Comment

A Model for Representing Gender Differences in the Pattern of Cognitive Abilities

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Feingold's (February 1988) recent meta-analytic assessment of gender-related performance on the Differential Aptitude Tests (DAT) indicated that the magnitude of the male performance advantage on spatial-related measures and the female performance advantage on language-related measures decreased between 1947 and 1980. This trend toward disappearing gender differences indicates that conceptual models for the explanation of group, as well as individual, differences in the profile of cognitive abilities must identify a mechanism by which secular, or cultural, changes can influence the pattern of cognitive skills, but at the same time such a model must be constrained by current knowledge of more fundamental mechanisms, that is, the neural substrates and associated processes underlying human cognition. Along these lines, one must consider the mechanisms by which both biological and sociocultural factors might influence the developing pattern of human cognitive abilities.

One potential biological mechanism involves gender differences in prenatal exposure, or sensitivity, to adrenal/gonadal hormones (cf. Resnick, Berenbaum, Gottesman, & Bouchard, 1986). A hormone-related influence on gender differences in the pattern of cognitive skills does not, however, provide a satisfactory explanation of Feingold's (1988) findings of a decrease in the magnitude of such differences. An alternative to the hormonal explanation is that culture-mediated differential patterns of experience for male and female individuals underlie gender differences in cognitive abilities (Serbin & Connor, 1979). Indeed, culture, presumably through its impact on the focus of activities, does appear to influence the developing pattern of cognitive skills (Lesser, Fifer, & Clark, 1965). An experience-related mechanism would explain Feingold's (1988) results if it is assumed that male and female activity patterns have become more similar in recent years; thus, as experiences become more similar, the male and female profiles of cognitive abilities converge.

However, the experience-based explanation is not completely satisfactory as it does not account for findings that suggest that the human cortex is likely specialized for the processing of language- and spatial-related information from birth (e.g., Molfese, Freeman, & Palermo, 1975; Witelson, 1987; Witelson & Swallow, 1987) and that, at least for adults, there appear to be functional, and perhaps hormone-influenced, differences in the left and right hemisphere of male and female individuals related to the processing of such information (Gur et al., 1982; McGlone, 1980). In other words, a strictly sociocultural mechanism underlying gender differences in the pattern of cognitive abilities does not account for functional and perhaps anatomical differences in the human brain as related to biological sex and as potentially related to cognition.

Thus, it might be proposed that some form of interaction between sociocultural and biological factors underlies the observed gender differences in cognitive abilities: This type of proposal actually explains little and is, in fact, simply an admission that both biological and sociocultural factors likely influence human abilities. A more satisfactory model would require the identification of a mechanism that influenced the developing pattern of cognitive abilities and was itself influenced by both biological and sociocultural factors.

One such potential mechanism is gender, and individual, differences in the frequency of engagement in sex-dimorphic behaviors (Ehrhardt & Meyer-Bahlburg, 1981; Frayer & Wolpoff, 1985). These activities should be understood in terms of the frequency of engagement in observable behaviors that are evident early in ontogenetic development and are likely influenced by biological factors. Such behaviors include physical outdoor activity levels and rehearsal of parenting behavior (Ehrhardt & Meyer-Bahlburg, 1981). Thus, biological factors, which may include adrenal and gonadal hormones, in addition to influencing the functional organization of the cortex, appear to exert a subtle influence on the early activity patterns of our species, and the relative focus of these behaviors, in some respects, seems to be different for male and female individuals (Maccoby, 1988). Furthermore, these same behavior patterns may also be influenced by sociocultural factors (Frayer & Wolpoff, 1985) and may differentially impact the developing pattern of cognitive skills (Baenninger & Newcombe, in press).

In short, the hormone-influenced male tendency to engage in certain sex-dimorphic activities more frequently may give male individuals an advantage, relative to female individuals, in the development of spatial-related skills. Culture, however, may attentuate or exaggerate these early biology-related behavioral gender differences by directing the focus of the experiences of male and female individuals to be more or less similar, which would thereby influence the pattern of gender-related abilities. Within this model, the male performance advantage on measures of spatial ability would be related to prenatal hormonal factors, but the magnitude of this advantage would not be immutable and in fact could vary across generations and across cultures.

If this is the case, there are two potential long-term outcomes. As male and female individuals become more similar in the focus of their activities (e.g., the type of course work they pursue in high school), then the gender difference in the pattern of cognitive abilities might eventually disappear. The second possibility is that lessening behavioral gender differences might interact with subtle and perhaps hormone-influenced differences in the fundamental information-processing systems of male and female individuals, which might attenuate the magnitude of the gender differences in cognitive abilities, but these differences might not completely disappear.

One general prediction of this model is that the male performance advantage on measures of spatial ability should be evident in childhood and the magnitude of this gender difference should increase throughout childhood and adolescence (cf. Johnson & Meade, 1987). Moreover, the model predicts a specific relationship between early activity patterns and the pattern of later cognitive abilities. To illustrate, individual differences in spatial abilities should be related to the frequency of engagement in male-typical sex-dimorphic behaviors (e.g., rough-and-tumble play) and not to the frequency of engagement in female-typical sex-dimorphic behaviors. Alternatively, the relationship between the frequency of engagement in early sex-dimorphic behaviors and the profile of cognitive abilities might be less direct. For example, the distribution of these early sex-dimorphic behaviors might be continuous with later patterns of adolescent spatial-related activities which, in turn, could contribute to gender, and individual, performance differences on measures of spatial ability.

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