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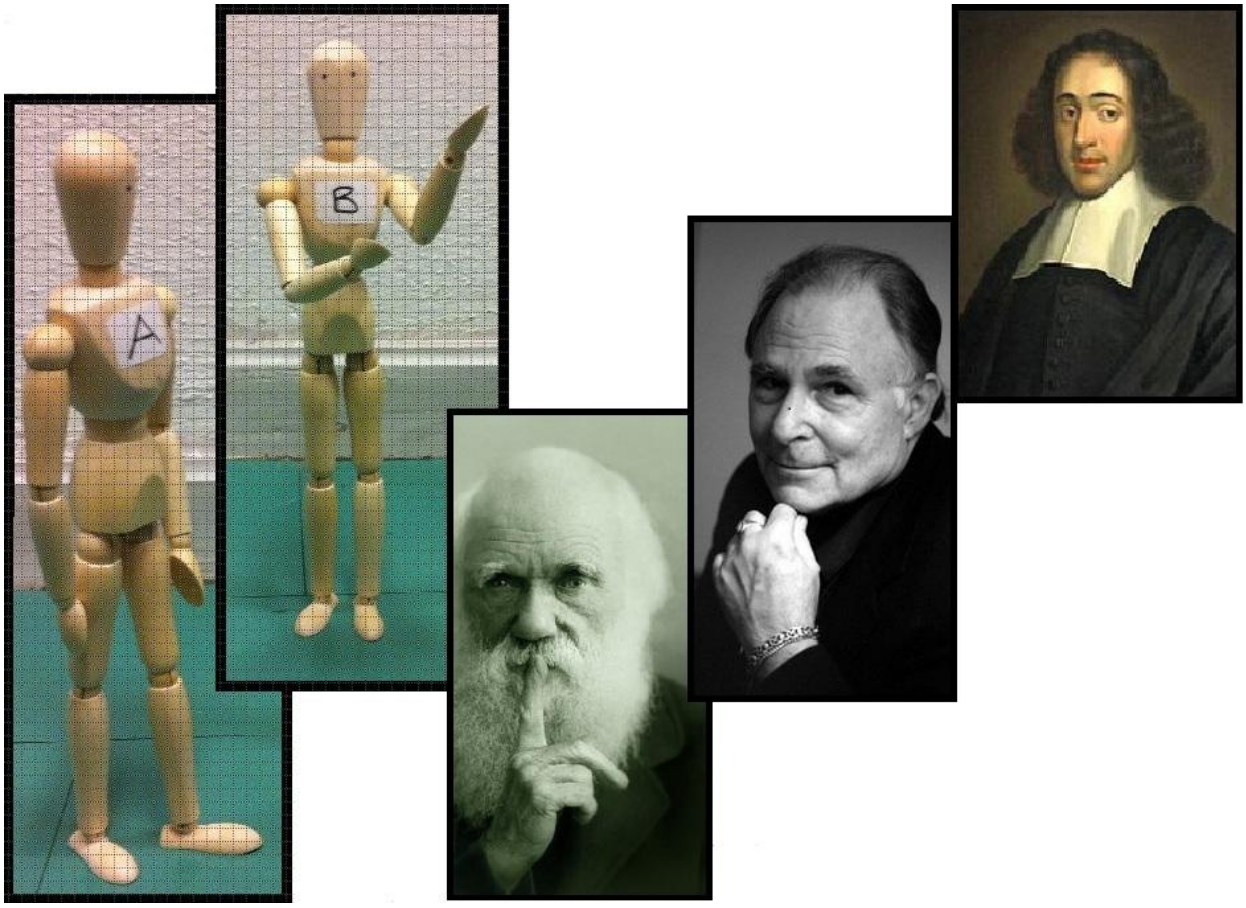

Bipedics: Towards a new category of kinesics.

An empirical investigation of the expression of attitude, and emotion, through simple leg and foot gesture.

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Abstract

Nonverbal communication skills are a crucial element to social interaction where an enhanced awareness can elevate individuals' emotional and social well being. Research by scientists in this field have historically focused on the role of facial expression and vocal quality as primary channels of the expression of attitude and emotion.

However, this area of research has neglected an important part of the human body and subsequently the role that simple leg/foot gesture might play in the expression of attitude and emotion is largely unexplored.

The present investigation draws on material from outside the scientific literature to propose a new category of kinesics; bipedic gestures. Two studies were conducted to empirically investigate the validity of bipedic gesture as a channel to express attitude, emotion and liking.

The present investigation's first study analysed corpus material, and obtained a significant positive correlation between attitude and frequency of leg/foot movement consistent with previous literature. A second study consisted of an on-line experiment testing the relationship between perceived liking and disliking, and certain leg/foot gestures. Highly significant results were obtained from the second study.

The results obtained within the present investigation suggest that attitudes and emotions such as liking can be expressed through simple leg and foot gesture and there is a subsequent call for further research into a new area of nonverbal communicative behaviour, a sixth category of kinesics; bipedic gestures.

'γνῶθι σεαυτόν; nosce te ipsum; know thyself'

Key words:

Attitude, Bipedic Gesture, Bodily Communication, Consciousness, Emotion, Expression, Foot Pointing, Leg Crossing, Kinesics, Liking, Nonverbal Behaviour , Nonverbal Communication

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Introduction

1.1 Max

In 2004 the world's largest computer museum at Paderborn in Germany employed a unique member of staff, the employee's name was Max. Max is much like any other member of staff at the Heinz Nixdorf Museum (HNF); he engages in 'small talk' with visitors and colleagues, and is described by Pfeiffer and colleagues (2011) in the following way, "he has interesting content to tell, he is a character, he proactively engages with visitors, and he shows emotions…" (Pfeiffer et al, 2011, p.125).

Max achieves this much like any other human at the HNF. Through using a range of communicative channels including verbal communication through the use of words and speech. And nonverbal communication through the use of facial expression, head movement, position of torso, and his use of arms and hands.

A significant difference between Max and his colleagues at the HNF is that he is a virtual human. An anthropomorphic artificial agent that has been designed to replicate human communication – both verbal and nonverbal – in such a way as to be a competent communicative partner to visitors at the HNF. Max has been described by his creators as being representative of the cutting edge in artificial intelligence at the turn of the millennium (Pfeiffer et al, 2011, p.121) and advanced enough for the question to be asked at scientific conferences as to whether, in the future, he will become self aware or gain consciousness (Wachsmuth, 2008, p.283).

Figure 1: Max (right) in the laboratory, and at the HNF (top image).

However, on observing MAX either ‘at work’ at the HNF, or ‘at home’ in the laboratory with his creators at the University of Bielefeld (see Figure 1, above), and in spite of his impressive range of artificial communicative competencies, he is missing a significant physical component.

Max has no legs or feet.

Reviewing both moving and stationary images of Max[1] it appears that for the purpose of communication Max is verbally reliant on synthesized speech and nonverbally reliant on facial expression and hand/arm movement. But his legs and feet, which are often conspicuously hidden by a virtual desk or the physical limitations of the screen being used to project his virtual being (see Figure 1, above), appear to play no role in his communication.

As mentioned already Max, in his communication, uses a range of channels to convey information and feelings. These include verbal communication; sounds, words, and language, and nonverbal communication. It should be noted at this early juncture that none of these channels operate independently and that the interplay between these various modes of communication must achieve an effective synergy in order to appropriately, competently and efficiently convey meaning. This in the same way as the various parts of an orchestra perform as one entity; the wind instruments, the strings, percussion and brass sections all coordinate themselves to convey meaning musically. If any single instrument, let alone an entire section, is out of synch, or missing altogether, the affect can be highly noticeable and detrimental.

The fact that within Max’s symphonic range there is an entire section missing section, in so far as he does not use his legs or feet in his nonverbal communication, represents the present state of research in the area of nonverbal communication and behaviour. In preparing for the present study contact was made with Professor Wachsmuth (Chair of the Artificial Intelligence Group at University of Bielefeld) who confirmed that an absence of research into expression associated with leg and foot movement was the reason behind Max’s legs and feet “so far” only being used for changing his position in space.

The absence of research in this area is apparent when reviewing the relevant literature.

[1]From reviewing a collection of images and video clips using both websites and academic journals.

James' (1932) study of the relationship between bodily posture and the expression of emotion employed over 1,200 observations of 347 different postures using three different experimental designs. In spite of the wide variety of different human postures experimented with by James' study it failed to take any account of expressive patterns or behaviours specifically associated with leg and foot movement (James, 1932).

Smith-Hanen (1977) found in her study of the effect of nonverbal communication in counseling that different leg positions were significantly related to participant perceptions of warmth and empathy. However, it was only certain leg positions were significant and that, "The effects of the various leg positions were more complex than the arm positions" (Smith-Hanen, 1977, p.87). Harrigan and colleagues (1985) also found in their study of physicians' use of nonverbal communication to establish rapport that certain symmetric and asymmetric leg positions were significantly related to participant ratings of rapport (Harrigan et al, 1986).

More recently, in their work on developing a comprehensive system for the coding of body movement in bodily communication, Dael and colleagues (2012) highlight a number of considerations relevant to research in this area. These include the complexity of reliably coding / measuring any body movement, the wide range of systems available, and the present state of research on nonverbal communication where much has been achieved within facial expression and speech analysis but, "[where] a similar level of methodological advancement in the field of body movement research has been largely absent" (Dael et al, 2012, p.2).

When reviewing Dael and colleagues' study it is clear that in spite of the stringent efforts employed to reliably code all expressive aspects of body-movement relevant in nonverbal communication - including leg/foot movement and posture – they then neglect this part of the human body due to technical difficulties.

> "*All visible skeletal body movement was categorized as an action or posture, with the exception of leg movement for which there was not enough visibility to distinguish between action and posture*"
>
> (Dael et al, 2012, p.5)

> *"We further included general categories such as leg movement and whole body movement for which the exact articulators could not be obtained due to technical limitations."*
>
> (Dael et al, 2012, p.6, emphasis added)

Harrigan (2008) in a review of methodologies associated with kinesics (the study of gestures and body movement in communication) states that the focus of research has been on head, face and hand movement. That in reference to arm and leg positions there is a "lack of comprehensiveness" in describing the various arrangements and what they might mean, other than a degree of openness (Harrigan, 2008, p.178).

There are, within the scientific literature, several references that refer in passing to the role that leg/foot movement and posture might play; in psychotherapeutic observations and quasi-courtship behaviours (Scheflen, 1964; Scheflen, 1965; Dittmann et al., 1965), in interview situations (Ekman and Friesen, 1969a), and in respect to interpersonal relations (Mehrabian, 1968, 1969, 1972/2007). However, none of this research investigates this specific part of the human body and the role it might play in nonverbal communication and behaviour.

A logical next step might be to ask if there are any other sources of information, outside of the scientific literature, that might provide insight into the communicative behaviours associated with leg/foot movement and posture.

1.2 Researchers versus Non-researchers

There is an alternative source of information about the role of leg /foot movement and posture within nonverbal communication and this is to be found within the pages of popular literature. However, before approaching this body of work caution must be applied.

In their review of non-verbal communication within applied settings Riggio and Feldman (2005) refer to a divide between 'non-researchers' and researchers, between 'popular literature' and its assumed antonymic term; scientific literature (Riggio & Feldman, 2005, p.xii). Riggio and Feldman state that there are those within 'popular literature' who make sensational claims that have no foundation within research or the scientific literature, demonstrating this with choice titles from popular literature such as, "*How to Read a Person*

Like a Book… and *How to Understand People and Predict Their Behavior Anytime, Anyplace" (*Riggio & Feldman, 2005, p.xii, *emphasis* in original).

Lecci and colleagues (2008) in a review of Trial Consultants[2] in the *voire dire* process within the US jury selection system state that these practitioners, who often publish books on nonverbal communication[3], frequently offer no explanation for their skills. Further stating that these practitioners rarely base their observations on scientific literature and often make 'grossly exaggerated' claims in what is a 400 million dollar industry (Lecci et al., 2008, p.70).

These views are echoed by Harrigan and colleagues (2008) where popular literature is referred to as 'pop-psych books' and are described as having emerged in the 1970s to popular public reception but whose various publications represent, "…a disservice to the field of nonverbal behavior research." (Harrigan et al, 2008, p.139).

This source of information would appear to be taboo within the field of nonverbal behaviour and communication research. However, a pragmatic, skeptical and highly empirical approach to these sources may yield results when researching a part of the human body that appears neglected in the scientific literature. Subsequently, the present study will be referring to two works from popular literature; publications by Navarro (2008) and Pease (1991). These two reference materials have been selected on the basis of opportunity alone.

Mindful of the observations made above by those within the scientific community (Riggio & Feldman, 2005, Harrigan et al, 2008, and Lecci et al. 2008), and in reviewing the two selected works in question, it would appear that Pease's work entitled '*Body Language – How to read others' thoughts by their gestures.*' is representative of the sensationalist titles that are described as doing a disservice to this field of research. However, Navarro presents observations from an applied setting – that of crime detection and prevention for the US government[4] – and as such possibly represents a more reliable source from which this study can take possible leads. It is for this reason that the present investigation will refer in the first instance to Navarro's work and use Pease's work for the purpose of cross reference alone.

[2] Trial consultants; individuals hired to assist with jury selection by asking questions and 'reading' nonverbal communication to inform decisions as to which jurors would be sympathetic, or not, to their client's case.
[3] For instance, Lecci et al. (2008) cite examples of publications by Jo-Ellan Dimitrius and Mark Mazzarella.
[4]Enquiries were made with the FBI's Behavioral Analysis Unit in the US, via the local US Embassy in Copenhagen, where it was confirmed that Mr. Navarro had indeed been an FBI Special Agent with skills, experience and training responsibilities as presented in his publications.

Attention now turns to what these authors say about nonverbal communication associated with leg/foot movement and posture.

1.3 Non-researchers' Observations

Both Navarro (2008) and Pease (1991) have chapters, or sections of chapters, dedicated to the role of leg/foot movement and posture within nonverbal communication. Navarro dedicates an entire chapter to the subject, entitled; '*Getting a Leg Up on Body Language: Nonverbals of the Feet and Legs*' (Navarro, 2008, p.53-84) and Pease refers to this part of the human body in two chapters, 'Leg Barriers' and 'Pointers' (Pease, 1991, p.66-73, p.113-123, respectively).

Navarro describes twenty different leg/foot movements and postures (see Appendix [i], p.60) and Pease describes seven (see Appendix [ii], p.62). These movements and postures are in both standing and seated positions, and are described as representing various internal attitudinal and emotional states.

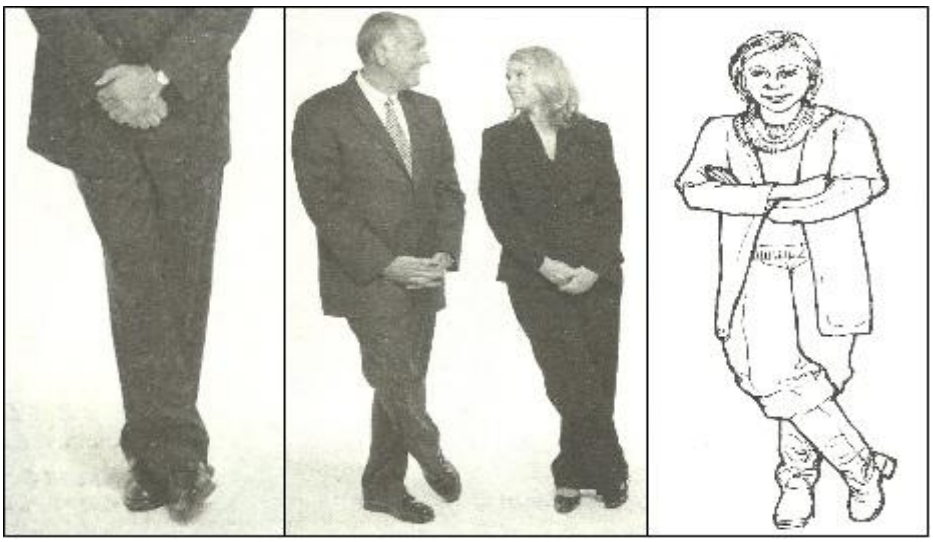

Figure 2 : Navarro's High Comfort Display (left & centre) compared with Pease's Standing Leg Cross representing defensiveness (right).

Within each writer's set of observations[5] there are disagreements in respect to what certain leg/foot movements and postures mean. For example, Navarro's *High Comfort Display* (left and centre image above, within Figure 2) seems to be describing the same physical posture as

[5] See Appendices [i] and [ii] for a detailed overview of these observations, in table form.

Pease's *Standing Leg Cross*. However, these are described as representing different attitudes or emotions by their respective authors. Navarro's *High Comfort Display* reflects an internal state of high comfort, confidence, and general good mood in relation to another person (Navarro, 2008, p.68). However, Pease states that a person displaying the very similar, *Standing Leg Cross* (Figure 2, right image) would be feeling the opposite by comparison; defensive and anxious in relation to the person/s in their company [6] (Pease, 1991, p.69). This contradiction represents one of the challenges associated with using these reference materials when investigating an area of previously unexplored bodily communication, which in turn highlights the need to use empirical methods. However, before discussing these challenges, attention will be returned to the reference materials and to what these authors say about the meaning behind leg/foot movement, and posture, in relation to attitude and emotion. Using Navarro (2008) who represents the most cohesive and scientifically orientated account.

Navarro (2008) adopts the generally accepted position that nonverbal communication in humans, and other species, is linked to the expression of emotions and is controlled by a specific part of the human brain. Navarro draws a link between his own observations and the fields of evolutionary biology and psychology where he suggests that leg/foot movements, and postures, derive from an automatic *fight, flight* or *freeze* response to environmental stimuli. According to Navarro it is for this reason that leg/foot movement, and posture, is usually beyond the conscious control of the individual, and therefore a reliable means of gauging internal states such as attitude and emotion. Navarro explains that this is because these nonverbal communicative behaviours are controlled by the limbic region[7] of the human brain, also known as our mammalian brain (Navarro, 2008, p.54-57).

As mentioned Navarro and Pease combined provides the present study with a total of twenty-seven different leg/foot movements and postures. In deciding which of these to empirically investigate a number of challenges need to be noted and considerations made; these include (i) contradiction and inconsistencies within the popular literature, (ii) methodological problems experienced by previous studies, and (iii) the challenges presented by this particular part of the human body.

[6]Even though, it is noted, that artist drawing the Standing Leg Cross has deemed fit to character the person depicted with a broad smile; hardly consistent with feelings of anxiety and defensiveness.
[7]Using what Damasio (2006) refers to as a "common catchall' for a number of separate organs; the cingulate gyrus, the amygdala, and the basal forebrain; collectively the Limbic system (Damasio, 2006, p.28).

(i) *Contradiction and inconsistencies within Popular Literature* exist and the present study's reference materials (Navarro and Pease) are no exception. Where a lack consistency is compounded by a lack of referenced scientific sources to check validity and reliability, where such inconsistencies arise. Another example to that already mentioned above (Figure 2) is the difference in behaviours associated with leg crossing in the seated position. In his book Pease refers to the *Standard Leg Cross* and the *American Leg Cross*[8] where as ironically, Navarro, who is an American[9], makes no such distinction. Reviewing both reference materials there are three communicative behaviours which appear to agree in both their form and what they represent, which provides the present study with behaviours that can be empirically tested.

(ii) *Methodological problems experienced by previous studies* can be divided into two categories; difficulties and scope. In the former previous studies refer to difficulties arising from either the complexity of leg/foot movement and posture (Smith-Hanen, 1977) or problems arising from a choice of methodology not suited to studying the entire human body, including leg/foot movement and posture (Dael et al., 2012)[10]. In the latter, scope has been a problem in previous studies that have attempted to code the entire human body within one investigation (James, 1932, Dael et al. 2011, 2012). Perhaps focusing on specific areas, one at a time, is a more productive line of attack as demonstrated by the advances in Ekman's work (see Ekman and Friesen, 1969b) with FACS[11] serving as a case in point.

(iii) *The challenges presented by this particular part of the human body* in an empirical investigation of nonverbal communication are not to be taken lightly. Harrigan (2008) states that the scale of the human body, whilst 'vast' in terms of area compared with the face, presents only a modest number of moveable parts. The present study disagrees with this appraisal, especially when considering there has been so little work conducted with this part of the human body and particularly when one considers that the legs and feet combined have sixty bones (per leg) and possibly hundreds of muscles to articulate each of these bones. So the number of different movements and positions that a combined 120 bones (with their various muscles) can perform will present a methodological challenge to the present study.

[8]This same distinction is made in earlier works by Desmond Morris in the 1970s, as will be discussed later.
[9]Cuban American, distinction made here in case it is important to the author.
[10]Dael et al. (2012) used video corpus material where the field of view of the video clip did not reveal the entire human body, which represents a problem with the corpus approach in this area; a researcher cannot go back in time and alter the conditions at the time that the corpus material is recorded to suit their study's requirements.
[11]FACS; Facial Action Coding System, a systemised means of coding facial expression that has been widely accepted within the scientific community across disciplines and areas of research.

Drawing from the reference material and the considerations made (above) six nonverbal communicative behaviours associated with simple leg/foot movement and posture emerge;

Standing Position	(i)	Positive Foot Pointing
	(ii)	Negative Foot Pointing
	(iii)	Positive Leg Crossing
	(iv)	Negative Leg Crossing
Seated Position	(v)	Positive Leg Crossing
	(vi)	Negative Leg Crossing

Figure 3 : The six leg/foot movements and postures under investigation.

Cross referencing these with the reference material each of the above simple leg/foot movements and postures are reported as possessing the following meaning;

(i) Positive Foot Pointing (when standing).
Observable in groups of three or more where during the conversation one person will display interest in another (whether the other person is talking or not) by positioning their standing feet on the ground in such a way that one of their feet points in the direction of that other person of interest. Also applicable to dyads and described as an unconscious intention cue (corresponding with Appendix [i], Behaviour No. 2 and 16, and Appendix [ii], Behaviour 7).

*(ii) Negative Foot Pointing (when standing).*The opposite to Positive Foot Pointing, described above.

*(iii) Positive and (iv) Negative Leg Crossing (when standing).*Both reference materials have these but each offer different meanings, subsequently the present study has separated them into two (positive and negative) on the basis that these are supposed to attitudes and emotions and at their most basic level these can normally be arranged into positive or negative. Described as an unconscious intention cue (corresponding to Appendix [i], Behaviour 7, 8 and 9, and Appendix [ii], Behaviour 4).

*(v) Positive and (vi) Negative Leg Crossing (when seated).*Observable in seated dyads and smaller seated groups it is where, in the positive orientation, one person will display interest

in their conversation partner by crossing their leg towards that other person so that the inside of the calf, knee and inner thigh is orientated towards that other person of interest. Not observable where persons are seated opposite to one another but at a 90° angle (or less) to each other, or side by side (as on a couch). Negative is the reverse of the positive and described as a partly conscious act (corresponding to Appendix [i], Behaviour 10 and 11, and Appendix [ii], Behaviour 1, 2 and 6).

Now that the reference materials from the non-researcher observations have been examined and arranged into empirically testable units of analysis attention will now turn to two final considerations before turning to the theoretical background. Namely, (i) a hope of what this study may lead to within the field of research of nonverbal communication and behaviour, and (ii) potential applications beyond the field of research.

1.4 A new category of kinesics: Bipedics

In their highly influential paper[12] Ekman and Friesen (1969b) propose five categories of nonverbal behaviour; these being *Emblems*, *Illustrators*, *Affect Displays*, *Regulators* and *Adaptors* (Ekman and Friesen, 1969b, p.63). It can be observed that these five categories have become associated with various different parts of the human body. For example, *Emblems* are associated primarily with hand gesture and movement, *Illustrators* and *Regulators* with arm and head movement. And although within their paper Ekman and Friesen do comment on foot/leg movement, and posture, it is mentioned only in passing reference when discussing *Adaptors*, and appears nowhere else.

Harrigan (2008) defines kinesics as, "actions and positions of the body, head and limbs." (Harrigan, 2008, p.137). Coleman (2009) expands on this where kinesics is defined as, "gestures and other body movements in nonverbal communication… often classified into emblems, illustrators, adaptors, regulators [and] affect displays" (Coleman, 2009, p.404).

Drawing on the above sources the present study proposes a sixth category of kinesics; *Bipedics* or *Bipedic Gestures*.

[12]Ekman & Friesen's paper has proven influential as its taxonomy has become the prevailing paradigm within nonverbal communication research, since reported and described within many journal articles and text books.

‘Bi-ped-ic’ is a word derived from the Latin ‘*Bi-*’ meaning ‘*two*’, and ‘*-ped-*’ meaning ‘*foot*’, and ‘*-ic*’ is a common suffix from the Greek *ikos* and the Latin *icus* meaning, “*to have the features of*” (Sykes, 1985, p.491). The term ‘*Gesture*’ is used based in its basic definition; “…significant movement of limb or body; use of such movement as expression of feeling…” (Sykes, 1985, p.414). Further defined as, “…A bodily movement, usually of the hands or the head, that has a communicative function in kinesics.” (Coleman, 2009, p.317). Although at odds with other researchers’ classifications that refer to leg/foot movement, and positioning, as something that is part of a posture, and not a gesture in itself (James, 1932), the present study takes an alternative view and proposes the use of the term ‘gesture’.

In respect to terminology, and from this point forward, the rather long and clumsy term ‘*leg/foot movement/s and posture/s*’ will be substituted with the term ‘*bipedic gesture*’, for the purpose of ease of use as well as consistency with this study’s proposal relating to *Bipedics*. From reviewing the relevant literature the present study did not find this term in use anywhere which is not surprising as the study of *Bipedic Gesture* appears to be neglected and as already mentioned only appears (in content only) within popular literature.

There is one other researcher not mentioned up till this point who, whilst not using the term *Bipedic Gesture*, has commented upon leg/foot movement and posture, and whose influence can be seen within this study’s reference material from popular literature; Desmond Morris.

Desmond Morris; a former University of Oxford scholar, describes himself as, “…an author [of] some fifty scientific papers and seven books before completing The Naked Ape in 1967” (Morris, 2008). *The Naked Ape*, *Manwatching: a field guide to Human Behaviour* and *People Watching* were landmark publications in the 1970s and 1980s, and possibly represents some of the first publications to bring into the public domain the study of nonverbal communication. Within his work there are a number of passing references to *bipedic gestures*, as the following excerpt demonstrates;

> “*There are some leg positions that appear, for some reason, to be almost wholly feminine. These include leg-hugging and thigh-clasping… the posture is not popular amongst men: a random sample revealed that the relevant female/male ratio was 19 to 1.*”
>
> (Morris, 2002, p.146)

However, a problem arises with the epistemological nature of this and many of Morris' observations. For instance, the above extract refers to a 'random sample' but fails to provide by whom or when this was undertaken. The origins of terms used are unclear; *leg-hugging* and *thigh-clasping* – are these Morris' own terms or from an established body of work? Additionally, direct references to literature are rare within Morris' work when compared to Ekman, Argyle or even Darwin writing nearly a hundred years prior to Morris. Subsequently, although Morris's indirect contribution may be significant, the empirical nature of the present investigation prevents reference to his work to any great extent.

1.5 Relevance & Application

An important question to ask at this juncture is one of relevance and application; why should the present study investigate bipedics or bipedic gesture? It is argued that there are four possible applications from this research.

Max & Artificial Agents of the Future

Technology is a possible application of the present study. Artificial Agents of the future have a possible application beyond those represented by agents confined to the pages of a website (such as IKEA's Anna) and even Max's installation at the Heinz Nixdorf Museum.

The ultimate evolution of these applications would approach something like what appears in science fiction. Such as the holographic Chief Medical Officer in Star Trek Voyager, or the holographic librarian 'Vox' in the 2002 movie The Time Machine (see Figure 4). These imaginings are such convincing artificial agents that by today's standards passing humans would have some difficulty telling them apart from a 'real' medical officer or librarian.

Figure 4 : Artificial Agents of the Future; Holographic Chief Medical Officer (above), & Vox (below).

To achieve such technological advancement relies

much on Artificial Intelligence and the development of machine consciousness[13]. Equally important would be these Artificial Agents of the future being programmed with convincing verbal and nonverbal communication. The proposed study hopes to be able to contribute to a body of work that may make this a possibility at some point in the future.

Enhanced Social Interaction, Impression Management & Self-monitoring

Riggio (1992), when summarising research relating to nonverbal communication and interpersonal relations, states that individuals who are more expressive, and who possess more advanced "nonverbal encoding abilities", are often viewed as attractive in greeting situations. Furthermore, individuals with good nonverbal encoding abilities are more likely to be noticed, more likely to be perceived by others as warmer and more intimate, and can affect the emotional state of bystanders observing a social encounter (Riggio, 1992, p.11).

This is linked to the theories of Self-presentation and Self-monitoring. Coleman (2009) defines self-presentation as the, "conscious or unconscious control of the impression that one creates in social interactions…", where unconscious control is understood as likely to mean natural abilities; people who are gifted in nonverbal encoding abilities (Coleman, 2009, p.682). Self-monitoring[14] can be viewed as an extension to self-presentation where individuals increase both their self-awareness and their self-regulation of expression which additionally leads to an increase in awareness of others' nonverbal communication (Riggio, 1992, p.13).

By investigating an area of nonverbal communication that appears neglected it is hoped that the present study can help to inform activities such as self-presentation and self-monitoring.

Interpersonal Skills Training

Serving as an extension to the previous consideration Argyle (1988) lists three applications for nonverbal communication research all of which would come under the head 'training'. These are listed as; (i) Social Skills Training (SST), with focus on individuals with mental health diagnoses; (ii) Social Skills Training for Work; and (iii) Training for Intercultural Contact (Argyle, 1988, p.9). These three training applications appear to miss an obvious fourth category which would be non-specialist social skills training for 'normal people'

[13] Whatever machine, or human, consciousness is, as will be touched upon within the theoretical background.
[14] Riggio (1992) explains that self-monitoring was a term first used by Snyder (1974, 1979) arising from observations in his studies (Riggio, 1992, p.13-14).

whether this be for students within the 'compulsory' education system (students aged 5-16 years of age) or adults of any age who wish to develop their nonverbal communication skills. As Riggio (1992) eloquently states, "communication skills in general, and nonverbal skills in particular, are so very critical to all aspects of social life and psychosocial well-being." (Riggio, 1992, p.23).

Law-enforcement & Medical Interviews

Sigmund Freud stated, "He that has eyes to see and ears to hear may convince himself that no mortal can keep a secret. If his lips are silent, he chatters with his fingertips, betrayal oozes out of him at every pore" (Freud, 1905, p.94, in Ekman and Friesen, 1969a, p.89). Although Freud has become more associated with parapraxis (the so called, 'Freudian slip') he also believed that nonverbal behaviour offered insight behind conscious, and unconscious, attempts to deceive both others and our own selves.

Related to this view, and speaking from a contemporary law-enforcement perspective, Navarro (2008) describes bipedic gestures as offering a window to unconsciously controlled, spontaneous 'tells' relating to negative affective states (such as anxiety, defensiveness) and positive affective states (such as confidence, happiness), and snap transitions between these states (Navarro, 2008, p.56). Ekman and Friesen (1969a) agree that *facial expression* can provide "nonverbal leakage" in an interview situation, where the interviewee may be attempting to deceive the interviewer, but disagree in respect to the role that a bipedic gesture might play stating that 'even less external feedback is given in the feet/legs than to hands' (Ekman and Friesen, 1969a, p.95). This study hopes to add clarity to these opposed views in the hope to further inform interview strategies where an element of deception is present; whether it be within law-enforcement or a psychotherapeutic setting.

Additionally, within a healthcare setting when a general practitioner is interviewing their patient the present research hopes to add to the findings which might further enhance doctor patient engagement and rapport (Hanen-Smith, 1977, Harrigan et al., 1986)

Summary

In summary (i) it has been shown through using the example of an advanced artificial agent that a gap exists within the field of research concerned with nonverbal behaviour and

communication research – centered on the role that leg/foot movement, and posture, serves in bodily communication. (ii) It has been shown that this gap does not exist in popular literature and (iii) consideration has been given to the pitfalls of using such a source as reference material. (iv) The observations made by two authors from popular literature have been examined to extract possible units of analysis with reference to methodologies employed within previous scientific studies. (v) A proposal is made for the study of a new category of kinesics drawn from both the gap in the present literature and this investigation's reference material from popular literature; this being *Bipedics* or *Bipedic Gestures*. Finally, a review of relevant applications has been conducted identifying four practical areas of use.

Attention now turns to the theoretical background relevant to the present investigation.

Theoretical Background

What follows is a review of theoretical areas deemed relevant to the present study. It will start with a short discussion regarding (i) *Definitions and Terms of Reference* within the field of research concerned with nonverbal communication. Followed by reviews of; (ii) *What is Communication*; (iii) *What is Nonverbal Communication & Behaviour*; (iii) *Attitude and Emotion*; and finally; (iv) *The Role of Consciousness*, relevant to the present investigation.

2.1 Definitions and Terms of Reference

Within the field of nonverbal communication there are a number of terms in use and a number of perspectives on their use. It seems prudent at this stage to discuss this aspect of the field of research in which the present study is performing its investigation.

Mehrabian (1972/2007) argues that the term 'nonverbal behaviour'[15] is a misnomer on the basis that a number of phenomena studied under this umbrella term refer to qualities of speech, or verbal communication. Subsequently, Mehrabian argues for a semantic distinction dichotomized into implicit and explicit coding (Mehrabian, 1972/2007, p.1-2). Argyle (1988) refers to bodily communication and nonverbal communication (NVC) but distinguishes between nonverbal communication and nonverbal behaviour (NVB). This, Argyle argues, on

[15] Mehrabian's view on the term 'nonverbal behaviour' by implication must apply to nonverbal communication.

the basis that nonverbal behaviour is unintentional whereas nonverbal communication possesses intentionality (Argyle, 1988, p.2). Visual-communication, a term favoured by ethologists, is another term used which excludes vocalization, phonology and paralanguage, and so misses the 'constellation' of different channels that are used simultaneously within communication (Chevalier-Skolnikoff, 2006). There are also other terms in use to describe the phenomena being investigated, such as multi-modal communication, cross-modal communication, body language and so forth.

Ultimately, differences in terminology and word usage may not matter so long as an audience understands. Orwell (1946/1981) recommends that language – and by implication its words and terminologies – should be used as an instrument of expression of thought and not for the concealment or prevention of thought and ideas (Orwell, 1946/1981, p.170).

Applying Orwell's pragmatic and practical approach, and having regard to the language and terms used within the relevant literature, the present study uses nonverbal communication, nonverbal behaviour, and nonverbal communicative behaviour interchangeably to represent the same phenomena; all channels of communication excluding words/language[16].

It is also noted that within the field of communication studies there appears to be many terms used to refer to the act of communicating and to those who do the communicating. These would include, 'informant', 'interactant', 'interlocutor', 'sender', 'receiver', 'encoder' and 'decoder'. Most of these are either self evident or familiar to students of communication, for example an 'informant' is one whom 'informs', an 'interactant' is one whom 'interacts'. In respect to 'sender' and 'encoder' and the act of encoding, this refers to the those who send a message through what ever channel is being used – so for the purposes of this study a person engaged in performing bipedic gestures, such as leg pointing or leg crossing (regardless of awareness or intentionality), is doing the encoding or sending. The terms 'receiver' and 'decoder' refer to those receiving the message. These terms will be used here, as and where appropriate with additional regard given to Orwell's advice on the use of language. The term 'interlocutor' refers to, "one who takes part in dialogue or conversation" (Sykes, 1985, p.524) and whilst dialogue and conversation are not exclusive to language their semantic proximity to verbal communication means the present study will refrain from its use in this context.

[16] When referring to 'words/language' these are referred to in their purest sense, not in the way that words and language can be spoken as mediated by phonology; pitch, pace and volume of speech.

2.2 Communication

Over sixty years ago Claude Shannon and Warren Weaver proposed a model that has possibly become one of the most influential and pervasive theoretical models of communication; the 'mathematical model of communication'. This was conceived as a general model of communication that could be applied to everything, including computers, machines, humans and non-human species, and was composed of a simple flow-diagram. This comprised of a sender at one end, a receiver at the other end, with a message signal between the two via a channel. There was an extra box labeled 'noise' to represent anything that might interfere with the transmission of the 'pure' message (Hutchby, 2001, p.37-38)[17].

Following in Shannon and Weaver's formulaic approach a definition of communication is provided by Allwood (2002) where communication is the, "Transmission of content *X* from a sender *Y*, to a recipient *Z*, using an expression *W* and a medium *Q* in an environment *E*, with a purpose/function *F*" (Allwood, 2002, p.7, *emphasis added*).

According to Hutchby (2001), these theoretical models and definitions are representative of a 'computational' approach to understanding communication. Hutchby identifies a second approach; 'interactional' which, he states, is the paradigm favoured by social scientists. This approach, according to Hutchby, shapes both communication research methodology and the way in which communication is 'conceptualized and analyzed´ (Hutchby, 2001).

Appearing to follow within the interactional approach to understanding communication Baxter and Braithwaite (2008) propose a definition of communication that is orientated more towards interpersonal communication, "…a process, it involves a dyad or normally a small number of people; creating meanings and it is enacted through verbal and nonverbal message behaviors… [it] is the production and processing of verbal and nonverbal messages between two or more people."(Baxter and Braithwaite, 2008, p.6). Baxter and Braithwaite (2008) go on to explain from their studies[18] that there are three distinct paradigms that influence research questions, methods and analyses. These being the post-positivist perspective, the interpretive perspective, and the critical perspective (Baxter and Braithwaite, 2008, p.6-13).

[17]The original conceptualization did not include a 'feedback loop', which was a later addition.

[18] As a foundation for their own work Baxter & Braithwaite conduct an impressive review of 958 studies of interpersonal communication, published within the leading 19 communication journals since 1990.

Applicable Perspectives on Research from Communication Theory

Applying these theoretical perspectives to the present study an attempt to adopt a positivist (or post-positivist) approach to researching communication, and bipedic gestures, will be taken. This will incorporate what Baxter and Braithwaite refer to as the 'logical-empirical tradition' which incorporates the search for 'objective reality' separate from the existence and experience of the researcher. Seeking to establish universal rules of cause and effect, based on interdependent variables, that are universal. Research in this domain should be consistent with observed phenomena, testable (i.e. replicable, open to falsification), and logically consistent with, or logically derived from, previous research. This with the aim to be able to predict interactions between individuals (Braithwaite and Baxter, 2008, p.7).

Considering these theories, definitions and approaches to research within the study of communication (and nonverbal communication) the present investigation will seek to adopt a positivist, logical-empirical approach to studying bipedic gestures. This is because the reference material, and observations, underpinning bipedic gesture arrives from non-research based popular literature. As this present investigation is operating within a scientific arena, and as this represents new research in what could be a new category of kinesics, it is important to apply the robustness of the scientific method consistent with the publications within the relevant literature.

2.3 Nonverbal Communication

The study of nonverbal communication can trace its roots to antiquity as demonstrated by Aristotle's treatise on Physiognomy and Socrates' commentary in Xenophon regarding what a person's face and posture said about them whether it were moving or not (James, 1932, p.405, 429 respectively). The study of posture and movement also received attention during the mid-Victorian period with publications on etiquette and rhetorical posture popular at the time (Morris, 2002, p.16, p.259, and p.356).

However, in respect to a comprehensive and scientific study of nonverbal communication it is perhaps Charles Darwin who is most often cited as the first pioneer in the field (Harrigan, 2005, p.121). In 1872 Charles Darwin published *The expressions of the Emotions in Man and Animals* which represented the first systematic examination of nonverbal communication associated with expression and body movement. When referring to the body of research

preceding his own work Darwin himself states, 'the older treatises, which I have consulted, have been little or no service to me.' (Darwin, 1872/2005, p.7). This dismissive is not applied to all predecessors[19], however, none of Darwin's predecessors or contemporaries provided as comprehensive an overview of nonverbal communication and none have been as influential, or withstood the test of time, as well as Darwin's work.

Within Darwin's theory he arranged his observations and findings on facial expression in primates (of which humans are one) around three categories; *Descriptive*, *Functional* and *Causal*. The terms are self explanatory but two warrant further explanation within Darwin's theoretical framework because they are of relevance to the present study. The *Functions* of facial expression, according to Darwin, communicated the feelings of the interactant (human/non-human) where certain expressions were associated with certain internal feelings, or emotions, which he listed as states of pleasure, joy or affection, pain, anger, and astonishment or terror (Chevalier-Skolnikoff, 2006, p13).

The *Causes* of emotional expression were separated into three further categories, these are; the *Principle of Serviceable Habits*, the *Principle of Antithesis*, and the *Principle of Direct Action*. According to Darwin these formed the basis under which nonverbal communication could be understood in respect to when, how and why expressions were displayed.

The *Principle of Serviceable Habits* refers to survival behaviours that were originally consciously performed acts responding to dangerous stimuli in an individual's environment, such as running from a source of danger like a pride of lions or running to a source of safety, such as the family cave. These, overtime, have become unconsciously associated with mental states – such as social anxiety or dislike – and so are repeated outside of a survival situation often at inconvenience to the interactant themselves (Darwin, 1872/2005). The *Principle of Antithesis* refers to the notion that opposing emotions are displayed by similarly opposing physical display. The final *Principle of Direct action* states that, "an excited nervous system acts directly and involuntarily upon the body and therefore affects particular bodily reactions" (Chevalier-Skolnikoff, 2006, p14).

Applying Darwin's theoretical framework to bipedic gesture two elements appear relevant;

[19] Darwin refers respectfully to a number of predecessors, for example the many references to French neurologist Duchenne de Boulogne whose work on electro-stimulation of facial muscles was highly relevant to Darwin.

Principle of Serviceable Habits and *Principle of Antithesis*. In the former it is possible to deduce *Positive/Negative Foot Pointing* as falling under both of these elements; first, foot pointing could be an evolutionary hangover from readying the body to move towards or away from a desired or undesired phenomena in the environment. Whether this be a lion, a cave or a particularly attractive or unattractive conversation partner. The *Principle of Antithesis* being applicable here because a *Positive Foot Point* displaying *interest* has its opposite and antithetic equivalent in a *Negative Foot Point* displaying *disinterest*.

Leg crossing can be interpreted within Darwin's theoretical framework in a similar way. For example *Positive Leg Crossing* in the seated position would be where one interactant will cross their legs towards another interactant displaying their inner thigh, knee and calf, and in doing so revealing a physiologically vulnerable area. A display of the inner thigh potentially exposes the femoral artery[20] more so than a showing of the outer thigh (with legs crossed away from another interactant). To perform this display action might be an unconscious display of trust, liking and generally a positive attitude and emotion to another interactant. A display surviving from a previous era in humanity's evolution and so an example of a *Principle of Serviceable Habits* and *Principle of Antithesis* as it has both a negative and an opposing positive posture[21].

Darwin's theoretical framework serves as a foundation upon which most contemporary theory is still built upon. For example, Ekman and Friesen's (1969b) seminal paper that categorized nonverbal behaviour into the taxonomy that is still used today has many echoes of Darwin's original conceptualization. For example, in their paper Ekman and Friesen refer to three rules which they argue explains behaviour; *origin*, *usage* and *coding* (Ekman and Friesen, 1969b, p.49). Comparing this to Darwin's similar approach using three different terms; *Descriptive*, *Functional* and *Causal* serves as a demonstration of Darwin's theoretical influence.

However, Ekman (2006) makes an important point in that Darwin's main preoccupation was with the study of facial expression and since Darwin's time there have been many more channels and modes of nonverbal communication and behaviour identified from research (Ekman, 2006, p.xi), as shown in Figure 6 below (see p.27).

[20] The femoral artery being one of the major blood vessels in the human body protected by the femur and thigh muscle to on its exterior side; the outer thigh 'wall' but not so protected to the inner thigh 'wall'.
[21] It should be noted that some of these evolutionary comparisons, whilst in less detail and not directly to Darwin's theory, are also made by Navarro (2008).

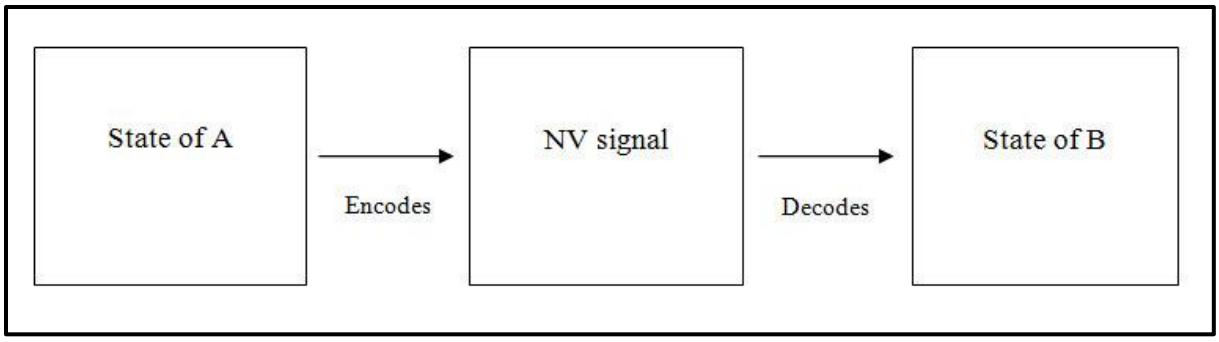

Figure 5 : Argyle's Model of Nonverbal Behaviour.
(Argyle, 1988, p.2)

Argyle (1988) offers a definition and simple 'computational' styled theoretical model of nonverbal communication orientated to interpersonal interaction relevant to the present study. Argyle states that nonverbal communication and behaviour includes; "facial expression, gaze (and pupil dilation), gestures, and other bodily movements, posture, bodily contact, spatial behaviour, clothes and other aspects of appearance, non-verbal vocalizations, [and] smell" (Argyle, 1988, p.1). And proposes a model (above, Figure 5) that emphasises the nonverbal element to communication where it is argued that too much emphasis has historically been placed on language, that language is highly dependent on nonverbal communication, and that there is much that can't be conveyed through words alone (Argyle, 1988, p.2).

The implications for the present study are that within Argyle's conceptualisation bipedic gesture would be categorised as a bodily movement which is encoded by one interactant (A) to convey a NV signal which is decoded by another interactant (B). With NV signal being specific forms of bipedic gesture such as positive/negative foot pointing and leg crossing.

2.4 Attitudes & Emotions

The relationship between nonverbal communication and the expression of emotional state has been widely accepted within theory and research since the time of Darwin's publication of *The Expressions of Emotion in Man and Animals* in 1872. In James' (1884) seminal paper "*What is Emotion?*" he states; "Surprise, curiosity, rapture, fear, anger, lust, greed, and the like, become then the names of the mental states with which a person is possessed. The bodily disturbances are said to be the "manifestation" of these several emotions, their "expression" or "natural language"..."(James, 1884, p.189).

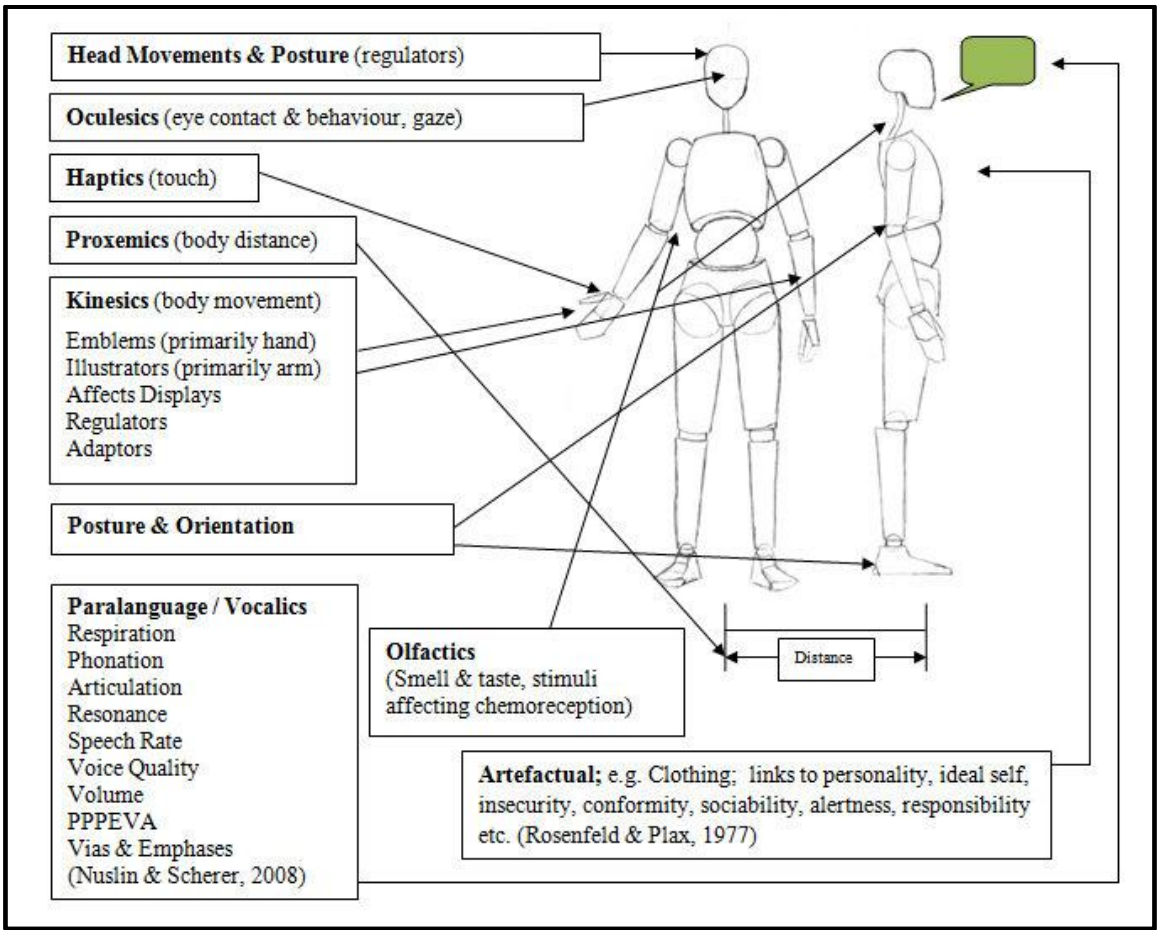

Figure 6 : Channels & Modes of Nonverbal Communication

However, these bodily disturbances, or expressions of emotion, are seen as primarily dependent on facial expression within the field of nonverbal communication where some researchers unequivocally state that bodily movement (such as bipedic gesture) cannot communicate emotion (Harrigan, 2008, p.141).

This absolute position is not accepted by all (certainly not by Navarro) and Argyle (1988) suggests a number of ways that interactants can convey emotion aside from facial expression, including proxemics, posture and tone of voice (Argyle, 1988, p.73).

Dael and colleagues (2011) examined the expression of emotion through body action and posture and found that a combination of patterns of different body parts did convey some emotional content. In their review of the theories of emotion – relevant to the object of their enquiry and the present study; bodily communication – Dael and colleagues list three types of theoretical model. These are (i) Basic Emotions Models, (ii) Dimensional Models and (iii)

Componential Emotion Models, with the first of these perhaps being the most well known[22]. An important point made is that none of these models have been previously tested in respect to their portrayal via bodily communication (Dael et al., 2011, p.2).

In respect to defining and distinguishing emotion theoretically, and returning to the three models identified by Dael and colleagues (2011), basic emotions models are described by the authors as based on facial expression research that has identified a specific number of universal emotions (see foot note below). However, these models struggle when any emotion outside the categories of basic emotions and so have difficulty accommodating what Evans (2000) refers to as higher cognitive emotions such as envy and jealousy (Evans, 2000, p.21).

The second model of emotion; the dimensional model, is typified by various Circumplex Models of Emotion which seek to not categorise but to position emotion within a graph's two X/Y dimensions. Dael and colleagues demonstrate with one such model that uses for its dimensions; degree of valence, or pleasantness, and degree of arousal, or activation (Dael et al., 2011, p.3). One immediate problem with this conceptualisation is that there are some emotions – such as love – that could and would 'hit' all parts of the Circumplex. The third model - Componential Emotion Models – presents a more sensitive and complex means to understand emotion and is too complex for the purpose of the present study.

Logical questions that arise at this juncture are (i) what about attitude and where does this fit with emotion, and (ii) what are the implications for an investigation of bipedic gesture?

Tackling the first of these Bohner and Dickel (2011) in their review of the most recent research into the area of attitude and attitude change define attitude as, "an evaluation of an object of thought. Attitude objects comprise [of] anything a person may hold in mind, ranging from the mundane to the abstract, including things, people…" (Bohner and Dickel, 2011, p.392). In reviewing theoretical thinking the authors distinguish between an approach to attitude as a temporal phenomena constructed fleetingly, and another that views it as stable within a person's memory, as the diagram adapted from their paper seeks to summarise (see Figure 7, below).

Argyle (1988) offers another view of attitude, when reviewing studies that have performed

[22]Based on Ekman's studies that identified the so called 'big six'; joy, distress, anger, fear, surprise and disgust across cultures.

factorial analysis on social behaviour studies, stating that two dimensions of attitude tend to emerge from research; Dominance vs. Submissiveness and Friendliness vs. Hostility (Argyle, 1988, p.86). Argyle also argues convincingly that there are many similarities between attitude and emotion illustrating with examples in relation to speed of onset where people can be quick to joy or anger (emotions) and quick to liking or disliking (attitudes). And by noting that attitudes and emotions often have the same nonverbal display characteristics (Argyle, 1988, p.86). It is also noted that liking and disliking are probably the most important types of attitude within social or interpersonal encounters based undoubtedly on the fact that humans are social animals in need of liking and wanting to avoid being disliked.

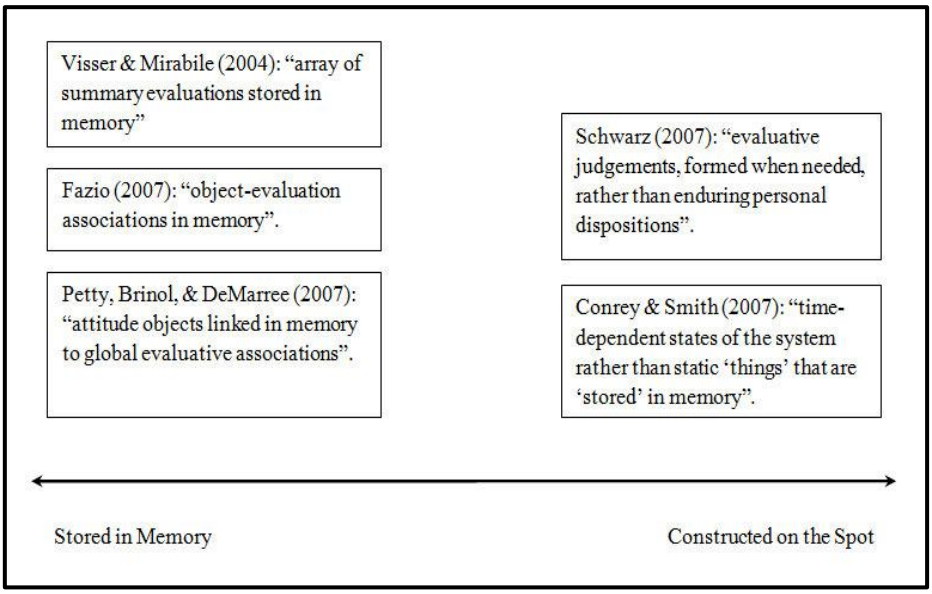

Figure 7 : Attitude Definitions; Stable vs. Temporal Approaches.
(adapted from Bohner & Dickel, 2011, p.393)

Bringing this to the present investigation the implications for a study of bipedic gestures appear as (i) there is no body of literature that assigns specific emotions to specific bodily movements that can be directly drawn upon for bipedic gesture, (ii) some researchers believe that emotion cannot be conveyed through bodily communication, (iii) attitude and emotion can be viewed as broadly similar states, and (iv) it is possible to view these phenomenon within a complex or a simple theoretical framework.

Applying a simplistic framework of attitude and emotion to this study's bipedic gestures, from the theories reviewed, leads to bipedic gestures being seen as expressed different emotions and attitudes as summarized in Figure 8 (below).

Positive Emotion & Attitude	(i)	Positive Foot Pointing (standing)	**Basic Emotions**; Joy, Surprise[23],**Circumplex Emotion**; High Pleasantness &Valence, High or Low Arousal. **Attitude**; Friendliness, Submissiveness, Stable & Temporal
	(iii)	Positive Leg Crossing (standing)	
	(v)	Positive Leg Crossing (seated)	
Negative Emotion & Attitude	(ii)	Negative Foot Pointing (standing)	**Basic Emotion**; Fear, Disgust, Anger, Distress, Surprise, **Circumplex Emotion**; Low Valence &Pleasantness, High or Low Arousal. **Attitude**; Hostility, Dominance, Stable & Temporal
	(iv)	Negative Leg Crossing (standing)	
	(vi)	Negative Leg Crossing (seated)	

Figure 8 : Theories of Emotion & Attitude Applied to Bipedic Gesture.

2. 5 The Role of Consciousness

One feature of bipedic gestures (based upon the reference material) is awareness and the role that consciousness, and the unconscious, plays when people are displaying these behaviours. According to Navarro (2008) these communicative behaviours are not within the direct conscious control of an individual, and so represent a reliable insight into attitude/emotion.

Before reviewing the theoretical background to awareness and consciousness within nonverbal communication it is important to note that underpinning all of these theoretical constructs there lies a single, fundamental problem. That being there is no scientific, or philosophical, consensus as to what consciousness actually is. Blackmore (2005) describes the size of the task well when stating, "..consciousness is at once the most obvious and yet most difficult thing we can investigate." (Blackmore, 2005, p.5). Despite the lack of a commonly agreed definition, or theoretical paradigm, there is growing interest in this area of research. The BBC science programme *Horizon* reviews this research in its episode *Out of Control* which starts by stating, "we like to think we're in control of everything we do, everything we think, and everything we feel, but scientists are discovering that at every moment of our lives an unseen presence is guiding us all… your unconscious mind" (Horizon, 2012). In summarising research by some of the world's leading institutions[24] one of the experiments reviewed compares (i) what people think they do with (ii) the real strategies employed by

[23] In categorising the traditionally accepted basic emotions (Evans, 2000, p.5) into negative and positive domains it is noted that more seem to belong to 'negative' than 'positive'. Maybe betraying their evolutionary origins is as much as. defence& offence (preservation of life &genes) was maybe more important than befriending (allegiance development & procreation). Surprise is listed within both domains as this appears appropriate.

[24]Research includes; Dr. Mark Edwards of UCL's Institute of Neurology; Professor Kia Noble of University of Oxford's Brain & Cognition Laboratory, Columbia University's Professor Paul Sadja and Dr. Dennis Schaffer of Ohio State University.

their unconscious mind. It involves participants' attempts to catch a remote controlled toy helicopter, in flight, whilst wearing a head-camera recording what they are seeing when attempting this task. Each participant describes their own strategy for how best to catch the helicopter; steady speed, positioning, patience, going 'criss-cross' and angles. However, when head camera video footage is compared the exact same results are seen in every single participant; perceptually participants are unconsciously maintaining an eye-line with the target sufficient to give it the appearance of flying in a straight line so as to facilitate capture. A, "simple, unconscious algorithm hardwired into the head of every pursuer [which represents] the efficient strategies that guide your every step in life" (Horizon, 2012).

The notion of an unseen presence guiding an individual's mind and behaviour (and by implication their communication) is not new. Philosophically it touches upon matters such as free will, determinism, the dilemma of determinism (Blackburn, 2008), and within the field of consciousness studies there are findings that further highlight the possibility that individuals are not aware of the hidden agendas of their unconscious minds.

	Index	*Icon*	*Symbol*
Indicate	✓		
Display		✓	
Signal			✓
Indicate	Unconscious & unintentional; blushing, pupil dilation.		
Display	Full consciousness; deliberate use of a regional accent, pointing.		
Signal	Consciously showing that you are showing; use of language.		
Index	Information conveyed about an object via causality; sun = warmth.		
Icon	Information conveyed about an object via similarity; image/icon.		
Symbol	Information conveyed about an object via shared meaning; words.		

Figure 9 : Allwood's Conceptualisation (adapted from Allwood, 2002, p.4).

The most famous of these has become known as the Libet problem and refers to the findings of Benjamin Libet who, in the 1970s, discovered that the common assumption about the sequence of (i) a person's conscious decision to perform an act, (ii) a person's neural activity, and (iii) a person's movement of muscles to accomplish an act was maybe wrong. When asked to flex their arm and to note the precise time the decision was made to perform this act Libet noted something unexpected amongst his participants. In all cases (ii) neural activity

preceded (i) the decision to act; in other words the conscious decision to perform an act occurred 350 micro seconds AFTER the unconscious processes involving neural activity had already started (Blackmore, 2009, p.128).

Turning attention to consciousness within communication there are two theoretical frameworks that whilst can't explain the processes at least provide a theoretical description.

Allwood (2002) combines awareness and intentionality in his conceptualisation of conscious and unconscious processes in communication. Awareness and intentionality are set along a continuous scale where at one end *Indicate* refers to communicative acts displayed without intention, and therefore unconsciously. *Display* and *Signal* are at the other end of the continuum where awareness and intentionality gradually increase[25] (Allwood, 2002, p.4). Allwood combines this with his commentary regarding semiotic relations (*Index*, *Icon* and *Symbol*) to form a table as shown above (Figure 9).

Sender	Receiver	
Aware	Aware	verbal communication, some gestures, e.g. pointing.
mostly unaware	mostly aware	most nonverbal communication
Unaware	unaware, but has an effect	pupil dilation, gaze shifts, and other non-verbal signals
Aware	Unaware	sender is trained in the use of e.g. spatial behaviour
Unaware	Aware	receiver is trained in the interpretation of e.g. bodily posture.

Figure 10 : Degrees of Awareness within Interpersonal Communication.
(Adapted from Argyle, 1988, p.5)

Relevant to the present study's focus on interpersonal communication, Argyle (1988) summarises the role of conscious and unconscious processes within a sender and receiver exchange by proposing a five layered dichotomy (Figure 10, above) which summarises the relationship between an individual's awareness of what they are sending and receiving communicatively through their nonverbal and verbal communication (Argyle, 1988, p.5). Relating these theoretical frameworks to bipedic gestures the following is proposed.

[25]Allwood (2002) also suggests that a person can have intention without being aware of having that intention which is possibly consistent with Dr. Dennis Shaffer's research about the brain's mental strategies being played out – for instance catching the toy helicopter (see above) – without the person themselves knowing.

Positive & Negative Foot Pointing

These would occur during standing communication where the brain's cognitive load is high due to attention needing to be maintained on a number of activities and external stimuli (standing, conversing, awareness of surroundings, moving from one position or destination to another[26]). Therefore likely to be an unconscious act, fitting with Allwood's *Indicate / Icon* and Argyle's *Sender-unaware-Receiver-Unaware*.

Positive & Negative Leg Crossing

These occur would occur during seated communication where the cognitive load is lower due to attention needing to be maintained on less activities and external stimuli (no standing, rest, less change in surroundings, not preoccupied with travel to or from a position or destination[27]) and so it is possible that this communicative act will involve more awareness fitting with Allwood's *Indicate / Icon* and Argyle's *Sender-unaware-Receiver-Unaware*.

When referring to these theoretical frameworks reference specifically related to bipedic gesture appears once in Allwood (2002) within a non-empirical assumption that these display nervousness or emphasis (Allwood, 2002, p.7), and appear to be absent in Argyle (1988).

Within the few empirical studies that have reported findings related to bipedic gesture none question the role of consciousness in their investigations (Harrigan et al., 1985, Smith-Haden, 1977). Whilst other studies within the literature reviewed comment on the usefulness of an explicit knowledge implicit postural markers within psychotherapy (Sheflen, 1964) or show the existence of a 'blind spot' in respect to self versus others judgements of implicit dispositions from nonverbal cues (Hoffman et al., 2009).

Related to this study's overall research aims; from the considerations above concerning the levels of awareness and intention within bipedic gestures it is concluded that under experimental conditions participants would not display an awareness of these.

Summary

The present investigation's review of the theoretical background began with (i) an overview of the definitions and terminologies within communication and nonverbal communication

[26] Imagine conversing at a conference, or when walking through a corridor, or when going from A to B.
[27] Imagine conversing in a meeting, or during a work one-to-one supervision, or having a chat on a sofa.

research. (ii) A review of theoretical definitions and concepts within the study of communication and (iii) nonverbal communication specifically. (iv) An overview of emotion and attitude was then conducted where it was concluded that at a certain level these were indistinguishable and could be conceptually defined in simplistic terms for the purposes of this study. (v) The theory and research associated with consciousness in bipedic gesture was explored where it was concluded that most of the behaviours under investigation would be outside of the awareness of everyday interactants. At points (ii) and (iii) historical context was provided and theoretical implications again drawn to the current investigation, these included that a positivist approach within the logical-empirical tradition shall be adopted methodologically, with a focus on interpersonal communication.

3 The Present Study – Aims and Research Question

The aim of the present study is to empirically investigate the validity of bipedic gestures in terms of (i) attempting to verify which bipedic gestures express which attitudes and emotions within interpersonal communication, and (ii) the extent to which these processes occur within the conscious awareness of the interactants displaying them.

Translating this aim into testable research questions and hypotheses, based on the conclusions obtained from reviewing the relevant theories, the following four hypotheses are proposed.

- H_1 *There will be a significant relationship between participant perceptions of bipedic gestures and estimations of attitude and emotion.*
- H_2 *Positive bipedic gestures will be positively correlated with positive attitude and emotion.*
- H_3 *Negative bipedic gestures will be negatively correlated with positive attitude and emotion.*
- H_4 *Participants will not be aware of bipedic gestures.*

Method

In order to empirically investigate the relationship between bipedic gesture, attitude, emotion, and levels of awareness, two separate studies were conducted by the present investigation. The first uses corpus material which comes in video form together with attitudinal data. The second study employs an experimental design using variables related to this study's four hypotheses. The brief overview of the methodology behind each study is now provided.

Study 1: Corpus Analysis

4.1.1 Method Design

Drawing on the approach adopted by previous studies that have investigated emotion and body action (Dael et al., 2011, 2012) the present investigation also employed the use of a video corpus which was analyzed using content analysis (Treadwell, p.177). This video corpus was deemed especially appropriate because, unlike in previous studies, it provided a full body view of interactants whilst they were in conversation[28] which allowed the observation and coding of bipedic gesture. The video corpus material comprised of dyadic conversations between interactants who did not know each other and who were left alone in a room to discuss what ever topics they wanted. All dyadic conversations involved the interactants standing face to face with each other and all dyads comprised of three possible gender groupings; male interacting with male, female interacting with female, and male interacting with female. All interactants within the corpus material spoke in Swedish and the content of their conversation was not translated to English or cross referenced with bipedic gesture. After the video clip was recorded the interactants completed a three page attitude questionnaire (see Appendix [iii] and [iv]) that asked them to rate how they felt and how they felt about their conversation partner. Appropriate items were selected from the attitude questionnaire, others were omitted as they were deemed not to be measuring liking.

4.1.2 Procedure

(i) All attitude scales were coded using only the third page of the questionnaire which asked each interactant to rate their conversation partner, (ii) these responses were ranked on the

[28] See Dael et al. 2011, where video corpus material did not allow for full body analysis.

basis of how highly each interactant ranked their conversation partner, (iii) the highest scoring ten and lowest scoring ten interactants – on the basis of their attitudes to their conversation partner, based on scale scores – were extracted from the total list of forty interactants. (iv) The corpus material for these interactants was coded using content analysis[29] with a pre-defined universe based with units of analysis based on the six bipedic gestures identified from the literature[30]. (v) Following reduction (see footnote 30 below) to the most basic, observable bipedic gesture the units of analysis that were coded are; (v-i) Frequency of Change of bipedic gesture, coded as number of times bipedic positions were changed; (v-ii) Amount of Leg Crossing Behaviour, coded as seconds spent in a standing-leg-crossed position with no attempt to differentiate between 'positive' and 'negative'; and (v-iii) Negative Leg Pointing. (vi) Following collation and tabulation of codes data comparisons between attitude scores and bipedic gestures (v-i), (v-ii) and (v-iii) was conducted.

4.1.2 Participants

The corpus study involved video footage of a total of 37 adults aged approximately between their early twenties and mid to late thirties. There were 15 male and 22 female interactants all bar one of whom were from Sweden. The majority of interactants were students though some interactants were also in employment, the precise numbers of which are unknown to the present investigation.

4.1.3 Materials

Materials include the corpus material made available by the Interdisciplinary Center SSKKII/SCCIIL[31] based at the Department of Applied IT, Gothenburg University, and an Attitude Scale[32] completed by interactants, a copy of which is in the appendices (Appendix [iii] and [iv], p.64 and p.65).

[29]Although content analysis is applied traditionally to media, the same principles were employed; analysing content by quantifying the contents of the corpus video, use of categorisation and coding (Coolican, 1994, p.111)
[30] However, these units of analysis had to be revised immediately after analysis and coding had begun as it was realized that only one specific bipedic gesture could be clearly observed and coded, and because interactants were standing it immediately made redundant any attempt to code seated bipedic gesture.
[31]SSKKII; Språk, Semantik, Kogniton, Kommunikation, Information och Interaktion, translated in English as SCCIIL; Semantics, Cognition, Communication, Information, Interaction & Language; see www.scciil.gu.se.
[32]The name of the Attitude Scale used is unknown to the present study, however, a copy of the relevant page used for coding attitude is available in the appendices (see Appendix [iii] and [iv]).

Study 2: The Mannequin (online) Experiment

4.2.1 Method Design

The second study of the present investigation used an experimental design (Coolican, 1994, p.78). Treadwell (2011) states that one reason to conduct an experiment is to establish causality, does A cause B as predicted (Treadwell, 2011, p.143). For this experiment the intention was to manipulate the dependent variable (DV) and the independent variable (IV) to test this investigation's hypotheses. The DV that this experiment aimed to manipulate was participant perception of bipedic gesture related to attitude, using the experiment's IV; the various positions of leg and foot posture through the use of a mannequin doll set in a pseudo-social encounter. The main control employed was an experimental blind; participants were not informed at the start of the experiment that the images or questions were related to nonverbal communication or bipedic gesture. An additional control was the use of gender neutral mannequins[33]; male mannequins were selected as they looked more gender neutral than the female mannequins who were clearly female from the shape of their upper torso.

This approach is inspired by methodologies employed by Little (1968) where dolls were used by researchers investigating the relationship between proxemics, different social encounters and differences between five national cultures (Little, 1968). The present study departed from Little's methodology by using artist's mannequins as opposed to dolls so that limbs could be articulated to characterize the bipedic gestures being investigated. Motivation for this methodology also arises from James's (1932) study of expression in bodily posture where photographs (see Appendix [vii]) of a human mannequin, wearing a black mask and a white gym suit were used[34].

In both studies by Little (1968), and James (1932), the use of a doll or mannequin is used to make the posture and gesture stimulus as neutral as possible. However, James (1932) reports in his study that in spite of attempts to keep the human mannequin as objective and neutral as possible, the 'gym suit' may have led participants to perceive the mannequin as a gymnast or

[33] As inspired by Little (1968) who used similar gender neutral dolls to avoid any extraneous variables such as the projection of assumed gender relations between his dolls.
[34] James (1932) used black masks to hide the mannequin's facial expression and a white gym suit in an attempt to adopt an as-neutral-as-possible stimulus for his participants, a consideration behind the use of mannequins.

athlete which may have influenced participant response and therefore represented a possible extraneous variable (James, 1932, p.425).

This is the main reason why mannequins were employed for the present study so as to reduce extraneous variables associated with gender, culture and class. Consideration was given to the issue of artificiality and ecological validity[35]; whether the artist's mannequins are so removed from human physical appearance that a risk arises that participants may not connect to them as a stimulus for postural expression. However, reviewing comments made by participants in Little's (1968) study this was dismissed. It is reported that two of the participants were so engaged with the dolls' social dynamic that they felt that some of the postures were disrespectful (Little, 1968, p.3).

One experimental control not used was a counterbalancing control to reduce order effects in the data (Coolican, 1994, p.91), this is an important point that will be discussed later. Participants were recruited via what is known as convenience sampling (Treadwell, 2011, p.109) or opportunity sampling (Coolican, 1994, p.91).

4.2.2 Procedure

Study 2 employed the following procedures; (i) three mannequins were purchased and simple dots were drawn onto their faces to indicate position of eye and direction of gaze, (ii) pictures were taken of three mannequins in fifteen different social encounters; four seated and eleven standing on the floor of the basement at Gothenburg University's Central Library. The scenarios were manipulated to display bipedic gestures with other parts of the body in articulated or non-articulated positions. (iii) The fifteen images were uploaded to an online survey application where a questionnaire was devised around the experiment's IV and DV, also incorporating the controls. (iv) An advert for participants was made to students at the Department Applied IT, Gothenburg University via the student web-portal and simultaneously another advertisement was published via social media. (v) Once advertised students and non-students could access the experiment's web-page via a one-click hyperlink that took them straight to the front page of the survey / experiment. (vi) Participants then navigated the pages of the questionnaire – all pages of which are presented in Appendix [v]. (vii) The web based

[35]Ecological validity being an acknowledged weakness to experiments which is balanced with benefits; a consideration that can be applied to all methodologies.

questionnaire itself comprised of 35 questions, 15 of which were set against the experiment's DV using scenarios and one which was set to test this investigation's fourth hypothesis relating to levels of awareness of bipedic gesture.

4.2.3 Participants

In total 101 participants attempted to complete the online experiment 61 of whom completed all questionnaire items. These 61 participants were composed of 36 females and 25 males, with 39.3% of these aged between 25-34 years and 41% aged 35-54 years[36]. Although the online experiment was initially targeted towards student participants these were the minority group with 37 non-students (60.7%) compared with 24 students. Participants originated from many different cultures spread across eleven different countries (UK; 29/47.5%, Sweden; 18/29.5%, Australia; 4/6.6%, Hungary; 2/3.3%, USA; 2/3.3%, Canada; 1/1.6%, Cuba; 1/1.6%, Germany; 1/1.6%, Iraq; 1/1.6%, Malaysia; 1/1.6% and Russia; 1/1.6%).

4.2.4 Materials

Apparatus used for this study included three, 12"/15cm tall wooden, male artists mannequins, use of the online survey engine SurveyGizmo and an iphone used to take photographs of the mannequin scenarios.

4.2.5 Ethical Considerations

One consideration applicable to Study 2 more so than Study 1[37] relates to the ethical aspects of conducting research. Consideration was given to the three core principles for conducting ethical research summarised by Hennink et al. (2011); respect, benefice and justice (Hennink et al., 2011, p.63). Participants were advised that they could withdraw at any time, that identities would be kept confidential and full explanations were provided on request to achieve '*informed consent*' (Hennink et al., 2011, p. 63), no requests were received. Regard was also given to the British Psychological Society's code of ethics as the present study's author is affiliated to this body (BPS, 2009).

[36]The broad age groupings were an automatic feature of the web-based survey engine used, as age was not a relevant factor to the study's experimental design it was not deemed important or necessary to amend.
[37]Deemed not applicable so much as there was no direct contact with participants / interactants within the corpus study, though considerations such as maintaining participant / interactant anonyminity were observed.

Results

5.1 Study 1: Corpus Analysis Study

The results from Study 1 are presented in the following tables and figures. Table 1 (below) provides the results of the statistical testing of the relationships between participant attitudes and units of analysis used when analysing the corpus material. The Pearson's product-moment correlation test is used as statistical conditions are satisfied and parametric assumptions are met, namely; the level of data is appropriate and the objective is to test for similarities between two sets of data (Coolican, 1994, p.299). Table 1 (below) lists the relationships that were tested (column one) followed, in order from left to right, the number of participants (N.), the Pearson's r coefficient (r), its accompanying t-value, the degrees of freedom (d.f.), critical value (c.v.), and the p-value obtained with the assistance of an online statistical table calculator that was used to verify part of the analyses[38].

	N.	**r**	**t-value**	**d.f.**	**c.v.**
Participant Attitude x Leg/Foot Movement Frequency	20	0.417*	1.946	18	0.472
Participant Attitude x Leg Crossing Behaviour (seconds)	20	-0.097	-4.340	18	0.472

** significant at p < 0.05, based on a one tailed prediction, significant at p < 0.10, two tailed.*

Table 1 : Correlation Data from Corpus Analysis.

As can be seen from Table 1 (above) the relationship between Participant Attitude and Leg/Foot Movement Frequency meets the statistical significance level at the $p < 0.05$ level of probability based on a one-tailed critical value. Based on the critical value for a two-tailed prediction, where the hypothesis does not incorporate a predicted direction, this result is statistically significant at the 10% level of probability. Although this is above the agreed thresholds for social and behavioural sciences it is a result that would none-the-less merit further investigation if taking the result on a two-tailed critical value alone (Coolican, 1994, p.252).

[38]The present study used a statistical tables calculator available at www.vassarstats.net to verify results.

In plain, non-statistical, language, this result shows a positive correlation between two variables; the higher a participant's score on their attitude scale in respect to their conversation partner (the more positive s/he felt about the other) the greater the frequency in leg and foot movement during the conversation on the part of that participant.

Of interest within these results is the weak negative correlation between Participant Attitude and Leg Crossing Behaviour. This means that the higher a participant rated their conversation partner on the attitude scale (the more positive s/he felt about the other) the less they crossed their legs during the conversation. Although this seems to support predictions in relation to bipedic gesture caution must be exercised as the correlation is weak (-0.097) and failed to meet significance thresholds meaning it is a result that might have occurred by chance alone.

	N.	$\bar{x}$ Attitude Scores	$\bar{x}$ Frequency of change in Leg/Foot Position	$\bar{x}$ Negative Foot Pointing (Seconds)	$\bar{x}$ Leg Crossing (Seconds)
Highest Attitude Scores	10	30.8	17.6	123.6	54.5
Lowest Attitude Scores	10	14.2	19.8	170.6	89.9
Female Participants	10	21.6	16.2	144.6	61.8
Male Participants	10	23.4	21.2	149.1	82.6
Highest Scoring Females	5	29.8	15.6	120.2	23.2
Highest Scoring Males	5	31.8	19.6	127.0	85.8
Lowest Scoring Females	5	13.4	16.8	169.0	100.4
Lowest Scoring Males	5	15.0	22.8	171.2	79.4

NB. $\bar{x}$: mean value

Table 2 : Comparison of Average Frequencies & Durations.

Table 2 (above) displays the averages for the units of analysis used (columns) as arranged between four comparison groups.

The first paired group shows averages for (i) participants with the top ten highest attitude scale scores (those most positive towards their conversation partner) with participants with the lowest ten attitude scale scores (those most negative towards their conversation partner). This comparison reveals a tendency for participants with a negative attitude towards their conversation partner to display more Negative Foot Pointing (an average of 170.6 seconds

compared with 123.6 seconds) and more Leg Crossing Behaviour (an average of 89.9 seconds compared with 54.5 seconds).

The second paired group compares averages for (ii) male and female participants. The results show that male participants tended to display more Leg Crossing Behaviours than their fellow female participants with the average for males being 82.6 seconds and the average for females being 61.8 seconds.

The third paired group (iii) compares male and female participants with the highest attitude scale scores which represents the participants most positive to their conversation partner. Results reveal a very strong tendency for male participants with a high attitude scale score to engage in Leg Crossing Behaviours more so than their fellow positive female participants (male average; 85.8 seconds, female average; 23.2 seconds).

The final group (iv) compares male and female participants with the lowest attitude scale scores representing participants with a negative attitude to their conversation partner. Results indicate a tendency for female participants with a low attitude scale score to engage in more Leg Crossing Behaviours than their fellow negative male participants (female average; 100.4 seconds, male average; 79.4 seconds).

Drawing comparisons between the paired groups one striking result is that the females who scored lowest on their attitude scale spent, on average, nearly five times more time in the leg cross position that their fellow females who scored highest with their attitude scores.

Departing from the results gained from analysis of the corpus material using this study's established units of analysis a number of recurring leg and foot behaviours were observed by a number of participants (see Figure 11 below). Many of these behaviours do not appear in the literature (research or non-research) and are reported here with names selected by this study as seeming appropriate.

It is felt appropriate to report these for discussion later.

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="3">Foot Tapping (above).</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="3">Foot Curling (above).</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="2">Toe Tapping (above two images).</td><td>The Hovering Leading Foot (above).</td></tr>
</table>

Figure 11 : Unexpected Leg & Foot Behaviours.

5.2 Study 2: The Mannequin (online) Experiment

The following tables and chart represents results from Study 2. Table 3 (below) displays in the first column each scenario within the online experiment (see Appendix [v]), the second column shows the number of participants who provided responses to each scenario (N.), the third column represents the percentage of selections made by participants in line with predictions within this study's bipedic gesture taxonomy. The remaining columns detail the statistics once a χ^2 'goodness of fit' test has been applied to the data (Coolican, 1994, p.264). Thereafter, following from left to right, the columns represent; the χ^2 value obtained from calculations for each scenario; the critical value (c.v.) that the χ^2 value has to meet or exceed to be significant at the $p<0.05$ level[39];the degrees of freedom (d.f.) for each calculation and the applicable significance level obtained for each scenario in the final column.

Scenario No.	N.	Responses in line with Prediction	χ^2 value	c.v.	d.f.	P value
1	91	79.1%	30.87	3.84	1	<0.0001
2	88	84.1%	40.91	3.84	1	<0.0001
3	86	73.3%	18.60	3.84	1	<0.0001
4	84	64.2%	6.86	3.84	1	0.0088
5	80	67.5%	9.80	3.84	1	0.0017
6	75	76.0%	20.28	3.84	1	<0.0001
7	72	18.1%	29.39	3.84	1	<0.0001
8	71	62.0%	4.07	3.84	1	<0.0437
9*	70	70.0%	42.33	5.99	2	<0.0001
10	70	91.4%	48.06	3.84	1	<0.0001
11	70	74.3%	16.51	3.84	1	<0.0001
12	70	81.4%	27.66	3.84	1	<0.0001
13	69	52.2%	0.13	3.84	1	0.7184
14	69	85.5%	34.79	3.84	1	<0.0001
15	69	43.5%	1.17	3.84	1	0.2794

** Scenario 9 provided three choices to the participant so affecting applicable d.f.*

Table 3 : Summary of Results from online Experiment

As can be seen from table 3 (above) there is a very strong and highly significant tendency for participant responses to follow predictions made within the bipedic gesture taxonomy (see Figure 3, p.14 and Figure 8, p.30). There are three scenarios where responses fail to meet

[39] Critical value for these tests based on two-tailed predictions.

significance levels where subsequently chance can't be eliminated as a cause for their respective results.

There are two scenarios which, in respect to their data, fail to follow the predictions; these are *Scenario 7* and *Scenario 15* with the former representing a strong and highly significant ($p<0.0001$) tendency in the opposite direction to the predicted outcome.

Figure 12 and Table 4 (below) show the results from the final item/question of the online experiment which asked participants to list all parts and functions of the body that are used to communicate ideas, thoughts, attitudes and emotions (from everything they knew and everything that they had heard). Content analysis was performed on the responses from the sixty-one participants who provided an answer to this final item/question, eliciting 1,267 words of content[40].

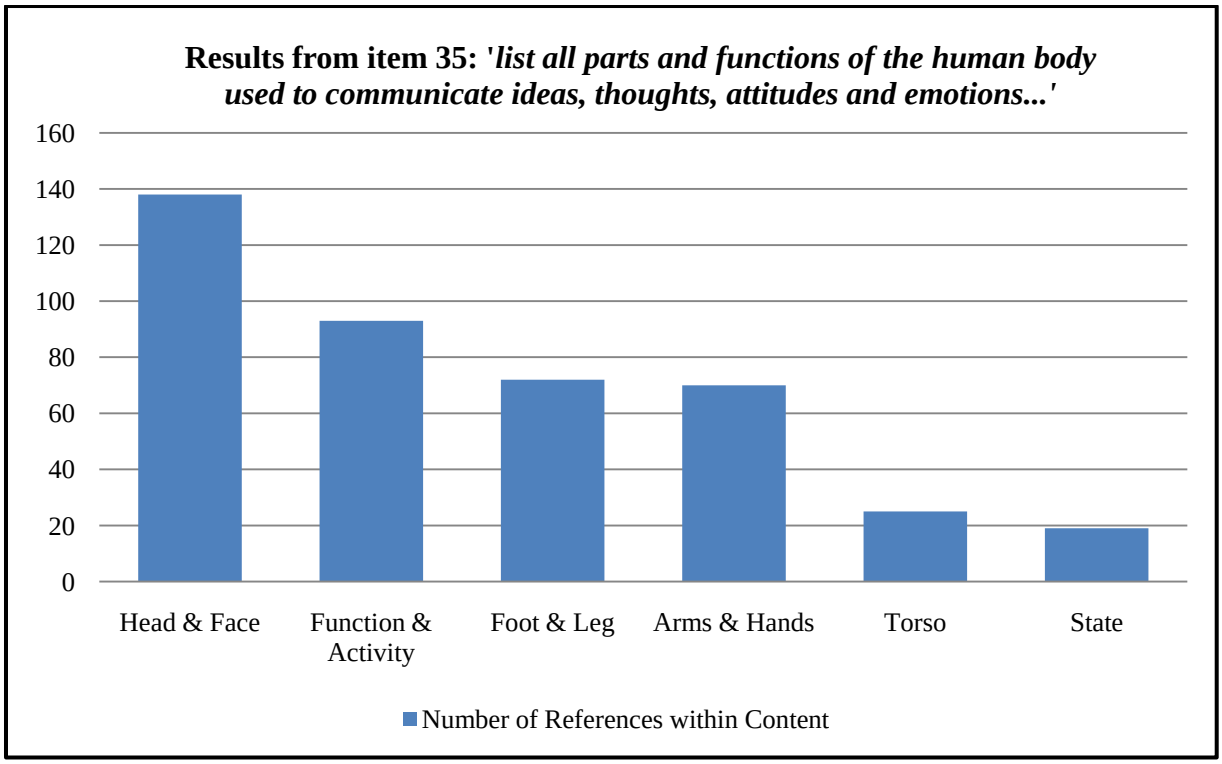

Figure 12 : Results from Content Analysis.

As can be seen from Figure 12 (above) there is a strong tendency for participants to provide responses that fall under the Head & Face category (138 references; 33%), followed by

[40] Content analysis for the purpose of this study is referring to the, 'categorising and describing of content within a communication recorded' ,asynchronously, via the online experiment's item/question (Treadwell, 2011, p.206).

Function & Activity (93 references; 22%), Foot & Leg (72 references; 17.3%), Arms & Hands (70 references; 17.7%), Torso (25 references; 6%) and State (19 references; 4%). Table 4 (below) shows the actual reference terms as they appeared in the data, in order of frequency, together with the number of times the specific reference term appears.

Eye	47	Shoulder	10	Interest	6	Finger	4	Lower	2
Hand	37	Facial Expression	10	Orientation	5	Lips	4	Pupil	2
Leg	33	Eyebrow	9	Crossing	5	Attitude	4	Taste	2
Arm	27	Torso	8	Touch	5	Direction	3	Cheek	2
Feet	26	Stance	7	Closed	5	Chest	3	Nervousness	2
Posture	17	Hair	7	Foot	5	Hip	3	Breathing	2
Sit	13	Emotion	7	Smell	5	Nose	3	Sweat	2
Mouth	13	Open	6	Distance	4	Smile	3	Body Angle	1
Face	11	Gaze	6	Point	4	Tongue	3	Toe	1
Gesture	10	Ear	6	Turn	4	Calf	2	Forehead	1

Table 4 : Reference Items Coded to Categories as Summarized in Figure 12.

From content analysis of the responses it can be seen that there is a clear awareness amongst participants of bipedic gestures. ‘Leg’ being the third, and feet the fifth, most mentioned specific part of the body in connection to communication (Table 4, above) and representing 17.3% of all references (Figure 12, above).

Discussion

The present study’s aim was to empirically investigate the validity of bipedic gesture in the context of, (i) attempting to identify which bipedic gestures expressed which attitudes and emotions within interpersonal communication. As well as (ii) to attempt to test the extent to which bipedic gesture is a nonverbal communication processes that is consciously or unconsciously controlled. To achieve this four hypotheses were proposed, the predictions that they represent were based on this study’s reference material from non-research based popular literature as well as from a review of some the most relevant theoretical models in the field.

Attention will now be turned to this study's four hypotheses in the context of discuss these against the results obtained.

H_1 *There will be a significant relationship between participant perceptions of bipedic gestures and estimations of attitude and emotion.*

Study 2's results are most relevant to this investigation's first hypothesis where participants were asked to judge which mannequin was liked or disliked by viewing a series of fifteen scenarios. Each scenario offered the participants one of two or three choices (see Appendix [v]) one of which was in line with predictions regarding bipedic gesture. Reviewing the results within Table 3 (above) there is a strong and significant tendency for participants to follow prediction and to select the 'liked' mannequin that is on the receiving end of a Positive Leg Point or Positive Leg Cross. This occurs in thirteen of the fifteen scenarios and all thirteen meet significance thresholds well in excess of the 1% level of probably, meaning that the probability that these results were gained by chance alone, repeatedly, is well below 1%.

With such convincing results the immediate concern is that a Type I error has occurred with the data (Coolican, 1994, p.251) meaning that the study has obtained a false positive and so is erroneously rejecting the null hypothesis that there is no relationship between IV and DV. In examining this possibility one cause of a Type I error might be an order effect caused by a lack of a counterbalancing control within the experiment whose introduction would have changed the order of scenarios for each participant. However, this does not bear up to scrutiny when balanced against the fact that none of the participants would have been able to guess the experiment's IVs or DV within the first scenario. The responses for this scenario represent one of the strongest percentages where participant responses follow the bipedic prediction. Participants would not have been able to guess the DV due to an experimental blind control being implemented so that there was no awareness of the rationale behind the scenarios or questions. Applying an 'eyeball test' (Coolican, 1994, p.242) to the data and viewing the emerging percentages of participant responses that are both in-line with, and against, prediction there is no pattern of increasing percentages one way or the other which is what would be expected with order effects – this suggesting that no order effect was present.

Critically reviewing this finding another factor that could have led to such a strong effect and statistically significant result is that some of the mannequins have very little articulation in

other parts of their body (arms, hands, head), or posture, or orientation, apart from foot orientation. Scenario 2 and 10 (see Appendix [v], Figure 16 and 22) are examples of this. Counterbalancing this however is the fact that although Positive Foot Pointing is obvious, there are scenarios that simulate a specific bipedic gesture only once and yet participant responses move in line with prediction in a statistically significant way. For example, Scenario 9 (Appendix [v] Figure 23) is the only scenario to simulate a mutually Positive Standing Leg Cross between mannequins A and B, and this is also the only scenario where participants are offered more than one choice of options. However, again 70% of participants selected an option in-line with prediction regarding bipedic gesture and this again was a highly statistically significant result.

There are three instances where participant responses do not follow prediction and interestingly one where responses are in the opposite direction to prediction in a statistically significant way. This interesting result concerns Scenario 7 (Appendix [v] Figure 21) and on viewing the scene it is perhaps obvious why; mannequin B is displaying a Positive Leg Cross towards mannequin A (the prediction) but participants have selected mannequin C which is where mannequin B's head, gaze, torso and lean are orientated towards. This result is interpreted by the present study as being one scenario where too much encoding was attributed to other parts of the body in the setting up of the scenario such that it presented a confounding variable to the study's DV.

Another final criticism of this result could be ecological validity in respect to how realistic are wooden mannequin's when compared to real humans in social encounters. Countering this would be considerations regarding the previous studies that have employed this method with no reduction of realism (see p.38 above and commentary on Little's (1968) study).

Although the discussion could continue in respect to the findings that support this investigation's first hypothesis simply by virtue of the number of scenarios used, and examining each of these individually, however, the above discussions points stand out as being potentially the most relevant and of most interest.

H_4 Participants will not be aware of bipedic gestures.

Attention is now turned to this study's final hypothesis on the basis that it was also tested

within the Mannequin (online) Experiment as just discussed above. Reviewing Figure 12 and Table 4 (above) it is clear that participant responses to questionnaire item 16 (see Appendix [v], Figure 30) demonstrate high levels of awareness of parts of the body associated with bipedic gesture; namely legs and feet. Within the raw data there were 65 occurrences of the words Leg, Foot, Feet and Toe (Table 4) and when categorized (Figure 12) represents the part of the body with the third most frequent references. This clearly indicates that this study's participants were aware of this part of the human body in relation to nonverbal communication. The question that arises is why? This part of the human body has escaped the attention of previous research and although it appears within the non-research literature it is unlikely that all participants had read these works prior to the experiment. What can't be discounted with this result is the presence of an order effect given that item 35 comes at the end of the sequence of scenarios all testing for bipedic gestures. If participants didn't have any previous warning about the IV and DV with Scenario 1 then by item 35 it is highly likely that the net effect of 15 scenarios with a repeated IV would have influenced responses.

However, countering this is the strength of participant responses in line with predictions associated with bipedic gesture in Scenarios 1-15. This result may not be the product of a fault with the methodology but may in fact reflect peoples' awareness of the role played by these body parts. There is no clear answer, suffice to say that based on the results from the present investigation it was found that participants have high levels of awareness of bipedic gestures, against the predicted experimental hypothesis.

H_2 *Positive bipedic gestures will be positively correlated with positive attitude and emotion.*

H_3 *Negative bipedic gestures will be negatively correlated with positive attitude and emotion.*

As this investigation's second and third hypotheses are based initially on the results from Study 1 – Corpus Analysis – and as they are both correlative predictions representing opposite sides of the same correlative, *Antithetic* coin, these results shall be discussed together.

The first thing worthy of mention is that data coded from this study's corpus material relevant to bipedic gesture did not yield statistically significant correlations when compared with attitude scale scores. As mentioned within the methodology section (footnote 30, p.36 above) there were difficulties matching the predefined codes based on bipedic gestures with the

reality of what was happening within the corpus material. Although there was clear visibility of all parts of the interactants' body the first problem was that they were all in a standing position. This immediately rendered seated bipedic gestures obsolete from the coding process. In terms of positive and negative leg crossing and positive foot pointing this was very difficult to distinguish given the surprising subtlety of movement with this part of the body. Negative Foot Pointing was clearly distinguishable and coded accordingly but the only distinguishable leg crossing behaviour was the leg cross itself and even within this simple configuration of the lower limbs there was much variation as demonstrated within Figure 12a (below).

Figure 12a : Different Leg Crossing Behaviours.

A weak negative correlation was observed between Leg Crossing Behaviour and Attitude whereby higher attitude scores were related to lower frequencies and time spent in a leg crossed position. The more a participant liked their conversation partner the less they crossed their legs which would be consistent with predictions made by bipedic gestures. Whereby crossed lower limbs (orientated away from the other) is an indicator of negative emotions and attitudes (see Figure 8, p.30, above). However, bearing in mind that in correlation studies a result of 0 means no relationship and a result of 1 equates to a 'perfect' correlation a score of -0.097 speaks for itself in respect to the strength of this affect.

Analysis of the corpus material was conducted using units of analysis based upon this study's taxonomy of bipedic gesture. However, consideration was also given to findings from the few

previous studies that have investigated leg and foot movement as part of their study. Subsequently, frequency of change in bipedic gesture, or posture, was recorded and this yielded a significant result. Participant attitude was positively correlated with frequency of change in standing leg and foot posture and this was statistically significant at the 5% level of probability. The more a participant liked their conversation partner the more frequently they changed their standing bipedic, or leg and foot, posture.

Inferential statistical analysis to one side, some results of note did emerge from Study 1's descriptive data. For example, the five lowest scoring females on the attitude scale held a Legs Crossed position five times longer than the five highest scoring females. The more positive a female participant's attitude to their conversation partner resulted in them crossing their legs less. There was also a noticeable trend for those participants with a negative attitude to their conversation partner to display more Negative Foot Pointing (see Table 2,p.41, above) which is in line with predictions associated with bipedic gestures. Other results show that on average female interactants conversed whilst holding a standing leg crossed position twenty seconds longer than their fellow male interactants. And that those with a negative attitude to their conversation partner held standing leg crossed positions on average for 25 seconds longer than those with a positive attitude.

Two further observations of interest involve (i) isopraxism and (ii) bipedic gestures that were both anticipated and not anticipated from this investigation's reference material within popular literature.

In terms of (i) isopraxism, the extent to which the conversational partners were mirroring and copying each other's behaviour, this could be observed within the corpus data but was not coded or analysed beyond an observational note. Perhaps in future studies the relationship between isopraxism and bipedic gesture could yield interesting results in terms of liking and building rapport between dyads, and smaller numbers of interactants.

In terms of the range of commonly occurring bipedic gestures that were exhibited by interactants independently (not an assumed isopraxism) within the corpus material, there were a number of interesting gestures that both matched, and did not match, the reference material. Reviewing Figure 11 (p.43 above) three bipedic gestures that were independently repeated by a number of participants was what this study refers to as Foot Curling, Foot Tapping and Toe

Tapping. These were repeated with such frequency that – alongside isopraxism – another research methodology is perhaps suggested where a purely observational and inductive approach to categorising bipedic gestures might gain interesting results and contribute to the field of study. One occurring bipedic gesture that is referred to within the reference material is referred to as The Hovering Leading Foot (see Figure 11, p.43) which seems to match what Navarro (2008) would refer to as a Gravity Defying Behaviour (see Appendix [i]).

However, in conclusion the present investigation's second and third hypotheses these were not supported by the data obtained from Study 1 – Corpus Analysis, but were significantly supported (as already discussed) within the present investigation's Study 2 – Mannequin (online) Experiment, particularly Scenario 9, 12, 14 (see Table 3, p.44, and Appendix [v], p.66).

Relevance to Previous Research & Theory

As mentioned there has been little research conducted specifically into the role that bipedic gestures play in expressing emotion or attitude. Smith-Hanen (1977) found in reviewing six different seated leg positions related to rapport that openness in leg position[41]was not an influencing variable but that a complex interaction between arms and legs were important. As was the frequency of movement as is supported by this study's findings. The issue of crossed and uncrossed legs, again in seated dispositions, was reviewed by Harrigan and colleagues (1985) and it was found that uncrossed and symmetrical positions adopted by counseling staff were most likely to instill positive attitudes and feelings from patients. Again, findings in respect to leg crossing behaviour and attitude ratings appear consistent with these findings.

Of relevance to previous research is this study's conclusion in respect to the use of corpus material for the purposes of coding the whole human body, and the specifically bipedic gesture. It is likely that corpus material used by the present study was more appropriate than Dael and colleagues (2011) use of University of Geneva's GEMEP corpus. This is because unlike the GEMEP corpus the SSKKII corpus from Gothenburg University allowed the viewing and coding of the entire body, including legs and feet. However, as corpus material is by nature a body of material captured in time from a past research activity the interactants, their numbers, their positions, instructions and so forth are all beyond the control of any subsequent researcher. For example, Positive Foot Pointing is described within the reference materials as being

[41]Openness often referred to within the literature as arms akimbo or legs akimbo for reasons unknown.

observable in groups larger than dyads and further, trying to obtain corpus material for interactants who happen to be seated in the correct position with good video angles for capture of relevant movements seems over ambitious. The conclusion relevant to Dael and colleagues and to any future investigation of bipedic gesture is that it is perhaps better to use analysis of role play[42].

In respect to the theoretical dimensions to this study's findings there is some support within the data for a new and sixth category if kinesics; bipedic gestures. The findings from the Mannequin (online) Experiment strongly support this conceptualization, however it is felt that these results should be greeted cautiously and that further investigation is warranted.

7 Limitations and Future Research

One question that arose during the corpus analysis related to foot pointing behaviours was whether being left or right footed (as with footballers) was relevant – would a person display with their right foot like a right handed person would when pointing directions. The answer is that there is insufficient data, and literature, to respond to this question which at a stroke demonstrates both a limitation and future research opportunity – especially given some of the results of the present study that point towards a relationship between bipedic gesture and expression of attitude (liking) and emotions.

Another limitation to the present study was certain aspects of its methodology; namely use of corpus material, a lack of a counterbalancing control in its experimental study, and a lack of access to computerized analysis software (such as SPSS). Future research could easily navigate the latter two problems within a replication study that would incorporate counterbalancing controls, that would access appropriate software and that would employ inter reliability judgment analysis of mannequin posture for additional methodological robustness.

Scheflen (1964) argues that examining a phenomena within nonverbal communication with too narrow a focus can be flawed, using uses an illustrative linguistic analogy where he states

[42]This was one ambition of the present study where the experimenter would have more control of the conditions under which video recording would have been made incorporating seated conversation as well as standing. However an insufficient number of participants came forward to volunteer for this element of the research.

that it is like examining a language by looking at just one character of that language's alphabet (Scheflen, 1964). Dittmann (1971) makes a related comment in reviewing the work of Ray Birdwhistle on kinesics and his efforts to create a parallel language system that attempted to reduce the phenomena of investigation *ad absurdum* (Dittmann, 1971). The present study's focus on one part of the human body could be viewed similarly as too narrow a focus on just one part of the whole picture that is the symphony and synergy of bodily communication. Whilst the results of the present study are encouraging there would be additional benefit in future studies adopting a cross comparative analysis between bipedic gesture and an established nonverbal indicator of emotion or liking, such as facial expression coded through the use of FACS (see footnote 11, p.13).

Another question relates to a gender effect on leg crossing behaviour as there is much research that suggests gender differences in nonverbal communication (Frances, 1979; Vrugt and Kerstra, 1984). Non-empirical observations typically assign leg crossing behaviours to females than to males (Morris, 1977, 2007). However, the present study found a reverse effect which, when combined with the observed instances of isopraxism combined with the matching hypothesis (Berscheid, 1978) within interpersonal attraction; this perhaps represents another interesting avenue of future inquiry.

Culture and its influence was beyond the scope of the present investigation and so was not explored to any extent in spite of the extensive literature regarding differences in nonverbal communication between cultures (for example see Collett, 1994). This subsequently represents another interesting area of future research and inquiry; how bipedic gesture might vary with culture.

Final Comment

The philosopher Spinoza stated the following in respect to agency, determinism, and free will within the human condition, "Men think themselves free in as much as they are conscious of their volitions and desires, and never even dream, in their ignorance, of the causes which have disposed them so to wish and desire." (Spinoza, 1677, Part 1, Prop. XXXVI, Appendix). However deterministic as this might sound, and as Spinoza is often portrayed, Kisner (2011) argues that Spinoza's true concern was for human freedom of which one form was self-determination. This is described as a kind of free will compatible with causal determinism

where although behaviour is determined there is an element of free will by knowing this to be the case and being able to act accordingly (Kisner, 2011, p.18).

One aspect of bipedic gestures investigated in the present study is the role that the unconscious mind plays in this proposed, sixth kinesic category, as well as within nonverbal communication in general. Although not supported by the present study's findings much of present day thinking suggests that the unseen presence that guides, or determines, human behaviour, and by implication communication; is the unconscious mind (p.30, above).

One hoped for benefit of the present study, and any future research into bipedic gesture, is that it might work towards exploring the boundary between conscious and unconsciously controlled communication. This with the aim that through the application of practical activities, such as self-presentation and self-monitoring, a heightened awareness of how individuals ***encode*** bodily communication can be gained. This in turn will not only make individuals better communicators but will perhaps provide greater insight into an individual's own communicative behaviour and possible underlying motivations through reflection.

This ultimately is perhaps one of the greatest failings of 'pop-psych-books' where the emphasis is solely on how to ***decode*** others' behaviours and their intentions – the myth of the mind reader. Turning this mindset on its head represents an opportunity where individuals learn how humans ***encode*** which in turn might provide an enhanced insight and elevate communicative competence through what Allwood refers to as *own communication management* (Allwood, 2002).

Thus, allowing individuals to work to achieve that what was inscribed over the entrance to the Temple of Apollo at Delphi; to 'know thyself' (and that unseen presence), communicatively.

The current investigation has taken a small step towards this by investigating a previously un-researched area of nonverbal communication. Results have been obtained that suggest a relationship between the expression of emotion and attitude, and simple leg/foot movement. This represents an opportunity to open a new area of research within the field of nonverbal behaviour and communication that may lay the foundation to establishing a possible new, sixth category of kinesics; bipedics.

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Appendix

[i] Summary of Observations in Navarro (2011).

[ii] Summary of Observations in Pease (1991).

[iii] Self-report Attitude Survey from Corpus Study (an anonymised original).

[iv] Self-report Attitude Survey from Corpus Study (translated into English).

[v] Screen Shots of all web pages from The Mannequin (online) Experiment.

[vi] Raw Data from Participant Attitude Scales (Corpus Study).

[vii] Example of Mannequin used in James' (1932) Study.

Appendix [i] Summary of Observations in Navarro (2011).

Behaviour	Description	Mental / Cognitive Emotional State
Happy Feet (p.57)	**Seated**, 'wiggling' or bouncing feet.	Confidence, Happiness, Satisfaction, Impatience, increase in frequency of movement reflects increase in these states.
Shifting Foot Behaviour (p.60)	**Standing**, Torso facing interactant but foot/feet facing away to an exit.	Disengagement, Lack of Interest, Low Rapport, and High Disaccord, an *intention cue* indicating the intention to engage or disengage.
Knee Clasp (p.62)	**Seated**, Hand holding one or both knees.	*Intention cue* indicating intention to disengage, to literally get up and leave.
Gravity Defying Behaviours (p.63)	**Standing**, toe in air, heel on ground, standing high (legs as straight as possible).	Happiness, Positive, Excited, Positive Feelings, opposite with depressed emotional state, some synchronization to conversation and content related with Happy, Positive state, i.e. 'good news'.
	Standing, The 'Starter Position', heel up, toe down.	Indicating intention to active or exertion, to about to do something, leave, to act.
Leg Splay (p.65)	**Standing**, Legs/feet apart at shoulder distance.	Territorial, power, authority, intimidation, preparing to fight, stable base to launch/repel such, Anger, aggression.
High Comfort Display (p.68)	**Standing**, Legs crossed.	High comfort with another interactant, high confidence, rapport with other.
	Standing, leg crossed "tilt".	Subconscious 'tilt' to those others especially liked by the interactant.
	Standing, Isopraxism.	Mirroring of standing leg cross between interactants indicating mutual liking.
Seated Leg Crossing (p.73)	**Seated**, Leg crossed, foot towards other.	Indicates interest in either the other interactant or the subject being discussed.
	Seated, Leg crossed, foot away from and thigh towards other.	Defensive position, indicating dis-interest, disaccord, with other interactant or subject, a blocking behaviour.
	Seated, congruence, all crossed in same direction.	Harmony in group, with opposite assumed from opposite behaviour.
Feet Managing Greeting Space (p.75)	**Standing**, step backwards on greet.	Needs more space, not comfortable, wants to be elsewhere.
	Standing, step forwards on greet.	Interest towards other interactant on first meeting.
	Standing, stationary on greet.	Comfortable with social encounter.
Cooperative & Uncooperative	As above, item 2 "Feet Shifting Behaviour".	

Leg Kick Response (p.79)	**Seated**, change in movement intensity/frequency, actual kicking action.	A 'visceral reaction to a negative stimuli', the change from a 'wiggle' to a 'kicking' motion.
Foot Freeze (p.80)	**Seated**, sudden stop of foot/leg movement.	Indicates change in emotional state, onset of anxiety, feeling threatened, or concealment, a restraining behaviour.
Interlocked Feet (p.81)	**Seated**, feet interlocked with each other or legs of a chair.	Indicating nervousness, attempts to conceal or deceive, stress state, a 'freeze in face of threat' response.
Foot Hiding (p.83)	**Seated**, feet withdrawn from view under chair.	Stress response, in a social exchange topics causing stress triggers this withdrawing behaviour with 'recovery' to re-emerging, feet visible, when stressor topics not in conversation.

Appendix [ii] Summary of Observations in Pease (1991).

Behaviour	Description	Mental / Cognitive Emotional State
Standard Leg Cross (p.66)	**Seated**, Right knee and leg over left.	State: Defensive, supportive gesture used with other negative gestures such as arm crossing. Typical of UK, European, Australia & NZ.
American Leg Cross (p.67)	**Seated,** right leg over left leg, but intersection with right ankle places on left knee.	Indicates competitiveness, removed from cultural context (i.e. outside US) indicates argumentativeness. Typical of American interactants.
Leg Clamp (p.68)	**Seated,** leg lock with hands holding leg in horizontal position.	Indicative of entrenched attitude to something, stubbornness.
Standing Leg Cross (p.69)	**Standing,** legs crossed.	Defensive, not open, combined with other indicators such as distance (proxemics) and arm gestures.
Ankle Lock (p.71-73)	**Seated,** not crossed leg, legs crossed at ankle.	'metaphoric lip biting' where person is holding back, negative attitude, emotion, though, fear, or nervousness, defensive . Special note: male and female variants to this kinesics gesture.
Seated Body Pointing (p.117)	**Seated,** crossed knee pointing towards another interactant.	Means to show interest, exclude others in a social group or dyad.
Foot Pointing (p.119)	**Standing,** one foot (leading foot?) pointing at person or object of interest.	Indicative of interest in something, an "interest cue" where "pointing at people who are interesting and attractive".

Appendix [ii] Self-report Attitude Survey from Corpus Study (an anonymised original).

Kryssa för det alternativ som passar bäst:

Jag kände min samtalspartner redan före samtalet
Har aldrig träffats O O O O O O O Goda vänner

Jag tyckte samtalet var trevligt
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle gärna vilja gå och dricka en kopp kaffe med min samtalspartner, om hon/han frågar
Stämmer inte alls O O O O O O O Stämmer helt

Tillsammans med min samtalspartner skulle jag kunna tänka mig
Ett ”one-night-stand”
En kort affär
Ett förhållande
Ett vänskapsförhållande V
Inget av ovanstående alternativ

Jag skulle gärna gå på bio med min samtalspartner, om hon/han frågar
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle lämna mitt telefonnummer till min samtalspartner, om hon/han skulle fråga efter det
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle lämna min mailadress till min samtalspartner, om hon/han skulle fråga efter den
Stämmer inte alls O O O O O O O Stämmer helt

Jag tycker att min samtalspartner är
Oattraktiv O O O O O O O Attraktiv

Jag tycker att min samtalspartner är
Osympatisk O O O O O O O Sympatisk

Hur bedömer du dina chanser hos din samtalspartner med avseende på
Ett ”one-night-stand” Dåliga O O O O O O O Bra
En kort affär Dåliga O O O O O O O Bra
Ett förhållande Dåliga O O O O O O O Bra
Ett vänskapsförhållande Dåliga O O O O O O O Bra

Jag skulle vilja bjuda min samtalspartner på en kopp kaffe
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle vilja fråga min samtalspartner om han/hon skulle vilja gå på bio med mig
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle vilja be min samtalspartner om hans/hennes telefonnummer
Stämmer inte alls O O O O O O O Stämmer helt

Jag skulle vilja be min samtalspartner om hans/hennes mailadress
Stämmer inte alls O O O O O O O Stämmer helt

Appendix [iv] Self-report Attitude Survey from Corpus Study (translated into English).

Please tick the option that best suits:

1. I knew my conversation partner before the conversation:
   Have never met (1) (2) (3) (4) (5) (6) (7) **Good Friends**

2. I thought that the conversation was nice:
   Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

3. I would like to go for a coffee with my conversation partner if he were to ask:
   Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

4. Together with my conversation partner I would be willing to:
   A 'one night stand'
   A short affair
   A relationship
   A friendship
   None of the above

5. I would like to go to the cinema if my conversation partner were to ask:
   Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

6. I would give my telephone number to my conversation partner if s/he were to ask for it:
   Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

7. I would give my email address to my conversation partner if s/he were to ask for it:
   Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

8. I think that my conversation partner is:
   Unattractive (1) (2) (3) (4) (5) (6) (7) **Attractive**

9. I think that my conversation partner is:
   Not nice (1) (2) (3) (4) (5) (6) (7) **Nice**

10. How would you rate the chances of your conversational partner for:
    A 'one night stand'
    A short affair
    A relationship
    A friendship
    None of the above

11. I would like to invite my conversation partner for a coffee:
    Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

12. I would like to ask my conversation partner if they would like to go to the cinema with me:
    Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

13. I would like to ask my conversation partner for his / her telephone number:
    Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

14. I would like to ask my conversation partner for his / her email address:
    Do not agree at all (1) (2) (3) (4) (5) (6) (7) **Totally Agree**

Appendix [v] Screen Shots of all web pages from The Mannequin (online) Experiment.

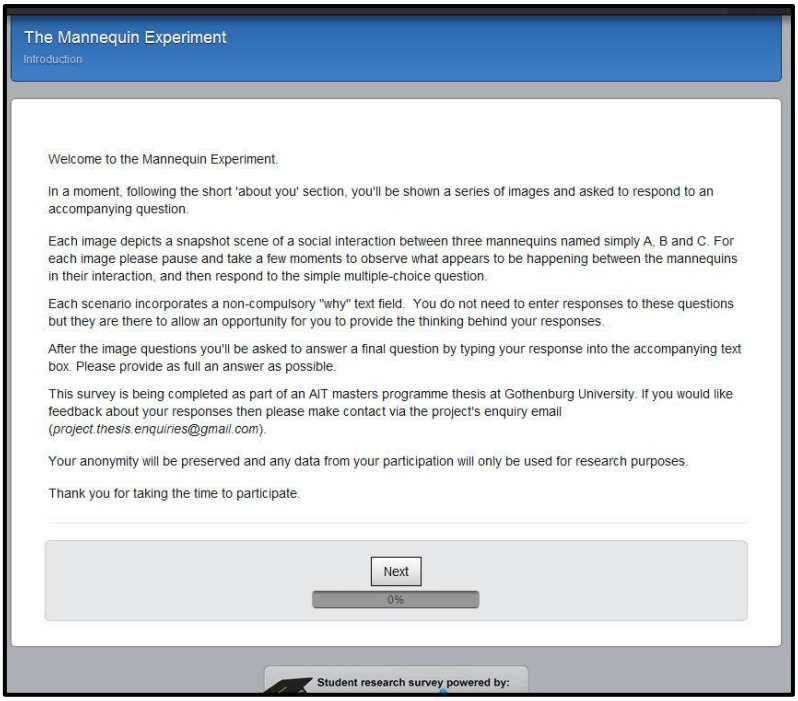

Figure 13: Webpage 1; the introduction page.

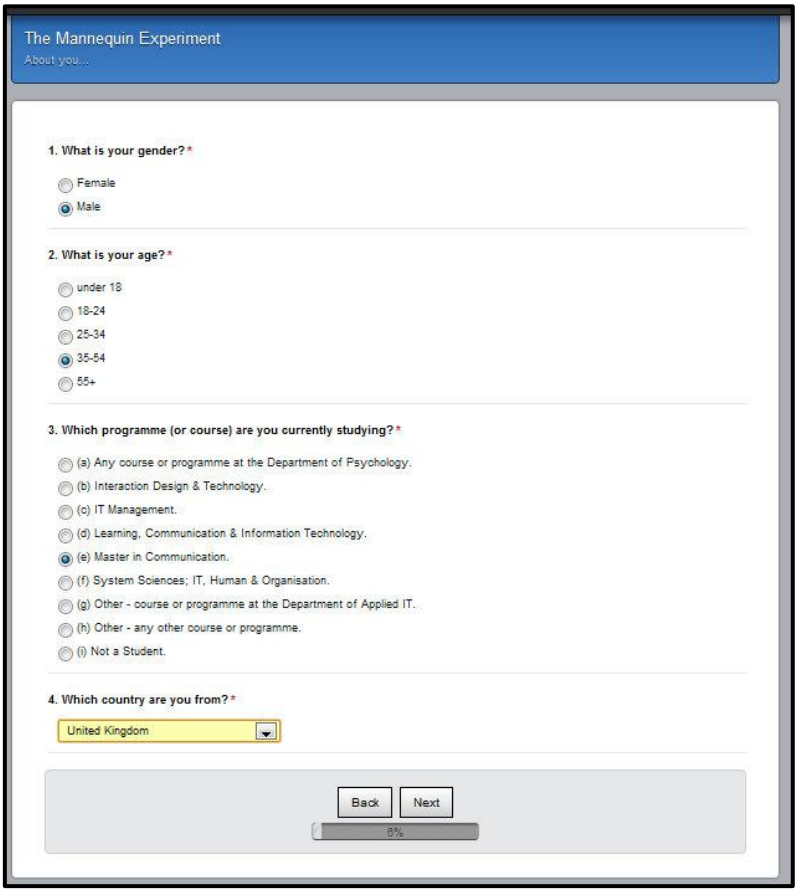

Figure 14: Webpage 2; the participant demographics page / Questions 1 to 4.

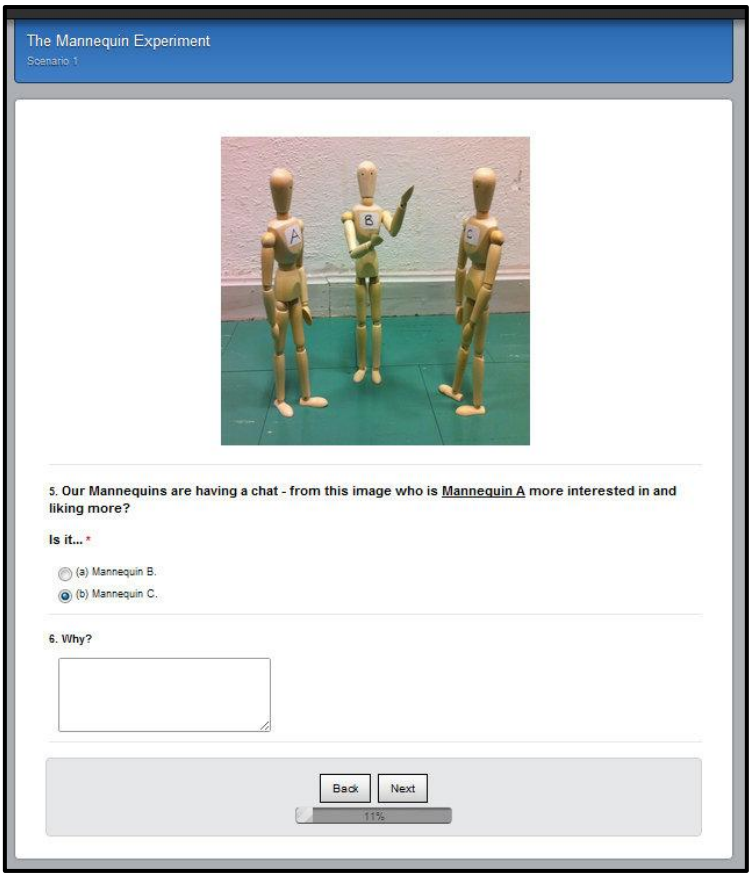

Figure 15: Webpage 3, Scenario 1 / Questions 5 & 6.

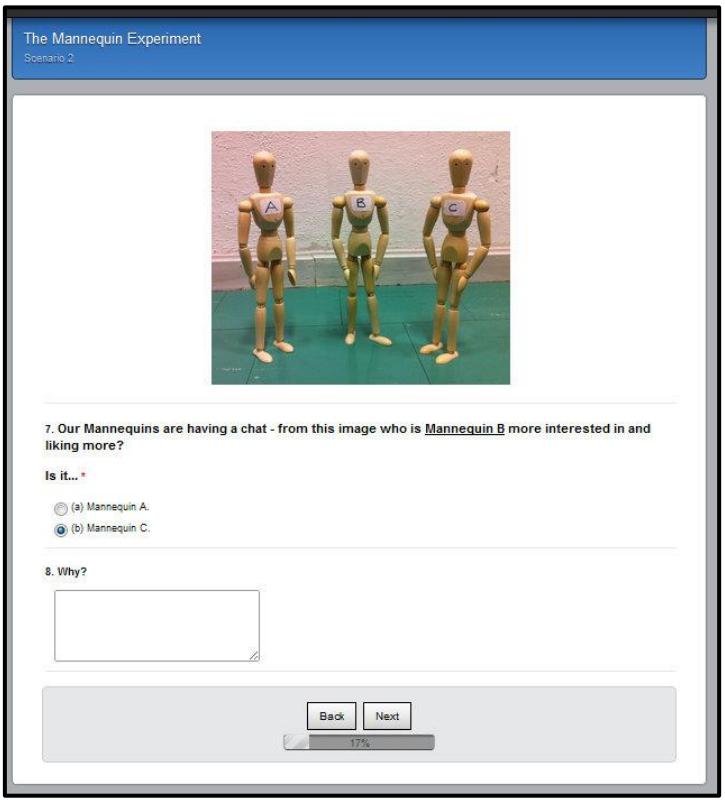

Figure 16: Webpage 4, Scenario 2 / Questions 7 & 8

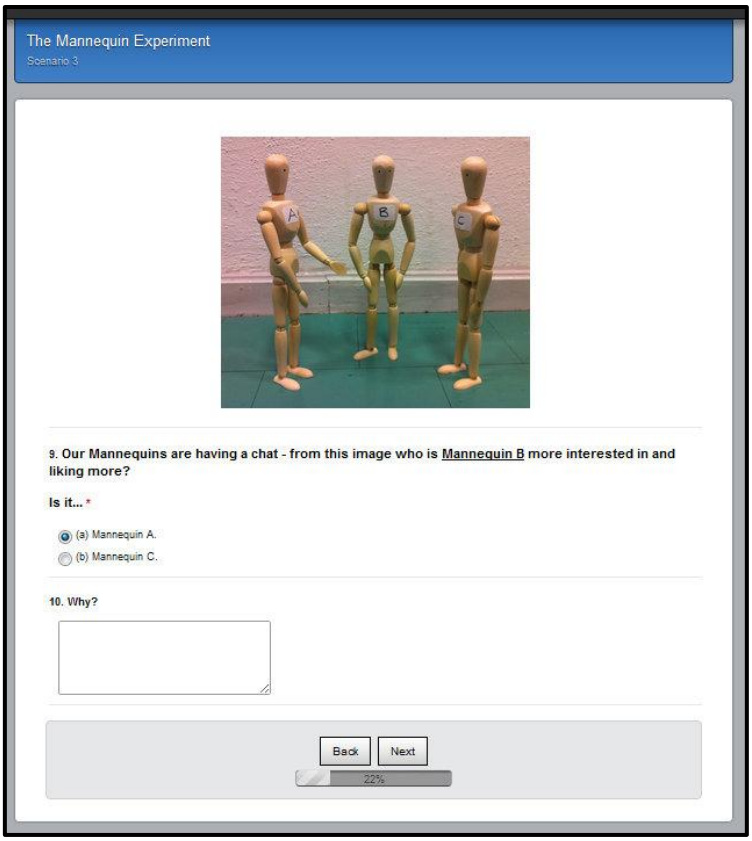

Figure 17: Webpage 5, Scenario 3 / Questions 9 & 10.

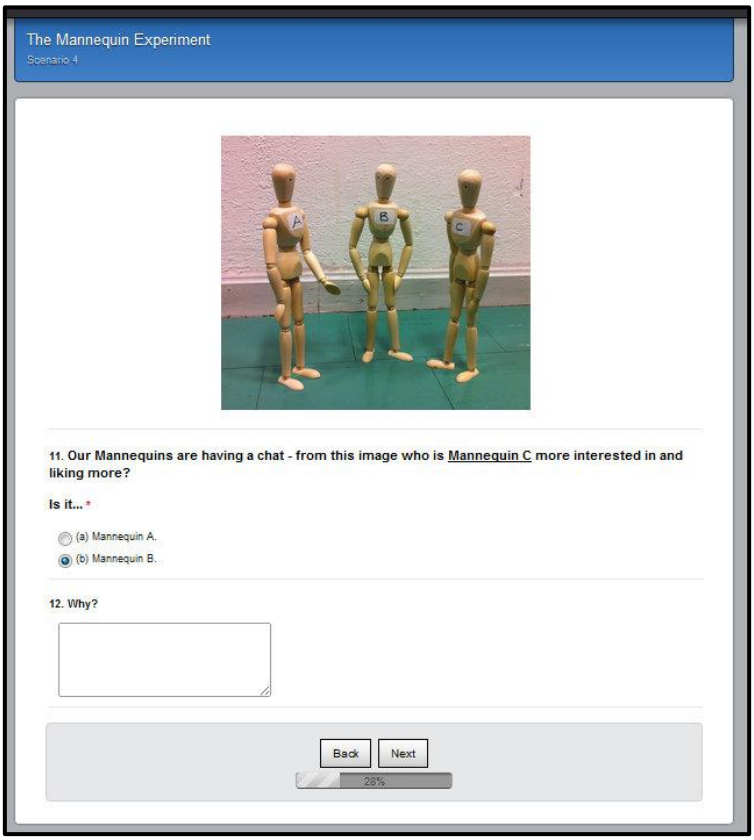

Figure 18: Webpage 6, Scenario 4 / Questions 11 & 12.

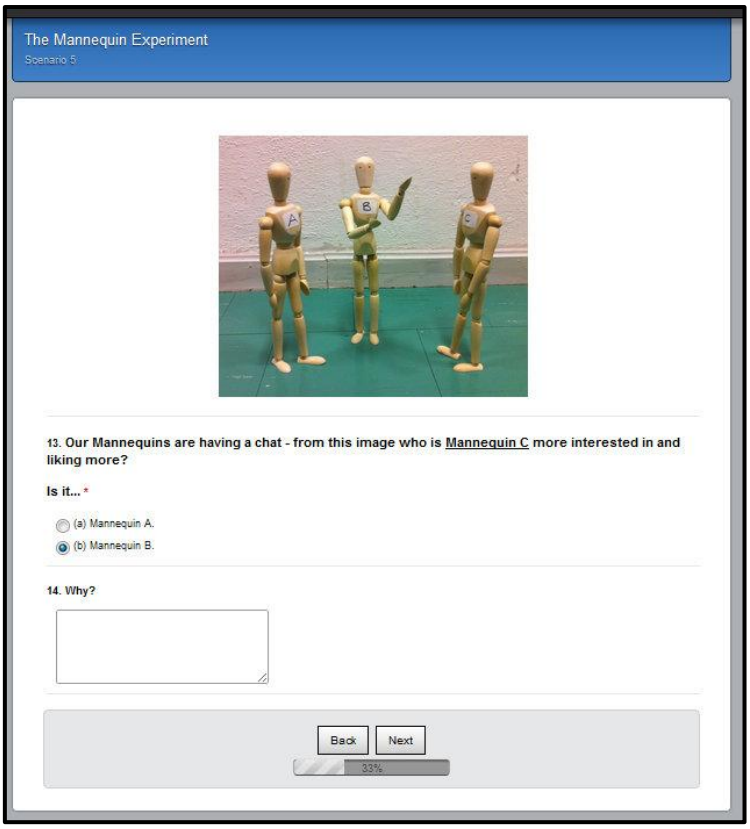

Figure 19: Webpage 7; Scenario 5 / Questions 13 & 14.

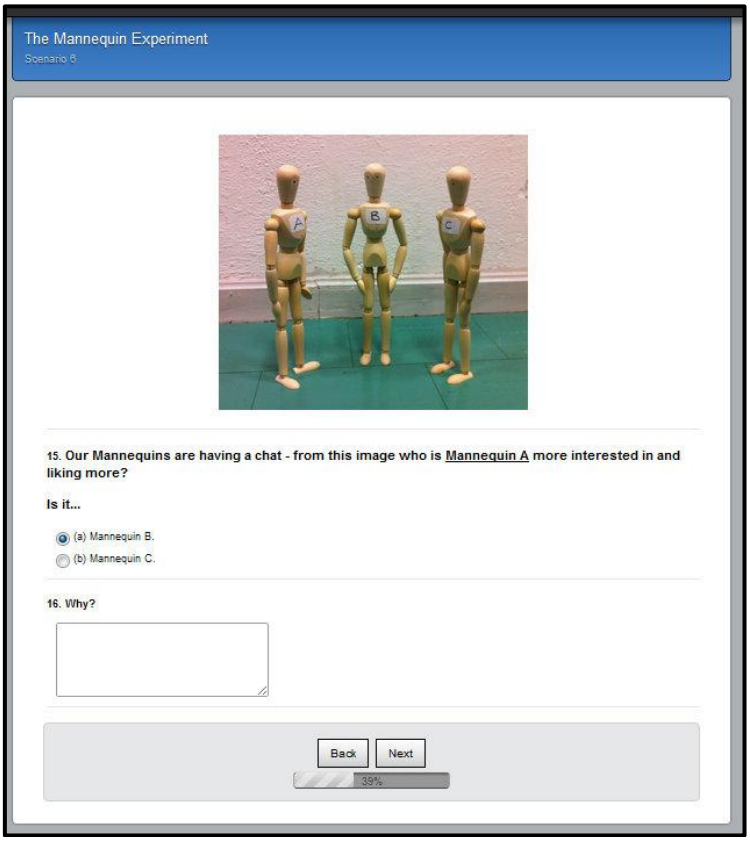

Figure 20: Webpage 8, Scenario 6 / Questions 15 & 16.

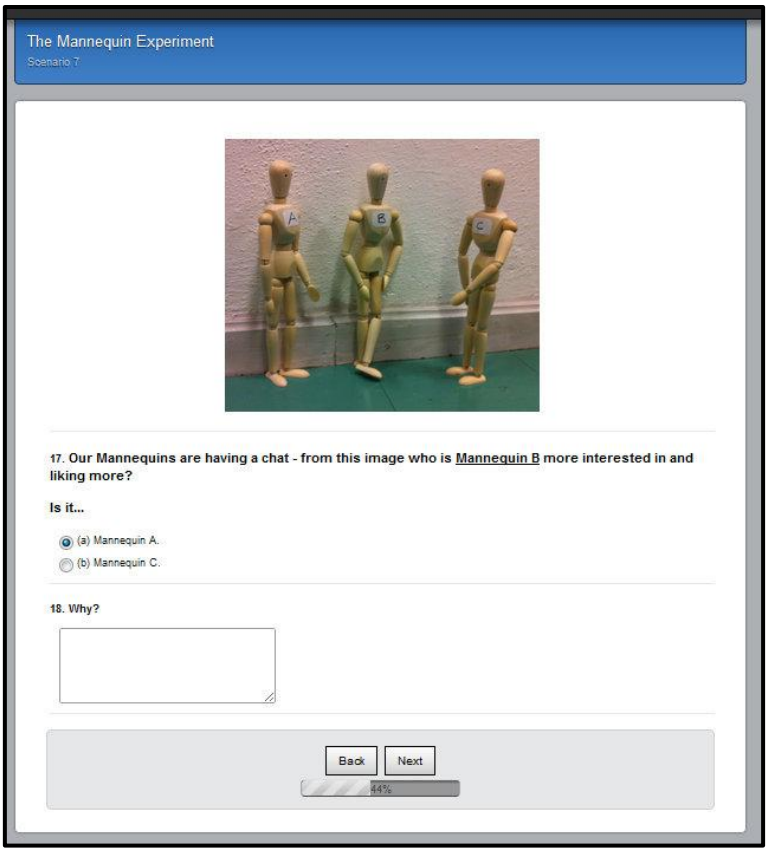

Figure 21: Webpage 9, Scenario 7 / Questions 17 & 18.

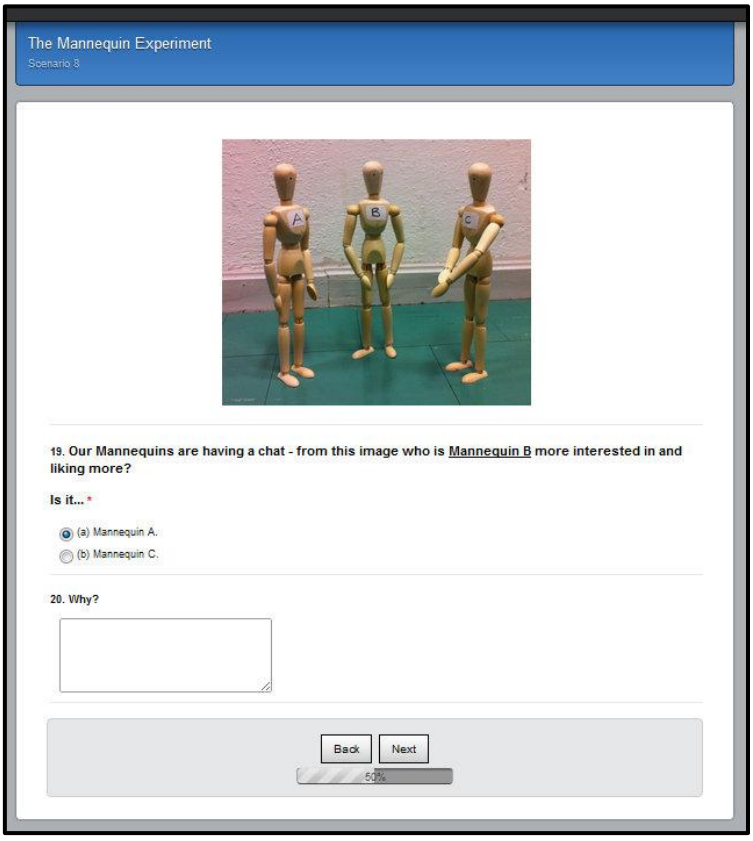

Figure 22:.Webpage 10; Scenario 8 / Questions 19 & 20.

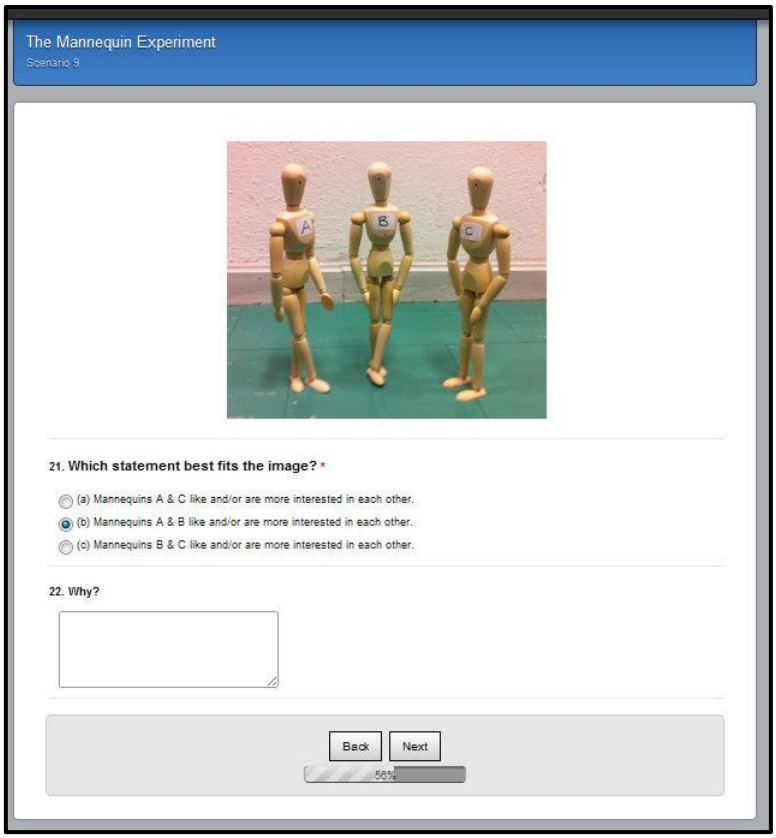

Figure 23: Webpage 11; Scenario 9 / Questions 21 & 22.

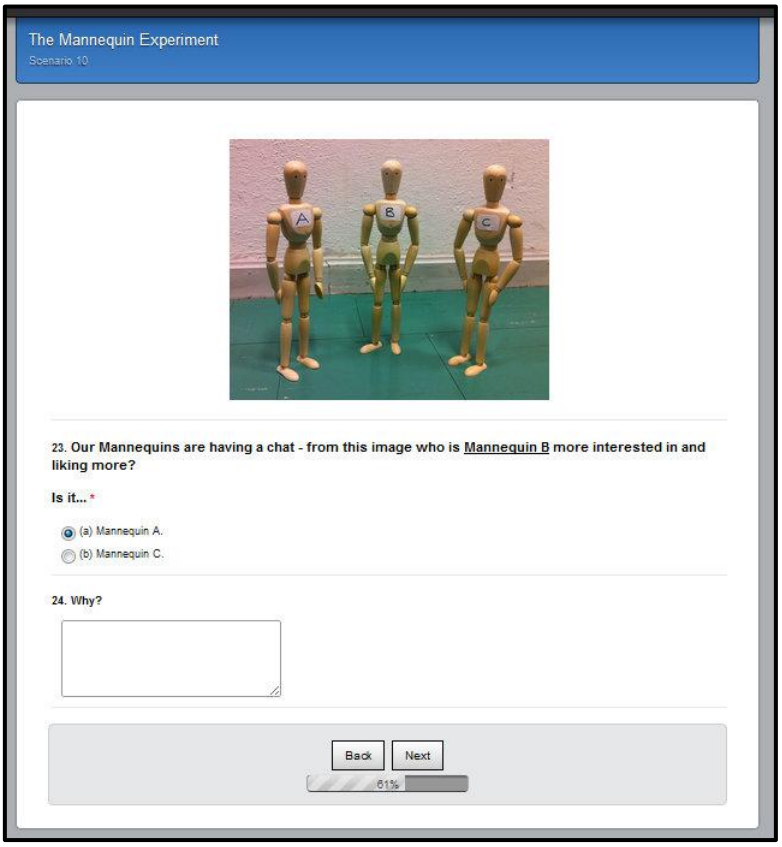

Figure 24: Webpage 12; Scenario 10 / Questions 23 & 24.

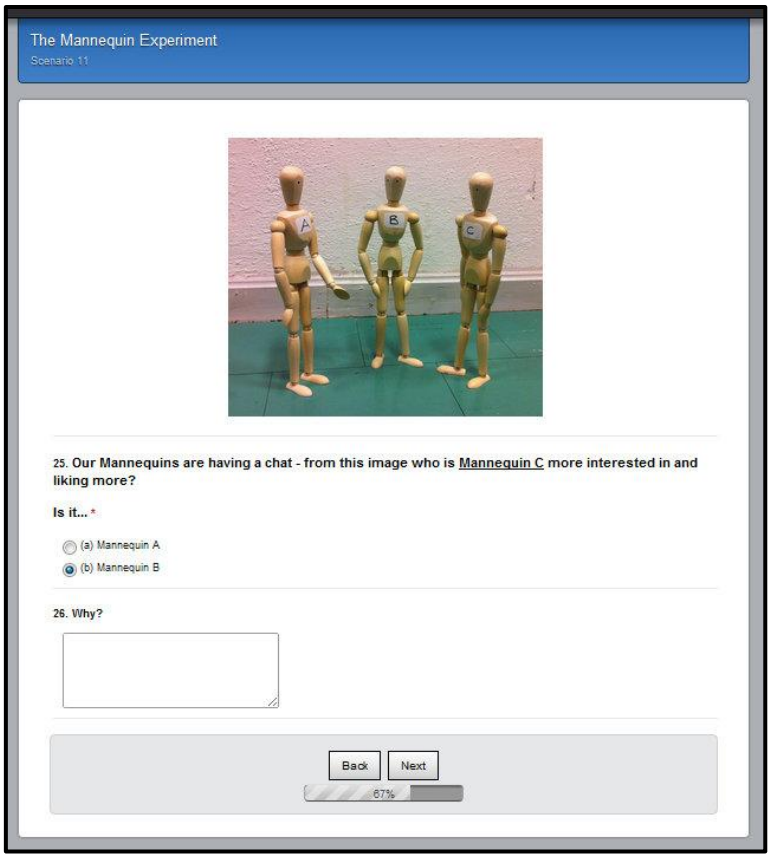

Figure 25: Webpage 13; Scenario 11 / Questions 25 & 26.

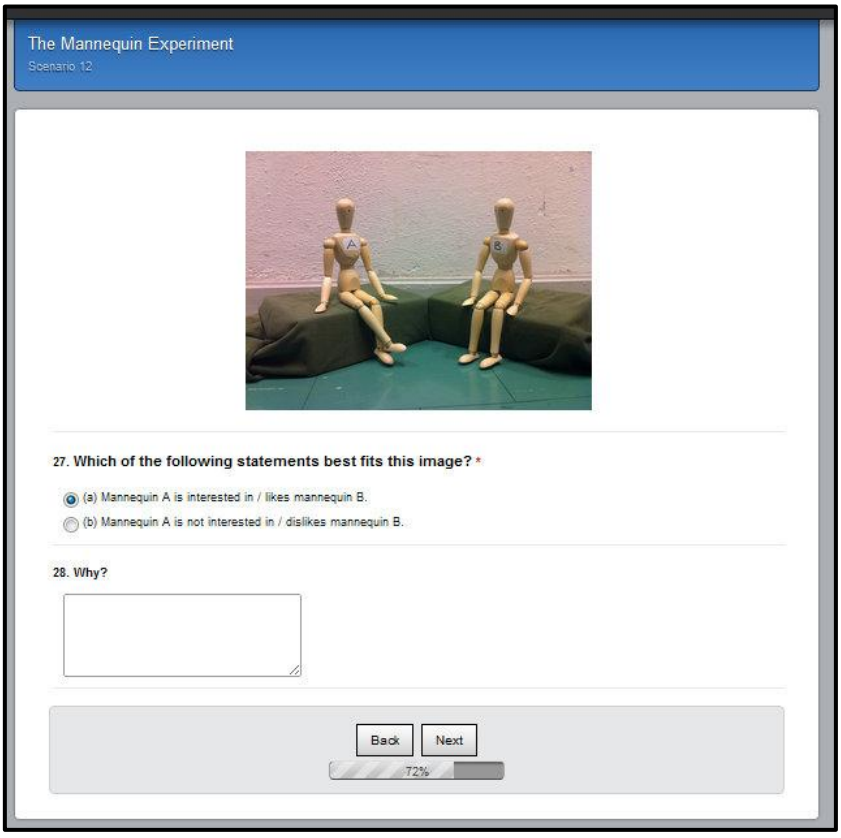

Figure 26: Webpage 14; Scenario 12 / Questions 27 & 28.

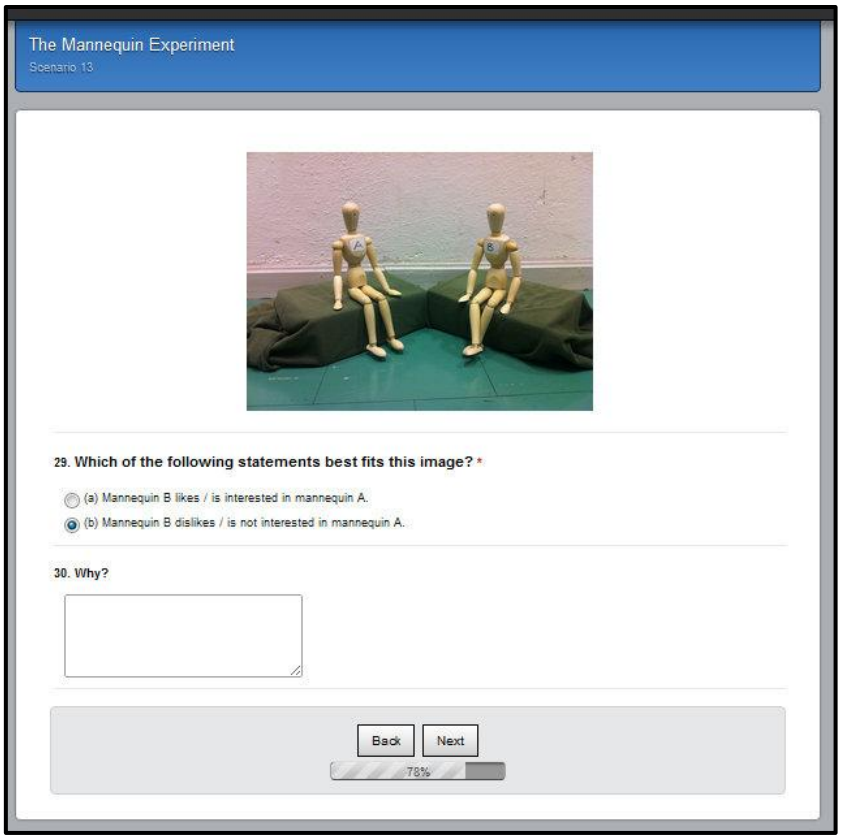

Figure 27: Webpage 15; Scenario 13 / Questions 29 & 30.

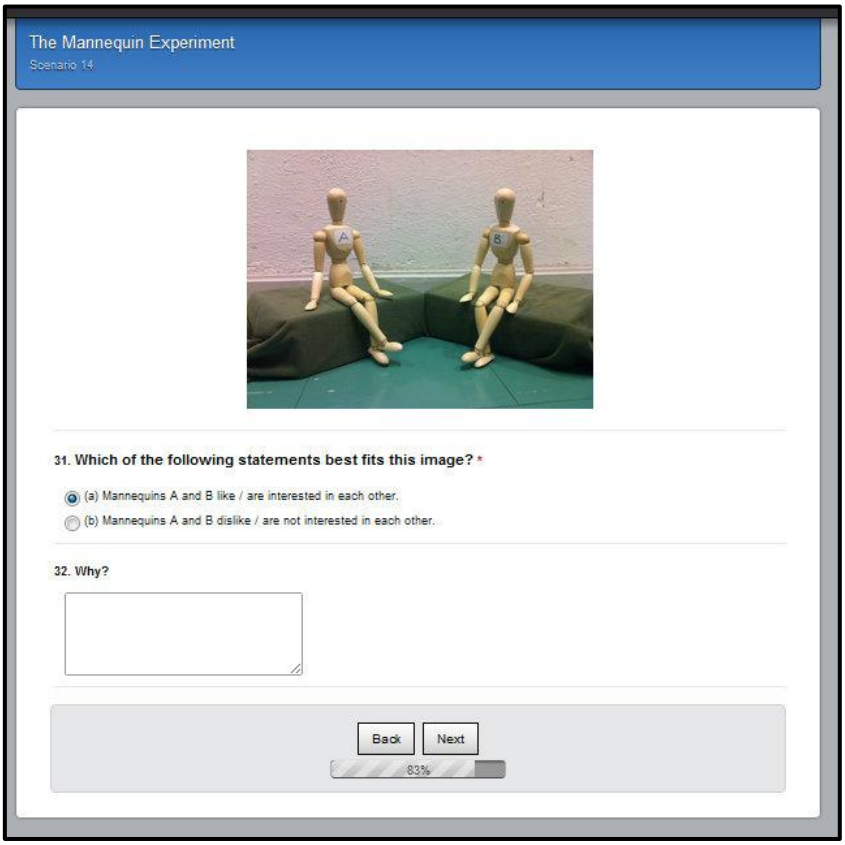

Figure 28: Webpage 16; Scenario 14 / Questions 31 & 32.

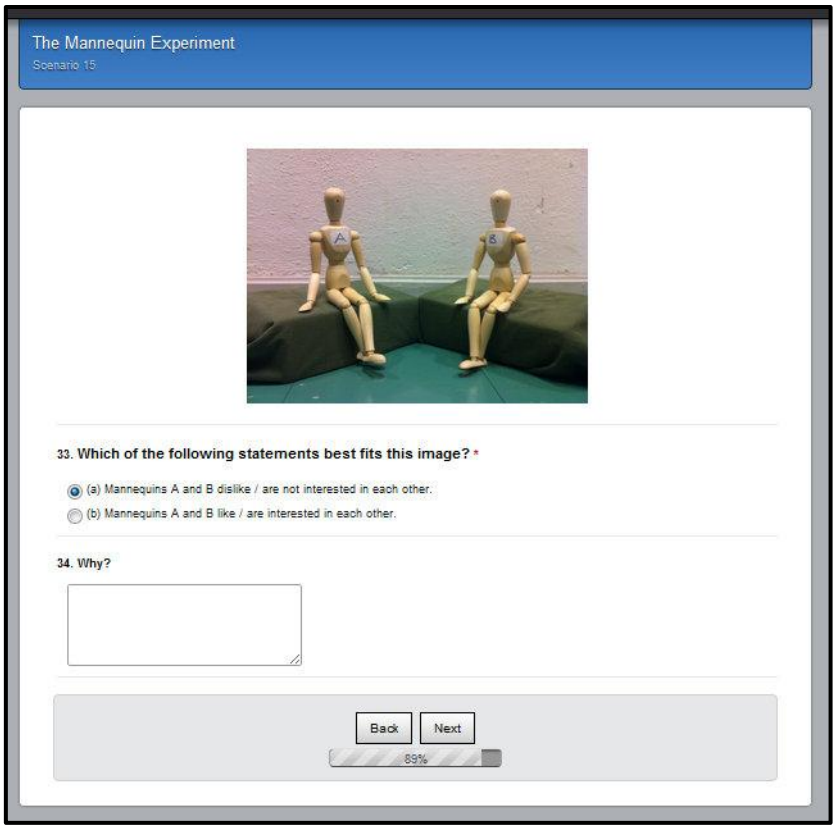

Figure 29: Webpage 17; Scenario 15 / Questions 33 & 34.

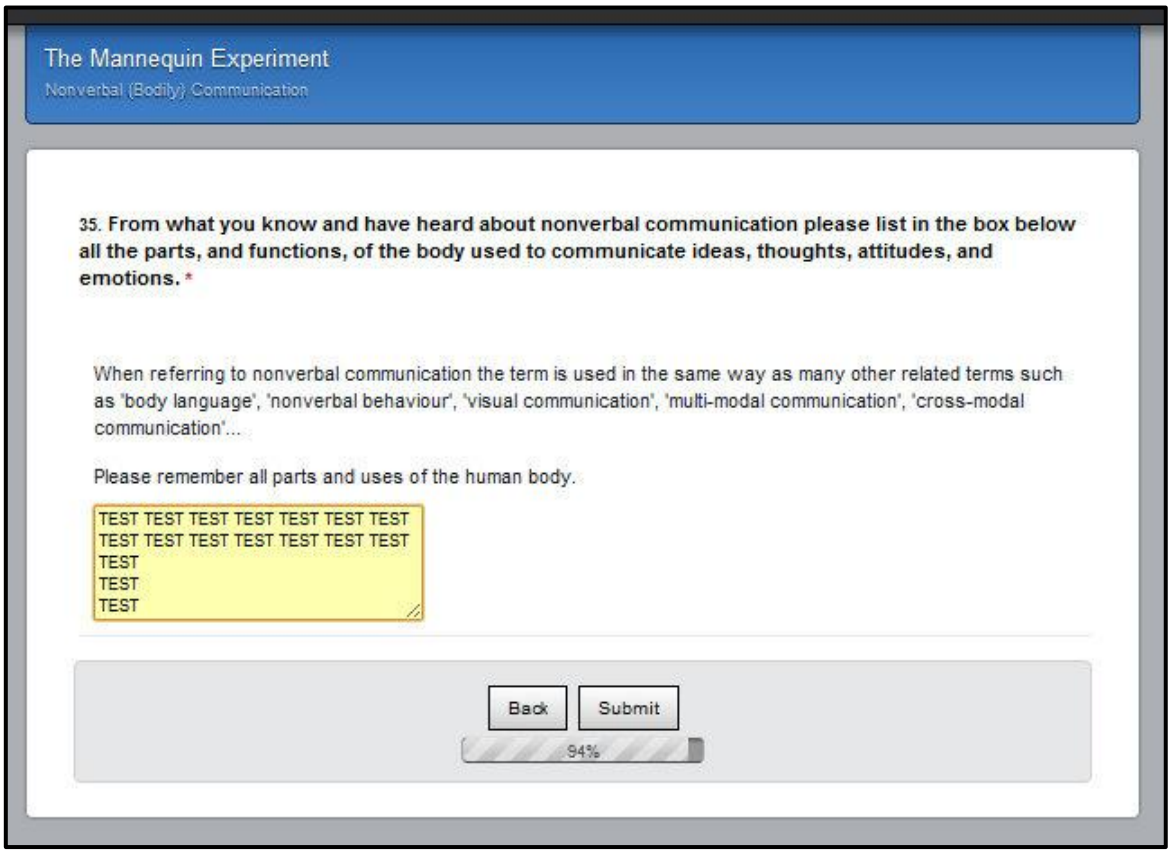

Figure 30: Webpage 18; Question 35, Probing Question.

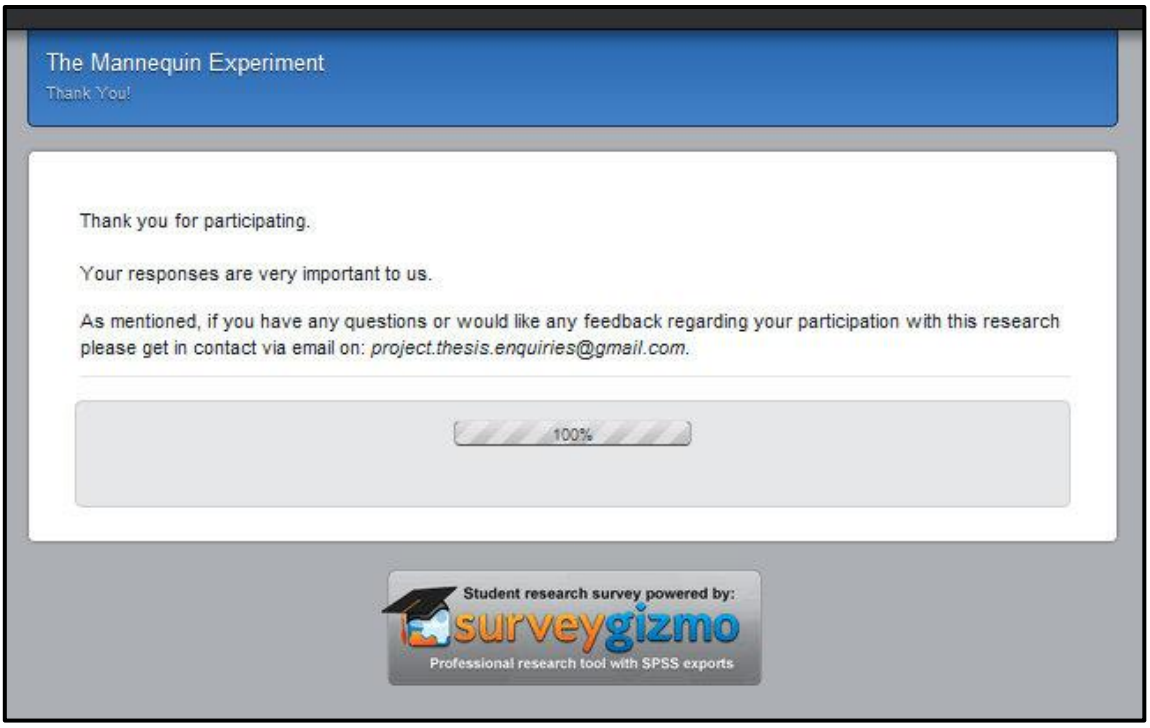

Figure 31: Webpage 19; Thanks &Closing Statement.

Appendix [vi] Raw Data from Participant Attitude Scale Scores and Content Analysis.

Video	Participant	conversation partner is attractive	conversation partner is nice	If asked, I would take a coffee with my conversation partner	I would like to ask my conversation partner out for a coffee	How was the conversation	Individual Attitude Score	Frequency of Change in L/F Position	Negative Foot Pointing	Leg Crossing
1a	1	4	6	3	1	6	20	*	*	*
1b	2	5	6	7	7	6	31	12	55.0	51.0
2a	3	4	6	6	4	5	25	*	*	*
2b	4	1	6	4	2	6	19	38	46.0	258.0
3a	5	4	7	7	1	7	26	*	*	*
3b	6	6	7	6	5	7	31	15	243.0	0.0
4a	7	3	6	1	1	6	17	33	282.0	192.0
4b	8	6	6	6	5	5	28	26	73.0	76.0
5a	9	4	6	1	1	2	14	13	0.0	0.0
5b	10	6	5	4	3	6	24	*	*	*
6a	11	5	6	6	5	7	29	15	147.0	31.0
6b	12	7	7	7	7	7	35	16	0.0	293.0
7a	13	4	7	6	2	5	24	*	*	*
7b	14	4	5	3	2	5	19	*	*	*
8a	15	1	1	1	1	1	5	22	143.0	0.0
8b	16	5	5	4	4	4	22	*	*	*
9a	17	1	3	6	5	7	22	*	*	*
9b	18	6	6	5	3	7	27	*	*	*
10a	19	5	4	6	5	6	26	*	*	*
10b	20	3	5	6	4	6	24	*	*	*
11a	21	6	6	7	5	7	31	18	262.0	0.0
11b	22	4	6	4	1	7	22	*	*	*
12a	23	4	6	2	2	6	20	*	*	*
12b	24	5	6	4	2	6	23	*	*	*
13a	25	6	6	2	2	4	20	*	*	*
13b	26	4	7	2	1	5	19	4	420.0	0.0
14a	27	7	6	7	7	7	34	26	245.0	9.0
14b	28	2	5	1	1	3	12	12	0.0	310.0
15a	29	5	7	6	6	7	31	13	0.0	0.0
15b	30	4	7	7	5	7	23	*	*	*
16a	31	4	7	7	4	7	29	24	98.0	0.0
16b	32	1	7	1	1	6	16	3	0.0	0.0
17a	33	2	7	3	1	7	20	*	*	*
17b	34	4	6	5	2	7	24	*	*	*
18a	35	7	7	1	1	7	23	*	*	*
18b	36	1	7	7	7	7	29	11	113.0	85.0
19a	37	4	6	5	3	6	24	*	*	*
19b	38	4	6	3	3	5	21	22	129.0	0.0
20a	39	1	1	1	1	4	8	45	283.0	139.0
20b	40	6	2	1	1	1	11	6	398.0	0.0

NB. From left to right, columns 3, 4, 5, 6 & 7 represent participant rankings where 1 is the lowest score representing a less favourable attitude to conversation partner (‘dislike’) and 7 is the highest score representing the most favourable attitude to conversation partner (‘liking’). Column 8 is the sum of scores from selected items. Column 9 is no. of times movement occurred and columns 10 and 11 are scaled in seconds.

Appendix [vii] Example of Mannequin used by James' (1932) Study.

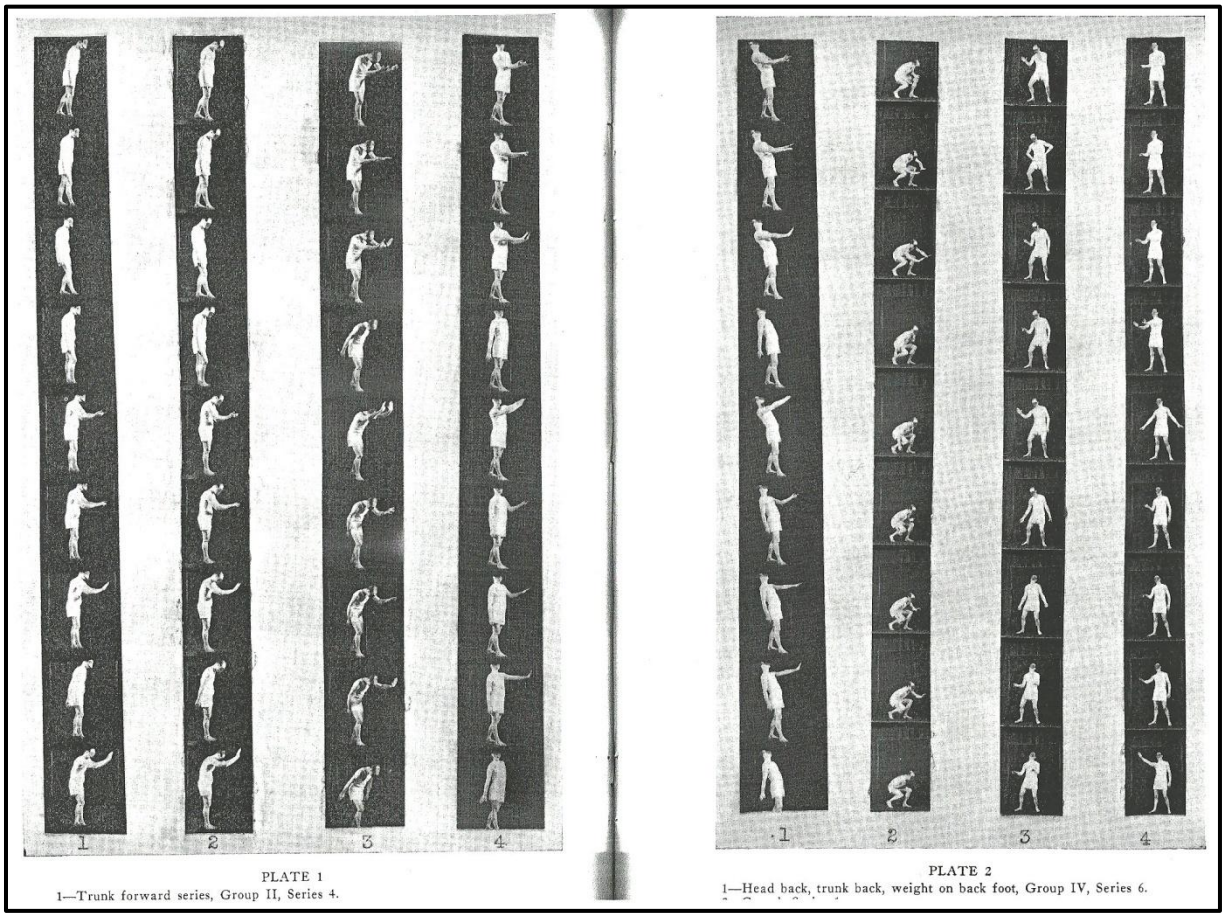

PLATE 1
1—Trunk forward series, Group II, Series 4.

PLATE 2
1—Head back, trunk back, weight on back foot, Group IV, Series 6.