

# Ear Advantage and Facial Asymmetry: Their Possible Roles in Handedness

## Avantage De L'oreille Et Asymétrie Faciale: Leurs Rôles Possibles Dans La Main

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### ABSTRACT

This expression explores the interrelations among ear advantage, facial asymmetry, and handedness. By examining current literature and integrating findings from key studies, including those by Dane et al. and Previc, we aim to elucidate how these aspects of cerebral lateralization interact and contribute to the manifestation of handedness. The implications of these relationships for understanding the neural basis of lateralization are also discussed.

### ABSTRAIT

Cette expression explore les interrelations entre l'avantage de l'oreille, l'asymétrie faciale et la main. En examinant la littérature actuelle et en intégrant les résultats d'études clés, y compris celles de Dane et al. et de Previc, nous visons à élucider comment ces aspects de la latéralisation cérébrale interagissent et contribuent à la manifestation de la main. Les implications de ces relations pour la compréhension de la base neurale de la latéralisation sont également discutées.

### INTRODUCTION

Cerebral lateralization refers to the specialization of brain functions in the left and right hemispheres. Handedness, the preference for using one hand over the other, is one of the most observable manifestations of lateralization. This review focuses on two other important aspects of lateralization: ear advantage and facial asymmetry. Ear advantage refers to the phenomenon where one ear shows superior performance in auditory tasks, often associated with the dominant hemisphere for language. Facial asymmetry pertains to differences in the structure and function of the left and right sides of the face, which may reflect underlying hemispheric dominance. We will explore how these phenomena relate to handedness and discuss their potential neural mechanisms.

### EAR ADVANTAGE

#### Definition and Mechanisms

Ear advantage, particularly the right

ear advantage (REA), is commonly observed in dichotic listening tasks where individuals tend to perform better with stimuli presented to the right ear. This phenomenon is attributed to the left hemisphere's dominance for language processing, as auditory information from the right ear is primarily processed by the contralateral (left) hemisphere.

Several studies have documented REA in various populations, supporting its association with left hemisphere dominance. For instance, Kimura et al (1) demonstrated that right-handed individuals typically exhibit a stronger REA, suggesting a link between ear advantage and handedness. Further research by Bryden et al (2) extended these findings to include left-handed individuals, who show more variable patterns of ear advantage, possibly due to more diverse brain lateralization.

#### Correlation with Handedness

Studies indicate a significant

correlation between ear advantage and handedness. Dane et al. found that right-handed individuals are more likely to exhibit REA, reinforcing the notion that lateralized auditory processing is related to motor preferences (3). Additionally, Dane and Gumustekin investigated sex and handedness differences in hearing durations of the right and left ears, finding significant differences that further underscore the relationship between ear advantage and handedness (4).

### FACIAL ASYMMETRY

#### Definition and Mechanisms

Facial asymmetry refers to the structural and functional differences between the left and right sides of the face. These asymmetries can manifest in various ways, including differences in facial expressions, muscle tone, and even craniofacial structure. Facial asymmetry is thought to reflect the underlying asymmetry in brain function.

## LITERATURE REVIEW

Research has shown that facial asymmetry can be indicative of hemispheric dominance. For instance, Sackeim et al. (5) found that emotional expressions are often more pronounced on the left side of the face, which is controlled by the right hemisphere, dominant for emotional processing. Additionally, about two-thirds of humans possess a slightly larger left facial region (6,7).

### Correlation with Handedness

The relationship between facial asymmetry and handedness has been explored in several studies. An association between the width of human craniofacial areas and hand preference has been reported by Keles et al (8) and by Dane et al (9). In a recent study, Dane, Gungormus, Okuyan, and Tan (3) reported that the left side of the face was larger than the right side in a sample of left-handers, whereas right-handers did not show such a right-left difference in facial measurements. They remarked that hand skill and cognitive abilities might be predicted from craniofacial width in right- and left-handed men and women. Dane et al. (9) reexamined these findings in a sample of healthy young adults and found significant differences in the widths of the right and left craniofacial regions between right-handed and left-handed individuals, suggesting a potential common neural basis for these lateralized traits.

### Previc's Theory on Cerebral Lateralization

Previc (10) proposed a general theory concerning the prenatal origins of cerebral lateralization in humans. This theory suggests that lateralized functions, including handedness, may have their roots in early prenatal development, influenced by factors such as fetal positioning in the womb and sensory stimulation.

## INTEGRATIVE DISCUSSION

### Neural Basis of Lateralization

The interrelations among ear advantage, facial asymmetry, and handedness likely stem from the neural organization of the brain. Hemispheric specialization for different functions, such as language in the left hemisphere and emotional processing in the right hemisphere, may result in observable asymmetries in both auditory processing and facial structure.

### Implications for Understanding Handedness

Understanding how ear advantage and facial asymmetry relate to handedness can provide deeper insights into the mechanisms of cerebral lateralization. For instance, the consistent association of REA with right-handedness supports the idea that lateralization of language and motor functions are interconnected.

## FUTURE DIRECTIONS

Future research should aim to explore these relationships in more diverse populations, including left-handed individuals and those with atypical lateralization patterns. Longitudinal studies could also help determine how these asymmetries develop and interact over time.

## CONCLUSION

This review highlights the significant relationships among ear advantage, facial asymmetry, and handedness. By integrating findings from various studies, including Dane et al. (2002, 2003, 2004) and Previc (1991), we suggest that these aspects of cerebral lateralization are interconnected and may share common neural mechanisms. Further research is needed to fully understand the complexities of these relationships and their implications for the broader field of neuroscience.

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