Letters

Imprinting

While I wish to follow Eckhard Hess' injunction [*Science* **130**, 133 (1959)] of making no assumption about the nature of imprinting, may I suggest the concept of "deflection" for the time when such speculations will become helpful. The instinctual need for parent relation can be channeled into a variety of objects. I have previously designated such modifications as deflection [G. Haydu, *Architecture of Sanity* (Julian Press, New York, 1958)]. Imprinting is a particularly fascinating form of deflection.

Hess' studies with meprobamate and chlorpromazine (see his Table 1) are in good accord with this concept. Meprobamate reduces only the immediacy or urgency of the object need but not its form. Chlorpromazine brings the organism back from its present configuration and lets it transact such object need in an earlier style. (In the rat, for example, chlorpromazine inhibits the deflected form of escape drive.)

In his Table 1, line 2, Hess indicates that meprobamate reduces imprinting attempted at an optimal period, while chlorpromazine does not do this. The regressive action of the latter brings the duckling back to a period during which receptivity is high. Line 4 of the same table indicates that meprobamate produces no effect when object need for deflection is at a normally low level, while chlorpromazine effects a marked increase of imprinting by bringing the duckling back to a previous period (17 to 20 hours) which is characterized by considerable "imprintability."

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In the article entitled "Imprinting" [*Science* **130**, 133 (1959)] by E. H. Hess, experiments contrary to the author's theoretical position were dismissed because of the alleged failure to employ animals of an appropriate age. Thus Hess states: "In many instances the animals are *too old* when used in the experiments to fall within the critical age for imprinting, with the result that only association learning can occur" (italics mine).

In one of the studies which Hess dismisses [H. Moltz and L. Rosenblum, *J. Comp.* and *Physiol. Psychol.* (1958)] it is stated quite explicitly that all ducklings were exposed to the "imprinting" object within 5 to 10 hours after hatching. Since the critical period to which Hess refers occurs during the first 13 to 16 hours from hatching, Moltz and Rosenblum's animals were obviously not too old. Therefore, Hess' dismissal of the Moltz-Rosenblum data—data which are not in accord with his theoretical position with respect to imprinting—was not justified. A similar error was made in dismissing two studies by Jaynes [*J. Comp. and Physiol. Psychol.* (1956); *ibid.* (1957)]. Again, the subjects employed were not "too old," and the data were contradictory.

An article of mine, currently in press in the *Psychological Bulletin*, treats the experimental results which Hess does not consider relevant to his position and presents a different explanation of the imprinting phenomenon.

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The Newtonian Universe

In a recent issue of *Science* [**130**, 328 (7 Aug. 1959)], M. K. Munitz reviews Arthur Koestler's book *The Sleepwalkers*. As I have not read the book, I cannot either agree or disagree with Koestler. One of Munitz's notions, however, calls for comment. He quotes Koestler as saying that "the blueprint of the universe remains essentially the one Newton drew for us, in spite of all disturbing rumours about the curvature of space, the relativity of time, and the runaway nebulae." Munitz adds to this that "the judgment just quoted is . . . contrary to the most obvious truth and in its own way . . . perverse . . .," and he indicates that in his view modern science has gone far beyond Newton to things radically new.

It seems to me that there is here a strong misunderstanding as between the constructs of the professional scientist and the somewhat simpler conceptual universe of the intelligent and educated layman. It is no accident that, only two generations after Newton, Kant and Laplace proposed a vast universe filled with innumerable stars at large distances from each other which have condensed to their present form out of diffuse gaseous masses, a concept which we still hold today in some only mildly modified form. This line of thought is entirely "Newtonian." The main thing that we moderns have added is the burning up of nuclear fuel to keep the stars shining. It seems clear that the revolutionary break is between the universe of Aristotle and Ptolemy on the one hand and that of Kepler and Newton on the other, relativity being also very near to Newtonian concepts. So far as I can see, there is here a danger that we professionals lose touch with the philosophy and the concepts of society at large. The loss will be both society's and ours.

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Stored Foodstuffs and Fallout

Because of the high concentration of radioactive fallout in bombed areas after a nuclear attack, soils would be contaminated and crops could not be grown for a considerable period. The effects of this critical period of possible starvation could be mitigated by utilization of so-called surplus grains, milk, and egg products from storage. The shelters that house the foodstuffs would keep them from being contaminated by strontium-90 and other long-lived radioisotopes. These storage structures could be decontaminated far more easily and more quickly than the soils on which crops would have to be grown.

Much attention is being given to the problem of the accumulation of large supplies of surplus grains, milk, and egg products in storage in this country, and to the cost of maintaining the proper storage conditions to insure against spoilage. Granted that these costs are high, such surpluses nevertheless constitute the cheapest kind of insurance against possible starvation periods that would follow an atomic holocaust. In fact, protective storage of foodstuffs seems to be the only means of alleviating, at least to some extent, critical food shortages in contaminated regions.

The normal production of new foodstuffs would probably be suddenly and completely cut off in extensive areas beneath bomb bursts. Data are at hand that show how long the present stored surpluses of foodstuffs would supply the population. These data show that stored supplies would be consumed in a comparatively short time, even when rationed at a bare maintenance level.

For these reasons I advocate that the present levels of stored foodstuffs be carefully maintained. More than that, a study should be made of possible means of improving storage against fallout contamination. In addition, consideration should be given to the advisability of increasing the stored amounts of some foodstuffs and possibly decreasing others. Maintaining reserves of fiber materials should also be considered, particularly of materials needed for clothing.

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