

Growing In Circles: New Study Examines How Rearing Environment Can Alter Navigation

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Many animals, including humans, frequently face the task of getting from one place to another. Although many navigational strategies exist, all vertebrate species readily use geometric cues; things such as walls and corners to determine direction within an enclosed space. Moreover, some species such as rats and human children are so influenced by these geometric cues that they often ignore more reliable features such as a distinctive object or colored wall.

This surprising reliance on geometry has led researchers to suggest the existence of a geometric module in the brain. However, since both humans and laboratory animals typically grow up in environments not entirely made up of right angles and straight lines, the prevalent use of geometry could reflect nurture rather than nature.

A new study published in the July issue of *Psychological Science*, a journal of the Association for Psychological Science, is the first attempt to examine whether early exposure to strong geometric cues influences navigational strategy.

Alisha Brown, a psychology graduate student at the University of Alberta, raised fish in either a rectangular tank, or a circular tank free of angular information. Brown and her colleagues later trained the fish to swim to one particular corner of a rectangular-shaped test arena with either all white walls (geometric information only), or one colored wall (featural and geometric information).

Their results demonstrated that the ability to use geometry to aid navigation did not depend on exposure to angular geometry during rearing: In the featureless test arena, fish from both rectangular and circular rearing tanks used geometry to navigate. However, when features were present to help navigation, the circle-reared fish were more likely to depend on the feature even if it meant choosing a geometrically incorrect corner.

The researchers concluded that the ability to learn about geometry for navigation seems to be innate, but the use of geometric cues to navigate is determined by both nature and nurture. When reared in the absence of rectangular geometric structures, fish show a greater dependence on features for navigational guidance.