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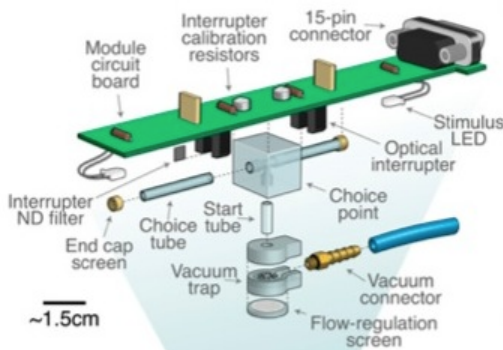
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### Do Fruit Flies Have Free Will?

By Alex B. Berezow

Fruit flies appear to have certain preferences, even ones that don't seem to have any known basis in genetics. Just like how one identical twin might like tomatoes and the other despises them, genetically similar fruit flies show dissimilarity in a preference for light.

Researchers at Harvard University employed isogenic (genetically similar due to inbreeding, but not identical) fruit flies in a device called a "FlyVac." The contraption consisted of a T-maze (think: a "fork in the road"), and at each end was an LED light. (See diagram.)



The light that was illuminated was chosen at random. The fruit fly entered the maze and had to make a phototactic choice: Go toward the light (photopositive) or away from it (photonegative). After whatever choice it made, it was unceremoniously vacuumed, taken back to its original position and forced to go through the maze again. And again. And again. Such was the fate of some 17,600 flies.

The authors discovered that fruit flies within a particular strain (a type of genetic variant) displayed much more variability in their choices than one would expect by chance alone. For example, one photopositive fruit fly strain chose light about 80% of the time. However, one oddball fly in this group chose light 100% of the time. This is aberrant behavior, but the authors were not able to identify a genetic explanation for this.

The authors examined other fruit fly strains and found similar results. The variability within the strains was much greater than one would expect by chance. (When the researchers compared the strains to each other, they found differences in both light preference and variability, indicating that genetics plays some role in phototaxis *between* fruit fly strains, but not *within* fruit fly strains.)

So, why would a genetically similar fruit fly strain display such variability? The authors propose several possible explanations: Fruit fly brains are wired with considerable error; it is evolutionarily "cheaper" to tolerate a few oddballs than to evolve a more stringent neurological mechanism; fruit fly brain circuits are finicky and sensitive to multiple stimuli; or fruit fly "personalities" are a non-heritable adaptation for survival.

Left out of the discussion is the next most obvious question: Do fruit flies have free will?

**Source:** Jamey S. Kain, Chris Stokes, and Benjamin L. de Bivort. "Phototactic personality in fruit flies and its suppression by serotonin and *white*." PNAS Online November 13, 2012. doi: 10.1073/pnas.1211988109

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