Delusions as exploitative deception

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Abstract

Non-bizarre delusions are hypothesized to be psychological adaptations which evolved to mitigate the dangerous consequences of social failure. When humans lived in small, kin-based groups, delusions would have functioned to combat social failure by closely mimicking conditions, such as possession of important information, external threats, or illness, where fellow group members were likely to cooperate and provide assistance. If delusions are adaptations to social failure, then they should onset when an individual faces a serious social threat, they should function (in ancestral type environments) to elicit social benefits—at least in the short term—and they should cease when the social threat ceases, an hypothesis which is examined in the context of numerous published studies of Delusional Disorder (DD).

Studies of the relationship between DD and life events, immigrant status, prison psychoses, and discrimination all indicate that social deficits play a significant etiological role. Cross-cultural data collected in traditional societies show that delusions can elicit social benefits. Finally, studies show that positive social variables are the most important predictors of remission of DD. A case can therefore be made that delusions are an effective adaptation to social failure.

Keywords: delusions, psychosis, parasitism, cooperation, social failure

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Even paranoids have real enemies. American poet Delmore Schwartz.

1. Introduction

Thomas Szasz is well known both for his biting critique of the mental illness concept (e.g., Szasz 1961) and his vehement condemnation of what he views as the coercive nature of modern psychiatry (e.g., Szasz 1970). Less well known is that in addition to these philosophical and social critiques, Szasz has offered a positive theory of mental illness, namely that so-called mental illnesses are really strategies in the social games in which we are all engaged:

> [N]otions such as hysteria or mental illness can be properly understood only in the context of a specified social setting. In other words, while such diseases as syphilis and tuberculosis are in the nature of events or happenings, and hence can be described without taking cognizance of how men conduct themselves in their social affairs, hysteria, and all other phenomena now popularly called mental illnesses, are in the nature of actions. They are thus made to happen by sentient, intelligent human beings and can be understood best, in my opinion, in the framework of games. "Mental illnesses" thus differ fundamentally from ordinary diseases and are similar, rather, to certain moves or techniques in playing games. Suffering from hysteria is thus far from being sick and could more accurately be thought of a playing a game, correctly or incorrectly, skillfully or clumsily, successfully or unsuccessfully, as the case might be. (Szasz 1961, p. 225)

According to Szasz, these strategies are incorrectly labeled illnesses because they often involve socially undesirable behaviors like lying, cheating, and deception. Psychiatry, however, is strictly prohibited from considering this view:

> For the contemporary psychiatrist to speak of lying in connection with so-called mental illness is anathema. Once a person is called a "patient" his psychiatrist is no longer even permitted to consider such a thing as lying. The prohibition placed on this term and all it connotes has been at least as strong as that on sex in Victorian society, and perhaps even greater. Anyone who speaks of lying in connection with psychiatric problems, tends ipso facto to be identified as "antipsychiatric" and "antihunanitarian," meaning thereby that he is both wrong and bad. I believe this is most regrettable, and merely signifies the contemporary psychiatrist's (and lay person's) sentimentalizing attitude toward the so-called mentally ill. Such an attitude toward mental illness is harmful to science and has no place in it. (Ibid, p. 272)

Here I will show that Szasz' positive theory of mental illness as strategic deception can be framed as a testable hypothesis using theories from modern evolutionary biology. I will also show that given this framing, much evidence collected using the illness model actually supports Szasz. In important ways, however, my argument differs from Szasz'. First, I am not advancing a social critique of psychiatry; I am merely interested in whether the illness model is the correct scientific model of certain types of psychiatric symptoms or whether some other model fares equally well or better. Second, I am not proposing that Szasz is correct about *all* mental illnesses – I strongly suspect that he is not. I will only be investigating a single psychiatry symptom: non-bizarre delusions. In particular, I am explicitly excluding schizophrenia, which I believe to be the product of one or more genuine brain dysfunctions. Finally, unlike Szasz I will specify in detail the special social circumstances that should elicit deceptive strategies and the benefits such strategies can deliver in the types of social environments in which humans evolved.

1.1 The mystery of delusions

Delusions are tenaciously-held, false beliefs, and are generally divided into two categories, bizarre and non-bizarre. Bizarre delusions are beliefs that are inconsistent with a person's culture – for example, an American's tenaciously-held belief that insects were living in his brain.

Non-bizarre delusions, on the other hand, are tenaciously-held false beliefs that nonetheless could be accepted as true in that individual's culture – for example, an American's tenaciously-held, false belief that he knew of an assassination plot against the president, or was being spied on by Al Qaeda. Meissner (1987) defines non-bizarre delusional conditions as

> a relatively permanent and unshakable delusional system accompanied by the preservation of clear and orderly thinking. The delusions are typically persecutory in nature or take the form of delusions of jealousy. The delusional system may form the basis for anger and resentment. Ideas of reference are common, *and are often associated with a life pattern which involves considerable social isolation, seclusiveness, or eccentricity*. (emphasis added)

This paper will be solely concerned with non-bizarre delusions whose etiology, as discussed in more detail below, almost certainly involves severe social deficits and is therefore quite distinct from that of bizarre delusions. Although easy to recognize, non-bizarre delusions have been difficult to define, for they are not simply false beliefs. A person who holds a belief commonly accepted by his or her community (e.g., ghosts exist) is not considered delusional, for example, even if Western psychiatrists would consider this belief to be false. As we shall see shortly, the number of categories of non-bizarre delusions is actually quite limited, largely eliminating concerns about the definition of delusion.

Delusions are often systematized, with the delusional system forming a logical and coherent whole. Recent events may be incorporated into the system, or used as supporting evidence. Oltmanns (1988) provides additional important characteristics of non-bizarre delusions, with none considered to be either necessary or sufficient:[1]

> The belief is held with firm conviction. The person's statements or behaviors are unresponsive to the presentation of evidence contrary to the belief.
>
> The individual is preoccupied with (emotionally committed to) the belief, and finds it difficult to avoid thinking or talking about it.
>
> The belief involves personal reference, rather than unconventional religious, scientific, or political conviction.
>
> The belief is a source of subjective distress or interferes with the person's occupational or social functioning.
>
> The individual does not report subjective efforts to resist the belief (in contrast to patients with obsessional ideas).

Enormously disruptive to sufferers and their families, delusions are among the most difficult psychiatric conditions to treat. After more than a century of research, however, no compelling explanation of delusions has emerged. Delusions have been attributed to disturbances in affect and thinking, deficits in perception, defects in the psyche, projections or externalizations of personal wishes, conflicts, or fears, altered views of the self, susceptible personality types, existential conflicts, avoidance responses, unsuccessful social interactions, and cybernetic regulation of the self and others. Most theories can be characterized by two major "themes": delusions are either motivational (individuals are motivated to explain unusual perceptions, or they are motivated to reduce or ameliorate uncomfortable emotional or psychic states), or delusions are a sign of an underlying cognitive defect (see Winters and Neale 1983 for references and critique).

[1] I have omitted his first two criteria specifying that the belief is not shared by others, since I will be arguing that, in ancestral environments, delusional individuals were able to convince others to share their beliefs.

Cognitive deficit models of delusions appear to be attracting the most research attention. This research has revealed numerous deficits in cognition that distinguish individuals with persecutory delusions from both other psychiatric patients as well as normal controls. These deficits are typically grouped into a limited set of categories, such as attentional biases, attributional biases, 'jumping-to-conclusion' biases, and theory-of-mind deficits. For example, compared to non-delusional psychiatric patients and controls, individuals with persecutory delusions preferentially attend to threat-related stimuli, preferentially recall threatening episodes, spend less time reappraising potential threats in ambiguous pictures, take more credit for successes, more strongly deny responsibility for failures, tend to attribute failures to active malevolence on the part of others, draw conclusions based on less information and are more confident in these conclusions (especially with regard to emotionally salient material), and are less able to correctly infer the mental states of others (for a review of these studies, see Bentall et al. 2001; Blackwood et al. 2001).

But do these finding really reveal cognitive deficits, or do they simply reveal cognitive *differences*? Imagine, for the sake of argument, that a person with persecutory delusions had real enemies and/or a compelling motive to deceive others. It would not be surprising that this person preferentially attended to threat-related stimuli, preferentially recalled threatening episodes, tended to attribute failures to the malevolence of others, and so forth. Further, most, if not all, of these differences are state differences, not trait differences: cognitive differences covary with delusional symptoms. Correlation is not causation, so it is impossible to conclude that these cognitive differences are the cause of delusions. Because none of these studies controlled for individuals' social circumstances, it is also impossible to conclude that these cognitive differences are evidence of genuine cognitive deficits, that is, of mental illness. The evidence is equally consistent with a strategic interpretation that views delusions as an adaptive response to certain kinds of social threats, a view I develop in detail here. What researchers investigating cognitive aspects of persecutory delusions may have accomplished is to have experimentally operationalized paranoia. That is, they can now *detect* paranoia using cognitive tests, an important achievement. It is far from clear, however, that they can *explain* paranoia, even at a proximate level.

Regarding the many other types of theories, a comprehensive review concluded, "In sum, despite large numbers of explanation and theories on delusional thinking, there is no agreed upon conceptualization or general model concerning their nature and very few theories enjoy empirical support" (Winters and Neale 1983). A more recent appraisal (Roberts 1992) was even more blunt: "Although delusion remains one of the basic problems in psychopathology, attempts to understand its pathogenesis have been dominated by unsubstantiated speculation…."

1.2 Should a function for delusions be considered?

Mainstream psychologists and psychiatrists generally favor the view that "normal" psychological states can be objectively defined. Indeed, one popular definition, embodied in the DSM-III-R, is that "normal" can be defined statistically; whatever most people experience and do is "normal" (e.g., Cohen 1981). Experiences that are both relatively rare and deemed harmful to the sufferer, in contrast, are "abnormal." Critics of Western conceptions of "normal" and "abnormal" psychology (e.g., Foucault 1965; Scheff 1966; Szasz 1961), on the other hand, regard these concepts as inherently value-laden social constructions created, not to treat brain diseases, but to control undesirable behaviors. Labeling undesirable behaviors and emotions like

aggression and delusions as "abnormal" allows them to be "treated," with powerful drugs if necessary, and allows persons exhibiting them to be committed to institutions.

Wakefield's widely influential work has provided an elegant definition of abnormal psychology – mental disorder – that neatly resolves the debate. Wakefield persuasively argues that both physical and mental disorders should be conceptualized as *harmful dysfunctions* (e.g., Wakefield 1992a, 1992b, 1999), a two-part definition where the terms "harmful" and "dysfunction" each play distinct and important roles. Wakefield accepts that the brain comprises a suite of distinct parts that evolved by natural selection and thus have adaptive functions. If this is true, then dysfunction, the second part of Wakefield's disorder concept, can be objectively defined, free from judgments of social value: *"dysfunction* is a scientific and factual term based in evolutionary biology that refers to the failure of an internal mechanism to perform a natural function for which it was designed" (Wakefield 1992:374). Yet dysfunctions are not necessarily disorders. A man who has chosen to have a vasectomy has a dysfunctioning reproductive system, but one would not say that he is suffering from a disorder. Indeed, this dysfunctioning is exactly what the man desires. Under Wakefield's definition, only those dysfunctions that are deemed *harmful* by society are disorders: "…*harmful* is a value term referring to the consequences that occur to the person because of the dysfunction and are deemed negative by sociocultural standards" (Wakefield 1992:374). In Wakefield's disorder concept, the social value-laden component of disorder classifications is made explicit and therefore more easily subject to debate and critique. Thoughts, feelings, and behaviors that are deemed harmful by society, yet are not the product of dysfunctioning mechanisms in the brain, are also not disorders. If aggression or delusions are the product of properly functioning, evolved brain mechanisms, then they are not disorders, even if they might cause harm.

Despite the widespread use of powerful drugs to suppress the brain processes underlying psychiatric symptoms, attempts to explore possible functions for mental illnesses are often dismissed by psychiatrists and others (e.g., Coyne 2000; Orr 2003; Wilson 2002). If doctors suppressed bodily processes while dismissing efforts to determine whether the processes served any useful function, however, their ethical failure would be clear. Inquiring whether delusions are functional is especially urgent. The long-term use of older 'typical', and even the newer and safer 'atypical', antipsychotic drugs used to treat delusions is particularly dangerous. In a significant fraction of patients these treatments cause serious side effects like parkinsonism, and even irreversible brain damage, such as tardive dyskinesia—repetitive, involuntary, purposeless movements (Bagnall et al. 2003).

Using Wakefield's disorder concept, if delusions evolved to serve some function – if they are an adaptation – then they are not a mental illness, even if they are deemed harmful by society. Establishing that a psychological phenomenon is an adaptation requires that (1) some important reproductive problem posed by the physical or social environment be identified (the *selection pressure*), and (2) that the psychological phenomenon in question be shown to effectively solve that problem. I will argue that severe social failure was an important selection pressure on the evolution of human psychology. I will then argue that certain types of deception would have effectively mitigated the costs of severe social failure. Finally, I will argue that delusions are exactly these types of deception. Were such a functional hypothesis supported, suppression of functional symptoms with dangerous drugs would be require additional ethical considerations, and new treatments would be conceivable. Given the lack of a scientific consensus on a model of delusions as a dysfunction, a serious inquiry regarding possible functions for delusions is long overdue.

2. The selection pressure: severe social failure

Humans are an exceptionally social species. Few evolutionary theorists doubt that, over evolutionary time, successful human reproduction (termed *fitness*) required successful social relationships (e.g., Byrne and Whiten 1988). It follows then, that a failure to form, or loss of, social relationships would have imposed a severe fitness cost. Intuitively, it is easy to see that one's social relationships face constant threats. A spouse can fall in love with another, a parent can die, a friend can betray, and so forth. Consistent with these intuitions, standard evolutionary biological models of human sociality also predict that threats to social relationships were an inherent and unavoidable risk. Biological kinship, for example, is a foundation of cooperation and sociality in many species, including humans (Hamilton 1964). Individuals help others who share their genes. Parental investment in offspring is one important instance of kinship-based cooperation. Kinship-based relationships, however, are not immune to disruption. If a parent dies, children, especially young children, lose an extremely important social partner. The same goes for other important relatives like siblings, aunts, and uncles.

Biological kinship is not the only mechanism underpinning cooperation in humans. Reciprocal altruism (e.g., Trivers 1971), where individuals repeatedly exchange benefits to their mutual benefit, is another mechanism that is thought to be important to human cooperation. In all known traditional societies, individuals receive very important benefits from their reciprocal relations with others. These include food, protection, health care, and mates (Brown 1991; Cohen 1977; Keeley 1996; Kelly 1995; Lee and DeVore 1968; Sahlins 1972; van den Berghe 1990). To obtain these benefits, one must provide benefits. In reciprocal altruism models, if one fails, or is unable, to provide benefits, access to benefits is terminated. Any circumstance which prevented an individual from meeting their reciprocal obligations, such as illness, injury, or loss of territory, would jeopardize their reciprocal relationships.

Forming social relationships is costly in time and effort, so individuals should prefer to cooperate with individuals who provide the greatest benefit at the least cost. I will term the net benefits obtainable from an individual her *social value*. If forming relationships were costly in terms of time and effort, then cooperation with one individual may have precluded cooperation with another, leading to a 'market' for cooperative partners based on their social value (Bull and Rice 1991; Nöe and Hammerstein 1994; Nöe et al. 1991). This phenomenon has been documented in animals (e.g., Bshary and Nöe 2003), and has been argued to be an important aspect of human sociality as well (e.g., Dugatkin 1995). Competition for cooperative partners has many implications, the most important for this paper being the constant risk faced by each individual that important relations will be "renegotiated" at a lower profit margin, or even terminated should a better partner be found.

Cooperative deficits such as loss of close kin, a failure to find a cooperative partner, poor terms of cooperation, few benefits provided by cooperative partners, few or no returns yielded by reciprocal investments, renegotiation of cooperative relationships on less favorable terms, termination of one or more relationships, or hostile individuals impeding one's attempt to cooperate with others or ostracizing one from the group would have decreased or eliminated access to essential resources, seriously reducing one's fitness. Social failures would have greatly increased the difficulties in finding or keeping a mate, immature offspring would have received less care and investment, and close kin may have suffered as well. Social science has tended to reify the group; groups and group membership are taken for granted. If social exchange and cooperative partner choice are important aspects of human sociality then it is unlikely that

individual human psychology takes group membership for granted. Cooperative relations must be constantly maintained by providing benefits.

In the environment of evolutionary adaptedness (EEA), some individuals who suffered cooperative deficits may have had physical or psychological impairments or abnormalities that hindered their ability to provide benefits. Or they may have acted selfishly leading others to break off relationships. In other cases, however, they may not have anything 'wrong' with them and they were not necessarily disliked. They simply had less to offer than other group members. In fact, when there is intergroup competition, all group members have intrinsic value to other group members as co-defenders, and will have rights to certain group resources. But, because fitness is relative, individuals suffering cooperative deficits were at a distinct fitness disadvantage. If these arguments are correct, there should have been a large selection pressure for adaptations to mitigate the fitness disadvantage of individuals suffering cooperative deficits. One price that humans pay for their almost unprecedented reliance on cooperation with both kin and non-kin is the serious fitness cost that attends social failure.

3. The adaptations: vigilance and exploitative deception

The rest of this article will argue a simple proposition: that when individuals are in what would have been, in ancestral environments, a bad social situation, they will increase their vigilance and they will lie. When they are in a disastrous social situation, they will believe their own lies to increase the odds that others believe them too. What I am adding to this prosaic, even banal, idea, is simply that there are specialized psychological adaptations to increase vigilance and to lie. The lies are compulsory and completely unconscious, and are tightly focused on themes that garnered social benefits in ancestral social environments. Because these lies are often (but not always!) implausible in modern states, they succeed less often than they would have in ancestral environments, and have therefore been misidentified as psychopathology. This proposal obviously represents a radical alternative to mainstream views of delusions as a mental dysfunction of some sort. As such it is extremely speculative and will require considerable further testing.

3.1 Increased vigilance

Individuals suffering severe social failure have, by definition, few cooperative partners. They have few people to take care of them if they are injured or fall ill, they have few people to provide critical resources like food, and they have few allies to help defend them in conflicts with others. Consequently, they are far more vulnerable than others to illness, injury, resource shortages and social conflicts. Given this increased vulnerability, it becomes increasingly necessary to avoid such costly circumstances. To do so, socially vulnerable individuals must increase their vigilance, at the expense both of devoting more time and effort to other tasks and of mistaking benign situations for dangerous ones.

3.2 Signaling and deception: General theory

From an evolutionary perspective, adaptations for communicating information or sending signals evolved because they benefited the sender, and not necessarily the receiver (Dawkins and Krebs 1978). Organisms may communicate either true or false information when it is in their fitness interest to do so. Because conflicts between organisms are common, deception should be rife in nature, and it is. Mimicry and crypsis are extremely widespread in vertebrates, arthropods and opisthobranch gastropods (Starrett 1993). Every example of camouflage coloring in animals

and plants is an example of deception. In a naïve biological theory, bluff and deception would be the rule rather than the exception among organisms with conflicts of interest. In *cooperative* relationships, however, where communication enhances the effectiveness of cooperation and future interactions are likely, outright exploitation of receivers should be rare (Markl 1985). In fact, in cooperative social systems, signals should be cheap and easy to send because this reduces the cost of cooperation, thus increasing its fitness benefit.

Receivers in cooperative relationships are nonetheless susceptible to third-party parasites that mimic the sender's signal, since discrimination against the parasite's signals may jeopardize the benefits obtained by communicating and cooperating with the sender. "[P]ersistently effective third party exploitation can take advantage of a dyadic communication system which is highly important for the dyad's fitness. Since this is also the condition most favoring selection against intradyadic exploitation and for intradyadic cooperation, we should expect to find such exploitative third party intrusion most spectacularly combined with very cooperative and mutually beneficial social relationships" (Hölldobler 1977). This has been documented in nature. Ants are a highly cooperative social species, and they have evolved an elaborate yet inexpensive communication system based on both chemical and behavioral signals. This system, however, is exploited by parasites. Certain species of beetles have evolved to mimic ant feeding signals in order to receive food from the ants while providing nothing in return (Hölldobler 1977).

Organisms living in social systems that rely on "cheap" signals for the exchange of substantial benefits are susceptible to exploitation by parasites that can mimic these signals because the organisms cannot effectively discriminate against possible parasites without accidentally discriminating against real cooperators. For humans, whose language communication system relies on "cheap" vocalizations, these unavoidable "parasites" may be individuals who have been excluded from social relationships.

3.3 Exploiting cooperative partners

In biological theory, one of the principle mechanisms to deter deception in cheap signaling systems is to punish false or deceptive signals by defecting from repeated future cooperative interactions to the deficit of the sender (e.g., Silk, Kaldor, and Boyd 2000, and references therein). An important cost that humans face for deceiving other group members, in other words, is the loss of social relationships. This consequence of "cheating" is predicted by virtually all models of the evolution of cooperation based on social exchange (Axelrod and Dion 1988; Axelrod and Hamilton 1984). An individual who is already suffering severe social failure, however, that is, one with few or no profitable social relationships and little access to future cooperation, cannot be deterred by such threats. This individual has nothing to lose and much to gain from successful deception that elicited social benefits they otherwise had no access to. An adaptation to deceive and exploit cooperative partners should be present in all individuals, but only activate in those for whom the benefits of deception outweigh the costs. Among individuals already suffering severe social failure, the benefits of deception and exploitation will almost always outweigh the costs because there are few or no costs!

What would such a deceptive, exploitative adaptation look like? First, it should cause individuals suffering severe social failure to signal others that they need social benefits, and that they can provide social benefits in return. These individuals should behave in ways that are difficult to consciously imitate, like displaying intense fear or excitement (e.g., Ekman, Roper, & Hager, 1980), because such behavior may be more likely to convince others. They should be able

to give reasons for their behavior that are difficult to independently verify, at least immediately. Examples include the claim that one possesses important information or has an intimate relationship with a high status individual. The deceptive signals, like cues of need and distress, should be supported by explanations or additional information which provide a plausible basis for the signals. Individuals attempting to extract cooperative benefits from others via deception will be plausible recipients of the intended cooperative benefits, and they should feel compelled to communicate their deceptions to others. The adaptation should deactivate if and when cooperative partnerships are established.

There is evidence, discussed below, that delusions satisfy every hypothesis, and conversely, that these hypotheses account for most of the significant clinical, etiological, and demographic aspects of delusions, a psychotic psychiatric symptom. The only previous (brief) suggestion that I have encountered that psychoses function to mitigate social exclusion is Wallace (1960). He presents no rationale for this function however. As I discussed earlier, Szasz (1961) has argued that "mental illness" in general is often a form of deception. Henderson (1974; 1981) has carefully investigated the hypothesis that "neuroses," though not psychoses, function to elicit care, and Sullivan (1953) is well known for his interpersonal approach to psychiatry. The exploitative deception hypothesis of delusions is consistent with the argument that self-deception functions to facilitate the receipt of cooperative benefits (Alexander 1979; Nesse 1990; Slavin 1985; Trivers 1985).

3.4 Alternatives to deception

Individuals facing severe cooperative deficits should respond by attempting to please members of the group and to conform to group values. An important prediction of the exploitative deception hypothesis is that such an adaptation will only trigger when an individual has made a concerted effort to acquire beneficial relationships but has failed, or has lost significant relationships that would be difficult or impossible to regain or replace. These individuals cannot "suck up" because no one wants what they have to offer. They might have been able switch groups, but the costs of switching groups may often have been prohibitive, especially during intergroup conflicts. *Amok*-type violence could have been another alternative, but would only have been an option for particular individuals (e.g., healthy males) when there was a non-zero chance of eliminating major competitors and escaping deadly reprisals (e.g., when there were only a few other adult males). Deception appears to be one of the few viable strategies for individuals facing severe social failure to obtain the benefits they need to survive and reproduce.

3.5 Domains of deception

There are three domains where humans receive substantial social benefits: defense, social exchange, and mating. Each of these should consequently be the target of individuals wishing to extract social benefits via deception.

Defense: Belief that there is an external threat provides a *very* strong impetus for cooperation among humans (e.g., LeVine and Campbell 1972), and it has been argued that external threats were a significant selection pressure for the initial evolution of cooperation among hominids (Alexander 1987). Because high levels of within-group cooperation among a large number of individuals is essential to successful defense, external threats provide an extremely strong incentive to maximize internal cohesiveness and cooperation, and to minimize internal discord. Further, in the face of an external threat, each healthy group member, even those whose social

value was previously low, now has considerable value to other group members as a defender. Group members should readily cooperate against possible external threats because the costs of responding to a false threat are lower than the costs of not responding to a real threat. Deceptive claims of external threats could increase access to cooperative benefits by exploiting these aspects of human psychology.

Social exchange: Individuals should prefer cooperating with individuals who have valuable benefits to offer. Deceptive cues of access to important information, people, or of possessing valuable skills should increase one's social value to others. Additionally, individuals should help others when they can provide large benefits to others at low cost to themselves (throwing a rope to a drowning man, for example) because they are then eligible for a return on this investment when the benefited individuals reciprocate (Gouldner 1960; Trivers 1971). Humans give off numerous cues of distress like crying and expressions of fear (e.g., Darwin 1872; Ekman 1989) indicating they are eligible for receiving these kinds of cooperative investments. Deceptive cues of illness, fear, or distress could elicit cooperative investments from unsuspecting fellow group members. Social norms could also dictate providing assistance to needy group members.

Mating: Males provide resources and protection to females in exchange for mating opportunities. Conversely, females offer mating opportunities in exchange for resources and protection (Symons 1979). Deceptive cues given by males that they can offer valuable resources or protection increase the probability of mating opportunities. Deceptive cues given by females that they are attracting the mating interest of important males imply access to resources and protection that might themselves attract cooperative benefits from others, or deter threats.

4. Delusions as exploitative deception

4.1 Mental illness as adaptation

Several authors have suggested that certain psychiatric symptoms and syndromes may be adaptations (Badcock 1990; Chance 1988; Gardner 1982; Gilbert 1989; Glantz and Pearce 1989; Hagen 1999, 2003; Huxley et al. 1964; Nesse 1991; Price 1972; Thornhill and Thornhill 1990; Wilson 1993). Unpleasant experiences like nausea, vomiting, and fever are healthy, physiological adaptations in response to toxins and infections. Analogously, intense, negative psychological experiences like delusions and hypochondriasis may be normal, "healthy" adaptations to certain types of social failure.

4.2 Delusional Disorder

To avoid confounding the etiology of delusions with the etiology of depression, hallucinations, brain damage, or substance use, all of which can be associated with delusions (Manschreck 1989), I will restrict my focus to delusions in the absence of any other symptom, that is, to the distinct nosological entity Delusional Disorder (DD). (See Jorgensen and Jensen 1988; Kendler 1980; Kendler 1982; Kendler 1984; Kendler 1987; Kendler and Tsuang 1981; Koehler and Hornstein 1986; Opjordsmoen 1987; Winokur 1977, for work on the nosological validity of DD and related delusional psychoses.) Individuals with DD are cognitively, emotionally, and physically unimpaired, and their *only* symptom is a non-bizarre delusional framework. Specifically, DD is defined (APA 1994) by the presence of non-bizarre delusions of at least one month's duration, and by the absence of hallucinations, disorganized speech disorganized or catatonic behavior, flattening of affect, markedly impaired functioning, odd or bizarre behavior, underlying medical condition, or physiological effects of a substance (i.e., drug

use). Paranoid Disorder (DSM-III) is an older term for DD that excluded delusions other than persecutory or jealous.[2]

Paranoid Schizophrenia (DSM-IV) is similar to DD, except that prominent auditory or visual hallucinations are present in addition to delusions. This paper will not propose an adaptive function for Paranoid, Catatonic, or any other type of schizophrenia. Unfortunately, studies of delusions often include individuals who might be diagnosed as schizophrenic or for whom a diagnosis of DD is excluded due the presence of prominent hallucinations or other psychotic symptoms. Besides delusions and hallucinations, psychotic symptoms include disorganized speech, and grossly disorganized or catatonic behavior. The use of data including any such individuals will be noted.

Although DD is rare (with a prevalence of approximately 0.01-0.03%), delusions in concert with other symptoms like depression and auditory hallucinations are not. One population survey found the prevalence of delusions to be 3.3% (Van Os et al. 2000). Another large (n=18,980) cross-cultural survey found the prevalence of delusions to be 1.9% (Ohayon and Schatzberg 2002). Though delusions can be associated with a variety of other conditions, individuals with DD have delusions and *nothing else*. Identifying the cause of DD could therefore reveal the specific cause of non-bizarre delusions. Let's call this unknown cause 'X'. It might then be the case that the association of delusions with, e.g., brain damage, hallucinations, substance use, or depression was via the association of brain damage, hallucinations, substance use or depression with X. For example, brain damage could cause X, which then causes delusions.

Where possible, findings for DD will be contrasted with those for schizophrenia. Schizophrenia provides an excellent control case for DD since it is also a psychotic disorder whose symptoms include both bizarre and non-bizarre delusions, as well as the more disabling psychotic symptoms. As will be seen below, DD has a social and demographic "fingerprint" quite distinct from schizophrenia. When delusions are separated from psychotic and other symptoms, an etiology of social exclusion and isolation emerges. In section 5 I will argue that 'X', the unknown cause of non-bizarre delusions, is severe social threats.

4.3 'Paranoia' as increased vigilance

Paranoid Personality Disorder (PPD, DSM-IV) is not considered to be a psychotic disorder; individuals are not delusional—they do not cling tenaciously to an elaborated false belief—nor have they experienced other psychotic symptoms. They are, however, very distrustful and suspicious of others, whose motives are interpreted as malevolent. PPD may be an adaptation to cooperative deficits based on vigilance rather than deception. Socially threatened individuals must be on the constant lookout for attempts to deprive them of material, social, or reproductive resources. Because they do not have social partners that would help them, they must also be more vigilant in avoiding injury and disease. PPD, anxiety, obsessive-compulsive, and certain somatoform "disorders" may therefore be vigilance-type adaptations to social and physical threats. PPD appears to be more common than persecutory delusions, and, if an adaptation, may be used instead of deception for less severe social threats. Socially threatened individuals who fear members of their in-group may be increasing their vigilance towards likely internal adversaries rather than attempting to exploit them.

[2] These older DSM III criteria are still commonly encountered in the research literature.

4.4 Delusions as adaptations for exploitative deception

I propose that non-bizarre delusions are adaptations for ameliorating the fitness costs of severe social deficits. Delusional themes are not random or arbitrary. In principle, delusional themes could orbit any domain of human cognition involving belief formation, including any aspect of the physical environment, the biological environment, material culture, or even numerous aspects of the social environment. But they don't. Cross culturally, the vast majority of delusions can be characterized by a tiny subset of all conceivable themes, themes that are central to the exchange of social benefits. *Every* common category of non-bizarre delusion has a natural interpretation as a functional mechanism to elicit some social benefit or mitigate the consequences of social deficits. According to DSM-IV (APA 1994) virtually all non-bizarre delusions belong to one of five themes (table 1), themes that closely resemble the domains of deception predicted by the exploitative deception hypothesis.

Other categorizations of delusions have been proposed, but most involve a small number of similar themes. Delusions of reference, for example, where individuals feel that events have a special personal significance, are a commonly mentioned theme that DSM-IV appears to have subsumed under grandiose, persecutory or other themes, as it has also done for religious delusions.

Delusions of different types often appear together in a complimentary fashion. An individual who is attempting to gain benefits based on cooperative defense would profit by presenting themselves as a valuable and important person as well. Importantly, individuals act consistently with the delusional framework. Wessely et al (1993) found that 60% of their sample of deluded individuals[3] reported at least one action based on delusion; third-party informants reported that 52% of the sample probably or definitely acted on delusions. Persecutory delusions were significantly more likely to be acted upon than other beliefs. In a sample of patients with DD who were being supervised by a forensic psychiatric service after violent or threatening acts, Kennedy, et al. (1992) similarly found that 80% of the acts were related to the delusion. Other actions, such as fleeing or barricading to avoid delusional persecutors were also consistent with the delusion.

[3] Sample included individuals diagnosed with schizophrenia and affective psychosis.

Delusional theme	Hypothesized function
Grandiose: Individuals are convinced they possess important information, have a special relationship with a very important person, or have some great (but unrecognized) talent or insight.	Deception: Individuals are presenting themselves as highly valuable cooperative partners. They are attempting to gain social benefits by exploiting partner-choice and reciprocal investment mechanisms.
Persecutory: Individuals believe that they are threatened by powerful others. These are the most common type of delusions (Bentall et al. 2001). Individuals with these delusions can give very convincing accounts of the reputed threat, behave consistently with the delusion (Wessely et al. 1993), and give cues of genuine fear and distress (Kennedy et al. 1992).	Vigilance: Socially threatened individuals need to greatly increase their vigilance towards the social environment. Deception: Belief in an external threat provides a *very* strong impetus for cooperation among humans belonging to the same group (e.g., LeVine and Campbell 1972), especially those living in small, autonomous bands with real enemies. These delusions exploit the cooperative defense mechanisms of others.
Erotomanic: Individuals believe that another person, usually of high status, is in love with them. Males with erotomanic delusions often attempt to rescue females from some imagined danger (APA 1994). Note that the delusional person does not necessarily claim to be in love with the target.	Deception: Individuals that are highly valued by, and have an important connection with, a high status individual have higher value themselves. Claims of sexual relationships may have been particularly difficult for others to disprove because even when such relationships exist individuals often deny them. Males falsely claiming to offer defensive benefits to females are attempting to obtain both cooperative and reproductive benefits. These delusions exploit partner-choice and reciprocal investment mechanisms.
Somatic: Individuals with somatic delusions, which are often difficult to distinguish from Hypochondriasis (APA 1994), are preoccupied with the fear or idea that they have a serious disease based on a misinterpretation of one or more bodily signs or symptoms. The fear persists despite medical reassurance.	Vigilance: Socially threatened individuals need to be particularly concerned about falling ill because of the uncertainty that others will care for them. Deception: Group members may be tricked into providing care under the assumption that they are going to receive a substantial payback for helping a seriously ill person. Social norms may also dictate providing assistance to those who appear in need. A function for delusions that an individual emits a foul odor from the skin, mouth, rectum, or vagina, or that certain parts of the body are ugly or misshapen, are not obvious, though they may be indicative of the increased vigilance of socially threatened individuals.
Jealous: Individuals believe their mate to be unfaithful.	Vigilance: Many jealous delusions are not examples of exploitative deception, but are simply a greatly increased form of normal jealousy. In the EEA, socially threatened individuals were likely at great risk for losing their mates. Jealousy deters a partner from providing benefits to others.

Table 1: The five non-bizarre delusional themes according to DSM-IV, and their possible functions

For delusions to be a universal psychological adaptation, they must be found in all cultures. That appears to be the case (Ndetei and Vadher 1984; Westermeyer 1988). Westermeyer (1988), relying on a review of the literature, four years of field work in Asia, 15 years at an International clinic at the University of Minnesota Hospitals and Clinics, and several studies of culture and psychopathology conducted in the United States, makes the following cross-cultural generalizations about delusions:

1. Delusional themes (e.g., grandiose, persecutory) vary little, if any, across cultures, whereas the specific content (e.g., persecution by shamans) may be influenced by culture.
2. Culture-bound (i.e., emic) and secular (i.e., etic) delusional content are not mutually exclusive, but may coexist in the same individual.
3. Delusional content can be quite etic, or secular, and yet still give rise to behaviors that are highly culture bound or emic (such as building a religious shrine or undertaking *amok*-type violence).

The hypothesis, in sum, is that individuals facing severe social threats developed powerful delusional systems. These caused them to unconsciously deceive their fellow group members in order to receive social benefits that they had lost or been unable to obtain. For example, an individual experiencing a persecutory delusion—the Bongo-Bongo are trying to kill me—would display very convincing signs of fear and distress and be able to cite evidence of the truth of their claims. In a small, somewhat isolated band with genuinely hostile Bongo-Bongo neighbors, such a display could be convincing enough that fellow group members would cooperate with this individual against the Bongo-Bongo, a common enemy. Indeed, it is difficult to see why an otherwise normal individual displaying convincing, culturally consistent fear towards a known enemy would not be believed at least some of the time. And if they were believed, it is difficult to see why they wouldn't at least occasionally obtain social benefits.

Because only a tiny fraction of the world's population currently lives in small, isolated communities with hostile neighbors, delusions, even if they are adaptations, will often fail to elicit benefits. Citizens of industrial societies live in large communities with extensive police and military forces, and have access to many sources of information. Since external attacks are unlikely and exaggerated fears are easy to disprove in these contexts, delusional displays of persecution have little chance of success and in fact are usually maladaptive—they tragically tend to intensify social isolation rather than mitigate it. Although cooperative deficits should cause delusions in all societies, delusions will usually provide social benefits only in the now rare small, kin-based societies. Cults may be the exception. Cult leaders may be, in some cases, paranoid and/or grandiose individuals exploiting lonely and vulnerable people.

5. Relation of severe social threats to DD

5.1 Psychiatric populations

If delusions are adaptations to cooperative deficits, then cooperative deficits should cause delusions. It appears that they do. Though the strong association of cooperative deficits with DD could be explained by social selection (individuals with DD tend to experience cooperative deficits), confounding variables, or methodological problems, many researchers have concluded that cooperative deficits play a causal role in DD. Kendler (1982) argues that DD is distinguished from schizophrenia by low rates of psychiatric illness among family members of patients with DD, and the fact that environmental factors look to be more etiologically important than do than genetic-constitutional ones. The hypothesis that these "environmental factors" are cooperative deficits is supported by several lines of evidence. Principle among these are case control studies of DD vs. schizophrenia. Because the symptoms of DD are less disabling than those of schizophrenia, social selection theory would predict that DD will be associated with fewer cooperative deficits than will schizophrenia. Several studies described below show just the

opposite: DD, the less severe syndrome, is associated with more cooperative deficits than schizophrenia, supporting a social causation theory of DD.

Cameron (1943) was among the first to explicitly locate the genesis of delusional systems in the social arena. Cameron identified the importance of social isolation and lack of social communication in the development of a delusional framework, and noted specifically that "[p]aranoic attitudes and actions...grow out of a breakdown in the machinery of social cooperation." Cameron, however, felt that isolation from the community was only the "final outcome" of a process that led the delusional individual to act detrimentally on his environment. Interestingly, he recognizes that delusional behavior may occasionally make an individual a "distinguished person and, though rarely, a leader of men," an important phenomenon that may have occurred more frequently in traditional social contexts.

Lemert (1962) found strong evidence for the *causal* role of social exclusion in paranoia. He retrospectively studied eight cases of persons with "prominent paranoid characteristics." Four cases involved persons admitted to the state hospital at Napa, California, with diagnoses of Paranoid Schizophrenia. The lack of any history or evidence of hallucinations or intellectual impairment, however, excludes schizophrenia as a likely diagnosis for these cases. The others involved persons admitted to hospitals, involved with the law, or having chronic job difficulties. One case resembled Paranoid Personality Disorder.

Lemert spent as much as 200 hours per case collecting data from anyone who played a significant role in the life of the person involved, attempting to establish the order in which delusions and social exclusion occurred. He found that:

> [t]he paranoid process ***begins*** with persistent interpersonal difficulties between the individual and his family, or his work associates and superiors, or neighbors, or other persons in the community. These frequently or even typically arise out of bona fide or recognizable issues centering upon some actual or threatened loss of status for the individual. This is related to such things as the death of relatives, loss of a position, loss of professional certification, failure to be promoted, age and physiological life cycle changes, mutilations, and changes in family and marital relationships. The status changes are distinguished by the fact that they leave no alternative acceptable to the individual, from whence comes their "intolerable" or "unendurable" quality. For example: the man trained to be a teacher who loses his certificate, which means he can never teach; or the man of 50 years of age who is faced with loss of a promotion which is a regular order of upward mobility in an organization, who knows that he can't "start over"; or the wife undergoing hysterectomy, which mutilates her image as a woman (emphasis added).

Lemert concludes that it is this process of exclusion and isolation which leads to the development of the delusional framework and not the converse. He notes that paranoia emerges in situations where "the goals of the individual can be reached only through cooperation from particular others, and in which the ends held by others are realizable if cooperation is forthcoming from ego," precisely the conditions that pertained in hunter-gatherer groups during the EEA and precisely the conditions predicted by the exploitative deception hypothesis.

Retterstöl's retrospective/case-control study (1966) of 301 first-admission psychiatric patients with paranoid and paranoic symptoms, also supports a social causation theory. Based on an analysis of case notes and follow-up interviews, he found that 100% of paranoid psychosis were caused by an event that "provokes the insecurity of the individual," i.e. those that tended to isolate the individual and make him feel an outsider, either by making him unpopular within his own group, or by transplanting him to new and strange surroundings; this was true of only 54% of cases diagnosed with schizophrenia.

Kay et al. (1976) conducted a case-control study between psychiatric patients diagnosed with either paranoid psychosis (n=54), or with affective psychosis (n=57). A minority of the paranoid

patients were diagnosed as schizophrenic. At the *onset* of illness, the following features distinguished the paranoid group from the affective group: low social class, having few or no surviving children, living alone, and social deafness—all social resource variables. Paranoid patients were found to have had more difficulty than affective patients in forming and maintaining satisfactory interpersonal relationships *before* the onset of the illness, and had been more solitary, shy, reserved, and suspicious, and less able to display sympathy or emotion. Kay et al. conclude that their data support

> a multifactorial hypothesis, according to which various adverse circumstances, especially when in combination, such as being unmarried, having few close relatives, belonging to lower social class groups, or becoming deaf, are expected to increase the chances of hardship, insecurity and loneliness in later life. The accumulated sense of deprivation and injustice might be supposed to conduce to paranoid illness.

Because socially impaired personalities were not associated with low social position, they disfavor downward social drift as an explanation for the correlation of the social variables with paranoid illness.

Kaffman (1981), in a retrospective study group of 34 individuals with DD (DSM-III Paranoid Disorder), found that in every case there was a clear and realistic connection between paranoid premises and facts and events in the patients' life. He also found that "*authentic* past and current interpersonal transactions play a dominant role in generating and activating the paranoid beliefs (emphasis added)." From the case studies presented, these transactions appear to have involved isolation and rejection.

In a study by Jørgensen (1987), 88 patients with delusional psychosis[4] were asked "If you got (sic) personal or emotional problems, do you think you could talk with any of your family, friends, fellow workers or neighbors?" Fifty percent answered no, compared with 10% of the general Danish population.

5.2 Prison Psychoses

If cooperative deficits cause delusions, then isolated individuals should be particularly at risk, especially those who are purposefully removed from society. Solitary confinement—an extreme form of social isolation—has long been known to cause delusions (Nitsche and Wilmanns 1912). Grassian (reported in Henderson 1995) evaluated inmates of California's maximum security prison, Pelican Bay, in particular those in the Security Housing Unit (SHU) who are isolated 22 1/2 hours a day, and are excluded from work and group exercise programs. Of 50 inmates interviewed, 58% suffered from paranoia, largely or completely attributable to SHU conditions, and 34% were actively psychotic.

Grassian (1983) also reports on a study of 14 inmates subject to solitary confinement at Massachusetts Correctional Institution at Walpole. The population was not preselected by overt psychiatric status. All were male, with a mean age of 28. Median duration of confinement in isolation was 2 months. In addition to symptoms like anxiety, hyperresponsitivity, hallucinations, and cognitive difficulties that are documented effects of sensory deprivation (Heron et al. 1953; Lilly 1956), 43% of the inmates experienced non-psychotic persecutory fears attributable to isolation.

[4] The majority of patients were not schizophrenic or suffering from affective psychosis according to both ICD 8 and DSM III criteria, although some did experience hallucinations.

5.3 Immigrants and refugees

Immigrants and refugees are quite likely to suffer cooperative deficits since they have often left family, friends, and other important social ties behind, and will face increased difficulties competing for social benefits in a foreign culture. The successful formation of new social ties in the adopted country is far from assured. Tellingly, numerous studies have found extremely high rates of delusional and paranoid symptoms among immigrant and refugee populations (Carpenter and Brockington 1980; Chiu and Rimon 1987; Ettinger 1959; Ettinger 1960; Kendler 1982; Ødegaard 1932; Westermeyer 1989). Two studies show rates of DD among immigrants be 40-50 times that of the indigenous population (Ettinger 1960; Westermeyer 1989), compared to only a 3 1/2 fold increase for schizophrenia (Ettinger 1960). Kendler (1982) found rates of DD among the foreign born to exceed rates of either schizophrenia or affective illness ($p << 0.0001$). DD clearly has a particular association with immigrant/refugee status.

In an attempt to resolve whether these results are best explained by social selection theory, social causation theory, or other factors, Westermeyer (1989) conducted a careful study of paranoid symptoms and disorders among 100 Hmong refugees living in the United States. In six of nine cases (66%), no pre-emigration factors could be found. His study indicates that successful acculturation, assessed in several ways, is associated with low paranoid symptoms. Chiu and Rimón (1987) report that 56% of the paranoid immigrants in their study had no history of psychiatric treatment prior to immigration.[5] These studies indicate that social causation appears to contribute to the high prevalence of delusional symptoms among immigrants, although social selection is probably an important factor as well.

5.4 Low socioeconomic status

DD is associated with poor social and economic standing, as is mental illness in general (Robins et al. 1991). This association, however, seems particularly strong in the case of DD. In a review of the demographics of DD, Kendler (1982) found that patients with DD were more likely to come from poor economic backgrounds and to be more poorly educated than either patients with affective illness or (in most cases) schizophrenia. He argues that since schizophrenia should produce greater psychosocial disability than DD due to more disabling symptoms, downward social drift as a consequence of delusions is an unlikely explanation of this pattern. Kay et al. (1976) also found paranoid patients to be significantly associated with low social class as compared to patients with affective disorders. They, too, disfavor the social selection hypothesis.

But, is low SES associated with cooperative deficits of the kind hypothesized to cause delusions? Mirowsky and Ross (1983), using data on 463 individuals collected during a community mental health survey in El Paso, Texas, and Juarez, Mexico, found that low socioeconomic status together with belief in external locus of control—the expectation that "outcomes of situations are determined by forces external to one's self, such as powerful others, luck, fate, or chance,"—was strongly associated with "mistrust", the feeling that it is safer to trust no one. Mistrust, in turn, was associated with "paranoia" ("paranoia" being determined by responses to four questions similar to diagnostic criteria for DSM-IV Paranoid Personality Disorder). Mirowsky and Ross conclude that powerlessness, victimization and exploitation were the causative factors of mistrust and thus paranoia.

[5] 22% of these patients had a DSM-III Paranoid Disorder while 61% were classified as Paranoid Schizophrenic.

5.5 Discrimination

Individuals who experience discrimination based on ethnicity, sex, sexual orientation, age, disability, or appearance are at increased risk for cooperative deficits. Consistent with the exploitative deception hypothesis, they are also at significantly increased risk for delusional symptoms. A large (7076) random sample of members of the Dutch population (all fluent Dutch speakers) were screened for a three-year longitudinal study (Janssen et al. 2003). Individuals with any evidence of psychotic symptoms (or psychosis-like experiences) at the initial interview were excluded from the study. Significant associations were found between perceived discrimination reported during the initial interview and delusional ideation at the final interview three years later. The rate of delusional ideation was 0.5% in those who did not report discrimination, 0.9% in those who reported discrimination in one domain, and 2.7% in those who reported it in more than one domain. This association remained after adjustment for variables measured at the initial interview like employment status, marital status and education level, non-psychotic DSM–III–R diagnosis, indicators of premorbid social adjustment, and personality measures of neuroticism, self-esteem and locus of control. Interestingly, no association was found between discrimination and onset of hallucinatory experiences, suggesting that discrimination increases risk for delusions, and not psychotic symptoms per se.

Intuitively, severe social failure would seem to be a consequence of suffering delusions. The facts, however, strongly suggest the opposite. Unlike schizophrenia, severe social threats *precede* the onset of delusions, and are thus good candidates as a cause of delusions.

6. Age-Of-Onset Hypothesis

Because one major risk of deception is exclusion from future cooperation, young individuals should be less likely to employ a deceptive strategy since they are putting at risk more future opportunities to cooperate—young individuals should try harder to "suck-up." An adaptation to exploit potential cooperative partners should also be less likely to activate in older individuals because their lower likelihood of survival to provide a return on the investment means they are riskier reciprocal investments. They may also be able to provide fewer defensive benefits due to physical frailty. Consistent with these predictions, DD, but not schizophrenia, is largely an affliction of middle age (figure 1).

Additionally, the exploitative deception adaptation should not be activated in individuals for whom the deceptive guise would be implausible. Although children faced serious social threats, in particular the loss of one or both parents, it would have been unlikely that they could mitigate these threats by experiencing persecutory or grandiose delusions. Why would enemies be targeting a particular child? Could a child reasonably pass him or herself off as being high status or having valuable social connections? Although all humans require food and protection, during the EEA children would have been unable to acquire these resources through reciprocal relations with others since it is unlikely that adults viewed children as plausible partners for cooperative defense or food sharing arrangements. Children acquired these resources through investments by parents and kin. Conversely, children did not require many of the benefits that go with defensive cooperation such as protection of mates and offspring. Delusions should therefore be extremely rare among children, a surprising conclusion given that children often fear imaginary dangers.

The demographic data on DD supports this hypothesis. Very few individuals younger than 20 are diagnosed with DD (See fig. 1). Cases of DD in individuals younger than 15 are almost unheard of, though psychiatric symptoms in children are common (NIMH 2002).

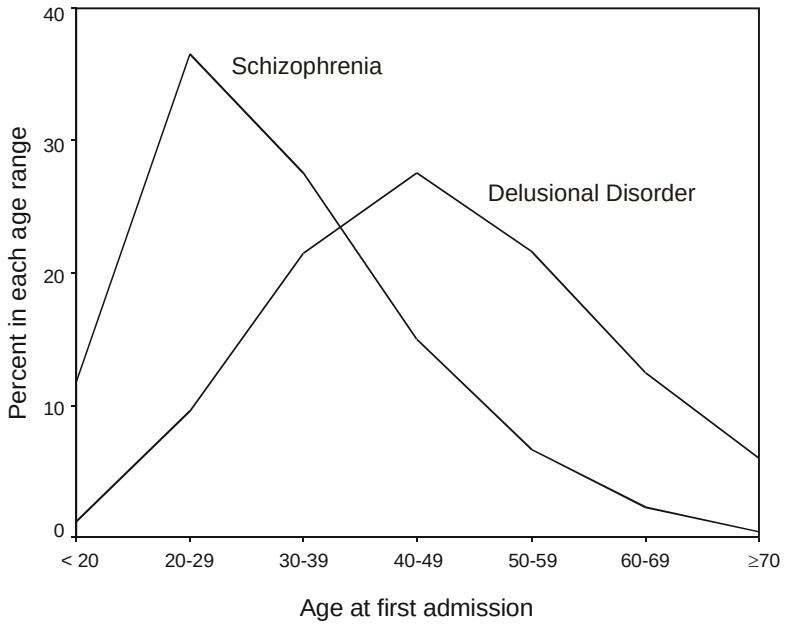

Figure 1: Distribution of DD and schizophrenia by age at first admission. Data from Kendler 1982.

Almost all of the very rare case reports on delusional systems in pre-adolescents are examples of shared psychosis, with a parent as the primary partner (see below; see also Arthur and Schumann 1970 for discussion of some rare cases of delusions in pre-adolescents).

Unlike persecutory or grandiose delusions, somatic delusions are a viable means for children to exploit the investment mechanisms of others. It is logical for children to attempt to obtain benefits from kin by mimicking illness, but not by exhibiting fears of enemy attack, high status, or sexual relations with high status individuals. The demographics of somatization disorders supports this hypothesis: 40% of individuals with somatization disorder report onset at age 10 or earlier; 55% report an age of onset of 15 years or earlier (Swartz et al. 1991), a striking contrast to the demographics of DD.

In a similar vein, individuals should experience delusional persecutory fears that were plausible, given their age and sex. Ethnographic evidence indicates that over evolutionary time men more often experienced external threats and women within-group threats (Geary 1998; Hess and Hagen n.d.). Consistent with this pattern, Walston et al. (1998) found that men's persecutory delusions were more likely to feature strangers, and women's to feature someone familiar. Fears of within-group threats could exploit group factionalism.

7. Evidence that delusions "work"

Psychiatry recognizes that delusional individuals can convince others to share their delusional framework, and has even reified the phenomenon as Shared Psychosis (Folie à Deux). According to DSM-IV (APA 1994):

> The essential feature of Shared Psychotic Disorder is a delusion that develops in an individual involved in a close relationship with another person (sometimes termed the "inducer" or "the primary case") who already has a Psychotic Disorder with prominent delusions.... The [secondary] individual comes to share the delusional beliefs of the primary case in whole or in part....Usually the primary case in Shared Psychotic Disorder is dominant in the relationship and gradually imposes the delusional system on the more passive and initially healthy second person. Individuals

> who come to share delusional beliefs are often related by blood or marriage and have lived together for a long time, sometimes in relative isolation. If the relationship with the primary case is interrupted, the delusional beliefs of the other individual usually diminish or disappear. Although most commonly seen in relationships of only two people, Shared Psychotic Disorder can occur among a larger number of individuals, especially in family situations in which the parent is the primary case and the children, sometimes to varying degrees, adopt the parent's delusional beliefs.

It must be noted that secondaries are often vulnerable individuals who may have a preexisting psychiatric disturbance or physical disability (Soni and Rockley 1974).

Turning to reports of delusions in traditional societies, El-Islam (1980) studied the remission of delusions among a group of deluded psychotics from the Arab Gulf states. The existence of traditionally shared beliefs in the family and community set the stage for remission. The patient often attributed the remission of his delusions to relatives dealing with the object of delusion through prayer or through traditional healers, or the delusion became "absorbed" into the cultural belief system and lost its force. These phenomena illustrate that close kin may take delusions seriously, and by doing so, alleviate the symptoms. The phenomena where relatives accept an individual's delusional framework is also noted by El Sendiony (1976) and by Murphy (1967; cited in Westermeyer 1988).

Although I have argued that it will be difficult for delusions to operate properly in large Western societies, they should still function in contexts that resemble human social groups during the EEA, i.e. small, somewhat isolated kin-based communities. Only a tiny fraction of the world's population currently lives in such societies, however, making this prediction extremely difficult to test. Furthermore, if the exploitative deception hypothesis is correct, deluded individuals would often not be seen as deluded, and should therefore often escape detection. The only cases that would be recorded would be those where the delusions were not believed and the delusional person was brought to the attention of a psychiatrist, anthropologist, or other health worker who then prepares a case report.

Psychiatric surveys of entire populations have a much better chance of detecting delusional individuals whose strategies might be succeeding, but such surveys among hunter-gatherer populations are rare. In one of the few psychiatric surveys of a (former) hunter-gatherer population—the Five-Year Epidemiologic Survey of Northern Aboriginal Reserves—435 individuals out of a total population of 10,500 were identified as suffering from a psychiatric disorder (Eastwell 1982). Of these, 57 were diagnosed as reactive psychosis, or fear-of-sorcery syndrome. Characterized as an anxiety state with paranoid features magnified to psychotic proportions, the patient fears imminent death from sorcery, and the severity of the concurrent autonomic signs is noteworthy. Eastwell observes that members of the clan "close ranks [with the patient] in indignation against the putative sorcerers," exactly the outcome predicted by the exploitative deception hypothesis.

Although in these cases the external threat was supernatural, if DD is an adaptation then persecutory delusions could invoke any threat accepted as 'real' in the individual's culture. Further, many anthropologists argue that sorcery and witchcraft accusations often reflect genuine political conflicts (e.g., Bleek 1976 and references therein).

8. Social benefits and the remission of delusions

According to the exploitative deception hypotheses, delusions and persecutory fears should remit in individuals who receive sufficient social benefits. Jørgensen and Aagaard (1988) studied the relationship of a number of social variables to impairment, remission, and relapse. They

found that being married, living with others, having frequent social contacts, working full-time, and belonging to high status social groups were important predictors of good outcome. Living alone, having few social contacts, and not working prior to admission, on the other hand, were by far the best predictors of poor outcome for this group of patients.

Jørgensen and Aagaard conclude that social variables like having social contacts and useful work are more valuable than any of the clinical variables in predicting outcome. Because they are correlations, the data presented by these researchers do not favor social causation over social selection theories, but they do demonstrate the strong and *necessary* association of positive social variables with the remission of DD. Finally, even patients who attributed their delusions to biological disease nonetheless stressed the importance of strong, supportive social environments to dispelling delusions (Stanton and David 2000).

9. Detecting exploitative deception

Individuals who are being deceived and exploited by others should evolve mechanisms to detect it. Detecting the deceptive exploitation seems fairly easy in this case: if only individuals suffering severe social failure use the strategy, other group members should evolve to ignore all requests for cooperative benefits from these individuals. There are, however, several factors that favor the exploitative deceivers.

9.1 Factors favoring exploitative deceivers

As Hölldobler (1977) has argued for social mimics among ants, individuals who evolve to successfully discriminate against exploitative deceivers risk inadvertently discriminating against real cooperators. Because the benefits received through cooperative signaling are so valuable, individuals may evolve to tolerate some exploitation rather than risk losing the benefits obtained from the far more common genuine cooperator. Additionally, because social failure was a deadly threat, whereas being exploited was likely a less-than-deadly threat, the selection pressure on adaptations for exploitative deception was stronger than it was on detection mechanisms. Exploitative deception adaptations can then be expected to outperform detection mechanisms as a consequence of this asymmetrical, intraspecific arms race (Dawkins and Krebs 1979).

Further, exploiters may attempt to target individuals who have little or no information concerning the social status of the exploiter. These could include individuals from other groups, or individuals from competing factions within the group. All groups have internal politics and competing factions. Given that social exchange is often a subtle affair, involving not physical rejection but exclusion from important relationships and events, some factions may be significantly less aware of the social status of an individual than are other factions. An individual facing social failure could then exploit the "naive" faction by manipulating their fears of, and competitiveness with, other factions, for example; this might have been the goal of woman's persecutory fears of familiar persons. It may also have been possible in some situations to exploit members of other groups. Deception might even have facilitated switching groups.

Modeling ancestral hunter-gathers as living in a number of small, discrete groups is also an oversimplified view of their social organization. Many known hunter-gatherers lived in fission-fusion societies. Group size fluctuated dramatically with season, with smaller foraging bands aggregating into much larger groups to participate in communal hunts (Kelly 1995). The periodic aggregation and dispersal of a large 'in-group' would have enhanced the opportunities for successful deception. Information transfer would have been slowed during times of dispersion, hindering the detection of deception by naïve individuals during aggregations.

Individuals who have committed a serious transgression that has not yet been discovered by other group members could also have preemptively employed deception in order to divert attention from themselves. For example, if an individual had an affair with the headman's wife, a transgression that, if discovered, could have been severely punished, they could have preemptively diverted the group's attention towards an imaginary threat. Since their transgression has not yet been discovered, there would be no reason to question them. In this case, delusions would function to prevent, rather than mitigate, low social value.

9.2 Limitations on assessing the social network

Another powerful argument in favor of social failures successfully employing exploitative deception is that it is very difficult to identify them. It is hard enough to know what everyone in the group thinks of oneself, let alone what they think of everyone else. To illustrate this argument, let's assume a simple social model where relationships are formed based on one's social value. Individuals with exceptionally low social value are at risk because no one chooses to cooperate with them. Individuals are low in social value only if they are ranked low by almost everyone in the group. In order to detect individuals who are low ranked by everyone, one must track the *entire* social network. For even modestly-sized groups, the time and effort required to track an entire social network are high and possibly prohibitive. The costs of ranking fellow group members' social value to oneself, and of assessing one's social value to fellow group members, only grow linearly with group size. In a group of 20, an individual must assess the social value of 19 fellow group members, and assess how he or she is valued by the same 19. The cost of assessing the entire social network, however, grows quadratically with group size. In order to determine who among fellow group members might be ranked low by everyone, an individual would have to assess how 19 fellow members rank the other 18 members, for a total of 342 different assessments. Estimates are that ancestral hunter-gatherers may often have lived in groups ranging in size from 25 to 150 individuals (Kelly 1995; Dunbar 1993). Tracking the social value of all individuals in a medium-sized group of 50 would have required 2352 different assessments. As long as the number of persons ranked low by individuals grows linearly with group size, then the cost of determining who might be ranked low by everyone grows as the square of group size.

In this simple model, individuals are low-ranked not because there is necessarily anything inherently wrong with them (although there might be), but simply because better partners are available. In a group of size 50, for example, a given person might be close with, say, 10 or 15 people; the remaining 35-40 people are ranked 'low' by that person simply because he or she can't afford the time and effort to maintain close relationships with more than 15 people, not because those 35-40 persons are abnormal in any way. In fact, 15 of those 35-40 persons will usually be ranked 'high' by someone else; another (possibly overlapping) 10-15 will ranked high by yet someone else, etc. A person only faces a serious social threat in the rare circumstance when he or she fails to be ranked 'high' by anyone. It is the latter circumstance that is dangerous and that may be hard to detect.[6]

[6] The costs of tracking the entire social network might be reduced by, e.g., gossiping, yet there are reasons why individuals wouldn't want to readily advertise their rankings of others' social value. When circumstances change, rankings of social value can change dramatically. If one discovers, for example, that a low-ranked person is a relative of a highly desired potential mate (and could therefore facilitate a marriage), their social value to an individual may well skyrocket. But, if the previously low-ranked person knew that an individual had spoken disparagingly of their social value, they would be much less likely to cooperate with them.

It is worth keeping in mind that people exaggerate and lie all the time and, even when they have a known motive, get away with it for whatever reason. Conversely, if evidence from contemporary and past societies is any guide, delusions have a receptive audience. Large segments of the public believe things that closely resemble common delusional themes. They believe in conspiracy theories, UFO's, and that certain people have special powers and abilities, and they pay money to psychics and astrologers. The evolution of an adaptation to lie in dire social circumstances does not seem out of the question, especially since individuals facing social failure needn't change everyone's opinion of them, they only need to manipulate the social calculus of a few group members in their favor. In sum, in a high-stakes game of social musical chairs, there might have occasionally been an odd man out. Identifying them may not have been trivial, improving their chances of deceptively exploiting others.

10. Delusions with other symptoms

Delusions commonly occur with other psychiatric symptoms like depression, auditory hallucinations, the negative symptoms of schizophrenia, brain injury, and substance use (Manschreck 1989). One population survey found, for example, that 4.1% of individuals suffering depressive symptoms also had delusions (Ohayon and Schatzberg 2002). Another found an approximately 0.7% prevalence of delusions with auditory hallucinations in the general population (Robins and Regier 1991).

The association of depressive symptoms and delusions is clearly consistent with the hypothesis explored here. Individuals suffering a loss of social standing sufficient to trigger delusions would obviously be vulnerable to depression as well. The association of brain injury with delusions is also consistent. If a brain injury or other neurological deficit causes individuals to lose social value and thus their social relationships, then delusions would, under the hypothesis, be an adaptive response to the loss of social relationships, not to the brain injury per se. Interestingly, two studies found extremely high rates of delusions following brain injury (Achte et al. 1969; Koponen et al. 2002), but in 42% and 66% of the cases the delusions onset more than 10 years after the injury. This long delay suggests that delusions might have been caused by the social consequences of the injury rather than the brain injury itself.

If auditory hallucinations are an indication of neurological deficits that would cause a loss of social value then, again, delusions could be seen as an adaptive response to the loss of social value, explaining the association of delusions with auditory hallucinations. Speculatively, given that a large fraction of individuals in most societies, particularly small scale societies, believe in supernatural agents or powers (Boyer 1994; Brown 1991), auditory hallucinations may not have interfered significantly with the deceptive function proposed for delusions, and could simply be a neutral byproduct of the putative delusional adaptation.

11. Conclusion

Social systems that rely on cheap signals for the exchange of substantial benefits are very susceptible to exploitation by individuals willing to use deception. For humans, exploitative deceivers should often be individuals facing severe social failure because the costs of cheating are small to non-existent for these individuals, and the potential benefits are large.

The pervasive conception of delusions as some kind of dysfunction is perfectly compatible with evolutionary theory, and a number of cognitive differences between delusional and non-delusional individuals *have* been discovered. Yet cognitive differences are predicted by both dysfunctional and functional hypotheses, and so, in and of themselves, are not proof of an

underlying pathology. Most of the cognitive differences that have been found suggest that individuals with paranoid delusions are especially sensitive to threats and are particularly likely to attribute successes to themselves and failures and mal-intent to others, consistent with the functional hypothesis explored here.

The exploitative deception hypothesis unifies many of the symptomatological, epidemiological and demographic aspects of Delusional Disorder under one theoretical umbrella. During our evolutionary history, individuals facing social failure, e.g., those receiving meager to non-existent fitness benefits from their relationships, would have had to monitor their social and physical environment very carefully, and may have had no choice but to unconsciously deceive others in order to obtain badly needed benefits. Of the entire universe of conceivable false beliefs, delusions comprise only a tiny set of themes, themes that appear designed to generate precisely those cues that would have elicited cooperation from the group: possession of important information and abilities, fears of external threat, illness, and intimate relations with high status individuals. Each of these situations would have been difficult for other group members to verify, at least in the short term, making them ideal candidates for exploitative deception. Many lines of evidence indicate that social deficits cause delusions – it appears there may be some truth to the quip that even paranoids have real enemies, or at least very few friends – and the available data indicate that delusions deliver social benefits to individuals in small, kin-based societies.

Szasz' argument that lies and deception are important aspects of what is usually termed mental illness, reframed here as an adaptationist account of delusions, is reasonably well-supported by the available evidence. This evidence, however, does not rule out traditional dysfunction theories. In particular, considerably more evidence is needed that delusions garner benefits in small, kin-based societies that outweigh their obvious costs. Given that powerful drugs are regularly used to suppress delusions, however, drugs that often fail to improve patients' lives yet cause dangerous side-effects, including sometimes irreversible brain damage in a significant minority of patients (Bagnall et al. 2003), it is a scientific and ethical imperative to investigate possible functions for these deeply mysterious cognitive processes. If the hypothesis explored here were eventually to be confirmed, interventions aimed at ameliorating social failure should be an efficacious treatment.

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