

SECTION 4 - GUESTS (NON-EUROPEAN REGION)

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**CUSTOMS AND BORDER SECURITY
THREAT RECOGNITION TRAINING & TECHNOLOGY**

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Abstract

The article deals with threat recognition, which is an integral skill set for law enforcement, Customs and border security officers. The research described in this article focuses on specific issues related to human brain function and its connection to non-verbal behavior. The authors emphasize that recognizing non-verbal communication can improve the Customs and border security efficiency. By combining professional training in non-verbal behavior, paralinguistic signals and facial recognition, Customs and border security officers would be far more adept at interpreting quickly and properly the emotions and intentions of those who cross the border. From a Customs perspective, the ability to read non-verbal behavior of individuals will assist in the prevention of smuggling, human trafficking and illegal weapons or cargo transport across state borders.

Key words: non-verbal behavior, professional training, interpreting non-verbal communication, threat recognition, threat recognition technology, Customs and border security.

Introduction

In the last two decades, there has been a significant increase in body language awareness and its use for a myriad of purposes: to train Marines and Soldiers for combat, to assist the Department of Homeland Security in preparing police and security personnel for the field and to aid in business meetings as well as the medical field, to name just a few examples. A large percentage of what a person communicates and perceives during interaction with others is based primarily on non-verbal cues. Recognizing those cues is a skill that is both innate and learned. Reading body language is also an excellent way to gauge whether what one says matches one's nonverbal behavior and can reflect very accurately a person's emotional state and provide immediate awareness of any change in that state.

For the past two decades, many of the solutions proposed and implemented in the Customs

arena are technology centric. That includes scanners, international databases and a host of camera systems to monitor activities. For the most part, Customs agencies around the world have ignored the best pattern recognition system we have. That is the human brain. By training the Customs officers how to recognize threats, whether they are economic, terrorist related or human trafficking, the authors argue that such training may be some of the most effective tools to combat illegal activities.

Improvements in Customs officer's effectiveness in detecting and halting illicit cargo will improve the business climate between countries and foster greater foreign investments. Since trade is the engine that drives the global economy, Customs officers are key governmental agents responsible for enforcing international, regional and national trade policies. The Customs officers are also often the first line of defense against a host of illegal activities which can be significantly reduced at the point of entry.

There are many technologies that seem to embrace various aspects of this domain; however, they fail to integrate an adaptive intelligence platform that makes detecting, deterring, and defending a border from foreign and domestic threats efficient. A simple platform that utilizes Geographic Information Systems (GIS), structured data, open source intelligence, closed source intelligence, and crowd sourcing can provide a significant lead and perhaps even information dominance desperately needed by global nations to combat border and Customs concerns.

1. Body language domains

Any body language references must be made in context and be relevant to the situation observed and at hand. *Domains* is a term used to connote a means to view the human landscape and detect the messages. These messages are both abundant and clear to those willing to study exactly what the body is saying or in some cases, what the mind is attempting to conceal.

Inattentional blindness is the ability "to look directly at something and still not see it."¹ This determines what one sees and registers consciously and what one sees but fails to perceive.² Two people can observe the same action and walk away with a completely different recall of the event. In essence, there is no guarantee that we perceive the world accurately.³ Unfortunately for human beings attention is, in practical terms, a zero-sum equation where paying attention to one event or action reduces the ability to pay attention to other activities. So the issue becomes how to direct our attention resources where they will provide the most useful gain.⁴

The specific domains utilized for this article; biometrics, proxemics, kinesics and atmospherics, and when evaluated in concert with each other provide a much better cognitive evaluation of an observed action and/or a developing situation. These specific domains offer an ability to assess the multitude of non-verbal behaviors or the environment under consideration. Accurate assessment and a proactive approach are critical in saving lives and reducing illegal cargo, detecting a bomber in a crowd or determining the truthfulness of someone's statements.

Biometrics is the science and technology of measuring human body characteristics such as

¹ Hallinan, JT 2009, *Why We Make Mistakes*, Broadway Books, New York, pp. 81-83

² Chabris, C & Simons, D 2010, *The Invisible Gorilla*, Crown Publishers, New York, pp. 38-39

³ Medina, J 2008, *Brain Rules, 12 Principles for Surviving and Thriving at Work, Home and School*, Pear Press, Seattle, p. 206

⁴ Chabris, C & Simons, D, *The Invisible Gorilla*, p. 39

fingerprints, retinal scans, voice patterns or facial patterns for authentication and security purposes.⁵ For the purposes of this article, biometrics refers to the group of autonomic functions, or involuntary changes within the body that a person cannot control such as pupil dilation, blink rate or reddening of the face.

Blinking or blink rate is an observable biometric which may indicate the presence of stress, anxiety or normal activity. The normal blink rate for individuals is 15-20 blinks per minute or approximately once every 3 seconds. Blink rate changes are related to cognitive processing so when an individual blinks rapidly, that may be indicative of an inner struggle the person is facing.⁶ The blink rate will return to normal once that perceived threat or anxiety has passed. Lying and deceit are two examples of when the blink rate will increase significantly and can be monitored by careful observation.

Proxemics: According to Edward T. Hall, proxemics is “the study of humankind’s perception and use of space,” and for our purposes, proximity is the interpretation of the spatial distance we maintain as we interact with others, depending upon the social and cultural context. Hall developed the idea of human spatial research in his classic anthropologic book, “The Silent Language” written in 1959.⁷ He described four different levels of space as public, social, personal and intimate space (figure 1). It is important to note that spatial distances differ depending upon the cultural context. When people violate our personal space, we experience an immediate and powerful limbic reaction.

Figure 1.

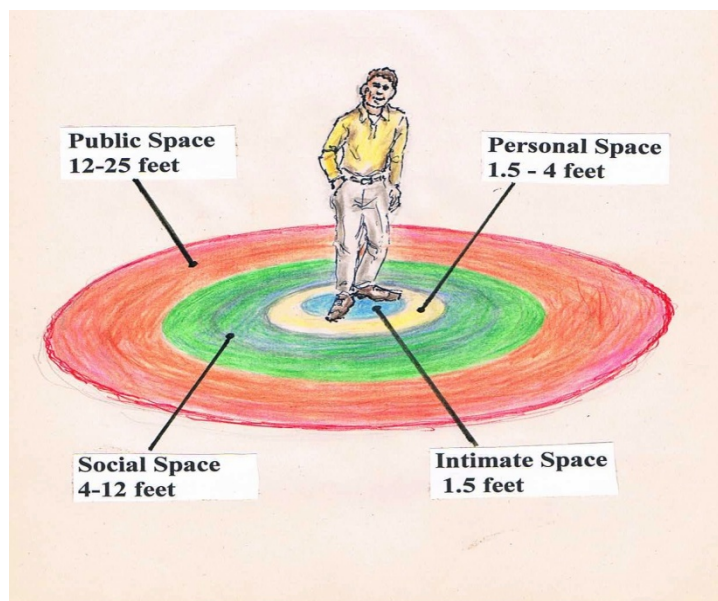


Figure 1 depicts the four levels of space individuals recognize according to Hall. Cautions should be used in applying these distances to different cultures because the distances will vary, but still remain relevant. Artwork provided by Nick Nichols.

⁵ "Biometrics", last modified October 2008, <http://searchsecurity.techtarget.com/definition/biometrics>

⁶ Ibid., p.183

⁷ Hall, ET 1959, *The Silent Language*, Anchor Books, New York

*Behavioral science is all about better understanding criminals and terrorists – who they are, how they think, why they do what they do – as a means to help solve crimes and prevent attacks.*⁸

Kenisics is a means of communication through gestures that reflect feelings, attitudes and intentions. By observing closely, humans elicit information which may provide an indication of another person's thoughts or reactions to a specific situation and may telegraph threatening movements or actions. The study of body language is not an exact science and should not be interpreted outside the context of observed movements or gestures and the situation in which they occur. Understanding body language involves the interpretation of at least three consistent cues to arrive at a specific conclusion

There are two primary indicators displayed in body language which are universal: comfort/discomfort and pacifying behaviors.⁹ When humans feel discomfort regarding an individual or situation, the limbic portion of the brain responds by sending body language cues that reflect their negative feelings. The opposite is also true. Body language can indicate positive feelings about an individual or situation.¹⁰ Interpreting the wealth of signals a person displays depending upon mood, level of anxiety, or relaxation can often help determine what that person is thinking or anticipate how the individual might act in that specific circumstance. Pacifying actions nearly always follow some threatening or negative event the person has recently experienced.¹¹ These natural responses to trauma, known as "pacifying behavior," are a human being's unconscious attempts to restore the homeostasis or normal condition of the brain-body connection. This type of non-verbal mannerism provides the observer with enough information to determine the person's current state of mind.¹²

Atmospherics is the collective mood or atmosphere of a given environment: how it sounds, feels or smells during normal activity. The key is to establish a baseline of normal activity such as traffic patterns and times at border crossings, how most travelers act when approaching Customs officers at an airport checkpoint or the type/model of cargo transport vehicles at given border crossing. From that given baseline, the observer can measure all other activity to determine if there is something added or removed from the baseline that could alter the activity. These changes from the established baseline are called "anomalies". Looking for anomalies is the key to predicting future events, threatening or otherwise. The goal is to observe the environment, detect anomalies and make sense of them in the context of the situation.

All humans are susceptible to a phenomenon termed "change blindness",¹³ a failure to detect changes in a scene after a brief disruption of the visual field. Basically, some minor but possibly crucial aspect of the scene goes unnoticed. The eyesight of all animals is cued to detect motion. Humans have better than 180 degrees of vision, but only a small percentage of that is high-quality acute vision. The human eye provides high resolution to an angle of only two degrees.¹⁴ What we see depends greatly upon what we expect to see or are looking for. Seeing is

⁸ "Serial Killers' by the FBI's Behavioral Analysis Unit", last modified March 26, 2013,

⁹ Navarro, J, 2008, *What Every Body is Saying*, Harper, New York, p. 35

¹⁰ Ibid., pp. 34-35

¹¹ Ibid., p. 35

¹² Ibid., p. 37

¹³ Hallinan, *Why We Make Mistakes*, p. 14

¹⁴ Hallinan, *Why We Make Mistakes*, p. 17

mentally a very difficult task, especially when looking intently for something out of the ordinary.

According to Dr. Wolfe, of the Boston Brigham and Women's Hospital Visual Attention Lab, if one is looking for something and doesn't find it, one tends to give up. So the observer's quitting threshold is directly related to his or her success rate in finding a given object. Wolfe goes on to say that the way the human brain is wired, it rationalizes that it is not productive to invest an inordinate amount of time or effort looking for something that's rarely present.¹⁵ That's not a problem unless the job centers around finding weapons or indications of WMD in the hundreds of X-Ray photos a scanner might see in an hour.

An additional problem is inattentive blindness, which is the result of a person dividing attention between two or more disparate tasks.¹⁶ Human perception attempts to be as efficient as possible, and in order to be efficient, people skim. However, with this efficiency the trade-off is accuracy.¹⁷ We notice some things but not others. According to Hallinan, as something becomes routine or familiar, humans tend to go on auto-pilot and notice fewer anomalies.¹⁸ Context helps determine whether we "notice" something or someone while in the process of searching.¹⁹ The single most important characteristic that experts share is their willingness to devote extra time to improving their skills. Practice, practice and more practice must be their hallmark.

2. Cognition and attention

We humans operate with numerous cognitive illusions on a daily basis. The illusion of attention is a perfect example of how we believe we are paying attention and will or should notice and remember far more of our experiences than we actually do.²⁰ The concept of looking but not seeing is totally incongruent to how we believe the mind works and retains information.

Inattentive blindness is most prevalent when someone is looking for a specific item or person and is therefore not likely to notice what he is not expecting to see. Depending upon how focused a person's attention is, even a brightly colored reflective vest worn by a motorcyclist can go unnoticed. Because items or events are easily detected when they are expected, it is natural to assume that they should be obvious even if they are unexpected.²¹ Chabris and Simons indicate that there is little evidence to indicate exactly what inattentive blindness misses. This is because the focus is on the anticipated events or objects and not on what is unexpected and thus unobserved. So for the human brain, Chabris and Simons conclude that attention is a zero-sum situation: the attention paid to one area of focus detracts from the ability to focus on another.²² Essentially, we can't have our cake and eat it too, when it comes to focus and attention. Unexpected events are rare by definition and a failure to notice them is not normally catastrophic. However, if the job focus is to notice those unexpected events, life-threatening results can occur.²³

Regarding human memory, Chabris and Simons state that, "what is stored in memory is not an exact replica of reality, but a re-creation of it." So what one recalls from memory is often a

¹⁵ Hallinan, *Why We Make Mistakes*, p. 23

¹⁶ *Ibid.*, p. 81

¹⁷ *Ibid.*, p. 110

¹⁸ Hallinan, *Why We Make Mistakes*, p. 113

¹⁹ *Ibid.*, p. 114

²⁰ Chabris, C & Simons, D, *The Invisible Gorilla*, pp. 8-9

²¹ Chabris, C & Simons, D, *The Invisible Gorilla*, p. 35

²² *Ibid.*, pp. 37-38

²³ *Ibid.*, p. 39

combination of remembered details and what one thinks should have happened or been in a scene.²⁴ This leads to a phenomenon termed “Change Blindness,” a failure to notice something in a scene that was previously not there. Most people firmly believe they would notice changes, yet few actually do in experiments.²⁵ What does this have to do with threat recognition or threat awareness? Detection of changes is critical in developing better security, spotting cues that indicate smuggling, or detecting someone conducting surveillance at a border checkpoint.

3. Non-verbal behavior and non-verbal communication

Non-verbal behavior generally refers to body language (kinesics), but also encompasses facial expressions, gestures, tone of voice and posturing and can include iconography, such as tattoos or graffiti. Each of these aspects of non-verbal behavior can account for 60-65 percent of all interpersonal communication. Researchers have discovered that non-verbal mannerisms provide about five times more impact than verbal communication. If there is an inconsistency in the non-verbal and verbal messages, women tend to put more stock in the non-verbal signals since they know that verbal communication can be laced with deceit.²⁶ People are frequently unaware of the amount and degree of information their non-verbal actions are revealing. Therefore, non-verbal behavior can actually provide a more honest assessment of the person’s emotional state or intentions at that particular moment.²⁷

Just as with any skill that develops over time, reading non-verbal communication takes both training and continual practice to maximize a person’s ability not only to recognize cues, but also to respond appropriately in order to mitigate threatening situations. First, we must recognize that humans are capable of projecting thousands of non-verbal behaviors. Because of this, it’s up to the trained observer to weed out inconsequential behaviors and focus on the important behaviors and what is causing them.²⁸ Understanding the physiological and biological basis for human non-verbal behaviors is a prerequisite to fully understanding how the mind-emotion-body signals work. The true beauty of this information is that it applies to human beings irrespective of race, religion or national origin. Any member of the “Human Race” will exhibit these traits in greater or lesser degrees. It’s up to the trained observer to recognize and interpret the nonverbal meanings. So how much of the 60-65 percent of non-verbal behaviors are Customs officers actually oblivious to or not recognizing?

Surveillance Technology for video monitoring utilizes software and hardware to capture human movement and/or audio. The majority of these video systems do not provide an in-depth analysis to the non-verbal behavior. Few remaining agencies that have access to advance systems utilize systems that highlight anomalies. The ability to include algorithms to account for such changes is not unfeasible and can be integrated into a common cloud platform to work with existing video systems, reducing the high cost of replacing cameras or investing in new applications. These systems will be extremely effective if used in conjunction with trained human analysts.

²⁴ Ibid., p. 49

²⁵ Ibid., p. 55

²⁶ Pease, B & Pease, A 2006, *The Definitive Book of Body Language*, Bantam, New York, p. 23

²⁷ Navarro, *What Every Body*, pp. 2-4

²⁸ Ibid., pp. 17-18

4. Brain function and its connection to non-verbal behavior

As with learning a foreign language, practice and understanding are keys to interpreting human behavior. Non-verbal behavior cues are the universal language of politics, business, medicine, military and law enforcement. Knowing only one language can be equated to living in a single-room house. One can live comfortably in that room, but be closed off from other experiences. Venturing out can be challenging but developing the skills to be bi-lingual or multi-lingual opens the door to other rooms and new adventures. Those willing to unlock the doors find that their house has expanded and their lives are much richer for it. In the same way, recognizing non-verbal communication enhances one's ability to interpret the human behavior around him or her and to act or react accordingly.

Behaviors are manifestations of thoughts, emotions and situations. To fully understand how the brain directs the body to display its emotions in non-verbal mannerisms, one must explore the cognitive center of the human being. Humans actually have three major components to the brain: the limbic brain, the stem brain and the neo-cortex. Understanding how each part of the brain plays a unique part, researchers can better interpret the non-verbal behavior and determine what the brain wants to communicate to the outside world.²⁹

The limbic brain is the portion of the triune brain that responds in real time to one's survival. The limbic brain doesn't take time off for good behavior and therefore, provides continual, reliable and honest non-verbal mannerisms which in turn reflect accurate intentions, feelings and even thoughts. This is the human's emotional epicenter which sends signals to muscles which reflect behavioral mannerisms. Because activity in the limbic brain acts without input from the neocortex (the intellectual brain) its actions are considered honest indicators of how one truly feels. It is the cornerstone of human non-verbal behavior.

Limbic in Latin means "border." The limbic system is essentially the border between the neocortex and the sub-cortical structures of the brain. The amygdala is the core of emotional behavior and motivation. According to Dr. Beatrice de Gelder, a professor at Tilburg University, The Netherlands, the amygdala plays a vital part in the relationship responses.³⁰ The limbic system, in particular the amygdala, is responsible for that "gut feeling or instinct", and where memory and emotions are combined.

Fear conditioning such as seeing a snake, alligator or African lion is the result of the limbic system providing a survival link via the amygdala. This is where the pairing of two stimuli, seeing the lion and the conditioned fear response, is manifested. Reading the signals produced by the limbic system is critical with regard to anticipatory action.³¹ Elevated heart rate and increased breathing are two symptoms of the limbic response to fear which are observable. The first response to seeing a slender, black shape coiled in the bushes is to imagine a snake and jump back. If it's a hose, one might feel silly but relieved. The pathway of that potential threat went from the eyes to the thalamus and on to the amygdala, which is responsible for the instantaneously quick response to perceived danger.

The concept of freezing in the face of danger manifests itself when people are either attempting to bluff or are caught in a lie. Just as early humans did, people today freeze in the face

²⁹ Ibid., pp. 21-23

³⁰ Swenson, R, "Review of Clinical and Functional Neuroscience", viewed 15 September 2013, http://www.dartmouth.edu/~rswenson/NeuroSci/chapter_9.html.

³¹ Dougherty, P, "Chapter 3: Central Control of the Autonomic Nervous System and Thermoregulation", viewed 20 September 2013, <http://neuroscience.uth.tmc.edu/s4/chapter03.html>.

of danger, hence the well-known phrase “like a deer-in-the-headlights.” That limbic freeze can also occur when people are questioned by a Customs officer at a port of entry. When frightened, people tend to breathe shallowly or even hold their breath. These actions are autonomic and unconscious, but quite obvious to someone looking for those indications.

Generally, the person facing the threat has something to hide which is causing such a limbic response. After the perceived threat has passed, he will exhale deeply as he walks away. That is when a second agent looking for that behavior should stop the person and ask to take a second look at his paperwork. Sure that the threat has passed, he is now taken by surprise and more emotional leakage will often occur. Subsequent questioning will then have a better chance to uncover some area of deceit or smuggling the individual was attempting to conceal.

It is well known that women have a much greater capacity for using and interpreting non-verbal communication than men do. Magnetic Resonance Imagine (MRI) brain scans demonstrate that women have 14-16 areas of the brain to interpret behavior while men have 4-6 such areas.³² The primary reason for this is biological, since in every society, the female is the primary caregiver to infants. The mother must be able to interpret the signals of an infant who can neither talk nor use a gesture to indicate what the infant needs. Though men start out in a deficit regarding reading non-verbal cues, they needn't remain there. This biological difference between men and women regarding non-verbal behavior detection is critical for Customs agencies to recognize. Because of the innate ability of females to better read and interpret non-verbal behaviors, the authors recommend that far more females should be involved in Customs Officer duties.

The primary task of the limbic system is to ensure survival by programming humans to avoid discomfort or danger and to search for safety.³³ When a human perceives a threat or experiences anxiety, the body will “leak” signals pertaining to that threat or anxiety. The same is true for a person who is relaxed and at peace. The nonverbal cues the body produces will be consistent with comfort and tranquility. By observing more intensely and looking specifically for non-verbal behaviors of discomfort and comfort, one can better evaluate a person's intentions, stress levels or even thoughts. This is a critical skill set for military and police forces as well as officers assigned to border crossings, airports and ship terminals. These comfort and discomfort behavioral markers aid substantially in anticipating behavior “Left of Boom,” which is to say, before a bomb explodes or illegal act is committed.

Pacifying behaviors are the limbic brain's attempt to restore the homeostasis of the body and get it back to normal.³⁴ Interpreting human pacifying behaviors is critical in determining a person's emotional state of mind. It aids in determining when someone is at ease or responding negatively to an event and happens in real time, often before the person is aware of exhibiting such behavior. At a Customs window, the officer should be continually looking for these behaviors as they discuss a cargo manifest with a driver, for example. If the driver reacts negatively to a question or comment, such a response could be evidence of invalid documents. If other questions elicit similar behavior, the Customs officer can be confident there are problems that require further investigation. The officer should look for clusters or groups of at least three cues or non-verbal behaviors which signal the driver's thoughts and reactions.

What is the best sequence for interpreting the body signals and which portions of the body

³² Pease & Pease, *The Definitive Book*, p. 14

³³ Navarro, *What Every Body*, pp. 34-35

³⁴ *Ibid.*, p. 35

provide most/least reliable information? A logical assumption would be to start at the top (head) and work down to the feet.³⁵ The folly of such an approach is that the face is the single most deceptive part of the body and includes over 40 different muscles.

Humans frequently turn away from situations or people they dislike or perceive as threatening and turn towards those they agree with or like. This behavior could be an immediate tell or cue of how someone feels towards another in a group dynamic.³⁶ If a person turns their feet away from the group or towards an exit, one can interpret the movement as a disengagement from the conversation (subtle, but observable and important).

5. Dominant behavior cues

Territorial displays are exhibited when an animal feels threatened or is trying to intimidate others. This non-verbal behavior is used to establish control and show dominance. Rather than peeing on bushes or tearing bark from a tree trunk, humans will most often take up more space, thus occupying more territory. When a male German Shepherd feels threatened or when someone is encroaching on its territory, the first non-verbal behavior it exhibits is the raised hair on its back and its front feet spread wider than shoulder width. This makes the dog appear larger than it is and is done to intimidate an opponent. For example, a police officer may display control with feet splayed and hands on hips or weapon belt when confronting someone about to get a ticket (figure 2). This posture is one of authority, confidence and control. When humans feel threatened or in a confrontational situation, the stance will widen to deliver a signal of potential problems in an attempt to intimidate the opponent (not unlike the German Shepherd – minus the peeing).

Figure 2.



Figure depicts a posture of authority and control.

³⁵ Ibid., p. 55

³⁶ Navarro, *What Every Body*, p. 61

A Customs officer should view with suspicion a person who faces the counter while his feet face the exit. His feet indicate a desire to leave the area even as the torso, oriented toward the Customs officer, attempts to conceal this desire. This is especially true if the individual indicates in an abrupt manner that he has nothing to declare.³⁷ Chances are quite high that it is not a connecting flight or a meeting that is causing his abruptness but the undeclared goods he may have. Therefore, the situation might warrant a second evaluation by another Customs officer.

Feet and leg movement is normal, thus an excellent stress or anxiety indicator arises if the movement suddenly stops.³⁸ The limbic system has just responded to the freeze instinct at the first sign of a threat. Determining what caused that response should be the next task. The limbic brain is very much in play with respect to the actions and reactions that occur in the torso and arms. There are a number of vital organs in the core of the body that the limbic system needs to protect from perceived threats.

The first non-verbal signal from the core, and possibly the most obvious signal, might be how a person moves his upper body away from someone or something he dislikes or feels is a threat. Proxemics may be both observable and measurable as persons distance themselves from someone who is perceived as a threat. The normal human response to a threatening or unpleasant person is to create physical distance. If creating space between the threat and themselves is not possible, people will use the torso and upper body to blade away from the individual, a very noticeable behavior to anyone observing the situation.

The arms may be the most expressive producers of non-verbal behavior while a person is speaking. For anyone too far away to hear the conversation or see the facial responses, watching the arm movement of those engaged in conversation provides knowledge of who is talking and how others in the group are responding to the speaker. Conversation is a give and take interchange and the individual using the most hand and arm gestures is usually the one in control of the conversation at that point in time.

The human limbic system provides response to a threat by trying to oxygenate the larger muscles needed in preparation for fight or flight response. If a person detects a possible threat, the chest may expand more than normal, filling the lungs with air.³⁹ This response is an indication of anxiety or anger building inside the person. How people carry objects in their arms is also an indication of the comfort or discomfort they feel at that moment. Navarro related that Customs officers can sometimes detect a level of anxiety people exhibit as they get closer to the Customs desk. The manner in which a lady holds a handbag or a man a briefcase, can indicate the value of the contents or illegal items they are carrying.⁴⁰ In these situations, the limbic brain is telling the arms to guard what is valuable.

Customs officers have indicated that individuals who approach the counter and place their hands rather wide on the counter are immediately attempting to confront and intimidate the officer – a dominance behavior. The hands are extremely expressive and can relate subtle changes in the limbic system. According to Dr. David Givens, Director of the Center for Non-Verbal Studies in Spokane, Washington, the human brain devotes a significant amount of attention to the hands and

³⁷ Navarro, *What Every Body*, p. 78

³⁸ *Ibid.*, p. 80

³⁹ *Ibid.*, p. 104

⁴⁰ *Ibid.*, p. 115

fingers since they can be both expressive and dangerous.⁴¹ From a threat-recognition perspective, hiding of the hands denotes threatening behavior. Since the hands are an integral part of most conversations, their absence in the conversation may be considered a signal of dishonesty.

Much of the research conducted in the last two decades regarding emotions and non-verbal behavior has been in clinical or static trial experiments wherein the subjects of the study had to identify specific emotional expressions by looking at a series of photographs in a “freeze frame” environment where they could stop and analyze each picture. However, humans live in a fluid and dynamic environment rather than a “freeze frame” situation where they can stop and identify what is happening, what emotions are present and whether there or not there is a threat. Dr. Charlotte Sinke conducted research at the Social and Behavioral Sciences Department at Tilburg University and at Maastricht University in The Netherlands to determine how the context of a situation contributes to a person’s ability to recognize human emotions. Dr. Sinke demonstrated that with just a momentary glimpse (<50ms), the human brain can determine the context of a scene or situation. That ability also assists in object recognition and detection.⁴² Dr. Sinke determined through her research that the human brain must process simultaneously both an object and the context of the situation.⁴³ This brain activity, known as *parallel processing*, resulted in a finding that contrasted with the widely held belief that the processing center of the human brain must evaluate one object, process it and then move on to the next object – a sequence termed *serial processing*. According to Dr. Sinke the human brain is capable of both parallel and serial processing.

Successful recognition of an object (face, weapon, etc.) is not independent of its context. The human brain requires that context to make an accurate assessment. The same is true for emotional detection, which is dependent upon contextual cues such as body posture, vocal inflections, facial expressions or social situation which enable a person to correctly discern the situation. According to Dr, Sinke, humans have a predisposition to search for social meaning while observing social interactions. The amygdala (AMG) and the fusiform cortex (FC) both contribute significantly to the recognition of whole-body expressions regarding the emotions of fear and happiness.

6. Different cultures and behaviors

Basic emotions are similar across different cultures as Dr. Ekman determined in his research from the 1960s and delineated in his book, *Emotions Revealed*. Economic globalization increases contact with many different cultures. In the arena of Customs and border security, cultural awareness and knowledge of differing cultural behaviors are a requisite for success. Most research involving emotions has focused on the face. Dr. Sinke points out that members of the same race are more adept at recognizing various emotional expressions in people of their own race than the emotional expressions by individuals of other races.⁴⁴ She indicates that some cultures express emotion differently or the display of emotion differs in degree depending upon the

⁴¹ Givens, D "Non-Verbal Dictionary", *Center for Non-Verbal Studies*, viewed 12 October 2013, <http://center-for-nonverbal-studies.org/6101.html>.

⁴² Sinke, Ch 2011, "Perception of Emotions from Faces and Bodies and the Influence of Context", (PhD diss., Maastricht University and Social and Behavioral Sciences at Tilburg University, the Netherlands), p. 15

⁴³ Sinke, Ch, "Perception of Emotions", p. 16

⁴⁴ Sinke, Ch, "Perception of Emotions", pp. 28-29

situation. By combining training in non-verbal behavior, paralinguistic signals and emotional facial recognition, Customs and border security officers would be far more adept at interpreting quickly and properly the emotions of those they encounter in their profession.

Pre-attentive processing is the unconscious gathering of data from the environment and filtering of what is important for survival or a specific task. An example of this would be the search for specific pieces of a puzzle from among the jumble of others. The human brain filters out those pieces that do not match those for which the person is specifically looking. This is analogous to an airport screener viewing the X-ray machine monitor as hand-carry luggage moves past. That screener will filter items using a pre-attentive process, selecting only those objects of interest. There are real pitfalls with pre-attentive processing, since the brain can too easily switch to “Auto-pilot” and miss critical items.

At this point, it’s necessary to discuss some universal gestures and some of the science behind the development of kinesics. It turns out that the non-verbal messages and the emotional state of an individual are closely linked. Reading body language or other non-verbal signals assists in determining the emotional state of a person at that moment. What that information cannot determine is the “Why” regarding the observed signals. Scientific research conducted on blind individuals demonstrates that many non-verbal behaviors are in fact universal. Since a blind person could not have learned such behaviors by seeing and mimicking, the occurrence of these cues proves that they are universal human traits and are not culturally specific.⁴⁵

Dr. Paul Ekman further proved that spontaneous facial expressions, a form of non-verbal communication, are also exhibited in congenitally blind individuals. Ekman found that facial expressions used in five disparate cultures were the same and thus inherent to all humans.⁴⁶ Beyond facial expressions, the shoulder shrug is a universally accepted gesture indicating that a person either doesn’t understand or doesn’t know what someone else is saying. In the shoulder shrug, there are distinct nuances worthy of note: the symmetrically raised brows which provide a submissive signal, the hunched shoulders which guard the carotid artery in case of attack, and the exposed palms which demonstrate nothing to hide. There are numerous cultural differences, but regardless where in the world one is, the shoulder shrug means the same thing.

Barbara Pease and Allan Pease, authors of *The Definitive Book of Body Language*, indicate that there are three cardinal rules in reading body language:

- Read Gestures in Clusters
- Look for Congruence
- Read Gestures in Context

The ability to study a series of body language cues can be greatly assisted by the use of technology, both in its advanced form and at rudimentary levels. A system that helps an analyst pick up the visible body language of a group of people based on deductive inference systems can help detect the leadership within a group. If this system is compiled overtime and more observations are noted then perhaps leadership structures can be understood. This is especially helpful as a method of understanding protesters, crowds (especially near and around a government building), borders, or venues. This provides a technological platform for both analysts and technology to work together in detecting non-obvious patterns, a key to solving decentralized

⁴⁵ Ekman, *Emotions Revealed*, p. 17

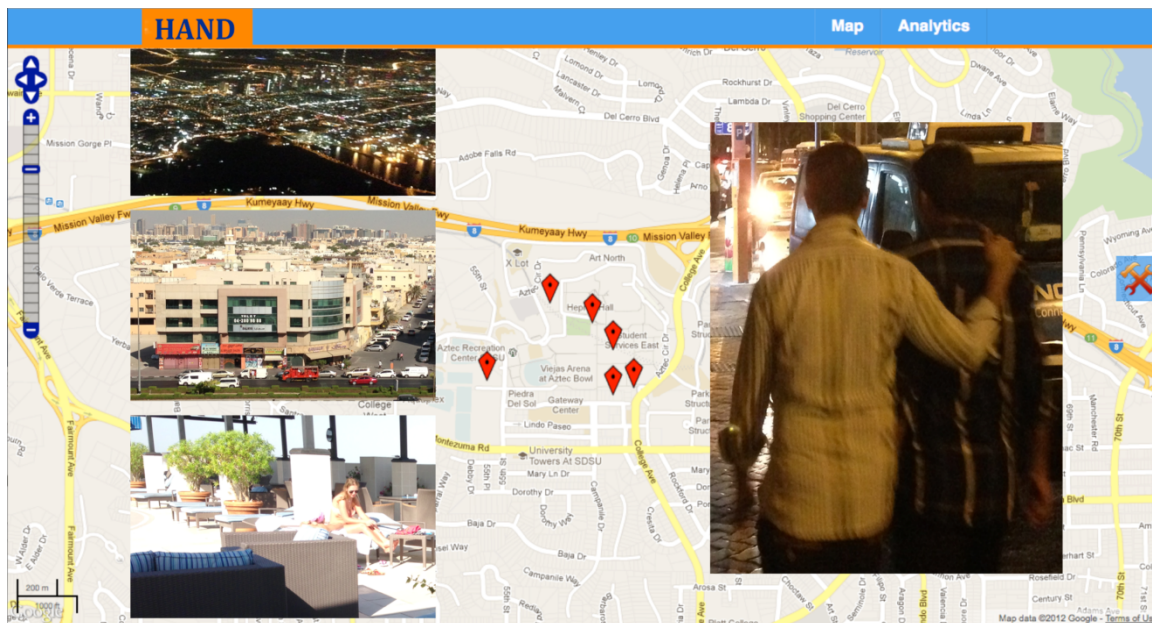
⁴⁶ *Ibid.*, p. 21

organizational structures. Collections of these patterns can serve as training data to automate this process in delivering an automated intelligence system.

Cultural differences can exist and must be given special attention in literature that impacts such automation. For example, the citizens of India (Republic of India) move their head in a sideways tilt to indicate “yes” and also sideways (without a tilt) to indicate “no”. An American observing this could define both of these body language cues as “no” without proper training. In the United States an indication of “yes” is the movement of a persons head up and down. This may seem to be a small issue from a 30,000 ft perspective, however, if you were observing a scientist using remote surveillance and are seeking to know if they plan to go operational in two days with a weapons launch, then the seriousness quickly sets in. Having a complete understanding and training in body language as well as accounting for cultural differences cannot be ignored. The price for guessing is too high.

Ongoing training must be given to the practitioners by experts who have experience in the theater (field operations) as well as academic backgrounds in order to learn from national experience and cater a tailored course that can benefit the sponsoring nation and offer security. The course as a whole must be evaluated for domain significance to show strengths and weakness. This is a wonderful opportunity for technologists that focus on domain knowledge.

Figure 3. Screenshot of human analysis and network detector (HAND)



We should note that the technology of this type serves as a helping hand in the process of interpreting human behavior dynamics. The Human Analysis and Network Detector (HAND) is a platform that can be built in collaboration with host nations that can operate on a mainframe or a private cloud network as part of the intelligence grid allowing various threat recognition to be shared and makes data fusion a practical and rewarding experience (figure 3).

7. Detection of deceit

The psychology behind lying has been a popular subject of discussion for the past two decades. In the course of reading body language and discerning non-verbal behavior, the face can reveal a significant amount of information. The human face has over 40 separate muscles enabling it to make over 100 distinct facial gestures.⁴⁷

The ability to read faces and interpret actual emotions enhances or augments other non-verbal behavior in order to determine with much better certainty whether or not a person is lying. Police generally develop an ability to read both people and situations after being on the street for a couple of years. But how much more effective they would be if they were capable from their very first day to understand the role which non-verbal behavior plays in questioning suspects or recognizing potential trouble in a street scene before it erupts. Thus a familiarity with the psychology of lying and a cognitive approach to understanding that aspect of human behavior is critical for police, military, and Customs and Border Security Officers.

In a 2012 Report to the Nations, the Association of Certified Fraud Examiners estimated that a typical business or organization loses as much as 5% of its yearly revenue due to fraud and deception. On a world-wide scale, global fraud loss exceeds \$3.5 trillion with 20% of these cases being a loss of at least \$1.0 million. The industries most at risk are banking, financial services, government contracting and manufacturing.⁴⁸ It is extremely important in the commercial arena to detect deceit and interpret non-verbal behavior within an organization to protect the bottom line. Improvements in Customs officer's effectiveness in detecting and stopping illicit cargo will improve the business climate between countries and foster greater foreign investment.

Detecting deception is a skill set that frequently provides few obvious indicators of success. In a global economic environment with near-instant communication, it's become even more important to have a better feel for what type of person or firm is offering a business arrangement. In view of the report mentioned above, to be for-warned is to be for-armed in making better business decisions based on detecting the presence or absence of deceit.

There has historically existed a dearth of solid theoretical research involving the cognitive process of telling lies and determining lies from deceptive messages. Dr. Williams, from Cardiff University in England, examined the cognitive processing differences between veracity and deception.⁴⁹ Recent functional Magnetic Resonance Imaging (fMRI) studies have demonstrated that the prefrontal cortex is particularly active when a person is engaged in telling a lie.⁵⁰ The link between increased prefrontal cortex activity and higher executive processes indicates that increased cognitive processes are required for deception. Dr. Williams also points out that different types of lies elicit different activation in the prefrontal cortex.⁵¹ She suggests that because different areas of the brain are activated, one should also expect the manifestation of different non-verbal behaviors.

When the human brain processes a question, the truth becomes active in the working

⁴⁷ Sherwood, S, "How Many Muscles Are in Your Face," *Neuroscience Psychology*, viewed 21 October 2013, <http://curiosity.discovery.com/question/how-many-muscles-in-face>

⁴⁸ Association of Certified Fraud Examiners, "2012 Report to the Nations", viewed 23 October 2013, <http://www.acfe.com/rtn.aspx>

⁴⁹ Williams, EJ, 2012, "Lies and Cognition: How Do We Tell Lies and Can We Detect Them?", (PhD diss., Cardiff University School of Psychology)

⁵¹ Ibid., p. 51

⁵² Ibid., p. 52

memory. Then the brain conducts a risk/reward analysis and if a deception is the chosen path, the brain retrieves information from long-term memory to construct the lie.⁵² The deceitful path is both longer and, according to Dr. Williams, involves more brainpower and memory use. This study by Dr. Williams validates the work of Dr Ekman, Barbara and Alan Pease and Joe Navarro in demonstrating that there is a delay in the deceitful response pathway which the lie must travel within the brain. Her study also highlighted that lies activated additional regions in the brain in the process of lying.⁵³ The brain regions associated with deception are also involved with the working memory, task switching and response inhibition processes (suppression of actions that are inappropriate in a given context and that interfere with goal-driven behavior).⁵⁴

For most of human history, communication has happened in face-to-face interaction. This is partly why so much human communication is non-verbal in nature.

*The mind produces a thought, The thought produces a feeling, That feeling "leaks" out through body language, You read the body language, and thus, You're reading the mind.*⁵⁵

Both verbal and non-verbal mannerisms which signal deception are, at best, part of an imprecise science.⁵⁶ Therefore, it's even more imperative that one uses Pease's cardinal "3-C" rule of Context, Congruence and Clusters to detect deceit. Both liars and those telling the truth have the same objective in mind: to appear as honest as possible.⁵⁷ This is where the skillfulness of the police, Customs officer or border security officer comes into play.

8. Facial expressions and emotions

The face is the most expressive part of the human body with over 40 different muscles that come into play.⁵⁸ Dr. Paul Ekman is one of the foremost experts in the field of emotions and their manifestations in the body, particularly in the facial region. In many cases, human consciousness doesn't even recognize that the brain is projecting emotional behavior.⁵⁹ Dr. Ekman studied emotions because they determine the quality of human life, are a universal trait and affect daily living in a myriad of ways. Emotions can also telegraph intentions and thoughts.

Dr. Ekman has identified a total of seven distinct emotions that have universal expressions. Interpreting these seven expressions in conjunction with other non-verbal behaviors will most accurately determine the emotional state of an individual at a specific point in time. The seven universal human emotions are sadness, anger, surprise, fear, disgust, contempt and happiness.⁶⁰ From a Customs perspective, the ability to read the facial expressions and non-verbal behavior of individuals is a skill-set that aids in the prevention of smuggling, human trafficking and illegal weapons/cargo transport across state borders.

Emotions affect nearly all the important decisions humans make and prepare the human

⁵² Ibid., p. 23

⁵³ Ibid., pp. 28-29

⁵⁴ "Response Inhibition," viewed 20 September 2013, http://www.cognitiveatlas.org/term/id/trm_4a3fd79d0af66

⁵⁵ Borg, J 2011, *Body Language*, Prentice Hall Life, Edinburgh, XVIII

⁵⁶ DePaulo, BM & Morris, WL 2004, *Discerning Lies from Truths: Behavioral Cues to Deception and the Indirect Pathway of Intuition, The Detection of Deception in Forensic Contexts*, ed. Par Anders Granhag and Leif A. Stromwall, Cambridge University Press, Cambridge, UK

⁵⁷ DePaulo, BM & Morris, WL 2004, *Discerning Lies from Truths*, p. 17

⁵⁸ Borg, *Body Language*, p. 62

⁵⁹ Ekman, *Emotions Revealed*, XVIII

⁶⁰ Ibid., p. 58

psyche to cope with critical situations. Reading emotions is akin to reading a person's intentions and desires. Dr. Ekman went on to develop the theory that emotions are most frequently exhibited when humans feel threatened – not unlike the freeze, flight or fight response discussed earlier.⁶¹

The emotions are essentially an autonomic appraising system which continually scans, just as ground radar might, to detect movement which could negatively affect our well being. Since the mind can evaluate a situation in milliseconds, the body often responds before it realizes what is happening, and this response is registered on the face as one of the seven universal emotions listed above. With consistent training, it's possible to recognize those emotions displayed in order to determine potential deceit, threats or normal anxiety in a given situation.

Since emotions alter how one views the world and interprets the behavior of others, knowing that those emotions register in the face makes the detection of said emotions considerably easier. The first step in this process is to determine what triggers the emotional responses and which connections in the human brain make the learned trigger part of permanent memory. Dr. Ekman found that the higher the stakes in a situation, the more emotional displays are present, particularly in the face.⁶² Many human emotions developed as signals to express to others how an individual was feeling or what emotions were important at that particular time. These emotional signals are always energized and thus broadcasting how humans are feeling, including the intensity level of that specific emotion. Since these emotional signals emerge when an emotion begins (often before the person even recognizes it), these emotions are markers or cues of anticipated behavior.⁶³

Humans have excellent motor control regarding the skeletal muscles, but the facial muscles are a different story and are controlled to a greater extent by the human brain.⁶⁴ Expressions can be extremely subtle and humans are generally not very adept at recognizing these subtle emotional cues. The more accurate a Customs officer can be at determining the emotional state of the individual in question, the better decision they can make. This is where training, not in technology, but in non-verbal human behavior detection is paramount.

Summary and concluding remarks

The contention of this article is that all of the Customs, border security and police agencies need training to recognize threatening body-language postures and other non-verbal behavior during escalating situations. Such behavior is frequently evident to the trained individual before the situation requires an “escalation of force,” or increased demonstration of control by the officer.

The focus of this article has been threat recognition, threat awareness and the role they play in understanding a myriad of human interactions. The sections regarding body language and the decision-making process focused on how inattentional blindness contributes to a failure to discern important information in the field of vision. The detection of body language cues is critical in improving the Customs and border security efficiency. The fact that women are better at detecting and using non-verbal behaviors is strong evidence that they should be utilized more fully in detection roles in the Customs arenas. That change alone, could improve the detection of a host of cross-border criminal activity. Human brain function and its connections to non-verbal behavior

⁶¹ Ibid., p. 63

⁶² Ekman, *Emotions Revealed*, p. 52

⁶³ Ibid., p. 56

⁶⁴ Ibid., pp. 62-63

explain why humans are susceptible to inattentional blindness during particularly hazardous situations. Recognizing non-verbal communication enhances one's ability to interpret human behavior. Threat recognition and threat awareness are integral skill sets for law enforcement, Customs and border security officers.

As we have already mentioned above, the technology can also assist in interpreting non-verbal behavior of a person. However, very few organizations are equipped with such development and training capability globally, such ambitious technological solutions will require a long-term collaboration between service providers, international government entities, academia, and private companies. The cost of not creating such a network clearly outweighs the benefits from doing it. Oftentimes, more money is lost thinking of building a solution than creating it right away. Enemies of the state seem to have a more rapid procurement process than the entities that fight them and who need it the most. It is perhaps this commitment that we must agree upon as we are now in the net centric era. The resulting output will assist in trade optimization, counter trafficking of humans and commodity, continuity of operations, disaster management, infrastructure protection, civil protection, humanitarian assistance and disaster relief, and law enforcement among other segments of modern society.

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