uals of a given reptilian species were each tested under the six conditions; then the whole test procedure was repeated on the same day after a 15-minute rest period. For each reptilian species this procedure was repeated at least once at a later date.

Data were obtained by direct visual observation of each animal's movement under the different conditions. Verbal descriptions of behavior were recorded and supplemented by numerical ratings based on an arbitrary scale extending from 0 to 6: a rating of 5 or 6 was recorded for a vigorous optomotor response in the form of good OKN, strong head nystagmus, or consistent tracking of the stimulus pattern by locomotion; a rating of 3 or 4 indicated a less vigorous but still clear-cut and fairly consistent response; a score of 1 or 2 indicated that some optomotor reaction was obtained but was weak or inconstant; 0 meant no response. The species was classed as unidirectional if the average score for responses to c→u stimulation differed from that for response to u→c stimulation by more than 2 score units. Otherwise, the species was classed as bidirectional. Two to four observers witnessed each test. Eye, head, and body movements were generally easily observable, and agreement between observer ratings was usually close.

Guinea pigs and rabbits showed a unidirectional response to monocular OKN stimulation. This is consistent with earlier reports. Prairie dogs (afoveate, pure cone retina) also showed a unidirectional response, as predicted (Table 1).

More than half of the reptilian species were bidirectional in their responses to monocular optomotor testing, showing that degree of decussation of visual pathways cannot be decisive (Table 1). When these data are examined for relationship of response type to retinal type, it is seen that all the animals consistently exhibiting bidirectional responses were foveate, and all but two of the animals exhibiting unidirectional responses were afoveate.

Tests performed on 17 species of birds (one individual of each) showed optomotor bidirectionality in every instance (*14*). Birds have excellent vision; most have cone-rich retinas with an area centralis and single or double foveae, except for ground feeders and domesticated species, which are generally considered afoveate (*11*). On the basis of available information (*11*), we suspect that all our species are foveate.

These findings are almost entirely in accord with prediction. In the sample of reptiles all the afoveate species were nocturnal, and all foveate species were diurnal, suggesting that some other aspect of adaptation to diurnal or nocturnal conditions might provide an anatomic criterion as effective as presence or absence of a fovea for predicting bidirectionality or unidirectionality. However, the mammalian and avian data tend to support the special relevance of the fovea in two ways: The first is that the prairie dog (Table 1), domesticated pigeon (*9*) and chicken (*10*), although diurnal, gave unidirectional optomotor responses, and these forms differ from the previously tested diurnal mammals and most of the diurnal birds in that they are afoveate (*11*); the second is that the three species of owls all gave bidirectional optomotor responses, although two of the three were nocturnal species (*11*). Study of animals with pure rod foveae (*11, 15*) can further test this differentiation.

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15. For example, the gecko *Sphaerodactylus parkeri* [G. Underwood, *Nature* **167**, 183 (1951)].
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Mongoose and Millipedes

Davis and I (*1*) have described the peculiar behavior whereby the African banded mongoose (*Mungos mungo*) hurls and smashes certain hard-shelled "pill" millipedes (order Glomerida) before eating them. The study was done with a caged mongoose at the New York Zoological Park and millipedes shipped to us from Africa. In several of the many letters received in response to our report, doubts about the validity of our findings were expressed because of the abnormal setting in which they were obtained. The following excerpt, taken from a book (*2*) which has only now come to my attention (*3*), attests to the occurrence of the behavior in nature.

> Mongooses . . . in captivity . . . eat almost anything, but in their wild state they live mainly on insects. A friend of mine recently told me a strange tale about one of these creatures. He's an old man, and he's more or less grown up in these wild stretches of Natal. He said that one morning when he was sitting quietly under a tree in the bush hoping to see some birds, he spotted a colony of mongooses nearby. Suddenly one of them climbed a short distance up a tree and knocked down a pill millipede. The mongoose jumped down after it, grabbed it between his front feet, and hurled it through his backlegs against the tree. The impact smashed the otherwise-impregnable ball, and before any of his friends could cheat him of his prey, he ate it.

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3. I thank Dr. R. F. Lawrence, Albany Museum, Grahamstown, South Africa, for alerting me to Mrs. Wager's book, and Mr. V. A. Wager for permission to reproduce the passage from his wife's book.

10 April 1968