The influence of body language and expected competency on gaze behaviour while forming an impression of a tennis player.

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Abstract

Cues conveyed by an athlete's appearance and reputational information provided prior to an encounter have independently been shown to influence the impression perceivers form of others. Underpinning this process, it is not known how a target's a) body language, b) gender or c) reputation may influence where a perceiver fixates their gaze when an individual comes in to view. Participants (N=106) randomly observed a male or female tennis player appearing on a monitor displaying positive or negative body language having been provided with that player's recent win/loss record. Eye tracking recorded gaze behaviour in the first 5 secs after the player came in to view. After segmentation of the player in to six areas of interest, MANCOVA at $p<.05$ showed a clear preference for perceivers to direct their gaze towards the player's head region. Body language and player gender influenced distribution of gaze per region of interest but this was largely unaffected by reputational information. This work indicates that the head region accounts for the largest proportion of gaze when individuals form judgements of opponents in a tennis setting. The balance of where observers look when forming these judgments is influenced by the gender of the player being observed and the body language being displayed.

Keywords: judgements; social perception; eye tracking

Introduction

Cues present in a person's appearance provide early information on which judgements about that individual can be made (Pendry & Macrae, 1996). In this light, Asch's (1946) Gestalt approach and Anderson's (1981) piecemeal integration model both describe the process by which a perceiver integrates information conveyed by an individual when forming an overall judgement of that person. Whether cues are assimilated and considered as a whole (Asch) or systematically integrated (Anderson) marks a theoretical divergence, however, both approaches advocate for the central role that detection of cues plays in influencing the judgements we make of others.

At the point an individual is encountered, immediately observable visual cues serve as the dominant source of information upon which impressions are formed (Olson, Roese, & Zanna, 1996). More specifically, Aronson, Wilson, and Akert (1994) propose that a person's posture, facial expression and gaze provide highly salient information central to the process of forming an impression. Previous research has shown that when instructed to form judgements of others, perceiver's predominantly direct gaze towards a target's head over other areas of interest (AOI's), i.e., waist, legs and chest (Melnyk, McCord, & Vaske, 2014; Gervais, Holland, & Dodd, 2013). Thelwell, Page, Lush, Greenlees and Manley (2013) provided the first investigation in a sports setting to record participant gaze when forming judgements of a coach. Thelwell et al. (2013) presented undergraduate students with a video of a strength and conditioning coach demonstrating a standardised set of exercises in one of three reputational conditions. Using eye tracking technology, Thelwell et al. recorded the extent to which a participant gazed at the coach whilst the individual was providing verbal instruction. Prior to viewing footage of the coach the participants were presented with text indicating that the coach was either 'in training', a 'professional' or that there was 'no information available'. This work showed no differences among the conditions in the total time spent looking at the coach but participants looked more frequently at the coach 'in training'. This preliminary work serves to demonstrate that reputational information moderates gaze when forming judgements of others in sport settings. However, Thelwell et al.'s work did not record which areas of the coach the participant fixated on thus it remains unknown where athletes direct their gaze in the process of forming a judgement of a competitor.

Target status (conveyed through manipulation of dominant or submissive body language) and gender have been shown to be two further factors that moderate gaze behavior when forming judgements of others. For example, DeWall and Maner (2008) found that high status (open, expansive) individuals received more total time in fixation than low status (contractive, closed) counter-parts. Similarly, Holland, Wolf, Looser and Cuddy (2016) showed a higher proportion of fixations and total time on the head area when observing a target displaying high status as opposed to low status non-verbal body gestures. Although the proclivity to attend to the head was hypothesized, Holland et al.'s result did not reach statistical significance which the author's account for in two ways; 1) the artificial nature of forming judgements based on photos, and 2) the target did not look directly at the camera thus undermining the positive, high status condition. In a similar vein, research in sport has repeatedly shown body language to provide diagnostic cues informing the judgements we make of opponents (Rimmer, Greenlees, Graydon, Thelwell, & Buscombe, 2008). Work with participants from various sporting domains has subsequently served to confirm the status of body language as a primary factor influencing the judgements athletes make of others (e.g., Lubker, Visek, Geer, & Watson II, 2008; Furley, Dicks, & Memmert, 2012).

As part of their impression formation continuum model, Fiske, Lin and Neuberg (1999) proposed that the sex of the target provides diagnostic information that either directly informs, or moderates, the way that other person cues are interpreted when we encounter a novel person. Evidence in support of this proposition was provided by Wun-Man and Hills (2016) who found that participants fixated for longer on female as opposed to male faces. This result serves to extend DeWall and Maner's (2008) earlier work which demonstrated a similar gender main effect qualified by an interaction that saw high status male, but not female targets make more fixations when compared to their low status counterparts. Taken together this body of work indicates that when forming judgements of others we observe a preference for gaze to be directed towards the head, for gaze to the head to reduce in situations when the target projects dominant non-verbal body language and for gaze duration to increase when observing female as opposed to male targets.

Upon encountering a target person, a perceiver is afforded a large amount of person cues that could be selected and processed, however, an individual has been seen to ostensibly search for information that confirms their prior held expectation for that person (Miller & Turnbull, 1986). If congruence is achieved resources are immediately withdrawn resulting in a range of cognitive,

affective and behavioural concequences that serve to influence the interaction between the observer and target going forwards (Olson, Roese, & Zanna, 1996). When target information is perceived to be incongruent with one's expectation more effortful processing ensues with increased attention devoted to the target as the perceiver attempts to resolve the discrepancy between expectation and current perception (Fiske & Neuberg, 1990). The sports literature is currently bereft of information describing the impact that reputation, body language and gender collectively have on where a perceiver looks, and for how long, whilst forming a judgement of a sports competitor. The findings of Seiler, Schweizer and Seiler (2018) do however show that non-verbal behavior (dominant vs submissive) and performance related information (objective performance rating) both independently influence perception of team confidence when these sources are delivered in tandem. Seiler et al. (2018) concluded, "people do not rely on one single cue when forming their impression of others, but on several available perception-relevant criteria" (p.36). .

Inherent in sport is the observation of one's opponent pre-match either during a warm-up or in the moments leading up to a contest and this occurs against a backdrop of knowing that individual's ranking, playing record, recent form or reputation. It would appear therefore that the course and outcome of sporting encounters, like wider social interactions, may be influenced by the early judgements athletes make of their opponent. Research to date in the area of impression formation in sport has reported participant judgements via Likert based scales (Greenlees, Bradley, Holder, & Thelwell, 2005; Manley, Greenlees, Graydon, Thelwell, Filby, & Smith, 2008) or employed qualitative designs to unearth the sources of information perceiver's use when forming judgements of others (Rimmer, Greenlees, Graydon, Thelwell, & Buscombe, 2008). There is currently no evidence that describes where a perceiver fixates their gaze when forming judgements of sports performers. Furthermore, although evidence indicates that prior held information (reputation), target gender and body language influence the judgements formed of others we do not know how these potential moderators interact to influence gaze behavior when observing an opponent in sport.

The over-arching objective of this study was to elucidate where an observer's gaze is directed in the instance immediately following exposure to a tennis player. It was hypothesized that participants would fixate more on the head region than the other AOI's when observing a hypothetical opponent but this result would be qualified such that fewer fixations and for less total time on the head would occur in the positive as opposed to the negative body language

condition. It was hypothesized that there would be more fixations and for a longer duration when observing female targets as opposed to males. It was also hypothesized that reputational information received prior to encountering a target player will interact with body language condition. More specifically, it is hypothesized that gaze duration and number of fixations will be highest when reputation is positive and body language negative or when reputation is negative and body language positive (both incongruent conditions).

Method

Participants. The participants (N=106; M age=26.7, SD=6.9) were all studying for an undergraduate degree at the lead author's institution. The sample comprised 42 males and 64 females with 55% self reporting ethnicity as White-European, 23% Black-European, 12% Asian and the remaining 10% 'other'. All participants had normal or corrected to normal vision and reported that they had experience of playing tennis at a recreational level. Ethical clearance for the study was obtained from the lead author's institution. All participants signed consent forms and volunteered to take part in the study.

Stimuli Development. The stimuli were comprised of footage showing any two of four possible clips of a male or female control tennis player followed by a different male or female target tennis player. All of the players in the videos were white, of average height, with an athletic physique and were right handed. The target players wore the same clothing irrespective of the body language being displayed (see body language manipulation). All videos were recorded using a Sony PJ240 HD camera which was mounted on a tripod elevated to 1.70m and placed 12m directly in front of the entrance to a regulation indoor tennis court. Both the control and target player wore standard tennis attire that can be purchased from any major sports retailer. For both the control and target the footage showed a player enter the playing area, approach the camera (positioned at the net post), pause to tie shoelaces, remove a racket from a standard tennis bag and then walk to the centre of the baseline at which time the footage stopped. To increase authenticity the control and target players were filmed at different locations but in both cases the facility would be considered to be a mid-size tennis club. The total length of footage for the control and target players was edited to ensure that the duration was similar across body language condition and for each of the male and female players (45 secs ±3).

Body Language. The target players were instructed to adopt characteristics while walking that in previous studies, have been shown to represent positive and negative body language (Buscombe, Greenlees, Holder, Thelwell, & Rimmer, 2006). More specifically, in the positive body language condition the target player entered the court and approached the net post while making eye contact with the camera, keeping the head up, shoulders back and adopting a wide stance. In the negative body language condition the target player's gaze was fixed off centre and slightly towards the ground, head stooped, shoulders rounded and with a narrower stance. A manipulation check employing seven Likert-type scales (see procedure for detail) demonstrated a main effect for body language for both the male ($F(1, 42)=18.52; p<.05$) and female target conditions ($F(1, 64)=11.45; p<.05$). This result confirmed that the target player was viewed more favorably in the positive (Male: M=42.3; SD=7.2; Female: M=40.5; SD=6.3) than in the negative (Male: M=26.4; SD=6.5; Female: M=29.6; SD=7.4) body language condition.

Reputation. Neutral, positive or negative prior playing information was presented in the form of a recent win/loss record along with an indication of the player's recent form. For example, the negative condition vignette comprised, "The player that you are about to view plays at a tennis club in the East London area. The player has a negative win/loss record for this season and has seen their tennis ranking decline steadily over the past year. This player volunteered to be filmed as part of this project". The neutral condition stated that the experimenter had no prior information about the player. It was established during pilot testing that presentation of this text for 20 seconds prior to the player appearing was sufficient for it to be read in full.

Measures

Eye Tracking. An Applied Science Laboratories (ASL, Waltham, MA) model 504 remote eye tracking system with a 50Hz sampling rate was used. Following accurate calibration the system error in point of gaze measurement is designed to be less than 1 degree. An EYEPOS (ASL Laboratories) software package presented the stimuli, recorded the data and controlled the experiment. The 19 inch display monitor had a resolution of 1024 x 768 and a refresh rate of 85Hz. A chinrest with head support served to minimise participants' head movements. Calibration was performed before every trial using a sequential nine point light display resulting in gaze position error rates of less than 1 degree. Natural variation in corneal structure and

tracking can lead to some participants not returning a successful calibration and in such cases data was discarded prior to analysis.

The ASL eye tracker was used to record the number of fixations, location of fixations and the cumulative duration of fixations for each designated area of interest (AOI) on the target tennis player. The AOI's were determined in line with Williams, Ward, Knowles, & Smeeton's , (2002) work which employed video capture of realistic tennis simulations, identifying that 1) the head and shoulder, 2) trunk and hip, 3) right arm (racket arm), 3) left arm, 4) racket, 5) right leg and 6) left leg are areas that draw a participant's attention when tasked with making judgements of tennis players. (). Fixation measures were computed for the first five seconds after a player entered the playing area. The starting point showed the player in frontal view walking towards the camera and this view was maintained for the five second period. Pupil dilation was recorded synchronously with gaze behavior with a view to gaining additional insight in to depth of processing per AOI (Wang, 2011).

Procedure

The participants were tested individually and were informed that the purpose of the study was to gather information concerning their impressions of two tennis players. They were told that after viewing each player they would be asked to report their judgements of that individual using seven, nine point Likert-type scales. The dimensions of interest included 'focused-not focused', 'assertive-not assertive', 'prepared-not prepared', 'competitive-non-competitive', 'dominates opponent-is dominated by opponent' and 'decisive-not decisive'. The dimensions were selected based on their inclusion in previous similar studies with tennis players (Greenlees, Buscombe, Thelwell, Holder, & Rimmer, 2005). This data was used only to confirm that the body language manipulation was functioning in-line with the designated condition and as such was not subject to any further analysis. The participants were informed prior to commencing the experiment that the dimensions of interest would alter between the two players being viewed.

The participants were briefed on the remote eye tracking procedure and the calibration process. They gave written informed consent and completed demographic information. Participants then placed their chin on a support rest and viewed the monitor from a distance of 45cm. Each participant was calibrated using a 9-point grid and the participant's right eye was tracked. The experiment then started with a 20 second on-screen display of the control expectancy vignette,

followed by a fixation cross positioned centre screen for one second, and the control player video clip for forty-five seconds. The Likert scales then appeared one at a time on screen and participants gave their ratings verbally within a time limit of five seconds. The responses were recorded by hand by the experimenter who was seated out of sight but within a couple of metres of the participant. There then followed an identical sequence for the target player but the content of the expectancy information (neutral, positive, or negative) and player body language (positive or negative) differed according to condition. Participants were assigned randomly to conditions and the entire session lasted no more than 30 minutes.

Data Analysis

Prior to analysis of variance (ANOVA), a constant value of 1 was added to the raw data and a log base-10 transformation was used in order to reduce skewness. However, the means are reported in original values for ease of interpretation. A 2x2 ANOVA with participant gender and control player gender as factors demonstrated no significant main or interaction effects with respect to judgements of the control player. Based on this result subsequent analyses were performed with data collapsed across both participant and control player gender.

Separate 3(reputation (positive:negative:neutral)) x 2(body language (positive:negative)) x 2(target player gender (male vs female) MANCOVAs were conducted with the first five seconds of eye tracking data serving as the dependent variable. A five second period was selected because although impressions can be arrived at in very short periods of time (~39ms) a longer duration allows for more consistent judgements to be formed. At the upper end, the time period was restricted to ensure a manageable amount of data was extracted from the gaze tracker software ensuring sufficient depth was retained to enable the a priori research questions to be answered. Follow-up univariate ANOVAs were performed to test for the effect of each independent variable on the dependent measures. In all analyses the scores from the control player were used as a covariate to control for naturally occurring differences in the extent to which the participants devoted attention to the target player. In each case if equality of variance or homogeneity of regression slopes assumptions were violated Greenhouse Geisser corrections were applied modifying the degrees of freedom attached to each computation. All statistical analyses were performed with significance set at $p<.05$.

Results

The data from eight participants were excluded from the analysis due to calibration difficulties. GazeTracker default values were used such that a fixation is defined as a series of three or more samples within a 40 pixel radius for at least 200 ms. Care was taken to eliminate overlap between the AOI's that may naturally otherwise occur as the target player approached the camera. This was achieved by instructing the target player to walk in such a way as to not overlap body segments, for example, ensuring the player's arms stayed outside the torso region. Each AOI was also digitally pinned to track the subtle movement that occurs in each body part when walking towards the camera. The AOI regions were not visible to the participants and were used only at the analysis stage.

*Number of Fixations***.** There was a significant main effect of player gender on number of fixations, whereby female players received more fixations than male players (.81 and .33 respectively) on the racket, $F(1,95) = 5.92$, MSE = 0.37, $p = .017$, $\eta 2 = .059$, and on the right arm (1.55 and .44 respectively), $F(1,95) = 21.19$, MSE = 0.34, $p < .001$, $\eta 2 = .187$. The left arm, by contrast, received more fixations for male (.91) than for female (.13) players, $F(1,95) = 10.98$, MSE = 0.41, $p = .001$, $\eta 2 = .104$, as did the leg area (3.39 and .62 respectively), $F(1,95) = 51.73$, MSE = .064, $p < .001$, $\eta 2 = .059$ (Figure 1a).

There was no main effect of reputation (all $p > .05$) but there was a significant body language x reputation interaction for the right arm, $F(2,95) = 4.28$, MSE = .034, $p = .017$, $\eta 2 = .083$. A post-hoc Tukey test showed no significant difference in number of fixations on the right arm whether reputation was neutral, positive or negative and whether body language was positive or negative (all $p > .05$). The gender x reputation interaction was also significant for fixations on the right arm, $F(2,95) = 4.79$, MSE = .034, $p = .010$, $\eta 2 = .092$, but again results from a post-hoc Tukey test were not significant ($p > .05$).

Body Language had significant effect on number of fixations such that there were more fixations when body language was negative than when it was positive, on the head (3.24 and 1.93 respectively), $F(1,95) = 11.32.04$, MSE = 4.34, $p = .001$, $\eta 2 = .106$, on the player's right arm (1.67 and .38 respectively), $F(1,95) = 30.47$, MSE = 1.41, $p < .001$, $\eta 2 = .243$, and on the racket (.86 and .30 respectively), $F(1,95) = 8.65$, MSE = 1.01, $p = .004$, $\eta 2 = .083$. The opposite

pattern occurred for the legs, with more fixations for positive (3.13) than for negative (.80) body language, $F(1,95) = 50.37$, $MSE = 3.80$, $p < .001$, $\eta 2 = .346$ (Figure 1b).

Insert Figure 1a here

Insert Figure 1b here

The gender x body language interaction was significant for number of fixations on the head, $F(1,95) = 62.31$, $MSE = .070$, $p < .001$, $\eta 2 = .396$, the right arm $F(1,95) = 88.33$, $MSE = .034$, $p < .001$, $\eta 2 = .482$, the body, $F(1,95) = 18.03$, $MSE = .056$, $p < .001$, $\eta 2 = .160$, the racket, $F(1,95) = 16.47$, $MSE = .037$, $p < .001$, $\eta 2 = .148$, and marginally significant for the legs, $F(1,95) = 3.78$, $MSE = .064$, $p = .055$, $\eta 2 = .038$. Table 1 displays the number of fixations as a function of player gender and body language. The player x body language x reputation interaction was not significant (all ps > .06).

Insert Table 1 here

*Total Fixation Duration***.** For total fixation duration, there was a significant main effect of player gender such that for the head, durations were longer for the male (2.642 s) than for the female (1.689 s) player, $F(1,95) = 11.98$, $MSE = .018$, $p = .001$, $\eta 2 = .112$, and for the legs, also longer for the male (2.168 s) than for the female (.838 s) player, $F(1,95) = 9.68$, $MSE = .019$, $p = .002$, $\eta 2 = .092$. In contrast, the right arm had longer durations for the female (2.233 s) than for the male (.886 s) player, $F(1,95) = 9.92$, $MSE = .010$, $p = .002$, $\eta 2 = .095$, and similarly for the racket, durations were again longer for the female (1.280 s) than for the male (.509 s) player, $F(1,95) = 5.14$, $MSE = .010$, $p = .026$,$\eta 2 = .051$ (Figure 2a).

The main effect of body language showed that fixation durations were longer on the leg area, $F(1,95) = 6.34$, $MSE = .019$, $p = .014$, $\eta 2 = .063$, in the positive (2.019 s) than in the negative (1.063) condition, but for the right arm, $F(1,95) = .58$, $MSE = .010$, $p = .035$, $\eta 2 = .046$; durations were longer when body language was negative (2.079 s) rather than positive (.982), and also longer on the racket, $F(1,95) = 4.53$, $MSE = .010$, $p = .036$, $\eta 2 = .046$, for negative (1.253) rather than positive (.489) body language (Figure 2b).

Insert Figure 2a here

Insert Figure 2b here

There was a gender x body language interaction for the head, $F(1,95) = 8.21$, MSE = .018, $p = .005$, $\eta 2 = .080$, and for the legs $F(1,95) = 26.16$, MSE = .019, $p < .001$, $\eta 2 = .216$ (Figure 3). The body language x reputation interaction was also significant for the head, $F(2,95) = 3.28$, MSE = .018, $p = .042$, $\eta 2 = .065$. For body language, no other main effects or interactions reached significance (all $p > .05$), nor were there any significant effects involving reputation (all $p > .05$).

Insert Figure 3 here

Mean pupil diameter

There were no significant effects for pupil diameter (all $p > .05$).

Discussion

The results show a consistent preference for participants to direct their gaze towards the target player's head during the first five seconds immediately after the target individual came in to view. A number of interactions between target player gender, body language and reputation across individual AOI's superseded this result and served to illustrate that gaze behavior varies as a result of the interplay between stable characteristics (gender), observable cues (body language) and prior held information (reputation). This work supports Fiske, Lin and Neuberg's (1999) assertions about the role that gender, appearance and prior held information play in influencing how perceivers form judgements of others. The present findings provide the first objective account of where perceivers focus their gaze when forming judgements of sports performers. Furthermore, this work illustrates that a perceiver adjusts their gaze, drawing on different sources of information, based on the appearance and reputation of a player.

The results evidenced more fixations on the head, right arm and racket in the negative body language condition and more fixations on the legs in the positive body language condition. In line with the *a priori* hypotheses there was found to be more fixations on the head in the

negative body language condition however contrary to prediction the total duration of fixations was unaffected by body language. This would appear to indicate that participants employed an 'anchor and adjust' (Epley, & Gilovich, 2006) strategy whereby the head was used as a confirmatory source of information with more frequent but quicker looks in this region being used to confirm established judgements of the performer. The veracity of this proposal could be tested in future work with an analysis of scan path highlighting whether participants were, in fact, adopting an 'anchor and adjust' approach when arriving at their judgement. Furthermore, individual specific gaze patterns may emerge informed by certain personality characteristics. For example, one's disposition to experience 'need for closure' (NfC) and thus decisively arrive at a judgement in a short period of time may logically inform a gaze strategy that leads to a limited number of fixations within minimal duration (Webster, & Kruglanski, 1994). As NfC reduces this may result in more extended durations across multiple fixations as perceiver's engage in a more effortful, time and resource consuming search strategy. Similar patterns may extend to manipulation of the conditions in which the judgement is being made. For example, Buscombe and Greenlees (2012) showed that under time pressure participants reported elevated ratings of a tennis player's performance having viewed that individual displaying positive body language during the warm-up. Eye tracking protocols would serve to illuminate the gaze strategy adopted in time constrained situations with the prediction that a perceiver would purposefully prioritise the head in the knowledge that with limited time this area provides the largest amount of diagnostic information on which to base a judgement.

It was hoped that employing a measure of pupil dilation would permit inferences to be drawn in relation to interest and depth of processing for each AOI. The lack of statistically significant findings with regards to pupil dilation leaves us unable to provide further insight in this regard. As such we cannot discount the critique that more and longer fixations may not necessarily equate to deeper processing. As such it may be possible that in practice the head does not actually account for the greatest proportion of variance in the judgements we form of others even though it was seen in this study to draw the greatest number and duration of fixations. In light of these findings future research is warranted employing impression formation tasks with simultaneous recording of psychophysiological (e.g., heart rate variability, heat flux or electrocardiogram) and neurological (e.g., electroencephalogram) measures previously shown as a means of investigating cognitive processing and load (Haapalainen, Kim, Forlizzi, & Dey, 2010). Reporting of these measures would elucidate any fluctuation in internal state that occurs during periods of fixation on specific AOI's. This data would serve to confirm, or otherwise,

whether the head does in fact serve as the most pertinent source of information when forming pre-match judgements of others in sport.

The hypothesized increase in duration and number of fixations in situations when body language and reputation were incongruent was not observed. Although an interaction was detected for total fixation duration this result was marginally significant and was not detected in the post hoc analysis. One potential explanation for this result lies in the suggestion that the interaction of body language and reputation is either too subtle, or complex, to lead to clearly defined groups and as such the proposed congruent and incongruent combinations were not adequately established. In this vein there may be more pertinent combinations of variables to consider that together create more recogniseable congruent and incongruent conditions. For example the work of Solomon and colleagues illustrates that psychological cues hold significant diagnostic value when forming impressions of athletes (Becker, & Solomon, 2005). Work by Furley and Schweizer (2016) supports this premise showing that perceivers are able to detect subtle alterations in non-verbal behavior which in turn provides information about a player's current psychological state. Specifically, Furley and Schweizer found that cues projected via the non-verbal behavior of football referees lead to officials being construed as less confident in the way they conveyed a decision after an ambiguous as opposed to an unambiguous foul tackle. Studies that inform participants of a target's psychological state (positive vs negative) and contrast this with appearance (positive vs negative body language) might be more informative in detecting differences in processing across congruent and incongruent conditions.

Research has shown that emotion and psychological state can be reliably predicted from facial expression (Ekman, 1997) and that such judgements are influenced by the race, gender and similarity of the perceiver and the individual being judged (Wu, Laeng, & Magnussen, 2012). Given the preference of participants in the current study to gaze at the head, researchers might like to investigate how different facial expressions are interpreted and what these images say about a player's current mental state. Accordingly, facial expression may convey a certain psychological state which in turn informs our judgement of an opponent. When considered in the context of the findings of the present study it would appear that future research which systematically modifies the facial expression of a target person thus manipulating personal (appearance) and psychological (inferred mental state) cues would elucidate the interaction between these two categories of target relevant information.

The present study found no main effect for either participant or control player gender in terms of gaze behaviour during observation of the control player. This finding indicates that gaze behavior was similar for male and female participants when observing the same male and female control players. This result is somewhat surprising given that previous research has shown gender differences in a range of impression formation and social perception studies (Deaux, 1984). It would appear therefore that gender differences may not result from gaze behavior per se but rather the interpretation and weight attached to each cue may vary with the gender of the observer. At this time it appears logical to call for further work with a simplified design investigating gaze behavior and gender in isolation in order to shed light on the current finding. However, future work should be mindful of adopting a reductionist approach given that judgements of opponents in sport are made against a backdrop of various combinations of perceiver and target gender with naturally occurring variations in body language and reputational information. With this in mind it is acknowledged that the artificial conditions inherent in undertaking a laboratory based study requiring observations of athletes displayed on video monitors may be considered a limitation of the current work. Future field based work employing mobile eye tracking equipment may go some way to answering this critique.

The present study sought to address a gap in the literature and describe where a perceiver fixates their gaze when forming an initial judgement of a tennis player. Furthermore, the results show a preference to fix gaze on the head although this finding should be considered against a backdrop of a range of interactions that also implicate the role that stable characteristics (gender), observable cues (body language) and, to a lesser extent, prior held information (expectancy) play in shaping gaze behavior. This work serves to inform coaches and athletes of the dominant role that information conveyed by the head region, and by extension facial expression, has in informing the judgements that athletes make of others in sport.

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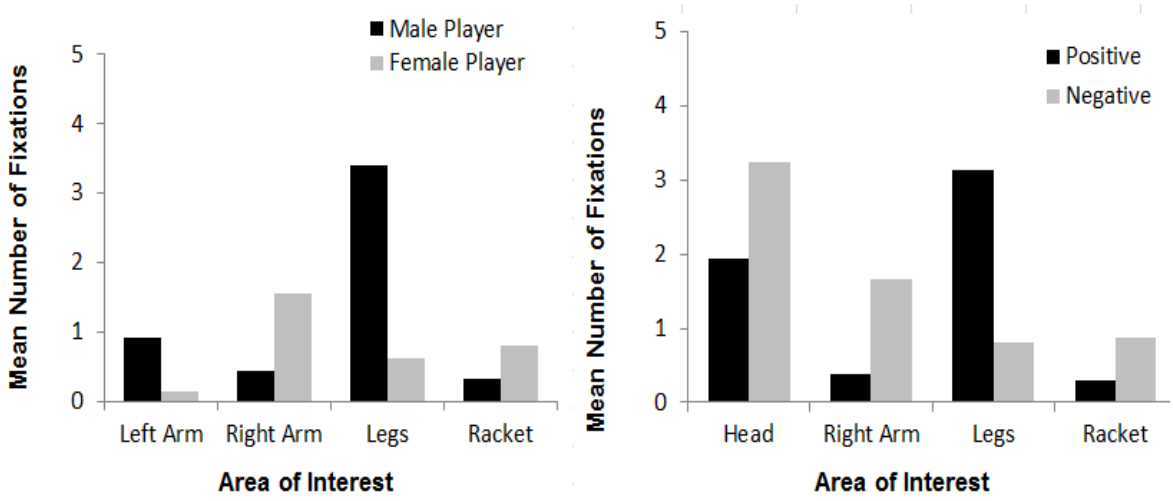

Figure 1. Main effect player gender (left) and body language (right) ($p<.05$).

	Male Player Positive BL	Male Player Negative BL	Female Player Positive BL	Female Player Negative BL
Head	.714	4.85	3.14	1.56
	(1.92)	(3.02)	(1.98)	(1.45)
Left Arm	.786	1.04	.071	.200
	(1.20)	(2.38)	(.262)	(.408)
Right Arm	.750	.120	0.000	3.28
	(1.30)	(.431)	(.000)	(2.23)
Body	.214	1.270	1.57	.600
	(.42)	(2.16)	(1.93)	(1.35)
Legs	5.107	1.54	1.14	.040
	(2.69)	(2.52)	(1.30)	(.200)
Racket	.429	.231	.179	1.520
	(.80)	(.541)	(.476)	(1.83)

Table 1. Number of fixations (M and SD) as a function of target player gender by body language.

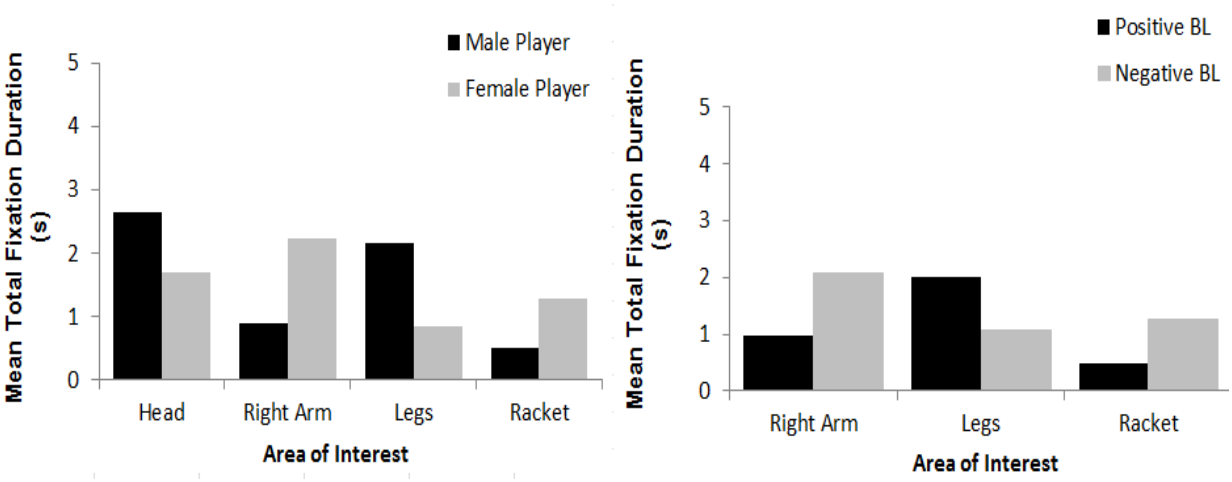

Figure 2. Main effect player gender (left) and body language (right) ($p<.05$).

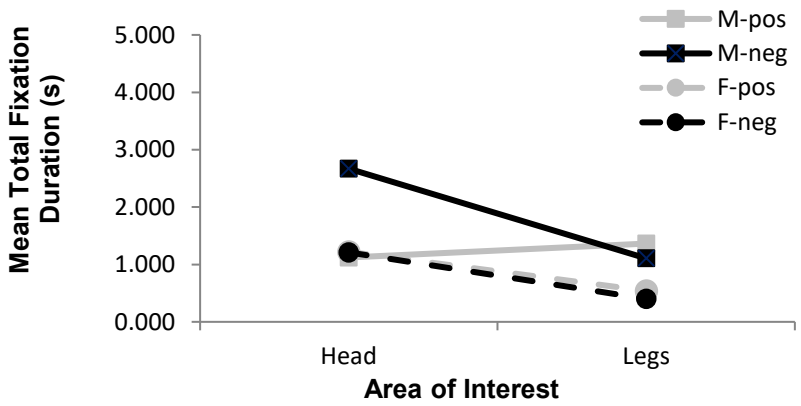

Figure 3. Total fixation duration as a function of target player gender (F/M) and body language condition (Pos/Neg) across the two AOI's reaching $p<.05$.