



Introduction

BIOLOGICAL BASIS OF TEMPERAMENT

The purpose of this investigation was to examine the role of temperament in the initial attraction phase of mate choice. Cross-cultural surveys, brain imaging studies, population and molecular genetics, comparative research and twin studies suggest that many traits of temperament are heritable, relatively stable across the life course and linked to specific gene pathways and/or hormone or neurotransmitter systems. A literature review of behavior genetics, and studies of neurotransmitters, hormones, medications, illicit drugs, and gender reassignment indicate that a suite of biobehavioral traits are associated with four broad, interrelated yet different neural systems: 1) the related dopamine and norepinephrine systems; 2) the serotonin system; 3) the testosterone system; 4) and the related estrogen and oxytocin systems. Currently biological data are not sufficient to establish the exact biological bases of these four hypothesized dimensions of temperament. Nevertheless, the currently available literature, the reliability of the FRI-NQ measure, and the ten validity measures suggest that four temperament dimensions are likely to be associated with four interrelated yet specific neurochemical systems.

Dopamine and Norepinephrine (DA/NE)

Components of sensation-seeking associated with dopamine activity include: thrill, experience and adventure seeking; boredom susceptibility; and disinhibition (Zuckerman, 2005). Cloninger also associates novelty seeking with other traits, including exploratory excitability, impulsiveness, quick-temperedness, extravagance and disorderliness (e.g., Cloninger et al., 1991; 1994). Other traits linked to activity in the dopamine system include sex drive (Meston & Frohlic, 2000); mania and hypersocial behavior (e.g., Depue & Collins, 1999); enthusiasm (e.g., Goreman & Wesman, 1974; Zuckerman, 1994); lack of introspection (e.g., Cloninger et al., 1991; Ebstein et al., 1996; Gerbing, Ahadi & Patton, 1987); social dominance, energy, assertiveness, ambition, motivation and achievement striving (e.g., Depue & Collins, 1999; Wacker et al., 2006), exploration (Espejo, 1997); abstract intellectual exploration (DeYoung et al., 2002); cognitive flexibility (Ashby et al., 1999); plasticity (DeYoung et al., 2005); curiosity (e.g., Olson, Camp & Fuller, 1984); idea generation, and verbal and non-linguistic creativity (Flaherty, 2005).

Serotonin (5-HT)

Alleles of the serotonin system are associated with sociability (Golimbet et al., 2004), lower levels of anxiety, higher scores on a scale of hypomania and extroversion, and lower scores on a scale of “No Close Friends” (Golimbet et al. 2004). Positive mood and sociability are associated with serotonin activity (e.g., Flory et al., 2004; Opbroek et al., 2002), as is religiosity (Borg et al, 2003), conformity (DeYoung et al., 2002), orderliness (DeYoung & Gray, 2005), conscientiousness (Manuck et al., 1998), concrete thinking (Zuckerman 1994), self-control (Manuck et al., 2000), sustained attention (Zuckerman 1994), low novelty seeking (Serretti et al., 2006) and figural and numeric creativity (Reuter et al., 2006)

Testosterone (T)

Traits currently linked with prenatal testosterone expression are heightened attention to detail, intensified focus, and restricted interests (e.g., Baron-Cohen et al., 2005; Knickmeyer et al., 2005). Testosterone activity is also associated with emotional containment (Dabbs & Dabbs, 2000), emotional flooding, particularly rage (Manning, 2002), social dominance, aggressiveness (e.g., Dabbs, 1990; Knickmeyer et al., 2005; Mazur et al., 1997), less social sensitivity (Baron-Cohen et al., 2005) and heightened spatial and mathematical acuity (Gerschwind & Galaburda, 1985).

Estrogen and Oxytocin (E/OT)

Verbal fluency and other language skills are linked with estrogen priming in the womb (e.g., Baron-Cohen et al., 2005; Knickmeyer et al., 2005; Manning, 2002). Empathy, nurturing, the drive to make social attachments, and other prosocial skills are associated with estrogen and oxytocin activity in humans and other mammal (e.g., Baron-Cohen, 2002; Kendrick, 2000, Pedersen et al., 1992; Taylor et al., 2000). Estrogen activity is also associated with contextual thinking (e.g., Baron-Cohen et al., 2005; Dabbs & Dabbs, 2000; Fisher, 1999), imagination (Fisher, 2009), and mental flexibility (Skuse et al., 1997). (

Method

Participants

Participants from the online website Chemistry.com® who provided consent for inclusion in research were selected for this study. The final sample comprised 28,128 male (n=17,776) and female (n=10,352) heterosexual adults, who provided data on their selections for a first meeting with a potential romantic partner and who gave a non-negative (positive or blank) rating of their partner after returning from the first date were selected for the analysis.

Procedure

Participants completed demographic information (e.g., age, residence, occupation, sexual orientation, etc.), the FRI-NQ, and validity questions with the goal of finding a romantic partner.

Materials

A 56-item temperament measure, the Fisher-Rich-Island Neurochemical Questionnaire (FRI-NQ) was used to assess compatibility between participants (Fisher, Rich, Island, & Marchalik, In Press). The FRI-NQ consists of four 14-item scales. There were four response options for each item: “Strongly disagree,” “Disagree,” “Agree,” and “Strongly Agree.” The scales investigate those traits associated with the proposed dopamine/norepinephrine system, and the serotonin, testosterone and estrogen/oxytocin systems. The FRI-NQ has been translated in five different languages and has consistently yielded high to moderate score validity and reliability. The Cronbach alpha score reliabilities of this sample for each scale (DA/NE; 5-HT, T, and E/OT) were: .79, .79, .80, and .78 respectively.

Test Creation and Validation

The Fisher-Rich-Island Neurochemical Questionnaire (FRI-NQ) was created to measure temperament associated with four neural systems, DA/NE, 5HT, T, and E/OT. Test items were chosen to be consistent with behavioral characteristics associated with these systems. Items were modified to increase the internal consistency of the scales, while reducing inter-scale correlations through repeated administrations using a commercial, United States Internet dating site. Participants were anonymous adults who regularly used the Internet dating site between 2006-2007 for the purpose of finding a romantic partner. Participants were selected based on their research consent and the release of their self-reported demographic, dating, and personality data. The final scales were validated on a sample of 39,913 participants from this dating site.

Results

Table 1 shows the likelihood of trait combinations compared to frequencies that would be obtained if participants randomly selected their dating partners.

Men and women who predominantly expressed traits associated with the proposed dopamine/norepinephrine scale were significantly more likely to choose to meet individuals who predominantly expressed their same primary personality dimension ($\chi^2 = 16.95$, $df=1$, $p < .001$, $\phi = .025$). Those who predominantly expressed traits associated with the proposed serotonin scale were also significantly more likely to select to meet one another ($\chi^2 = 123.54$, $df=1$, $p < .001$, $\phi = .066$). While individuals who predominantly expressed traits associated with the proposed testosterone scale were significantly more likely to choose to meet those who predominantly expressed traits associated with the proposed estrogen/oxytocin scale dimension (Male T, Female E/OT: $\chi^2 = 59.37$, $df=1$, $p < .001$, $\phi = .046$; Male E/OT, Female T: $\chi^2 = 47.75$, $df=1$, $p < .001$, $\phi = .041$). Hence, similarity attracted among those predominantly expressive of the proposed dopamine/norepinephrine and serotonin scales; while opposites attracted among those predominantly expressive of the proposed testosterone and estrogen/oxytocin scales.

Discussion

Interpretation

Attraction and mate selection are governed by myriad cultural and biological factors. A literature review indicates that men and women are generally attracted to individuals from the same socio-economic and ethnic background; those with a similar level of education, intelligence and physical attractiveness; those who share their religious and social values; those with a similar sense of humor and degree of financial stability; individuals with similar social and communication skills; those who can provide the resources they seek in exchange for the assets they can provide; those who can enable them to achieve the lifestyle that they seek; those who reciprocate their love; and those who fit within their unique psychological template for the appropriate partner. Timing and proximity play a role in mate choice, as do childhood experiences. And a biological factor, the MHC component of the immune system, may play a role in mate choice. This study suggests that additional aspects of biology play significant roles in the initial attraction phase of mate choice.

Applied Value

- Given the importance of mate choice to general happiness and fertility, and the increased popularity of online dating websites, the public and professionals should request dating sites to be transparent in the reporting of their proprietary instruments' validity, reliability and efficacy.

Future Research

- The current study does not include same-sex couples; however the website caters to participants seeking same-sex or opposite-sex partners; therefore, examining patterns of same sex pairing, using FRI-NQ, is equally warranted.
- A study of long term married opposite-sex couples is currently underway to assess the durability of initial biological attraction.

Table 1. Temperament Type by Gender: Ratio of Expected to Observed Frequencies (Significant deviations, $p < .01$, are **bold**)

Male	Female	Observed/Expected	
5HT	E/OT	91%	Avoid
T	5HT	92%	
DA/NE	T	93%	
E/OT	5HT	93%	
5HT	T	97%	Neutral
E/OT	DA/NE	98%	
DA/NE	E/OT	98%	
T	DA/NE	99%	
E/OT	E/OT	99%	
DA/NE	5HT	100%	
T	T	100%	Attract
5HT	5HT	111%	
T	E/OT	112%	
E/OT	T	114%	
DA/NE	DA/NE	117%	

References

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