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Letters to the Editor

Are Humans Maximizing Reproductive Success?

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In a recent issue of this journal, Weinrich (1977) analyzed the sexual practices and reproductive behaviors of modern human societies. He developed an evolutionary theory to predict the relative frequencies of various behaviors in different social classes and races, based solely on the predictability of their income. There are serious theoretical and empirical difficulties with his scheme.

In dealing with a fluctuating resource (income), Weinrich has failed to adequately distinguish the effects of *predictability, variability* and *average* amount of resource available. All of these properties are necessary for the complete characterization of resource availability as a mathematical random variable, and all are important in determining the optimal reproductive pattern in a population. The predictability of a random variable is given by the serial autocorrelation, that is, the set of correlations of the variable at time t with itself at various earlier times, $t-\Delta t$ (see for example Kendall and Stuart, 1976, on stationary autocorrelated time series). Since predictability is described by a set of *correlations,* it is entirely independent of variability and the average. By focusing on predictability Weinrich has ignored the influence particularly of the average level of resources. When resources are superabundant (a high average level) with a large minimum availability, and survivorship is high, the reproductive schedule which maximizes the number of future descendants is one of early reproduction and high fecundity, regardless of the predictability or variability of the resources. When resources are scarce (a low average level) limited reproduction often yields the best chance of producing progeny which will survive to reproductive age. These examples demonstrate that the average resource availability can be more important in determining the optimal reproductive pattern than either the variability or predictability of resources.

Weinrich's theory was developed in obvious analogy with the theory of r and K selection. Since I informed him in a personal communication that the conditions of average resource availability in different social classes would lead to opposite predictions from those based on predictability (assuming for the sake of argument that he correctly assessed the lower classes to have less predictable incomes) because the upper classes have a higher average income,

he has denied the applicability of standard r and K selection theory to the problem, stating "I consider in this paper situations where the classical r and K theory does not apply: situations where the group in the more unpredictable and variable environment is not exploiting an abundant resource (p. 93)." But he does not provide any justification for neglecting the influence of average resource availability.

By employing an evolutionary theory to explain differences in sexual and reproductive behavior between social classes, Weinrich is assuming that humans adopt in different environments appropriate patterns of behavior which maximize their reproductive success (p. 92, 114). This assumption is obviously false, for if humans are maximizing their reproductive success, why do the upper classes not have more children since they can easily afford to do so? Many people have consciously opted for the maladaptive strategy of limited reproduction in the midst of plentiful resources. I conclude that humans are not maximizing their reproductive success and that modern sexual practices are best explained by psychological and social mechanisms more complex than the simplistic evolutionary theory advocated by Weinrich.

References

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The Author Replies

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My implicit definition of "predictability" differs from Lande's. By predictability I mean the probability that investors present at the time an offspring is conceived will find themselves able and willing to continue investment in that offspring at a reasonable rate through the end of parental investment. It is thus influenced by the probability of events like the death or disability of investors, and includes

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components of both Lande's predictability and his "average amount of resource available" (see p. 94, paragraph 3). Predictable variability is handled by adjusting the average amount expected. My theory asserted that both "Lande-predictability" and high income affect "Weinrich-predictability" in the same direction. Thus for the pair-bonding class differences considered in my paper, separation of the two was not required. Moreover, my paper never purported to show that all differences in pair bonding tendencies can be based "solely" on either kind of predictability. On the same page as Lande's quotation, I noted that "There are, of course, a great many other factors that influence the strength of a species' pair bond." Elsewhere on that page, and in the Discussion and the paragraph before, there are passages that show I proposed an additional, not exclusive, explanatory path.

Some of Lande's (and D. Hickey's) oral comments after an early presentation of my ideas improved my logic; thus I cited them in my Acknowledgements. But the sentence he cites is not a "justification for neglecting" anything. Rather, it is a discarding of *r* and *K* theory, whose assumptions do not fit this particular human application.

The rest of Lande's criticism mystifies me. The parts referring to "early reproduction and high fecundity," "limited reproduction" (once qualified by "often," once unqualified), and having "more children" are irrelevant to my paper. They concern not pair bonding, but fertility, a word I used only once, to refer to passages in my thesis discussing fertility and social class (Weinrich, 1976, pp. 9–18, 24–36, Tables 1–2, Figs. 1–8). I do not want to take much space discussing work that did not appear in this journal, but let me note that the different effects of Weinrich-predictability and average level of resources on *fertility* are controlled for in my thesis at nearly every point.

So Lande's criticism of my *theory* boils down to a misunderstanding about definitions. But additionally, he finds serious "empirical difficulties" with my paper, cites none, and proposes a theory of his own that is unsupported and unexplained. "When resources are superabundant...," and in other cases, Lande is led by logic unspecified to "opposite predictions from those based on predictability," namely my own. But my own accord with the data, and so Lande's theory must contradict the facts. Yet Lande does not discard his own logic. Instead, he concludes that any reasoning must be untenable if it begins with an "assumption" (actually, a hypothesis) connecting human behavior with reproductive success in the recent evolutionary past.

Lande concludes his critique in a blaze of unsupported assertions and premature conclusions. After asserting that "obviously" the upper classes can "have more children" he ignores the possibility that we are now seeing the effects of evolved mechanisms operating maladaptively in a new environment. But much more importantly, he confuses fertility with reproductive success. This is analagous to mistaking clutch size for the number of offspring surviving to adulthood – upper-class couples might restrict fertility yet succeed in raising more offspring to the corresponding point in the next generation's life cycle. (This is known to be true for some IQ classes: see Lewontin, 1970.) Lande asserts that the cause of much fertility restriction is conscious, explained by "psychological and social mechanisms," which he calls "complex." He appar-

ently concludes that these mechanisms are to be understood without reference to adaptation. I emphatically disagree (see p. 91). The central conclusion of my paper was that social scientists must cease routinely dismissing biological components in their models of behaviors affecting reproductive success. These models are far more deserving of Lande's adjective "simplistic" than my own. It is a shame that a biologist of his caliber would encourage them.

References

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