

FUNCTIONAL DATA ANALYSIS IN EVOLUTIONARY BIOLOGY

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What is the effect of selection on correlated traits? A biologist has bred mice selectively, choosing mice that have high wheel- running activity at age 7 weeks. He has also bred a control line of mice. How do these two groups of mice compare on various characteristics like wheel-running activity, body mass, growth rate?

Consider body mass. Each mouse's body mass is recorded weekly for a period of 80 weeks, and can thus be considered as a function. Growth rate is the derivative. How can we decide the amount of smoothing for estimating these functions and derivatives? Existing techniques allow us to decide this independently, mouse by mouse. But when curves are fairly similar, as the body mass and growth curves are, the mouse by mouse technique doesn't use all available information.

I will discuss ways to choose the amount of smoothing for groups of functions - for estimating the functions and their derivatives. I will apply this to the body mass and growth rates of the mice, and will test that the two groups are the same.