Letters

Cities in the Seas

In a recent editorial (4 Sept., p. 993) Athelstan Spilhaus strongly advocates the colonization of the sea, pointing to recent advances in buoy construction and underwater living that suggest to him the imminent feasibility of floating and undersea cities. In so doing Spilhaus lends his forceful pen and great personal prestige to the ever popular "enough and to spare" philosophy that has for some years now made headlines and sustained the delusions of people who like to think that if they just relax and procreate, the "fallout" of genius will solve the problems of supporting an ever-increasing population on an ever-shrinking planet.

To argue, by implication, if not directly, that human ingenuity must somehow surmount the problem of maintaining and sustaining constantly expanding numbers of people is to misidentify the problem. Even if this could be done for a while, and in reasonable physical comfort, the psychological trauma of sheer overpacking would eventually give many of us "lemming disease," not to mention the drain on nonrenewable resources. It would be far more to the point to stop reassuring the people and the politicians that Science or Engineering will find a way, and to increase emphasis on the eventual necessity of a sociological solution —a stable population capable of existing within the reasonably clement reaches and the practically attainable resources of the solid earth. Any other course amounts to playing Russian roulette with the future of mankind.

I find equally troublesome the exhortation that in the event occupation of a different realm becomes necessary, the occupants "might just as well be our men." Why not Tshombe's men if they need the space and will behave decently in it? The international community of science has done much to fortify the concept of a brotherhood of man. Let us not now encourage retrogression by differentiating between "our" scientists or "our" men and somebody else's. If it must be done, let it be done from a common pool of knowledge by or for whoever needs to do it first.

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Determinism: Bias and Complementarity

Boring's article in the issue of 14 August entitled "Cognitive dissonance: Its use in science" suggests to me that there is still something useful to be said concerning the perennial problem of freedom and determinism. In listing the antithesis between freedom and determinism as "the best known instance of cognitive dissonance that the scientist encounters," Boring implies that the simultaneous employment of these two paradigms involves an inconsistency. . . . Historically, science has resolved this problem by utilizing a different paradigm: a dichotomy of observed and observer. The paradigm of determinism is applied to the observed. The paradigm of choice is applied to the observer. This policy works well in physics and astronomy and causes little or no difficulty in chemistry, but difficulties appear on the horizon of biology and increase in psychology, approaching catastrophe in introspective psychology. Difficulties arise and increase as the distinction between the observer and the observed diminishes.

Why does Boring view the freedom paradigm as "a preference for certain kinds of ignorance"? Presumably because acknowledging a concept of freedom entails staking out an area of phenomena unamenable to scientific treatment. Does not existing scientific evidence suffice to deny the existence of any area of freedom—to assert that the area of determinism includes all phenomena? Wherever science has been sucecssful, determinism has been found. Does not this irresistibly bolster the argument? Not irresistibly, and *perhaps not at all* if scientific method involves a deterministic bias. When a scientist is given a set of data his first step is to seek some trace of order, some evidence of interrelation among the individual items. When he thinks he has found it, he constructs a hypothesis, which he then tests by examining the concurrence (or lack of it) between the deductive consequences of his hypothesis and appropriate empirical observations. What does he do if he fails to find any order in the data? He may seek more extensive data, or more precise data. But, if he continues to fail to find any order? I submit: he ultimately abandons this exasperating project and seeks a more promising one. Ergo, the scientist concentrates his efforts in the areas where causal relations appear. He prospects for determinism, and that is what he finds.

What else could he do? Well, if the data related to human action, especially human thought, he just possibly might suspect these disordered items to be in the area of freedom, to consist of prime events which wave no causalistic tails behind them. Cannot some fruitful method be developed to deal with this possibility? Is not the effort worthwhile? If no effort is made at all, is this not also an exhibition of a "preference for certain kinds of ignorance"? If this issue is explored no further, about all that has been accomplished is a comfortable rationalization of the dissonances under discussion—number iv in Festinger's list of methods for dealing with a cognitive dissonance. Accordingly let me pose a more specific problem for study.

The practical application of the concept of freedom to choose is in the making of decisions. Let us take this question from the level of the practical to that of the abstract, illustrating with the selection of strategy for utilizing computers to play games. Since the possible number of moves in a game of chess is finite, though very large, it would be possible in principle to construct and program a computer to review at each step the ultimate consequences of each possible move and select the best one (or one of the