III trial is justified.

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Ecological Science and Statistical Paradigms

In his excellent research commentary "Ecological science and statistical paradigms: At the threshold" (*Science*'s Compass, 23 Jan., p. 502), Brian A. Maurer calls for more testable models in analyzing ecosystem behavior, given the complexity and causal uncertainty associated with such ecosystems. Others, including me, would take his recommendation one step further. One major social science approach to analyzing highly complex and uncertain behavior is triangulation, the use of very different (indeed, orthogonal) theories, methods, or databases to converge on points for follow-up (*1*). By using such different but formal approaches to address an issue, we do not so much reduce the issue's uncertainty or complexity (although that is one aim) as we increase our confidence about how to proceed. Triangulation has recently been applied to the debate over sustainable development and ecosystem management (*2*) initiated by Ludwig, Hilborn, and Walters' 1993 *Science* Policy Forum (*3*).

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References

1. N. Denzin, *The Research Act* (Aldine, Chicago, IL, 1970); T. D. Cook, in *Social Science and Social Policy*, R. L. Shotland and M. Marks, Eds. (Sage, Beverly Hills, CA, 1985), pp. 21–52; J. Brewer and A. Hunter, *Multimethod Research* (Sage, Newbury Park, CA, 1989).
2. E. Roe, *Taking Complexity Seriously: Policy Analysis, Triangulation, and Sustainable Development* (Kluwer, Boston, 1998).
3. D. Ludwig, R. Hilborn, C. Walters, *Science* **260**, 17 (1993).

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On "The Science of Substance Abuse"

The series of papers entitled "Frontiers in neuroscience: The science of substance abuse" (3 Oct. 1997, p. 45) provides a thoughtful review of recent research on how addictive drugs alter brain function. Several of the papers present the conventional view that addiction is a chronic and relapsing disorder; however, according to epidemiological research, addiction is the psychiatric disorder with the highest recovery rates and the shortest duration (*1*, *2*). Experimental and clinical studies show that the factors that influence voluntary behavior, such as economic and social costs, persuade many addicts to quit using drugs (*3*, *4*). Not mentioned is the fact that voluntary behavior is mediated by the brain and the extensive findings on relapse rates and recovery.

It has long been acknowledged that changes in brain function alter voluntary behavior, and in the last 20 years or so, laboratory research has revealed many of the details of these relations. Thus, neuroadaptation could just as likely influence preference as preclude it. The difference is important. An addict who takes drugs voluntarily can be persuaded by contingencies or new information to stop using them. An addict who takes drugs involuntarily cannot be persuaded by costs and incentives to stop using them. To determine whether drug-induced brain changes lead to involuntary drug use, we must turn to the re-