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# Ecological Experiments that Inform Evolution: A Typology

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## Abstract

Session: Ecology and evolution: How Ecology Matters (Ophelie Ronce, Roberta Millstein, Michael Doebeli, and Alirio Rosales)

In Chapter One of Jared Diamond and Ted Case's classic *Community Ecology*, Diamond provides a typology of three types of experimental methods: laboratory experiments (or LEs – these are perturbations produced by the experimenter in the laboratory), field experiments (or FEs – these are perturbations produced by the experimenter in the field), and natural experiments (or NEs – these are natural perturbations occurring in the field). In identifying the strengths and weaknesses of each kind, Diamond claims that "the NEs' expanded spatial and temporal scales open up for study a whole range of problems (including evolutionary ones) that are inaccessible to FEs and LEs" (1986, 14); he also states that "FEs are blind to whole classes of phenomena" such as "genetic changes (evolutionary responses)" that are detectable by NEs (1986, 10). But is it really the case that laboratory experiments and field experiments are uninformative for evolutionary questions? Furthermore, are there other experimental methods whereby ecology can inform evolution? For example, social scientists describe a method called causal process tracing (Brady and Collier 2010); is this a fourth method or a combination of the other three methods? Or is it not an experimental method at all? The answers to these questions will be explored through brief case studies illustrating the different types.

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