

# Demonstrating Causation in Mixed Methods Research

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# Abstract

- This webinar deals with how mixed methods research can provide credible evidence for causal conclusions. Unfortunately, the topic of causation is a problematic one for researchers. The philosophical literature on causation is vast and complex, and most of it isn't of much use to researchers in the social sciences.

## Abstract (continued)

- In addition, many quantitative researchers are convinced that only quantitative (particularly experimental) methods can adequately address causation, while many qualitative researchers reject the concept of causation entirely, seeing it as a positivist concept that is incompatible with an interpretive or constructivist approach.

## Abstract (continued)

- My purpose in this course is to challenge both of these views. I highlight those issues that *are* critical for, and of real use to, both qualitative and quantitative researchers, and show how these issues can inform and improve our ability to make and justify causal claims in our research.

Recent attempts to clarify the philosophy of causation for researchers:

- R. Burke Johnson, Federica Russo, & Judith Schoonenboom, Causation in mixed methods research: The meeting of philosophy, science, and practice. *Journal of Mixed Methods Research*, 2017.
- Phyllis Illari & Federica Russo, *Causality: Philosophical Theory Meets Scientific Practice*. Oxford University Press, 2014.
- Nancy Cartwright, *Hunting Causes and Using Them*. Cambridge University Press, 2007.

- "Causal concepts are like tiles that, put next to one another, and in the right way, will let an image emerge. And the image will be a sophisticated causal theory. So, the question is how to arrange the tiles, in order to create a recognizable and useful image for each research study."
- Johnson, Illari, & Schoonenboom, 2017.

- "oftentimes, the more viewpoints are appropriately combined and cumulatively met, the greater the evidence of causation" and "the more philosophical truthmakers are thoughtfully, logically, and systematically combined (vis-a-vis the particular research question and context) and are satisfied, the stronger the evidence of causation."
- Johnson, Illari, & Schoonenboom, 2017.

## Two main *types* of theories of causation:

- Regularity theories (Illari and Russo call these “difference-making” theories). These focus on the view that causes make a regular, predictable difference in the things they affect.
- Process or mechanism theories (Illari and Russo call these “production accounts”). These focus on understanding *how* causes achieve their effects.



# Variance theory and process theory

- Variance theory
- the world is seen in terms of variables and the relationships among variables
- causality is seen as a consistent relationship between independent and dependent variables
- Process theory
- the world is seen in terms of entities and events and the processes that connect these
- causality is seen as a coherent process by which some entities and events influence others

- “Evidence of difference-making and of production (in this chapter, often of mechanisms) are complementary because each addresses the primary weakness of the other.”
  - Illari and Russo, 2014, p. 58

“the unique strength of experimentation is in describing the consequences attributable to deliberately varying a treatment. We call this **causal description**. In contrast, experiments do less well in clarifying the mechanisms through which and the conditions under which that causal relationship holds—what we call **causal explanation**.”

(Shadish et al., *Experimental and Quasi-experimental Designs for Generalized Causal Inference* (2002), p. 9; emphasis in original)

Current approaches to causation “are not alternative, incompatible views about causation; they are rather views that fit different kinds of causal systems . . . there is no single interesting characterizing feature of causation; hence no off-the-shelf or one-size-fits-all method for finding out about it, no ‘gold standard’ for judging causal relations”

Nancy Cartwright, *Hunting Causes and Using Them* (2007, p. 2).

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Mohr argued that “the variance-theory model of explanation in social science has a close affinity to statistics. The archetypal rendering of this idea of causality is the linear or nonlinear regression model” (1982, p. 42), and that this conception of causality is “the basis of ordinary quantitative research and of the stricture that we need comparison in order to establish causality” (1996, p. 99).

# Hume's account of causation: a regularity theory

- We can't directly perceive causal relationships, thus we can have no knowledge of causality beyond the observed regularities in associations of events.

Recent versions of positivism have typically held “that there is a unity of method between the natural and the social sciences; the notion that the social sciences ought to search for eternal, lawlike generalizations; . . . a rejection of explanations which refer to subjective states of individuals such as motives or purposes; [and] a predilection toward quantification.”

Baert, P. (1998). *Social theory in the twentieth century*, p. 140.



“I suppose the greatest defect [of logical positivism] is that nearly all of it was false.”

A.J. Ayer, 1978. Accessed at <https://www.basicincome.com/bp/ratherlike.htm> (this links to a video of the television interview in which Ayer said this).

“Despite repeated attempts . . . to drive a stake through the heart of the vampire, the [social science] disciplines continue to experience a positivistic haunting.”

George Steinmetz, *The Politics of Method in the Human Sciences*, 2005.

“Many people on both sides [of the "science wars"] seem so to have internalized the [18th century] Enlightenment view of science that, for them, to challenge aspects of that view is to challenge science itself, and, conversely, to defend science is to defend it in its Enlightenment form.”

Giere, 1999, p. 5.

“To establish a causal link, you must conduct an *experiment*. . . Of the three research paradigms we discuss [descriptive, relational, and experimental], only experimental inquiries allow you to determine whether a treatment *causes* an outcome to change.”

Light, Singer, & Willett, *By Design: Planning Research on Higher Education* (1990)

“The examination of causal questions requires experimental designs using random assignment or quasi-experimental or other designs that substantially reduce plausible competing explanations for the obtained results. These include, but are not limited to, longitudinal designs, case control methods, statistical matching, or time series analyses.”

AERA Definition of science-based research,  
developed by an expert working group & endorsed  
by the AERA Council, July 11, 2008

## Reactions of qualitative researchers

- 1. Don't make causal claims.
- 2. “There exist multiple, socially constructed realities ungoverned by natural laws, causal or otherwise.” -- Guba & Lincoln, *Fourth Generation Evaluation* (1989)
- 3. Qualitative research *can* make causal claims, but using a different logic than quantitative research.

“We infer that the Panel’s commitment to review only experimental studies is based on the assumption that no other methodology can contribute to the establishment of causal claims about the effectiveness of instructional interventions. We follow Maxwell (2004) in arguing that this assumption is unwarranted.”

Cobb and Jackson, *The Consequences of Experimentalism in Formulating Recommendations for Policy and Practice in Mathematics Education* (2008)

# Strengths of Quantitative Methods

- Precisely measure values of variables for individuals/units (descriptive statistics).
- Relate values of one variable to those of another for an individual/unit, and control for “extraneous” variables to determine the relationships among the variables of interest (correlational statistics and group differences).
- Manipulate one variable, measure effect on other variables (experimental designs)
- Discern patterns that are not apparent to participants, or identifiable from simple inspection of the data.
- Make inferences from a sample to a population.



## A realist concept of causality

- Causation consists not of regularities, but of real (and in principle observable) causal mechanisms and processes, which may or may not produce regularities.
  - Andrew Sayer, *Method in Social Science: A Realist Approach* (2nd ed., 1992)

“Qualitative analysis, with its close-up look, can identify *mechanisms*, going beyond sheer association. It is unrelentingly *local*, and deals well with the *complex* network of events and processes in a situation. It can sort out the *temporal* dimension, showing clearly what preceded what, either through direct observation or *retrospection*.”

M. B. Miles & A. M. Huberman, *Qualitative data analysis: An expanded sourcebook* (1994, p. 147).

# Causal perception

- Infants can distinguish motion consistent with physical force from movement that is very similar but physically anomalous.
- Children can distinguish movement of a person that is consistent with their intention from movement that isn't.

## Two types of causal perception

- Natural (strong) perception
- At least some types seem to be innate.
- Perceived in a single event.
- Associative (weak) perception
- Learned.
- Depends on perception of regularities; requires many repetitions.

“On a daily basis, most of us probably behave as garden-variety empirical realists—that is, we act as if the objects in the world (things, events, structures, people, meanings, etc.) exist as independent in some way from our experience with them. We also regard society, institutions, feelings, intelligence, poverty, disability, and so on as being just as real as the toes on our feet and the sun in the sky.”

Thomas Schwandt, *The SAGE Dictionary of Qualitative Research*, 4<sup>th</sup> ed. (2015, p. 264).

# Strengths of Qualitative Methods

1. Understand participants' meanings and perspectives (interpretation).

“What people think, believe, and feel affects how they behave. The natural and extrinsic effects of their actions, in turn, partly determine their thought patterns and affective reactions.”

Albert Bandura, *Social Foundations of Thought and Action: A Social Cognitive Theory* (1986), p. 25.

“People's motives or reasons for undertaking certain behaviors could not form part of general laws governing those behaviors, but . . . those same motives or reasons could, in the individual case, cause the behaviors to be carried out”

L. B. Mohr, *The causes of human behavior: Implications for theory and method in the social sciences* (1996, p. vi).



# Strengths of Qualitative Methods

1. Understand participants' meanings and perspectives (interpretation).
2. Understand the context within which participants act, and its influence on them.

“You are told: use policies that work. And you are told: RCTs—randomized controlled trials—will show you what these are. That’s not so. RCTs are great, but they will not do that for you. They cannot alone support the expectation that a policy will work for you. . . For that, you will need to know a lot more. That’s what this book is about.”

Nancy Cartwright and Jeremy Hardie, *Evidence-based Policy: A Practical Guide to Doing it Better*. Oxford University Press, 2012.

“For us, the key question is how good a job this advice does in getting you from ‘it worked there’ to ‘it will work here.’ The answer: you are lucky if it gets you anywhere.”

Cartwright & Hardie, 2012, p. 46.

“without competence at the qualitative level, one's computer printout is misleading or meaningless. We failed in our thinking about programme evaluation to emphasize the need for a qualitative context that could be depended on . . . The lack of this knowledge . . . makes us incompetent estimators of programme impacts, turning out conclusions that are not only wrong, but often wrong in socially destructive ways.”

(Donald Campbell, 1984, p. 36, quoted by Pawson, 2006, p. 50)

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3. Understand the processes by which events and actions take place.
4. Identify unanticipated events and conditions that influence the situations and issues studied.

# Validity

"in general it must be recognized that there are *no* procedures that will regularly (or always) yield either sound data or true conclusions" (Phillips, 1987, p. 21).

# Validity

"Validity is a property of inferences. It is *not* a property of designs or methods, for the same designs may contribute to more or less valid inferences under different circumstances. . . . No method guarantees the validity of an inference" (Shadish, Cook, & Campbell, 2002, p. 34; italics in original).



## Recommended reading

- Maxwell, J. A. (2004). Causal explanation, qualitative research, and scientific inquiry in education. *Educational Researcher* 33(2), 3-11.
- Maxwell, J. A. (2012) The importance of qualitative research for causal explanation in education. *Qualitative Inquiry* 18(8), pp. 649-655.
- Moss, P. and Haertel, E. (2016). Engaging Methodological Pluralism. In *Handbook of Research on Teaching*, 5<sup>th</sup> ed.

## Recommended reading

- Weisner, T. S. (Ed.) (2005). *Discovering successful pathways in children's development: Mixed methods in the study of childhood and family life*. Chicago, IL: University of Chicago Press.
- Hay, M. C. (Ed.) (2016). *Methods that matter: Integrating mixed methods for more effective social science research*. Chicago, IL: University of Chicago Press.

## Recommended reading

- Maxwell, JA (2017). The validity and reliability of research: A realist perspective. Pp. 116-140 in D. Wyse, N. Selwyn, E. Smith, and L. E. Suter (Eds.), *The BERA/SAGE Handbook of Educational Research*. London: SAGE Publications.

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- Cartwright, N. and Hardie, J. (2012). *Evidence-based Policy: A Practical Guide to Doing it Better*. Oxford University Press.
- Illari, P. & Russo, F. (2014). *Causality: Philosophical Theory Meets Scientific Practice*. Oxford University Press,.
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“Social science has been singularly unsuccessful in discovering law-like regularities. One of the main achievements of recent realist philosophy has been to show that this is an inevitable consequence of an erroneous view of causation. Realism replaces the regularity model with one in which objects and social relations have causal powers which may or may not produce regularities, and which can be explained independently of them.”

“In view of this, less weight is put on quantitative methods for discovering and assessing regularities and more on methods of establishing the qualitative nature of social objects and relations on which causal mechanisms depend”

*Andrew Sayer, Method in social science: A realist approach, 2<sup>nd</sup> ed., 1992 ( pp. 2–3).*