

lated thinking, and deficits in empathy. Since each component of sociopathy is only partially correlated with the others, many other types of socializations can lead to variable levels of each one. I believe we need to examine each individual separately, to identify sensitively as many of the developmental risk and protective factors as possible. If some individuals appear to be very susceptible to becoming sociopathic – and do so in a protective environment with little exposure to risk factors – we can hypothesize that they have a strong genetic loading of the predisposing genes. If physiological markers or measures are available to identify the level of genetic load, so much the better.

In section 3.1.1, and elsewhere, we see Mealey's tendency to think of "primary" sociopaths as professional gamblers, emotionless cheaters, and incorrigible criminals. Let us not forget that they might also become TV evangelists, lawyers, politicians, driven scientists, and others who ruthlessly pursue their career without being thought of as criminals – though those who know them might note a calculatingness and social insensitivity in their actions.

In section 3.2, I see no treatment benefits from dichotomizing sociopathy. At present, we cannot change a person's genetic load for the behavior. All we can do for both of Mealey's "primary" and "secondary" sociopaths is try to make proactive and reactive environmental interventions: first, we can proactively try to reduce the risk factors and increase the protective factors that affect the development of the behavior; or, second, for those who already exhibit sociopathic behavior, we can use punishment or the threat of punishment for antisocial behavior along with rewards for socially acceptable behavior. Thinking of sociopathy in terms of a continuum (not just primary or secondary types) alerts us to the multiple variables we need to attend to when proacting or reacting to any given individual's sociopathic possibilities.

Sociopathy, evolution, and the brain

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Abstract: We propose that Mealey's model is limited in its description of sociopathy because it does not provide an adequate role for the main organ mediating genes and behavior, namely, the brain. Further, on the basis of our research, we question the view of sociopaths as a homogeneous group.

Although Mealey deals at length with sociobiology and impulsive mechanisms of genes and their resultant behaviors, she does not deal in an evolutionary sense with the organ through which the genes and behavior must be mediated: the brain. She discusses neurochemistry related to personality traits and correctly describes psychophysiological factors "as significant causes, not just correlates" of sociopathy. Yet she does not discuss from an evolutionary viewpoint, relevant neuropsychological constructs and selected brain structures that relate to sociopathy (or psychopathy or antisocial personality disorders). Since impulsiveness and impulse control are key constructs in the definition of behavioral control, and since these constructs have been related to selected brain areas, a discussion of the development of the brain and related behavioral control or inhibitory mechanisms would seem to be an appropriate and essential part of the development of her model. For example, damage to the orbital frontal cortex almost invariably results in impulse control problems. The personality trait of impulsiveness has also been related to frontal cortex functions (Barratt 1993). Damasio et al. (1990) have written on "acquired sociopathy" stemming from brain damage in the orbital frontal region.

Thus, cross-species comparisons of frontal cortex functions related to behaviors similar to those of psychopaths should provide data to strengthen and extend her argument. This is not to argue that sociopathy is a brain disease; but caution should be used in relying on population statistics and conceptual models such as the Prisoner's Dilemma as ultimate and sufficient explanations of complex constructs like psychopathy. Some personality traits such as impulsiveness may have had (and may still have) adaptive functions among persons with intact brains. Acting "automatically" or without reflection may be helpful in emergency situations. For example, it was estimated in a recent air crash that the pilot had less than five seconds to observe and respond appropriately to a warning light. Over the span of animal evolution, acting quickly to protect territory or other natural goods has always been at a premium. Perhaps this was true long before mammals were primates, or for that matter, before vertebrates were mammals. The population biology of sociobiologists often overlooks the length of time that Darwinian mechanisms may have been operating. In modern society, to react quickly and consistently without thinking can be a handicap when coupled with other personality traits (e.g., the high impulsiveness and low anxiety seen in psychopaths) or in situations that call for more reflection. Again, we suggest that Mealey's model should include more of a role for the main organ through which the genes and behavior must be mediated, namely, the brain.

In a study of impulsive aggression in our laboratory (currently being prepared for publication), we studied prison inmates, all of whom satisfied the criteria for antisocial personality as defined in DSM-III-R and measured by a standard interview (PDI-R). These inmates were all young male recidivists. Based on formal disciplinary reports of aggressive acts, we classified the subjects into impulsive aggressive and premeditated aggressive groups. Again, each aggressive act was classified using a standard interview. The measures of these aggressive acts were normally distributed along a continuum from completely premeditated to completely impulsive. We had hypothesized that the inmates who committed impulsive aggressive acts would have higher levels of impulsiveness and anger/hostility personality traits than those who committed the premeditated acts. Both groups of inmates had significantly higher levels of impulsiveness and anger/hostility than noninmate controls (matched for sex, age, education level, and race). The two inmate groups did not differ significantly in these personality traits. They did differ significantly, however, in cognitive psychophysiological measures of information processing during the performance of a simple choice task. The results implicated the frontal cortex and several other cortical areas. A frequency analysis of the EEGs (electroencephalograms) suggested that anticonvulsant medication might be helpful in controlling impulsive aggression among the inmates. The data to date are consistent with this suggestion. Within Mealey's model, these inmates would also satisfy the criteria for sociopaths. Yet, there were two distinct groups among them that expressed aggression in different ways and had significant differences in brain functions. Mealey's model suggests primary sociopaths are a homogeneous group. The above data raise questions about such homogeneity.

You can cheat people, but not nature!

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Abstract: The psychological mechanisms implicated in psychopathy do not limit their activity to those behaviors that support a cheater strategy in social games. They result in a number of other clearly maladaptive behaviors that do not directly involve other individuals. Thus, any gains

that might arise from the use of a cheater strategy in social situations are probably lost elsewhere.

The primary sociopath, or psychopath (Cleckley 1941; Hare 1986), exhibits behaviors easily interpreted as a cheater strategy in a reciprocal altruistic game. As such, the psychopath seems to have a marginally adaptive strategy in social interactions with other humans. But can the psychological mechanisms implicated in psychopathy limit their activity just to those behaviors that support the cheater strategy in social interactions? I think not. As I will show shortly, the same psychological mechanisms also cause the psychopath to engage in a number of behaviors not directly involved in social interactions with others that are clearly maladaptive. Thus, the real question is whether there is a net gain for the psychopath when some of his behaviors that do not involve other agents in social games are maladaptive as compared to nonpsychopaths, while other behaviors that do involve other agents are adaptive as a low-frequency cheating strategy in reciprocal altruistic games. This is a more difficult question to answer; however, I would guess that the psychopath obtains *at best* a net gain of zero from the costs that go along with the benefits of this strategy. Whatever the psychopath gains from reciprocators in direct competition through the use of a cheater strategy, he loses to these very same people through the indirect competition with them in situations not involving social games.

According to Mealey, the gains from cheating that the primary sociopath obtains occur because he takes a short- rather than long-term view of social interaction, choosing immediate gain over long-term gain through reciprocal altruism. She suggests that this occurs because the primary sociopath lacks the social emotions that bind individuals to each other, producing cooperation through time. It is the social emotions such as shame, guilt, sympathy, and love that are an essential part of the psychology that maintains the human social adaptation of reciprocal altruism, or of a cooperative strategy over multiple Prisoner's Dilemma-type social situations. The psychopath, lacking these emotions, is inclined not to cooperate over the long term with others, but prefers to cheat by taking the dominant defect strategy in Prisoner's Dilemma-like social situations.

I do not wish to debate with Mealey over whether the primary sociopath, or psychopath, lacks these social emotions or whether the lack of these emotions might provide an advantage to the psychopath through leading him to defect in Prisoner's Dilemma-type social situations. Indeed, the psychopath exhibits other related behaviors that seem to optimize the success of this strategy, such as his tendency to wander from one population to another so as to reduce multiple interactions with the same individuals (Harpending & Sobus 1987). However, there is every reason to think that the psychopath lacks not only the relevant social emotions but also other emotions that inhibit self-interested behavior even when other individuals are not involved. For example, it has long been known that psychopaths do not exhibit the usual physiological correlates of anxiety or fear when they know that they are about to be shocked (e.g., Hare 1986) and that this apparent emotional deficit reduces their capacity to learn responses that avoid both shocks and certain social punishments (Lykken 1957; Schmauk 1970). Such a general deficit in passive avoidance learning relative not only to other humans but to many other organisms (e.g., Mineka & Zinbarg 1991) can hardly be viewed as an adaptive consequence of psychopathy. It is a cost that must be balanced by the success of cheating in social situations.

But there are further difficulties associated with the lack of emotions in psychopaths that must also be considered, in particular, their lack of prudent behavior concerning future consequences of current activity. Even when other individuals are not involved, the psychopath fails to show concern about his own future. Especially in approach-avoidance conflict situations, the psychopath is unwilling to delay immediate gratifica-

tion for a better outcome later (e.g., Newman et al. 1992). Although he is quite capable of calculating what will happen in the future, he fails to take a sufficient interest in it to be motivated by the consequences of present actions for his future self. William Hazlitt pointed out long ago that it is the same sympathetic imagination that "must carry me out of myself into the feeling of others . . . by which I am thrown forward as it were into my future being and interested in it. I could not love myself, if I were not capable of loving others" (Hazlitt 1805/1969, pp. 2-3; Martin & Barresi 1995). In the case of the psychopath, just as he fails to show sympathy for other people's interests, he also fails to show sympathy for the interests of his future self. And again we can ask whether the direct payoffs from the cheater strategy offset these losses due to this lack of sympathy by the psychopath for his own future self. [See also Logue 1988; Rachlin 1995.]

My suspicion is that if the psychology of the psychopath is at all successful as a low-frequency strategy for human social interaction, it has developed through a form of genetic drift, where gains that are made through cheating are offset by the losses in noncheating situations. Turned around, what this means is that the success of the cheating strategy allows an intrinsically maladaptive behavioral disorder, psychopathy, to exist in higher frequency than it normally would. This possibility makes one wonder whether there are other psychopathologies that are maintained at fairly high frequencies through such "secondary gains" of the pathology. Conversion hysteria might be a prime example of just such a psychopathology.

Secondary sociopathy and opportunistic reproductive strategy

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Abstract: Mealey's analysis of secondary sociopathy has much in common with Belsky, Steinberg, and Draper's (1991) evolutionary theory of socialization. Both draw attention to the potential influence of early rearing in the promotion of a cold, detached, manipulative, and opportunistic style of relating to others and, in so doing, raise the question of whether secondary sociopathy represents a facultative reproductive strategy.

The assertion that a cold, detached, manipulative, opportunistic style of relating to others is, in some cases, the result of contextual stresses and rearing practices during childhood has much in common with an evolutionary theory of socialization advanced by Belsky et al. (1991). Building upon many of the same sociobiological foundations as Mealey, these theorists argued that humans have evolved to be responsive to their rearing circumstances in the service of reproductive goals (i.e., fitness). When parental care is harsh, rejecting, insensitive, and inconsistent, as it is likely to be when economic resources are limited and family stress is heightened, children are predisposed to develop insecure attachments to their parents, perceive others as untrustworthy and relationships as unending; in consequence, they develop an opportunistic (including aggressive, especially in males) advantage-taking style of relating to others (a sociopathic style?). This developmental trajectory, Belsky et al. argued, was part of a reproductive strategy designed to favor growth and mating over parenting, and thus was hypothesized to be associated with earlier timing of puberty, earlier onset of sexual activity, unstable pair bonds, and limited parental investment (see Fig. 1).

Like Mealey, Belsky et al. (1991, p. 650) highlighted