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Perceived health from biological motion predicts voting behaviour

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Body motion signals socially relevant traits like the sex, age, and even the genetic quality of actors and may therefore facilitate various social judgements. By examining ratings and voting decisions based solely on body motion of political candidates, we considered how the candidates' motion affected people's judgements and voting behaviour. In two experiments, participants viewed stick figure motion displays made from videos of politicians in public debate. Participants rated the motion displays for a variety of social traits and then indicated their vote preference. In both experiments, perceived physical health was the single best predictor of vote choice, and no two-factor model produced significant improvement. Notably, although attractiveness and leadership correlated with voting behaviour, neither provided additional explanatory power to a single-factor model of health alone. Our results demonstrate for the first time that motion can produce systematic vote preferences.

Keywords: Evolution; Health; Voting; Biological motion.

Body motion is a valid signal of socially relevant traits (see Blake & Shiffrar, 2007, for a review). Motion alone can indicate traits like sex (Kozlowski & Cutting, 1977; Pollick, Kay, Heim, & Stringer, 2005; Troje, 2002), age (Montepare & Zebrowitz-McArthur, 1988), personality (Heberlein, Adolphs, Tranel, & Damasio, 2004), and emotion (Dittrich, Troscianko, Lea, & Morgan, 1996). In addition, people are willing to make complex social judgements from surprisingly sparse motion stimuli (e.g., Barrett, Todd, Miller, & Blythe, 2005). We would therefore expect observers to use motion from our bodies to facilitate various social judgements.

Political scientists have known for some time that politicians have exploited hand gestures and other motions as a way of influencing their audiences—for example, by facilitating the processing of speech (Streeck, 2008). Research has demonstrated that gestures can lead to differences in audience perceptions of both the actor and the persuasiveness of their message (Maricchiolo, Gnisci, Bonaiuto, & Ficca, 2009). Here we looked at whether simple body motion stimuli

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could induce systematic biases in voting behaviour. More specifically, we examined the perception of socially relevant traits through motion and the influence of these perceptions on vote choice.

Previous research has shown that static images of faces can influence and predict voting behaviour (Little, Burriss, Jones, & Roberts, 2007; Todorov, Mandisodza, Goren, & Hall, 2005), even in children (Antonakis & Dalgas, 2009), above and beyond party affiliation and issue position (Rosenberg, Bohan, McCafferty, & Harris, 1986). Perceptions of leadership qualities seem to be important in this context. For example, a constellation of related qualities as judged from faces—leadership, competence, and intelligence—were the best predictors of voting outcomes (Todorov et al., 2005). Therefore, by examining voting decisions based on political candidates' motion, we considered whether candidates' movements while speaking signalled personality and physical characteristics and how these displays may also have affected observers' judgements and subsequent voting behaviour. While leadership is an important predictive signal from the face, perhaps other qualities are more easily perceived from motion and carry stronger effects on voting behaviour.

EXPERIMENT 1

In Experiment 1, we investigated how voting decisions were influenced by motion judgements for a pair of political candidates: Barack Obama and John McCain.

Method

Participants

A total of 35 volunteers (21 females) took part in the experiment, ranging in age from 18 to 41 years. All participants were students or staff at Bangor University.

Materials

A video clip from the website YouTube, featuring Barack Obama and John McCain, was taken from their second presidential debate (7 October 2008) in the build-up to the 2008 presidential elections. From this video, we selected two clips of 7 seconds in length, filmed from the same angle and distance, and which showed each man making similar movements—specifically, turning from one side to the other, while making a slight emphasis gesture with the left hand, and shown from the waist upwards. The videos were converted into stick-figure displays using custom Matlab software, where 10 landmarks (eyes, shoulders, elbows, wrists, tie knot, tie point) were identified manually for each frame, and an animation was produced (see Figure 1; to view the clips, see Ward, 2009). The final movie stimuli measured 562 × 420 pixels. All visual surface, contour, and audio information was therefore removed.

Procedure and design

Participants were informed that they would be shown movies of stick figures, recorded from two men giving a public talk, and they would be asked to rate characteristics based on the way the figures moved. Both videos played side by side on screen, looping back and forth continuously, while participants made estimates of each actor's physical and cognitive traits: attractiveness, trustworthiness, caring, dominance, leadership, anxiety, depression, physical health (all on a scale

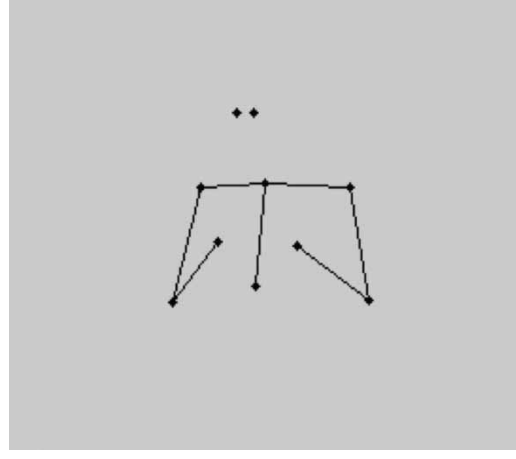

Figure 1. *A single frame from the Obama video.*

from 1 to 6), and age (in years). Both actors were rated for each trait (first the left, then the right figure) before continuing on to the next. Viewing distance was not fixed. Screen position of the videos was counterbalanced, and question order was randomized between participants (who were run individually).

After the ratings were collected by the experimenter, a series of questions were asked in fixed order. Participants indicated which figure they preferred to vote for, for president. Participants were then asked whether they knew the names of the two presidential candidates in the current US elections. If they did, they were then informed that the stick figures were created from these two men and were asked whether they could identify which stick figure represented which candidate. After being informed of the stick figure identities, participants were asked whether they were aware of the identities during the trait ratings phase. Finally, information regarding their political views and news exposure was collected.

Results and discussion

All participants reported that they were unaware of the stick figure identities while performing trait ratings. The candidates' motions were sufficiently distinctive to produce some different impressions of social traits. The Obama figure was rated as more trustworthy, $t(34) = 2.21$, $p = .034$, and dominant, $t(34) = 2.43$, $p = .021$, whereas the McCain figure was rated as more anxious, $t(34) = 3.11$, $p = .004$ (all values uncorrected for multiple comparisons—only anxiety is significantly different after Bonferroni correction). Mean scores for each candidate on each trait are provided in Table 1.

The political affiliation, age, and news exposure of observers had no correlation with vote choice (all ps $> .05$). This is in contrast with circumstances in which the identities of candidates are known, where we would expect political affiliation to be an important predictor of voting decisions (Bartels, 2000), and provides further evidence of participants' lack of awareness during ratings. Even after revealing the names of the stick figures, participants were unable to identify which was which: 51% accuracy, $t(34) = 0.17$, *ns* from chance. However, in this experiment, exposure to news was correlated with ability to identify the videos with candidates once the identities were revealed, $r(33) = .40$, $p = .02$, suggesting that the way the candidates move can be recognizable and remembered (Cutting & Kozlowski, 1977).

However, our main interest was whether social traits as judged from motion predicted vote. We therefore conducted stepwise logistic regression analyses to investigate the distinctive contribution of each trait to vote choice. We computed the difference between each participant's ratings of the candidates (e.g., the rating of Obama's leadership minus that of McCain's leadership) and used these differences as predictors of vote choice. Stepwise regression was used, so that factors that were redundant with others in the model, and

Table 1. *Mean ratings for the four stick figure videos*

Trait	*Obama*	*McCain*	*Cameron*	*Brown*
Caring	3.54 (0.20)	3.71 (0.18)	3.68 (0.21)	3.92 (0.20)
Trustworthiness	3.97 (0.16)	3.34 (0.19)	3.71 (0.17)	4.08 (0.20)
Depression	2.09 (0.23)	1.89 (0.18)	2.37 (0.18)	2.95 (0.20)
Age	36.82 (1.58)	35.06 (2.08)	37.59 (1.36)	43.05 (1.72)
Anxiety	2.46 (0.22)	3.63 (0.27)	2.26 (0.22)	3.84 (0.19)
Leadership	4.23 (0.20)	3.71 (0.23)	4.34 (0.19)	3.97 (0.19)
Physical Health	4.17 (0.21)	3.91 (0.22)	4.45 (0.18)	3.87 (0.22)
Dominance	4.31 (0.21)	3.46 (0.23)	4.21 (0.21)	4.18 (0.19)
Attractiveness	3.60 (0.19)	3.06 (0.21)	4.16 (0.18)	3.16 (0.18)

Note: Standard errors in parentheses.

therefore did not explain additional outcomes, were dropped. Although most factors (excluding perceived age, depression, and anxiety) were significantly correlated with vote choice, all rs(33) > .36, all ps < .03, regression including all variables using a forward likelihood ratio method produced a model of physical health alone, $B = -0.96$, $SE = 0.35$, $p = .006$, and this model produced a highly significant fit, $\chi^2(1) = 13.37$, $p < .001$. That is, health was the single best predictor of vote, and, as shown in Figure 2, additional factors produced little advantage, with all second-factor coefficients not significant (all ps > .05). As must be expected from this model, and illustrated in Figure 3, there was a significant interaction of voter preference (Obama or McCain) and stimulus (Obama or McCain) on health rating, such that higher ratings were given according to vote choice, $F(1, 33) = 19.89$, $p < .001$.

In order to confirm that participants were not voting based simply on how they remembered rating the two videos (e.g., if they rated McCain as more anxious just before voting, they may be more likely to vote for Obama), we conducted a logistic regression in which the position of the health rating question (1 to 9, randomized between participants) was included as a second covariate in addition to health. This addition was not significant, $B = 0.15$, $SE = 0.21$, $p = .48$.

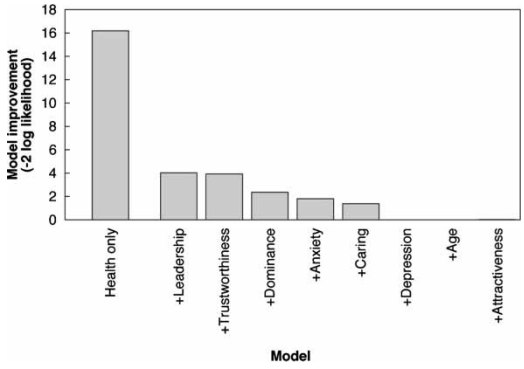

Figure 2. *Experiment 1 (McCain–Obama). Results of logistic regression predicting vote choice, comparing the one-factor health model to models of health plus a second factor. The health-only column shows the change in −2 log likelihood for a model with health as a predictor, compared to a constant-only model. The other columns show the additional change in this likelihood when a second factor is added to the health-only model. The chi-squared statistic for a model is equal to the change in likelihood.*

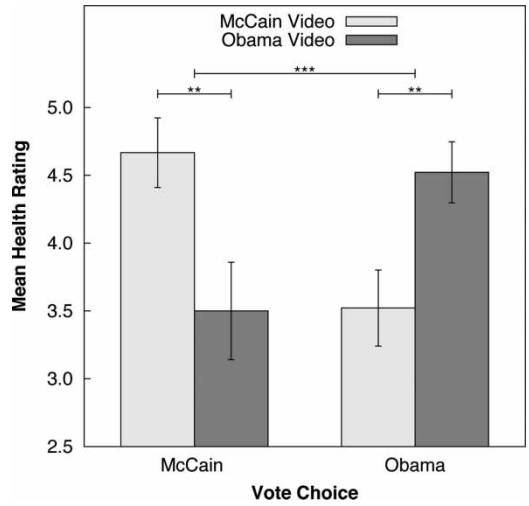

Figure 3. *Breakdown of health ratings for the two politician videos (McCain–Obama) as a function of vote choice. ** were significantly different at an uncorrected alpha level of .01; *** at .001.*

It is also unlikely that participants recognized the candidates from motion and then voted on this basis, as vote choice and other ratings were not related to political affiliation. The self-reported affiliation (from 1 = very liberal to 6 = very conservative) of those who voted for the Obama stimulus was no different from those that chose the McCain stimulus, $t(33) = 0.13$, $p = .90$. Similarly, differences in the candidates on single traits like health and leadership were uncorrelated with affiliation (all ps > .05).

EXPERIMENT 2

In Experiment 2, we sought to replicate and generalize our findings, using a different pair of politicians, in order to confirm that our results with health were not restricted to a specific set of stimuli.

Method

Participants

A total of 38 students (26 females) took part in the experiment, ranging in age from 18 to 33 years.

All participants were undergraduate students at Bangor University and took part in exchange for course credits.

Materials

A video clip from the website YouTube, featuring David Cameron and Gordon Brown, was taken from a House of Commons debate (28 November 2007). We selected two segments of video, each of 9 seconds in length, and showing each man making similar movements (slight turning from one side to the other, while making emphatic gestures with one hand), filmed from the same angle and distance, and shown from the waist upwards. Stick figure videos were created using the same method as that in Experiment 1. The final movie stimuli measured 562 × 420 pixels.

Procedure and design

We used an identical procedure to that of Experiment 1, although participants were asked to indicate which figure they preferred to vote for for prime minister, rather than president, and the final part of the questioning involved the leaders of the Labour and Conservative Parties in the UK.

Results and discussion

Again, all participants answered that they were unaware of the stick figure identities while performing trait ratings. Our analyses proceeded as in Experiment 1. The Brown figure was rated as more depressed, $t(37) = 2.02$, $p = .05$, and anxious, $t(37) = 4.95$, $p < .001$, whereas the Cameron figure was rated as more attractive, $t(37) = 3.31$, $p = .002$, and younger, $t(37) = 2.16$, $p = .038$ (all values uncorrected—only anxiety and attractiveness are significantly different after Bonferroni correction). Table 1 has mean ratings for each candidate. Again, the political affiliation, age, and news exposure of observers had no correlation with vote choice (all ps $> .05$). However, unlike Experiment 1, after revealing the names of the stick figures, participants incorrectly identified which was which, $t(37) = 3.27$, $p = .002$, and accuracy was not significantly correlated with news exposure, $r(36) = .27$, $p = .107$.

Although depression, leadership, health, and attractiveness were correlated with vote choice, again logistic regression analyses including all variables using a forward likelihood ratio method produced a model of physical health alone, $B = -0.65$, $SE = 0.23$, $p = .005$, and this model produced a highly significant fit, $\chi^2(1) = 11.12$, $p = .001$. As in Experiment 1, health was the single best predictor of vote, and, as shown in Figure 4, additional factors produced little advantage, with all second-factor coefficients not significant (all ps $> .05$). Again (Figure 5), there was the expected interaction of voter preference (Cameron or Brown) and stimulus (Cameron or Brown) on health rating, such that higher ratings were given according to vote choice, $F(1, 36) = 13.00$, $p < .001$.

Again, we conducted a logistic regression in which the position of the health rating question was included as a second covariate in addition to health, and this was not significant, $B = 0.07$, $SE = 0.16$, $p = .68$.

As in Experiment 1, affiliation did not differ as a function of vote choice, $t(35) = 0.27$, $p = .79$, and differences in the candidates' health and leadership ratings were uncorrelated with affiliation (all ps $> .05$).

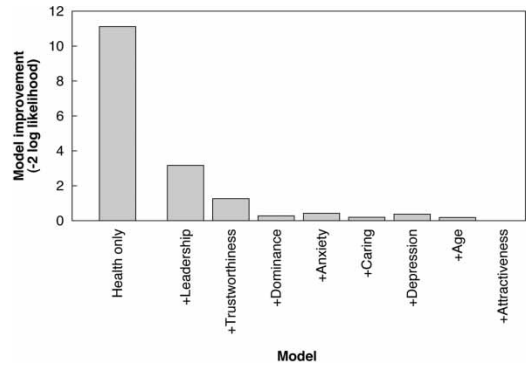

Figure 4. *Experiment 2 (Brown–Cameron). Results of logistic regression predicting vote choice, comparing the one-factor health model to models of health plus a second factor.*

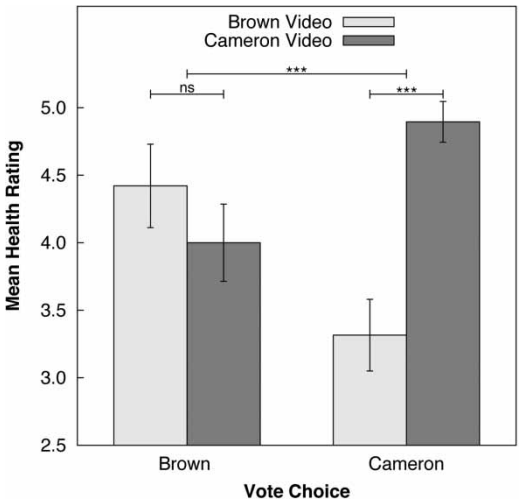

Figure 5. *Breakdown of health ratings for the two politician videos (Brown–Cameron) as a function of vote choice. *** were significantly different at an uncorrected alpha level of .001.*

GENERAL DISCUSSION

Our results demonstrate for the first time that motion, even simple gestures while speaking, can produce systematic vote preferences. These basic motions conveyed impressions of health that were especially predictive of vote choice above and beyond any other characteristics. This result may seem initially surprising, given that there was no significant difference in perceived physical health between the two candidates in either experiment. However, even though there was no overall agreement as to whether one candidate appeared healthier than the other, the results suggest that participants were driven by their individual perceptions about which candidate they thought was healthier when it came to casting their vote. This also explains why there were no significant differences in the number of votes for each pair of candidates—if there was no overall agreement as to which candidate was more healthy, and physical health was a major influence on voting behaviour, then this would not have led to an overall agreement as to the better candidate.

Therefore, although perceived health was an important influence on vote choice, there were differences in raters' judgements over which candidate appeared healthier. These differences could plausibly arise for several reasons. For example, multiple traits from body motion are associated with health (such as movement amplitude and balance, Voermans, Snijders, Schoon, & Bloem, 2007), but these traits may be dissociated to degrees in our stimuli. Different raters may also give different weights to different aspects of health as signalled from motion. Further research using actors of known health characteristics is necessary to address these issues and to determine the accuracy of physical health perceptions from body motion.

We represented our actors with stick figures rather than point-light displays. The stick figures made some information, which would be implicit in point-light stimuli, less ambiguous and easier for viewers to process. For one, the stick figures made body part positions more easily interpretable when their movement was minimal. This was particularly the case in Experiment 1, where both actors held one arm in a fixed position, holding a microphone to their chest, and to a lesser degree in Experiment 2, when the actors used the podium for support. Second, aspects of body morphology may be more directly represented in the stick figures—for example, the width of shoulders relative to the length of the arms. The same morphology information would be available in point-light displays, but might require more computation. Crucially, however, the stick figures still removed surface and contour information. An interesting future question is to what degree morphology, whether derived from point-light or stick figure displays, might be influencing ratings of health. In addition, given the initial videos and the methods used during stimulus production, the movies contained unavoidable jitter and noise. However, participants still systematically obtained and reported information from these stimuli, such that their vote choice could be accurately modelled by their ratings. It is possible that with higher fidelity stimuli, the perception and influence of traits would have been even stronger.

Our results suggest interesting differences to previous work using static images of faces. Perceived competence from facial photographs, a combined factor incorporating competence, intelligence, and leadership, can influence vote choice (Antonakis & Dalgas, 2009; Todorov et al., 2005). However, in our experiments, health rather than leadership, was the best predictor, and leadership did not improve the predictive power of a model based on health alone. In many other contexts, effects of attractiveness are pervasive, and positive traits in general (Dion, Berscheid, & Walster, 1972), including health (Kalick, Zebrowitz, Langlois, & Johnson, 1998), can be indiscriminately attributed on the basis of attractiveness. However, like leadership, attractiveness significantly correlated with vote but did not improve the predictive power of a model based on health alone.

Health is clearly a trait of great social relevance (e.g., in identifying fit mates and powerful friends), and body motion is likely to be an especially useful gauge of health levels. Efficient body motion places demands on both central and peripheral nervous systems, as well as vascular and skeletomuscular systems. The breakdown of motion control in disease is well established (Voermans et al., 2007), and variation in health and ageing are reflected in movement speed and variability (Hausdorff, Rios, & Edelberg, 2001). Our results therefore have important practical and theoretical implications. Practically, modern media ensures that the motion of candidates is now almost as readily available as their more carefully controlled still images. More generally, the influence of perceived health from motion suggests that motion is a valid and readily observed signal of health and neural integrity, which communicates important social qualities.

Supplementary multimedia files are published online alongside this article at http://www.informaworld.com/mpp/uploads/pqje_449513_supplementary_files.zip

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