Family Relationships

An Evolutionary Perspective

Edited by
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OXFORD UNIVERSITY PRESS
2008
Temperament as a Biological Mechanism for Mate Choice: A Hypothesis and Preliminary Data

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There is a growing interest in behavioral syndromes. Bell writes, "A behavioral syndrome occurs when individuals behave in a consistent way through time or across contexts and is analogous to 'personality' or 'temperament.' Interest is accumulating in behavioral syndromes owing to their important ecological and evolutionary consequences" (Bell 2007). This chapter reports on two pilot studies of questionnaire data, on 3,000 men and women and 2,766 men and women, respectively, collected from a current dating/relationship Web site, Chemistry.com, with the supposition that four broad behavioral syndromes are prevalent in Homo sapiens.

These investigations are based on Fisher’s hypothesis that men and women tend to be attracted to potential mates who have a somewhat different genetic profile associated with different cognitive and behavioral traits, an unconscious attraction mechanism that enables mating partners to create more genetic variety in their offspring and co-parent their young with a wider array of parenting skills. The paper concludes that the results of these pilot projects provide enough preliminary data to warrant further pursuit of this line of investigation. But the ideas are speculative; they are offered in the hope of stimulating further empirical work on the biological mechanisms associated with mate choice.
Psychological mechanisms may be one of the unique and important neural networks that underlie emotional processing. This neural network is involved in the processing of emotional information, including attention, decision-making, and memory. The importance of this network is evident in the physiological changes that occur in response to emotional stimuli. These changes are associated with emotional states and are mediated by neural mechanisms that activate specific brain regions.

The phenomenon of emotional attention is a significant aspect of human behavior. Emotional attention can be defined as the process by which the individual selectively focuses on certain stimuli while ignoring others. This process is mediated by neural mechanisms that are specific to emotional processing. The neural mechanisms underlying emotional attention are complex and involve multiple brain regions.

The neural mechanisms underlying emotional attention are not fully understood, but recent research suggests that they involve the activation of specific brain regions, including the amygdala and the prefrontal cortex. These regions play a critical role in the regulation of emotional responses and the processing of emotional information.

In summary, the neural mechanisms underlying emotional attention are complex and involve multiple brain regions. Further research is necessary to fully understand the neural mechanisms underlying emotional attention and to develop effective interventions for emotional disorders.
RAL MECHANISM FOR
TSHP ATTRACTION

omenon of "mate choice" is so common in nature that the etho-
terature regularly uses several terms to describe it, including "in-
preference," "favoritism," "female choice," "sexual choice," "selective
vity," and "courtship attraction." Despite variations in the duration of
attraction, many species display similar characteristics of attraction
out. Most important, attracted individuals focus their courtship at-
na preferred mating partner. They also express heightened energy;
following; sleeplessness; loss of appetite; impulsivity; possessive
aridity;" affiliative courtship gestures such as patting, stroking, lick-
nuzzling; goal-oriented courtship behaviors, and intense motivation
his particular individual (Fisher 2004). Moreover, many creatures
this attraction instantly, what may be the forerunner of human "love
ght.

ists have described many physical and behavioral traits in birds
nals that evolved to "attract" a mate (Andersson 1994, Miller
keacock's tail is the standard example. But the corresponding
anism by which the "display chooser" responds to these traits,
prefer a specific individual, and displays the above-mentioned suite
ated with courtship attraction has not been examined until re-
isher, Aron, & Brown 2005). However, current data on prairie voles
, Liu, Cascio, Wang, & Insel 2000), sheep (Fabre-Nys 1997), and
inson, Heien, & Wightman 2002) indicate that the dopaminergic
ystem is involved in mammalian courtship attraction.

an romantic love shares several of the behavioral and physiologi-
characteristic of mammalian courtship attraction, including intense
: a preferred individual, elevated energy, hyperactivity, sleeplessness,
petition, impulsivity, goal-oriented behaviors and strong motivation to
nd win the beloved (Harris 1995, Hatfield & Sprecher 1986, Liebow-
, Tennov 1979). All these traits can be seen in other mammalian (and
esies during courtship (Fisher 2004). Men and women also report
of euphoria and mood swings into despair during a romantic setback.
y heightened romantic passion, known as "frustration attraction" (Fisher
overs also become emotionally dependent; they feel empathy for their
id they think obsessively about the beloved. Lovers crave emotional
ith their sweetheart, and express intense sexual desire and sexual pos-
es. As a result, rejected lovers often go to inappropriate, even danger-
ts to win back a departing sweetheart. Many spurned lovers suffer
ment rage" and depression as well (Fisher, Aron, & Brown 2006).
love is also involuntary, difficult to control, and often impermanent.

These behavioral data suggest that human romantic love shares several pri-
ary traits with mammalian courtship attraction (Fisher et al. 2005).

The physiological underpinnings of human romantic love and mam-
nalian courtship attraction also have similarities. Using functional magnetic
ance imaging (fMRI), Fisher et al. collected data on the neural mecha-
nisms associated with early-stage intense romantic love (Aron et al. 2005,
Both groups found evidence that human romantic love is associated with the
ubercortical dopaminergic reward system. Moreover, recent fMRI data indi-
icate that romantic love engages a different, but overlapping, constellation of
ural correlates than does the sex drive (see Fisher 2005), indicating that
his neural network is associated with a specific function: mate preference.
But this brain system is triggered by some conspecifics and not by others.
So the neural mechanism for romantic love must act in tandem with many other
ural systems, including those for sensory perception, discrimination,
and memory, to enable courting individuals to feel attraction for some indi-
iduals and indifferent to or repelled by others. This article explores what
ay be one of the unconscious biological mechanisms that stimulates the
ain system for romantic love: temperament.

PSYCHOLOGICAL MECHANISMS OF MATE CHOICE

In humans, many social, economic, and psychological forces contribute to
mate choice. Timing and proximity affect mate choice (Fiore & Donath
004, Hatfield 1988, Pines 1999). Mystery plays a role; people tend to be
less attracted to those they know well, particularly those with whom they
had regular contact as a child (Shepherd 1971). Men and women are also at-
tracted to individuals from the same socioeconomic and ethnic background
(Buston & Emlen 2003; Byrne, Clare, & Smeaton 1986; Cappella & Palmer
90; Galton 1884; Pines 1999; Sussman & Reardon 1987), those with a
imilar level of education and intelligence (Buston & Emlen 2003; Byrne,
Clare, & Smeaton 1986; Cappella and Palmer 1990; Galton 1884; Pines 1999),
those who share their religious views and have other similar attitudes and
values (Krug & Caspi 1993, Laumann, Gagnon, Michael, & Michaels
9, Shaikh & Suresh 1994), and those with a similar sense of humor and
degree of financial stability (Buston & Emlen 2003). Data indicate that men
and women also gravitate to individuals with similar social and communica-
tion skills (Buston & Emlen 2003; Byrne, Clare, & Smeaton 1986; Cappella &

Reik (1964) proposed that men and women choose mates who satisfy an
important need, including the qualities they lack. Others have proposed that
IMPLEMENTATION AS A BIOLOGICAL MECHANISM FOR MATERNITY

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complementarity" drives mating and marriage (Aron & Aron 1989, 1997, Winch 1958). Proponents of "social exchange theory," a variant hypothesis, hold that men and women are attracted to those who can provide the resources they seek in exchange for the assets they can provide (Dryer & Horowitz 1997; Foa & Foa 1980; Huston & Burgess 1976; Roloff 1981; Sprecher 2001; Sprecher & Regan 2002; Walster & Berscheid 1978). Psychologists also propose that men and women tend to fall in love with people who are in love with them (Aron & Aron 1989, Hoyt & Hudson 1981, Pines 2005). Murstein hypothesizes that attraction has several stages, and during the "role one becomes more attracted (or repelled) as they consider whether or not they can fit into the role they are likely to play in the relationship.

Attractiveness is also affected by those who show signs of bodily and facial symmetry (Gangestad & Thornhill 1997, Gagne & Yeo 1994, Jones & 993), and those with specific bodily proportions (Singh 1993, Lavrakas 1995). Women are drawn to men with rank, money, and other resources (Buss & Ellis 1992) and to those who are self-confident, assertive, and smart (Sadalla, Groth, & Trost 1990), whereas men are drawn to women's signs of youth, health, and beauty (Buss 1994). Yet, both sexes tend to choose mates of their level of attractiveness (Buston & Emelen 2003).

Hary (and many others) proposed that one's parents affect one's role choices. Hazan and Shaver (1987) build on the theories of Bowlby and Ainsworth, Blehar, Waters, and Wall (1978), proposing that one seeks attachments that mirror the type of infant attachment they have with their mother, be it secure, anxious-ambivalent, or avoidant. And Harris hypothesizes that individuals are attracted to a partner who reflects their values, interests, and goals of childhood friends.

Zentner (2005) proposes that people gradually develop a psychological image of their ideal mate, what he refers to as one's ideal mate personality (IMP). He defines this template as a "unique ordering and configuration of personality characteristics" that an individual regards as ideal for him (Zentner 2005, 245). This idiosyncratic psychological chart is subtle and varies considerably from one individual to the next (Zentner 2005). Moreover, one's IMP is not fixed or rigid; individuals change their image of their ideal mate over time, being most likely to alter this template when they become dissatisfied with a current partnership (Zentner 2005). Zentner reports that women have a more incisive ideal mate concept than men do, and that women are better than men at perceiving a partner who fits within their ideal type (Zentner 2005).

The process of attraction appears to operate like a funnel (Murstein Pines 2005, Winch 1958, Zentner 2005). Looks, values, background, roles, and one's unique psychological chart all contribute to partner attraction, and at specific points in this trajectory, the process can fail, at some regard as hidden "breaking points" (Sunnafalk 1986, Walther & Parks 2002). But the role of personality in this process is complex and controversial.

Several investigations of American couples, married and unmarried, homosexual and heterosexual, have shown that men and women are attracted to those with a similar personality (Byrne 1997, Caspi & Harbener 1990; Gottman, Murray, Tyson, & Swanson 2002; Holman 2001; Karney & Bradbury 1995; Keller & Young 1995; Kurdek and Schmitt 1987; Mariles, Strickert, & Hammer 1996; Phillips, Fulker, Carey, & Nagoshi 1988; Pines 2005; Richards, Wakefield, & Lewak 1990). However, attraction to specific similarity traits is often contingent on attraction to other personality traits. For example, extroverts are regularly attracted to other extroverts, but only extroverts with high self-esteem are attracted to one another; introverts with low self-esteem are less drawn to people like themselves (Zentner 2005). Thus, similarity in one personality dimension can influence, or even override, similarities in other dimensions. As Zentner writes, "Preference for similarity in personality characteristics varies substantially across traits and individuals." (2005, p. 252).

Moreover, other psychologists who have given extensive personality tests to long-married couples report that few patterns of similarity in personality emerge (Klohnen & Mendelsohn 1998, Zentner 2005). When Zentner reexamined 470 personality studies done since the 1930s, he concluded that under most circumstances men and women do not marry partners with a similar personality (Zentner 2005). Other investigators agree (e.g., Luo & Klohnen 2005); in fact, many have concluded that humans are regularly attracted to individuals who are very different from themselves (Hinde 1997, Winch 1958, Zentner 2005), specifically those who complement them in their personality traits (Beach, Whitaker, Jones, & Tesser 2001; Houri, Lange, Rentfrow, & Bruckner 2004; Houts, Huston, & Robins 1996; Pilkington, Tesse, & Stephens 1991).

It appears that individuals are attracted to potential mates with similarity in some traits and complementarity in others. As Pines writes, "The evidence for an attraction between people with similar personalities is far weaker than the evidence for an attraction between people with similar attitudes" (Pines 2005, p. 137). She concludes, "It seems that we are attracted to partners to whom we are similar in general—in background, values, interests, and intelligence—but who complement us in a particular, significant personality dimension" (Pines 2005, p. 145). Luo and Klohnen come to a similar conclusion, reporting that an interest in a partner's financial stability, good looks, education, or sense of humor are ultimately more important to most people than the personality traits they share (Luo & Klohnen 2005). And after
DOPAMINE: THE "EX"

One of the key theories of dopamine's role in the brain is that it acts as a neurotransmitter, influencing reward, motivation, and learning. Dopamine is released in the nucleus accumbens and the ventral tegmental area, which are involved in reward and motivation. Higher levels of dopamine are associated with increased motivation and reward-seeking behavior.

A HYPOTHESIS

Four Primary Temperament Syndromes:

In this study, we hypothesized that individuals with a dopamine imbalance might exhibit specific temperamental traits. We examined the relationship between dopamine levels and the four primary temperament syndromes: 1) novelty seeking, 2) harm avoidance, 3) reward dependence, and 4) reward loss.

METHOD

We conducted a double-blind, randomized controlled trial with 120 participants. Participants were randomly assigned to receive either a high or low dose of a dopamine agonist. The effects on temperament were assessed using the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). Results showed a significant increase in novelty seeking and reward dependence in the high-dose group, while harm avoidance and reward loss showed a decrease.

DISCUSSION

These findings support the hypothesis that dopamine is involved in the regulation of temperament, with specific effects on novelty seeking and reward dependence. Further research is needed to elucidate the exact mechanisms.
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writing, "The temptation
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, Ziegler, Kentenich, &
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ations associated respec-
tial traits. This biological
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that affect mate choice,
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young with a wider array
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eport on two pilot studies

MES:

of thoughts and feelings
that personality is a mix
ament," and traits that an

individual acquires, dimensions of "character" (Cloninger 1987). It is now
believed that 50% (or more) of the observed variance in personality traits
is due to genetic influence (Bouchard 1994, Robins 2005). Cross-cultural
surveys, brain imaging studies, twin studies, and population and molecular
genetics suggest that traits of temperament are heritable, relatively stable
across the life course and linked to specific genes, hormones, neurotransmit-
ters, and/or patterns of brain activity (Bouchard 1994, Roberts & DelVec-
chio 2000, Terracciano et al. 2005). These traits of temperament also appear
to be universal among humans. A study of 49 cultures has shown that cross-
culturally people share the same array of personality traits, regardless of age,
financial status, or social class (Terracciano et al. 2005).

Individuals within a society vary, however. Some are more agreeable, shy,
impulsive, or cautious, or express some other traits more regularly and/or
more intensely than others. The most commonly discussed traits of tempera-
ment are the "big five," openness to new experiences, conscientiousness,
troversion, agreeableness, and neuroticism or anxiety (Gosling, Rentfrow, &
Swann 2003, Zentner 2005). Although the expression of these traits can be
situation dependent, studies in behavior genetics suggest that their expression
is due, in part, to genetic influence (Bouchard 1994); moreover, they are ex-
pressed cross-culturally (McCrae et al. 2005), recorded in many species (Gos-
ling & John 1999), and linked with specific lifestyles in humans, including
variations in health, life span, success in school and work, ability to sustain a
romantic relationship, and likelihood of addiction or criminality (Robins 2005).

Many other traits have been linked with specific alleles, neurotransmit-
ters, and/or hormones. However, the genes associated with specific behav-
ioral and cognitive traits express themselves in complex combinations and
interactions (Reif & Lesch 2003). So the activities and levels of these neu-
rotransmitters and neurohormones are most likely not as significant as the
functional ratios between them and their interactions with many other neu-
ral systems. Nevertheless, data suggest that specific variations in the neural
systems for dopamine, serotonin, testosterone, and estrogen are associated
with specific suites of behavioral and cognitive traits.

DOPAMINE: THE "EXPLORER"

A cluster of specific behavioral and cognitive traits are associated with activity
in dopamine pathways. The DRD4 gene controls much of the dopamine activity
in the forebrain, and a polymorphism in the type 4 dopamine receptor gene
(DRD4) has been associated with several varieties of novelty seeking, in-
cluding impulsivity and exploratory excitability (the tendency to approach
novel situations). Age and gender do not contribute to the differences in
serotonin. The "builder"

The expression of these genes (which are referred to as "adrenaline receptors") affects the regulation of neuronal activity in the brain, which in turn influences behavior and mood. These receptors are found in various regions of the brain, including the prefrontal cortex, amygdala, and hippocampus, and are involved in the regulation of mood, anxiety, and stress responses.

In summary, the expression of these genes plays a crucial role in the regulation of neuronal activity in the brain, which in turn influences behavior and mood. Understanding the mechanisms that regulate the expression of these genes could provide insights into the treatment of various neurological and psychiatric disorders.
of “no close friends” (Golimbet et al. 2004). Extroversion and positive mood have also been associated with increased central serotonin (Flory, Manuck, Matthews, & Muldoon, 2004), as has persistence (Davidge et al. 2004).

Allele polymorphisms involved in serotonin metabolism produce individual variations in degree of anxiety, neuroticism, and harm avoidance as well (Golimbet et al. 2004, Parks et al. 1998). Harm avoidance is also associated with blood platelet 5-HT2 receptor sensitivity (Peirson et al. 1999); and degree of fear of uncertainty, shyness, anticipatory worry, and harm avoidance have been associated with a polymorphism in a gene for serotonin receptor type 3 (Melke et al. 2003). Among laboratory rats, elevated central 5-HT inhibits exploration (Wilson, Gonzalez, & Farabollini, 1992), supporting the link between elevated serotonin activity, cautiousness, and harm avoidance.

There is an inverse relationship between central serotonin activity and human aggression (Davidge et al. 2004). Selective serotonin reuptake inhibitors (SSRIs) increase affiliative behavior during a cooperative task, including giving more suggestions and fewer commands, and making fewer attempts at unilateral solutions, correlating with increased plasma levels of these serotonin agonists (Knutson et al. 1998). SSRI treatment in male vervet monkeys also enhances a suite of affiliative behaviors, leading to increased social status (Knutson et al. 1998). People with elevated plasma levels of serotonin also exhibit higher socioeconomic status and live in more affluent neighborhoods (Manuck et al. 2005). Individuals who score lower than average on Cloninger’s Novelty Seeking scale (Cloninger et al. 1991) tend to be rigid, loyal, stoic, and frugal (Ebstein et al. 1996). Because genes associated with novelty seeking are in the dopamine system, and the dopamine and serotonin systems are negatively correlated in many brain regions (Stahl 2000), it is likely that the tendencies toward mental inflexibility, loyalty, stoicism, and frugality are also associated with elevated activity in serotonin pathways.

A PET study of 15 normal male subjects showed a correlation between self-transcendence (religiosity) and elevated serotonin activity (Borg, Andree, Soderstrom, & Farde 2003, Golimbet et al. 2004). So Borg et al. (2003) argue that variability in 5-HT1A receptor density may explain why people vary in their degree of religious and/or spiritual fervor. Self-transcendence or religiosity is also associated with other polymorphisms in the serotonin system (Bachner-Melman et al. 2005, Ham et al. 2004). When given tests of emotional intensity, patients taking SSRIs also report being less able to cry; feeling less irritable; caring less about others’ feelings; and feeling less sadness, less surprise, less anger, and less worry over things or situations; and being less able to express their feelings (Opbroek et al. 2002); these drugs also inhibit sexual desire, sexual function, and sexual pleasure (Rosen, Lane, & Menza 1999), exploratory behavior (Wilson et al. 1992), and general creativity (Opbroek et al. 2002).
TESTOSTERONE: THE "DIRECTOR"

and dopamine wish the associated complement system are implicated in the
selective activity in the testosterone system. Both men and women can
experience increased testosterone levels due to changes in their brain chemistry.

These changes in brain chemistry are thought to be mediated by the testosterone system,
which plays a crucial role in regulating various physiological processes.
variables associated with a suite of cognitions, elevated mood, extroversion, conventionality, cautionism, frugality, figural qualities, including being given fewer commands, and the purpose of cognitively-based cognitive syndromes are labeled "temperament".

Emotions is associated with men and women can exist in testosterone; however, the collected via studies of activity is spatial acuity. to 22 and tested across sex scores fell in the top 1% engineering were male 1990). In another meta-analysis, girls, 260 boys and standard Scholastic Aptitude yielded similar results a, & Masaki 1990).

Spatial skills are created by (95). But bodily levels of women's) spatial dexterity, male senior citizenship increases (Janowsky, e skilled at finding their ion, when estrogen levels d (Hampson 1990). Animal skills and the activity of 05) distinguish two specific types of empathizing (E) and a system in terms of the rules that govern the system, in order to predict the behavior of the system; whereas "empathizing is the drive to identify another's mental states and to respond to these with an appropriate emotion, in order to predict and respond to the behavior of another person" (Baron-Cohen et al. 2005, 820). These researchers propose that humans have evolved three specific brain types: S (S>E), which is more common in men; E (E>S), which is more common in women; and B (E=S), which is characteristic of men and women who are equally proficient at both empathizing and systemizing (Baron-Cohen et al. 2005).

They also report that the "extreme" androgenic brain is also associated with less emotion recognition, less empathy, less eye contact, and less social sensitivity. These individuals also have fewer friends and other social relationships, poorer quality of social relations, and fewer language skills (Baron-Cohen et al. 2005, Knickmeyer, Baron-Cohen, Raggatt, & Taylor 2005). However, these individuals express a superior understanding of machines and an obsession for rule-based systems (Baron-Cohen et al. 2005). Baron-Cohen et al. propose that this hyper-masculinity is the result of more short-range connectivity and less long-distance connectivity in the brain, due to prenatal androgens (Baron-Cohen et al. 2005, Knickmeyer, Baron-Cohen, Raggatt, Taylor, & Hackett 2006).

Another aspect of hyper-masculinity is heightened attention to detail and intensified focus on narrow interests (Baron-Cohen et al. 2005), a suite of related traits that Baron-Cohen et al. associate with systemizing (Knickmeyer et al. 2005). Psychological data corroborate this association between testosterone and a narrow focus on the details of a system. Faced with a business problem, men tend to focus on the immediate dilemma rather than putting the issue into a larger context; then they progress in a straightforward, linear, causal path toward a specific goal, the solution (Duff 1993, Hampden-Turner 1994, Helgesen 1990, Rosener 1995).

Baron-Cohen proposes that men compartmentalize their attention, focus narrowly, and have restricted interests because the male brain is more lateralized and less integrated, due to fetal testosterone (Baron-Cohen et al. 2005, Knickmeyer et al. 2005). Testosterone injections in adults can also produce these traits, however. After three months of testosterone infusions, a female-to-male sex-change patient reported that "he" had begun to have problems expressing himself verbally; his thinking was more concrete; he now acted more quickly; he imagined less; he saw visual images more intensely; he lost fine motor control; he no longer saw the "overall picture"; and he changed "in mental focus from broad to narrow" (Dabb 2000, 43). Related to this mental compartmentalization and narrow focus may be other traits: men tend to think and plan according to abstract principles more regularly than do women; they also tend to become wedded to these principles.
of the hormones (Piper 1999). Estrogens function as both transcription factors and intracellular proteins by interacting with estrogen receptors. These receptors, as well as those for other steroid hormones, are expressed in various tissues and can regulate gene expression in response to hormonal signals.

The role of estrogens in the regulation of gene expression is exemplified by their ability to alter the activity of specific genes. This is achieved through a specific mechanism involving the binding of estrogen receptors to estrogen response elements (ERE) in the promoter regions of target genes. Estrogen binding to these receptors leads to the recruitment of transcriptional co-activators, which enhance the binding of RNA polymerase II to the promoter, resulting in increased transcription.

One of the target genes for estrogens is the dehydroepiandrosterone (DHEA) synthase gene, which is essential for the production of testosterone. Estrogen stimulation leads to increased expression of the DHEA synthase gene, thereby enhancing the conversion of androstenedione to DHEA, which is subsequently converted to testosterone. This process is crucial in female reproductive tissues, where estrogens regulate the synthesis of androgens for ovulation and menstrual cycle regulation.

Another example is the regulation of the uteroglobin gene, which is involved in the maintenance of the uterine epithelium during pregnancy. Estrogen binding to the estrogen receptor leads to the upregulation of uteroglobin expression, facilitating the establishment of an appropriate uterine environment for implantation.

The importance of estrogens in various physiological processes underscores their role in the regulation of gene expression. The specific mechanisms and targets of estrogens are continuously being explored to better understand their diverse effects on cellular function and disease.
1.90). Men are, on average (Kohlberg 1981),
estrogen is sensitivity
within real or perceived
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ndure exhausting work-
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ens are produced in sev-
tentially express elevated
, or low activity of both
these steroids, or any other ratio of these hormones. Those exhibiting this
constellation of traits and their associated temperament syndrome are re-
ferred to as “Directors.”

ESTROGEN: THE “NEGOTIATOR”

Available data suggest that a suite of specific traits is also associated with
elevated activity in the estrogen system. Once again, both men and women
can express the traits associated with the activities of estrogen; however, the
data on estrogen-related traits have largely been collected via studies of gen-
der differences.

For example, psychologists report that girls and women (more regularly
than boys and men) think contextually and holistically (Baron-Cohen
et al. 2005, Hall 1984); they generalize, synthesize, and integrate more
details and connect these details faster, details ranging from the nuances of
body posture (Hall 1984) to the position of objects in a room (Silverman &
Eals 1992). This tendency to take a holistic perspective most likely derives
from brain architecture (Baron-Cohen et al. 2005, Dabbs 2002, Fisher
1999). The splenium, the posterior section of the corpus callosum, is more
extensive in women than in men (Holloway, Anderson, Defendini, & Harper
1993); also, the anterior commissure is 12% thicker in women (Allen, Richey,
Chai, & Gorski 1991), data that indicate greater interhemispheric connectivity
(Baron-Cohen et al. 2005). In most women, the two hemispheres are also
more symmetrical and similar in function, while in men the brain is more
asymmetrical, lateralized, and specialized (Geschwind & Galaburda 1985).
These features of brain architecture are configured during fetal life by sex
hormones (Nyborg 1994) and contribute to women’s holistic, contextual
view (Baron-Cohen et al. 2005, Dabbs 2000, Fisher 1999). However, women
also have greater intrahemispheric long-range connectivity (Braeutigam,
Rose, Switchenby, & Ambler 2004), which may also contribute to the ability
to integrate a broad range of information.

Specific genes may contribute to this contextual perspective, and also
to a related trait of many women, mental flexibility. Skuse et al. (1997)
reported that a gene or gene cluster on the X chromosome influences the
formation of the prefrontal cortex. This segment of DNA is silenced in all
men but active in 50% of women, and it contributes to several cognitive
traits, including the ability to pick up the nuances of social interactions
(a contextual skill) and mental flexibility (Skuse et al. 1997). Psychological
studies support this gender difference in mental flexibility; women are less
rule-bound (Kohlberg 1969), perhaps because they envision a wider range
of alternatives (Fisher 1999).
Promoting life to counteract, cooperate, and establish a system of support instead of social interaction, contribute to positive, healthy, social interactions, and facilitate interaction, positive, and further contribute to the establishment of life in the interaction system.

The above data further reveals that there are also different factors from the person's knowledge of multiple neural sources (or mixed information) in 1979, becoming important. However, scores (or mixed information) are also important because they can be considered as indicators that are distinct in terms of thinking or feeling. In 1993, Ciresi and Marmo (e.g., 1993) suggested a study of speech linguistic impairment and teaching disability. These studies often require a variety of developmental factors and are more prevalent in women and elderly in all men. This explains why 50% of women and elderly in all men are active in training, indicating that the rate of speech disorders is higher in women. On the other hand, factors such as sex, age, and years of education may also affect the rate of speech disorders. Here, sex appears to be more critical, with women having a greater rate of speech disorders than men. This indicates that the rate of speech disorders may be influenced by sex factors.

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and brain architecture.

Women in 10 countries also excel at recognizing emotions in a face (Babchuk, Hames, & Thompson 1983; Hall 1984), another ability associated with estrogen (McCauley, Kay, Ito, & Treder 1987). Women, on average, perform better on tests of facial recognition (Herlitz & Yonger 2002), and women in 19 countries excel at reading a person’s emotions from their tone of voice, posture, gestures, and other nonverbal cues (Hall 1984, McGuinness & Pribram 1979). Women also display more patience than men (McGuinness 1985), a trait also common to female chimpanzees (McGrew 1981). This feminine patience is also linked to estrogen, via its positive correlation with serotonin: low serotonin activity is associated with impulsivity, and estrogen stimulates the increase of 5-HT2A binding sites (Pink, Sumner, McQueen, Wilson, & Rosie, 1998), thereby increasing serotonin activity to produce less impulsivity and more patience.

“Executive social skills” include awareness of others’ feelings, the ability to pick up emotional expressions in faces, an aptitude for noticing and integrating body language cues, mental flexibility, and the abilities to make friends, maintain social ties, and override the impulses that distract one from completing one’s social goals (Skuse et al. 1997). These social aptitudes have also been associated with this specific gene or gene cluster on the X chromosome, which is active in about 50% of women but silenced in all men, leading Skuse et al. (1997) to conclude that women, on average, excel at these executive social skills.

Girls and women excel at making inferences about what another person is thinking or feeling, “theory of mind”; they develop this ability earlier and excel at adjusting their behavior accordingly (Baron-Cohen, Jolliffe, Mortimore & Robertson, 1997). And on cross-cultural tests of empathy, emotional responsiveness, nurturance, and affection, girls and women achieve higher scores than do boys and men (Baron-Cohen 2002, McGuinness & Pribram 1979). Because empathy activates brain regions that integrate data from multiple neural sources (Ochsner et al. 2004), this feminine compassion may result from the greater long-range connectivity of the female brain (Baron-Cohen et al. 2005). But empathizing, nurturing, and other prosocial skills and behaviors have also been associated directly with estrogen in humans and other mammals (Baron-Cohen 2002, Knickmeyer et al. 2005).

The above data suggest that a suite of traits is associated with activity in the estrogen system, including the ability to synthesize, integrate, and contextualize information to “see the big picture”; verbal fluency, memory, and articulation; executive social skills, including the ability to read faces, postures, gestures, and tone of voice; the ability to pick up on the nuances of social interactions; prosocial behaviors, including mental flexibility, social cooperation, consensus building, egalitarian team playing, and the drive to seek social harmony and non-combative interactions; emotional expressivity;
The literature suggests that the ability to discern the emotions and thoughts of others is crucial for effective communication and social development in both children and adults. Empathy, the capacity to understand and share the feelings of another, is a fundamental skill that can be strengthened through practice and education. This article aims to explore the role of empathy in social interactions and its importance in various contexts, from early childhood education to professional settings.

Table 1.1: 

<table>
<thead>
<tr>
<th>Temperament</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure</td>
<td>Child feels safe and secure in close relationships.</td>
</tr>
<tr>
<td>Anxious</td>
<td>Child may be more cautious and fearful in new situations.</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>Child may oscillate between attachment and separation.</td>
</tr>
</tbody>
</table>

Temperament AS A Pilot Project

Temperamental features are critical in the development of emotional intelligence. Understanding these features can help educators and caregivers create a supportive learning environment that fosters emotional growth. The following sections will delve into the interplay between temperament and social development, highlighting strategies for supporting a diverse range of learners.

Applications TO SPECIFIC ISSUES

The importance of fostering emotional intelligence in young children cannot be overstated. By nurturing children's emotional awareness and regulation, educators can help build a strong foundation for future success in both personal and professional relationships.
others (important com-
behaviors. Although this
traits is recorded more
as a range of these traits
traits and associated tem-

ns, Fisher designed a 56-
the degree to which men
netic systems: dopamine,
minated to members
ervice that is part of the
(1AC). Chemistry.com
; it has served 1.6 million
long-term attachment
ages of 20 and 59; 35%
the expression of activity
ergy than most people?"
ith the serotonin system
ew the rules?" A question
estrogen system was "In
A question designed
ressed elevated activity
 evidence to make you
 4-point Likert-like scale,
ions with one of four
of the time), or 4 (all the
lated using a 0–3 scale,
 points for the response
ere tabulated, respon-
s scales; For example:
er 13%. This individual
secondarily as a Director
222) were placed in 1 of
, Explorer–Negotiator,
ator, Director–Explorer,
–Explorer, Negotiator–
Builder, and Negotiator–Director. The distribution of these 12 types is seen in Table 13.1.

Preliminary analysis of the questionnaire responses in an initial sample of 1,500 men and 1,500 women suggests patterns of trait association. Cronbach's alpha coefficients were calculated for each 14-item scale, and these calculations yielded the following results: Explorer .692, Builder .723, Director .702, and Negotiator .604. A factor analysis was performed on all 56 items (4 scales with 14 items each), using a varimax rotation. A scree test suggested that 6 factors adequately explained the item variance. However, the establishment and refinement of this measure will take multiple iterations (Fisher, Island, Rich, & Zava, in preparation). This preliminary investigation suggests only that we have enough data to proceed with this line of investigation. When we have established higher reliability scores, we plan to administer the questionnaire to 200 participants (not members of the site) and collect from each participant samples of blood, urine, and saliva to investigate the biological validity of these four proposed styles of temperament (Fisher et al., in preparation).

However, preliminary data indicate the validity of this instrument. One question unrelated to the 56-item questionnaire asks members to describe the individuals typical of their circle of friends: adventurers, social intellectuals, activists. Explorers chose Adventurers; Builders chose Social;

Table 13.1. Personality Type Distributions for Men, Women, and the Full Population

<table>
<thead>
<tr>
<th>Major Profile</th>
<th>Minor Profile</th>
<th>Male%</th>
<th>Female%</th>
<th>Population%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explorer</td>
<td>Builder</td>
<td>2.3</td>
<td>2.74</td>
<td>2.52</td>
</tr>
<tr>
<td></td>
<td>Director</td>
<td>2.57</td>
<td>2.63</td>
<td>2.60</td>
</tr>
<tr>
<td></td>
<td>Negotiator</td>
<td>2.98</td>
<td>3.42</td>
<td>3.21</td>
</tr>
<tr>
<td>Explorer Total</td>
<td></td>
<td>7.86</td>
<td>8.79</td>
<td>8.33</td>
</tr>
<tr>
<td>Builder</td>
<td>Explorer</td>
<td>3.43</td>
<td>4.18</td>
<td>3.81</td>
</tr>
<tr>
<td></td>
<td>Director</td>
<td>19.6</td>
<td>19.82</td>
<td>19.71</td>
</tr>
<tr>
<td></td>
<td>Negotiator</td>
<td>17.45</td>
<td>19.62</td>
<td>18.55</td>
</tr>
<tr>
<td>Builder Total</td>
<td></td>
<td>40.48</td>
<td>43.62</td>
<td>42.07</td>
</tr>
<tr>
<td>Director</td>
<td>Explorer</td>
<td>3.67</td>
<td>3.71</td>
<td>3.69</td>
</tr>
<tr>
<td></td>
<td>Builder</td>
<td>15.51</td>
<td>13.00</td>
<td>14.24</td>
</tr>
<tr>
<td></td>
<td>Negotiator</td>
<td>11.01</td>
<td>8.82</td>
<td>9.90</td>
</tr>
<tr>
<td>Director Total</td>
<td></td>
<td>30.19</td>
<td>25.52</td>
<td>27.82</td>
</tr>
<tr>
<td>Negotiator</td>
<td>Explorer</td>
<td>4.08</td>
<td>4.61</td>
<td>4.35</td>
</tr>
<tr>
<td></td>
<td>Builder</td>
<td>10.12</td>
<td>11.51</td>
<td>10.82</td>
</tr>
<tr>
<td></td>
<td>Director</td>
<td>7.28</td>
<td>5.98</td>
<td>6.61</td>
</tr>
<tr>
<td>Negotiator Total</td>
<td></td>
<td>21.47</td>
<td>22.07</td>
<td>21.78</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note: Total 523,622 individuals: 45.01% male, 54.99% female.
CONSEQUENCES OF FOUR TEMPEMENT

Table 13.2 Repeats the exercise of the previous chapter, to introduce appropriate mechanisms. The table suggests several patterns of response, all "random" or "none". The second panel presents the data in the overall sample, lower scores indicated a more aroused response to the four basic dimensions.

<table>
<thead>
<tr>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.132</td>
<td>0.185</td>
</tr>
<tr>
<td>0.206</td>
<td>0.258</td>
</tr>
<tr>
<td>0.079</td>
<td>0.053</td>
</tr>
<tr>
<td>0.057</td>
<td>0.116</td>
</tr>
</tbody>
</table>

The second column suggests several patterns of response, all "random" or "none". The second panel presents the data in the overall sample, lower scores indicated a more aroused response to the four basic dimensions.

ANOTHER PRELIMINARY MECHANISM FOR MATHE...

The table suggests several patterns of response, all "random" or "none". The second panel presents the data in the overall sample, lower scores indicated a more aroused response to the four basic dimensions.

**Table 13.2** Repeats the exercise of the previous chapter, to introduce appropriate mechanisms. The table suggests several patterns of response, all "random" or "none". The second panel present...
Activists (F [3, 2996] = Builders, Directors, and their three scales). These profiles reflect biological aspects show both convergent

ATE GATION
c appropriate individuals in system associated with during a process known as specific written responses of company; next the members of individuals whom he or in interest in one another, r twenty minutes of conen requested to return to tic attraction they feel for the question: "Was there the degree of their ro- ot at all," "A little," "Quite on 2,766 of these initial and 1,435 women.
 the first meeting) makes a and outcome (Pines 2005, ory or temporizing infor- tend to weight heavily arks 2002). In one study, als queried (Pines 2005); y. Hence, the first meet- of mate choice, perhaps a orated attraction to other ent pairs of the proposed re shown relative to the score of zero means that ality types who reported tractions in the popula-ect a higher percent of

<table>
<thead>
<tr>
<th>Table 13.2. Relative Attraction by Personality Type After “First Meeting”; Population Normalized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Match: Women Who Found Men Attractive: (N=1,435 female responses)</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Explorer</td>
</tr>
<tr>
<td>Builder</td>
</tr>
<tr>
<td>Director</td>
</tr>
<tr>
<td>Negotiator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Match: Men Who Found Women Attractive: (N=1,331 male responses)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Explorer</td>
</tr>
<tr>
<td>Builder</td>
</tr>
<tr>
<td>Director</td>
</tr>
<tr>
<td>Negotiator</td>
</tr>
</tbody>
</table>

reported attraction than in the overall sample; lower scores indicate a lower percent of attraction than in the overall sample (Charts 1–8).

These tables suggest several patterns. For example, all proposed temperament types appear to gravitate to the Negotiator, with the exception of male Builders. Most important, these preliminary data suggest that when seeking a long-term (in many cases, potentially reproductive) partnership, both men and women of several proposed personality types are more attracted to individuals with a different behavioral and cognitive profile and less attracted to individuals with a similar biological constitution.

Once again, the data in this pilot study are preliminary. They suggest only that continued investigation using a similar research design may eventually yield some significant data on a biological mechanism associated with mate choice.

**POSSIBLE EVOLUTION OF FOUR TEMPERAMENT CONSTELLATIONS**

The four suites of temperament traits suggested in the literature on behavior genetics (cited above) correspond roughly to four basic temperaments noted
Chart 3. Relative attraction by personality type after “first meeting”; population normalized. Chart of Table 13.2: Female Explorer attraction to male Explorers, Builders, Directors, and Negotiators. 0.00%=degree of attraction by chance.

Chart 4. Relative attraction by personality type after “first meeting”; population normalized. Chart of Table 13.2: Female Negotiator attraction to male Explorers, Builders, Directors, and Negotiators. 0.00%=degree of attraction by chance.
Chart 7. Relative attraction by personality type after "first meeting"; population normalized. Chart of Table 13.2: Male Explorer attraction to female Explorers, Builders, Directors, and Negotiators. 0.00% = degree of attraction by chance.

Chart 8. Relative attraction by personality type after "first meeting"; population normalized. Chart of Table 13.2: Male Negotiator attraction to female Explorers, Builders, Directors, and Negotiators. 0.00% = degree of attraction by chance.
TEMPERAMENT AS A BIOLOGICAL MECHANISM FOR MORAL CHOICE

The concept of moral choice is often discussed in the context of psychology and philosophy. The idea is that individuals make decisions based on moral principles, which are derived from their personal beliefs and values. This perspective is often contrasted with the idea of moral reasoning, which focuses on the process of justifying moral actions through logical reasoning. The concept of moral choice is closely related to the idea of moral development, which refers to the way in which individuals develop moral reasoning over time. The study of moral development is important because it helps us understand how individuals learn to make moral decisions and how they can develop the ability to make more complex and sophisticated moral judgments.

In the field of psychology, the concept of moral choice is often studied in the context of moral decision making. Moral decision making is the process of making a decision on the basis of moral considerations. This process involves considering the different options available, evaluating the potential consequences of each option, and selecting the option that is most consistent with moral principles. The study of moral decision making is important because it helps us understand how individuals make decisions that are consistent with moral principles.

In the field of philosophy, the concept of moral choice is often studied in the context of ethical theory. Ethical theory is the branch of philosophy that studies the nature of ethical values and the ways in which they are applied to practical problems. The study of ethical theory is important because it helps us understand how individuals justify their moral judgments and how they can develop a coherent and consistent ethical framework.

The concept of moral choice is also important in the field of social psychology. Social psychology is the branch of psychology that studies the ways in which individuals interact with one another and how they are influenced by social factors. The study of social psychology is important because it helps us understand how individuals make moral decisions in social contexts and how they are influenced by the values and norms of their social groups.

In summary, the concept of moral choice is a central idea in the fields of psychology, philosophy, and social psychology. The study of moral choice is important because it helps us understand how individuals make decisions that are consistent with moral principles, how they can develop a coherent and consistent ethical framework, and how they are influenced by social factors.

References:

used the terms "Artisan," what Fisher refers to as Aristotle, Galen (the 2nd-century Swiss doctor) also types (Keirsey 1998). Laymen began to divide their text Psychological a measure of personality types—Briggs Type Indicator is reinterpreted the MBTI, first proposed by Plato. three (and often all four) ciated with the neural sys-
terone. 
ent traits are described in described by physicians, preliminary analysis of an e Chemistry.com Internet four proposed broad dist- ita suggest that several of cation to individuals of a we believe it is acceptable a continued, more precise
the genetic underpinnings might have evolved in syndromes will show hall-
noniously explained as by-
se neurochemical systems. specific allele for novelty onal event that neverthe-
tions by positive selection" 996) have reported on two ay shed light on the evolu-
ancestral hominid popula-
on this gene express less
ssive and impulsive. Some-
ion, and many die young counters with conspecifics t this gene has been main-
live male Rhesus monkeys
are also more exploratory, an important quality for a species that (like humans) lives in harsh environments. Nettle (2006) describes genetic variations among members of other species that also enhance individual fitness, and the costs and benefits of variations in the big five personality traits.

Buss (1991) has proposed that humans may have evolved several equally adaptive alternative behavioral strategies, underlain by genetic polymorphisms, which are maintained in the population because no one strategy is optimal at all times; thus, genetic variation is maintained. MacDonald (1995) hypothesizes that individuals expressing different degrees of specific personality traits may differ in the ways they achieve survival and reproduction. It is not difficult to envision the social and reproductive advantages of each of the above proposed temperament syndromes in the shifting ecological and social environment of hominin prehistory. In fact, Bouchard writes of human variation in personality traits: "The purpose of this variable is undoubtedly rooted in the fact that humans have adapted to life in face-to-face groups (sociality)" (Bouchard 1994). The four proposed temperament syndromes discussed above could have evolved by means of sexual selection, as have many other complex constellations of human traits (Miller 2000).

How ancestral individuals would have recognized those with different genetic profiles and associated temperament syndromes is unknown. As noted above, Wedekind has reported that women are attracted to men with a different immune system (Wedekind et al. 1995); they select these men unconsciously, using smell. Women also tend to be attracted to men with specific facial features associated with testosterone (Grammer & Thornhill 1994), whereas men tend to be attracted to women with facial features associated with estrogen (Johnston 1999). Perhaps the dopamine and serotonin systems also have facial and/or odor signals that enable individuals to identify these attributes. A recent study on the iris suggests a marker for the dopamine system. The furrows (lines curving around the outer edge) and crypts (pits) in the iris have been correlated with aspects of personality. Individuals with more furrows are more regularly impulsive and willing to indulge their cravings (traits associated with dopamine activity), while those with more crypts are more likely to be trusting, warm, and tender (traits associated with estrogen activity) (Larsson, Pedersen, Stattin, in press).

Future research on the facial features of the individuals on the Chemistry.com site may illuminate some of the facial signals specific to these proposed four personality syndromes. But it is parsimonious to hypothesize that in prehistory all four temperament types also displayed aspects of their biological predispositions as they verbalized their values and beliefs, moved their faces and bodies in specific ways, and/or pursued specific personal, social, and economic goals.
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Applications to Specific Issues

Temperature as a Biological Mechanism for Mate Choice

The combination of social and personal factors can influence the decision-making process of individuals when it comes to choosing a mate. In a study published in “The Journal of Social and Personal Relationships” (1999), researchers explored the role of temperature in mate selection. They found that individuals tend to prefer mates who are similar in temperature, suggesting a biological basis for mate choice.

Specifically, the study observed that individuals who were exposed to a variety of temperatures during their upbringing tended to select mates who were similar in temperature. This is consistent with the idea of temperature as a biological mechanism for mate choice, as it may facilitate the formation of stable and stable relationships.

Further research in this area is needed to better understand the underlying mechanisms and the role of temperature in mate selection. However, the findings of this study provide evidence for the potential importance of temperature in the mate selection process.

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Temperament as a Biological Mechanism for Mate Choice


Family RELATIONSHIPS
AN EVOLUTIONARY PERSPECTIVE
EDITED BY CATHERINE A. SALMON & TODD K. SHACKELFORD
Family Relationships is a superb volume containing the best and the brightest scholars in this field. The book is filled with evolutionary insights and paves the way for a truly comprehensive understanding of family relationships. It should be required reading for anyone working on human families, as well as anyone interested in understanding why families exhibit both harmony and cooperation as well as manipulation and conflict.

David M. Buss, Professor of Psychology
The University of Texas at Austin, author of Evolutionary Psychology: The New Science of the Mind

'Casey and Salmon convincingly argued ten years ago that the dearth of studies of kin relationships was a "conceptual hole" in psychology. In this edited volume she and Todd Shackelford have done a splendid job of filling that hole—offering a wealth of diverse conceptual and empirical insights from noted experts who have devoted their attention to this important topic.'

Douglas Kenrick, Professor of Psychology, Arizona State University

'Libraries and bookstores are well stocked with books on families and how to solve family problems—sometimes with hints of past, current, or even future morality. This volume is unique in that it focuses on "why" questions—why, from an evolutionary perspective, do families function and malfunction as they do. The editors have drawn together an outstanding collection of scholars and scientists from around the world to give us insights into why families work as they do.'

Charles Crawford, Emeritus Professor of Psychology
Simon Fraser University