Right hemispheric bias and left visual field superiority: The effects of gender, handedness and mood on the perception of chimeric faces

Previous research into the perception of emotion has highlighted how this cognitive ability is influenced by a multitude of factors. A number of biological, social and environmental variables help determine our ability to judge the emotional state of others and, more specifically, the magnitude of emotion we perceive them to be expressing.

There is a general consensus amongst scientists that the two hemispheres of the brain are each specialised in the performance of different tasks. In general terms, the left hemisphere governs speech and other verbal tasks (Baron, 2001), while the right hemisphere specialises in the performance of visuo-spatial tasks and the comprehension and communication of emotion (Baron, 2001; Habib, 1998; Ladavas, Umilta & Ricci-Bitti, 1980). Consequently, the majority of research has revealed that when perceiving emotion, stimuli that activate our right hemisphere are going to more greatly influence our judgments than those that stimulate activity in our left hemisphere (Baron, 2001; Schwartz, & Smith, 1980).

Because the perception of emotion is a highly visual task, any right hemispheric (RH) bias theoretically should be strongly influenced by the design of our visual system. As Baron (2001) and Eccles (1984) acknowledge, the human visual system is structured in such a way that stimuli are perceived contralaterally; items presented to the left visual field (LVF) stimulate predominantly the right hemisphere, whereas items in the right visual field (RVF) stimulate chiefly the left hemisphere.

Thus, people who possess a RH bias when judging facial emotional expressions will be more influenced by the emotion expressed on the left side of the face than the right side (Roskowski, Snelbecker, & Rosen, 1986); this phenomenon is known as LVF superiority. Consequently, a chimeric face with a smiling left side and a neutral right side should be judged as 'happier' than a chimeric face with the smile on the right side if people display this LVF superiority. Several studies (e.g. Campbell, 1978; Christman & Hackworth, 1993; Schwartz & Smith, 1980) support this theory, and have inferred from the presence of this LVF superiority the existence of a RH bias when making judgments on facial emotional expressions. Our study aims to replicate these findings, hypothesising that participants, when judging happy-neutral chimeric faces, will exhibit this LVF superiority, thus indicating a RH bias.

Additionally, past studies have shown that this RH bias for the comprehension of emotion is shaped by various factors. Gender of the observer and the chimeric face, handedness, and mood, have all been found to influence the degree to which people display LVF superiority when judging facial expressions.

A number of studies have found females, as well as being more expressive and descriptive than males (Baron, 2001), demonstrate a greater LVF superiority than males (Crucian & Berenbaum, 1998; David, 1989; Ladavas *et al.*, 1980; Levy & Heller, 1992; Rubin & Rubin, 1980; Sanz-Martin & Loyo, 2001). Other studies have found gender to have no effect (Landis, Assal, & Perret, 1979). While this study seeks to clarify the role of gender, the previous research has led us to hypothesise females would show a stronger LVF superiority than males in this study.

With the small number of previous studies investigating the effects of gendered emotional stimuli showing highly mixed results (Campbell, 1978; Hugdahl, Iversen, & Johnsen, 1993), this study aims to explore whether the gender of the chimeric faces influences participants' judgments. If females are in fact more expressive than males, then there would be a greater differentiation between their expressive (happy) face and their neutral face in the chimeric faces. Thus, the study hypothesised that any RH bias (and subsequent LVF superiority) would be more pronounced when viewing female faces compared to male faces, as this specialised function of the right hemisphere would not be impeded by first having to determine whether the two expressions on the face are in fact different.

The finding by Bryden (1982) and Hellige *et al.* (1994) that left-handers are less likely to exhibit typical patterns of hemispheric specialisation suggests they will not display a RH bias to the same extent as right-handers. The majority of past research supports this theory (David, 1989; Compton & Levine, 1997; Levy, Heller, Banich, & Burton, 1983). We hypothesised that our study would replicate these findings, with right-handers exhibiting a greater LVF superiority than non-right-handers (left-handers and ambilaterals).

Compton & Levine (1997) found that an induced negative mood resulted in a shift in perceptual asymmetry on their face perception task in favour of the RVF, indicating a decrease in RH bias. This raises the possibility that a naturally-occurring negative mood could have the same effect, reducing the superior RH involvement that is otherwise evident in a positive mood. The fact that this study also found that changes in perceptual asymmetry throughout the menstrual cycle were in fact

attributed to fluctuations in mood rather than hormonal changes, as well as the finding in other studies that depressed patients display a decreased lateralisation of the RH bias (Jaeger, Borod, & Peselow, 1987; Kucharska-Pietura, & David, 2003) also suggest that spontaneous mood variations are associated with changes in RH contribution. However, numerous studies have made the conflicting finding that subjective mood has no effect on LVF superiority (Fogel, 2000; Harris & Snyder, 1992). This highlights the need to clarify the role of mood in the perception of emotion. In light of this past research, this study hypothesised that there would be a positive correlation between mood and RH bias; that is, the happier people reported themselves to be, the greater LVF superiority they would display

Thus, the aim of this study was to clarify any role gender, handedness and mood has on LVF superiority in judgments of emotional chimeric faces. While we expected the study sample to show a general LVF superiority in the comprehension of emotion, we hypothesised that this LVF superiority would be more pronounced amongst the female participants compared to the males, the right-handers more so than the non-right-handers, and those who reported themselves to be in a positive mood, compared to those in a more negative mood. We also hypothesised that viewing female chimeric faces would elicit a greater LVF superiority than when judging male chimeric faces. A RH bias would be inferred from the presence of this LVF superiority.