Abstract

Gait is known to have been used as evidence since 1839, initially based on the apocryphal belief that a person can be identified by their gait. The potential uniqueness of gait has yet to be proven, and therefore gait is currently considered to be a contributor to identification rather than a method of identification. In 2013 Birch et al [1] published the findings of an investigation into the ability of individuals with experience in gait analysis to identify people by observing features of gait recorded by closed circuit television cameras. The study showed that the participants made correct decisions in 71% of cases, significantly better than would have been expected to have occurred by chance. However, the presentation of gait evidence is not limited to witnesses with experience in gait analysis. This study compared the abilities and confidence of participants with experience in gait analysis with those of participants with no experience of gait analysis using the methodology of Birch et al 2013 [1]. The results showed no statistically significant difference in the number of correct identification decisions made by the two groups of participants, although the participants with experience of gait analysis made slightly more false negative than false positive decisions, whereas the participants with no experience made more false positive than false negative decisions. The participants with no experience in gait analysis reported significantly more confidence in their decisions than did the participants with experience ($p<0.05$). The results suggest that lay people giving gait based evidence are likely to be more confident in their assertions as to identity based on that evidence, than would a witness with experience of gait analysis. Careful consideration therefore needs to be given to the submission of gait based evidence by lay witnesses.

Introduction

There is an apocryphal belief that an individual can be identified by their gait [2, 3]. Shakespeare wrote in The Tempest, in Act 4, Scene 1: “*Here, Queen of highest state, Great Juno comes; I know her by her gait*.” However, we now understand that without the evidence of knowing how every human being walks we cannot claim that gait is a unique identifier. Gait, and in particular combinations of features of gait, can be highly discriminatory and therefore in the forensic context the gait of a person can contribute to the process of identification [4]. Gait is hard to conceal, and attempts to alter gait intentionally are both temporary and likely to result in a pattern of gait that elicits more attention being drawn to the subject [5].

The first use of gait as evidence currently referenced was the trial of Thomas Jackson at the Old Bailey, London, in 1839, the evidence regarding gait being given by George Cheney who stated that “I know him by his walk” [6, 7]. Since then the use of gait as evidence has steadily grown, particularly during the last 10 years. Along with the increasing use of gait as evidence, there has been a shift from gait evidence being presented by lay witnesses, to gait analysis being presented by expert witnesses. Such witnesses usually have expertise in gait and gait analysis gained in another area of professional practice that is now being applied in the forensic context. There is currently no statutory requirement for training or experience in gait analysis before someone is able to present gait evidence as an expert witness. The development of the Code of practice for forensic gait analysis, which has now completed its public consultation phase in the UK, and is awaiting publication, is seen as the first step in addressing this core issue[1].

According to Nirenberg et al 2018 [7] the use of gait as evidence in criminal trials can perhaps be divided into three broad categories:

i) observational gait analysis, based on research and practice associated with healthcare, in which observations regarding features of gait are made by eye,

ii) measurements from video footage, in which frame by frame analysis of footage is used in conjunction with virtual marker placement do generate linear measurements and angles,

iii) gait as a biometric, the intention of which is to use automated gait analysis systems to identify people based on the way they walk, often in conjunction with their shape.

While automated gait analysis systems have existed in the laboratory for many years, the development of a system that can be reliably applied to the quality and type of footage gained from the CCTV (closed-circuit television) systems currently in use is still to be achieved, as is the uprating of CCTV systems to a level at which their output would be of direct use in conjunction with such a system. Observational gait analysis therefore currently remains the most used form of gait as evidence utilised in criminal trials.

There is a fundamental difference in the paradigm underpinning forensic gait analysis based on observational techniques and the use of gait as a biometric. Gait as a biometric seeks to

[1] Currently available from the Office of the Forensic Science Regulator, UK.

identify a person using information regarding their gait, often in combination with other factors such as silhouette. Forensic gait analysis does not seek to identify a person by their gait. While it may be reasonable to assume that gait, dependant as it is on a complex combination of intrinsic anatomical and physiological factors, is unique, we do not have anything like the amount of data to substantiate such a claim. Even if we did, the information regarding gait that is recoverable from the type and quality of footage that is submitted for use in forensic gait analysis is far less than that required to capitalize on the uniqueness of gait. Forensic gait analysis looks for similarities and differences in features of gait and combinations of features of gait, which support or refute opposing propositions of identity. Forensic gait analysis cannot result in identification, nor does it seek to do so.

The criticisms levelled at the use of gait analysis as evidence [8-11] have largely been based on two factors; the lack of published peer reviewed evidence relating to various aspects of its use, and the lack of standardized processes and procedures. The peer reviewed research base continues to grow, informed and directed by case based professional practice. A tool to assist a standardised approach being taken to gait analysis in the forensic context has now been developed and published [12], and the Code of practice for forensic gait analysis is awaiting publication. The document sets out clear standards and processes for the use of observational gait analysis as evidence, which align closely with those already published for other areas of forensic science practice. Central to the document is the further development of the evidence base for the use of gait as evidence.

Birch et al 2013 [1] investigated the ability of individuals with experience in gait analysis to identify people by observing features of gait recorded by CCTV. Seven analysts were each asked to view five sets of footage, each of which showed a target walker and five suspect walkers. The analysts were asked to determine which, if any, of the suspect walkers was the target walker. The results showed an overall correct identification rate of 71%, with a 79% correct identification rate when the target walker and the suspect walker were recorded from the same camera angle. The results of Birch et al 2013 showed a somewhat higher rate of correct identification than did the early work of Stevenage et al 1999 [1, 13]. Stevenage et al showed that participants without experience of undertaking gait analysis could correctly identify walkers by their gait on 50% of occasions, a significantly higher rate of correct identification ($p<0.0005$) than would have been expected to have occurred by chance [13]. On the basis of these two sets of results Birch et al suggested that those with a background in gait analysis would perform better than those without a background in gait analysis in terms of identifying individuals on the basis of their gait [1]. However, there were significant differences in the methodologies used by the two groups of researchers. Birch et al used five suspect walkers, all or none of which could have been the suspect walker, while Stevenage et al used six suspect walkers, one of which was always the target walker. Stevenage et al asked the participants to rate how confident they were in their decision using a five point scale, while Birch et al did not. Stevenage et al used two lighting conditions for the target walker footage, while the lighting conditions were constant in the Birch et al experiment [1, 13].

This study sought to answer two questions:

I. Is there a difference in the ability of individuals with experience in gait analysis and individuals with no experience in gait analysis to identify people by observing their gait recorded by closed circuit television cameras?

II. Is there a difference in the confidence of individuals with experience in gait analysis and the confidence of individuals with no experience in gait analysis in their identification of people made by observing their gait recorded by closed circuit television cameras?

Method

The study was approved by both the Research Ethics Committee of the School of Health Sciences, University of Brighton, and the University Ethics Committee of the University of Strathclyde. The methodology used was based on that used by Birch et al 2013.

Eleven participants with training and experience in gait analysis were recruited to the study through a combination of professional bodies, professional social media, emails to professional practices, and professional networks. All participants were employed as Podiatrists, Chiropractors, Chiropodists, Gait Specialists, or Forensic Gait Analysts and were located in the UK, Ireland, Iceland and Canada. All participants had a minimum of university level training in observational gait analysis. Ten of the eleven participants used observational gait analysis as a regular part of their professional practice, the remaining one participant used their gait analysis training to underpin their professional practice, but at the time of data collection was not using observation gait analysis in their professional practice.

Twenty participants with no experience in gait analysis or forensic science practice were recruited to the study from the general public, in accordance with the research ethics guidance and requirements of University of Brighton and University of Strathclyde. In all cases it was the prospective participant that made initial contact with the research team. These participants were resident in the UK, Ireland, and Iceland. All participants were considered to be proficient in reading and writing English, based on their written application to join the study and the completed study documentation submitted prior to data collection, were able to understand the nature of the study and its purpose, were able to use a computer and Power Point presentation, and signed a participation consent form.

Video footage created for the Birch et al 2013 investigation was used for this study. Birch et al 2013 [1] recruited 13 participants (eight females, five males), matched for height and build, from a podiatry undergraduate course to act as "walkers" for CCTV footage. The thirteen walkers had no obvious pathological gait (including injury or use of a walking aid) and were recorded on three CCTV cameras, which captured the walkers in the frontal plane, the sagittal plane, and from an oblique angle, while walking along a 15 metre walkway in their normal manner. The walkers wore identical clothing (black loose bottoms, a black hooded sweatshirt, a black balaclava, and black socks and gloves) to conceal their identities, facial features and body contours. A total of 18 clips, each comprising of four seconds worth of footage, were selected for each walker, three from each recording angle and direction, providing a total of 234 clips (figure 1). Five clips were randomly selected to become the 'target walker'. Twenty five additional clips were randomly selected to represent the 'suspect walkers', five for each target. The selected clips were then formatted to AVI files in order to remove the time and date information, and the files embedded in a Microsoft PowerPoint presentation. Each slide of the presentation provided the viewer with a 'target walker' and five 'suspect walkers'. When being viewed, each clip was set to play in full screen mode.

Each participant in this study was given a choice of receiving the Power Point presentation and accompanying documentation through a Dropbox link, by email or by a package in the mail containing a DVD with the Power Point presentation, together with hard copies of the participation information sheet, consent form and data recording sheets. The return postage was prepaid in order alleviate any inconvenience to the participant.

On playing the PowerPoint presentation the participants were shown a short series of instructional slides, followed by the five slides each of which showed a target walker and five suspect walkers. For each of the five sets of footage the participants were asked if any of the five ‘suspect walkers’ were a match for the ‘target walker’. The participants were asked to record their decision on a data recording sheet (figure 2). The data recording sheet showed, for each set of footage, an eleven point scale, based on the European Network of Forensic Science Institutes 2015 Guideline for Evaluative Reporting in Forensic Science [14], on which their decision was to be recorded. The two ends of the scale were labelled with opposing propositions, to the left ‘the suspect walker is not the target walker’ and to the right ‘the suspect walker is the target walker’. The centre point on the scale was labelled ‘no confidence’, with five levels of increasing confidence on either side (limited, moderate, moderately strong, strong, very strong). Using this scale the participant recorded both their decision as to a match and their confidence in that decision. The participants were allowed to view the footage as often and for as long as they required to make a decision.

As in the Birch et al 2013 study [1], the results from the data recording sheets were entered into a Microsoft Excel spreadsheet. One mark was given for each correct decision while no mark (0) was given for incorrect decisions or a decision of no confidence. The scores were totalled for each analyst as well as for all analysts in each group. The level of confidence in decision was also entered into the Microsoft Excel spreadsheet.

Results

All 11 of the recruited participants with experience in gait analysis completed the study, together with 19 of the 20 participants recruited with no experience of gait analysis. Table 1 shows the number of correct decisions made by the participants. The participants with experience in gait analysis made correct decisions as to whether or not the “suspect walker” was a match for the “target walker” on 197 out of 275 occasions (71.64%), the mean individual score being 17.91 out of 25, with a standard deviation of 4.68. The participants with no experience in gait analysis made correct decisions as to whether or not the “suspect walker” was a match for the “target walker” on 306 out of 475 occasions (64.42%), the mean individual score being 16.11, with a standard deviation of 3.89. A two-sample unequal heteroscedastic t test showed there to be no significant difference between the number of correct decisions made by the participants with experience in gait analysis and those with no experience in gait analysis ($p=0.29$).

Table 2 shows the occurrence of false positive and false negative identifications made by the participants. The participants with experience in gait analysis made false positive decisions on a total of 38 occasions (13.81%) and false negative decisions on 40 occasions (14.54%). The participants with no experience in gait analysis made false positive decisions on a total of 95 occasions (20.00%) and false negative decisions on 74 occasions (15.58%). A paired t test showed there to be no significant difference between the number of false positive and false negative identifications made by either the participants with experience in gait analysis or those with no experience in gait analysis. A two-sample unequal heteroscedastic t test showed there to be no significant difference between either the number of false positive or the number of false negative identifications made by the participants with experience in gait analysis and the participants with no experience in gait analysis.

Table 3 shows the participant reported confidence in their decisions. The participants with experience in gait analysis reported an average confidence in their decisions score of 2.41 out of a maximum possible score of 5 (Std=1.36), while the non-experienced analysts reported a mean score of 3.29 (Std=1.39). A paired t test showed a statistically significant difference ($p<0.05$) between the mean individual confidence scores for the correct and incorrect decisions for both the participants with experience in gait analysis and the participants with no experience in gait analysis, the reported confidence in the correct decisions being greater than the reported confidence in the incorrect decisions in both instances. A two-sample unequal heteroscedastic t test showed there to be statistically significant differences ($p<0.05$) between the mean individual scores for overall confidence, in correct decisions and in incorrect decisions between the participants with experience in gait analysis and the participants with no experience in gait analysis, the participants with no experience in gait analysis reporting greater confidence in their decisions in all three cases.

Table 4 shows the results of an analysis of the relationships between the participant decisions and the reported confidence in those scores using the Pearson product moment correlation coefficient. Using Cohen's convention for the significance of the product moment [15], the results show a large positive correlation ($r>0.50$) between the number of correct decisions and the reported confidence in those decisions by the participants with experience in gait analysis, and a medium positive correlation (r>0.30 but <0.50) between the number of correct decisions and the reported confidence in those decisions by the participants with no experience in gait analysis. The results also show a small negative correlation (r<-0.1 but >-0.3) between the number of incorrect decisions and the confidence in those decisions by the participants with experience in gait analysis, and a large negative correlation (r<-0.5) between the number of incorrect decisions and the reported confidence in those decisions by the participants with no experience in gait analysis.

Table 5 shows the number of correct decisions made for each of the recording angles of the suspects. The number of correct decisions made by the participants with experience of gait analysis can be seen to vary between the five camera angles (max=86.36%, min=67.27%, range=19.09), the frontal anterior angle yielding the highest score of 43/55 (78.18%) and the frontal posterior angle yielding the lowest score of 37/55 (67.27%). In cases where the target and suspect were recorded from the same angle the number of correct decisions made by the participants with experience of gait analysis was 38/44 (86.26%), which was somewhat greater than the score of 159/210 (75.71%) in the cases where the target and suspect were recorded from different angles. The number of correct decisions made by the participants with no experience of gait analysis also varied to a similar degree, although the maximum and minimum scores were lower (max=72.63, min=54.74, range=17.89). However, unlike the scores of the participants with experience of gait analysis there was little difference in the scores between the cases where the target and suspect were recorded from the same, 48/76 (63.16%), and different, 258/399 (64.66%) angles.

Discussion

This study sought to answer two questions:

I. Is there a difference in the ability of individuals with experience in gait analysis and individuals with no experience in gait analysis to identify people by observing their gait recorded by closed circuit television cameras?

II. Is there a difference in the confidence of individuals with experience in gait analysis and the confidence of individuals with no experience in gait analysis in their identification of people made by observing their gait recorded by closed circuit television cameras?

The results suggest that there is no statistically significant difference in ability of individuals with experience in gait analysis and individuals with no experience in gait analysis to identify people by observing their gait recorded by closed circuit television cameras. The participants with experience in gait analysis did make proportionally more correct decision than those with no experience, 71.64% compared to 64.42% respectively, but not to a statistically significant degree. The results support the notion that individuals are capable of identifying people by their gait, a notion also supported by the work of Cutting and Kozlowski 1977, Stevenage et al 1999, Larsen et al 2008, and Birch et al 2013 [1, 13, 16, 17]. The results produced by the individuals with experience in gait analysis align closely with those of the Birch et al 2013 study, which used a different group of individuals with experience in gait analysis who made correct decisions in 70.86% of cases. On the basis of these overall findings it would seem to make little difference whether or not the contribution to identification made on the basis of gait, is made by a lay person or an expert witness. The term lay person is used here to describe a person with no expert knowledge of human gait. However, a more detailed consideration of the results shows some important differences in the performance of the two groups of participants.

The participants with experience of gait analysis made 78 out of 275 (28.36%) incorrect decisions, 38 (48.71%) of which were false positive identifications, and 40 (51.28%) of which were false negative identifications, a relatively even division of erroneous decisions between false positive and false negative, showing 2.57% more false negative than false positive identifications. The participants with no experience in gait analysis made 169 out of 475 (35.58%) incorrect decisions, 95 (56.21%) of which were false positive identifications, and 74 (43.79%) of which were false negative identifications. In this case there were 12.42% more false positive than false negative identifications. Although not statistically significant, participants with no experience in gait analysis showed a greater tendency to identify the suspect walker as being the target walker when they were not, than did the participants with experience in gait analysis.

The reported confidence of the participants in their decisions also shows differences between the two groups. Both groups reported significantly more confidence in their correct decisions than they did in their incorrect decisions ($p<0.05$), a finding supported by the findings of Stevenage et al 1999 [13]. However, the participants with no experience in gait analysis reported significantly more confidence in their decisions than did the participants with experience ($p<0.05$). This was the case for both correct and incorrect decisions ($p<0.05$). This would suggest that a lay person giving gait based evidence is likely to be more confident in their conclusions drawn from the available evidence than would an experienced gait analyst. An important part of presenting gait based evidence is the identification of the limitations of the evidence, and the likely impact of those limitations on the probative value that can be assigned to the evidence. It is the responsibility of the gait analysis witness to draw to the court's attention to the need to attenuate the probative value of the gait evidence because of such limitations.

Such limitations can be related to the technical quality of any footage used during the gait analysis, intrinsic factors associated with the subject shown in the footage such as pathology or emotion, or extrinsic factors such as the possible effects of walking across, up or down inclines, or the effects of accompanying people on the line of progression, speed or cadence of the subject [18-23]. Of particular significance is an understanding of the fact that features of gait are class level characteristics, not unique identifiers. When a lay person's attention is drawn to a particular feature of gait for the first time there is very naturally a tendency to assume that the feature is unusual. When the same feature is seen to be exhibited by the subject seen in two pieces of footage, there is therefore a tendency to conclude that it is the same person. A person with experience in gait analysis would, while making the comparison, take into account the fact that the feature of gait observed may be more or less common in the population, affecting the confidence that could be placed in any conclusions drawn. A lay person giving gait based evidence may have little or no understanding of either the importance of the prevalence of features of gait in a population or the impact of intrinsic and extrinsic factors on the gait of the subject seen in the footage. This lack of knowledge and understanding of the complexity of making gait based comparisons also gives rise to the possibility that the significantly greater confidence of the participants without experience of gait analysis could also be in part due to the Dunning-Kruger effect. The Dunning-Kruger effect suggests that people who lack skill or knowledge overestimate their expertise and talent, and think that they are performing well when they are in fact performing poorly [24, 25]. Having said that, on the basis of the Pearson product moment correlation coefficients, both groups showed a tendency, although to different degrees, for a positive correlation between the number of correct decisions and the level of confidence, and a negative correlation between the number of incorrect decisions and the level of confidence. High numbers of correct decisions were therefore associated with high levels of confidence, while high numbers of incorrect decisions were associated with low levels of confidence.

With regard to the number of correct decisions made for each of the five recording angles, overall the data suggests the beneficial effect on the number of correct decisions of having the two pieces of footage from which gait is being compared taken from the same recording angle. This result is in accordance with the findings of Birch et al 2013 [1]. However, more detailed analysis of the data shows that this overall finding is due to the participants with experience of gait analysis who made correct decisions on 86.36% of occasions where the recording angle of the target and the suspect were the same, as opposed to 63.16% achieved by the participants without experience. In terms of single recording angles, the participants with experience of gait analysis achieved their highest proportion of correct decisions, 78.18%, when the suspect was recorded from a frontal anterior angle. The participants with no experience of gait analysis achieved their highest proportion of correct decisions, 72.63%, when the suspect was recorded from an oblique posterior angle. The Birch et al 2013 study, both participant groups in this study, and the overall recording angle data from this study all showed that the fewest number of correct decisions were made when the suspect was recorded from a frontal posterior angle, that is directly from behind, 65%, 67.27%, 54.74% and 59.33% respectively. Troje et al 2005 showed that the greatest number of correct identifications was achieved from fontal and profile views, the fewest number from an oblique view [26]. Jokisch et al 2006 suggested that ‘frontal or half-profile view’ allowed the more efficient extraction of individual features of gait, the profile view yielding the fewest number of correct identifications of other people. In both of these papers the identification was being undertaken using three dimensional motion data, rather than video [27]. Larsen et al 2008 reported that, based on their work, a camera placed in a ‘frontal view’ allowed most features to be examined, although it is unclear from the paper whether or not a ‘frontal view’ meant an anterior and posterior frontal plane view, or just anterior [17]. None of these papers offers an explanation of why the frontal posterior angle yielded the fewest number of correct decisions in this study. As this was also found in the Birch et al 2013 study, which used the same methodology, it is possible that the root of the finding lies in the methodology [1]. The clips used were selected at random from the pool of a 234 clips, resulting in the use of an uneven distribution of clips recorded from each angle. Table 6 shows the frequency of use of the five recording angles in the various combinations for the target and the suspect. Although the frontal posterior angle was not used on any occasion for both the target and the suspect together, nor were the oblique posterior and the sagittal angles. The possible cause of this finding remains unclear and warrants further investigation.

The results were derived from a relatively small sample of participants, and the use of a larger sample may have improved the precision of the findings. Further studies using other samples taken from the same populations, and samples taken from populations with different characteristics, might also provide valuable data.

Conclusion

The results of the study suggest that there is no statistically significant difference in the ability of individuals with experience in gait analysis and individuals with no experience in gait analysis to identify people by observing their gait recorded by closed circuit television cameras. The findings of this study with regard to the experienced group of participants also support the earlier findings of Birch et al 2013 [1]. The results also showed that both groups of participants reported significantly more confidence in their correct decisions than in their incorrect decisions ($p<0.05$), but that participants with no experience in gait analysis reported significantly more confidence in their decisions than did the participants with experience ($p<0.05$), for both correct and incorrect decisions.

The results suggest that lay people giving gait based evidence are likely to be more confident in their assertions as to identity based on that evidence, than would a witness with experience of gait analysis. Careful consideration therefore needs to be given to the submission of gait based evidence by lay witnesses.

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Figure 2: data recording sheet

		very strong confidence	strong confidence	moderately strong confidence	moderate confidence	limited confidence	no confidence	limited confidence	moderate confidence	moderately strong confidence	strong confidence	very strong confidence	
Suspect 1	the suspect walker is not the target walker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	the suspect walker is the target walker
Suspect 2	the suspect walker is not the target walker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	the suspect walker is the target walker
Suspect 3	the suspect walker is not the target walker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	the suspect walker is the target walker
Suspect 4	the suspect walker is not the target walker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	the suspect walker is the target walker
Suspect 5	the suspect walker is not the target walker	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	the suspect walker is the target walker

Figure 1: process of footage capture and selection

footage capture	13 participants recorded in frontal and sagittal planes, and from an oblique angle, while walking
clip selection 1	18 clips of footage selected for each walker: 3 x frontal plane front 3 x frontal plane rear 3 x sagittal plane right 3 x sagittal plane left 3 x oblique front left 3 x oblique rear right 13 walkers x 18 clips = 234 clips
clip selection 2	5 clips randomly selected to be the ‘target walker’ 25 clips randomly selected to be the ‘suspect walkers’
Power Point	5 slides each showing: 1 x ‘target walker’ 5 x ‘suspect walkers’

Table 1: Number of correct decisions made by the participants.

	participants with experience in gait analysis	participants with no experience in gait analysis	unpaired t test
total number of correct decisions	197/275 (71.64%)	306/475 (64.42%)	p=0.29
mean individual score (out of 25)	17.91 (std=4.68)	16.11 (std=3.89)	

Table 2: Occurrence of False Positive and False Negative identifications

	false positive identifications	false negative identifications	paired t test
participants with experience in gait analysis	38 (13.81%)	40 (14.55%)	p=0.90
participants with no experience in gait analysis	95 (20.00%)	74 (15.58)	p=0.16
unpaired t test	p=0.27	p=0.77	

Table 3: Participant reported confidence in their decisions.

	mean confidence	mean confidence in correct decisions	mean confidence in incorrect decisions	paired t test (mean individual scores)
participants with experience in gait analysis	2.41	2.59	1.80	p=0.015
participants with no experience in gait analysis	3.29	3.51	3.01	p=0.006
unpaired t test (mean individual scores)	p=0.0007	p=0.0094	p=0.017	

Table 4: Pearson product moment correlation coefficients for reported confidence in correct and incorrect decisions.

	Pearson Correlation Coefficient confidence and correct decisions	Pearson Correlation Coefficient confidence and incorrect decisions
participants with experience in gait analysis	0.57	-0.17
participants with no experience in gait analysis	0.45	-0.57

Table 5: Correct decisions made by the participants for each of the five recording angles of the suspects.

	participants with experience in gait analysis		participants with no experience in gait analysis		total	
recording angle	correct decisions	% correct decisions	correct decisions	% correct decisions	correct decisions	% correct decisions
frontal anterior	43/55	78.18	59/95	62.11	102/150	68.00
frontal posterior	37/55	67.27	52/95	54.74	89/150	59.33
oblique anterior	49/66	74.24	76/114	66.67	125/180	69.44
oblique posterior	38/55	69.09	69/95	72.63	107/150	71.33
sagittal	30/44	68.18	50/76	65.79	79/120	65.83
same as target	38/44	86.36	48/76	63.16	86/120	71.67
different from target	159/210	68.83	258/399	64.66	416/609	66.03

Table 6: Frequency of use of the five recording angles.

recording angle	frequency for target	frequency for suspect	frequency for target and suspect	frequency for target not suspect	frequency for suspect not target
frontal anterior	2	5	2	8	3
frontal posterior	1	5	0	5	5
oblique anterior	2	6	2	8	4
oblique posterior	0	5	0	0	5
sagittal	0	4	0	0	4