (NOVEL). Both universal and Iraq-specific nonverbal cues were compiled in a database. Based on the learning and training literature, design guidelines were generated to assist in the design of the training tool. We conducted a preliminary research study examining several nonverbal cues that vary in modality channel, were either Iraqi or universal, and varied in the type of functionality (e.g., emblem). Preliminary results suggest that some nonverbal cues may have one-to-many connection (one cue to many meanings) that may be dependent on the culture or the context of the situation. In addition, existing cultural training tools that include nonverbal cues were identified, and the strengths and weaknesses of these tools are reported.

Utilization and Dissemination of Findings:

Research on nonverbal communication and its cultural context was reviewed, and a database of universal and Iraqi nonverbal cues was created based on various modality channels. The nonverbal cues reported here provide content for a training tool on decoding nonverbal communication in Iraq. Design guidelines were developed to assist in the development of the nonverbal learning (NOVEL) tool. These design guidelines are not limited to training nonverbal communication, but are broadly relevant for development of any training that relies on gaming or interactive media.

NONVERBAL LEARNING TO DECODE CUES IN CROSS-CULTURAL INTERACTIONS

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LEARNING TO DECODE NONVERBAL CUES IN CROSS-CULTURAL INTERACTIONS

As a global community, individuals from various cultural backgrounds need to interact for economical, social, and political reasons. Communication is an integral part of our daily lives and is paramount to collaborative interaction. Communication can be defined as a complex exchange of information, ideas, beliefs, concepts, and even feelings and emotions among people, oftentimes of different cultural backgrounds (Matsumoto, 2000). The manner in which people respond to and give meaning to behavior of others is an important component of communication. People can communicate via deliberate means, such as verbal conversation with some form of nonverbal signals. Oftentimes, people also communicate unintentionally through various forms of nonverbal cues such as body posture and facial expressions.

An important aspect of communication involves the way people encode and decode information. Encoding refers to how people choose (consciously or unconsciously) to create and send a message to another individual or group of people. Many times the formation of a message involves the understanding of the rules governing syntax, grammar, and phrase usage and appropriateness of that particular language. The process of decoding commences when an individual receives communication signals, such as specific words and behaviors, and translates these into meaningful messages. This also requires the individual who is translating the message to be familiar with the rules of the specific language as well as the nonverbal cues and cultural issues associated with the message. Misinterpretations may occur quite often, impeding the communication process and potentially creating hostile situations. The misunderstanding may be due to the unfamiliarity of the language, cultural variations, communication differences, and misinterpretation of the associated nonverbal behavior.

To address the critical need in military operations, this project developed a conceptual design of a dynamic, computer-based, interactive training tool for decoding nonverbal behavior when interacting with culturally diverse individuals. Thus, both culturally-universal nonverbal behavior and culture-specific nonverbal behavior were examined. The nonverbal communication literature was reviewed to identify universal and Iraqi nonverbal cues and their respective meanings to be embedded within the training tool. Furthermore, we analyzed the literature to identify factors influencing the reliability of nonverbal cue and misunderstanding. Our approach aimed to optimize training technologies by establishing sound scientific foundations and identifying innovative design concepts that may be incorporated into our training tool. A conceptual design for the nonverbal training tool was based on established design principles from the fields of nonverbal decoding assessment, learning, training, instructional design, multimodal interaction, gaming, and interactive media. Lastly, the report outlines a conceptual design of a nonverbal learning tool (NOVEL). This tool was designed and built around a process of convergence in terms of learning and training theories as well as design principles of gaming and interactive media.

Organization of Report

This report provides the foundation for achieving our overall objective of developing a nonverbal training tool. The report is divided into four major sections. The first technical objective was to identify universal and culture-specific nonverbal cues particular to a Middle-Eastern culture (i.e., Iraq). Section I reviews cross-cultural communication and provides an overview of challenges found when communicating with others from different cultural background. Section II more specifically discusses nonverbal communication. A comprehensive review was performed to investigate the characteristics, properties, and the taxonomies of nonverbal cues based on the functionality and modality channel of communication.

The second technical objective was to examine the reliability of nonverbal communication. Section III discusses the influence of culture, context, and functionality of nonverbal communication. This section also discusses the effects of our expectations and violations when communicating nonverbally. Finally, we present a preliminary experimental study on the effect of nonverbal cue functionality type (i.e., emblem), modality channel (e.g., body posture) and origin (i.e., universal or culture-specific) on accurately interpreting nonverbal cues.

The third technical objective was to identify methods for training for nonverbal decoding. Section IV presents instructional training design methods including several techniques used in assessing nonverbal decoding. This section also describes learning methods optimal for nonverbal decoding, including perceptual and conceptual learning, scenario-based training, and just-in-time training. Section V provides an overview of multimodal interaction principles to enhance training for various modality channels. Section VI more specifically discusses design principles related to gaming and interactive media. Topics presented include their impact, perspectives, and overall design principles.

The fourth and last technical objective was to generate and develop guidelines for the conceptual design of a nonverbal training tool. Section VII presents a competitive analysis performed on current training tools available to Soldiers. Section VIII provides design specification of the NOVEL tool. Specifications of various modules of NOVEL are described. Section IX presents the objectives of Phase II development and testing of NOVEL. Section X outlines a Phase III transition plan. Finally, Section XI concludes the report.

SECTION I: CROSS-CULTURAL COMMUNICATION

Challenges to Cross-Cultural Communication

Matsumoto (2000) summarizes several challenges that may arise during cross-cultural communication. First, individuals may automatically assume that cultures are similar, and if differences in culture are observed, the belief is that it would not influence communication. Oftentimes, these individuals may be naïve to the major role culture plays in the delivery and understanding of information. Second, individuals may neglect to perceive language differences among cultures even if small. For instance, if an individual is not entirely familiar with the foreign language in which they are communicating, the intended and conveyed message may not

be necessarily the message that is received by the native speaker. A third challenge in cross-cultural communication involves nonverbal cues. Language is not all verbal in nature. Several nonverbal cues perceived may be misinterpreted due to the unfamiliar cultural context. This will be described in greater detail later in the report. Preconceptions, biases and stereotypes can obstruct effective cross-cultural communication. Furthermore, when problems in cross-cultural communication do arise, negative views of the other culture may be created due to impatience, frustration, and difficulty in communicating the intended message accurately. For example, individuals may have the tendency to evaluate another culture based on how easy it is to relay information to their natives. Finally, an individual may sometimes feel awkward and stressed when interacting with another culture, which may also affect the communication process. This high anxiety may make actions stiff, or it may exaggerate assumptions about other cultures or interpretations of messages. Most of these obstacles are rooted in ignorance regarding other cultures. Hence, the first step towards bridging communication barriers is to develop familiarity with the influence of culture on information exchange.

A major cultural difference critical in cross-cultural interaction is the degree to which individuals communicate explicitly or implicitly. Hall (1976) proposed that context plays a key role in explaining many cultural differences. Context can be described as the information that surrounds communication and helps relay the message. Specifically, Wunderle (2006) suggests that “the Arabic language is a high-context language, which means that what is “not said” may be more important than what is said” (p. 14). Arabs communicate messages that are often implicit and highly coded. Therefore, an American Soldier’s challenge is to interpret what the message means by correctly understanding what is being said and the ‘way’ the message is being conveyed. This approach is in sharp contrast to low-context countries such as the United States, where the message is explicit and the speaker says precisely what s/he means.

One reason why Arabs communicate in a high-context employing an indirect and implicit style is that those who are communicating tend not to rely solely on language but leverage both the close personal relationships and nonverbal cues such as voice intonation and facial expressions that play a significant role in communication. These topics will be addressed later in the nonverbal section of the report. Low-context countries such as the United States in contrast, communicate to accomplish objectives. Since there is no personal relationship significance in communication, individuals tend to be direct and focused. Thus, information density and content may depend on the cultural context such that low-context cultures such as the US are direct, structured, convey information, and are explicit. Conversely, high-context cultures such as the Middle East are indirect and unstructured, maintain relationships when relaying messages, and are implicit (Hodgetts & Luthans, 2000). The information will be perceived depending on the cultural context background. For example, Zaidman (2001) found that high-context cultures such as Indians perceived the communication of low-context cultures as rude, aggressive, impatient, and lacking flexibility and style. Conversely, the perception of low-context cultures such as Israelis perceived the communication of high-context cultures to be vague and evasive.

As one consequence, the communication quantity is different across cultures (Hodgetts & Luthans, 2000). Specifically, high-context cultures like the Arab tend to have an elaborate style of communication. There is a great deal of talking where details and repetition is used. However, in low-context cultures like the United States communicators tend to be more exact, where focus

on precision and using the right amount of words to convey a message is crucial. Cultures also differ when using affective or instrumental styles of communication. The affective style used by high-context cultures is characterized by language which requires the listener to carefully note what is being said and to observe how the sender is presenting the information using emotion and nonverbal cues. Often the meaning is being conveyed via nonverbal cues that are culturally different and require the receiver to decipher what is being said. Again, these topics will be discussed in further detail in the report. Low-context cultures such as the United States, on the other hand, employ an instrumental style that is goal-oriented and focused on the sender relying little on emotion and nonverbal cues. The sender conveys the message clearly letting the receiver know exactly the information content (Hodgetts & Luthans, 2000).

There are six distinct patterns of cultural differences that may impact communication (Dupraw & Axner, 2006). First, cultures may differ in their approach to *acquiring and understanding information*. For instance, Americans may seek knowledge via self learning and solve problems through trial and error while Arabs may prefer classroom learning. A second pattern is attitude towards *conflict*, which may either be viewed in a positive light (i.e., the idea that conflict gives people the opportunity to work things out), or it can be perceived as something to be avoided at all costs. For example, people in the United States deal with conflict directly and openly in order to find solutions quickly to the problem at hand. This is frowned upon by many Middle Eastern countries that believe that conflicts should be resolved behind closed doors and never out in public. In the Arab culture, conflict and public confrontation are viewed as an embarrassment to all involved.

A third pattern of cultural differences is the approach toward *completing tasks*. When completing tasks in collaborative work, different cultures may place different degrees of value on creating and maintaining relationships throughout the process of completing the tasks rather than time of completing the task. Cultural research suggests that this notion is related to *time symbolism*, which is different cross culturally (Hall, 1976). Thus, one particular culture may take longer to complete a task simply because they pursue the task in a different fashion. The fourth pattern of cultural differences was found in *decision making*. While one culture may place heavy emphasis on individual decision making, the other may value delegated decision making that is based on consensus. A fifth cultural difference may be found in the attitude toward *disclosure*. For example, for Americans the issue of grief is considered to be private and certain behaviors and conversations may be considered intrusive. Conversely, for Arabs they may perceive the same behaviors and conversations as a sign of concern, honesty, and sincerity. Finally, *nonverbal communication* varies among cultures. As discussed above, nonverbal communication cues may be considered more important in some cultures than others as an aid in the understanding of messages. There may be many verbal and nonverbal culture-specific rules of discourse that govern certain aspects of communication including opening or closing conversations, taking turns during conversations, interrupting, using silence as a form of communication, pursuing only appropriate topics of conversation, using humor appropriately, using nonverbal behaviors and gestures, laughing at appropriate times, knowing when to stop talking, and sequencing a conversation (Taylor, 2006). This will be described in greater detail later in the report.

The effectiveness of cross-cultural communication and Soldier mission success is greatly dependent on cultural training. Research conducted in a previous Army SBIR Phase I project assessed cultural concepts critical to Army Soldiers. Interviews of Soldiers deployed to Arab countries confirmed the importance of having access to cross-cultural knowledge. Soldiers emphasized the significance of correctly interpreting nonverbal communication cues such as vocal tones, gestures, body language, eye contact, and facial expressions. These nonverbal communication cues may assist in building rapport and facilitating communication between Soldiers and Arab coalition partners and native Arabic speaking civilians while ensuring that nothing is ‘lost in translation’. The following section of this report, therefore, discusses these nonverbal cues identified by the Soldiers as important for cross-cultural interaction.

SECTION II: NONVERBAL COMMUNICATION

There is some variation among experts in regard to their definition of human communication. For instance, von Raffler-Engel (1988) describes communication as “*an exchange of information when there is intent to convey meaning on the part of the sender,*” and each person involved has some particular goal in this exchange, such as persuasion, obligation, or domination (pp. 76). Information can be exchanged through spoken or unspoken means. However, unintentional or unconscious nonverbal communication cues were not included in this particular definition. Key (1977) argues that communication is defined by any movement that aids in information exchange. For example, moving the muscles in and around your mouth may result in forms of nonverbal communication via speech, paralanguage (non-speech utterances), and/or movements of other body parts. Richmond and McCroskey (2000) concur with involving nonverbal cues and describe communication as “*the process of one person stimulating meaning in the mind of another person (or persons) by means of verbal or nonverbal messages*” (pp. 1).

We take the perspective that both verbal and nonverbal messages interact to form human communication. Verbal communication depends solely on speech to convey meaning. Verbal communication involves conscious actions and there are often breaks in the verbal conversation. Conversely, nonverbal communication involves a message transmitted to another person without words. It may or may not depend on the verbal language as supplement and these messages may or may not be conscious. Because many nonverbal messages are unconsciously initiated, there are no real breaks in the nonverbal “conversation” *per se*. Thus, nonverbal cues are continuously communicated.

At the most basic level, human communication can be divided into three distinct components: language, paralanguage, and kinesics (Poyatos, 1988). Language consists of spoken words and deals with the lexicology, morphology, and syntax of language. Paralanguage and kinesics are both types of nonverbal communication cues. Paralanguage involves any sort of utterances or vocal noises that accentuate language. Lowering or raising your voice, changing the pitch, or making a sound effect with your mouth are all examples of paralanguage. These cues help give verbal words more meaning. Finally, kinesics is comprised of movements and body positions that can occur simultaneously with language and paralanguage. These may include body posture, gestures, and gaze. Detailed distinctions will be later described in the report.

Research has demonstrated that more than 60% of meaning in an interaction occurs through nonverbal messages making it an extremely important aspect of communication (Hecht & DeVito, 1990). Whereas verbal messages transmit facts and objectives, nonverbal cues are used to assist and correctly interpret the attitude, feelings, and truths of the interactions (Burgoon, 1985). Nonverbal communication can also aid in developing and maintaining rapport. In general, rapport is thought to be apparent through nonverbal behaviors more often than verbal cues and includes physical displays of mutual attention, coordination, and positive interaction (Grahe & Bernieri, 1999). Thus, nonverbal visual cues provide additional information giving meaning that may not be available with verbal cues alone. For instance, research has found that people who could only observe nonverbal behavior in an interaction, without verbal cues, judged rapport more accurately than people who were able to both see and hear the interaction (Grahe & Bernieri, 1999). Based on these findings, it is clear that humans rely on nonverbal communication cues to enhance the communication process.

Characteristics of Nonverbal Communication

As mentioned above, nonverbal communication occurs when information and meaning are transmitted from one person to another without the use of words. Even though nonverbal communication may not always be overt, it is an integral part of the communication process. Hecht and DeVito (1990) describe several characteristics that apply to all forms of nonverbal communication in terms of *how* they are expressed, *what* are the primary meanings, and *why* are they used.

How: Understanding how nonverbal communication is expressed allows us to organize nonverbal cues into distinct separate parts. Thus, it alerts us to attend to specific areas to decode the sent message. We use our bodies and the environment to communicate nonverbal messages. *Body communication* includes posture, gestures, and physical appearance. *Facial and eye communication* describe movements of the face and eyes. *Spatial communication* focuses on the space between us and others. *Tactile communication* describes the physical contact between people such as touch. *Paralanguage and silence* includes the vocal sounds and silence in communication. *Smell* focuses on how odor (body smell or perfume) communicates to others. *Temporal communication* (also called chronemics) describes how the use of time conveys information (i.e., scheduling, time perception). Finally, *artifactual communication* are objects we associate with ourselves and others to emphasize status such as clothing, jewelry, and decorations.

What: In addition to recognizing nonverbal cues, it is important to understand the meaning being conveyed. Hecht and DeVito (1990) suggest three encompassing interpretations that nonverbal cues may have. First, they can mean *immediacy* in which an individual judges good or bad, be either positive or negative, or describe the closeness of an individual. For instance, we express likeability by a smile (facial communication) and close proximity (spatial communication). Nonverbal cues can also demonstrate *power* by showing dominance or status. For example, a supervisor leans over his subordinate (body communication) and touches him (tactile communication) in a meeting. Finally, nonverbal cues may be used to mean *responsiveness* by describing the way people react to others and events in their environment. For

instance, we show responsiveness by continuous eye contact (eye communication) and frequent gestures (body communication).

Why: Research has suggested that nonverbal cues function for several reasons (Hecht & DeVito, 1990; Richmond & McCroskey, 2000). Nonverbal cues provide *information* such as pointing somewhere to denote location. They may be used to *regulate* and manage the interaction via turn-taking and turn-giving cues (Hecht & DeVito). Nonverbal cues may also function to express *emotions* such as frowning to show displeasure. Furthermore, nonverbal cues may be used to *complement or contradict* verbal messages. Complementing cues may serve to reinforce and clarify the information being exchanged (Richmond & McCroskey). Conversely, contradicting cues conflict with verbal messages. It has been demonstrated that people tend to believe the nonverbal over the verbal message in contradicting situations (Burgoon, 1985; DeVito, 1989; Hecht & DeVito; Richmond & McCroskey). Nonverbal cues can also function to *repeat, reiterate, or substitute for* a verbal message (e.g. depending on context, glaring at someone may mean “I don’t like you”). Nonverbal cues may also function to *accent and emphasize* verbal messages. For example, an individual may pause in mid-sentence, speak loudly, or touch someone on the arm for added emphasis (Richmond & McCroskey). Finally, nonverbal cues may function to help *perform* certain tasks set by the individual such that you may touch your colleague to denote cooperation.

Properties of Nonverbal Communication

Burgoon (1985) identified several different properties of nonverbal communication. First, nonverbal cues can be broken down into “discrete units” or categories, such as body communication (gestures and body movement), facial and eye communication (gaze, affect displays), artifactual communication (utilizing objects to affect meaning and interpretation), proxemics (the use of space), territoriality (the ownership of space), tactile/haptic communication (via touch), paralanguage (auditory utterances that affect meaning), silence, olfaction, and chronemics (time and time preferences; DeVito, 1989). As mentioned above, nonverbal communication in these categories are performed continuously and viewed as progression in their signaling (i.e., vocal intonations, facial expressions; Littlejohn & Foss, 2005).

Second, as nonverbal cues are continuous in nature they can be displayed alone or as groups. They allow for quick and direct simultaneous multimodal sensory transmission via several different signals of the body giving added meaning to the interaction. Research has found that people can generally process nonverbal cues unconsciously or consciously faster than verbal communication cues (Burgoon, 1985). Third, some nonverbal cues, but not necessarily all, have iconicity or resemblance such that the cue is similar to what it symbolizes. They may exhibit semantic, syntactic, and practical rules governed by the native language and culture. Hence, they have consistent and recognizable meanings among a group of people. As we discussed above, this can pose a problem when attempting cross-cultural exchanges.

Fourth, nonverbal communication is always guided by *rules* which dictate the appropriateness and consequences of actions. Rules are greatly influenced by culture and social norms (referred to as display rules) and are most often learned by observing others to dictate when and where the use of nonverbal cues is acceptable (DeVito, 1989). Fifth, certain nonverbal

cues elicit universal meaning, which may be biologically determined. These cues are often emitted spontaneously and unconsciously. Finally, nonverbal cues are bound by the context of the situation, which ultimately gives their meaning. The influence of culture and context on the reliability of decoding nonverbal cues will be discussed later in the report.

Research has suggested individual differences in the encoding and decoding of nonverbal cues (Littlejohn & Foss, 2005). Overall, differences exist in the ability to communicate nonverbally, such that some people are better at sending, receiving, and managing or controlling nonverbal cues than others. Some individuals rely heavily on nonverbal cues, consistent with the saying that actions speak louder than words (Burgoon, 1985). It has been suggested that possessing good nonverbal communication skills enables a person to better initiate, develop and maintain social relationships (Richmond & McCroskey, 2000). These skills also allow a person to manage impressions s/he may give to others. An important finding of recent research suggests that nonverbal communication skills are learned and can be improved upon with observation, practice and training (Elfenbein, 2006). Although just hearing verbal information about interpreting nonverbal cues does not enhance the ability to decode nonverbal cues (Costanzo, 1992), actually observing and practicing interpretation of nonverbal cues greatly enhances the ability to recognize and decode these cues during interactions. Specifically, training in nonverbal decoding can be effective when individuals are provided feedback on accuracy of interpretation (Elfenbein, 2006). In other words, people can learn how to recognize and interpret nonverbal communication, in particular, across cultures. Therefore, it is possible to improve cross-cultural interactions through observation and training.

Nonverbal Cues Categorized by Function

To understand nonverbal communication, we must identify and investigate the various types and functions of nonverbal behavior. In one commonly accepted taxonomic approach, Ekman and Friesen (1969) examined nonverbal activities from three different perspectives: origin, coding, and usage. *Origin* describes the source of the nonverbal cue; it may be innate (hard-wired into our nervous system), it may be species-constant (universal for species survival), or variant (used within certain cultures or specific social groups). *Coding* defines the relationship of the nonverbal cue to its respective meaning; it may be arbitrary (no inherent meaning to the cue), iconic (resembles something), or intrinsic (containing meaning within the cue). The third method of categorization is *usage* which describes the degree to which the nonverbal cue is intended to convey information; communicative (deliberately), interactive (influences the behavior of others), or informative (not intended to convey information but does).

According to Ekman and Friesen (1969), the interpretation of a nonverbal cue may be *idiosyncratic* or have a *shared* meaning. A nonverbal cue is idiosyncratic if the sender or encoder performs the act only in a particular setting, or if only that individual (sender) performs it. An act can be decoded or interpreted idiosyncratically as well, if only one individual receiver is aware of the cue's meaning. A shared nonverbal cue is one which conveys information across a large group of people such that it may be universally understood or is more specific to a cultural group or social group. Depending on the origin, code, and usage, nonverbal cues are classified into five functional types: emblems, illustrators, affect displays, regulators, and adaptors (see Tables 1 and 2).

Emblems

Emblems are clear, explicitly defined and intentional body movements or utterances that are independent of speech and directly translate into phrases or words (DeVito, 1989; Richmond & McCroskey, 2000). They may repeat, substitute, or contradict part or all of the simultaneous verbal communication. Emblems carry less personal information (i.e. affect, feelings, and opinions) than other forms of nonverbal cues (Ekman & Friesen, 1969). Emblems occur mainly when verbal communication is inhibited by noise, external circumstances, distance, by agreement (e.g., the game of charades, or mimes), or because of biological disabilities. In these situations, the main message is carried in the emblem that could not be communicated verbally, which makes emblems critical in these scenarios. They can be recognizable gestures such as thumbs-up to represent hitchhiking or can be utterances such as “Shhh,” which represents the phrase “Be quiet” (Poyatos, 1988).

Table 1. Nonverbal categorization

	Emblems	Illustrators	Affect Display	Regulators	Adaptors
Origin	Learned	Learned	Innate Species- constant Variant	Learned	Innate Species- constant Variant
Code	Arbitrary or Iconic	Iconic	Intrinsic	Intrinsic or Iconic	Intrinsic or Iconic
Usage	Communicative	Informative Communicative Interactive	Informative Interactive	Interactive	Informative Interactive

Within a culture, emblems are not commonly misinterpreted because they have direct verbal translations and are universally shared among a group of people. However, many emblems do not mean the same thing across cultures, which often lead to misinterpretations (Ekman & Friesen, 1969). Learning and using correct emblems and gestures in cross-cultural interactions will lead observers to perceive the sender of the message as being competent. It will also increase positive interaction leading to higher quality relationships (Molinsky, Krabbenhoft, Ambady, & Choi, 2005). Correct usage and interpretation of these emblems are learned by observation and are adopted more quickly by immersing oneself for extended periods of time in the foreign culture.

Illustrators

Illustrators are nonverbal cues directly linked to words used to reinforce the verbal communication by allowing the individual to emphasize the word or idea. They are often linked to speech and serve to illustrate the verbal message, show the relationships between the person speaking and the verbal message (e.g., how s/he feels about what s/he says), emphasize the verbal message, and direct the conversation. They are usually intentional and cannot stand alone like emblems because they have no meaning apart from verbal messages (DeVito, 1989; Richmond & McCroskey, 2000). They may be a little less intentional than the use of emblems,

but generally people are aware that they are displaying illustrators (Ekman & Friesen, 1969). An example of an illustrator is when an individual shakes his head in disagreement as he verbally disagrees with something. Some illustrators can be understood independent of speech while others require speech for understanding. However, illustrators are related to the ongoing verbal communication and should be taken on a contextual basis, from moment to moment and situation to situation (Ekman & Friesen).

Affect displays

Affect displays reveal our emotional state and are expressed primarily via facial cues. They may also include postures and any other movement that gives some indication of emotion (DeVito, 1989; Richmond & McCroskey, 2000). Gaze in particular can be used to seek feedback from someone, regulate conversation, and transmit certain messages (DeVito). These displays may occur with or without awareness on the part of the sender, and they are highly dependent on context (Ekman & Friesen, 1969). Affect displays are extremely important because people tend to focus attention on affect displays as feedback during communication. The face receives more attention than any other part of the body during an interaction. Facial expressions can serve to intensify the emotion of an individual, but they can also mask what an individual is truly feeling and are not always reliable truth indicators (DeVito). In these cases deception may occur, and the perceiver must decide which affect displays are false and which are unintentionally “leaked” and show true emotion (Ekman & Friesen). As mentioned previously, different cultures may have different display rules guiding the appropriateness of aspect displays in certain contexts (Ekman & Friesen).

Regulators

Regulators are nonverbal cues that regulate interaction such as eye behavior, tonal variation and loudness, and/or head nodding to regulate conversation. They may also include body movements such as turn-taking cues that regulate and maintain the conversation and the interaction as a whole (DeVito, 1989). They tell the speaker to continue, repeat, elaborate, hurry up, become more interesting, stop speaking, etc. They do not mean anything alone without verbal exchange (Ekman & Friesen, 1969). Studies have shown that we are sometimes unaware of giving these cues, but when asked to repeat them, we can. They seem to be habitual, learned, and almost involuntary. Researchers have decomposed regulator cues into six stages including- (1) sighting, orientation and initial approach; (2) distant greeting and acknowledgement; (3) head dip if the interaction is not pursued; (4) greeting process and approach if the interaction is pursued; (5) final approach of less than 10 feet and the initiation of face-to-face interaction; and (6) the conclusion of the interaction (Kendon & Ferber, 1973). Thus, regulators are primarily interactive and are found to be extremely important. For instance, research has demonstrated that if regulators were inhibited in a conversation, the communication is quickly terminated because the perceiver recognizes that regulators are purposefully being withheld and discontinues the interaction (Ekman & Friesen).

Adaptors

Adaptors are movements that satisfy personal needs to help adapt to the environment and may also be behaviors that may be used to manipulate situations. Specifically, adaptors refer to when a person unintentionally touches himself, others, or objects during conversation. They allow individuals to adapt to different situations typically in response to stress or anxiety (DeVito, 1989; Richmond & McCroskey, 2000). They are learned to satisfy the self or body needs, perform bodily actions, manage emotions, develop or maintain relationships, or learn an instrumental activity (Ekman & Friesen, 1969). They appear to be triggered by something in the interaction and are habitually displayed, such that the sender is not intending to transmit a message (Ekman & Friesen). Several different types of adaptors have been suggested. Self-adaptors include scratching, biting the lip, and manipulating one's own body. Alter-directed adaptors are used as protection from other people (e.g., an individual may fold his arms and cross his legs to signify closed behavior). Finally, object-focused adaptors occur when an individual fiddles with an object. Table 2 demonstrates a summary of the five nonverbal categories and their respective meanings.

Table 2. Nonverbal cue category based on function

Category	Definition
Emblems	Clear, intentional body movements or utterances that are independent of speech and directly translate into phrases or words
Illustrators	Illustrate the conversation. They serve to emphasize words and phrases, used to when an individual points or gestures to something or someone that may or may not be present, or when an individual draws an imaginary picture in the air or on some surface area
Affect displays	Any movement/posture that gives indication of emotion; movements in the face that display emotion; facial expressions intensify the emotion of an individual, but they can also mask what an individual is truly feeling and are not always reliable truth indicators. Gaze is used to seek feedback from someone, regulate conversation, and transmit certain messages.
Regulators	Body movements such as turn-taking cues that regulate conversation and the interaction as a whole
Adaptors	Refer to when a person touches himself, others, or objects during conversation

Nonverbal Cues Categorized by Modality

An alternative taxonomic approach to nonverbal cues is by means of sensory modality channel. As mentioned previously, nonverbal communication is expressed by different part of the body. The taxonomy allows us to separate nonverbal cues into smaller parts and focuses our attention on specific areas as we attempt to recognize and understand their meaning. This is

extremely critical when interacting with others from different cultural backgrounds. The following sections discuss each of these nonverbal modality channels.

To address the objectives of the project, we classified nonverbal cues according to universal and culturally-specific cues specific to a Middle-Eastern culture (i.e., Iraq). The nonverbal cue literature was reviewed to compile nonverbal cues and their respective meanings. Universal nonverbal cues were categorized based on their unconscious and involuntary behavior. Also, cues were considered universal when they were interpreted similarly regardless of the decoder's cultural background. Conversely, culture-specific nonverbal cues are learned and understood based on the specific culture.

Body Posture

Kinesics, or body movement and behaviors are a result of muscular and skeletal movement. They include regular body functions (breathing, eating, etc), spontaneous and reflexive body movement (coughing, hiccupping, yawning), and combinations of movement and noises (Key, 1977). They also include- body posture, facial expression using eyes, mouth, and nose, and other body movement with hands. This section will focus on body posture cues; facial expression, eye contact and hand movements will be discussed in separate sections below.

According to Birdwhistell (1963), body movements have potential meanings in communication that can be analyzed and organized systematically. Moreover, he proposed that body movements may be used differently depending on the person's social group such that some cues may have shared meanings. Research has demonstrated that body posture may communicate unintentionally by leaking signals that we are unaware of. Body posture can serve as a reliable nonverbal cue to decode messages especially in deception. Generally, body movements are used to demonstrate intensity (muscular tension), range (extent of movement) and velocity (temporal length of movement; Poyatos, 1988).

Posture may be used to express our feelings and attitudes in two primary dimensions (Hecht & DeVito, 1990, Richmond & McCroskey, 2000). The first dimension conveys the feeling of immediacy. Body posture cues representing immediacy include body orientation, symmetric position, and forward leaning of the body. The second dimension of body posture cues communicates relaxation. Cues conveying relaxation include backward leaning, reduced tension in arms and legs, and asymmetry of positioning. For example, body posture may be used as a sign of (dis)interest by how we lean (towards to show involvement or away for detachment). Furthermore, studies have shown that people are likely to mirror others' postures as a sign for agreement.

The dimensions of immediacy and relaxation may be further decomposed into three main areas including- inclusive or non-inclusive, face-to-face or parallel body orientation, and congruence or incongruence. Body posture cues in the (non) inclusive category refer to body positions that are used to either invite or block out others. The category of face-to-face or parallel body orientation describes postural relationships between two individuals during conversation. A person may engage in conversation either facing another or while standing or sitting next to them. The type of postural orientation during conversation may provide nonverbal information

about the relationship. For instance, face-to-face positioning may indicate active and formal interaction which requires continuous monitoring of the other. Conversely, parallel postural positioning may indicate a neutral and passive interaction (Richmond & McCroskey, 2000). Congruency refers to whether two people are imitating the positioning and movements of each other or not. As stated above, mirroring signals agreement, likeability, and equality. Incongruent body posture can be used to indicate status differentiation. A higher status person may exhibit a more relaxed posture whereas a lower-status person exhibits more muscle tension.

Universal and Culture-Specific Body Posture Cues

Depending on the origin, code and usage, body posture cues may be universal or culturally-specific. Specifically, in Iraqi culture individuals use a more direct body orientation than Americans do, who tend to stand to the side or at an angle to each other during conversation (Samovar & Porter, 1991). Furthermore, Iraqi men may hold hands, kiss, and hug each other, but this only indicates that they are good friends. Signs of affection among Iraqi men are common, having no sexual meaning. Holding hands is a sign of deep friendship, respect, and also equality in status (Fattah, 2005). If an American becomes close friends with an Iraqi and he reaches out to hold hands, the American should accept it because it is a traditional expression of friendship (United States Navy Chaplain Corps, 1998). When an Iraqi initiates a close hug with his conversation partner, this is considered to be an honor. A full bodied embrace never occurs unless the Iraqis are very close friends. Strangers never hug or kiss one another but may interact with a handshake. See Appendix A for a selection of Universal and Iraqi body posture cues.

Gestures

Gestures lend some sort of meaning to an interaction occurring independently or simultaneously with verbal communication (Kendon, 1983). Hand gestures are often used as space or time markers to indicate size, distance, location, and temporal meanings (Poyatos, 1988). Gestures can be used in lieu of speech to supplement words and phrases. Gestures can be divided into three patterns including gestures with symbolic meaning, gestures with pictorial meaning, and gestures for emphasis (Brewer, 1951). Gestures that have symbolic meaning in a culture are used and understood independent of speech and conversation. Gestures that have pictorial meaning may or may not be understood outside of the context of a conversation. This form of gesturing generally serves to clarify and intensify conversation. Finally, gestures are sometimes used to emphasize certain points in the conversation and would typically not be understood outside of the context of the conversation.

Universal and Culture-Specific Gesture Cues

Gestures may have universal meanings or be more culture-specific. Gestures that are perfectly acceptable in one culture may cause confusion or offence in another culture. This is especially critical in times of conflict when distrust and suspicion runs high. An American Soldier would not want to inadvertently send mixed messages by making an offensive gesture or acting dishonestly according to host-nation standards of behavior.

In general, Iraqis depend greatly on gestures to communicate and convey nonverbal cues showing honor, respect, and friendliness. For instance, holding the tips of the thumb and fingers of either hand together to look like a pyramid and pointing vertically up from the wrist in front of body means 'Wait a minute and I'll be with you' in Iraqi is a gesture exhibiting symbolic meaning. An Iraqi will put the right thumb back and forth across the middle of the right index finger with hand held semi-clenched to symbolize money (a gesture found and readily understood in many cultures) and would usually accompany phrases about money. Extending the hands with the palms held open and down in front of the chest and tapping the tip of each index finger rapidly against its thumb is used to emphasize the smallness of something in Iraqi. See Appendix B for a selection of Universal and Iraqi gesture cues.

Eye Contact and Gaze

Eye behavior is considered to be very important in human communication (Richmond & McCroskey, 2000). The nonverbal cue of visual code refers to the direct or indirect eye contact made during interaction (Watson & Graves, 1966). Eye contact expresses attitude, emotions, and intentions in a very dynamic way (Hecht & DeVito, 1990). Eye contact and gaze typically reveal interest in a topic or person. During interaction, we often use eye movement to assist us to interpret verbal messages. Eye contact may be used in conversation to signal when to continue talking (mutual eye contact), stop (eye gazes away), or provide further explanation. As we will discuss in the next section, eyes and facial features also express emotion. Eye behavior is also affected by cognitive processing (Richmond & McCroskey, 2000). Conjugate Lateral Eye Movements (CLEMs) refers to the involuntary lateral shifts of the eyes to the right or left. We look to the left or right when we are thinking and look forward when we have stopped information processing. It has been proposed that eye behavior has three primary properties (Richmond & McCroskey). One property is the salience of eye gaze, used to manage interaction, elicit attention and communicate interest in other people. The second property is the stimulation of positive or negative arousal. Involvement is the third property of eye behavior; as the eye makes contact with another person, it is very difficult not to be involved with them even for a brief second.

Universal and Culture-Specific Eye Contact Cues

A very effective way of making a good first impression on someone from another culture is to learn the eye contact behaviors of the culture. The degree and intensity of eye contact may serve to tell your listener that you are either trustworthy and friendly or sneaky and suspicious. In the Middle East and the Iraqi culture, eye contact is often long and direct during conversations; however, staring and lengthy eye contact with women or with individuals who are praying is discouraged (United States Navy Chaplain Corps, 1998). They look directly into the eyes of the person with whom they are conversing, and this direct gaze is how Iraqis tend to evaluate the honesty of the person they are conversing with as well as show interest in the individual and conversation at hand (Samovar & Porter, 1991). For children or adults lowering the gaze during conversation is a sign of politeness when conversing with an older person or submission when being punished or reprimanded (Feghali, 1997). See Appendix C for a selection of Universal and Iraqi eye contact cues.

Paralanguage

Paralanguage refers to vocal behavior and all the oral cues in spoken utterances without word meaning. Vocal behavior provides information about age, gender, emotion, state of health, and trustworthiness (Richmond & McCroskey, 2000). Paralanguage includes language sounds (pauses, clicks, whispers, pitch), non-language sounds (whistles, kiss, laugh, cry), and control of air movement (nasal sounds, rate of speech; Key, 1977). These non-speech sounds also emphasize verbal content. Paralanguage can be unconsciously or consciously given (Poyatos, 1988). Paralanguage has primary qualities such as timbre, volume, tempo, and pitch. These exist so that we can recognize and differentiate between people. The primary qualities can be biological (e.g., dependant on gender), psychological (e.g., dependant on affect), social (e.g., dependant on context), and cultural.

Paralanguage can be classified in terms of qualifiers, differentiators, and alternates (Poyatos, 1988). Qualifiers are sound effects, accents, and whispers that emphasize or de-emphasize verbal messages. Differentiators reveal a person's age, gender, class, and culture. Alternates are comprised of sounds like sighs, throat clearing, coughing, and other non-speech utterances. Grunts, other audible sounds, and even silences are all used in conjunction with verbal and other nonverbal communication. Sound does not always need to be used to convey information. Silence, for example, is an element of nonverbal communication and can be used to dominate, control, emphasize, think, intimidate, or encourage an individual in an interaction (depending on the context; Key, 1977).

The vocal tone an individual uses may convey his or her attitude at that given time. It is also a means to evoke a response or reaction from the listener (e.g. changing vocal tones at the end of a sentence to ask a question). Like body posture and eye contact, vocal behavior is important in regulating our conversation in terms of turn-taking (Richmond & McCroskey, 2000). Specifically, vocal cues speaker use to maintain speaking without interruption includes increase loudness in speech, increase speech rate, and using more filled pauses. Vocal cues may also be used when speakers are ready to yield to another by a raise in the pitch of the voice at the end of the utterance, empathetic drop in pitch, intonation changes, reduced speaking rate, and a long unfilled pause – i.e., silence (Richmond & McCroskey).

Universal and Culture-Specific Paralanguage Cues

Vocal cues are perceived differently across regions as well as cultures and may cause confusion and misinterpretations of behavior. Nasality, voice stress, pitch, tone, and length can affect the meanings of these vocal noises. In general, Iraqis tend to converse more loudly than Americans. Vocal tones (e.g. aggressive, aggravated, critical, nervous, disappointed, friendly, enthusiastic, etc.) are often misinterpreted between Middle Eastern and American cultures. Specifically, in the Iraqi culture vocal tones signify different degrees of enthusiasm for the information presented or conversation being held. The actual tone the presenter uses can influence the content and interpretation of a message. For example, a somber presenter will have their message interpreted seriously. In contrast, during a presentation if a dismissive tone is used, the message will be disregarded and considered unimportant. In the Iraqi culture, it is necessary to portray your tone as accurately as possible so the message will be interpreted

precisely the way intended (Corballis, 2004). See Appendix D for a selection of universal and Iraqi paralinguistic cues.

Facial & Emotion Expression

The human face is the primary body part where expressions of emotion are transmitted. Our faces are critical in human communication since it is the most visible during interaction. Facial and emotion expression relating to anger, disgust, fear, happiness, sadness, contempt, and surprise have been suggested to be universal (Ekman & Friesen, 1986; Matsumoto, 2000). Cross-cultural research has suggested that these small set of facial expressions of emotion are universally expressed and recognized.

Universal and Culture-Specific Facial Expression Cues

Just as facial expression and emotion may be a universal language, some argue that there may be subtle differences across various cultures. For instance, accurate judgments of facial and emotion expressions have been proposed to be associated with similarity in cultural background (Elfenbein & Ambady, 2002). Thus individuals from the same culture may learn to perceive, recognize, and interpret facial and emotional cues based on culturally learned decoding rules.

An individual's culture tells him when and where to restrain or display emotion and what is acceptable and expected (Burgoon, 1985). Specifically, the appropriateness and display rules are culturally learned rules of expression management (Kupperbusch et al., 1999). These display rules are learned only because a child is born into a specific culture and environment (von Raffler-Engel, 1988). Usually the term "display rules" is used in conjunction with managing and controlling facial expressions according to these culturally defined rules so that the use of different facial expressions are appropriate for any given situation. Manusov and Patterson (2006) and Ekman and Friesen (1975) describe six ways that emotional expressions can be managed and expressed: (1) expressing true emotions with no modifications or inhibitions; (2) de-amplifying a feeling by expressing it with less intensity than actually experienced; (3) exaggerating or amplifying the expression of a feeling with more intensity than actually experienced; (4) neutral expression and expressing nothing; (5) expressing a feeling along with a smile in order to qualify the emotion; and (6) smiling in order to conceal true feelings (i.e., masking). These display rules are tied closely with an individual's specific culture, and vary accordingly by cultural expectations. Researchers have developed a reliable and valid way to measure display rules that takes into account five different expressive styles: expression, de-amplification (minimization), amplification (intensification), qualification, and masking (Matsumoto, Yoo, Hirayama, & Petrova, 2005). This new method of measurement is called the Display Rule Assessment Inventory (DRAI). The DRAI has been used in research that found that extraversion relates to expression and amplification, while openness is associated with de-amplification (Matsumoto et al., 2005). Furthermore, expression, amplification, and de-amplification are correlated with agreeableness, suggesting that individuals mask or qualify their emotions to be socially appropriate.

Cultures learn to express specific display rules to modify the emotional expression depending on issues related to social circumstances. For example, studies have shown that when

Japanese were compared to American participants, facial expressions while watching a movie with a negative scene varied according to the presence of an experimenter. When participants were alone, individuals from both cultures exhibited exactly the same facial expressions of emotion (Ekman, 1972; Friesen, 1972). These cultural differences may be attributed to the social rules learned by the Japanese, such that when a higher-status individual is present any negative emotion is masked with a smile so as to not offend that person (e.g., the experimenter). Thus, depending on the social circumstances, cultural display rules may disguise how facial and emotional expressions are expressed by either neutralizing the emotion, (de)amplifying the emotion, or masking the emotion entirely (Matsumoto, 2000). Hence, individuals from the same cultural background are likely to more accurately decode the display rules and interpret the emotional expressions of others. See Appendix E for a selection of universal and Iraqi facial expression cues.

Proxemics

Proxemics has been studied extensively in communication and refers to spatial distance cues between people in face-to-face communication, e.g. the appropriate intimate, personal, social distance, and public spaces (Hall, 1969). The amount of personal distance (or proxemics) that a person requires is based in part on that individual's cultural background. Proxemics can also involve the use of space to illustrate a status symbol (Key, 1977). Proxemics can be divided into kinesthetic factors and the touch code (Watson & Graves, 1966). The kinesthetic factors deals with bodily closeness and the potential for holding, grasping, or touching during interaction.

The touch code refers to the amount of touch that is involved in the conversation. Tactile or touch communication behaviors vary among genders, social statuses, and cultures. Tactile interaction functions to accentuate professional, social, friendship, intimate, and sexual relationships (DeVito, 1989). Tactile behavior involves touching that can fall into several categories including- greetings/congratulations, conversation and communication, ritualistic, signs of affection, play and recreation, occupation, learning activities, manipulation in interactions, and aggressive behavior (Key, 1977).

Universal and Culture-Specific Proxemics Cues

Iraqis tend to sit closer to each other than Americans do. For Iraqis, closeness during conversation is essential and offense is taken when this is not observed by their conversation partner. In the Iraqi culture, it is normal and appropriate to stand very close (about one to two feet away) to the conversation partner and moving away would be considered very impolite and be construed as an insult to the person (United States Navy Chaplain Corps, 1998). In addition, Iraqis are more likely to touch and pat each other than Americans (United States Navy Chaplain Corps, 1998). In the Iraqi culture, if no touching occurs during conversation, this can easily be interpreted as an attempt to maintain distance or a certain disdain towards the person being spoken to (Fattah, 2005). Furthermore, Iraqis will generally touch someone repeatedly during conversation in order to emphasize a point (Nydell, 2002). See Appendix F for a selection of universal and Iraqi proxemics cues.

In summary, nonverbal cues may be categorized according to their functionality or by means of their sensory modality channel. Depending on the origin, code and usage, nonverbal cues may be universal or culturally-specific. As we described previously (see also the appendices), there are similarities (e.g., facial expression) and differences (e.g., gestures) in how cues are used and interpreted. These nonverbal cues are used extensively in the Middle-Eastern culture to complement, contradict, emphasize, and/or substitute for speech.

SECTION III: RELIABILITY OF INTERPRETING NONVERBAL CUES

In order for a nonverbal cue to be reliably communicated, it must be perceived and correctly interpreted by the receiver. Some argue that the ability to accurately notice and understand nonverbal cues is dependent on individual differences. Consistent with previous research, Hall, Murphy, and Mast (2006) found that women demonstrated higher nonverbal recall accuracy and interpersonal sensitivity than men. This appeared to be the result of a heightened orientation to one's conversational partner, such that demonstrating positive affect to the receiver through frequent smiling, eye gaze, and head nods were correlated with more accurate interpretation of nonverbal cues.

Other than gender differences, relationships with others may be a factor in accurately recognizing and interpreting nonverbal communication. For instance, Matsumoto et al. (2005) found that people can reliably understand nonverbal cues of familiar people such as close friends and family members who exhibit and regulate the expression of their emotions. However, when interacting with strangers, people tend to conceal or qualify their nonverbal cues.

Depending upon the social context, the sender may or may not freely express their emotions via nonverbal cues. Zuckerman, Lipets, Koivumaki, and Rosenthal (1975) suggest that environmental influences may restrict the expression of certain emotions in a given environment but may lead the individual to develop a heightened ability for perceiving the nonverbal cues of others. Thus, reliably interpreting nonverbal cue may be due to varying skill levels for encoding versus decoding nonverbal cues such that for some people nonverbal cues may be easily interpreted yet difficult to produce.

Nonverbal modality channels described previously may be accurately interpreted based on the following conditions- the cue's specific meaning, intensity of cue, confirmation and contradiction with accompanying verbal or nonverbal message, clusters of cues, contexts, and culture. The specific meaning of a nonverbal cue (i.e., body posture, gesture) is communicated when it is recognized and accurately interpreted by others. The intensity of nonverbal cues aid understanding and stress the importance of the information. Intensity can be communicated in the severity of a frown or in the tightness of crossed arms. As the intensity of a nonverbal cue increases, the perceived criticality of the information being exchanged increases. Thus, in order to uncover the true intent of the message, it is important to look for groups of cues (clusters) that all mean the same thing (e.g. scratching your head may simply mean you have an itch, but scratching your head and raising your eyebrows conveys confusion). When several different nonverbal cues that mean the same thing are presented in temporal proximity during a conversation, the message communicated by the nonverbal cues is more reliable.

Finally, the context and culture should always be taken into consideration when trying to decode nonverbal cues. As demonstrated in the Appendices, cues may be universal or culture-specific (e.g., Iraqi). It is important to emphasize that nonverbal cues do not occur haphazardly or exist in isolation, but rather occur for specific functions and exist in the company of other nonverbal cues, verbal messages, context, and with people who may be culturally different.

Influence of Context and Culture

Context plays a major role in the way people communicate nonverbally. People use context and situations to determine how to behave and how to evaluate others during social interactions (Cody & McLaughlin, 1985; Hecht & DeVito, 1990). Nonverbal communication is dependent on context including verbal, situational, cultural, and other nonverbal cues. It is important not to rely solely on just one nonverbal cue, but to look for combinations and clusters of nonverbal cues. (Hecht & DeVito). For instance, people who focus only on individual nonverbal cues may stereotype individuals because they may perceive what they expect instead of what is really intended (Hecht & DeVito).

In every culture and in certain situations, expectations exist for nonverbal communication. These expectations illustrate the integral role that nonverbal behavior plays in everyday life. For instance, superior-subordinate and worker-coworker relationships are the types of relationships that may influence the interpretation of nonverbal communication cues. Particular nonverbal cues are learned from childhood, and different sets of cues are expected in formal vs. informal interactions (Jablin, 1985). Individuals first come into contact with nonverbal behavior as children growing up in a family environment. Children interact with their parents who establish dominance and the role of “boss” is quickly learned (Jablin). As children grow older they become involved in schools and other academic institutions where socialization on a larger scale begins. They learn work expectations, authority and superiority while learning appropriate manners of communicating with authority figures. As adults, they learn more about appropriate communication cues and expectations from the media, peers, and direct experience. Once these rules of nonverbal communication for different contexts are learned, individuals may successfully participate in these different situations. For instance, Matsumoto et al. (2005) found that individuals utilize different behavioral strategies to communicate, based upon the social situation they were engaged in, such that individuals expressed their emotions most sincerely with family members, followed by friends and colleagues, and were least sincere with strangers.

As an example, when in the context of superior and subordinate (dominant-submissive) roles, most of the interactions are in reference to task or job-related goals and are most often face-to-face. A supervisor has the right to request certain things of the subordinate and a certain amount of respect should be given to the supervisor by the subordinate (Richmond & McCroskey, 2000). There are specific nonverbal communication cues that superiors and subordinates display (see Table 3). An individual can generally tell who is who in the relationship just by observing the nonverbal behaviors of each. In the context of work group and co-worker roles, these relationships help people to understand the normal communication between superior and subordinates and how information is exchanged to facilitate superior-subordinate relationship (Jablin, 1985).

Table 3. Nonverbal communication cues given in superior-subordinate relationships (adapted from Richmond & McCroskey, 2000).

Nonverbal	Supervisor/Dominant Role/Higher Status	Subordinate/Submissive Role/Lower Status
Body Posture and Gesture	Relaxed posture (both standing and sitting)	Tense or cautious posture; more adaptive cues because s/he is tense
Face and Eye	Keeps head level and gaze direct, straight, long; expresses emotion more readily	May lower head and avert gaze; gets turn-taking cues from the supervisor
Paralinguistics	Uses silence to show dominance	More pauses
Space	Will invade subordinate space but not the other way around	Will not invade a supervisor's space unless instructed to
Touch	Initiates touch	Does not initiate touch

While context plays a major role in the way people communicate nonverbally, our societal rules and native culture create certain expectations that we rely on in all interactions and facets of communication. Thus, while much of our behavior is based on our interpretations of communication and how we code and decode information, most of our communication cues and behaviors are defined by the culture we come from. For instance, even the slightest and most subtle difference between gestures can have huge differences in meaning and interpretation (e.g. palm-in versus palm-out gestures; Archer, 1997). As mentioned in the cross-cultural communication section, culture and communication are inextricably intertwined so that one cannot be separated easily from the other.

Reliability and Functionality of Nonverbal Communication

One approach to assessing which nonverbal cues may be inherently more reliably communicated is based on the functional categorization of nonverbal communication, referred to earlier as emblems, illustrators, regulators, affect displays, and adaptors (Ekman & Friesen, 1969). In particular, emblems are suggested to be the easiest to interpret since they do not rely on context, unlike most of the other categories. It is clear that emblems will only be understood correctly if the receiver is familiar with the sender's particular culture. In contrast, illustrators are inherently dependent upon context and the environment as the sender refers to a locations in space or in a local environment. Similarly, although affect displays are universal in their recognition, display rules understanding is dependent upon the culture and context of the conversation between the sender and receiver. Regulators and adaptors also require further knowledge of the sender's background culture to be accurately interpreted.

Due to the one-to-many relationship (one nonverbal cue-many interpretations) of regulators, illustrators, adaptors and affect displays, it may be difficult to accurately interpret nonverbal cues. Emblems, on the other hand, have a one-to-one relationship between the nonverbal cue and the explicit meaning, which often represents a word or phrase. Appendix G presents a summary of the factors influencing the reliability of nonverbal interpretation based on their respective categories. Appendix H provides an example of nonverbal cues that require context to be interpreted correctly based on military scenarios.

Nonverbal Cue Reliability Experiment

To assess the reliability of nonverbal communication, we examined nonverbal cues based on the modality channel (i.e., body posture, gestures, eye contact, facial expression, paralinguistics, and proxemics), their respective functions (i.e., emblems, regulators, illustrators, affect display, and adaptors), and their corresponding origins (i.e., universal or Iraqi-specific). We developed an experimental design to test the hypothesis that emblems, affect displays, and universal nonverbal cues would be the most easily recognized and accurately interpreted. We measured both the correct interpretation of the cues and the corresponding confidence level of the response given by the participant.

Participants. Seven people participated in this pilot experiment, ranging in age from 20 to 57 ($M = 38$ years) and gender (3 females; 4 males) as well as apparent cultural awareness (3 English-speaking Americans familiar with universal nonverbal cues, 2 American Soldiers who have been to Iraq and interacted with Iraqis, and 2 Iraqis).

Methods. After signing a consent form, participants completed a brief demographic questionnaire that asked questions such as gender, age, language background, and, when applicable, experience with Iraqi nonverbal cues. Next participants were presented with a 25-question test of their ability to recognize and understand nonverbal cues (see Appendix I for all experiment materials). This was presented via a PowerPoint presentation on a laptop computer. For each question, participants were given a word or phrase describing a concept that could be communicated through nonverbal communication gathered from the literature, such as “Anxiety,” “Rapport,” or commands such as “Stop” or “I advise you not to argue.” Participants then watched a three different video clips; each video was approximately two-seconds long. Each video clip was of a Caucasian male performing three different nonverbal cues; one of which matched the word or phrase provided. Participants were asked to correctly identify which of the three videos best matched the word or phrase. The nonverbal cues used as stimuli in this test included an assortment of the various functional categories (i.e., emblems, illustrators, affect displays, regulators, and adaptors), and channel modalities (i.e., body posture, gestures, eye gaze, facial expressions, proxemics, paralinguistics); they were also balanced for culture so that there were nearly an equal number of universal nonverbal cues and Iraqi-specific cues.

Immediately after responding to each of the 25 questions, participants were asked if they were familiar with the target nonverbal cue in the context indicated by the word or phrase, and were also asked to rate their confidence level for the answer they provided. Following the experiment, participants were asked to complete a brief post-questionnaire, which asked how challenging the task was, and if they used any specific strategies to determine their responses.

Result. Across the 25 questions asked about nonverbal cues, the three sub-groups scored roughly the same. The two Iraqis averaged 19 correct answers; the three English-speakers averaged 17, and the two American Soldiers averaged 16. The very small sample size does not allow for significance tests or any generalized conclusions. We would have expected the Iraqis to have scored highest, as they were familiar with both universal and Iraqi nonverbal cues. However, we would have expected the Soldiers to have scored higher than the English-speakers, since they were assumed to have more familiarity with Iraqi nonverbal cues than those who have

not interacted with Iraqis. One issue raised by the data from this small group of participants is the extent to which incidental learning occurs among, for example, Soldiers deployed to another country.

Participants rated their level of confidence for each response using a 7-point Likert Scale, in which 1 = “Not at all confident” and 7 = “Completely confident”. Iraqi participants rated their confidence levels the highest ($M = 6.24$, $SD = 0.89$),. Soldiers had the next highest confidence ratings ($M = 5.68$, $SD = 1.06$) followed closely by English-speakers ($M = 5.37$, $SD = 1.85$). Interestingly, the most commonly missed nonverbal cues overall were typically accompanied with a high-confidence rating (between 5 and 7) for all participants. Anxiety was the most missed by participants (100%), followed by recognition, inquiring, and defensiveness which was missed 85%. The nonverbal cues for no, authoritative, and dominance were missed by 57% of the participants.

Participants rated their familiarity with each of the nonverbal cues after each trial as well, and similarly to their confidence ratings, Iraqis rated their familiarity with the nonverbal cues highest, ($M = 1.5$, $SD = 0.51$) followed by the Soldiers ($M = 1.28$, $SD = 0.45$) and the English-speakers ($M = 1.17$, $SD = 0.38$).

The most commonly missed nonverbal cues were 5 Regulators that 4 or more participants missed, one Adaptor that all 7 participants missed, and one Emblem that 4 of 7 participants missed. Two of the Regulators may have been missed as a result of ambiguity. One of them was “Defensiveness”, which most participants associated with the “Stop” gesture, rather than someone seated with arms and legs crossed (the correct answer). In a later trial, “Stop” appeared as the target nonverbal cue, and all participants scored correctly on it, most of them verbalizing the realization that they missed the previous question. All participants missed the nonverbal cue “Anxiety”; many of them chose the video demonstrating “tapping one’s forehead” rather than the Adam’s Apple Jump (correct answer). This may be due to the fact that the Adams’ Apple Jump is done unconsciously. Similarly, 6 respondents missed the nonverbal cue for “Recognition”, which was the Eyebrow Raise; this may also be due to the fact that it is often performed unconsciously.

Only two of the Iraqi gestures were missed by a majority of participants: “Inquiring” and “No”. Notably, the two Iraqi participants, and one Soldier missed “Inquiring”, so it is possible that the video itself did not accurately portray the target cue. The Iraqi participants correctly identified all of the other 11 Iraqi nonverbal cues in the study.

Discussion. Based on the data from this pilot experiment, the most frequently missed type of nonverbal cue for all participants were adaptors and regulators. This was not surprising, as adaptors and regulators are often culture-specific, or vary by personality type, and usually occur subconsciously in conversation. Affect displays were most frequently accurately identified, and this is likely due to their universal nature. The two affect displays in the study which were Iraqi included “Surprise”, which looks very much like the universal cue, and “doubting the truthfulness”, which is a paralinguistic combined with facial expression.

All participants correctly identified the two universal emblems in the study, “Money” and “Stop”. The Iraqi emblems were missed by a few participants, especially “No”, which involves a gesture and a paralinguistic; only the Iraqi participants and 1 Soldier correctly identified “No”. Although there was greater accuracy for illustrators in comparison to emblems, it should be noted that there was only one illustrator in the study, and 8 emblems. The illustrator was an Iraqi proxemic for “emphasis”, which all participants scored correctly.

The fact that affect displays, emblems, and illustrators were most accurately identified by participants may be due the deliberate or at least conscious awareness for performing all three types of nonverbal cue. Humans often display affect purposefully, or at least aware of their affective states. They also use emblems to consciously communicate a word or phrase to someone, and illustrators are similarly used to communicate spatial relationships in the conversants environment. See Appendix G for details on specifications of each category.

Thus, in comparison to adaptors and regulators, which are usually performed unconsciously and variably (in manner and frequency) depending on the speaker’s personality, affect display, emblems, and illustrators may be perceived as more “concrete” and predictable in the sense that they are usually performed or expressed in the same manner each time. Moreover, because adaptors and regulators are much more variable in their display, it may be said that there is a one-to-many relationship between them (i.e., one adaptor may be expressed in many ways), versus affect displays, emblems, and illustrators, which are less variable, and closer to a one-to-one relationship (i.e., almost always expressed the same way).

The current pilot experiment looked at 25 target nonverbal cues to test how reliably they could be identified by English-speakers who were unfamiliar with Iraqi nonverbal cues, and Soldiers and Iraqis who were familiar with them. This was intended to be an initial attempt to discover whether any differences exist between the types of nonverbal cue and their likelihood of being correctly perceived. Based on our preliminary data, it appears that this is indeed the case, whereas affect displays, emblems, and illustrators seemed to be most reliably communicated.

To benefit U.S. Soldiers in their attempt to reliably understand nonverbal communication in a foreign environment, future research should investigate whether adaptors and regulators are truly less reliably perceived, perhaps by showing them in the context of a conversation. By their very nature, both adaptors and regulators are highly reliant on the dynamic of conversation, and perhaps that is why they were not as easily recognized in the present study, in comparison to affect displays, emblems, and illustrators, which can stand alone, and do not require the context of conversation to be understood. Future research should test these nonverbal cues in the context of conversation, rather than in isolation. Finally, there was only one illustrator in the present project, so illustrators should be more thoroughly examined in future research.

SECTION IV: INSTRUCTIONAL TRAINING DESIGN

As discussed earlier, nonverbal cues are an important component of communication. Many of the nonverbal cues are culturally influenced; i.e., they will vary in their usage and meaning across cultures, and so a person from another culture is in danger of significant misunderstandings. Therefore, to improve cross-cultural exchange, it is important to increase the

knowledge of nonverbal cues and the skills in decoding the cues. The success of cross-cultural nonverbal training has been demonstrated previously. Specifically, Collett (1971) trained English individuals to engage in more visually attentive behavior when interacting with Arabs. When asked to rate the interaction, Arabs preferred trained individuals to the control group.

One approach to nonverbal training involves attending to the nonverbal cues of others and gaining the ability to accurately recognize and interpret these signals. Riggio (2006) suggests that the skill of decoding nonverbal cues is a subset of the construct of interpersonal sensitivity, which is defined as “the ability to sense, perceive accurately, and respond appropriately to one’s personal, interpersonal, and social environment”(Bernieri, 2001, p.3). We suggest that nonverbal training should involve the development of primary skills with respect to observing a nonverbal cue- attention, recognition, and understanding of meaning. Without some knowledge of what a nonverbal cue looks like, an observer may visually ignore the physical features of a nonverbal cue during a conversation. Attention to a nonverbal cue is necessary but not sufficient for correct interpretation of a nonverbal cue. The observer must also understand the meaning behind the cue in order to accurately interpret its significance during a conversation or in a particular context. To develop a nonverbal training system, we first reviewed several nonverbal assessment techniques that have been designed to measure nonverbal decoding. As presented in Table 4, each method has its advantages and disadvantages.

Table 4. Nonverbal decoding methods

Nonverbal Decoding Method	Description	Advantages & Disadvantages
Brief Affect Recognition Test (BART) (Ekman and Friesen, 1974)	Earliest and simplest methods. Participants decode photographs of basic facial expressions of emotion (happiness, sadness, surprise, disgust, fear, and anger) for a fraction of a second and must choose the correct emotion. A total accuracy score represents measure of nonverbal emotional decoding skill.	Disadvantage- static, visual cues of distinct facial expressions of emotions, lacking of context.
Japanese and Caucasian Brief Affect Recognition Test (JACBART) (Matsumoto et al., 2000)	Same as BART with facial expressions from Japanese and Caucasian posers.	Advantage- multicultural images
Slide-viewing technique (SVT) (Buck et al., 2005)	Assess individual differences in ability to read subtle, natural (un-posed) emotional expressions. Faces are videotaped while watching emotion-evoking slides (positive- sleeping baby; negative- severe facial injury; unusual or scenic slides) and talking about them. Participants view the silent video and determine which slide they are viewing depending on facial expressions. Total accuracy score measure emotional nonverbal decoding and specific emotion score.	Advantage- 2 scores- total accuracy and specific emotion accuracy
Communication of Affect Receiving Ability Test (CARAT; Buck, 1976)	Same as SVT. This test measures ability to judge spontaneous expressions on adults' faces. The test presents 32 slides of faces of individuals who were originally videotaped while watching emotionally evocative slides (e.g., pleasant vs. unpleasant; 16 male items, 16 female items). The test taker chooses which slide was being viewed by the person on the tape. Male-encoder and female-encoder items were separately scored, along with a total score.	Advantage- natural and dynamic expressions
Diagnostic Analysis of Nonverbal Accuracy (DANVA)	Assesses both visual emotional expressions and auditory nonverbal cues (paralinguistics). Includes both posed and spontaneous photographs of emotional expression via facial expression, hand gestures, body posture, and vocal cues. Scores measure correct response on each nonverbal channel.	Advantage- posed and natural expressions. All nonverbal channels.
Profile of Nonverbal Sensitivity (PONS) (Rosenthal et al., 1979)	The PONS measures nonverbal sensitivity at decoding posed emotional states, specifically affective expressions in adult voices. The PONS is a 45-min 16 mm sound film that comprises 220 two-second auditory or visual segments showing a single individual portraying various emotional states. A pair of behavioral alternatives written on an answer sheet accompanies each segment. The viewer has to decide which alternative best describes the segment. The 220 segments represent scenarios from four affective quadrants (positive-dominant, positive-submissive, negative-dominant, negative-submissive) crossed by 11 nonverbal channels (e.g., face only, body only, audio only, and all possible combinations). The internal consistency of the PONS ranges from .86 to .92, and its median test-retest reliability is .69. There are also "Half-PONS," a shortened version of the PONS consisting of the first 110 segments. These short versions may use visual or audio cues.	Advantage- good psychometric properties. Assesses different nonverbal channels. Many scenes. Disadvantage- enacted scenes that are not natural or spontaneous. Time consuming.
Interpersonal Perception	The IPT is a videotape consisting of 30 scenes. Each scene is	Advantage- focuses

Task (IPT; Costanzo & Archer, 1989) Social Interpretations Task (SIT), (SIT; Archer. & Akert, 1977)	paired with a multiple-choice question about the interaction depicted in the scene. All scenes contain full-channel sequences of unscripted behavior and employ an objective criterion of accurate judgment. Five common types of social interaction are represented: status, intimacy, kinship, competition, and deception. Unlike the PONS, which is a measure of sensitivity to nonverbal cues alone, the IPT evaluates sensitivity to nonverbal and verbal cues.	on verbal, nonverbal, and situational cues. Natural scenes. Objective correct response. Many segments. Two or more interacting to view dyadic rapport.
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The various nonverbal decoding assessments shown in Table 4 all address, to some degree or another, primary skills of observing a nonverbal cue- attention, recognition, and understanding of meaning. We propose that the optimal method of training these skills sets is by perceptual and conceptual learning. Specifically, to develop perceptual skills related to attention and recognition of nonverbal cues, perceptual learning is important. Developing an understanding of the meanings behind nonverbal cues can be trained via conceptual learning and scenario-based training.

Perceptual Learning

E.J. Gibson (1969) defined perceptual learning as the "increase in the ability to extract information from the environment, as a result of practice and experience with stimulation coming from it" (pp. 3). Perceptual attention occurs early in the information processing cycle, before environmental stimuli have been cognitively processed (Goldstone, 1998). Thus, perceptual learning may be defined in terms of level of information processing (early perceptual vs. cognitively processed), and by the means which perceptual knowledge was acquired, either through explicit verbal training or nonverbal associations (Melcher & Schooler, 2004). When perceptual stimuli are presented rapidly, without verbal associations, perceptual learning occurs at a low-level of neural processing; when stimuli are presented with longer exposure time, perceptual encoding occurs more deeply, at a cognitive level, and allows the learner to organize the information schematically (Melcher & Schooler, 2004).

Neisser's perceptual cycle (1976; see Figure 1) describes how humans perceive and understand objects in their environment, which is usually based on a prior goal or intention and motivation. This cycle is reciprocal and continuous; one's new experiences are influenced by and build upon one's existing knowledge and experiences. Neisser's perceptual cycle describes the interactions between knowledge, perception, action, and environments. Thus, one's prior knowledge, or "schema", for an environment or situation directs one's attention during the "exploration" of a new environment. Objects or information in the environment are attended to and "sampled", and if deemed valuable, may modify one's existing schema. The Perceptual Cycle may be applied to learning nonverbal cues, such that in order for a nonverbal cue to be appropriately understood in contrast with other nonverbal cues, the learner must compare new stimuli with previously attended stimuli, and attend to the distinctions between the two in order to modify his or her existing schemas and develop a deeper knowledge for them.

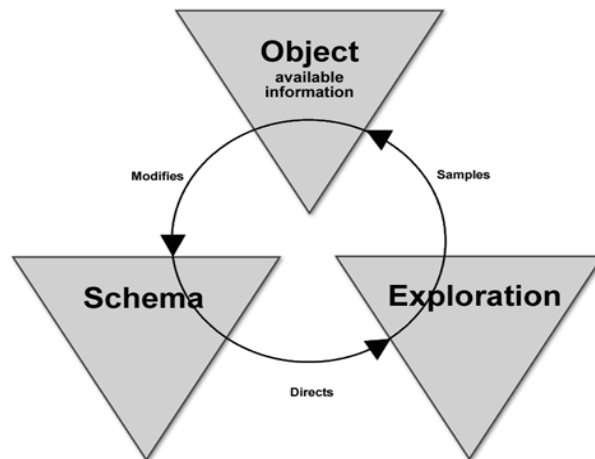


Figure 1. Neisser's perceptual cycle

Specifically, in order for nonverbal communication to occur between a sender and receiver (or observer), the receiver of the message must first attend to, or perceive, the nonverbal cue in their environment, then recognize the cue (i.e., differentiate it from other cues), and finally recall the cue's associated conceptual meaning. To develop a lexicon of nonverbal cues, the novice observer must first be aware of the speaker's physical features and movements to attend to and distinguish between those that constitute a nonverbal cue ("signal") and those which do not carry underlying meaning ("noise"). Once the observer can detect a potential nonverbal cue based on a series of physical features and movements, s/he must learn to discriminate between the stimuli of one cue in comparison to another. Similar to verbal language, in which a series of vocal sounds may be parsed into words or phrases, nonverbal communication, consisting of a series of physical features and movements, may be parsed into individual nonverbal cues. The observer must learn to recognize an array of physical features and movements, including body posture, eye gaze, facial expression, interpersonal proximity, vocal tones, and hand gestures, which may occur in series or parallel, as a single nonverbal cue. Finally, the parsed nonverbal cue must be associated with a concept in order to communicate its meaning. For instance, waving "hello" would be meaningless if the concept of greeting or "hello" was not associated with the gesture of the hand wave.

Attention

Training a Soldier to develop these perceptual skills is vital to decoding nonverbal cues as they occur in the context of a conversation, especially those which are cross-cultural. The Soldier must first become aware of which stimuli to visually and aurally (i.e., paralanguage) attend to as they pertain to nonverbal cues. To focus the learner's perceptual attention, training should present nonverbal cues to the learner via the sensory modalities in which the cues occur naturally in their context of use. They should not be accompanied by detailed verbal explanations. This allows the learner to make inferences about the nature of a nonverbal cue, and its relationship to other nonverbal cues, based upon its observed physical characteristics alone. Furthermore, according to Gibson (1969), an individual's perception changes with repeated exposure to stimuli and practice, such that repetition yields the ability to discriminate previously indistinguishable visual stimuli.

Our proposed computer-based training tool will incorporate these perceptual learning theories. Specifically, an introductory training module will acquaint the novice learner with a nonverbal cue performed in isolation (i.e., non-contextually) via a brief (2-3 second) video; two verbal labels, one of which describes its general categorical meaning may be incorporated to enhance perceptual learning. For example, the learner may have to select between “Anxiety” vs. “Rapport”, when matching the nonverbal cue in the video to the label. Immediate feedback (correct vs. incorrect) may be provided to the learner before the next video is presented. Nonverbal cues from a variety of categories may be presented repeatedly, until they are correctly associated with their labels. Moreover, to promote encoding of the nonverbal cues, they may be presented at a slow (rather than rapid) pace, and subsequent trials may be characterized by a high-contrast between the discriminatory features of one stimuli to the next (Melcher & Schooler, 2004).

The associate labels used in our training tool may be very basic categories of meaning. It has been shown that perceptual knowledge can be trained explicitly through detailed verbal explanations, or implicitly learned through associative learning techniques; the latter has been shown to lead to more efficient learning (Melcher & Schooler, 2004). Thus, the verbal labels we select in our initial training modules will be brief, and be associated with the visual and auditory characteristics of the nonverbal cues presented in the videos. As the learner evaluates and compares the physical features of the nonverbal cues, associative learning occurs, and the learner may begin to test hypotheses to better understand the inherent physical characteristics of particular categories of nonverbal cues (Melcher & Schooler).

Recognition

Once the Soldier has demonstrated the ability to attend to and associate perceptual cues with verbal labels, we will then train the skill of recognition and discrimination between two nonverbal cues. Generally, novices possess a single, basic categorical label for stimuli, whereas experts, more familiar with identifying patterns across complex stimuli, describe them with more specific categorical descriptions (Goldstone, 1998). The Soldiers would be presented with easy examples first, followed by increasingly difficult trials, which should help them better discriminate between similar stimuli. For instance, the level of difficulty may be related to the functional categorization of nonverbal cue presented. Table 5 presents a summary of the functional categories of nonverbal cues proposed by Ekman and Friesen (1969).

As mentioned previously, emblems should be relatively easy nonverbal cues to identify and distinguish due to their one-to-one relationship between stimulus and meaning. Affect displays, illustrators, regulators, and adaptors often involve a one-to-many relationship between a stimulus and its meaning, making them more challenging to interpret.

The initial modules of our training tool will present nonverbal cues individually (one per video), in isolation, and without distracters. This is based on research by Kass, Herschler, and Companion (1991), who found that pattern recognition skills are best developed via training that minimizes competing stimuli. However, recent studies by Fiore, Scielzo, and Jentsch (2004) and Fiore, Scielzo, Jentsch, and Howard (2006) suggest that adding visual “clutter”, or competing visual stimuli, in the context of a difficult visual discrimination task creates an optimal balance

of workload and performance, especially for people with high spatial ability. Based on this finding, to ensure that an individual receives optimal training (“cluttered” vs. isolated), our tool will first assess the learner’s spatial ability, prior to perceptual training.

Table 5. Functional categories of nonverbal communication

	Emblems	Illustrators	Regulators	Affect Displays	Adaptors
How does each category influence communication	Replaces words or phrases; used in environments where speaking is prohibited or discretion is desired. They are usually consciously given, so they can be repeated upon request.	Illustrators are depictions of verbal expression. They augment or amplify what a speaker is saying. Directly related to speech content, inflection, and loudness.	Regulators control and coordinate interaction during a conversation. They are very interactive between the speakers involved. They may be used to turn over the role as speaker, avoid/deny the role, or to demand it during a conversation.	General emotions and feelings are communicated typically via the face by affect display nonverbal cues. Additionally, sometimes other parts of the body or posture may also be involved to express intensity of emotion. Affect displays are highly dependent on context.	Adaptors are acts that are performed to the self (such as scratching or rubbing your hand), to others (smacking someone’s face), or to objects (such as picking lint off your shirt or playing with a paper-clip or pen). They are usually unconsciously done to release stress or tension.

Conceptual Learning

The ability to attend to and recognize a nonverbal cue is prerequisite to learning its underlying conceptual meaning. A concept is a mental representation of an object, event, or pattern, which contains knowledge considered relevant to the nature of the object, event or pattern (Gallotti, 2002). Concepts provide humans the ability to organize information into meaningful categories. These categories allow humans to make predictions about their environment. As described in Neisser’s Perceptual Cycle (1976), humans attempt to make sense of the world based on previous knowledge and experience; if that does not suffice, new concepts must be formed to handle the new information. Therefore, conceptual learning can be defined as *“the acquisition and application of new knowledge to result in concepts and symbolic representations not previously in the individual’s knowledge network, and would be exemplified in learning the meaning of a new idea, making connections between two previously unrelated ideas.”* (Maclellan, 2005).

Conceptual learning is critical as it provides deeper understanding of the knowledge acquired in comparison to perceptual learning. Research suggests that much of our conceptual learning of ‘schema’ knowledge is embedded in representative ‘stories’ (Schank, 1990). We employ these stories and use them as examples of principles within our schema. Our schemas is modified and updated as we interact with the environment and with others. Learners are actively involved in the learning process by constructing and structuring knowledge to previously learned concepts or establishing new concepts. The constructivist perspective proposes that learners are not passively receiving knowledge but rather knowledge is actively created by the individual to make sense of their experience (Piaget, 1967). Processes of assimilation and accommodation occur together as we modify (assimilate) our perception of the environment to fit our schema and modify (accommodate) our schema to fit the environment. Vygotsky (1978) argues that this construction of knowledge and understanding is not performed in solitary but founded on a social collaborative atmosphere.

In the context of learning nonverbal cues, the learner must associate meaning with the visual/auditory stimuli of nonverbal cues in order to properly decode the underlying message being communicated by the speaker. This may occur by providing context which may act as stories to assist in retrieving this information from memory at a later time. Promoting active learning and cooperative interaction with others while training may also assist in developing richer schema of nonverbal cue understanding.

One method of improving conceptual knowledge is through perceptual contrast training that helps learners to discern subtle conceptual differences between stimuli. This may be conducted by presenting contrasting events or scenarios, and asking the learner to describe the positive and negative aspects of each (Wilson, Burke, Priest, & Salas, 2005). When training nonverbal cues, contrasting scenarios of dyadic interaction may be presented to the learner, who should then identify which of the conversations contained the most socially appropriate or inappropriate nonverbal cues based on accurate recognition and understanding of nonverbal cues.

Nonverbal cues can appear very similar to the novice observer; thus, it is important to train the observer to attend to a cue’s unique features. The observable distinction between similar stimuli is called perceptual contrast. An observer’s situation awareness, which can impact their ability to notice such distinctions, can be improved with cue-recognition training at the featural level. This type of training will help increase the likelihood that the observer will notice the cue in a variety of environmental contexts (Burke, Salas, Estep, & Pierce, 2007). When training perceptual contrasts of similar nonverbal cues, greater learning is likely to result by presenting similar nonverbal cues in sequence, rather than mixing up different types between trials (Adini, Wilkonsky, Haspel, Tsodyks, & Sagi, 2004). For instance, novice learners do not usually utilize their knowledge of “base contrast” between similar stimuli when weighing decisions (Adini et al., 2004). Repeated practice and exposure to stimuli helps observers to improve their selection decisions when comparing stimuli.

Scenario-Based Training

As mentioned previously, one technique of training conceptual knowledge is via perceptual contrast training which utilizes contrasting scenarios while asking the learner to describe the

positive and negative aspects of each (Wilson et al., 2005). Thus, to increase the training effectiveness of cross-cultural nonverbal cues, it is important to provide *context* to these concepts, such as embedding this information within a culturally or operationally relevant scenario. Scenario-based training and assessment rely on controlled vignettes analogous to the real task environment, designed according to pre-specified training objectives and corresponding competencies (Cannon-Bowers, Burns, Salas, & Pruitt, 1998). Distinct trigger events, based on targeted training objectives, are scripted into a scenario, designed to elicit desired behavior, allow trainees to practice targeted skills, and provide an opportunity to measure performance and deliver specific feedback (Salas & Cannon-Bowers, 2000). In essence, with this methodology, “the scenario itself is the curriculum” (Cannon-Bowers et al., 1998, pp. 365).

Scenario/event-based approaches to training have been successfully demonstrated in numerous complex operational settings (e.g., Cannon-Bowers et al., 1998; Dwyer, Oser, Salas, & Fowlkes, 1999; Fowlkes, Lane, Salas, Franz, & Oser, 1994; Fowlkes, Dwyer, Oser, & Salas, 1998). For example, within law enforcement, the F.B.I. employs scenario-based training to teach rookie law enforcement agents how to effectively interact with civilians and criminals in potentially life-threatening circumstances (Lynch, 2005). This type of training allows these officers to utilize both their knowledge and skills in various situations, complete with role-players, scripts, and props, and has proven to be much more successful than simply reading a field manual (Lynch, 2005). Thus, using such realistic multi-sensory simulated experiences to present nonverbal training in cross-cultural interaction may increase motivation, knowledge integration, and mission effectiveness.

Applying perceptual contrast training via scenario-based training is promising for nonverbal cue decoding. The learner watches two scenarios in sequence and must determine how to react to each one. One of them may be socially appropriate and the other may indicate a threat. Schwartz and Bransford (1998) contend that training approaches that engage the learner may be more effective at developing a deeper and keener understanding of the information being trained. Furthermore, the ability to detect perceptual contrasts has been shown to improve accuracy of decision-making; this is most beneficial when the perceptual contrasts are contextually-defined (Burke et al., 2007).

In summary, it is important to first train Soldiers to attend to and recognize nonverbal cues in isolation, so that their perceptual distinctions (attention, recognition, perceptual discrimination) may be detected. Once Soldiers have learned to recognize the presence of nonverbal cues, the cues should be presented contextually, to train their underlying meaning. Specifically, the training tool should help the Soldier develop the skill of discerning the meaning of nonverbal cues as they are presented in context. Beginning with a perceptual learning perspective and progressing to conceptual training will help the learner become accustomed to detecting the nuances of both the physical characteristics of nonverbal cues as well as distinctions in their associated meaning.

Transfer of Training

While it is important to first learn to recognize and interpret nonverbal cues on their own, transfer of training for nonverbal cue recognition is vital, as nonverbal cues will be observed in a

variety of social contexts and cultural environments. In order to ensure effective conceptual training, a training tool should maintain consistent mapping between stimuli and concepts, promote transfer of training (i.e., to other environments and situations), and discourage negative transfer of training.

Negative transfer of training can occur when two situations involve similar or identical cues that are mapped to different responses or strategies. These incompatibilities can cause confusion and inhibit transfer of training to the second situation (Wickens & Hollands, 2000). An alternative to varied mapping, *feature learning* provides less disruption to conceptual learning by encouraging the learner to attend to the features of a stimulus and contrast it with other stimuli (Wickens & Hollands). Nonverbal cues that are highly context-dependent, for instance, require a Soldier to learn to recognize the cue in a multitude of contexts or environments. For such cases, it would be helpful to develop training trials where a target from one category and a distracter from another category are switched in later trials.

To promote transfer of training, it has been shown that describing functional distinctions helps learners better discriminate between similar stimuli in comparison to visual training alone (Goldstone, 1998). Moreover, to encourage positive transfer of training and prevent negative transfer, nonverbal cues should be consistently mapped to their conceptual meaning. A nonverbal cue in a learning module with a specific meaning should not be presented in a later learning module with different meaning, as this can disrupt learning the concept due to ambiguity and confusion (Wickens & Hollands, 2000). Emblems are likely the nonverbal cues most resistant to such ambiguity, due to their one-to-one relationship between physical stimulus and conceptual meaning. Other types of nonverbal cues that rely on the environment or context of conversation, such as regulators and some affect displays are more likely to be confused by the learner if presented inconsistently in learning modules. Awareness of these distinctions could assist the learner with transfer of training. For example, grouping nonverbal cues based on their function may improve transfer of training, as it has been shown that describing functional distinctions helps learners better discriminate between similar stimuli in comparison to visual training alone (Goldstone, 1998).

Just- in-Time Training

Given the dynamic, fast paced nature of today's military operations, there is an increasing and continuing need for effective just-in-time training programs and technological tools to provide or supplement Soldiers' basic training in response to changing operational requirements. Such *anytime-anywhere* technology may be especially useful for rapidly and effectively preparing Soldiers for operational contexts involving the need for interacting with different languages and cultures in stark contrast to their own. However, simply providing training programs targeting nonverbal decoding immediately before deployment may not be enough, especially given the amount of novel and complex information Soldiers need to absorb and integrate in a limited time span. Indeed, as mentioned above, a previous Army SBIR Phase I project included interviews with Soldiers who have been deployed to Middle Eastern countries which revealed that the cultural training provided prior to deployment was condensed and there was a high probability of forgetting this information when they later interacted with natives of that particular country (Samman et al., 2006). This is consistent with research findings showing

that when knowledge acquired in a training program is not applied within a short time span, this information will be forgotten, rendering the training ineffective (Woodford, 2004).

An *anytime-anywhere* tool may be especially useful for Soldiers who are in environments where training is not an option and have limited time to adequately prepare themselves for the challenges they may encounter in their newly assigned position. With the constant demand for rapid deployment, an efficient and effective way to bridge the learning gap of cross-cultural communication and nonverbal training is to offer a portable tool with reference knowledge that is easily accessible, making this information available anywhere and anytime. Support for the feasibility of this information presentation approach can be drawn from the increasing use of portable devices such as MP3, iPods and other mobile tools to deliver reference material (Agnvall, 2006). Corporations and trainers are realizing the potential to use these new, popular mobile gadgets as readily accessible means by which to provide employees with cost-effective multimedia. A recent report suggests that the number of people using these products could reach approximately 55 million by the year 2010 (Agnvall, 2006). With the opportunity of having reference material required to successfully sustain the training knowledge previously learned in recognizing and accurately interpreting nonverbal cues whenever and wherever, Soldiers may find this to be very valuable to effectively communicate with Iraqis.

SECTION V: MULTIMODAL INTERACTION

Given the need to present numerous pieces of information related to nonverbal cue and cultural understanding, display designers may look beyond visual displays to multimodal interaction. By employing other modalities (e.g., audition), training effectiveness may be improved by capitalizing on available modality cues. A member of this team has shown that these interactions are inducing a paradigm shift in interactive system design, allowing users to depart from primarily visual interaction alone to a whole host of multimodal interaction solutions (Samman, 2004; Stanney, Samman et al., 2004; Samman & Stanney, 2006). With multimodal systems, users perform complex tasks more quickly, with greater accuracy, and with improved user satisfaction (Maybury, 2001).

Based on perceptual learning, previously discussed, when various sensory modalities are combined, a process known as perceptual integration facilitates element detection and speeds reaction time (O'Hare, 1991). Multimodal interaction has been suggested to be effective as a learning tool by providing an abundance of encoding strategies for storing and retrieving memories (Doyle & Cruz-Neira, 1999). Making better use of the central nervous system's ability to handle a rich set of sensory user inputs and outputs allows individuals to integrate information from various channels. Different areas in the brain are guided to form various associative features related to the task. This provides an abundance of encoding strategies for storing and retrieving memories (i.e., encoding specificity; Tulving, 1983). The concept of encoding specificity suggests that one learns more than just an object (nonverbal cue); one also learns the context in which the information was presented. The concept of dual coding provides further evidence of how multimodality assists learning (Paivio, 1971). Dual coding proposes that when information is encoded in multiple ways (e.g., visual and auditory), it is more likely that the information will be retrieved when it is needed at a later time. This is particularly relevant in a multimodal interaction environment because there are multiple opportunities for the user to

encode information, thus expanding the notion of dual coding to “multi coding” (Samman, 2004). This is critical in training nonverbal communication such as learning the nonverbal cue and the context allows Soldiers to better encode the associative features of both which will assist in retrieval and decoding meaning.

Achieving the above benefits of multimodal interaction requires research to determine how best to achieve a synergistic communication between user, task, and context. According to the Multiple Resource Theory (Wickens, 1992), workload may be triggered when similar modalities are used in terms of user input, cognitive processing code, and/or user response modalities. Thus, to develop multimodal interaction, we may optimize the Soldier’s capabilities by devising a medium that is compatible to the way s/he perceives, thinks, and acts. Figure 2 may be used to guide us in developing multimodal interaction for nonverbal training tool. It is also essential to examine which modality is suited for which type of information. Table 6 suggests how nonverbal cues and context may be designed when using multimodal interaction.

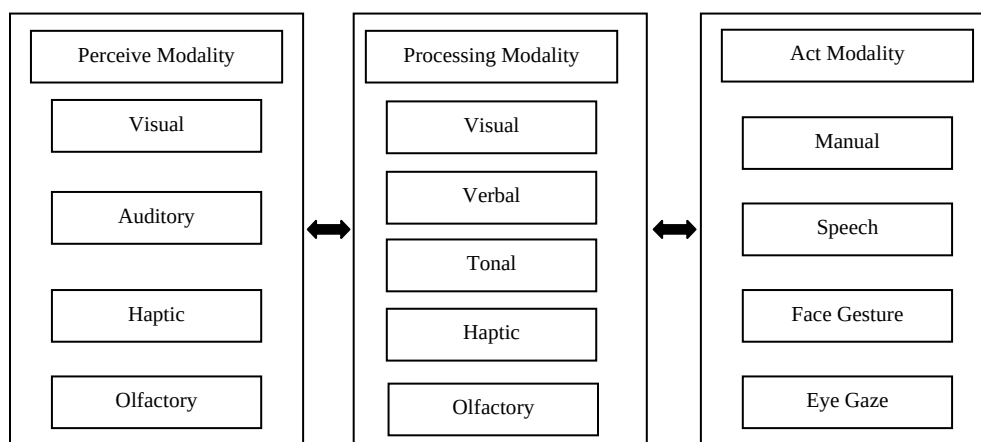


Figure 2. Multimodal Perceive-Think-Act Framework (adapted from Samman, 2005)

Having Soldiers interact with a tool multimodally is very valuable in effectively training nonverbal cues. As mentioned previously, research has suggested that individuals may recognize and interpret nonverbal cues more accurately when using particular channels. Specifically, Mesquita and Frijda (1992) found that individuals from the same cultural and language background were able to accurately recognize expressions based on tonal intonation contours and rhythm cues. Furthermore, depending on the nonverbal channel used to express emotion, differences were found in terms of recognition accuracy. For example, Elfenbein and Ambady (2002) found that happiness was most accurately recognized from a visual image of the face but least accurately from the voice. Conversely, anger and sadness were most accurately recognized cross-culturally from the voice but less accurately from a visual image of the face. *“This suggests that different nonverbal channels do not merely carry redundant information but rather each may have certain specialized functions in the communication of emotion....this reinforces the need for richer multichannel examination of emotional expression and recognition”* (Elfenbein & Ambady, 2002, p. 230).

Table 6. Theorized suitability of sensory modalities for conveying information (adapted from European Telecommunications Standards Institute, 2002)

Information Source	Visual	Auditory	Haptic
Temporal	↑	++	+
Spatial	++	↑	+
2D localization	++	+	+
3D localization		+	+
Alerts/warnings	-	+	++
Fast reaction time	++	+	↑
Persistence	++	--	++
Memorability	+	++	+
Relative quantitative	+	++	+
Absolute quantitative	++	-	--
Private/confidential	↑	-	++
Peripheral surrounding	-	++	+
Instructions	↑	+	+
Object properties	++	↑	++
Motion	+	↑	+

Key: ++ = best modality; + = next best; ↑ = neutral; - = not well suited, but possible; -- = unsuitable

In summary, multimodal interaction may be used to improve learning effectiveness and enhance Soldier's interpersonal skills and cross-cultural nonverbal communication. Multimodal interaction is widely applied in the gaming and interactive media industry. Therefore, the next section will review the literature on what comprises an effective educational game as it relates to training nonverbal cues. The scientific literature in the above and below sections will serve as a framework to develop a conceptual design of an interactive, computer-based training tool to decode nonverbal cues and facilitate communication between U.S. Soldiers and Iraqis. We hope to fill this gap by developing a conceptual design of training materials that are accessible, interesting, and most importantly effective.

SECTION VI: GAMING AND INTERACTIVE MEDIA

“Games are widely used as educational tools, not just for pilots, soldiers, and surgeons, but also in schools and businesses ... Games require players to construct hypotheses, solve problems, develop strategies, and learn the rules of the in-game world through trial and error. Gamers must also be able to juggle several different tasks, evaluate risks and make quick decisions ... Playing games is, thus, an ideal form of preparation for the workplace of the 21st century as some forward-thinking firms are already starting to realize.”

(The Economist, August 4, 2005)

Modern military use of games is centuries old, with one notable example being *Kriegsspiel*, a German game used to teach Soldiers battlefield strategies (Egenfeldt-Nielsen, 2005). Most military training has historically been carried out by the live simulation of military activities ranging from maintenance to combat. The arrival of computer-based training during the last twenty years has greatly increased the feasibility of using technological simulation, as

evidenced by the annual Interservice/Industry Training, Simulation and Education Conference (I/ITSEC). A majority of all the papers and demonstrations at the 2007 conference concerned computer based training systems.

According to Roger Smith, Chief Technology Officer for the U.S. Army Simulation and Training, *“The military has been one of the first and most avid adopters of game technologies. These games originated from military roots in the 1990’s and contain many similarities with the training devices that are used to train soldiers”* (Egenfeldt-Nielsen, 2005). For instance, the successful adoption of *Marine Doom* was a watershed moment in the use of original and modified computer video games for training. Over the past decade, the military has used many original and modified games, including *Full Spectrum Warrior*, *America’s Army*, and more recently, *Tactical Iraqi*.

The virtues of interactive, game-based learning are becoming apparent even within the K-12 educational establishment. Starting from the work of Seymour Papert (Papert, 1994) and others in the 1970's and leading to today's widespread use of video games for learning (Prensky, 2001), a great deal of experimental evidence is accumulating that interactive simulation can be used to teach skills at all levels of Gagne's taxonomy of learning (Gee, 2003). This training technique is in accordance with what Major General Robert Scales (ret.) proposed in testimony to the House Armed Services Committee (2004). He suggested that a useful training method to Soldiers might be *“urban sites optimized to teach soldiers how to coexist with and cultivate trust and understanding among indigenous peoples inside foreign urban settings. Such centers would immerse your soldiers within a simulated Middle Eastern city, perhaps near a mosque or busy marketplace where they would be confronted with various crises precipitated by expatriate role players who would seek to agitate and incite a local mob to violence.”*

Impact of Gaming and Interactive Media

Serious research on the educational potential of gaming and interactive media has increased markedly since 2000. With over 12.5 billion dollars in sales in 2006 and an estimated 18 billion dollars of sales projected for 2007, the computer game industry is a major economic player. It is highly likely that Soldiers will have played games and may in fact be “gamers.” While the age of the average gamer is 33, the mean age for active duty Soldiers is 27 and the bulk of the military force is under 40 years old (U.S. Department of Defense, 2007).

Therefore, it suggests that today's military recruits are drawn from a population that has grown up immersed in interactive media. Many 18-year-old Americans have used video games, computers, cell phones and hand-held computing devices all their lives. It is suggested that this interactive experience has led to fundamental differences in how today's youth acquire information and process it (Prensky, 2006; Jenkins, 2006; Gee 2007). J. R. Flynn (1984, 1987, and 2007) has documented a long term, steady increase in the I. Q. scores of students around the world. A leading hypothesis to explain this phenomenon asserts that the increasing complexity of the students' information environment has provided a constantly growing set of cognitive challenges. In response, young adults have evolved a distinctive culture and style of interacting with the world. Interactive media have also caused shifts in public education (Bransford, Brown, & Cocking, 1999).

The Digital Native is a phrase that characterizes these young adults and differentiates them from "digital immigrants", those who grew up in a paper-based world. According to Jukes and Dosaj (2004), key attributes of digital natives include the following characteristics- (1) they like to learn 'just in time' by seeking information when it is needed; (2) they like to interact with several peers simultaneously; (3) they are effective in parallel tasking; (4) they understand how to use hyperlinked information; and (5) they expect instant gratification. For instance, a digital native seeking a solution to a problem expects immediate solutions (e.g., 'Google' topics), discuss it with a circle of friends via instant messaging, post opinions about the question on a 'blog', and act on their knowledge by producing a web page or a 'YouTube' video. They expect that a game or an innovative entertainment product will soon appear that will comment on, satirizes, or otherwise incorporates any worthwhile new idea. Digital natives are adept users of play as a learning medium. Every new game requires rapid learning of its rules of engagement, story line and strategies for victory. Thus, to understand how people interact with and learn from games, we should examine game design and decipher the trends of the gaming industry and their scientific foundations.

Perspectives of Effective Educational Gaming

Costikyan (1994) is a frequently cited article that lists key concepts of game design, within the framing definition of gaming- "*A game is a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in pursuit of a goal.*" Decision making is more potent than mere interaction; decision making is interaction with a purpose. The player expects that their actions will cause something to happen that either moves them toward their goal or provides additional information. Information should be easy to find, in the right amount, and should require active effort to acquire. 'Just in case' learning is of little interest to digital natives, their logical strategy is 'just in time' in a world where knowledge is exploding.

Although the military has been a strong advocate of educational games for training, in the civilian world and academia many questions remain about the impact of educational gaming and interactive media and how to create an effective educational game. This is largely because educational game research occurs in different disciplines; from computer science, education, psychology, digital media, to the non-scholarly research undertaken by the commercial gaming industry. Because each discipline has specific views of educational gaming, research across many domains is necessary to form a cohesive, integrated picture. Thus, determining the components of an effective educational game is challenging but also richer as the same or competing hypothesis cross-pollinate to create a multifaceted picture of this topic. Fortunately, there has been much overlap among research results, although the level of detail in a specific area seems to be related to the discipline in which the research was undertaken. For instance, psychologists might emphasize motivation, where computer game theorists might emphasize aspects of the technology, such as the best hardware or software design methodology, motivation of game players, structure of games, and what makes games "fun."

The scientific study of psychology in education yielded many results. In particular, the subfields of instructional design and the related field of cognitive science were quite instructive.

Instructional Design (ID) is the systematic process of translating general principles of learning and instruction into plans for instructional materials and learning. Although ID is also a discipline and a science, for the purposes of this report, we shall address it primarily as a process. Thus, ID can be further defined as the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs (McNeil, 2007).

Principles of Effective Educational Gaming

The cognitive science literature focuses on the formation of internal knowledge structures and the relationships between concepts and causes. Effective learning results in the retention and transfer of skills across domains. New skills are formed based on prior learning and reflection is encouraged. In Bloom's taxonomy, the analysis, synthesis, and evaluation steps are primarily cognitive processes (see Figure 3). To facilitate deeper learning, knowledge should be presented incrementally in a step-wise fashion and should be chunked to group meaningful units of information. Meaning should not be habitually de-contextualized, nor should basic skills be habitually learned in isolation or out of context. Skills should be presented inductively by engaging the player progressively in the game/domain. New knowledge should be presented on a 'need-to-know' basis. Allowing the player to experiment with novel situations and make discoveries, without always explicitly feeding them information, can facilitate deeper learning (Gee, 2003). To promote knowledge understanding and assist analysis, synthesis and evaluation in our nonverbal training tool, the principles discussed below will be incorporated in the design process.



Figure 3. Bloom's Taxonomy

Background knowledge should always be accessible to the user. For example, within a gaming context, help can be stored in material objects in the gaming environment (e.g., a graphical image, advice given by a non-playing character.) This allows the player to engage their minds with other tasks, but also have access to assistance (Gee, 2003). However, when information or assistance is given proactively to the user, instead of just available, it should be offered 'just-in-time' when needed or when it can be applied. Designers should consider embedding links to external material as part of the game (Prensky, 2001; Mitchell & Savill-Smith, 2004; Kelly & O'Kelly, 1994; Oyen & Bebeko, 1996; Becta, 2001; Dempsey et al., 2002), or provide them with templates or example solutions to solving problems (Kelly & O'Kelly, 1994; Oyen & Bebeko 1996; Becta 2001; Dempsey et al., 2002; Mitchell & Savill-Smith, 2004). When assistance is provided, it should be clearly marked. Another consideration is to

offer players an opportunity to consult with an expert (Mitchell & Savill-Smith, 2004). The result is scaffolded instruction rather than direct instruction.

Questions and participative learner activities are also encouraged. Eliciting individualized responses in the form of diagnostic feedback can be helpful. Additionally if players can provide input to parameter-driven animation of dynamic simulations, this can be effective. The inclusion of advanced ‘challenge’ activities or complex exercises to stimulate higher order thinking skills can provide a good balance to lower order skills. However, learning situations should be ordered so that in the early stages less complex information is presented in such a way that they lead to generalizations in later stages of the game (Gee, 2003). Therefore, in the beginning, players should see many instances of fundamental signs and actions than would normally occur in the real world (Gee, 2003). As the player progresses through the game, reflection should be encouraged (Prensky, 2001). Reflection should be presented so that players can infuse existing knowledge with new knowledge and can adjust their cognitive maps if necessary (Prensky, 2001; Mitchell & Savill-Smith, 2004).

Autonomy allows players to have control over their learning environment. The environment should be learner-centric and should adapt to individual learner profiles and should match the learner’s needs and interests. One simple way to do this is to allow players to customize their interface by adjusting the color, text, or avatar (Kelly & O’Kelly, 1994; Oyen & Bebeko, 1996; Becta, 2001; Dempsey et. al, 2002; Mitchell & Savill-Smith, 2004). The learner should be able to have control over the content presented and be able to vary the pacing or have the ability to review information as needed. Players should be presented with meaningful personal choices during game-play (Ryan, Rigby, & Przybylski, 2006). This enables the player to feel that they are the cause of the action; thus, satisfying their need for autonomy. Providing opportunities for action at any given moment during game play, such as providing multiple ways for them to progress through the game, also helps the player to retain a sense of control (Gee, 2003). During game play, it is equally important not to punish the player for things that are out of their control. Even elements in graphic design (e.g., exclusion of graphical doors that the character cannot walk through) can be adjusted to meet autonomy needs (Ryan & Rigby, 2006; Rigby, 2007). Furthermore, if applicable, designers should consider using computer artificial intelligence (CAI) branching to allow users to progress through material in a learner-centric manner while still maintaining a defined learning sequence. (Nicole, 2007) Finally, allowing the user to take the role of a specialist, rather than a learner, is helpful, particularly for those who have quickly mastered elements of the domain.

Gaming and interactive media designers should also consider the components of the tool in terms of the *basic knowledge, skills, and methods of the domain*. Components involve breaking learning concepts into unitary components prior to more composite components, such as principles and procedures are necessary. Providing control by the player over quantity and degree of difficulty of components and exercises has proven effective as have practice environments. Identifying components are particularly important for some development models such as the Game Object Model (GOM) and ADDIE. Although, this information should be contextualized, there are instances when information can be de-contextualized and still taught effectively (Mitchell & Savill-Smith, 2004).

Collaborative learning fulfills the social needs of the players. This includes joint work, a teaming approach, social negotiation, accountability and peer evaluation. Learners can be encouraged to share what is learned outside of the game/domain with others online or in person (Gee, 2003). Games should also provide opportunities for human interaction (Kelly & O'Kelly, 1994; Oyen & Bebko, 1996; Becta, 2001). It should incorporate opportunities for discussion into the game. For example, the inclusion of learning prompts may be an effective way to promote social interaction. Another consideration is adding team play toward common goals (Ryan & Rigby, 2006; Rigby 2007). In multiplayer games, including both competition and cooperation (where learners must work together to achieve a goal) can be beneficial. For instance, pairing two learners at a computer provides a natural setting for peer teaching.

Engagement, immersion, and creativity are critical and often-overlooked factors in educational software design. At the root of these should be the element of flow (Csikszentmihalyi, 1990). One way to enhance immersion, fantasy, and creativity is to make the non-playing characters active. Providing short, focused meaningful dialog can add to atmosphere of the game and can encourage fantasy which is key to retention (Ryan et al., 2006; Rigby 2007). The goal is to have a game that is fun enough that someone who is not in the target audience would still want to play it and learn from it (Prensky, 2001; Mitchell & Savill-Smith, 2004). Other ways to foster creativity and flow is to incorporate innovative analogies, metaphors, and icons and use them as bridges from familiar to unfamiliar learning territory. Designers should take care, however, to not overwhelm the player during problem solving, thinking, and reasoning operations or long-term retention might not occur (Sweller, 1988). The addition of novel situations and real-world problem solving with authentic tasks however, helps players to remember situations while also taking ownership of the problem solving process. Creativity in presentation is also important. For example, being mindful of the visual representation of characters in games may include gender and ethnic balance. Incorporating a means to help players overcome visual, auditory or other disabilities is also important (Becta, 2001; Mitchell & Savill-Smith, 2004). Providing a non-game option for those who do not want to play the game is also a good option.

Challenge is incredibly important and is at the core of game play. The game design should create the right amount of challenge for the player (Gee, 2003). This means that the player should operate at the outer edge of his or her resources to optimize challenge. (Gee, 2003). However, care should be taken to ensure that excess challenge is not provided. Designers should also vary the pacing. Too much challenge is frustrating; sustained challenge can lead to concentration and attention, but excess may be de-motivating and exhausting over time (Ryan et al., 2006; Rigby, 2007). The goal is to optimize challenges, to match abilities, and to stretch people without overwhelming them (Ryan et al., 2006; Rigby, 2007). Designers should vary the nature of the challenge. For instance, means of scoring and providing different levels of challenge might be options. Players should also be able to select the level of difficulty at the beginning of the game (Poole, 2000). Adding optional sub-goals for players of higher abilities and rewarding them for meeting those can add more challenge without penalizing those without the same level of skill (Kelly & O'Kelly, 1994; Oyen & Bebko, 1996; Becta, 2001). Intrinsic rewards should be available from the beginning through the end of the game. Rewards should be customized to player level, effort, and growing mastery of the game (Gee, 2003). Games should also be tested to determine whether the game is too difficult or too easy for the

average user. Challenging players may also occur by providing clear, achievable goals and giving feedback on player's progress. Challenge may also include both short and long term goals. However, challenge should be limited to the game play, not to game mechanics such that game mechanics should be fairly simple for players to learn (Gee).

Competency is closely associated with challenge; providing the right level of challenge boosts the player's sense of competency. One way to help players feel competent is to foster a high success to failure ratio. One practical means of doing this is to give the player help surreptitiously during a 'boss fight' when the player has to tackle the last and greatest 'enemy' prior to winning the game (Ryan et al., 2006; Rigby, 2007). Research also has indicated that rewards should be offered intermittently and should be customized for each learner's level, effort, and growing mastery of the game (Poole, 2000; Gee, 2003). Additionally, the player should feel comfortable with taking risks during the game. One means to do this is to be very careful about providing feedback that is negative such that the user should feel safe to take risks during game play (Ryan et al., 2006; Gee).

Feedback of player's performance should be incorporated to demonstrate mastery of the game and the material (Kelly & O'Kelly, 1994). Providing clear, achievable goals and feedback on the player's progress is also important. Integrating feedback and debriefing into game play is particularly effective (Kelly & O'Kelly, 1994; Oyen & Bebeko, 1996). Feedback should incorporate process and performance measures. Different types of feedback should be provided for both the system and real world (Kelley & O'Kelly, 1994). Users should be able to experience mastery in the moment to moment game play, not only at the end of a level (Ryan et al., 2006; Rigby, 2007). One common way to do this is to provide consistent, positive, but relevant feedback during game play such as points counters or damage meters (Ryan et al.; Rigby).

Mastery of the game and the material are important factors in the educational gaming and interactive media. It is possible for players to memorize, and therefore master the game, but not master the learning material. To counteract this, it is recommended that as the player progresses, certain elements for achieving the goal change (Mitchell & Savill-Smith, 2004). In this way, they 'undo' routine mastery and cause players to be forced to think about the educational material. One simple example might be for players to be presented with different scenarios or types of problems as they play. Another example might be changing the strategy for winning when the players move to the next level of game play (Gee, 2003).

Relevance, in adult education in particular, is an important part of the educational process. The context of the lessons and therefore the educational game should be relevant to player's lives (O'Donnell, Reeve, & Smith, 2007). If a simulation is being designed, it should mirror real life in three aspects - process, content, and context (Stretch, 2000). Therefore, designers should consider the target audience's needs when determining the pace and duration of the games and enable interaction with fantasy and realistic characters (Becta, 2001; Dempsey et al., 2002). Relevancy can also be applied to the type of technology selected to implement the lesson. In the ARCS model of motivation and engagement, relevancy refers to whether the learner views technology as connected to personal goals.

Identity is also quite important. Games often allow players to create a virtual identity. Games should allow players to make links between their real-world identity and their virtual one. This fosters commitment to their identity in the virtual world and contributes to a sense of immersion (Gee, 2003). A learner should be given real choices about that identity. A good educational game should also help people to see themselves in different roles. For example, the player should be able to take on the role of a teacher, producer, or an “insider” as well as a learner (Gee). Those playing the educational game should think of themselves primarily as “players” and not “learners” to foster the sense of immersion (Prensky, 2001). Altruism is an important part of the identity for many people. Providing opportunities for altruistic play are important. For example, in a quest game, a Soldier might stop and provide a piece of candy or a toy to a little kid. Making these moments clear and explicit and providing no penalty for them allows players to feel good, helping them be further immersed in the game world (Ryan et al., 2006). The games with most impact are structured so that players learn something about themselves and their potential (Gee).

Incidental learning is effective when it is masked to the player although deliberate on the part of the designer. Winning prototypes support engagement and incidental learning (Mitchell & Savill-Smith, 2004; Dempsey et al., 1996). Game designers should consider the player’s expectations of a specific genre, the different learning outcomes based on relationship between type of content (i.e., fact, concept, procedure, principle), and level of performance required (i.e., use, find, remember).

Technical considerations should also be considered in educational game design. For example, designers should ensure that the structure of the game matches learning objectives. Designers should also consider the development of games for different platforms (i.e., desktop, mobile; Oyen & Bebko, 1996). The technical boundaries of the game, such as bandwidth, latency, computation power, and communication architecture should be mapped to the technical infrastructure of the target audience. Like any other good software application, the game should be scalable, secure, and provide good technical support (i.e., bug patches, error resolution, and active complain-response channel). Additionally, building in cheating detection and an active test bed can allow characteristics to be changed over time (Cheung & Siu, 2002).

In summary, the above principles gathered in gaming and interactive media should guide the conceptual design of the nonverbal training tool.

Interactive Performance

Interactive Performance (IP) is an art form related to improvisational acting that is emerging as frequent elements in game concept formation. Leading graduate schools of game design such as Carnegie-Mellon’s Entertainment Technology Center and the Florida Interactive Entertainment Academy incorporate courses in improvisation and interactive performance in their curricula. Interactive Performance integrally involves both a group of trained *inter-actors* and a guest/protagonist called the *spect-Actor* (more detail described in Wirth, 1994 and Izzo, 1998). Researchers Jeff Wirth and Steve Fiore (personal communication, 2007) conducted several experiments in which a student audience observed (via live video) an interactive performance in which one member from the student audience was taken into the next-door

performance space to serve as the spect-actor. Audience engagement and learning were measured. Preliminary results indicate that audience members learned more and were substantially more engaged with the subject matter when someone they knew was the active participant "in the box" than when a stranger served as spect-actor. Furthermore, Wirth (personal communication, 2008) conducted another experiment with medical residents at a Jacksonville hospital. Preliminary results suggested strong learning effects when residents in another room observed through one-way video the interaction of another resident with "patients" (inter-actors playing the role of patients). Based on these promising findings, the medical school of the University of Florida is developing plans to incorporate Wirth's interactive performance techniques in medical resident training. This new technique may be considered to be a new trend in gaming, training, and educational interactive media.

Based on the instructional training design, multimodal interaction, gaming and interactive media sections, we compiled design principles (see Appendix J) that were employed in the conceptual design of the nonverbal decoding training tool (NOVEL). In the next section, we will evaluate several tools used by Soldiers to train for cross-cultural interaction in terms of language and operational readiness.

SECTION VII: COMPETITOR ANALYSIS

To aid in the development of a nonverbal decoding training tool, a competitor analysis was performed on several pieces of software. Three candidates for analysis were identified based on the following criteria- (1) each contains culture-specific training for Iraq (or can be easily modified to by the end user to include such training); (2) each requires that the trainee considers Iraqi gestures as part of the training process; and (3) each is either currently in field use or is currently in the test/evaluation phase by the military. The tools analyzed were:

- Tactical Iraqi (Tactical Language Training, LLC)
- VCommunicator (VCom3D)
- VECTOR (Chi Systems)

Additionally three other applications were considered- ES3 Sim ("Every Soldier a Sensor Simulation"), ELECT BiLat, and DARWARS Ambush! However, upon closer examination, DARWARS Ambush! ELECT BiLat, and ES3 Sim did not seem to provide significant training in culture and nonverbal communication; thus, fall outside the scope of this report.

Tactical Iraqi™

Tactical Iraqi™ is a self-paced, computer software program that teaches Iraqi language (Arabic) and culture in an immersive, 3D, scenario driven environment. Developed by Tactical Language Training, LLC. and specifically tailored for the U.S. Marine Corps and U.S. Army personnel, the program provides up to 100 hours of training.

Tactical Iraqi™ is one of the "best of breed" products for game-based Iraqi Arabic language training. It is computer-based and immersive, particularly in the Mission module, and

presents gestures in context. It also tests gestures as well. However, there are some factors that suggest that Tactical Iraqi™ alone does not provide adequate coverage for gestures.

First, Tactical Iraqi provides less than 30 gestures, which limits the number of gestures to Soldiers such as those that may be important in a dangerous situation. Second, there is not a method for user input such as to easily add gestures that may be from a particular area, or include cues that might be gender specific. Third, since gestures are interspersed throughout the training program and not grouped together in one module and may take roughly 100 hours to complete the entire program in its entirety, focused learning of gestures is extremely difficult.

Fourth, independent result findings indicated that Tactical Iraqi was not nearly as effective as other modes of instruction for teaching Iraqi cultural information. Specifically, an evaluation to determine the effectiveness of Tactical Iraqi as a training tool for Special Operations Forces was commissioned by the Special Operations Forces Language Office (SOFLO) (Surface, Dierdorff, & Watson, 2007). The project evaluated training effectiveness not only in terms of what information the student actually learned, but also in terms of their reactions to the training methods and content, how the tool affected their motivation and self-efficacy for learning, behavioral criteria, and reaction measures such as satisfaction and usability. Only 25.3% of the respondents preferred Tactical Iraqi for opportunities to practice applying knowledge of Iraqi culture. Less (22.7%) felt that the tool offered adequate opportunities to learn mission-related Iraqi culture and a still smaller percentage (13.5%) felt that the Tactical Iraqi was superior in allowing them to learn Iraqi culture. The authors recommended changes for improving the tool such as changes to the cultural data presentation. Reviewers recommended that cultural knowledge and application, as well as cultural testing should be added to the Tactical Iraqi (Surface, Dierdorff, & Watson, 2007, pp. 77). Thus, relying on Tactical Iraqi alone for nonverbal communication training might prove to be ineffective given the proliferation of gestures and other nonverbal cues in Iraqi culture and their importance in communication.

VCommunicator Mobile

VCommunicator Mobile is a portable language training and reference system that incorporates rudimentary gestures within the context of a phrase. The system, which has been successfully deployed in the Army's 10th Mountain Division, is a small portable reference that doubles as a training tool. Scenarios are simply a means to organize phrases and the portability means that Soldiers are able to use the tool during their "downtime" while they are deployed. Although useful, the number of gestures included in the tool is very limited. Additionally, learners receive no feedback as to whether they interpreted gestures correctly. Lastly, the system is suited to individual learning, but not to group instruction.

VECTOR

VECTOR (Virtual Environment Cultural Training for Operational Readiness) is a computer-based game that provides cultural training through the use of a detailed, scenario-based training virtual environment. The game consists of scenarios that are similar to those found by Soldiers in the field. Trainees navigate their avatar through the scenarios, with the aim of forming good relationships with the Iraqi Non-Playing Characters (NPC) so that they can obtain

information. If the trainee performs culturally appropriate gestures and asks culturally appropriate questions, they are rewarded with the trust of the NPC and the player gets more information. If not, the NPCs become uncooperative. The trainee must use the cues as well as dialogue to decide their next course of action (see Figure 6).

Table 7 presents a comparison between the three products and their features. Appendix K provides further detail comparison to their respective features and functionalities.

Table 7. Feature Comparison of Competitor Analysis

Feature	Tactical Iraqi	VECTOR	VCom3D
Trains gestures	Y	Y	Y (limited)
Gestures in context	Y	Y	Y
Number of gestures included	LESS THAN 30	N/A	N/A
Task based learning	Y	Y	Y
Provides feedback on correct interpretation of gestures	Y	Y	N
Trainee can add gestures	N	N	N
Provides animated representations	Y	Y	Y
Provides video/real life simulation	Y	N	N
Suitable for Group Instruction	N	N	N
Suitable for Individualized Instruction	Y	Y	Y

SECTION VIII: NONVERBAL LEARNING (NOVEL) TOOL

To train Soldiers nonverbal recognition and understanding, the overall objective of this project was to develop an interactive, computer-based training tool to improve Soldiers' ability to decode nonverbal cues and behavior. The tool, which we labeled NOVEL will assist Soldiers to exhibit effective cross-cultural communication skills and prepare them to interpret and predict behavior more accurately in cross-cultural environments. NOVEL will train nonverbal cues expressed via multiple channels (e.g., body posture, gestures, paralinguistics, eye contact, facial expressions, and proxemics) in a modular format for universal and Iraqi cues and will provide feedback to Soldiers while assessing their performance.

Principles of NOVEL Design

We developed five modules we label as the A, B, C, D and E of nonverbal cue training. The first module is Acquire perceptual knowledge by attending and recognizing nonverbal cues. Associative learning will be employed to connect implicit nonverbal cues to explicit verbal labels. The second module is Build on the perceptual knowledge attained in the first module via perceptual discrimination training in terms of repeated exposure and practice. The third module is Critique a scenario to promote conceptual learning by using the perceptual contrast training method. The fourth module is for the trainee to Do it by training as an active learner in the training scenario while being observed and critiqued by other fellow trainees to promote social learning. The fifth and final module is Exercise what you have been trained on to sustain the

recognition and understanding of nonverbal cues anywhere and anytime within a social surrounding. Further detail on each module will be discussed below.

NOVEL Conceptual Design and Architecture

Conceptual design. NOVEL is built around a process of convergence. Scientifically based training principles of perceptual, conceptual, and active social learning theories are used as a framework in training nonverbal cues. Trainees are trained to recognize, understand, and then predict behavior based on nonverbal cue interaction. During every stage the system will gather information about the trainee's performance, so as to present the most-needed cue experiences in subsequent stages. Additionally, response feedback will be provided throughout the training modules.

NOVEL Performance Assessment. During each module, trainee's performance will be tagged for correct and incorrect responses. Nonverbal cues that were incorrectly recognized or understood in every module will be 'flagged' and embedded in the following modules to be re-trained.

The following sections briefly describe NOVEL's modules.

Pretest

Training objective- Prior to training Soldiers on nonverbal cues, a pretest will be presented to establish nonverbal cue knowledge in recognition and understanding. The information will assist to assess training effectiveness when comparing pre-test performance to post-training performance.

Module 1-Acquire nonverbal cues

Training objective- This module will train Soldiers to attend to and recognize nonverbal cues by employing perceptual training principles. Associative learning will be employed to connect implicit nonverbal cues to explicit verbal labels.

Module 2- Build nonverbal cue knowledge

Training objectives- Build on the perceptual knowledge attained in the first module and expand by employing perceptual discrimination training with repeated exposure and practice.

Module 3-Critique scenarios

Training objectives- The third module is to critique a scenario and promote conceptual learning by using the perceptual contrast training method. Employing conceptual and scenario-based training principles, this module will extend the training of recognizing and understanding of nonverbal cues in context.

Module 4-Do it for yourself

Training objective- The fourth module is for the trainee to ‘do-it’, by training as an active learner in the training scenario while being observed and critiqued by fellow trainees to promote social learning.

Module Five-Exercise when you deploy

Training objectives. Employing social learning and just-in-time training principles, this module will be provided to Soldiers as a follow-up training tool when in the foreign country.

NOVEL Hardware and Software Configurations

Hardware. Our primary hardware target is a standard Wintel PC running Windows XP or Vista. This platform is in common use in schoolhouse training environments throughout DoD, and is easily accessible in laptop form. A headphone-microphone combination will be required for the audio interaction in Modules three and four.

Our secondary hardware target is a PDA capable of wirelessly surfing the web, displaying color graphics and audio. One example may be the iPhones, which has an 8 or 16GB flash drive and a 3.5 inch display with 480 x 320 pixel resolution. It supports wireless Wi-Fi 802.11b/g and Bluetooth. It has multiple multimedia capabilities that include a built-in camera, stereo earphones with built-in microphone, support for multiple audio formats including MP3 and WAV, and video formats including MPEG-4. This makes it very suitable for displaying videos. iPhones support Mac OS X v10.4.10 or later operating system, as well as Windows Vista and XP, and iTunes 7.5 or later. Apple has designed the iPhones to be a completely closed system. Although full application development is not yet opened, there are many Web-based applications for use. iPhones could be suitable for displaying videos and animations due to the support of multimedia capabilities mentioned above and the web-based applications that are already available. However, game development is still not possible since apple is refusing to turn the iPhone into a gaming platform. There are some iPhone hacking kits already available and programs for use, but the results are not yet guaranteed.

Software. We expect that all of NOVEL will be deliverable by un-enhanced Web browsers such as Internet Explorer, Firefox and Safari. The significant exception is the audio feedback component, which will require some special code development. For our own software development (e.g., custom RTE), we anticipate using Eclipse Java because of its maturity, ease of use across platforms and wide availability of open source software modules. Most elements of NOVEL would be relatively easy to deliver through a run time environment similar to the SCORM 2004 3rd edition Reference Run Time Environment.

To allow for cross-platform compatibility, the development may be performed using C++. OpenGL is very widely used worldwide and famous for its well supported and best documented graphics API. There are many extensions and utility libraries to facilitate development and help shorten the development cycle. The extgl extension loading library can be used to generate OpenGL extensions. Simple Direct Media Layer (SDL) can provide

windowing, input, and image loading functionality. SDL is written in C but works with C++. Any C++ and OpenGL with SDL implementation will allow for cross platform support as they support Linux, Windows and Mac OS X operating systems. Linux is a free open source Unix-type operating system developed under the GNU General Public License. The GNU C compiler gcc could be used. Gcc is developed by the GNU project as a free compiler. All graphics may be developed using OpenGL API. The system may also be ported to other operating systems like Windows or MacOS. For windows, the development may be done in Visual Studio and OpenGL. As for Mac OS X, it may include a BSD-based POSIX API and hence any development on Linux could be ported to Mac OS X.

Initial Evaluation of NOVEL Conceptual Design

An initial evaluation was conducted soliciting feedback from Army Soldiers on the potential utility of NOVEL's A, B, C, D, and E modules for nonverbal training, as described in Section VIII, based on conceptual design features illustrated in paper and computer storyboards.

Participants. Three males between the ages of 24 and 26 participated in this study. Participants spent between 6 and 14 months in Iraq. All three interacted with Iraqi civilians, and one also interacted with Iraqi military personnel. Two participants had only 1 day of training, while one had one month of training. All participants rated themselves as "Medium" for computer experience (used 3 to 10 software applications) and "High" for video game experience (play often, 3-5 week).

Methodology. Participants first signed an informed consent form, completed a demographic questionnaire, and interacted with a pre-test, 5 modules, and a post-test prototype of a nonverbal cue training tool NOVEL. For the pre-test and post-test, participants watched a scenario and were then asked to choose the correct meaning of the nonverbal cue from multiple choice responses. For the Modules, participants watched videos of nonverbal cues and determined meanings of those cues. After completing each section, participants rated them on several criteria discussed below. After interacting with each Module, participants completed questionnaires that assessed their opinions of the effectiveness and usefulness of each training module, as well as their perceived level of enjoyment with each module.

Results and Discussion. Participants used 5-point Likert Scales (1 = positive opinion, 5 = negative opinion) and open-ended questions to assess their opinions of each of the above modules based on several factors:

1. *Understood the rules.* The three participants rated the rules for all modules as easy to understand (Mean = 1.3) with the exception of Module 5, which was rated as less easy to understand (Mean = 2.7).
2. *Ability to recognize nonverbal cues.* Participants said that all modules promoted ease of recognition for nonverbal cues, especially Modules 2 and 3 (Mean = 1.0). The Pre-Test and Post-Test were rated as accurate tests of one's ability to recognize nonverbal cues.

3. *Ability to remember nonverbal cues.* Participants rated the ability to remember (or test one's ability to remember) nonverbal cues similarly to the ability to recognize them. Modules 2 and 3 were again rated as most likely to promote memory for nonverbal cues, while part of Module 1 was rated as least likely to promote memory for nonverbal cues (Mean = 2.7). The Pre-Test and Post-Test were rated as somewhat accurate tests of one's ability to recognize nonverbal cues.

4. *Ability to understand nonverbal cues.* Modules 2 and 3 were rated highest for promoting one's ability to understand nonverbal cues. The Pre-Test was rated as less accurate to test one's ability to understand nonverbal cues (Mean = 2.7) than the Post-Test (Mean = 2.0)

5. *Real people vs. animated figures.* All three participants preferred to see real people performing nonverbal cues in the videos to the idea of having animated figures. Animated figures were rated a Mean of 3.7 or 4.3 for every module, while real people were rated as 1.7 or 2.3.

6. *Usefulness.* In terms of usefulness, Module 3 was rated as most useful (Mean = 1.3), and Module 4 was rated as least useful (Mean = 2.7).

7. *Efficiency of Learning.* Modules 2 and 3 were rated as most efficient at training nonverbal cues (Mean = 1.3) and Module 4 (Mean = 3.0).

User Satisfaction Ratings. A subset of Shneiderman's (1987) Questionnaire for User Interaction Satisfaction (QUIS) was utilized to assess user preferences as they related to interactions with the modules. For each of these 5 questions, two anchor words were provided on a 5-point scale, and participants circled the number in between the anchors that best described their satisfaction level. Note that the anchors were scored in reverse to the previous questions, such that a low rating in this section indicated a negative opinion.

a) *Frustrating vs. Satisfying.* Participants rated most modules a Mean of 4.0 or higher (approaching "Satisfying"). The highest rated was Module 2 (Mean = 4.7). The two lowest rated (Mean = 3.3) were the Pre-Test and Module 5.

b) *Terrible vs. Wonderful.* Module 2 was rated closest to "Wonderful" (Mean = 4.3), while part of Modules 1, was rated lowest (Mean = 3.3).

c) *Difficult to Play vs. Easy to Play.* Module 1 and the Post-Test were rated as easiest (Mean = 4.7) while Module 2 (Mean = 3.0) was rated as less "Easy to Play". These ratings are slightly inconsistent with the ratings of "Frustrating vs. Satisfying" above, where Module 2 was rated as most satisfying. One may deduce that the challenge associated with Module 2 contributed to its satisfaction rating.

d) *Boring vs. Fun.* Modules 2, 3, and 4 were rated a Mean of 4.0 (approaching "Fun") while the Post-Test was rated as least fun (but not boring) with a Mean of 3.3.

e) *Ineffective at helping me learn nonverbal cues* vs. *Effective*. Modules 2 and 3 were rated as most “Effective” (Mean = 5.0), followed by the Post-Test (Mean = 4.0). Part of Module 1 was rated as “Ineffective” (Mean = 1.3), and the Pre-Test was rated as slightly ineffective (Mean = 2.3).

Summary of Findings

All three participants had positive feedback about NOVEL’s five modules. One stated that *“this system has great potential”*, another stated *“hopefully it will be available for my next deployment”*, while another believed that it is *“very good, it can train many soldiers quickly and will save lives”*. One participant added that this type of training would be good for interrogators, and desired to see “actual stories” recreated in the form of a learning module to train how to read a “high-stress” situation.

Participant feedback also indicated some potential limitations of NOVEL. The visual elements of NOVEL may prove to be less engaging and convincing than the production value standards that Americans expect from daily viewing of professionally produced television and internet content.

SECTION XI: CONCLUSION

Military experts stress that cross-cultural communication and understanding is critical for Soldier mission success. *“Culture awareness and the ability to build ties of trust will offer protection to our troops more effectively than body armor....In Iraq, a curtain of cultural ignorance continues to separate the good intentions of the American soldier from Iraqis of good will. Inability to speak the language and insensitive conduct become real combat vulnerabilities that the enemy has exploited to his advantage.”* (Major General Robert Scales, US Army, 2006). One effective method is in recognizing and accurately interpreting the nonverbal behavior of others, especially Iraqis such that *“communication with speakers of Arabic requires the ability to “read” beyond what is being said in words, and to understand nonverbal communications”* (p. 37) (Lieutenant Colonial William Wunderle, U.S. Army, 2006).

Current cultural training methods emphasize “do’s” and “don’ts” of cultural protocol. The training lectures that mention nonverbal communication briefly touch upon a couple of nonverbal cues that should not be performed. Based on our competitor analysis, the only training tool that trains nonverbal cues is Tactical Iraqi. However, to date, the tool limits training to one sixth of nonverbal communication (e.g., gestures); hence, restricting Soldier communication interaction. Ignorance of more than 60% of cross-cultural communication becomes a vital vulnerability to Soldier success. Furthermore, interviews with a few Soldiers who have been deployed to Iraqi and other Middle Eastern countries suggests that the cultural training provided prior to deployment had a high probability of being forgotten when they arrived and interacted with natives of that particular country (Samman et al., 2006). This is consistent with research findings showing that when knowledge acquired in a just-in-time training program is not applied within a short time span, this information will be forgotten, rendering the training ineffective (Woodford, 2004).

Given the need to enhance cross-communication exchange between U.S. Soldiers and Iraqis, the current project sought to design a training tool for decoding nonverbal behavior. Nonverbal communication was reviewed and a database of universal and Iraqi nonverbal cues was created based on various modality channels including body posture, gestures, eye contact, facial expressions, proxemics, and paralinguistics. This database may be incorporated into the training tool to assist Soldiers in recognizing and understanding nonverbal communication. As we synthesized the nonverbal communication literature, we found that the reliability of nonverbal cues is dependent on several factors (i.e., type of nonverbal cue, culture, and context). We conducted a preliminary research experiment examining several nonverbal cues that vary in modality channel, were either Iraqi or universal, and varied in the type of functionality (i.e., emblem, regulator, affect display, illustrator, and adaptor). Results suggest that the emblems and illustrators were easier to understand whereas regulators, adaptors and affect displays may be easily misunderstood. We propose that this may be due to the one-to-one connection of emblems (one emblem to one meaning), whereas the others may have one-to-many connection (one cue to many meanings) that may be dependent of the culture or the context of the situation.

To develop a conceptual design for the nonverbal training tool, we established design principles based on scientific foundations found in the literature on nonverbal decoding assessment, learning, training, instructional design, multimodal interaction, gaming, and

interactive media. Design principles were created and served as the building blocks for the conceptual design of a prototype of the Nonverbal learning tool (NOVEL). This tool was designed and built around a process of convergence. Scientifically based training principles of perceptual, conceptual, and active social learning theories were used as a framework in training nonverbal cues. Trainees will be trained to recognize, understand, and predict behavior based on nonverbal cue interaction. Five modules were designed to incorporate the ABCDE of nonverbal training, which are- (1) Acquire nonverbal cues; (2) Build knowledge of concepts; (3) Critique others; (4) Do it yourself; and (5) Exercise when you are deployed.

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APPENDIX A BODY POSTURE

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Stressed, disturbed, startled, uncertainty, frustration, anger	When someone is disturbed or startled by something, the first reaction is to reach up and touch the back of the head.	Static				X	X
Uncertainty about or disagreement with an idea; may not vocalize how they are feeling	Hunch shoulders, angle head to one side, and compress lips.	Dynamic				X	
Holding back negative emotion, uncertainty, fear Meaning may be equivalent of “biting one’s lip”	Seated, with ankles locked and (usually) tucked under the chair, while hands grip the arm rest of the chair.	Static		X		X	
Disagreement, misunderstanding of a speaker’s message In an emotional conversation: Disbelief, sympathy, grief, cognitive dissonance, emotional empathy	Head shake rotating horizontally from side-to-side. In emotional conversation, side-to-side rotation is rhythmic.	Dynamic	X	X		X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Resignation, uncertainty, submissiveness Reveals misleading, ambiguous, or uncertainty in dialogue; thus, it may provide a probing point to examine opinions	Shoulder shrug may modify, counteract, or contradict verbal remarks. For example, a shoulder lift, accompanied by saying, "Yes, I agree" suggests, "I don't agree".	Dynamic	X	X		X	
Rapport, friendliness, coyness (courtship); strike a submissive pose; respond to cute signs (e.g., babies)	Head tilts to side	Static				X	
Attraction, "I give up," childlike, harmless	Men and women may unconsciously shrug their shoulders when they find each other attractive	Dynamic		X		X	
Invitation to speak	Aiming of one's upper body at partners they like, even while angling their faces and eyes away. Squaring-up the shoulders is a nonverbal invitation to speak.	Dynamic		X		X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Admiration, agreement, liking Disagreement, dislike	Angular distance reveals how we relate to or feel about people who are sitting, standing, or waiting nearby. Our upper body unwittingly <i>squares-up, addresses, and aims at</i> people we like, admire, and agree with, but angles away from people we dislike or disagree with.	Dynamic		X		X	
Affection, blessing	A mouth-to-head kiss displays affection or blessing.	Dynamic			X	X	
Agreement, liking, loyalty	Aligning the upper body with that of someone we like or are loyal to. May be used to tell who is the most powerful person in the room by noticing that everyone else's torso is aimed at him/her.	Static		X		X	
Agreement, comprehension, affirmative cue, approval, understanding	A rhythmic, vertical, up-and-down movement of the head while listening to someone.	Dynamic		X		X	
Readiness	Hands on hips shows that the body is prepared to perform or take part in something or to take charge.	Static			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Readiness	Leaning forward in one's chair, ready for an encounter or conclusion.	Static		X			
Attracted, Interested	Body weight is shifted to one hip and front foot is pointing forward. This stance provides a clue to a person's intentions by pointing the foot (i.e., toward nearest exit or a person).	Static		X		X	
Closed off, defensive, submissive, uncomfortable	Crossing one's legs indicates closed off communication.	Static				X	
Non-Receptive to Communication	Seated, with both crossed legs and arms.	Static				X	
Holding back a valuable concession	Locked ankles may means concealing information. Ask questions to reveal the hidden concession.	Static				X	
Negative Feelings	Gross postural shifts, such as bending away.	Dynamic				X	
Anxious Interaction	Flex arms, lean away, angle away from person who upset us.	Dynamic				X	
Defensive barrier sign, Acute Nervousness, Chronic Anxiety	Arms crossed while speaking, with elbows pulled tightly into the body (i.e., flexed and abducted).	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Unintended Aggression	Extended height will denote authority and aggression.	Static				X	
Disliking, Disagreement	Arm-cross, held less tightly against the chest, with elbows elevated and projecting outward (away from the body, i.e., abducted), in a guard-like stance.	Static				X	
Disagreement, Disliking, Shyness	Bending spinal column away from person seated beside you.	Static				X	
Disagreement, Misunderstanding of a speaker's message	Head shake rotating horizontally from side-to-side.	Dynamic	X	X		X	
Intimidation	Seated version of hands on hip pose, except hands are behind the head with elbows pointing outward.	Static				X	
Dominance	Dominant person toe direction go outward while submissive person toes move inward	Static				X	X
Dominance, No Intention to Leave	Predominantly a male gesture, feet are apart and firmly on the ground.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Arrogance, Disdain	Extend the spine backward (dorsally).	Static				X	
Dominate, Threaten, Bluff	Enlarge or exaggerate the body's size.	Static				X	
Superiority, Arrogance, Disdain	Lift the chin and look down the nose.	Static				X	
Dominance, Confidence	Eyebrow raise; Hands on Hips; Head tilted back; Palm-down gestures	Dynamic				X	
Powerful feelings of Conviction, Excitement, Superiority, sometimes Rage	Emphatically nod head while speaking or listening.	Dynamic				X	
Authority	We accent our words with authoritative palm-down cues, and show that we mean business by squaring our shoulders, lifting our faces and chins, and visibly standing tall.	Dynamic				X	
Flight, Submission	Swallowing is associated well with flight and submission.	Dynamic				X	
Submissiveness, Lack of Conviction	Lean backward and away. Use palm-up gestures.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Respect, Submissive Status to Authority	Feet together and both pointing forward. This is a formal, yet neutral stance.	Static		X	X	X	X
Humility, Supplication	Unusual posture, in which the body stands upright with arms extended by its sides, palms rotated forward, and feet resting flat upon the floor.	Static				X	
Submissive Appeal, Harmlessness, Lower Social Status	Bow or nod head.	Static		X		X	
In an emotional conversation: Disbelief, Sympathy, Grief, Cognitive Dissonance, Emotional Empathy	Rhythmic side-to-side rotation of the head.	Dynamic	X	X		X	
Authority	We accent our words with authoritative palm-down cues, and show that we mean business by squaring our shoulders, lifting our faces and chins, and visibly standing tall.	Dynamic				X	
Emphasis for an Idea, Assertion, or Key Speaking Point	Flexed-forward, lowering motion of the skull.	Static				X	
Promote Key Points	Lean forward over, and use palm-down gestures.	Dynamic				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Social Space	Invaded social space will force a person to lean backwards at the waist.	Static				X	
Women Social Space (with other women)	Women stand slightly closer to each other, face each other more, and touch more than men do with other men.	Dynamic				X	
Shy, Timid (women)	The leg twine is used by shy and timid women.	Static				X	X

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Body Posture

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Brief Conversation	After shaking hands in greeting, Iraqis continue to hold your hand while talking if they expect the conversation to be brief. Upon saying "good-bye", they shake it again.	Dynamic		X	X		
Greeting	With members of the same sex, kissing both cheeks is a common greeting, like embracing.	Dynamic		X		X	
Friendship	Same-gender Iraqis hold hands to express friendship.	Either				X	
Good Friends, Equality (in status)	If an Iraqi reaches out to hold your hand, accept it, as it is a traditional expression of friendship and respect	Static				X	
Greeting Strangers	Strangers DO NOT hug and kiss, Women are NOT touched in public	None					

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Outward Display of Affection, Friendship (not sexual in nature)	Outward display of affection between men (and women) shows friendship; not sexual. Can show this by: 1) Holding Hands, Kissing, Hugging 2) If Iraqi does not touch you, he does not like you 3) Full-body embrace should NEVER be initiated until you are completely sure the Iraqi is a close friend; It is considered an HONOR if an Iraqi gives you a full embrace.	Dynamic				X	
Opposite Sex Meeting (DO NOT display Affection)	It is unacceptable to show affection for anyone of the opposite sex in public (including spouses!). When a man meets a woman, he should nod and say, "Hello". He SHOULD NOT touch or compliment her.	Dynamic					
Insult while Seated	DO NOT sit with legs crossed because it may point the soles of the feet at the other person. This is insulting to person	Static					

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Body Posture (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Disdain	If no touching occurs during conversation, it may indicate an attempt to maintain distance or certain disdain towards the person spoken to.	None				X	
Emphasize a Point	It is common to touch someone repeatedly during a conversation, often to emphasize a point. Touching and patting is an important component in conversing with others.	Dynamic	X			X	
Conversational Body Orientation	Iraqis use direct body orientation when conversing.	Static					

APPENDIX B GESTURES

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Gestures

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Neutral Attitude	Straight-on head up position.	Static				X	
Rapport, Agreement	Palm-up cues, Eyebrow flash (raised quickly), Head nod, Shoulder shrug	Dynamic		X		X	
Acknowledgement	Observer waves with palm facing person	Dynamic	X		X		
Reluctance, Sincerity, Stop Hugging	Patting the back while hugging shows reluctance to continue hugging, or sign to the other person to end the hug. Sincere huggers hold on tightly.	Dynamic		X		X	
Agreement, "Yes"	With origins in bowing to appear subordinate, the head nod is recognized as agreement or saying, "Yes".	Dynamic	X	X		X	
(encourages) Cooperation, Agreement	Talkers will often mimic head nodding unconsciously when they agree, which results in increased cooperation.	Dynamic	X	X		X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Friendliness	Palm-up gestures are friendlier and more conciliatory than palm-down.	Dynamic				X	
"Yes"	"Yes" is expressed with a downward nod.	Dynamic			X		
Acknowledgement	Smiling (sometimes accompanied by eye gaze).	Dynamic		X		X	
"OK"	Fist with thumb up.	Dynamic			X		
Negative, Judgmental, Aggressive Attitude, Disapproval, Dejection	Chin is down.	Static				X	
Approval	Applause shows approval.	Dynamic			X		
Thinking	Tap side of head or forehead with fingers.	Dynamic	X		X		X

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Contemplate a Creative Solution to a Problem	Position in which the tactile pads of the fingertips of one hand gently touch their counterparts on the other hand. May be done while listening, speaking, or thinking.	Static			X	X	
Direct Someone's Attention to Something/Someone we are Experiencing Aggression, Hostility, Unfriendliness (if pointing at someone in close proximity)	We point to direct others' attention to something we experience ourselves. DO NOT point directly at another human being in close quarters while shaking finger.	Static	X				
Anxiety, Unvoiced Disagreement	Unconscious Fisting	Static				X	X
"No", Disagreement	Head shake rotating horizontally from side-to-side.	Dynamic			X	X	
Avoidant behavior to voice a Hidden Objection	Picks at clothing, appears innocent.	Dynamic				X	X
Anxiety, Unvoiced Disagreement	Unconscious Fisting	Static				X	X

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Problem	Fingers hold forehead or head.	Static	X			X	X
Stall for time	Put arm of glasses in mouth, or other objects like a pen to your lips or in the mouth.	Static			X		
"Wait"	Palm down, held horizontally.	Static			X		
"Give", "Come"	Hand horizontal with curved palm up and fingers together.	Static			X		
"Stop"	Hand vertical with palm up and fingers apart.	Static			X		
Superiority, Fearlessness, Arrogance	Head tilted high, displaying the neck with the chin jutting forward.	Static				X	
Readiness to Dominate	Elbows up and pointed out and away from the body, with hands on hip, make someone look bigger and more noticeable because they take up more space.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Confidence, Assertiveness, Dominance	Hands and forearms assume prone position of a floor pushup. Accompanied by aggressive, palm-down, "beating" signs, our ideas, remarks, opinions appear stronger and more convincing.	Dynamic				X	
Submission	Tilting head toward the side displays the vulnerable neck, making a person appear smaller.	Static				X	
Submissiveness, Desire to Not Offend	Raising the shoulders and pulling the head down hides the neck and makes a person look smaller.	Static			X	X	
Readiness to Dominate	Elbows up and pointed out and away from the body, with hands on hip, make someone look bigger and more noticeable because they take up more space.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Negative response, such as "no", "perhaps", or "what you say is false"	Quick snap of the head upwards with accompanying click of the tongue.	Dynamic			X	X	
Person gestured to is a liar	Half-closed hand is placed in front of the stomach, and then turned slightly toward someone.	Dynamic			X	X	
"Maybe", Uncertainty	Rubbing head to mean maybe	Dynamic			X		
Suggesting stupidity or doubt	Pull lower eye lid.	Dynamic			X		
Warning, especially to child	Touch or light pull on ear.	Dynamic			X		
Cleanliness, Respect, Social Norm	Social Norm: Never use the left hand to gesture, as it is perceived as unclean. Use the right hand for handshaking, eating, giving, and receiving.	Dynamic	X	X	X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Grab one's Attention Equivalent to American gesture of (palm-up) bringing index finger towards oneself repeatedly	Place right hand out, palm down, with fingers brought toward oneself repeatedly in a clawing motion.	Dynamic	X				
Respect, Thanks, Gratitude	Place palm of the right hand on chest, immediately after shaking hands with someone. A head bow may be added.	Static				X	
Friendship, Greeting, Respect	Derived from Bedouin customs, men touch noses together upon greeting.	Static				X	
Friendship, Greeting	Kiss only the shoulders upon greeting.	Dynamic				X	
"Come Here"	Place palms down, fingers waving.	Dynamic	X				
Sincerity	Place hand on heart to express sincerity. Acceptable alternative to male-female handshake.	Static	X			X	
Sincerity, Gratitude, "Thank God"	Place palm of the right hand on chest, bowing the head a little and lowering the eyes.	Static			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Friendship, Greeting	Kissing repeatedly on the cheeks when greeting. A person should reciprocate	Dynamic				X	
Conciliatory Gesture	Pat another person's shoulder with the right hand.	Dynamic			X	X	
"Probably", "Yes"	Swaying or bobbing.	Dynamic			X		
"OK"	Hand gesture with thumb-forefinger circle, 3 fingers extended upwards, palm is facing down.	Dynamic			X		
Thinking	Scratching head	Dynamic					X
Obscenity	Palm facing person, middle finger extended out, rest of fingers vertical up	Static			X	X	
Insult	Hold the right hand with the back forward, then lightly brush the tips of the fingers beneath the chin several times with a forward motion.	Dynamic			X	X	
"She is Beautiful"	Thumb-forefinger circle, 3 fingers extended upwards, palm facing down, signing hand is shaken.	Dynamic	X		X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"A Beautiful Girl"	Pull left hand, as if stroking beard, down across face from eyes, with fingers across the right cheek, and thumb across the left cheek. When hand leaves chin-point, fingers touch thumb, and hand in this position is drawn out as far as several feet from the face without dropping appreciably below chin level. Gesture may be done with either hand, or a short pull at the chin, extended only slightly beyond.	Dynamic	X		X	X	
"Go to Hell!"	Fist with vertical forefinger and middle finger extension, and fingers are apart.	Static			X	X	
Secret, "Follow Me"	Downward turn of palm.	Dynamic			X		
Extreme Regret, Remorse for a person or situation, potential Threat	Biting the right forefinger, which has been placed sideways in the mouth.	Static			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"what you say is false"	Quick snap of the head upwards with accompanying click of the tongue.	Dynamic			X	X	
Person gestured to is a liar	Half-closed hand is placed in front of the stomach, and then turned slightly toward someone.	Dynamic			X	X	
"No" or Negative	Shake index finger sideways.	Dynamic			X	X	
Admonition Not to Argue	Gently graze someone else's chin with the right fist.	Dynamic			X		
"No" (strong "No")	Tilt head slightly back and raise eyebrows.	Static			X	X	
"No"	Move head back and chin upward.	Static			X		
"No" (emphatic)	Move head back and make a clicking sound with tongue.	Dynamic			X	X	
"No"	Open palm and move right to left.	Dynamic			X		
"No", "Never"	Hold right forefinger up and move it from left to right quickly several times.	Dynamic			X	X	

Iraqi Gestures (continued)

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"Be Careful", "Wait a Little Bit"	Hold fingers in a pear-shaped configuration, with tips pointing up about waist level. Move hand slightly up and down quickly.	Dynamic			X		
"That's Enough, Thank You"	Pat your chest above the heart a few times.	Dynamic			X		
"Give it to Me"	Hold the right hand out, palm up, then close the hand halfway and hold it.	Dynamic			X		
"Go Away"	Hold right hand out, palm down, and move it as if scooping something away from you.	Dynamic			X		
"Get Lost", Disinterest	Flick chin.	Dynamic			X	X	
"Nothing", Dismissal	Upward flick of wrist.	Dynamic			X		
"I'll Strangle You!"	Hand horizontal with palm up and fingers together means "Give" or "Come", however, tensed and jiggled means "I'll Strangle You!"	Dynamic			X	X	

Iraqi Gestures (continued)

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"Slowly"	Hand is semi-pursed, with thumb and forefinger, while shaken slowly.	Dynamic			X		
Challenge, Threat	Gently graze someone else's chin with the forefinger or simply holding the middle finger down with the thumb while the other fingers are extended.	Dynamic			X	X	
Strength	Forearm Jerk.	Dynamic				X	
"No Need for Worry"	Flipping the hand near the mouth and simultaneously making a clicking sound with the tongue and teeth.	Dynamic			X	X	
"Get Lost", Disinterest	Flick chin.	Dynamic			X	X	
"Nothing", Dismissal	Upward flick of wrist.	Dynamic			X		
"I'll Strangle You!"	Hand horizontal with palm up and fingers together means "Give" or "Come", however, tensed and jiggled means "I'll Strangle You!"	Dynamic			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Respect	Touch the tips of the right fingertips to the forehead while bowing the head slightly, or kiss the back for a dignitary's hand.	Static				X	
Respect, Respectful Greeting for same sex exchanges, especially elders	Iraqis kiss the hand of an elder and then apply it to a child's head to communicate respect.	Static				X	
Extreme Regret, Remorse for a person or situation, potential Threat	Biting the right forefinger, which has been placed sideways in the mouth.	Static			X	X	
Emphasis	Joining the tips of the right thumb, forefinger, and middle finger, then moving the configuration rapidly in front of the body, is used to add emphasis to whatever an Iraqi is saying.	Dynamic	X			X	
Emphasis, Firmness in conjunction with nearly any phrase	Make fist with either hand, and move arm slowly up and down, wrist locked, as if pounding a table, while exposed thumb of fist is also moved slowly up and down on index.	Dynamic	X			X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Emphasis, with final twist occurring at the moment of making the final point, as added emphasis	Make fist with either hand, with thumb tucked into fist as if shooting a marble, and at the end of the gesture, the thumb and index finger flip open and the entire hand pivots slightly outward from the wrist.	Dynamic	X			X	
Emphasis	Extend hands, palms held open and down, in front of chest, and tap the tip of each index finger rapidly against its thumb. A "twin" gesture, it is used to emphasize the small size of something.	Dynamic	X				
Emphatic Dismissal	Upward toss of forearm.	Dynamic	X			X	
"It is on my list of things to do", "It's on my mind to accomplish", "It's my obligation"	Place the right hand or its forefinger on the tip of the nose, on the right lower eyelid, on top of the head, or on the moustache or beard.	Static			X		
Expression of lack of money or scarcity, Translated = "I have only a little"	Flick right thumbnail on front teeth.	Dynamic			X		

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

"Quiet Down"	Hold the right hand out, palm down, and move it up and down slowly.	Dynamic			X		
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Iraqi Gestures (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Express: What was requested is not available, or Person being inquired upon is not present	Hold the right hand in front of the face, with the back facing forward, then flip the hand so the palm is up.	Dynamic			X		
"Do you want me to answer the question for you?"	Run tips of right forefinger and thumb along the earlobe.	Dynamic			X		
"Forgot something" or to call for one's attention	Snap of the middle forefinger or middle finger on the thumb.	Dynamic			X		
"Very good"; "I am winning"	Make fist with right hand, keep thumb extended upward.	Dynamic			X		
Express "What?", "Why?"	Hold right hand out, palm down, then quickly twist the hand to show the palm upward.	Dynamic			X		
"No Need for Worry"	Flipping the hand near the mouth and simultaneously making a clicking sound with the tongue and teeth.	Dynamic			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

"No Need for Worry"	Flipping the hand near the mouth and simultaneously making a clicking sound with the tongue and teeth.	Dynamic			X	X	
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APPENDIX C EYE CONTACT

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Eye Contact

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Unvoiced Doubt, thinking	Involuntary eye movements to the right and left, occur during moments of thinking	Dynamic		X		X	
Uncertainty, Disagreement with a speaker's remarks	Head is turned fully away to one side in an effort to avoid gaze during a conversation.	Dynamic		X		X	
Recognition upon greeting someone	Automatic raising of eyebrows which takes place the instant recognition takes place.	Dynamic		X			
Rapport (increased mutual eye contact) Disagreement (less eye contact)	Unconsciously, two speakers demonstrate increased mutual eye contact the more they get along.	Dynamic		X		X	
Expression of one's attentional direction	Gaze direction shows others where our attention lies.	Static				X	
Stress, Arousal	Significantly faster blinking rates.	Dynamic				X	
Observer looks Shifty, Suspicious	Looking at or below the mouth	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Eye Contact (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Disagreement	Unconsciously, giving someone you dislike less eye contact.	Dynamic		X		X	
Uncertainty, Disagreement with a speaker's remarks, Shyness, Disliking	Head is turned fully away to one side in an effort to avoid gaze during a conversation.	Dynamic		X		X	
Intimidation	Peer over your glasses.	Static				X	
Arrogance, Talking Down at Someone	Looking at the forehead of another person invokes a reaction that you appear arrogant, talking down to them, or staring through them.	Static				X	
Evaluation of Honesty during Conversation	Iraqis will look directly into the eyes of the person they are conversing with. The gaze may be over a long period of time.	Dynamic				X	
Display of Intention: Trustworthy and Friendly, or Sneaky and Suspicious	The degree and intensity of eye contact may serve to tell the listener about your intentions.	Dynamic				X	
Rude American Behavior	Avoiding gaze may indicate an American is hiding something. Iraqis consider this rude behavior during conversation.	Static					

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Eye Contact

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"Swear by my Own Eyes!"	Finger on the eyes.	Static					X
Submission, Politeness in children and lower status individuals when being punished or reprimanded	Lowering one's gaze during conversation, or children or lower status individuals may do so to be polite or during punishment.	Static				X	
Respect	Long and direct eye contact during discussions are important; however, avoid staring and lengthy eye contact with women and people who are praying.	Static					
Respect for Religious people or Strangers of opposite sex	Lowered gaze is expected of religious persons and strangers of the opposite sex.	Static				X	
Conversational Eye Blinks	Instead of occasional blinking in conversation, Iraqis will lower their eyelids very slowly.	Dynamic					
Conversational Respect	Hiding (behind dark sunglasses) is rude during conversation. Remove sunglasses.	Static				X	

APPENDIX D PARALINGUISTICS

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Paralinguistics

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Listener: Disagreement, Anxiety, Doubt Speaker: possible sign of Deception, Uncertainty	Clearing of one's throat while either listening to a message or while speaking.	Dynamic				X	
Announcement of Physical Presence	Consciously clearing one's throat to announce their physical presence in the room.	Dynamic		X			
Approval	Whistling and cheering.	Dynamic				X	
Uncertainty, Deceptive, Aggressive	Clearing the throat may reveal uncertainty. Possible sign of Deception.	Dynamic		X		X	
Authority, Assertiveness, Aggression, Confidence, Threat	Convey attitude via low and/or falling pitch.	Dynamic				X	
Aggression, Interrupt, Overrule, or Challenge a Speaker	Aggressive throat clearing.	Dynamic		X		X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Dominance, High social status	When two people converse, the person whose low-frequency vocal characteristics change the least is perceived by both as having the higher social status.	Static				X	
Competence	Competence shows in a well-moderated voice tone, rapid speech, few verbal disfluencies or hesitations, fluid gestures, eye contact.	Dynamic				X	
Dominance	Low tone of voice.	Static				X	
Authority, Assertiveness, Aggression, Confidence, Threat	Convey attitude via low and/or falling pitch.	Dynamic					
Submission, Lack of Confidence	High or rising pitch.	Dynamic				X	
Questions vs. Statements and Pitch	High, rising pitch = question Low, falling pitch = statement	Dynamic		X			
Maintain Role of Speaker	Speakers who wish to maintain the role of speaker use fillers (vocalized pauses such as "er", "em", "um", etc.) to indicate they are not finished talking.	Dynamic		X			

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Turn-Yielding in Conversation	Rising intonation, as in asking a question, is the most common paralinguistic turn-yielding cue. A falling intonation indicates completion of a thought.	Dynamic		X			
Turn-Requesting Cue	The listener indicates his or her desire to take a turn as speaker by vocalizing with an "er" or "ah" for example.	Dynamic		X			
Voice Tone Adaptation	People unconsciously adapt to each other's voice tones.	Dynamic		X			
Turn-Denying Cue	Speaker passes the turn to the listener (i.e., asking a question) but the listener does not wish to speak at the moment. The listener will often engage in turn-denying behavior such as avoiding eye contact, pretending to cough, or mumbling sounds that resemble, "I don't know".	Dynamic		X			

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Back-Channeling Cue	Listener indicates desire for speaker to continue their role as speaker by providing positive, reinforcing cues, such as "hmm". Research suggests that silence duration of approximately 1 second is oriented to by speakers as troubles-indicative. Filler words especially useful for cross-cultural communication where fluency is limited and long pauses are additional mental effort required to recall words and syntax.	Dynamic		X			

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Paralinguistics

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Conversational Hesitation	Hesitation in conversation is achieved by the utterance [mm].	Dynamic		X			
Doubt truthfulness	Iraqis' way of warning or doubting the truthfulness of something is done by lower pitch utterance of [εah].	Dynamic				X	
Warning	The utterance [hÄ] may be used as a warning.	Dynamic				X	
"Yes" vs. "No"	The Iraqi "Yes" nod is often accompanied by a short [εh]. The Iraqi "No" head toss is often accompanied by [lÄ]. Each has a lower pitch and no rising intonation, making it easily confused with Americans' use of these sounds elongated as a query.	None			X	X	
Agreement	Iraqis sometimes use [mhm] for agreement, but usually say an actual word like, "aywah".	None			X	X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Strength and Sincerity	Iraqis tend to speak quickly and loudly (compared to Americans, which may perceive it as obnoxious and aggressive). Loudness for Iraqis means they are speaking strongly and sincerely. They accent each word and use a higher pitch range when speaking. Speaking softly is a sign of weakness and deceitfulness.	Dynamic					
Inquiry	An Iraqi's way of uttering an inquiry is [hæ].	None					
American Rudeness	When Americans say [hm] it is sometimes mistaken for rudeness by Iraqis.	None					
"No"	Single tongue click.	Dynamic			X		

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
"Leave Me Alone"	Silence. Can also be used to dominate, control, intimidate	None			X	X	
Conversational Hesitation	Iraqis hesitate in conversation with the utterance [mm]/	Dynamic		X	X		
Tone Raising	English is a tonal language, while Arabic is a Semitic language. In tone languages, high tone is associated with words denoting small or related concepts, and low tone is associated with words denoting large or related concepts. Iraqi culture may raise their tone, but not for diminutive explanations.	Dynamic					
Dramatic Effect	Loudness (compared to "normal" level of loudness) of speech is mainly used for dramatic effect, and in most cases should not be taken as an indication of how strongly the speaker feels about what he or she is saying.	Dynamic					

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Short Speech Pauses	Pauses between words are usually not too long.	Dynamic					
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Iraqi Paralinguistics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Response to Accidents	Americans generally say, "oops" and "uh-oh" in response to an accident. They also vary intonation to reflect the gravity of the situation. Iraqis use the word "Afwan" to respond to accidents, using the same intonation regardless of the seriousness of the situation.	Static					
Conversational Discomfort	When an Iraqi mumbles something incoherent, it is usually a sign that the conversation is not proper, or he does not want to answer. He will not say that the questions are too personal or make him uncomfortable; he will mumble or answer very ambiguously instead.	Dynamic				X	

APPENDIX E FACIAL EXPRESSIONS

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Onset of Anger, Disliking, Grief, Sadness, Uncertainty	Lip Compression; Tense Mouth	Static				X	
Disagreement, Doubt, Uncertainty	Lower Eyebrows	Static				X	
Surprise, Puzzlement, Uncertainty	Jaw Drop	Static				X	
Disappointment, Displeasure, Sadness, Uncertainty	Lip Pouting. Push the lower lip against the upper, protruded lip.	Static				X	
Anxiety, Boredom, Excitement, Fear, Horror, Uncertainty Stimulating the lips diverts attention, e.g., from: a) disturbing thoughts and b) people who may upset us.	Lip touch. One of our most common self-touch cues, the lip- touch signals a variety of moods and mental states.	Static				X	X
Disagreement, Scheming, Calculated Thought	Lip pursing is averting, puckering, and rounding the lips.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Unspoken Disagreement, Disbelief, Disliking, Displeasure, Uncertainty. May modify, counteract, or contradict verbal remarks. Ex: Following the statement, "Yes, I am confident," e.g., a protruded tongue may suggest, "I am not actually confident." Tongue-shows can reveal misleading, ambiguous, or uncertainty. This may signal probing points to analyze and explore.	Show your tongue.	Static	X			X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Yawning is sign of drowsiness and sign of mild anxiety, disagreement, or uncertainty. When alert listeners yawn in response to controversial ideas or suggestions, the yawn signals a probing point, and may be used to explore objections or concerns.	Yawning	Dynamic				X	
Rapport	Laugh and Smile	Dynamic				X	
Emotional Arousal, Potential Anger	When we breathe deeply our nostrils flare. They may uncontrollably widen in anger as well, when listening to disagreeable comments.	Dynamic				X	
In Public: "Do Not Disturb", Keep your Distance	A neutral, "blank" face in public keeps others at a polite distance.	None				X	
Emotional Anxiety, Embarrassment, Stress	The Adam's Apple jumps.	Dynamic				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Stranger/Public Anxiety, Become Focus of Attention in a Group, Embarrassment, Shyness, Anger, Shame	Facial flushing/blushing is elicited by social stimuli. Suddenly, the face, ears, and neck (in extreme cases, the entire upper chest) redden, causing further embarrassment.	Dynamic				X	
Anxiety, Nervousness, Emotional Concerns, Onset of a Mood Shift, Novel Thought, Sudden Change of Heart	Lip and jaw tension, or a tense mouth.	Static					
Disagreement, Annoyance, Onset of Anger, Disliking, Grief, Sadness, Uncertainty	Lip Compression; Tense Mouth	Static				X	
Fear	Upper eyelids are raised, and lower eyelids are tensed, while the lips are stretched back toward the eyes. This expression is determined by context.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Slight Anger, Strong Anger	Slight Anger: Move jaw forward, lower eyelids slightly tensed. Strong Anger: Nose wrinkled, eyebrows lowered and pulled together, upper eyelids are raised.	Static				X	
Anger, Fear	Clenched fists signal an aroused state.	Static				X	X
Anger	Pull eyebrows down and together, inner eyebrows down toward the nose; eyes open wide, staring hard (maintaining eye contact). Lips together tightly and tensed, but not puckered. Jaws tensed; Postures of body display, hands on hips, fist, hand-behind-head, and palm-down beating gestures; Frowning and tense-mouth.	Dynamic				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Fear	Exaggerated angular distance, increased breathing rate, trembling/chattering teeth, crouching, crying, faster eye-blink rate, fear grin, widely opened flashbulb eyes, flexion withdrawal gestures, freeze reactions, hair-bristling, screaming, squirm cues, staring, dilated pupils, tense mouth, throat-clearing, yawning.	Dynamic				X	
Disagreement, Annoyance, Onset of Anger, Disliking, Grief, Sadness, Uncertainty	Compress lips into a fine line. Sudden lip compression may signal anger or dislike.	Static				X	
Disgust	Nose wrinkled, upper lip raised as high as it will go, lower lip also raised and protruding slightly. Wrinkles extending from above the nostrils downward to beyond the lip form an inverted U-shape; nostrils raised. Extreme disgust includes raising of cheeks and lowering of eyebrows to create crow's	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

	feet wrinkles.						
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Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Disagreement, Doubt, Uncertainty	Lower Eyebrows	Static				X	
Disagreement, Scheming, Calculated Thought	Lip pursing is averting, puckering, and rounding the lips.	Static				X	
Response to Unpleasant Sensations of Suffering due to Physical Injury, Trauma, or Emotional Distress.	Visible muscle contraction of the face, including a wince or a frown. A casual touch from someone disliked.	Dynamic				X	
Defeated Attitude, Guilt, Shame, Submissiveness, Distorting the Truth, Telling a Lie	Gaze-down may convey a defeated attitude.	Static				X	
Surprise	Lifted eyebrows, wide eyes, dropped jaw with open mouth, arms raised with fingers spread apart in defensive position. Expression is determined by context.	Static				X	
Sadness	Mouth dropped open, corners of lips down; cheeks are raised as individual is squinting (pulls against the lips); eyes	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

	look downward and upper eyelids droop.						
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Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Sadness	Mouth dropped open, corners of lips down; cheeks are raised as individual is squinting (pulls against the lips); eyes look downward and upper eyelids droop.	Static				X	
Enjoyment	Broad smile, higher contour cheeks, eyebrows relax and drop down slightly.	Static				X	
Crying	Sobbing vocal exhalation, ranging from soft-to-loud; involuntary tightening of the voice box and pharyngeal muscles, quivering chin, depressed lip corners, puckered brows, flared nostrils, tearing eyes, facial flushing, shoulder-shrugs, forward bowing motions of head and torso (similar to laughing). Happy Cry: 2 minutes average Sad Cry: 7 minutes average	Dynamic				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Anger, Surprise, Fear, Intense Emotion	Involuntary, dramatic widening of the eyes, performed in situations of intense emotion.	Static				X	
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Universal Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Surprise, Puzzlement, Uncertainty	Jaw Drop	Static				X	
Disappointment, Displeasure, Sadness, Uncertainty	Lip Pouting. Push the lower lip against the upper, protruded lip.	Static				X	
Sadness	Bowing postures of body wall, cry face and lip-pout, gazing down, slumped posture of shoulders, and audible sigh.	Static				X	
Supercilious air of Disdain, Haughtiness, Pride, Intensified Facial Expression	Raising eyebrows strengthen a dominant stare, exaggerate a submissive pout, or boost energy of smile. Involved muscle elevates eyebrows to form prominent horizontal furrows in forehead, making facial gesture look/feel stronger. May be in tandem with head-tilt back, or raising one or both eyebrows. We may					X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

	unconsciously life eyebrows giving orders, argue important points, or make demands.						
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The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Facial Expressions

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Prevent Confrontation, Hostility, Disruption of Social Face	Avoid individual expression.	Static		X		X	
Conceal Negative Emotions	Iraqis tend to conceal their negative emotions in the presence of someone of higher status.	None		X	X		
Exaggeration	Iraqis use a lot of exaggerated imagery in conversation. They use exaggerations and assertions so they do not get misunderstood. For the listener, it is an error to assume that something is more important than something else because it is over-stressed.	Dynamic	X			X	
Surprise	Hit the side of one's face with the palm of one hand, head slightly tilted and eyes wide open.	Static				X	
Emphasis with Words	Words are more emotional and significant in nature. Words are attached to emotions, not reality.	None				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Facial Expressions (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Shared Emotion Tone, Superfluous Exaggerations	Iraqis may omit details/facts and technicalities and instead strive for the shared emotion/experience of the conversation. Emotion/tone is stressed more so than the transfer of information and facts. Superfluous statements and exaggerations are valued.	Dynamic		X			

APPENDIX F PROXEMICS

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Proxemics

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Deception, Disagreement, Fear, Uncertainty	Holding and arm or wrist increases with anxiety.	Static				X	X
Deception, Disagreement, Fear, Uncertainty	Self-stimulating behaviors, e.g., holding an arm or wrist, massaging a hand, or scratching, rubbing, or pinching the skin increases with anxiety to comfort oneself	Dynamic				X	X
Rapport	Rapport is expressed by a reduced angular distance between speakers and direct body alignment.	Dynamic				X	
Friendly	Corner seating encourages friendly, casual conversation.	Static		X		X	
Affection	We kiss to show affection.	Dynamic				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Universal Proxemics (continued)

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Cooperation	Sitting next to someone suggests cooperation.	Static		X		X	
Emotional Closeness	The closer a person feels emotionally toward someone else, the closer they will stand next to them.	Static		X		X	
Deception, Disagreement, Fear, Uncertainty	Holding hand or arm or wrist increases with anxiety.	Static				X	X
Competitive or Defensive Atmosphere	Sitting directly across from someone.	Static				X	

The cues listed and interpreted in this appendix were drawn from a variety of sources, and their validity has not been assessed.

Iraqi Proxemics

Decoded Mood / Mental State / Message	Full Description	Static / Dynamic	Illustrator	Regulator	Emblem	Affect Display	Adaptors
Direct Confrontation	Iraqis tend to confront each other more directly than Americans do.	Dynamic					
Conversational Proximity	Iraqis tend to sit closer than Americans.	Static					
Conversational Proximity	Iraqis are more likely to touch each other than Americans.	Dynamic					
Conversational Proximity	For Iraqis, closeness during conversation is a necessity. Offense may be taken when this is not observed by their conversation partner.	Static					
Conversational Proximity	Typical conversational distance is very close (1 to 2 feet). Iraqis do not distinguish between a public and private self. Moving away may be considered impolite. In general, Iraqis tend to stand and sit closer and to touch other people (of the same sex) more than Westerners do.	Static					

APPENDIX G
FACTORS INFLUENCING RELIABILITY BASED ON NONVERBAL CUE CATEGORIZATION

	Emblems	Illustrators	Regulators	Affect Display	Adaptors
How critical is category to cross-cultural communication?	Recognizing foreign emblems may be useful to understand a message that two individuals are trying to discreetly communicate.	When communicating with foreign speakers, it may help to indicate the location of something or stress a point.	Within a culture or unique social group, regulators are involuntarily performed to indicate the role of speaker in a conversation. Foreign observers may benefit from knowledge of regulator in order to understand whether two people communicating in a foreign language are involuntarily using regulators or intentionally communicating a message to each other or about the observer.	Misinterpretation can lead to conflict, or escalate a disagreement. This is especially likely between speakers from distinct cultures who may not be familiar with social norms or culture-dependent display rules. For instance, it may be inappropriate to express certain emotions in specific contexts or situations and doing so may be perceived as offensive; similarly, responding to someone else's expressed affect may be inappropriate in certain contexts.	Adaptors may indicate a speaker's discomfort or that some deeper issue is bothering them.

	Emblems	Illustrators	Regulators	Affect Display	Adaptors
How reliable is category to communication understanding?	Encoding is usually intentional, but decoding an emblem is reliant on knowledge of the gesture itself (which is culturally-dependent). If the observer is aware of the meaning of a gesture, it is typically reliably communicated.	The reliability of an illustrator depends upon the content and context such as <u>sender's mood</u> or enthusiasm level (e.g., excited vs. tired) as well as the <u>environment</u> itself. For example, if someone is using an illustrator in an unfamiliar building to the observer, the observer may not understand what they mean when they point to something.	As a foreign observer who is not well-acquainted with the language, it may be challenging to distinguish regulators. Reliability is dependent on <u>interpersonal interaction, social roles, and context.</u>	Affect Display is very reliable (universally) in terms of decoding one's current general emotional state (e.g., happy, angry, sad). The head & face communicate the nature of one's affect, while posture & body movements communicate the intensity of an emotional state. <u>Context</u> , cultural norms and social class influence <u>display rules</u> and affect display interpretation.	Adaptors are not very reliable, because the observer may not know the individual's <u>personality</u> well enough, or may not be aware of <u>external factors</u> that affected their mood (i.e., the cause of their discomfort or stress).

	Emblems	Illustrators	Regulators	Affect Display	Adaptors
What factors influence reliability and misinterpretation?	Knowledge of emblems in different cultures. The culture you are in will influence the reliability—they may mean different things across cultures. Thus, if the meaning is known, emblems may be reliable nonverbal cues.	The content of the message, the context and situation, personality and mood of person may all be factors influencing the reliability of the illustrator. Thus, in order to accurately decode illustrators, you need to understand the context.	These are culturally-dependent, learned nonverbal cues. In order to accurately interpret them, the observer must be familiar enough with the culture and context.	Most affect display nonverbal cues are universal (often communicated by the face), some are culturally-dependent, and a knowledge of their meaning is important to communication understanding. Cross-culturally, social norms may prohibit (full) expression of affect in certain social contexts (mask, intensify). Thus, to accurately interpret affect displays, you need to understand context and sender of the message.	Because these are typically unconsciously performed to release tension (like scratching your own hand, slapping someone on the back, or fidgeting with an object like a pen, etc.), they do not communicate an intentional message. Thus, to accurately interpret adaptors, you need to understand context.

APPENDIX H

EXAMPLE OF CONTEXT BASED ON MILITARY SCENARIOS

Scenario 1: Cooperating with a Sheik

Setting

The U.S. military sets up an intercultural meeting between two American officers and a Sheik from a small village to discuss building a new school for the community. The U.S. officers bring an interpreter with them, but they are not sure how much they can trust the accuracy of his translations due to his political and religious affiliations.

The village is in a state of unrest. In response to the presence of American Soldiers in the area, there has been a slight increase in crimes protesting their presence. The Americans wish to fund and build a school for the community, to better educate the villagers and simultaneously, they hope to reduce crime on the streets.

Characters - Background

American Officers: The Americans wish to bring peace and order to the small village. They hope that building a school will help the villagers to become more “civilized” (by American standards). One American Captain accompanied by an interpreter meets with the Sheik.

Sheik: An important man, he is very busy and not always punctual. He is very emotionally connected to the people of his village and very proud of his accomplishments - his reputation in the community is vital to him, and lately it has been dwindling.

Script	NVCs	Context (Setting, Environment, Personality)	Intended Meaning (Sender)	Correct Interpretation (Receiver)	Misinterpretation (Receiver)
1. The Soldier and his interpreter arrive at the Sheik's residence 10 minutes early for their meeting, and patiently wait for the Sheik and local Iraqi leaders to arrive. The Sheik arrives 15 minutes late and greets the Americans with a customary Iraqi embrace.	Regulator / Affect Display (I) With members of the same sex, kissing both cheeks is a common greeting, like embracing.	The Americans arrive early out of politeness and American business etiquette. They are a little disappointed that the Sheik is late, but they are also aware that he is very busy and only had time for a short meeting.	The Sheik is welcoming the Americans to his home and establishing rapport.	The Americans are a little uncomfortable with the intimate greeting, but they go along with it and accept it as hospitality.	n/a

APPENDIX I
RELIABILITY OF NONVERBAL CUES STUDY

INFORMED CONSENT FORM FOR THE NONVERBAL CUE RELIABILITY TEST

Purpose of the Project:

The research experiment in which you will be asked to participate today is intended to provide information pertaining to nonverbal cue interpretation. Your contribution as a participant in this study is greatly appreciated in helping us understand nonverbal cues.

Procedures:

You will be asked to watch brief videos of different nonverbal cues. The experimenter will ask you a question to the interpretation of the nonverbal cue.

Confidentiality:

Participation in this study is voluntary. All information will remain strictly confidential. At no time will your name or any other identification be used. You are at liberty to withdraw your consent to the experiment and discontinue participation at any time. If you have any questions after today, please contact Dr. Shatha Samman at (407) 491-6034.

I have read and understood the information on this form and had all of my questions answered.

Participant's Name

Date

Participant's Signature

Date

1. Gender: Female____ Male____

2. Age: _____

3. Nationality:_____ Native Language: _____

3b. List any foreign languages you speak fluently:

4. Education Major/Degree: _____

4a. Highest Level Completed (or Current):

____ High School

____ Freshman

____ Sophomore

____ Junior

____ Senior

____ Graduate

5. Computer Experience:

____ Low (used 1 to 2 software applications)

____ Medium (used 3 to 10 software applications)

____ High (programming skills)

6. Video game Experience:

____ Low (rarely play games)

____ Medium (play sometimes, 1-2 times a week)

____ High (play often, 3-5 week)

7. How do you best learn new information (check all that apply)?

____ Visual

____ Auditory

____ Kinesthetic

If applicable...

8. Years in Military? _____

9. How long were you in Iraq?_____

10. Prior to deployment, how long was your cultural training program? _____

10a. What did you learn in your cultural training?

11. When you were in Iraq, who did you interact with (check all that apply)?

____ Iraqi civilians

____ Iraqi military

____ Did not interact with Iraqis

Nonverbal Cue Reliability Questionnaire

Instructions- Please watch the accompanying videos illustrating each statement below and select the nonverbal cue that best describes the **bolded** behavior.

After completing each statement, state how confident you are of your answer, using a scale of 1 (not at all confident) to 7 (completely confident)

- 1) **Disturbance** is communicated with which nonverbal cue?
- Head nodding up and down and uttering short [ɛɛh]
 - Reaching up and touching the back of your head
 - Raising your eyebrows

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 2) **Doubting the truthfulness of something** is communicated with which nonverbal cue?
- Tilting your head back, placing your hands on your hips
 - Closing your eyes and placing your right hand on chest
 - Uttering lower pitch of [ɛɛh]

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 3) Showing **rapport** is communicated with which nonverbal cue?
- Horizontally curving up your palm with fingers together
 - Pointing soles of feet at others
 - Smiling

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 4) **Recognizing someone upon greeting** is communicated with which nonverbal cue?
- Clearing throat
 - Automatically raising of eyebrows
 - Placing your thumb between forefinger and middle finger

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 5) **Readiness** is communicated with which nonverbal cue?
- Placing hands on your hips
 - Crossing your legs
 - Touching your Lips

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 6) **“Yes”** is communicated with which nonverbal cue?
- a. Head nodding up and down and uttering short [ɛh]
 - b. Placing your fingers beneath your chin in forward motion
 - c. Tensing your lip and jaw

How confident are you with your answer on a scale from 1 to 7: _____
Have you seen this cue before? Yes____; No_____

- 7) **Stress** is communicated with which nonverbal cue?
- a. Significantly blinking faster
 - b. Tilting your head to side
 - c. Bowing your head & placing your right hand on chest

How confident are you with your answer on a scale from 1 to 7: _____
Have you seen this cue before? Yes____; No_____

- 8) **Inquiring** about something is communicated with which nonverbal cue?
- a. Compressing your lips
 - b. Shrugging your shoulders with palms up, nodding your head and raising your eyebrows
 - c. Uttering [hæ]

How confident are you with your answer on a scale from 1 to 7: _____
Have you seen this cue before? Yes____; No_____

- 9) **Defensiveness** is communicated with which nonverbal cue?
- a. Seating with both legs and arms crossed
 - b. Vertically placing your palms up and fingers apart
 - c. Uttering [hm]

How confident are you with your answer on a scale from 1 to 7: _____
Have you seen this cue before? Yes____; No_____

- 10) **Anxiety** is communicated with which nonverbal cue?
- a. Taping the side of your head
 - b. Squaring your shoulders, standing tall with your palms-down
 - c. Your Adam's apple jumps

How confident are you with your answer on a scale from 1 to 7: _____
Have you seen this cue before? Yes____; No_____

- 11) **Anger** is communicated with which nonverbal cue?
- a. Pretending to cough; mumbling sound and avoiding eye contact
 - b. Your eyebrows lowered and pulled together, your eyes open wide and staring hard, and your nose is wrinkled
 - c. Placing your fingers in a pear-shape, fingertips above your waist level and moving hand slightly up& down

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 12) **Avoidance** is communicated with which nonverbal cue?
- a. Dropping your jaw
 - b. Picking at your clothing
 - c. Leaning forward while seated

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 13) **“I advise you not to argue”** is communicated with which nonverbal cue?
- a. Touching back of head
 - b. Raising your eyebrows
 - c. Gently grazing the person’s chin with your right fist

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 14) **“No”** is communicated with which nonverbal cue?
- a. Placing your glasses or Pen in your mouth or touching your lips
 - b. Moving your head back and making a clicking sound with tongue
 - c. Crying, pouting your lips, bowing your posture, and slumping your shoulders

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 15) **“Stop”** is communicated with which nonverbal cue?
- a. Placing your hand vertically with palm up and fingers apart
 - b. Crossing arms, elbows pulling tightly into body
 - c. Looking at or below someone’s mouth

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

16) **“Wait a little bit”** is communicated with which nonverbal cue?

- a. Your Adam’s apple jumps
- b. Holding fingers in a pear-shaped configuration, with tips pointing up about waist level and moving hand slightly up and down
- c. Jerking head, standing, growling voice tone

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

17) Being **authoritative** is communicated with which nonverbal cue?

- a. Your right hand is patting someone else’s shoulder
- b. Seating and placing your hands behind your head with elbows menacingly pointing outward
- c. Widening your eyes dramatically

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

18) **Dominance** is communicated with which nonverbal cue?

- a. Pursing your lips
- b. Holding another person’s hand after handshake, repeating handshake
- c. Erecting your body posture with feet apart and firmly on the ground

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

19) **Politeness** is communicated with which nonverbal cue?

- a. Lowering your eye gaze during conversation
- b. Angling/leaning away while flexing your arms
- c. Biting your right forefinger, placing it sideways in your mouth

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

20) **Surprise** is communicated with which nonverbal cue?

- a. Showing your tongue
- b. Uttering [mm]
- c. Hitting the side of your face with the palm of one hand while your head is slightly tilted and your eyes wide open

How confident are you with your answer on a scale from 1 to 7: _____

Have you seen this cue before? Yes____; No_____

- 21) To **emphasize** a point is communicated with which nonverbal cue?
- Touching and patting someone repeatedly during conversation
 - Placing your hand on your eyes
 - Smiling

How confident are you with your answer on a scale from 1 to 7:_____

Have you seen this cue before? Yes____; No_____

- 22) **“It’s my obligation”** is communicated with which nonverbal cue?
- Wincing, frowning, showing visible muscle contraction
 - Placing the right hand or its forefinger on the tip of your nose
 - Upward flicking of your wrist

How confident are you with your answer on a scale from 1 to 7:_____

Have you seen this cue before? Yes____; No_____

- 23) **“What/Why”** is communicated with which nonverbal cue?
- Slumping your shoulders with an audible sigh
 - Massaging your hand by scratching, rubbing, and/or pinching your skin
 - Holding your right hand out, palm down, then quickly twisting the hand to show the palm upward

How confident are you with your answer on a scale from 1 to 7:_____

Have you seen this cue before? Yes____; No_____

- 24) **Respect** is communicated with which nonverbal cue?
- Holding the right hand out, palm down, and moving it like scooping something away from you
 - Peering over your glasses
 - Touching the tips of the your right fingertips to the forehead while bowing the head slightly

How confident are you with your answer on a scale from 1 to 7:_____

Have you seen this cue before? Yes____; No_____

- 25) **“Money”** is communicated with which nonverbal cue?
- Putting your right thumb back and forth across middle of right index finger, with your hand semi-clenched
 - Raising your eyebrows
 - Aggressively clearing your throat

How confident are you with your answer on a scale from 1 to 7:_____

Have you seen this cue before? Yes____; No_____

Thank you very much for helping us with this questionnaire!

APPENDIX J DESIGN GUIDELINES

Guideline	Category	Source
Learners should be presented with multiple ways to make progress or move ahead. This allows the learner to make choices and use their own styles of learning.	Autonomy	Gee, 2003
Offer choice of interface (use of color, text, various combinations of video and audio). Allow players to customize.	Autonomy	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003 Savill-Smith, 2004
Provide meaningful personal choices during game-play.	Autonomy	Ryan, Rigby 2006; Rigby 2007
Enable the learner to feel that they are the cause of the action, not the game design. This feeds their sense of autonomy.	Autonomy	Ryan, Rigby 2006; Rigby 2007
Provide opportunities for action at any given moment in a game (i.e. interact with a variety of objects or take different actions in a scenario).	Autonomy	Ryan, Rigby 2006; Rigby 2007
Make the learner feel in control for not punishing them for things that are out of their control.	Autonomy	Habgood, 2006
Be wary of offering “equivalent” features that don’t add anything new unless it is the same feature but within a new context.	Autonomy	Habgood, 2006
Make the learner feel in control by giving them choices that seem to make a real difference to the game.	Autonomy, Competency	Habgood, 2006
Be careful of the artwork that it does not imply options that can’t be taken (for example many doors in a room that you can’t go through).	Autonomy	Ryan, Rigby 2006; Rigby 2007
If used in a classroom, the games should acknowledge the role of the teacher and should facilitate the teacher’s meaningful intervention.	Blended Learning	Becta, 2001, p 6
The game design should provide the learner with ample opportunity to operate within, but at the outer edge of his or her resources so that he/she experiences the right level of challenge.	Challenge	Gee, 2003
Vary the nature of the challenge, means of scoring, etc. to provide different levels of challenge.	Challenge	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002
Progress through different skill levels and skill sets.	Challenge	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002;

Guideline	Category	Source
Optimize challenges to match abilities – to stretch people without overwhelming them.	Challenge	Ryan, Rigby 2006; Rigby 2007
Vary the pacing. Too much optimal challenge is frustrating. Sustained challenge can lead to concentration and attention – but too much is exhausting and de-motivating over time.	Challenge	Ryan, Rigby 2006; Rigby 2007
Challenge learners by adding difficulty levels and optional sub goals for learners of different abilities.	Challenge	Habgood, 2006
Test other learners to determine whether the game is too difficult/too easy.	Challenge	Habgood, 2006
Reward the learner for achieving goals and sub goals.	Challenge/Reward	Habgood, 2006
Games should be tested to ensure that the difficulty is at the correct level for the user.	Challenge/Test	Game Maker, p. 89
Challenges should be easy to achieve, but hard enough to be worth playing. Learners give up on games that are too easy. Games that are too hard make them feel bad about themselves.	Challenges	Game Maker p. 88
Feed the competency need of the learner by helping them to have a high success to failure ratio.	Competency	Ryan, Rigby 2006; Rigby 2007
In “boss fights” give the learner a “leg up” – give them opportunities to win. There is an ego investment here, so if they fail at this, there is a negative impact.	Competency	Ryan, Rigby 2006;; Rigby 2007
Sustained enjoyment of an MMO is a function of continued success rather than feeling continually stretched.	Competency	Ryan, Rigby 2006; Rigby 2007
Meanings should not be general or de-contextualized.	Context	Gee, 2003
Basic skills are not learned in isolation or out of context. Basic skill is discovered bottom up by engaging in more and more of the game/domain.	Context	Gee. 2003
Be mindful of gender and ethnic balance.	Diversity	Becta, 2001; Savill-Smith, 2004
Provide a non-game option for those who do not want to play .	Diversity	Becta, 2001; Savill-Smith, 2004
Consider disabilities – visual, auditory, and other.	Diversity	Becta, 2001; Savill-Smith, 2004
The learning should be structured so that they learn the domain knowledge, as well as something about themselves and their current and potential capacities.	Domain Knowledge	Gee, 2003
Learning should appear to be incidental to the learner, although it should be deliberate on the part of the designer. Winning prototypes can support engagement and incidental learning.	Engagement/Immersion	Savill-Smith, 2004; Dempsey, et. al, 1996

Guideline	Category	Source
Make the learner feel in control by giving the learner audio feedback about their interactions with the game.	Feedback	Habgood, 2006
Games should be fun enough that someone not in the target audience would still want to play it and would learn from it.	Fun	Prensky, 2001; Savill-Smith, 2004
Simulations should provide support for the learner and opportunities to consult an expert.	Help	Savill-Smith, 2004; Stretch 2000
Ensure a clear route through the software, and constant access to information that aids navigation.	Help	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003 Savill-Smith, 2004
Enable learners to access learning tools (instructions, tutorials, etc.) during game play.	Help	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003 Savill-Smith, 2004
Include learning templates and example solutions.	Help	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003
Include training levels to support the learner when they most need it.	Help	Habgood, 2006
Allow the learner to experiment and make discoveries, minimize “overt telling” of information.	How the user is presented with information	Gee, 2003
Games should allow learners to identify their real-world identity with their virtual identity to form a commitment to it and to a virtual world. The virtual world should be compelling.	Identity	Gee, 2003
Learners should be able to take on and play with virtual identities and should be given real choices about that identity.	Identity	Gee, 2003
The learner is an insider, teacher, producer (not just a consumer) and should be able to customize the learning experience and domain game from the beginning and throughout the experience.	Identity	Gee, 2003
People using it should think of themselves as learners rather than trainees.	Identity	Prensky, 2001 Savill-Smith, 2004
Emphasize opportunities for altruistic play. For example, the game can include a Soldier who during the game stops and gives a toy or piece of candy to a little kid. Make these moments very clear.	Identity	Ryan, Rigby 2006; Rigby 2007

Guideline	Category	Source
Provide positive contextual feedback. For example, a non-playing character can say: “Hey – it’s my friend from the 3 rd Battalion” if he’s seen the learner before. This should be related to something they did in the past.	Identity/Context	Ryan, Rigby 2006; Rigby 2007
Make the non-playing characters active – give them lines to say that add to the environment and atmosphere of the game.	Immersion	Ryan, Rigby 2006; Rigby 2007
The game design should require that as learner’s progress, they “undo” routine mastery to adapt to new ones or changed conditions. This ensures that learners actually learn (not just memorize) the material.	Learning	Gee, 2003
Learner’s skill and knowledge in the subject matter should improve markedly the better and longer he/she plays.	Mastery	Prensky, 2001; Savill-Smith, 2004
Integrate feedback and debriefing into the game.	Mastery	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002;
Feedback should incorporate process and performance measures.	Mastery	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002;
Different types of feedback should be provided (system and real world).	Mastery	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002;
Allow users to correct errors and learn from errors.	Mastery	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001
Experience mastery in moment-to-moment game play. Examples: Defeating enemies, conquering in-game challenges, puzzles, and quests.	Mastery	Ryan, Rigby 2006; Rigby 2007
Provide consistent, positive, but relevant feedback during game play (such as damage meters).	Mastery	Ryan, Rigby 2006; Rigby 2007
Losing and dying are fine as long as there is mastery feedback (people know why they’ve died and what they can do to improve).	Mastery	Ryan, Rigby 2006; Rigby 2007
Challenge learners by providing clear, achievable goals and giving feedback on learner’s progress.	Mastery	Habgood, 2006
Challenge learners by including both long and short-term goals.	Mastery	Habgood, 2006
Avoid shame and the learner dying for no reason.	Mastery/Competency	Ryan, Rigby 2006; Rigby 2007
Keep the game and instructions very simple to minimize frustration.	Mechanics	Kelly and O’Kelly 1994;

Guideline	Category	Source
		Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002;
Ensure there is a means of recording the progress through the game and ensure that this is visible to the learner.	Mechanics	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003 Savill-Smith, 52
Ensure that the mechanics (how to play the game, work the controls etc.) is not challenging.	Mechanics	Ryan, Rigby 2006; Rigby 2007
Meaning and knowledge can be built up through various modalities, not just words.	Modality	Gee, 2003
Intrinsic motivation is preferable to external motivation.	Motivation	Savill-Smith, 51 VanDeventer and White (2001), Dempsey, <i>et. al.</i> 1996
Vary the length of the modules.	Novelty/Creativity	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003; Savill-Smith, 2004
Keep the beginning of the game somewhat simple because the threshold of interest and concentration might be low.	Order of Presentation	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001
Learning situations are ordered in the early stages so that earlier cases lead to generalizations that are fruitful for later cases.	Order of Presentation of Concepts	Gee, 2003
In the beginning, the learner should see many more instances of fundamental signs and actions than would be the case in a less controlled sample.	Order of Presentation of Concepts	Gee, 2003
The learner is given explicit information on demand and just-in-time (when the learner needs it) or when the information can be understood.	Order of Presentation of Concepts	Gee, 2003
Thinking, problem solving, and knowledge can be stored in material objects and in the environment so that learners can engage their minds with other tasks while keeping those objects accessible.	Reference	Gee, 2003
Embed opportunities in the game structure and make links to external material as part of the game.	Reference, Behaviorist	Prensky, 2001 Savill-Smith, 2004
The game should encourage reflection.	Reflection/Cognitive	Prensky, 2001; Savill-Smith, 2004
Reflection should be presented in multiple levels so that learners can integrate what they are learning with new knowledge.	Reflection/Cognitive	Savill-Smith, 2004; Becta, 2001
Context should be relevant to learner’s lives.	Relevancy	Becta 2001; Savill-Smith, 2004

Guideline	Category	Source
Simulations should mirror real life in three areas: content, context, and process.	Relevancy	Savill-Smith, 2004; Stretch 2000
Consider target audience needs when determining the pace and duration of the game.	Relevancy	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey et al. 2002; Mitchell 2003; Savill-Smith, 2004
Enable interaction with realistic-familiar characters, not just fantasy characters.	Relevancy	Becta, 2001; Savill-Smith, 2004
Reward the learner randomly.	Reward	Habgood, 2006
Games should offer rewards intermittently, not only at the end.	Rewards	Mitchell/Savill-Smith, p. 48 (from Poole 2000)
For learners of all levels, there should be intrinsic rewards from the beginning through the end of the game. Rewards should be customized to each learner’s level, effort, and growing mastery of the game.	Rewards/Challenge	Gee, 2003
Games should offer selectable levels of difficulty (i.e. Beginner, Intermediate, and Advanced).	Rewards/Challenge	Mitchell/Savill-Smith, p. 48 (from Poole 2000)
The game should make it safe for learners to take risk. Learners will take risks if the real-world consequences are lowered.	Risk	Gee, 2003
Learner shares what is learned outside the domain/game with others – some of whom the learner may rarely or never see face-to-face.	Social	Gee, 2003
Cater to the learners affective and social needs. Opportunities for human interaction.	Social	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003 Savill-Smith, 2004
Incorporate opportunities for discussion into the game (possibly learning prompts).	Social	Kelly and O’Kelly 1994; Oyen and Bebeko 1996; Becta 2001; Dempsey et al. 2002; Mitchell 2003; Savill-Smith, 2004
Team plays towards common goals.	Social	Ryan, Rigby 2006; Rigby 2007
Make multi-learner games more fun to play by including competition and cooperation.	Social	Habgood, 2006
Balance multi-learner games by providing characters with different strengths and weaknesses.	Social	Habgood, 2006

Guideline	Category	Source
Balance multi-learner games by weighing choices to provide interesting trade-offs.	Social	Habgood, 2006
Ensure the game structure matches the learning objectives.	Structure	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey <i>et al.</i> 2002; Mitchell 2003; Savill-Smith, 2004
Develop games for different platforms (mobile, computer, etc.).	Technical	Kelly and O’Kelly 1994; Oyen and Bebko 1996; Becta 2001; Dempsey et al. 2002; Mitchell 2003; Savill-Smith, 2004
Consider the technical boundaries of the game (bandwidth)	Technical	Cheung and Siu, 2002;
Incorporate scalability	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Include security.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Consider incorporating built-in cheating detection.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Include how you will handle bug patches.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Provide an active complaint-response channel.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Incorporate logging and audit trails.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Include Post-detection mechanisms.	Technical	Cheung and Siu, 2002; Savill-Smith, 2004
Add a testbed that allows characteristics to be changed in real time.	Technical	Habgood, 2006
Learners are given ample opportunity to practice and support for transferring what they have learned earlier to later problems.	Transfer	Gee, 2003

APPENDIX K COMPETITIVE ANALYSIS

	Tactical Iraqi	Vcommunicator	VECTOR
Two-Way Spoken Communication	Yes, contains special algorithm that does not penalize beginners for the slow rate of speech as long as the words are pronounced correctly. Speech recognition software is calibrated to recognize a variety of accents.	No - One way spoken communication and writing system.	
Iraq Specific	Yes	Yes - Iraqi Arabic and Iraqi Kurdish	Yes - Iraq (also Kurdish)
Languages/Culture Specific Customs Available	Yes, Iraqi Arabic	Yes - Language and corresponding gestures are spoken/displayed	Yes - not language - but culture specific
Basic Skill Training	Yes - There are three modules; the Skills Builder module allows learners to focus on basic vocabulary skills.	Yes	N/A
Scenarios Provided	Yes - There are three modules. The Arcade and Mission modules allows learners to focus primarily on decoding, rehearsal, and reflection, which is vital for learning.	Yes - phrases are grouped by scenario	Yes - fully interactive virtual village.
Non-Verbal Skills Included	Yes- gestures	Yes - Language and corresponding gestures are spoken/displayed	No
Encoding of Information	Yes	Yes	Yes
Decoding of Information	Yes	No	Yes

	Tactical Iraqi	Vcommunicator	VECTOR
Feedback Provided	Yes - Specialized speech recognition algorithms have been developed to help Soldiers learn how to correctly pronounce words in a "safe" environment. Beginners are not penalized for speaking slowly.	No	Yes - immediate feedback
English or American Equivalent	Yes	Yes	Yes
Evaluation	Yes - Quizzes are provided. Additionally, student progress is stored in database tables and can be extracted using basic SQL commands to provide detailed reports.	No	N/A
Artificial Intelligence	Yes - If student has encountered or mastered material provided, but is having trouble remembering, English "hint" is provided by an avatar that acts as the user's aide during game play. If new learning occurs, the student is presented with Arabic and English instruction. Software adjusts to the level of the student.	No	Yes - "remembers" past interactions and non playing character react accordingly
Customized Avatars/Puppets	No	Yes	Yes
Deployed in the Field	Yes - 20,000 have been trained using this software (Dec 2007 - www.tacticallanguage.com)	Yes - US Army 10th Mountain Division	Evaluated at West Point
Practice/Reflection Opportunities Provided	Yes	No	N/A

	Tactical Iraqi	Vcommunicator	VECTOR
Reference	Yes - the Mission Skills Environment provides reference; however there are no other reference materials indicated.	Yes	N/A
System Requirements	Windows. P4, Core DUO 32-Bit, or Athelon Processor; 1G RAM, 1G HD, Direct X9/ATI Radeon 9800 card with dedicated memory; Noise-canceling headset w/ microphone.	Apple video iPod (can be strapped to upper arm) or Nano (can be strapped to wrist).	
Company	Alelo	VCOM 3D	Chi Systems
Cost	Free to members of the military	N/A	N/A
Development Tools	Sum Total's Tool Book, Medina, Unreal Tournament	VCOM 3D Studio, Gesture Builder	Jupiter Engine, iGen
Modifications by the User Allowed	Yes	Yes - 6 hours of training required (source: vcom3D)	Yes - XML-based scenario story editor
Game Type/Narrative	First Person Adventure/Quest	None - reference tool	First Person
Developers	USC	VCOM 3D	Chi Systems
Distributors	Alelo	VCOM 3D	Chi Systems
Development Date	Ongoing	Ongoing	Ongoing