

An Evolutionary Perspective of Sex-Typed Toy Preferences: Pink, Blue, and the Brain

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Large sex differences in children's toy preferences are attributed to gender group identification and social learning. The proposal outlined in this paper is that contemporary conceptual categories of "masculine" or "feminine" toys are also influenced by evolved *perceptual* categories of male-preferred and female-preferred objects. Research on children exposed prenatally to atypical levels of androgens and research on typically developing infants suggest sex-dimorphic preferences exist for object features, such as movement or color/form. The evolution and neurobiology of mammalian visual processing—and recent findings on sex-dimorphic toy preferences in nonhuman primates—suggest further that an innate bias for processing object movement or color/form may contribute to behaviors with differential adaptive significance for males and females. In this way, preferences for objects such as toys may indicate a biological preparedness for a "masculine" or "feminine" gender role—one that develops more fully as early perceptual preferences are coupled with object experiences imposed by contemporary gender socialization.

KEY WORDS: human evolution; human sex differences; toy preferences; gender roles; visual processing.

Large sex differences in toy preferences exist throughout much of childhood (for discussion, see Ruble & Martin, 1998) and appear to further sex differences in cognitive and social development. Playthings, selected to amuse or engage the interest of a child, also afford opportunities for object manipulation or exploration that appear to enhance sex-dimorphic spatial abilities (Liss, 1981). Most children prefer playmates of the same sex and with compatible play styles (e.g., Alexander & Hines, 1994), and these preferences result in same-sex groupings that promote sex-dimorphic social interaction patterns (Maccoby, 1990, 1998). In these ways, sex-dimorphic toy preferences in childhood are early underpinnings of gender role in adulthood.

This paper describes research on sex differences in human behavior and perceptual processing suggesting that evolved visual processing biases contribute to contemporary sex-dimorphic toy preferences. This new suggestion is consistent with the general hypothesis that contempo-

rary sex-dimorphic play styles may have adaptive significance for males and females. For example, selection pressures for male bonds that facilitated successful group hunting and protection of resources are thought to have evolved male preferences for male playmates (Benenson, Morganstein, & Roy, 1998). Research reviewed in this paper suggests that the early social roles of males and females may also have evolved preferences for object features and functions that influence children's toy preferences and perpetuate behavioral sex differences with adaptive significance. As summarized below, the proposed transactional relations among biological factors, social roles of males and females, and toy preferences are supported by studies on the proximate social and biological determinants of toy preferences and research on the evolutions of sex-dimorphic spatial abilities and color vision.

PROXIMATE SOCIAL AND BIOLOGICAL INFLUENCES ON CHILDREN'S TOY PREFERENCES

Children's toy preferences are often explained in terms of gender socialization. A gender label clearly

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initiates a process of social learning that includes modeling and reinforcement of sex-typical toy preferences (Bussey & Bandura, 1999). Consistent with the stereotypical social roles of men and women, male infants are provided more frequently with toy vehicles or toy tools, whereas female infants are provided more frequently with dolls (Pomerleau, Bolduc, Malcuit, & Cossette, 1990). In later development, boys and girls prefer different toys (Connor & Serbin, 1977; Liss, 1981) and these toy preferences are consistent with the general cultural view of gender appropriate toys. The apparent internalization of social norms for gender appropriate toys is thought to occur with the formation of a gender identity—the hypothesized core of gender schemas or mental representations that include socially defined gender appropriate behavior (Maccoby, 1988; Martin, 1989, 1999; Martin & Halverson, 1981; Martin & Little, 1990). From this perspective, once a child accepts membership in a gender group, he or she comes to value and adopt the social role associated with their gender label, and this gender role includes preferences for toys such as dolls or vehicles.

A gender label is initiated by the dichotomous categorization of the external genitalia, whose male or female appearance is one outcome of a cascade of prenatal hormonal processes that also influences the sex-dimorphic development of the brain, at least in nonhuman mammals (Kelly, Ostrowski, & Wilson, 1999; MacLusky, Bowlby, Brown, Peterson, & Hochberg, 1997). Increasingly, studies on human and nonhuman animal species indicate that another outcome of this biological process of sexual differentiation is sex-dimorphic behaviors. Experimental manipulation of gonadal hormones (e.g., by physical or chemical castration or by injecting exogenous androgens) during nonhuman development shows unequivocally that hormone-dependent masculinization of the brain increases the frequency of subsequent rough and tumble play (Meaney, 1988; Meaney & McEwen, 1986) and also masculinizes sexual and aggressive behavior (Breedlove, Cooke, & Jordan, 1999; Cooke, Hegstrom, Villeneuve, & Breedlove, 1998). Studies on atypical reproductive development during prenatal life in humans suggest that sex differences in prenatal androgen levels may initiate similar behavioral sex-dimorphisms in our postnatal life (Collaer & Hines, 1995; Wilson, 1999)—tendencies that in typical development appear amplified by gender socialization (e.g., Campbell & Eaton, 1999). Girls with congenital adrenal hyperplasia, for example, are exposed to high levels of adrenal androgens prenatally (i.e., more male-typical; e.g., Carson et al., 1982). Some research indicates that postnatally they show greater aggression (Berenbaum & Resnick, 1997), enhanced (i.e., masculine) visuospatial

abilities (Hampson, Rovet, & Altmann, 1998; Resnick, Berenbaum, Gottesman, & Bouchard, 1986), more masculine occupational preferences (Berenbaum, 1999), and an increased rate of bisexual or homosexual sexual orientation in fantasy and/or behavior (Zucker et al., 1996).

Preferences for toys typically preferred by boys are also increased in androgenized girls (Berenbaum & Hines, 1992; Hines & Kaufman, 1994). Increased preferences for “masculine” toys may indicate an atypical gender socialization of androgenized girls (Fausto-Sterling, 1992). They also suggest that biological factors (i.e., prenatal levels of androgens) may influence sex-dimorphic toy preferences (Berenbaum & Hines, 1992; Hines & Kaufman, 1994). In view of animal research indicating prenatal androgens promote rough and active play (e.g., Meaney, 1988), one previous suggestion is that higher levels of prenatal androgens in girls may increase preferences for “masculine” toys because such objects afford greater opportunities for engaging in male-typical play (e.g., Hines & Kaufman, 1994). Biological influences on toy preferences are also consistent with other research showing that visual preferences in infants for gender-linked toys exist earlier in development than predicted by cognitive–social theories of gender role behavior (Campbell, Shirley, & Heywood, 2000; O’Brien & Huston, 1985; Serbin, Poulin-Dubois, Colburne, Sen, & Eichstedt, 2001). Moreover, as visual preferences for gender-linked toys precede an ability to engage in gender-linked play-styles, sex differences in the salience or rewarding properties of distinct object *features* associated with “masculine” or “feminine” toys appear to exist (Campbell et al., 2000).

An innate preference for distinct object features would also explain why vervet monkeys (*Cercopithecus aethiops sabaues*) show sex differences in toy preferences similar to those documented previously in children (Alexander & Hines, 2002). In that study, the proportion of contact time with toys typically preferred by boys (a car and a ball) was greater in male vervets compared to female vervets, whereas the proportion of contact time with toys typically preferred by girls (a doll and a pot) was greater in female vervets compared to male vervets. Sex-dimorphic object preferences in infants and in nonhuman primates suggest that the conceptual category of “masculine” or “feminine” is directed by a *perceptual* category of female-preferred and male-preferred objects. If so, then “masculinized” toy preferences in androgenized girls (e.g., Hines & Kaufman, 1994) may occur, in part, because prenatal androgen levels influence the structure and function of the brain systems that subserve the recognition of these object categories.