Commentary/Mealey: The sociology of sociopathy

the absence of a definitive historical record, therefore, the
empirical strength of the current paper rests entirely on the
charm of a metaphor for human interactions, of the random
matching one-shot Prisoner's Dilemma model with imperfect
identification of types. But this is not the only charming model
available, and some of the others (including the same one with
different parameter values) do not admit a stable proportion of
cheaters, or do not admit cheaters at all. Also, if taken seriously,
the model chosen makes predictions about sociopathy that do
not seem to be true.

I will address these criticisms in reverse order. Recall that if a
mixed strategy profile is evolutionarily stable, then if a particular
strategy A increases (or decreases) in frequency, the payoffs to all
the strategies must change so that A is relatively disadvantaged
(or advantaged). Natural selection will then ensure that strategy
A goes back to its proper place. If we are to take the current
application of Frank's (1988) model seriously, then the propor-
tion of cooperators in an ancient society with "too many" of their
own kind have had difficulty gaining access to resources and mating partners? We just do not know, and the target article is not helpful. Perhaps cooperators would become more diligent, but if cheaters ganged up under a
charismatic Attila one suspects large numbers would be an
adversary.

The dynamic for secondary sociopathy is discussed in the
paper, but things seem to go the wrong way. One has to be
careful here - if I move from Kingston to New York City and as a
result, my kids are more likely to become sociopathic, this could
be because environmental differences lead New York to have a
higher proportion of cheaters. Rather, suppose that a small
number of young sociopaths move to Kingston, all else the same.
According to the Frank/Mealey model, Kingston children will
now be less likely to become sociopathic. I have no evidence; but
like most parents, I think not.

Frank's (1988) model is a variant of the round robin, infinitely
repeated Prisoner's Dilemma introduced by Axelrod (1984) in his
celebrated competition. But there are other models that have
equal "charm" and are therefore equally (unlikably) capable of
presenting a picture of the conditions facing primitive homo
sapiens. Here are two examples:

Consider a model where individuals match up randomly, play
a one-shot Prisoner's Dilemma, and then have the choice of
continuing or terminating the match (Carmichael & MacLeod
1994; Stanley 1993). If the match ends, both parties go back,
anonymously, to the matching market. If not, the partners may
stay matched until death, continuing to play a Prisoner's Di-
llemma each period. For a modern image, think of the matching
market as a large, dimly lit singles' bar.

Even though cooperators play a repeated Prisoner's Di-
lemma, the strategy "tit for tat" does very poorly. It is quickly
invaded by cheaters who defect at the first opportunity and then
move on to a new match. An interesting evolutionarily stable
strategy is for cooperators to offer (and demand) an exchange of
gifts at the beginning of any new match (Carmichael & MacLeod
1993). Cheaters in this society would have to buy a succession
of gifts, and this effectively screens them out. This model makes
quite a few predictions about the form of the gifts that must be
used.

Here is another one (Carmichael 1994). Suppose we retain the
one-shot matching framework of Frank but change the game
from a Prisoner's Dilemma to a bargain. People meet and have to
decide how to divide the spoils of some joint venture (the carcass
of some animal, perhaps). If they can agree quickly on a division,
then all is well. If they cannot, the spoils disappear, dragged
away by a hyena. Strategies that do well in these bargains will proliferate into the future. An intraspecies arms race might develop, where
"bargaining ability" grows over time. Rational and emotional
bargainers will be vulnerable to the "terrible twos" strategy of
demanding almost everything, backed up with the emotional
threat to emasculate those who refuse. Faced with such an opponent, a rational bargainer cuts his losses, takes what is offered, and moves on. Of course an entire society of two-year-olds does very poorly, and can be invaded by
a group whose members fight if they do not receive at least half
the spoils. This strategy is evolutionarily stable - it quickly
reaches agreement with itself and can do no worse than any
invader it meets. Again, in this simple model, there is no room
for cheaters.

Readers will recognize the "bourgeois" strategy of Maynard
Smith (1982), but there are some new twists. In particular, if
people are of two types, there are many equilibria where one
type does better than the other. If men fight whenever they get
less than one-third and women fight whenever they get less than
two-thirds, for example, this is evolutionarily stable. Equilibria
like these require that one's notion of territory be socially
determined. There must be a way for early experience and
teaching to establish and coordinate internal notions of what one
deserves out of life. Sociobiology can therefore account for the
existence of systemic discrimination, and society may indeed, at
least partly, be to blame.

The point, of course, is not that these are better models of
reality than the one used in the target article, but they do seem
equally plausible, and they have implications that are at least as
attractive and intriguing. Perhaps they each capture relevant
but separate aspects of reality. If so, Mealey's conclusion - that
I don't know - is not robust. (The rule of emotions in these models,
by contrast, is robust.) Cheaters do prosper, no doubt. But until we
have excellent evidence about the exact nature of early human
society, or until we can show that in any sensible evolutionary
model there will survive a small proportion of cheaters, socio-
biology will not be able to tell us why.

NOTES
1. Among other things, gifts should have low use value, be over-
priced, and should be hard to recycle as gifts in a subsequent match. Cut
flowers and chocolates work - house plants and money do not.

2. Unless, of course, the invader has a weapon. The arms race in this
model is real.

Prisoner's Dilemma, Chicken, and mixed-
strategy evolutionary equilibria

Andrew M. Colman

Abstract: Mealey's interesting interpretation of sociopathy is based on
an inappropriate two-person game model. A multiperson, compound
game version of Chicken would be more suitable, because a population
evolving in random pairwise interactions with that structure would
evolve to an equilibrium in which a fixed proportion of strategic choices
was exploitative, antisocial, and risky, as required by Mealey's
interpretation.

In a target article of exceptional scholarship and originality,
Mealey has put forward an interesting new interpretation of
sociopathy. Given the vast range of material covered by the
article and the limited space available for my commentary, I
shall confine my comments to the specific-game theoretic model
that underpins Mealey's interpretation. I shall argue that it
cannot do what is required of it, and I shall suggest an
alternative.

Like most earlier theorists who have used game theory to
explain the evolution of social behavior, starting with Maynard
The total payoff to a player adopting a mixed strategy is just a weighted average of $P(C)$ and $P(D)$.

The values of $P(C)$ and $P(D)$ payoff functions at their endpoints are found by setting $e = 0$ and $e = n$. Thus, if none of the other players chooses C (i.e., $e = 0$), the payoff to a solitary C chooser is $S_n$ and the payoff to a D chooser is $P_n$. If all of the other players choose C (i.e., $e = n$), then a C chooser gets $R_n$ and a solitary D chooser is $T_n$. It is clear that in the case of the Prisoner’s Dilemma game $T_n$ can be interpreted as the temptation to be the sole D chooser, $R_n$ the reward for collective cooperation, $P_n$ the punishment for collective defection, and $S_n$ the sucker’s payoff for being the sole C chooser.

Figure 1(a) shows clearly that, in the case of the Prisoner’s Dilemma game (with $T > R > P > S$), the $P(D)$ payoff function strictly dominates the $P(C)$ payoff function, which means that a D choice pays better than a C choice irrespective of the number of others choosing C. The evolutionarily optimal strategy is therefore not frequency-dependent, and the population will (regrettably) evolve to a stable equilibrium in which every player chooses D in every two-person encounter. This means that the Prisoner’s Dilemma game cannot provide a basis for Mealey’s interpretation of sociopathy, in which the “cheater strategy” (the D choice) corresponds to various criminal, delinquent, and generally antisocial or predatory forms of behavior that she claims exist at a low frequency in every society and are maintained through frequency-dependent Darwinian selection.

A more appropriate game theoretic model might be a compound version of the game of Chicken, which Maynard Smith (1970, 1976) and Maynard Smith and Price (1973) call the Hawk-Dove game. This game is defined by the inequalities $T > R > S > P$, and the $P(C)$ and $P(D)$ payoff functions are shown graphically in Figure 1(b). In this case, the population will evolve to a mixed-strategy equilibrium point, where the two payoff functions intersect. To the left of the intersection, when relatively few of the others choose C (i.e., small), the C function lies above the D function, which means that the fitness payoff from a C choice is higher than from a D choice, so the number of C choosers will increase relative to D choosers and the outcome will move to the right as C increases. To the right of the intersection, exactly the reverse holds: D choosers will increase relative to C choosers and the outcome will move to the left as C decreases. At the intersection, and only there, the strategies are best against each other and are in equilibrium, and any deviation from the mixture at that point will tend to be self-correcting. By setting the parameters (values of the payoffs $T$, $R$, $S$, and $P$) appropriately, the intersection point, and thus the proportion of “predatory” D-choices, can be made as small as required.