

Interaction Analysis

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Abstract

This workshop will provide a relatively broad introduction to the topic of interaction between exposures. We discuss interaction on both additive and multiplicative scales using risks, and we discuss their relation to statistical models (e.g. linear, log-linear and logistic models). We discuss and evaluate arguments that have been made for using additive or multiplicative scales to assess interaction. We describe inferential procedures for interaction when logistic models are fit to data but when additive and not just multiplicative measures of interaction are desired. We discuss issues of confounding for interaction analyses and how whether control has been made for only one or both of two exposures affects whether interaction estimates can be interpreted as causal interaction between the two exposures or only as effect heterogeneity. We further discuss conditions under which interaction gives evidence of synergism within the sufficient cause framework, when interaction is robust to unmeasured confounding, interaction for time-to-event outcomes, case-only estimators of interaction, and power and sample size calculations for additive and multiplicative interaction. Illustrations will be given from environmental, genetic, and infectious disease epidemiology. Software code will be provided.

Tyler VanderWeele is Professor of Epidemiology in the Departments of Epidemiology and Biostatistics at the Harvard School of Public Health. His research focuses on methods for drawing causal inferences from observational data with a specific focus on methods for mediation, interaction, and spillover effects. His empirical work is in the areas of perinatal, genetic, social, and psychiatric epidemiology; various fields within the social sciences; and the study of religion and health.