

Lindell, Annukka and Savill, Nicola

ORCID logoORCID: <https://orcid.org/0000-0002-6854-0658> (2009)

Time to turn the other cheek? The influence of left and right poses on perceptions of academic specialisation. *Laterality*, 15 (6). pp. 639-650.

Downloaded from: <https://ray.yorks.ac.uk/id/eprint/3087/>

The version presented here may differ from the published version or version of record. If you intend to cite from the work you are advised to consult the publisher's version:

<https://doi.org/10.1080/13576500903201784>

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form. Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. [Institutional Repository Policy Statement](#)

RaY

Research at the University of York St John

For more information please contact RaY at ray@yorks.ac.uk

**Time to turn the other cheek? The influence of left and right poses on
perceptions of academic specialisation**

Annukka K. Lindell

School of Psychological Science, La Trobe University, Australia

Nicola J. Savill

School of Psychology, Bangor University, Wales

Published in *Laterality*, 2010, 15 (6), 639-650

Address correspondence to: Annukka Lindell, School of Psychological Science, La Trobe University, Bundoora, Victoria 3086, Australia. E-mail: a.lindell@latrobe.edu.au

Keywords: Asymmetry; Laterality; Left; Right; Hemisphere; Portraits; Art.

Abstract

The human face expresses emotion asymmetrically. Whereas the left cheek is more emotionally expressive, the right cheek appears more impassive, hence the appropriate cheek to put forward depends on the circumstance. Nicholls, Clode, Wood, and Wood (1999, *Proceedings of the Royal Society (Section B)*, 266, 1517–1522) demonstrated that people posing for family portraits offer the left cheek, whereas those posing as a Royal Society scientist favour the right. Given that the stereotypical representations of members of different academic disciplines differ markedly in their perceived openness and emotionality (e.g., “serious” scientist vs. “creative” writer), we reasoned that people may use cheek as a cue when determining a model’s area of academic interest. Two hundred and nine participants (M=90, F=119) viewed pairs of left and right cheek poses, and made a forced-choice decision indicating which image depicted a Chemistry, Psychology or English student. Half the images were mirror-reversed to control for perceptual and aesthetic biases. Consistent with prediction, participants were more likely to select left cheek images for English students, and right cheek images for Chemistry students, irrespective of image orientation. The results confirm that determining the best cheek to put forward depends on your academic expertise: an impassive right cheek suggests hard science, whereas an emotive left cheek implies the arts. Psychology produced no left or right bias, consistent with its position as a discipline perpetually straddling the boundary between art and science.

The human face is an exceptional communicative tool. From a glance we can effortlessly extract important information about a person: are they old or young? Male or female? Content or fearful? Research confirms that faces also give us an insight into personality, allowing us to gauge important traits such as trustworthiness and genuineness from little more than a passing glance (e.g., Engell, Haxby, & Torodov, 2007). Intriguingly, just as the brain's two hemispheres have differing processing specialisations, the two sides of the human face differ in their expression and communicative ability (e.g., Sackheim, Gur, & Saucy, 1978). Though faces typically appear bilaterally symmetrical at first glance, this subjective impression belies notable asymmetries in our facial expressions. Darwin (1872) first reported that whether smiling or sneering, the two halves of the face mobilise differentially: in facial expressions such as "sneering defiance", movement is predominantly confined to one side of the face (typically the left), a hypothesis since established in both human (Sackheim et al., 1978) and nonhuman primates (Hauser, 1993). Given that facial muscles are controlled by contralateral brain regions, such observations point naturally to a greater role for the right hemisphere in the expression of emotion.

Classically, the right hemisphere has been regarded as dominant in the control of emotion, irrespective of valence. This right hemisphere hypothesis is based predominantly on clinical data: patients with lesions in the right hemisphere demonstrate greater difficulty in interpreting emotion in speech (Hellige, 1993), recognising emotional words (Borod, Andelman, Obler, Tweedy, & Welkowitz, 1992), and identifying emotion in faces (Bowers, Bauer, Coslett, & Heilman, 1985) than control patients with left hemisphere lesions. The right hemisphere's predominance for emotion control leads to stronger expression of emotion on the left hemiface, the lower two-thirds of the face being innervated contralaterally (Patten, 1996). Using chimeric faces created from mirrored left-cheek or mirrored right-cheek composites, Sackheim et al. (1978) demonstrated that people perceive left cheek composites as showing stronger emotion than similar right cheek composites. Such findings confirm the greater expressivity of the left-hand side of the face.

Expressional asymmetries between the two hemifaces can lead to marked differences in terms of perception, and are argued to contribute to a notable asymmetry in portraiture. McManus and Humphrey (1973) first reported that the majority of portraits, from the renaissance to the present day, depict the sitter posing with the left cheek forward (56% male, 68% female). Discussing a number of possible reasons for this significant bias, Nicholls, Clode, Wood, and Wood (1999) proposed that the overrepresentation of the left cheek stems from the sitters' unconscious desire to show their emotive left cheek (hence the stronger bias in females than in males, with the former known to be more willing to express emotion; Kring, Smith, & Neale, 1994).

To test this hypothesis, Nicholls et al. asked people to pose for a photo in an emotive (family portrait) or impassive (Royal Society scientist) condition. They demonstrated that emotional context influences the cheek sitters offer: those asked to express as much emotion as possible intuitively offer the emotive left cheek; those wishing to conceal emotion present the impassive right cheek. As such, these data support the notion that people are implicitly aware that the left side of the face is the more expressive.

If the left cheek is genuinely more emotionally expressive, this should influence people's perceptions of the sitter. Indeed, research has confirmed that we judge individuals who pose offering the left, rather than right, cheek as being more emotionally expressive (Nicholls, Wolfgang, Clode, & Lindell, 2002b). Nicholls et al. presented participants with a series of photos of models posing with their head turned 15° to the left, 15° to the right, or facing directly ahead. Participants were asked to imagine that they knew the person depicted, and to rate their emotional expressivity using Kring et al.'s (1994) scale. The data confirmed that identical models posing directly facing the camera, and with their left cheek forward, were rated as expressing their emotions more openly than models posing with the right cheek forward. Compatible research has confirmed that people who rate themselves as being more emotionally expressive tend to intuitively offer their left cheek when

asked to pose for a portrait “as themselves” (Nicholls, Clode, Lindell, & Wood, 2002a), further confirming the link between emotion and the left cheek. Combined, this research suggests that the cheek presented offers a silent social signal to the viewer. Because humans must constantly monitor cues (e.g., eye gaze, head orientation, posture, gesture) to interpret other people’s intentions, and ascertain their meaning and consequences, the human brain contains neural systems specialised for automatically extracting such social cues to facilitate interpretation (Adolphs, 1999). A simple turn of the head to expose one or the other cheek appears to be one such cue.

Nicholls et al.’s (1999, 2002a, 2002b) research confirms that the pre- dominant cheek communicates relative emotionality, in addition to factors like identity, age and gender. Theoretically, these emotive cues could implicitly influence opinions concerning other factors, for example, occupation. Stereotypically, some occupations and academic pursuits are perceived as being more serious, logical and analytic (i.e., hard sciences) than others (e.g., Lunn & Noble, 2008; McAdam, 1990). There is a popular conception of scientists being “unemotional, logical rationalists,” (Nicholls et al., 1999, p. 1520), and examination of portraits of scientists conform to this stereotypical image: the catalogue of Royal Society scientists’ portraits failed to reveal the traditional emotive left cheek bias (cf. McManus & Humphrey, 1973; ten Cate, 2002), with scientists equally likely to show the left or right cheek. It is hardly surprising then, that when Nicholls et al. (1999) asked students to pose as a serious scientist, they were more likely to proffer the right cheek. Together, these data imply that a right cheek pose may be perceived as more consistent with the stereotype of the “cold unfeeling scientist” (Nicholls et al., 1999, p. 249). Thus, if asked to determine someone’s professional field, you would theoretically be more likely to suggest a scientific career if that person is depicted putting their right cheek forward.

If concealing emotion is stereotypically linked with scientists, we speculated that expressing emotion (i.e., left cheek pose) may be perceived as consistent with

people engaged in the arts (e.g., English), popular views seeing such individuals as more creative, open and expressive than their scientific counterparts. Hence we would expect that people offering their left cheek would be perceived as specialising in the arts/humanities. But what of psychology? For decades, the debate over psychology's appropriate standing as an art or a science has raged. Arguably, being such a broad discipline, psychology straddles aspects of both the hard sciences (e.g., neuroscience) and the social sciences (e.g., counselling): it is scientific in the sense that empirical studies are used to test hypotheses, but an art in the sense that clinical psychology is intuitive, and relies on more than pure administration of technique. How this categorisation influences cheek perceptions remains to be seen.

Indeed, assessment of cheek preferences may help determine whether psychology is currently perceived as an artistic (left cheek) or a scientific (right cheek) pursuit. To ascertain the merit of our predictions, we asked participants to examine pairs of photos depicting left and right cheek poses, imagine that they knew the people, and make a forced choice, selecting which one was more likely to be a Chemistry (or English, or Psychology) student. If perceptions of academic specialisation are affected by cheek shown, we expected that participants would be more likely to select left cheek images for English students, and right cheek images for Chemistry students. Examination of the pattern of selection for Psychology students would shed light on whether the discipline is commonly viewed as an artistic or scientific pursuit. To ascertain whether the observed effects stem from genuine expressional asymmetries on the part of the models, or perceptual/ aesthetic asymmetries on the part of the viewer, unbeknownst to participants half the images they viewed were mirror reversed. If participants have an aesthetic preference for a particular perceptual arrangement (e.g., Gordon, 1981), then their image preferences will change as a function of orientation (original vs. reversed). If, as we predict, image preferences are driven by genuine anatomic asymmetries in expressiveness of the models, then cheek preferences should be consistent across both original and mirror reversed orientations.

Method

Participants

Two hundred and nine participants (M=90, F=119), ranging in age from 18 to 24, were recruited from Bangor University's participant research pool. All participants were strongly right-handed (Edinburgh Handedness Inventory score $>+7$; Oldfield, 1971), had normal or corrected vision, were students of psychology, and received course credit in exchange for their involvement in the study. All were naïve to the aims and expectations of the investigation.

Stimuli and materials

The stimulus set comprised a series of photographs of 12 models (M=F, Mean age 26 years). Each model posed for two photographs, a left and a right cheek pose, taken professionally using a Kodak DCS460 digital camera (2048×3072 pixel colour images). Models all wore an identical black, v-neck t-shirt and were asked to adopt a natural, friendly expression, as though posing for a family photograph. In each pose, the model's midline directly faced the camera, however their head was turned 15° to the left or right of the camera, upon which models' eyes were fixated. The left and right images were digitally reversed to produce mirror-reversed versions of each image. As such, there were four images of each model: Left Original, Right Original, Left Reversed, Right Reversed (see Nicholls et al., 2002b, for sample stimuli).

A series of stimulus slides were generated using a Latin-Square design, pairing each of the models once with each of the other five same-sex models. Each A4 stimulus book contained a representative set of six pairs of images: each pair showed two same-sex models, one in a left cheek pose and one in a right cheek pose. Half the stimuli showed a pair of Original orientation images; half showed a pair of Mirror-Reversed images (unbeknownst to the participants). The orientation of the images

was counterbalanced to ensure that for half of the images, the left cheek pose appeared on the left and, for the remaining half, the left cheek pose appeared on the right. The images were 102 mm wide and 153 mm high and were printed in grey-scale on landscape A4 sheets. Each pair of images was centred and separated by 20 mm in the centre of the sheet.

At the bottom of each sheet, one of three prompt questions was printed: “Which person is the ENGLISH (PSYCHOLOGY, CHEMISTRY) student?” In each stimulus book, participants were required to indicate which person was the ENGLISH student for a pair of male and female models, which person was the PSYCHOLOGY student for a pair of male and female models, and which person was the CHEMISTRY student for a pair of male and female models, thus there were six trials per participant. The order in which the different academic areas were presented was balanced between participants.

Procedure

Participants completed a single experimental session of approximately 10 minutes duration. After completing a consent form and the Edinburgh Handedness Inventory (Oldfield, 1971), each was given a set of stimuli to evaluate. They were asked to spend 30 seconds inspecting each pair of images and were encouraged to “examine the pairs of faces and try to imagine what those people are like. Try to imagine what their personalities are like, whether they’d be good or poor students, and which type of study they’d be likely to undertake. Once you’ve thought about what those students would be like, we’d like you to indicate which member of each pair looks more like a student of a particular faculty (English, Chemistry, Psychology).” Following each 30-second inspection period, participants were instructed to indicate their forced-choice selection on a response sheet. Participants were subsequently debriefed.

Results

Repeated measures logistic regression was employed to model the relationship between cheek preference (left, right) and the predictor variables: faculty (English, Psychology, Chemistry), participant gender (Male, Female), and model gender (Male, Female). A test of the full model versus a model with intercept only was statistically significant, $\chi^2(2)=14.56$, $p < .001$. The model was able to successfully classify 62.4% of those who made left cheek selections, and 47.3% of those who made right cheek selections, giving an overall success rate of 55%.

Inspection of Table 1 indicates that whereas faculty had a significant influence on cheek selections, neither participant gender nor model gender significantly affected cheek preference ($p > .1$). The interactions between faculty, model gender and participant gender similarly proved nonsignificant ($p > .1$).

TABLE 1

Repeated measures logistic regression predicting cheek selection from faculty, participant gender and model gender

<i>Predictor</i>	<i>B (SE)</i>	<i>Wald χ^2</i>	<i>p</i>
Faculty	−0.54 (0.14)	14.6	<.001
Gender (participant)	0.18 (0.12)	2.38	>.1
Gender (model)	0.11 (0.11)	0.89	>.1

Univariate analysis confirms that when making cheek selections for Chemistry faculty, participants were significantly more likely to choose right cheek poses, $\chi^2(1)=3.68$, $p=.05$, whereas when making cheek selections for English faculty, participants were significantly more likely to select left cheek poses, $\chi^2(1)=9.44$, $p<$

.01. For Psychology faculty, however, participants were no more likely to choose the left than right cheek, $\chi^2(1)=0.54$, ns (please refer to Figure 1).

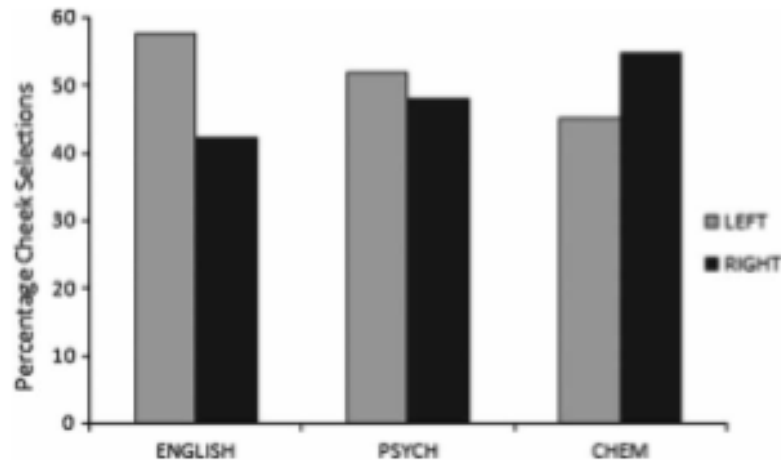


Figure 1. Percentage of left and right cheek selections as a function of academic area.

DISCUSSION

There is little question that the left cheek is more emotionally expressive. People offer the left cheek when asked to pose for emotive portraits, and the right when posing impassively (Nicholls et al., 1999). We judge people showing the left cheek as having more emotionally expressive personalities (Nicholls et al., 2002b) and indeed, people who pose for photos “as themselves” by offering the left cheek have higher self-rated levels of emotional expressivity (Nicholls et al., 2002a). Given the consistency of these findings, we reasoned that people may use cheek shown as a subconscious cue when asked to judge a student’s academic specialisation. Based on the (arguably well-founded) stereotype that scientists are impassive and logical, whereas people pursuing the arts are more creative and open, we predicted that people would be more likely to pick models showing their right cheek as being science students (i.e., Chemistry), and models showing the left cheek as being arts students (i.e., English). The results were consistent with prediction: identical models were more likely to be selected as Chemistry students.

Bearing in mind that identical stimuli were used across the three different conditions (English, Chemistry, Psychology), the difference in cheek preference as a function of academic faculty is particularly striking. Participants determined that the models looked more like English students when they showed their left cheek, and more like Chemistry students when they showed their right cheek; thus a subtle shift in head direction (158) has the potential to significantly impact academic perception. Stereotypically, scientists are perceived as being cold, logical and impassive (Nicholls et al., 1999) and hence should be more likely to conceal emotion. Consequently, right cheek poses appear more consistent with students of the hard sciences (e.g., Chemistry), as the right cheek is less emotionally expressive. In stark contrast, people pursuing the arts are perceived as more creative, open and expressive. As such, left cheek poses are deemed more appropriate for English students, the left cheek being more expressive as it is controlled by the emotive right hemisphere. Importantly, these effects were evident irrespective of image orientation: even when the photos had been digitally reversed, making a true left cheek pose appear as though it is a right cheek pose, participants selected the true left cheek poses for English students, and right cheek poses for Chemistry students. Such a result is important as it confirms that the observed effects stem from genuine differences in physiognomy and hence, emotional expressivity, between the left and right hemifaces, and not from a form of perceptual confound, aesthetic preference, or strategy on the part of the participants.

These results are congruent with Nicholls et al.'s (1999) finding that people offer their right cheek when asked to pose as serious scientists, concealing emotion, and their left cheek when posing for a family portrait, expressing emotion. They argue that people intuitively know which side of the face expresses emotion more effectively, and thus naturally turn their left cheek to express emotion. The present results indicate that this intuitive knowledge subsequently influences perceptions of academic specialisation: for research areas characterised by creativity and openness, a left cheek pose is preferred, whereas disciplines renowned for their serious, analytic, logical approach are naturally predisposed to right cheek postures.

The fact that there was not a clear left or right bias for perceptions of Psychology students fits well with the notion that as a research realm, psychology straddles the boundary between the arts and the sciences. Perhaps if participants had been asked to indicate which model looked more like a cognitive neuroscience student (presumably right cheek poses), or which model looked more like a counselling psychology student (presumably left cheek poses), a differential cheek preference would have emerged. However, given that the academic discipline of psychology encompasses aspects of both the hard sciences and the social sciences, the lack of a clear cheek preference for psychology students appears prosaic. That said, it is important to note that all the participants in this study were themselves students of psychology. As such, their identification with the group and familiarity with the specialization is likely to have enhanced the ease with which they categorised models in the “Psychology” condition. Future investigation is needed to determine whether Chemistry and English students (a) perceive psychology students in the same light, and (b) view themselves as comparatively impassive/emotive, as indicated by their psychology colleagues’ cheek selections.

Model gender did not influence selections, with similar patterns of cheek preference for both male and female models. Similarly, participant gender was not a significant predictor of cheek selection: both male and female participants showed clear biases for left cheek poses for English students and right cheek poses for Chemistry students. Given that females are typically argued to be superior judges of emotional expression (e.g., Montagne, Kessels, Frigerio, de Haan, & Perrett, 2005; Thayer & Johnsen, 2001), and are also known to be more emotionally expressive (Kring et al., 1994), such a finding is perhaps surprising. However in the significant body of literature assessing emotion perception, there is a large degree of contention, with many studies indicating no evidence of sex differences (e.g., Westbrook, 1974; Grimshaw, Bulman-Fleming, & Ngo, 2004). The present findings fall in line with these latter studies, including the work by Nicholls et al. (1999, 2002b), suggesting

that males and females are similarly sensitive to the subtle emotional cues conferred by the cheek put forward.

Throughout this paper we have argued that the left cheek confers emotionality whereas the right communicates greater passivity, in line with the classic view of the right hemisphere's dominance for emotional processing, and Nicholls et al.'s (1999, 2002a, 2002b) research. However the valence hypothesis presents an alternate proposal. The valence hypothesis attributes opposing affective polarity to the hemispheres: the left hemisphere is dominant for positive, approach-related emotions, and the right hemisphere for negative, avoidance-related emotions (e.g., Davidson, 1992). Whilst it has been established that the left cheek remains the more emotive cheek overall (Demaree, Everhart, Youngstrom, & Harrison, 2005), the right cheek has indeed been found to express relatively stronger positive, and the left cheek stronger negative, emotionality (Nicholls, Ellis, Clement, & Yoshino, 2004). Thus is it possible that the left cheek preference for English students, and the corresponding right cheek preference for Chemistry students, reflect a link between English and avoidance behaviours/emotions, and Chemistry and approach behaviours? Such an account appears unlikely. The research assessing cheek preferences and approach/avoidance behaviour suggests that there are gender differences: left cheek poses are more likely to be approached for females as they appear sexually attractive, and avoided for males as they indicate "aggressive dominance" (Schirillo & Fox, 2006, p. 253; Schirillo, 2008). The lack of gender effects for either models or participants in the present study suggests that the motivation for selection is does not appear to be approach/avoidance-related.

Instead, in line with both Nicholls et al. (1999) and ten Cate (2002), we argue that the cheek preferences noted reflect historical personality predispositions toward concealing and expressing emotion in scientific and artistic pursuits respectively. The fact the Nicholls et al. (1999) found that models pose offering the left cheek when required to express as much emotion as possible, making no reference to academic specialisation, and that people who pose offering the left cheek are rated

as being more emotionally expressive (Nicholls et al., 2002b), is consistent with our conclusions.

Our finding that perceived academic specialisation is significantly influenced by cheek shown has potentially important implications. Indeed, these data suggest that something as subtle as a 158 left or right head turn can boost viewers' perceptions of your standing, whether it be as a member of a creative and open, or serious and analytic, discipline. From academics appearing in the public eye (e.g., on television), to expert witnesses testifying in court, knowledge that the cheek put forward will be interpreted as a subconscious cue that has the potential to enhance (or equally, counterbalance) your area of academic expertise is potentially important. Scientists wishing to augment their standing as serious logicians would be well advised to present their right cheek, whereas those keen to defy the stereotype and enhance their perceived creativity and openness should offer the left cheek. Such subtle, conscious manipulations cannot, of course, over-ride the content of the speaker's presentation, interview or testimony. However, putting the appropriate cheek forward will serve to encourage perceptions of academic specialisation in your favoured direction. If you want to be perceived as expressive and open, rather than serious and analytic, it may just be time to turn the other cheek.

Acknowledgements

Many thanks to Chris McManus and Mike Nicholls for their helpful suggestions on matters statistical.

References

Adolphs, R. (1999). Social cognition and the human brain. *Trends in Cognitive Sciences*, 3, 469- 479.

- Borod, J. C., Andelman, F., Obler, L. K., Tweedy, J. R., & Welkowitz, J. (1992). Right hemisphere specialization for the perception of emotional words and sentences. *Neuropsychologia*, 30, 827- 844.
- Bowers, D., Bauer, R.M., Coslett, H. B., & Heilman, K. M. (1985). Processing of faces by patients with unilateral hemisphere lesions: Dissociations between judgements of facial affect and facial identity. *Brain and Cognition*, 4, 258-272.
- Darwin, C. (1872). *The expression of emotions in man and animals*. New York: D. Appleton & Company.
- Davidson, R. J. (1992). Emotion and affective style: Hemispheric substrates. *Psychological Science*, 3, 39-43.
- Demaree, H. A., Everhart, D. E., Youngstrom, E. A., & Harrison, D. W. (2005). Brain lateralization of emotional processing: Historical roots and a future incorporating “dom- inance”. *Behavioral and Cognitive Neuroscience Reviews*, 4(1), 3-20.
- Engell, A. D., Haxby, J. V., & Todorov, A. (2007). Implicit trustworthiness decisions: Automatic coding of face properties in the human amygdala. *Journal of Cognitive Neuroscience*, 19, 1508- 1519.
- Grimshaw, G. M., Bulman-Fleming, M. B., & Ngo, C. A. (2004). Signal-detection analysis of sex differences in the perception of emotional faces. *Brain and Cognition*, 54, 248-250.
- Gordon, I. E. (1981). Left and right in art. In D. O'Hare (Ed.), *Psychology and the arts* (pp. 211- 241). Sussex: Harvester Press.
- Hauser, M. D. (1993). Right hemisphere dominance for the production of facial expression in monkeys. *Science*, 261, 475-477.
- Hellige, J. B. (1993). *Hemispheric asymmetry: What's right & what's left*. Cambridge, MA: Harvard University Press.
- Kring, A., Smith, D., & Neale, J. (1994). Individual differences in dispositional expressiveness: Development and validation of the emotional expressivity scale. *Journal of Personality and Social Psychology*, 66, 934-949.

- Lunn, N., & Noble, A. (2008). Re-visioning science, "Love and passion in the scientific imagination": Art and science. *International Journal of Science Education*, 30, 793-805.
- McAdam, J. E. (1990). The persistent stereotype: Children's images of scientists. *Physics Education*, 25, 102-105.
- McManus, I. C., & Humphrey, N. K. (1973). Turning the left cheek. *Nature*, 243, 271-272.
- Montagne, B., Kessels, R. P. C., Frigerio, E., de Haan, E. H. F., & Perrett, D. I. (2005). Sex differences in the perception of affective facial expressions: Do men really lack emotional sensitivity? *Cognitive Processing*, 6, 136-141.
- Nicholls, M. E. R., Clode, D., Wood, S. J., & Wood, A. G. (1999). Laterality of expression in portraiture: Putting your best cheek forward. *Proceedings of the Royal Society (Section B)*, 266, 1517-1522.
- Nicholls, M. E. R., Clode, D., Lindell, A. K., & Wood, A. G. (2002a). Which cheek to turn? The effect of gender and emotional expressivity on posing behaviour. *Brain and Cognition*, 48, 480-484.
- Nicholls, M. E. R., Wolfgang, B. J., Clode, D., & Lindell, A. K. (2002b). The effect of left and right poses on the expression of facial emotion. *Neuropsychologia*, 40, 1662-1665.
- Nicholls, M. E. R., Ellis, B. E., Clement, J., & Yoshino, M. (2004). Detecting hemifacial asymmetries in emotional expression with 3D computerised image analysis. *Proceedings of the Royal Society*, 271, 663-668.
- Oldfield, R. C. (1971). The assessment and analysis of handedness: The Edinburgh Inventory. *Neuropsychologia*, 9, 97-113.
- Patten, J. (1996). *Neurological differential diagnosis* (2nd ed.). New York: Springer-Verlag.
- Sackheim, H. A., Gur, R. C., & Saucy, M. C. (1978). Emotions are expressed more intensely on the left side of the face. *Science*, 202, 434-436.
- Schirillo, J. A. (2008). Gender's effect on the hemispheric laterality of Rembrandt's portraits. *Spatial Vision*, 21, 19-26.

- Schrillo, J. A., & Fox, M. A. (2006). Rembrandt's portraits: Approach or avoid? *Leonardo*, 39, 253- 256.
- ten Cate, C. (2002). Posing as professor: Laterality in posing orientation for portraits of scientists. *Journal of Nonverbal Behavior*, 26, 175-192.
- Thayer, J., & Johnsen, B. H. (2001). Sex differences in judgement of facial affect: A multivariate analysis of recognition errors. *Scandinavian Journal of Psychology*, 41, 243-246.
- Westbrook, M. (1974). Sex differences in the perception of emotion. *Australian Journal of Psychology*, 26, 139-146.