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Evolutionary Theories of Schizophrenia: An Experience-Centered Review

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The ongoing incidence of schizophrenia is considered a paradox, as the disorder has genetic basis yet confers survival handicaps. Researchers have not reached consensus regarding theories explaining this contradiction. Major evolutionary theories hypothesize that schizophrenia is: (1) a byproduct of other evolutionary processes, (2) linked to survival advantages that counteract disadvantages, (3) associated with processes such as shamanism conferring advantages to groups, (4) a consequence of modern environments, (5) a result of random processes, such as mutations. A null hypothesis argues that philosophical or methodological problems render evolutionary paradigms inappropriate. These arguments are reviewed in light of an experience-centered approach, which regards experiential accounts as data. A ritual healing theory, derived from this orientation, has bearing on evolutionary theories pertaining to schizophrenia. This theory explains the nature of shamanism, which has features coinciding with schizophrenia. The ritual healing theory is supported by folklore, medical, and anthropological evidence, is amenable to empirical evaluation, and has clinical applications.

Schizophrenia is an evolutionary puzzle, as it has genetic basis, yet confers survival handicaps (Brüne, 2004; Keller and Miller, 2006). How could genes linked to evolutionary disadvantages have become prevalent? There are five major theoretical orientations that attempt to resolve this paradox by explaining schizophrenia's origin within human evolution. This article will review these arguments in light of a ritual healing theory based on an experience-centered approach. The experience-centered approach regards people's reports of unusual perceptions as data, useful for evaluating hypotheses.

According to the stress-diathesis model of schizophrenia, genetically prone individuals exhibit fully psychotic symptoms after exposure to a threshold level of stress. Such people may reveal unusual pre-psychotic behaviors suggesting that they are prone to a psychotic break (Berenbaum, Thompson, Milanek, Boden,

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and Bredemeier, 2008). This model includes the concept of schizotypy, a genetically-based continuum of personality characteristics and experiences ranging from normal dissociative, imaginative states to fully psychotic conditions (Claridge, 1997). Schizotypy includes non-pathological but strange cognitions, termed *anomalous experiences*.

Anomalous experiences refer to common, universal, unusual perceptions, regarded within folk traditions as beyond scientific explanation (Cardeña, Lynn, and Krippner, 2000; McClenon, 2002). Anomalous experiences include apparitions, waking extrasensory perceptions, paranormal dreams, out-of-body experiences, near-death experiences, sleep paralysis, psychokinesis (unexplained movement of objects), and folk healing. These perceptions are relatively common with over half of United States samples claiming one or more episodes (McClenon, 1993a, 1993b, 1994, 2002). The experience-centered approach, accepted by many folklorists, has generated data indicating that universal elements within these experiential forms have shaped folk beliefs in similar directions all over the world (Hufford, 1982; McClenon, 1994, 2002). This argument is supported by anthropological research, folklore studies, and random sample surveys of students from colleges in the United States, Japan, and China (Hufford, 1982; McClenon, 1993a, 1993b, 1994, 1997a, 1997b, 2000, 2002).

A ritual healing theory, derived from the experience-centered approach, provides an evolutionary explanation for religious sentiment. The theory argues that anomalous experiences shaped beliefs providing the ideological foundations for shamanism, humankind's first religious form. Shamanism entails practitioners going into trance and acquiring power or information from spiritual realms to benefit others. It has been practiced by all hunter–gatherers for many millennia. According to the ritual healing theory, shamanic healing is effective due to placebo and hypnotic processes. As a result, genotypes related to absorption, dissociation, and hypnotic capacities were selected, shaping the biological basis for modern spirituality (McClenon, 1997a, 2002).

An emerging psychiatric paradigm, supported by clinical studies, coincides with this theory. Psychosis and spirituality are viewed as on a continuum, with spiritual experience a form of healthy psychoticism (Claridge, 2010; Clarke, 2010). Studies indicate that some forms of anomalous experience are associated with psychological health, particularly when coupled with cognitive organization, adaptive religious beliefs, and creativity (Boden and Berenbaum, 2004; Goulding, 2002; Jackson, 1997; McCready and Claridge, 2002; Nelson and Rawlings, 2010; Schofield and Claridge, 2007). Experience-centered data suggest that this continuum includes psychotic experiences (pathological), anomalous experiences (generally benign), spiritual experiences (often psychologically healthy), and shamanic experiences (placebo and hypnotic effects coupled with anomalous experiences).

A review of evolutionary processes explaining schizophrenia, in light of the experience-centered approach, allows testable hypotheses regarding psychosis. Evolutionary theories can help identify schizophrenia's phenotypes (observable characteristics) associated with genotypes (existing genes). When phenotypes are accurately defined, researchers can locate associated alleles and, using reverse phenotyping, determine mechanisms by which these alleles shape phenotypes (Schulze and McMahon, 2004). Research within this paradigm should hopefully resolve many evolutionary issues regarding schizophrenia within the next 50 years (Keller and Miller, 2006, p. 441).

Evolutionary Theories

Researchers have devised categories of evolutionary process explaining schizophrenia (Brüne, 2004; Keller and Miller, 2006; Pearlson and Folley, 2008; Polimeni and Reiss, 2003, 2005; Stevens and Price, 2000). Schizophrenia is thought to originate from (1) evolutionary byproducts, (2) a balance of advantages and disadvantages, (3) group selection, (4) environmental change, and (5) random processes. A null hypothesis argues that all evolutionary hypotheses will be rejected since schizophrenia is not a distinct disorder or has little genetic basis. Most evolutionary positions are not mutually exclusive of each other and the null hypothesis could be partially correct, as schizophrenia alleles may explain only a small percentage of disorder variance.

The ritual healing theory, pertaining to shamanism, has elements coinciding with evolutionary schizophrenia theories. Because the ritual healing theory focuses more on anomalous experience than psychosis, it is not threatened by the schizophrenia null hypothesis. This review does not advocate any particular schizophrenia theory but argues that the ritual healing theory provides insights regarding psychotic religious ideation.

Null Hypothesis

Critics argue that evolutionary theories are flawed due to problems with twin studies, logical and factual errors, problems within diagnostic systems, and false philosophical assumptions (Adriaens, 2008; Joseph, 2004, 2005; Sarbin, 1990). Joseph (2004, 2005) focused on twin studies, discussing the eugenic foundation of genetic psychology, problems with the equal-environment assumption in twin studies, statistical confusion regarding comparison of identical and fraternal twins, methodological biases operating across study designs, and a failure to find schizophrenia genes. Kendler (2005) attempted to refute these criticisms, arguing that twin studies with different potential biases reach similar conclusions, equal-environment assumptions have been evaluated and corrected, and

more recent gene-finding efforts have been successful (see Gill, Donohoe, and Corvin, 2010, for gene-finding progress). The null hypothesis will be refuted to the degree that schizophrenia alleles explain the disorder's incidence.

Some critics of evolutionary theories point out flaws in the DSM paradigm (Kendell and Jablensky, 2003, Poland, Von Eckardt, and Spaulding, 1994; Sarbin, 1990). If schizophrenia cannot be reliably and validly defined, researchers cannot specify its phenotypes, making discovery of genotypes difficult. This problem is linked to schizophrenia's heterogeneity, the quality of having a wide variety of characteristics. Schizophrenia researchers regard heterogeneity as a major obstacle to progress in this field (Lenzenweger, 2010, p. 186). Some avoid the term *schizophrenia*, using the word *psychosis* as a label of convenience, since schizophrenia may not represent a distinct disorder entity. Community surveys reveal no true boundaries among DSM diagnostic symptom clusters, suggesting that schizophrenia is not a distinct disorder (Mirowsky, 1990; Mirowsky and Ross, 1989). The term schizophrenia may be merely a reified umbrella concept covering a heterogeneous group of disorders, rendering evolutionary theories pointless (Adriaens, 2008; Sarbin, 1990). Evolutionary theorists tend to assume that heterogeneity issues will be resolved by locating susceptibility alleles, a process that will indicate which theories have greatest explanatory value (Keller and Miller, 2006).

All evolutionary theories are derived from a basic scenario describing upright-walking hominids whose brain size, tool use, and mental capacities increased over six to eight million years. During this time span, Homo erectus gained control of fire, chanted and sang while clustering around fires, and achieved control of vocal abilities. Over time, hominids acquired the capacity for complex symbolization and rapidly spoken language (Mithen, 2006). Paleolithic cave and rock art, dating more than 30,000 BP, indicate use of complex symbolization associated with shamanic altered states of consciousness and hallucinations (Lewis–Williams, 2002). At some stage, humans experienced modern forms of psychosis. This scenario provides a foundation for discussion of theories pertaining to the byproducts, benefits, environments, and random processes related to schizophrenia.

Byproduct Theories

Byproduct theories portray schizophrenia as a consequence of other evolutionary changes. Crow (2000) argues that schizophrenia results from incomplete hemispheric specialization due to selection of genes allowing language. Burns (2004) attributes schizophrenia to modified cortical connectivity required for development of the "social brain." Horrobin (2002) argues that ancient mutations brought about linguistic, creative, and shamanic ability, deficits in lipid metabolism, and, in modern environments, schizophrenia.

Gangestad and Yeo (1997) hypothesize that rapid evolutionary change due to fetus/mother competition for nutrients led to the genetic propensity for schizophrenia. Mothers and fetuses have different needs, resulting in evolutionary competition. Rapid evolutionary changes occur when two organisms evolve in response to each other, as between lions and zebras. As lions catch slower zebras, surviving zebras tend to be swifter and, as a result, lions evolve toward greater speed, causing continued selection among zebras. Resulting evolutionary cycles often have unexpected consequences since the selected genes replace other genes, resulting in detrimental byproducts. Gangestad and Yeo (1997) argue that the genetic propensity for schizophrenia was a byproduct of mothers and fetuses evolving rapidly in response to each other. Evidence regarding birth complications, schizophrenia, and genetic propensity fit this theory.

Byproduct theories, by themselves, do not explain schizophrenia's paradox. Although the human cognitive apparatus undoubtedly developed new ways to fail as it evolved, genes conferring disadvantages should have been eliminated over time (Keller and Miller, 2006). Alternate processes are required to explain schizophrenia's longevity.

Although there is no compelling animal model for schizophrenia, primatologists have observed captive chimpanzees exhibiting pathological paranoia, inappropriate emotion, self-injury, possible dissociation, and visual hallucinations (Brüne, Brüne–Cohrs, McGrew, and Preuschoft, 2006). These observations coincide with the stress-diathesis model since animals, placed in sufficiently stressful environments, develop psychopathologies, possibly proto-psychosis.

Some animals, exposed to extreme stress, employ freezing responses (playing dead or *immobility reflex*). Forms of this behavior are labeled *animals hypnosis* since the animal's demeanor seems similar to some forms of human hypnosis. A variety of stimuli, related to fear of predators, produces the reflex. Primate hypnotic inductions are similar to human inductions in that they involve methods that focus attention while reducing fear: repetitive grooming, ritual gestures, or cadenced vocalization (Volgyesi, 1966). Animal hypnotic behaviors imply that human hypnotizability, based on dissociation and absorption, evolved from hominid responses to stress, trauma, and ritual. In modern humans, dissociation, absorption, hypnotic propensity, anomalous experience, childhood stress, and childhood trauma are correlated with each other (Heap, Brown, and Oakley, 2004; McClenon, 2002; Moskowitz, Schäfer, and Dorahy, 2008). Childhood stress and trauma may trigger susceptibility alleles governing the other variables (McClenon, 2002).

Ritual healing theory suggests that shamanism developed as a byproduct of dissociation, absorption, and associated anomalous experiences. For over a million years, Homo erectus stared at fires while chanting and singing, activities that

induced beneficial altered states of consciousness (Mithen, 2006). According to the ritual healing theory, hypnotic capacities helped hominids to live harmoniously around fires, selecting for alleles allowing dissociation and absorption. This evolutionary process resulted in anomalous experiences shaping beliefs in spirits, souls, life after death, and magical abilities, the ideological basis for shamanism.

The human evolutionary scenario includes increased use of symbolization, rapidly spoken language, intentional burials (Middle Paleolithic), care of injured and infirm (Middle Paleolithic), and shamanism as portrayed by rock and cave art (Upper Paleolithic; see Lewis–Williams, 2002). This indicates that shamanic healing was practiced for at least 30,000 years, sufficient time to affect genes linked to psychosis, anomalous experience, and religiosity (McClenon, 1997a, 2002).

The most ancient medical writings from Mesopotamia, Egypt, Greece, India, and Persia coincide with the ritual healing scenario. These texts prescribe rituals, incantations, and amulets for disorders thought to have a spiritual basis. Prescribed strategies produce placebo effects among believers and hypnotic effects among those with hypnotic propensity (even those lacking belief). Cases described in ancient Egyptian texts and inscribed on fourth century BC Greek steles depict placebo/suggestion treatments, hysterical symptoms, and favorable outcomes (Sigerist, 1987a, 1987b, p. 66).

Random sample surveys of college students in the United States, China, and Japan reveal similar forms of anomalous experience as those described in ancient texts. This evidence coincides with folklore and anthropological accounts from a wide variety of societies (McClenon, 2002). Universal features within these experiential forms generate similar patterns within folk religious traditions (Hufford, 1982). Folklore research reveals major experiential forms: apparitions, paranormal dreams, waking extrasensory perceptions, psychokinesis, spiritual healing, out-of-body experiences, and near-death experiences (McClenon, 1994, 2002). People reporting frequent episodes develop similar notions regarding spirits, souls, life after death, and magical abilities. Apparitions of the deceased, for example, instill belief in life after death. Near-death experiences (seeing deities, spiritual realms, and deceased relatives during a medical emergency) generate powerful beliefs regarding an afterlife. People reporting visions or dreams providing valid information about distant or future events often acquire reputations within their community; people seek their advice as a result. Although culture shapes interpretations of these perceptions, a recurring theme within anomalous accounts is that experiences compel belief, even in the face of skepticism.

Interviews and observation of 33 Asian shamanic healers revealed that anomalous experiences were central to the process by which they became practitioners (McClenon, 1994, 2002). Paranormal dreams, extrasensory perceptions, and other anomalous experiences shaped their beliefs. Many reported that these perceptions compelled them to become healers. They described auditory and

visual hallucinations directing them to perform healing rituals that turned out to be effective. Experience-centered evidence, derived from folklore and anthropological studies, support the argument that shamanism is a byproduct of anomalous experience (McClenon, 1993b, 1994, 2002).

Balance Theory

Balance theories hypothesize that schizophrenia's negative impacts are balanced by benefits such as creativity, valued personality traits, or shamanism (Nelson and Rawlings, 2010; Nettle, 2001, 2006; Polimeni and Reiss, 2003, 2005; Stevens and Price, 2000). For over a century, researchers have assembled long lists of mentally disordered writers, poets, and artists, implying connections between these disorders and creativity (Porter, 2002, p. 82). Clinical evidence connecting schizotypy with creativity seems particularly strong. Artists, for example, report higher levels of schizotypal experience, thin boundaries, and deep absorption compared to norm data (Nelson and Rawlings, 2010).

Crispi, Summers, and Dorus (2007) provide genetic evidence supporting balance theory. Among "76 genes demonstrated to mediate liability to schizophrenia" which "exhibit especially strong and well-replicated functional and genetic links to this disorder," 28 exhibit positive selection (p. 2801). In other words, relative frequencies of these genes have increased over time, implying that they are connected to evolutionary advantages. Although the selective forces involved in this process are not known, these findings suggest that schizophrenia is a harmful byproduct of adaptive evolutionary change.

Critics point out weaknesses in balance theory. Not all studies find significant correlations between schizotypy and beneficial traits. In order for the creativity argument to be valid, creativity/schizophrenia alleles must confer greater benefit than creativity alleles unrelated to schizophrenia. Critics also argue that schizophrenia/favorable-trait alleles should be easy to find using current gene-hunting methods, yet these alleles have not been confirmed (Keller and Miller, 2006, p. 435).

The experience-centered approach provides ways of evaluating balance theory. If schizophrenia is linked to evolutionary advantages, we would expect folklore accounts to describe this connection. Thompson's (1955–1958) six volume *Motif Index of Folk Literature* assigns index numbers to recurring folklore themes. Analyses of these texts portray the degree that folklore motifs link psychosis with benefits. Motifs regarding madness or insanity include: D2065, Magic insanity; F959.1, Madness miraculously cured; F1041.8, Extraordinary madness; J156, Wisdom from fools; J1116.1, Clever madmen; M452, Curse: Insanity; V221.4, Saint subdues madman. Although madmen or fools are sometimes portrayed as clever or wise, these connections are noteworthy due to their rarity. Insanity, by itself, is not thought to be valuable. Madness is stigmatized in all societies and no folklore tradition regards the insane or their relatives as desirable marriage

partners. Although psychosis may coincide with favorable characteristics at times, this connection is not portrayed as prevalent.

Folklore traditions link schizotypy, anomalous experience, and folk religion. Folk stories describe the actions of holy fools who reveal hidden spiritual truths; these individuals have schizotypal characteristics (for Islamic/Sufi examples, see Shah, 1989, 1993; other examples include Hindu, Buddhist, and Christian mystics). Such mystics tend to ignore social conventions in opposition to social, intellectual, or religious elites. Many stories describe miracles which are thought to authenticate the mystic's message. Holy fool stories often provide psychologically healthy ways of thinking about misfortune and injustice, strategies useful for those unable to achieve success through conventional means. These stories reveal a kind of therapeutic creativity, suggesting a continuum joining schizotypy, spirituality, and innovation.

Other folklore motifs, not focusing on insanity, describe magical, spiritual, and religious benefits (for examples: V380, Miracle manifested to non-believers; V4, Value of religious exercises; D1700–D2199, Magic powers and manifestations). These stories describe ways of interpreting anomalous experiences and methods for dealing with spiritual forces. Accounts describe occult worlds beyond mundane reality; people attuned to this world through anomalous experience achieve certainty regarding spiritual realities. They sometimes label common goals regarding wealth, power, and social status as misguided, out of harmony with hidden dimensions. Beliefs based on anomalous experiences (spirits, souls, life after death, magical abilities) are portrayed as psychologically healthy — reflecting a reality more important than everyday reality.

Though balance theorists would expect motif items to describe connections between psychosis and creativity, analysis does not strongly support this. Folklore accounts mention wise fools and clever madmen, but these stories do not describe direct evolutionary benefits. Analysis provides better support for the ritual healing theory; folklore accounts describe anomalous experiences and associated beliefs supporting folk religious traditions that benefit believers through psychological processes (portrayed as magical).

Observation and interviews of 33 Asian shamanic practitioners reveal connections between psychotic-like perceptions, anomalous experiences, and ritual healing (McClenon, 1993b, 1994, 2002). Healers reported acquiring reputations within their communities as a result of their anomalous experiences. Many noted that they had suffered major illnesses that seemed beyond cure. Some worried that they might be going crazy since they heard inner voices demanding they become healers. They found that their illnesses were alleviated through mastering trance performance skills specified within shamanic traditions. As a result, they attained valued social roles through psychotic-like travels to spiritual realms.

People attending shamanic rituals reveal a spectrum of outcomes. Some exhibit psychotic-like trance behaviors, attributed to spiritual forces. Their problems are often alleviated through ritual healing, in ways that imply hypnotic processes. For example, the healer casts out a demon and the troubled person experiences immediate, full recovery. Other participants, not in trance, report benefits that can be attributed to placebo effects (requiring belief) or waking suggestion (requiring hypnotic capacity, see Heap, Brown, and Oakley, 2004). Many people claim psychological or spiritual cures but reveal no physical effects; others report no benefits at all. People who gain relief sometimes join cult-like groups whose testimony contributes to the therapeutic milieu. Those who master their proclivity for anomalous experience, and acquire performance skills, become shamanic practitioners (McClenon, 1994, 2002).

Shamanism has advantages compared to mainstream psychotherapy: (1) it facilitates early detection of psychological distress; (2) it induces trance in some participants, facilitating hypnotic suggestion; (3) it offers non-stigmatizing treatments; (4) it includes anomalous performances (heat immunity, pain denial, extrasensory perception, sleight-of-hand), enhancing placebo and hypnotic effects by capturing audience attention; (5) it involves entire communities in diagnosis and treatment, facilitating group therapy (Katz, 1982); (6) it provides a milieu with examples of treatment success; and (7) it calls on spiritual beliefs, contributing to placebo and hypnotic success.

The efficacy of ritual healing is almost axiomatic within the research literature (Benor, 2007; Lambo, 1974; McClenon, 2002; Winkelman, 2010). Although some cures seem medically anomalous, most can be explained as placebo and hypnotic effects (Brody and Brody, 2000; Fromm and Nash, 1992; Heap, Brown, and Oakley, 2004; McClenon, 1997a, 1997b, 2002). Hypnosis, proven to have genetic basis, can affect body processes previously thought unchangeable through conscious effort (Barber, 1984; Heap, Brown, and Oakley, 2004).

Group Selection Theories

Group selection theorists argue that psychosis alleles provide advantages to groups that outweigh individual disadvantages. As a result, human groups having specific genes replaced groups lacking these genes. Group selection arguments use elements from byproduct and balance theories. For example, Polimeni and Reiss (2003, 2005) review evidence that: (1) religious thoughts resemble forms of psychosis; (2) shamans foster hallucinations, trance states, and some use hallucinogens; (3) rituals are integral and provide functions in all cultures; (4) shamanism involves cognitive–behavioral task specialization in humans analogous to specialization in honeybees; (5) shamanism increases social cohesion; (6) psychotic-like trance fosters creativity; and (7) paranoid ideation can provide group selection advantages, an adaptive survival strategy when group conflict

is prevalent. In general, these positions coincide with accepted anthropological and sociological orientations (Durkheim, 1912/1995). In addition, Stevens and Price (2000) argue that shamans sometimes lead segments of their community to new settlements, dispersals that increase overall population. Group selection theories seem plausible to many social scientists since shamanism has been practiced by all hunter–gatherers for many millennia and has physiological, genetic basis (Winkelman, 2010).

Evolutionists tend to reject group selection theories, arguing that selection occurs when one gene replaces another gene, not by one human group with specific genes replacing another group lacking those genes (Hamilton, 1964). According to standard evolutionary models, group selection can occur only when groups have no gene flow between them, with resulting changes that are rare and relatively slow. Although Wilson (2002), and others, advocate multi-level group selection models, issues regarding these theories have not been resolved. Evidence from New Guinea implies that cultural group selection occurs, but is slow (Soltis, Boyd, and Richerson, 1995, see discussion, pp. 482–492).

Experience-centered data do not resolve group selection issues. Thompson's (1955–1958) *Motif Index of Folk Literature* mentions conflicts between groups without describing group selection. The ritual healing theory focuses on selection at the gene, rather than group, level. Although group selection theories have been deemed "least consistent with modern evolutionary theory" (Brüne, 2004, p. 48), shamanism has been observed to provide community benefits (Katz, 1982). Group selection theorists have not provided hypotheses amenable to full empirical testing. They must describe how slightly religious groups replaced non-religious groups and describe how researchers might identify genes conferring group benefits.

Environmental Change Theories

Environmental change theories argue that schizophrenia alleles were less harmful among ancient ancestors compared to modern people (Crow, 2000; Horrobin, 2002). Schizophrenia's genes are thought to be ancient since Australian Aboriginals, an ethnic group isolated from Asia about 60,000 years ago, exhibit the disorder (Polimeni and Reiss, 2005). Some environmental change theorists suggest that modernization generates schizophrenia. Although the environmental change argument explains how ancient schizophrenia genes survived until modern times, historical, anthropological, and clinical evidence bearing on this claim are not conclusive.

Scholars argue about the degree that ancient and non-technological peoples experienced "modern forms" of schizophrenia. The psychiatrist Burton–Bradley (1975, p. 109) observed that schizophrenia was rare among those New Guineans with limited outside cultural contact. Hindu Veda scriptures (1400 B.C.) and texts

from ancient Mesopotamia, Egypt, Israel, Greece, and Rome describe psychosis, but these documents do not depict a mental disorder arising in adolescence, causing hallucinations and delusions that may go away but often recur — the hallmark symptoms of schizophrenia (Gottesman, 1991). This is surprising since ancient observers, such as Hippocrates (460–377 B.C.), accurately described other mental disorders. Imprecise definitions of schizophrenia, and problems with interpreting evidence from past eras, prevent historians from reaching consensus regarding whether ancient texts portray this disorder (Fraguas and Breathnach, 2009).

Anthropological and clinical studies support the importance of gene–culture interactions, an idea that coincides with environmental change theory. Clinicians observe that people in non-technological, collectivist societies tend to experience psychosis in different ways than people in technological, individualist societies. Psychosis in non-technological societies tends to manifest in more benign forms, with sudden onset, rapid recovery, and full remission (Hopper, Harrison, Janca, and Sartorius, 2007). In these societies, acute psychotic episodes are more likely to include psychosomatic or hysterical symptoms (Moskowitz, Schäfer, and Dorahy, 2008; Shorter, 1992). This evidence suggests that some forms of psychosis in non-technological societies are treatable through shamanic rituals, a possibility supported by anthropological observation (McClenon, 1994).

Critics of environmental change theories point out that it would be incredible if people living in ancestral environments were so psychologically healthy that psychopathologies had no impact (Keller and Miller, 2006, p. 433). Although not conclusive, the historical, anthropological, and clinical evidence suggest that schizophrenia manifested differently during Paleolithic eras. The ritual healing theory suggests that shamanism developed, in part, as a way of dealing with psychosis-like anomalous experience.

Random Process Theories

Keller and Miller's (2006) polygenic mutation-selection balance theory argues that mental disorders reflect inevitable, continual mutational effects on the thousands of genes underlying human behavior. Keller and Miller argue that cognitive functions have modular characteristics; when harmful mutations disrupt a cognitive process originating during earlier evolutionary stages, connected functions, originating during later eras, are also affected. This gives mental disorders a watershed quality with "upstream" processes affecting layers of "downstream" processes. As a result, symptoms appear grouped in diagnostic categories due to the watershed's structural relationships. This theory is thought "consistent with the data on mental disorder prevalence rates, fitness costs, the likely rarity of susceptibility alleles, and the increased risks of mental disorders with brain trauma, inbreeding, and paternal age" (p. 385).

An alternate random process theory suggests that normal variants come together in rare, toxic combinations producing mental disorders (Pearlson and Folley, 2008). Although phenotypes conferring survival disadvantages should have been eliminated over time, benign mutations could continually generate possibilities for harmful genetic combinations.

Random process theories suggest that the search for schizophrenia alleles will prove difficult. Continuing failure to explain a large percentage of schizophrenia's incidence through genetic factors reduces faith in polygenic theories and makes random process theories increasingly attractive. Keller and Miller (2006) believe that future theorists will use multiple hypotheses to explain psychosis, with each having partial explanatory power. Mitchell and Porteous (2011, p. 19) maintain that recent empirical data suggest a "mixed model wherein some cases are caused by polygenic mechanisms and some by single mutations" — they call for emphasis on "interactions between disease-causing and disease-modifying variants in each individual."

The ritual healing theory specifies psychological disease-modifying processes. Traits associated with shamanism provided protection against stress and trauma and, as a result, shamanism provided evolutionary benefits shaping specific gene frequencies. This theory can be evaluated by: (1) collecting and analyzing schizotypal, anomalous, and shamanic experiences; (2) evaluating spiritual healing efficacy; (3) studying placebo and hypnotic processes; as well as (4) community surveys of variables correlated with schizotypal and anomalous experience.

Community surveys would generate data leading to better definitions of mental disorder and related phenotypes (Pearlson and Folley, 2008, p. 730). Comparison of results from different ethnic groups would be particularly useful for genetic researchers. Parallel to results presented by Mirowsky and Ross (1989), surveys could reveal the underlying architecture of phenotype linkages. Clusters of symptoms, highly correlated with each other, imply phenotypes sharing common allele risks. The ritual healing theory argues that community surveys would reveal correlations between schizotypal experience, anomalous experience, absorption, dissociation, hypnotic susceptibility, and related psychological variables since these variables share alleles affected by childhood stress and trauma. Survey data would reveal which questionnaire items were most associated with correlational clusters.

The ritual healing theory has clinical applications. It predicts that creative, shaman-like people devise innovative strategies for reframing problems within religious contexts. Clarke (2010) provides an edited volume portraying this innovative paradigm. Ritual practices, designed for therapeutic purposes, aid people in achieving cognitive self-control. Therapists, using this paradigm, advocate methods that enhance cognitive organization within spiritually supportive environments. They suggest specific forms of meditation, prayer, and other experience-based strategies, using non-stigmatizing methods (Brown, 2001;

Clarke, 2010; Romme and Escher, 1993; Tai and Turkington, 2009). Religion-based strategies have been proven effective through controlled clinical trials (Koenig, 2005).

Conclusion

Although no consensus exists regarding the degree that existing evolutionary theories explain schizophrenia's paradox, proponents of each position provide supportive evidence. The ritual healing theory has elements parallel to processes described in these theories. It describes byproducts, benefits, and environmental change. It focuses on factors that, if verified, could contribute to innovative treatment strategies. Genetics researchers may uncover biological markers to assist clinicians in designing psychotherapies specific to each patient. Survey research methods, folklore studies, anthropological observation, and investigation of religious-based, innovative therapies provide avenues to test hypotheses derived from this theory.

References

Adriaens, P.R. (2008). Debunking evolutionary psychiatry's schizophrenia paradox. *Medical Hypotheses, 70,* 1215–1222.

Barber, T.X. (1984). Changing "unchangeable" bodily processes by (hypnotic) suggestions: A new look at hypnosis, cognitions, imagining and the mind–body problem. In A.A. Sheikh (Ed.), *Imagination and healing* (pp. 69–128). Farmingdale, New York: Baywood.

Benor, D.J. (2007). *Spiritual healing: Scientific validation of a healing revolution.* Bellmawr, New Jersey: Wholistic Healing Publications.

Berenbaum, H., Thompson, R.J., Milanek, M.E., Boden, M.T., Bredemeier, K. (2008). Psychological trauma and schizotypal personality disorder. *Journal of Abnormal Psychology, 117,* 502–519.

Boden, M.T., and Berenbaum, H. (2004). The potentially adaptive features of peculiar beliefs. *Personality and Individual Differences, 37,* 707–719.

Brody, H., and Brody, D. (2000). *The placebo response.* New York: Cliff Street Books.

Brown, C. (Ed.). (2001). Recovery and wellness: Models of hope and empowerment for people with mental illness. New York: Haworth Press.

Brüne, M. (2004). Schizophrenia — An evolutionary enigma? *Neuroscience & Biobehavioral Review, 28,* 41–53.

Brüne, M., Brüne–Cohrs, U., McGrew, W.C., and Preuschoft, S. (2006). Psychopathology in great apes: Concepts, treatment options and possible homologies to human psychiatric disorders. *Neuroscience & Biobehavioral Review, 30,* 1246–1259.

Burns, J.K. (2004). An evolutionary theory of schizophrenia: Cortical connectivity, metarepresentation, and the social brain. *Neuroscience & Biobehavioral Review, 27,* 831–855 [Discussion, 855–885].

Burton–Bradley, B.G. (1975). *Stone-age crisis: A psychiatric appraisal.* Nashville: Vanderbilt University Press.

Cardeña, E., Lynn, S.J., and Krippner, S. (Eds.). (2000). *Varieties of anomalous experience: Examining the scientific evidence.* Washington, DC: American Psychological Association.

Claridge, G. (1997). Theoretical background and issues. In G. Claridge (Ed.), *Schizotypy: Implications for illness and health* (pp. 3–18). Oxford: Oxford University Press.

Claridge, G. (2010). Spiritual experience: Healthy psychoticism? In I. Clarke (Ed.), *Psychosis and spirituality: Consolidating the new paradigm* (second edition, pp. 75–88). West Sussex, United Kingdom: Wiley–Blackwell.

Clarke, I. (Ed.). (2010). Psychosis and spirituality: Consolidating the new paradigm. West Sussex, United Kingdom: Wiley–Blackwell.
Crispi, B., Summers, K., and Dorus, S. (2007). Adaptive evolution of genes underlying schizophrenia. *Proceedings of the Royal Society, Biological Science, 274,* 2801–2810.
Crow, T. J. (2000). Schizophrenia as the price that Homo sapiens pays for language: A resolution to the central paradox in the origin of the species. *Brain Research Reviews, 31,* 118–129.
Durkheim, E. (1995). *The elementary forms of religious life* [newly translated by Karen E. Fields]. New York: Free Press. (originally published 1912)
Fraguas, D., and Breathnach, C.S. (2009). Problems with retrospective studies of the presence of schizophrenia. *History of Psychiatry, 20,* 61–71.
Fromm, E., and Nash, M.R. (1992). *Contemporary hypnosis research.* New York: Guilford Press.
Gangestad, S.W., and Yeo, R.A. (1997). Behavioral genetic variation, adaptation and maladaptation: An evolutionary perspective. *Trends in Cognitive Science, 1,* 103–108.
Gill, M., Donohoe, G., and Corvin, A. (2010). What have the genomics ever done for the psychoses? *Psychological Medicine, 40,* 529–540.
Gottesman, I.I. (1991). *Schizophrenia genesis: The origins of madness.* New York: W.H. Freeman.
Goulding, A. (2002). Schizotypy models in relation to subjective health and paranormal beliefs and experiences. *Personality and Individual Differences, 37,* 157–167.
Hamilton, W.D. (1964). The genetical evolution of social behavior I and II. *Journal of Theoretical Biology, 7,* 1–16 and 17–52.
Heap, M.I., Brown, R.J., and Oakley, D.A. (Eds.). (2004). *The highly hypnotizable person: Theoretical, experimental, and clinical issues.* New York: Brunner–Routledge.
Horrobin, D.F. (2002). *The madness of Adam and Eve: How schizophrenia shaped humanity.* London: Bantam.
Hopper, K., Harrison, G., Janca, A., and Sartorius, N. (2007). *Recovery from schizophrenia: An international perspective.* Oxford: Oxford University Press.
Hufford, D. (1982). *The terror that comes in the night: An experience-centered study of supernatural assault traditions.* Philadelphia: University of Pennsylvania Press.
Jackson, M. (1997). Benign schizotypy? The case of religious experience. In G. Claridge (Ed.), *Schizotypy, implications for illness and health* (pp. 227–250). Oxford: Oxford University Press.
Joseph, J. (2004). *The gene illusion: Genetic research in psychiatry and psychology under the microscope.* New York: Algora Publishing.
Joseph, J. (2005). Research paradigms of psychiatric genetics. *American Journal of Psychiatry, 162,* 1985.
Katz, R. (1982). *Boiling energy: Community healing among the Kalahari Kung.* Cambridge, Massachusetts: Harvard University Press.
Keller, M.C., and Miller, G. (2006). Resolving the paradox of common, harmful, heritable mental disorders: Which evolutionary genetic models work best? *Behavioral and Brain Sciences, 29,* 385–404 [Discussion, 405–452].
Kendell, R., and Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *American Journal of Psychiatry, 160,* 4–12.
Kendler, K.S. (2005). Dr. Kendler replies. *American Journal of Psychiatry, 162,* 1985–1986.
Koenig, H.G. (2005). *Faith and mental health: Religious resources for healing.* Philadelphia: Templeton Foundation Press.
Lambo, T.A. (1974). Psychotherapy in Africa. *Psychotherapy and Psychosomatics, 24,* 311–326.
Lenzenweger, M.F. (2010). *Schizotypy and schizophrenia: The view from experimental psychology.* New York: Guilford Press.
Lewis–Williams, J. D. (2002). *The mind in the cave: Consciousness and the origins of art.* London: Thames and Hudson.
McClenon, J. (1993a). Surveys of anomalous experience in Chinese, Japanese, and American samples. *Sociology of Religion, 54,* 295–302.
McClenon, J. (1993b). The experiential foundations of shamanic healing. *Journal of Medicine and Philosophy, 18,* 107–127.
McClenon, J. (1994). *Wondrous events: Foundations of religious belief.* Philadelphia: University of Pennsylvania Press.

McClenon, J. (1997a). Shamanic healing, human evolution, and the origin of religion. *Journal for the Scientific Study of Religion, 36,* 345–354.
McClenon, J. (1997b). Spiritual healing and folklore research: Evaluating the hypnosis/placebo theory. *Alternative Therapies in Health and Medicine, 3,* 61–69.
McClenon, J. (2000). Content analysis of an anomalous memorate collection: Testing hypotheses regarding universal features. *Sociology of Religion, 61,* 155–169.
McClenon, J. (2002). *Wondrous healing: Shamanism, human evolution, and the origin of religion.* DeKalb, Illinois: Northern Illinois University Press.
McCready, C., and Claridge, G. (2002). Healthy schizotypy: The case of out-of-body experience. *Personality and Individual Differences, 32,* 141–154.
Mirowsky, J. (1990). Subjective boundaries and combinations in psychiatric diagnoses. *Journal of Mind and Behavior, 11,* 407–424.
Mirowsky, J., and Ross, C.E. (1989). *Social causes of psychological distress.* Hawthorne, New York: Aldine de Gruyter.
Mitchell, K.J., and Porteous, D.J. (2011). Rethinking the genetic architecture of schizophrenia. *Psychological Medicine, 41,* 19–32.
Mithen, S.J. (2006). *The singing Neanderthals: The origin of music, language, mind and body.* Cambridge, Massachusetts: Harvard University Press.
Moskowitz, A., Schäfer, I., and Dorahy, M. (2008). *Psychosis, trauma, and dissociation: Emerging perspectives on severe psychopathology.* Oxford: Wiley–Blackwell.
Nelson, B., and Rawlings, D. (2010). Relating schizotypy and personality to the phenomenology of creativity. *Schizophrenia Bulletin, 36,* 388–399.
Nettle, D. (2001). *Strong imagination: Madness, creativity and human nature.* Oxford: Oxford University Press.
Nettle, D. (2006). Schizotypy and mental health amongst poets, artists and mathematicians. *Journal of Research in Personality, 40,* 876–890.
Pearlson, G.D., and Folley, B.S. (2008). Schizophrenia, psychiatric genetics, and Darwinian psychiatry: An evolutionary framework. *Schizophrenia Bulletin, 34,* 722–733.
Poland, J., Von Eckardt, B., and Spaulding, W. (1994). Problems with the DSM approach to classifying psychopathology. In G. Graham and G.L. Stephens, (Eds.), *Philosophical psychopathology* (pp. 235–260). Cambridge, Massachusetts: MIT Press.
Polimeni, J., and Reiss, J.P. (2003). Evolutionary perspective on schizophrenia. *Canadian Journal of Psychiatry, 48,* 34–39.
Polimeni, J., and Reiss, J.P. (2005). Evolution and schizophrenia. In J.E. Pletson (Ed.), *Progress in schizophrenia research* (pp. 1–21). New York: Nova Science Publishers.
Porter, R. (2002). *Madness: A brief history.* New York: Oxford University Press.
Romme, M., and Escher, S. (Eds.). (1993). *Accepting voices.* London: Mind Publications.
Sarbin, T.R. (1990). Toward the obsolescence of the schizophrenia hypothesis. *Journal of Mind and Behavior, 11,* 259–283.
Schofield, K., and Claridge, G. (2007). Paranormal experiences and mental health: Schizotypy as an underlying factor. *Personality and Individual Differences, 43,* 1908–1916.
Schulze, T.G., and McMahon, F.J. (2004). Defining the phenotype in human genetic studies: Forward genetics and reverse phenotyping. *Human Heredity, 58,* 131–138.
Shah, I. (1989). *Wisdom of the idiots.* London: Octagon Press.
Shah, I. (1993). *The pleasantries of the incredible Mulla Nasrudin.* London: Arkana Books.
Shorter, E. (1992). *From paralysis to fatigue: A history of psychosomatic illness in the modern era.* New York: Free Press.
Sigerist, H.E. (1987a). *A history of medicine, I: Primitive and archaic medicine.* New York: Oxford University Press.
Sigerist, H.E. (1987b). *A history of medicine, II: Early Greek, Hindu, and Persian medicine.* New York: Oxford University Press.
Soltis, J., Boyd, R., and Richerson, P.J. (1995). Can group-functional behaviors evolve by cultural group selection? An empirical test. *Current Anthropology, 36,* 437–494.
Stevens, A., and Price, J. (2000). *Evolutionary psychiatry: A new beginning.* London: Routledge.
Tai, S., and Turkington, D. (2009). The evolution of cognitive behavior therapy for schizophrenia: Current practice and recent developments. *Schizophrenia Bulletin, 35,* 865–873.

Thompson, S. (1955–1958). *Motif-index of folk literature. A classification of narrative elements in folktales, ballads, myths, fables, medieval romances, exempla, fabliaux, jest-books and local legends* [revised and enlarged edition, six volumes]. Bloomington: Indiana University Press.

Volgyesi, F.A. (1966). *Hypnosis of man and animals* (second edition). Baltimore: Williams and Wilkins.

Wilson, D.S. (2002). *Darwin's cathedral: Evolution, religion, and the nature of society*. Chicago: University of Chicago Press.

Winkelman, M. (2010). *Shamanism: A biopsychosocial paradigm of consciousness and healing*. Santa Barbara, California: Praeger.