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# Theoretical article

## HAND PREFERENCE AND NEUROTICISM: CONCEPTUAL LINKS AND THEORETICAL CONSIDERATIONS

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***Abstract:***
*This article examines the complex relationship between handedness and the personality trait of neuroticism. While some early studies suggest an association between left-handedness and higher levels of neuroticism, more recent empirical findings present inconsistent results. A range of mediating factors are considered, including social pressure and the adaptive challenges faced by left-handed individuals in a predominantly right-handed world. These conditions may contribute to increased emotional reactivity and vulnerability to neurotic tendencies. Evidence also indicates potential gender differences in this association, with some sources highlighting a greater emotional sensitivity among women. In addition to socio-cultural influences, biological and prenatal determinants are analyzed, including genetic predispositions and hormonal environments during intrauterine development. Contemporary neuroimaging studies further support the existence of differences in brain organization related to emotional regulation among left-handed individuals. Overall, the relationship between handedness and neuroticism appears to stem from a complex interplay of genetic, neurological, developmental, and environmental factors. Further interdisciplinary research is required to elucidate the underlying mechanisms.*

***Keywords:*** *handedness, neuroticism*

## 1. Introduction

Throughout history, the relationship between handedness and emotional traits has intrigued researchers. In particular, the association between handedness and the personality trait of neuroticism has been the subject of extensive investigation, though results have varied significantly across studies. Early research efforts, many dating back to the mid-20th century, produced inconclusive outcomes – some suggesting that individuals who favor their left hand may be more prone to neuroticism, while others found no meaningful link. Despite advances in methodology and increases in sample sizes, findings have remained mixed, reflecting the complexity of isolating the effects of handedness on emotional traits.

A comprehensive review by McManus (2002) reported a small but possible correlation between left-handedness and neurotic tendencies. Although this meta-analysis suggested a slight increase in emotional instability among left-handers, the inconsistency of results across studies highlighted the challenges in drawing firm conclusions. The heterogeneity of samples and differing assessment tools may partially account for these discrepancies.

One plausible explanation for the observed emotional differences among left-handed individuals involves the unique challenges they may face in environments designed predominantly for right-handers. Coren and Porac (1977) proposed that the everyday inconveniences and potential social stigmas associated with left-handedness could result in elevated stress levels. This, in turn, may contribute to increased vulnerability to emotional dysregulation or higher neuroticism scores. Difficulties with tools, educational systems, and subtle societal biases may cumulatively impact emotional well-being.

Gender differences may further complicate the connection between handedness and neuroticism. For instance, findings by Hines et al. (2003) suggested that left-handed women may report higher levels of neuroticism compared to their male counterparts. This could be attributed to broader societal expectations regarding emotional expression, gender roles, or the way stress is internalized differently by women.

The relationship between handedness and neuroticism, although studied by a number of researchers, still remains unclear. One popular view is that the association between handedness and neuroticism have genetic foundations. Research findings indicated that handedness likely involves polygenic influences, while studies of twins suggest that up to 60% of the variance in neuroticism can be attributed to genetic factors. Scholars such as Annett (1996) have theorized that some of the same genetic mechanisms could potentially influence both traits, though specific genetic links remain elusive.

In addition to genetic influences, prenatal factors have been proposed as important contributors to both handedness and emotional temperament. For example, elevated levels of prenatal testosterone have been associated not only with a greater likelihood of developing left-handedness but also with increased emotional reactivity in later life (Beatty & Fendrich, 1994). Such biological conditions during fetal development may shape both behavioral preferences and affective dispositions.

Another view is that environmental pressures and cultural attitudes may also play a significant role. In societies where left-handedness is discouraged or stigmatized, individuals who exhibit this trait may be more likely to experience psychological discomfort or social exclusion. As Coren (1992) noted, the persistent use of right-hand-favoring tools and educational practices can contribute to feelings of frustration or marginalization, which may increase susceptibility to neurotic traits. McManus (2002) further emphasized that negative cultural perceptions of left-handedness could exacerbate stress and emotional reactivity in affected individuals.

Contemporary studies utilizing brain imaging technologies have provided deeper insight into the possible neural underpinnings of this relationship. For example, functional MRI research has explored how the default mode network, associated with introspective thought and emotional regulation, may function differently in left-handed individuals (Papageorgiou et al., 2019). These variations in neural activity might account for observed differences in emotional stability.

Summarizing recent findings it can be concluded that the relationship between handedness and neuroticism is likely multifaceted rather than directly causal. Papageorgiou et al. (2019) emphasized that any observed associations are probably shaped by a dynamic interplay of genetic predispositions, early developmental conditions, and environmental influences.

Indeed, the research into the relationship between handedness and neuroticism has been both extensive and varied. Early studies were inconclusive, with some suggesting that left-handed individuals exhibit higher neuroticism (Orme, 1970), while others found no such correlation (Camposano, Corail, & Lolas, 1991). The first major studies on this topic began in the mid-20th century and have since expanded to larger sample sizes and more sophisticated methodologies. A meta-analysis by McManus (2002) suggested a potential, albeit weak, connection between left-handedness and neuroticism. While the analysis pointed to some increased emotional instability in left-handed individuals, it emphasized that these findings were not consistent across all studies. The variability of results in this area has been a significant challenge for researchers. One possible explanation for these findings is that left-handed individuals face more environmental stress compared to their right-handed peers. This hypothesis, first suggested by Coren and Porac (1977), posits that being a left-hander in a predominantly right-handed world might lead to greater emotional challenges, such as

frustration or social stigma. This increased stress could, in turn, contribute to higher levels of neuroticism.

On the other hand, some studies have proposed that gender may play a role in the relationship between handedness and neuroticism. Research conducted by Hines et al. (2003) suggested that left-handed women may report higher levels of neuroticism than left-handed men, potentially due to societal gender expectations, emotional expression norms, or heightened sensitivity in women towards social and emotional stressors.

Another issue concerns genetic influences on handedness and neuroticism. Handedness is believed to have a genetic component, with multiple genes likely influencing whether a person is left- or right-handed (Brandler et al., 2013; McManus, 2002; Medland & Evans, 2020). Similarly, neuroticism has a known genetic basis, with twin studies revealing that 40-60% of the variation in neuroticism can be attributed to inherited factors. Some researchers, such as Annett (1996), have suggested that certain genetic markers might influence both handedness and personality traits like neuroticism, though specific genes responsible for both remain unclear.

Moreover, it has also been hypothesized that prenatal conditions, such as hormone levels during pregnancy, might influence both handedness and personality. High levels of testosterone in the womb have been linked to a higher probability of left-handedness, as well as increased emotional reactivity and neurotic tendencies in adulthood (e.g., Beatty & Fendrich, 1994). This suggests that early biological factors could play a significant role in shaping both an individual's handedness and their emotional predispositions.

Among the most frequently discussed theories is the idea that left-handed individuals may face unique environmental and social challenges that contribute to greater emotional sensitivity. In a world designed largely for right-handed people, from the layout of tools and gadgets to the very structure of educational systems, left-handers often find themselves navigating environments that don’t quite accommodate them. These day-to-day inconveniences can compound into feelings of frustration, social awkwardness, or even a lingering sense of being "different." According to Coren (1992), such social stressors may foster emotional instability, potentially increasing vulnerability to neuroticism.

Cultural perceptions of left-handedness also play a significant role. In certain societies, being left-handed has historically been viewed with suspicion or negativity, and individuals deviating from the norm were often subjected to stigma. As McManus (2002) points out, this cultural disapproval can lead to psychological distress. Left-handers in these environments may grow up with heightened emotional reactivity, shaped by years of feeling misunderstood or pressured to conform – factors that can contribute to traits typically associated with neuroticism.

In recent years, scientific inquiry into this topic has become more sophisticated. Contemporary studies have shifted from anecdotal observations to data-driven investigations, leveraging tools like brain imaging and large-scale longitudinal research. Functional MRI, for instance, has allowed scientists to explore how brain regions involved in self-reflection and emotional regulation, particularly the default mode network, might function differently in left-handed individuals. Some of these findings suggest that these neural variations could underlie distinct emotional processing patterns that relate to neuroticism (Papageorgiou et al., 2019).

Yet, the emerging consensus among modern researchers is that the relationship between handedness and neuroticism is anything but straightforward. Papageorgiou and colleagues (2019) argue that it's unlikely to be a direct cause-and-effect scenario. Instead, it’s more plausible that a complex interplay of genetics, prenatal development, environmental stress, and family dynamics shapes emotional outcomes. In this light, handedness may be just one piece of a much larger puzzle.

The summary of the above-mentioned literature review indicates that, while earlier studies suggested a connection between left-handedness and heightened levels of neuroticism,

current research presents a far more nuanced picture. Factors such as brain organization, cultural context, and upbringing appear to interact in complex ways, making it difficult to isolate handedness as a sole contributor. Foundational studies by Coren and Porac (1977), McManus (2002), and more recent work by Papageorgiou et al. (2019) have deepened our understanding, while also underscoring the multifaceted nature of this relationship. As with many areas of human psychology, the link between handedness and emotional traits appears to be shaped by a web of overlapping biological and environmental influences.

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