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Causation and Lurking Variables: Introduction

Learning Objective: Recognize the distinction between association and causation, and identify potential lurking variables for explaining an observed relationship.

Introduction

So far we have discussed different ways in which data can be used to explore the relationship (or association) between two variables. To frame our discussion we followed the role-type classification table:

		Response	
		Categorical	Quantitative
Explanatory	Categorical	✓C→C	✓C→Q
	Quatitative	✗**Q→C**	✓Q→Q

and we have now completed learning how to explore the relationship in cases C→Q, C→C, and Q→Q. (As noted before, case Q→C will not be discussed in this course.) When we explore the relationship between two variables, there is often a temptation to conclude from the observed relationship that changes in the explanatory variable **cause** changes in the response variable. In other words, you might be tempted to interpret the observed association as causation. The purpose of this part of the course is to convince you that this kind of interpretation is often *wrong!* The motto of this section is one of the most fundamental principles of this course:

Principle

Association **does not** imply causation!