European Journal of Training and Development

Opening the black box and searching for smoking guns: Process causality in qualitative research

Elisabeth E. Bennett Rochell R. McWhorter

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Elisabeth E. Bennett
Northeastern University, Boston, Massachusetts, USA, and
Rochell R. McWhorter
The University of Texas at Tyler, Tyler, Texas, USA

Received 4 July 2015
Revised 25 June 2016
Accepted 28 June 2016

Abstract

Purpose – The purpose of this paper is to explore the role of qualitative research in causality, with particular emphasis on process causality. In one paper, it is not possible to discuss all the issues of causality, but the aim is to provide useful ways of thinking about causality and qualitative research. Specifically, a brief overview of the regularity theory of causation is provided, qualitative research characteristics and ontological and epistemological views that serve as a potential conceptual frame to resolve some tensions between quantitative and qualitative work are discussed and causal processes are explored. This paper offers a definition and a model of process causality and then presents findings from an exploratory study that advanced the discussion beyond the conceptual frame.

Design/methodology/approach – This paper first conceptually frames process causality within qualitative research and then discusses results from an exploratory study that involved reviewing literature and interviewing expert researchers. The exploratory study conducted involved analyzing multiple years of literature in two top human resource development (HRD) journals and also exploratory expert interviews. The study was guided by the research question: How might qualitative research inform causal inferences in HRD? This study used a basic qualitative approach that sought insight through inductive analysis within the focus of this study.

Findings – The exploratory study found that triangulation, context, thick description and process research questions are important elements of qualitative studies that can improve research that involves causal relationships. Specifically, qualitative studies provide both depth of data collection and descriptive write-up that provide clues to cause-and-effect relationships that support or refute theory.

Research limitations/implications – A major conclusion of this study is that qualitative research plays a critical role in causal inference, albeit an understated one, when one takes an enlarged philosophical view of causality. Equating causality solely with variance theory associated with quantitative research leaves causal processes locked in a metaphoric black box between cause and effect, whereas qualitative research opens up the processes and mechanisms contained within the box.

Originality/value – This paper reframed the discussion about causality to include both the logic of quantitative studies and qualitative studies to demonstrate a more holistic view of causality and to demonstrate the value of qualitative research for causal inference. Process causality in qualitative research is added to the mix of techniques and theories found in the larger discussion of causality in HRD.

Keywords Mixed methods, HRD, Qualitative research, Causal inference, Process causality, Realism

Paper type Research paper

The authors would like to acknowledge the help of Dr Joseph A. Maxwell in answering questions about his work and Dr Susan A. Lynham for examining an earlier version of this paper.

European Journal of Training and Development
Vol. 40 No. 8/9, 2016
pp. 691-718

2046-9012
DOI 10.1108/EJTD-07-2015-0049

Juliet

What's in a name? That which we call a rose.

By any other name would smell as sweet.

[Romeo and Juliet (II, ii, 1-2)].

Shakespeare's famous line from *Romeo and Juliet* speaks of the idea that there are inherent features or properties to our concrete world that have an enduring quality, no matter the label one imposes on it. In this case, a rose could be named a skunk flower and yet many would recognize its beautiful and identifiable scent. Humans, however, also have a great capacity for transforming experiences of the world into abstract knowledge (Kolb, 1984) that can vary widely from person to person. The scent of a rose can evoke emotions that remind one of the joy of an anniversary, grief about the loss of a parent who tended to a rose garden or anger at a company's "Good Luck" bouquet given after an employee is laid off. As such, concrete reality intertwines with human experience and what Weick (2001) called sense-making. Our stories are a type of poetry creating, revealing and altering what we know, how humans act in the world and how events unfold over time. A discussion about causality in human resource development (HRD) would be incomplete without exploring the human capacity for meaning-making and experiencing the world, which qualitative research aims to understand. The field of HRD is intrinsically tied to understanding human motivations, local interventions, how techniques work to create positive change and the like, which means we cannot always inhabit the land of statistical generalizability when we aim to transform practice. Context matters.

The title of this article alludes to another famous writer, Sir Arthur Conan Doyle, creator of arguably the world's greatest fiction detective, Sherlock Holmes. Anyone who has encountered Sherlock Holmes in some form or fashion is likely to know about his superhuman observational capacity and perspicacity for deducing through logic. Behind the scenes, it is not hard to imagine that he also was a master of inductive logic, or the ability to create theories from the particulars of a case (Bendassolli, 2013) that might solve future cases. In any investigation, we often know the "what" of the case – although we recognize that there may be a greater "what" found through the process of research – but the "whodunit", "howdunnit" and "whydunnit" may be illusive. We may search not only for the obvious smoking gun where we can see cause and effect in action, similar to catching a criminal with the murder weapon in hand as in the Sherlock Holmes story, *The Gloria Scott* (Doyle, 2007), to help us understand who, how and why a phenomenon occurs, but we look for deeper understanding that identifies causal processes and interrelationships within a phenomenon. We may find multiple smoking guns that are clues that lead us to causal explanations and causal inference (Collier, 2011; Goertz and Mahoney, 2012).

Analyzing causal evidence is how a police officer determines who was at fault for a car wreck. Witnesses may tell the opposite or narrate incomplete stories that have to be weighed against physical evidence, such as measuring tire tracks, assessing angle of impact and calculating probable speeds. More subjective evidence might be the condition of the drivers; one may seem inebriated and the other in control of his or her faculties. The investigation is larger than any one person's perspective to arrive at an explanation of what happened that is sufficiently detailed to convince others of its veracity, and it is done in light of accountability to a wider community that needs to have

causes of accidents solved and to reduce chances of recurrence. As with any study, points of evidence and interpretation can be challenged, but we move forward with the notion of a preponderance of the evidence (Woody and Greene, 2012) that gives us more or less confidence in the work HRD does to improve organizations and people. Many researchers want to understand why and how things occur and so operationalize some type of causal theory, which can be thought of as "series of related cause-and-effect propositions that explain the mechanisms through which something affects something else" (Woodwell, 2013, p. 11).

The issue of causality has been discussed in other fields of education that call researchers to reframe understandings of causality (Anderson and Scott, 2012; Collier, 2011; Donmoyer, 2012; Goertz and Mahoney, 2012; Maxwell, 2012a), and it is an important discussion for HRD to address given that our commitment is toward not only developing and testing theory but also toward improving the local and particular practice of HRD. Those who make decisions in organizations and set policy are asking "what works?" questions (Donmoyer, 2012), and these questions often involve evaluating the cause and effect, even if with imperfect understandings. We act with the belief that an action has the ability to effect outcomes. Qualitative research has an important role to play in the local and particular practice of HRD that is beyond simply supporting quantitative causal designs.

The purpose of this article is to explore the role of qualitative research in causality, with particular emphasis on process causality. In one article, it is not possible to discuss all the issues of causality, but we aim to provide useful ways to think about causality and qualitative research. Specifically, we provide a brief overview of regularity theory of causation; discuss qualitative research characteristics and ontological and epistemological views that serve as a potential conceptual frame to resolve some tensions between quantitative and qualitative work; and explore causal processes. We offer a definition and model of process causality and then present findings from an exploratory study that advanced the discussion beyond the conceptual frame.

Causality and looking beyond regularity theory

A first step in the discussion is a brief look at the most salient background issues to causality. *Causal inference* has been defined as "a conclusion that when one thing happens, another specific thing will follow" (Zikmund *et al.*, 2013, p. 55) and, alternatively, "the method of logical reasoning that seeks to use all available facts to arrive at a conclusion about the relationship of particular causes to their effects" (Oxford Reference, 2015, para. 1). These definitions identify the importance of logic in determining cause and effect through knowledge of the relevant facts and relationships.

The literature on causality is controversial (Baumgartner, 2008), and the discussion often relates back to the work of David Hume in the eighteenth century, and from him came the regularity theories of causation, much of which arose from reflections on physical properties in the world. His view of causality begins with the empirical, arguing that understanding causal relationships was beyond a purely deductive approach but rather based on experience (Tacq, 2011). A Humean premise of regularity theory is that an effect invariably follows the cause, and so cause and effect are determined not from one instance of observation, but from many instances that confirm the relationship (Hume, 1786; Hitchcock, 2012). In this view, the invariable pattern of cause and effect is called *constant conjunction* where the cause occurs chronologically

before the effect and inference is based on repeated observations (Hume, 1786; Tacq, 2011). The main idea here is that repeated observations (experience) of cause and then effect create causal inference and demonstrate regularity; however, humans make-meaning from even one instance. For example, a person touching a hot stove does not need to repeatedly experiment to infer cause as a functional matter. Thus, philosophical and functional facets of causality may diverge in practice.

Regularity theory of causation reflects the pre-theoretic intuitions of causal relations in existential logic (Baumgartner, 2008), and it involves the principle of asymmetry. Asymmetry assumes that causation has directionality or "it does not follow from 'x caused y' that 'y caused x', for there is a fundamental distinction between 'cause' and 'effect'" (Dowe, 1992, p. 179). There are, however, problems with regularity theory of causation. The researcher's point of observation will affect how causal relations are theorized, and working with causality is a process of encirclement (Tacq, 2011) rather than solely through direct observation.

One significant problem with regularity theory is imperfect regularities or effects that do not always follow a cause (Hitchcock, 2012). Hitchcock (2012) suggested that a heterogeneity of circumstances can affect causality. He uses the example of smoking and lung cancer. Smoking is a cause of lung cancer, but the effect is not immediate (one cigarette does not cause instant cancer) and not all smokers develop lung cancer, due possibly to genetic predispositions. Smokers and non-smokers alike may be exposed to other carcinogens that cause lung cancer. He also identified problems with irrelevance – that is, an event that is always followed by an outcome may still be irrelevant to causing that outcome. With regard to asymmetry, regularity theory does not provide directionality of causation. Similarly, there may be spurious regularities, such as a drop in mercury on a barometer, which observed first, may be thought to cause a storm, which is observed afterward. Additionally, effects are not always discrete and finished. In the flow of human history, causes may continue to reach forward in time with many different effects.

Given problems with regularity theory, probabilistic theories of causation center upon the idea that causes alter the probability of an effect while still allowing that an effect may occur without the cause or they may fail to manifest altogether (Hitchcock, 2012). Basic logic statements of probabilistic causation include:

- the probability of x cause must be greater than zero;
- x cause occurs prior to y effect;
- a statistically relationship exists between x cause and y effect; and
- the statistical relationship is not spurious and it remains when controlling for confounding factors (Tacq, 2011, p. 267) and control of spuriousness depends upon the theoretical relationship between variables or causal modeling (Hitchcock, 2012).

The "gold standard" of research has been experimental design (Anderson and Scott, 2012; Antonakis *et al.*, 2010; Donmoyer, 2012; Eisenhart, 2005; Goertz and Mahoney, 2012) because it capitalizes on manipulable causes (Shadish, 2010). Experimental design never proves causality in an absolute sense, but rather provides degrees of confidence through statistical methods that assess probabilities of relationships and prevailing explanations (Bryman and Bell, 2011). Certainly, experimental studies are critical for

clinical trials where lives are at stake, but they are expensive, time-consuming (Gortler, 2015) and possibly unethical if one provides participants – including learners in a course – unequal standards of training or care. There are also logical problems with applying cause and effect in the natural world too closely to social phenomena. For example, two people could react very different to the same event.

Finding plausible alternatives is important for experimental research when developing models of assumptions and reducing threats to internal validity (Maxwell, 2013; Russ-Eft and Hoover, 2005; Shadish, 2010), and one way to handle this threat is to intentionally collect data on competing causal claims, which may falsify hypotheses (Popper, 1959; Shadish, 2010). Shadish (2010) recognized that Hume's theory of causation created *counterfactuals* – that is, logic statements that reflect if a cause did not occur then a given effect would not be manifest or other effects may be present in the absence of the given causal hypothesis – and he confirmed that the boundary between various types of validity is artificial, including the aforementioned internal validity, as well as external validity, which is the concept of whether a cause-and-effect relationship can be generalized elsewhere, and construct validity of inferences between the study design and the theoretical constructs that the study was meant to measure. In this view, the study design holds primacy over analysis when addressing threats to validity. Counterfactuals may be groups of people in a study, such as the control group (randomized design) or comparison group (non-randomized design) (Cook *et al.*, 2008).

Causation can be singular causation or general causation (Baumgartner, 2008; Hitchcock, 2012). Baumgartner (2008) provided examples of the two; general causation is found in the statement that alcohol causes drunkenness, whereas singular causation is found in the statement that drinking alcohol in the afternoon caused a person to become drunk that particular day. Researchers and practitioners are interested in both types of causation, as the establishment of general laws is important, but so also is deconstructing a given event, as in our murder mystery example. Laws in the physical sciences take on a different shine than the attempt to produce laws where people are concerned in the social sciences, due in part to the complexity of human behavior and changing historical contexts. It follows that there is a limit to regularity theory and probabilistic causation with particular regard to singular causation because repeated observations may not be possible.

According to Dowe (1992), new theories of causality seek to learn the properties a process might possess to produce effects. Examining a context for causal processes is a way to open the black box of causality that quantitative studies may leave closed where they rely on statistical analyses and the law of large numbers (Maxwell, 2012b). In many ways, humans are creating new processes that can produce new and previously unrecognized effects. Tacq (2011) indicated that the tendency has been to equate causality to a particular design; yet, he discussed how the distinctions between qualitative and quantitative research are less than the world imagines because they both use experimental logic, particularly with the use of counterfactuals. He pointed to a single case study in which the characteristics found in the case are compared with something, including, if necessary, the world that can be characterized as a second group of all other cases minus the one studied or more points of comparison if multiple case study is used; the comparison of which may lead to causal inferences through experimental logic. In other words, alternatives to the experiment will always be needed

to address causality in its larger sense (Cook *et al.*, 2008). Next, we look more closely at qualitative research and causality.

Conceptually framing causality in qualitative research

Causality has been hotly debated in a number of articles (Allwood, 2012; Anderson and Scott, 2012; Donmoyer, 2012; Glaser and Laudel, 2013; Maxwell, 2004a, 2004b, 2009, 2012a). Prior to a quantitative study, there is qualitative or inductive legwork that is done to theorize relationships, define constructs and select variables of interest. This is evident in the field of HRD, for example, in Lynham's (2002) application of Dubin's (1976, 1978) quantitative approach to theory-building; selection of variables occurs early, and Lynham (2002) confirmed that induction must occur somewhere in the process. However, the publication space in the research journals significantly limits the account of background work to develop theoretical models or the process of encircling causality.

Where qualitative research emphasizes induction, new theory-building and discovery of phenomena represented as constructs or processes can inform quantitative causal studies. Qualitative methods can be used to investigate further the how and why questions following statistical testing or they may forge new understandings from which quantitative studies may flow. Many scholars in HRD implicitly or explicitly address cause and effect, whether the effect is learning as result of training, change as a result of interventions or the reproduction of and resistance to oppressive organizational structures (Bierema, 2011). Cause-and-effect relationships may be described through the logic of problematization and the research questions researchers ask, as well as discovered within the data.

Organizations are complex places of practice and so isolating variables for cause-and-effect analysis can be very difficult without deeper investigation. Even a singular case can guide decisions in practice when HRD professionals compare findings with their own local environments. This section provides a closer examination of causality in qualitative research, with a particular focus on process causality.

Qualitative research

Qualitative research has been described as "an inductive process by which the researcher allows data interpretations to evolve and reveal patterns before, during, and after the data collection process" (Hanley-Maxwell *et al.*, 2007, p. 100). Although significant amounts of qualitative research tend to be inductive, deductive logic is also important for confirming findings and developing hypotheses, and so deductive and inductive logic are both important (Merriam, 2009; Ruona, 2005). Qualitative work that underpins quantitative studies is likely to be more deductive leading up to the more immediate development of testable hypotheses or the development of propositions. Propositions are knowledge claims in theory-building and they include the "logical deductions or truth statements about the theory in operation" (Lynham and Chermack, 2006, p. 74).

Researchers may apply inductive and deductive logic over the course of a study and across a research agenda. Qualitative and quantitative traditions, although distinct, can work in partnership at the level of logic. For example, grounded theory uses more inductive logic at first and then moves to deductive logic, and concepts and patterns found have to have earned relevance through use of constant comparison and theoretical sampling (Glaser, 1978). Grounded theory analysis may result in categories that include

causal conditions, context, intervening conditions and consequences (Marshall and Rossman, 2016, p. 223), which build contextually based theory. Maxwell and Miller (2008) identified case study, narrative analysis and grounded theory methods as particularly useful for uncovering causal explanations.

Qualitative research tends to be highly contextual, focused on understanding meaning and experiences, resulting in thick description, and may involve multiple data sources to triangulate findings (Lincoln and Guba, 1985; Merriam, 2009). We argue that these very characteristics of qualitative research make it highly suitable for addressing causality in the larger sense discussed in the preceding section. For example, qualitative studies are typically considered stronger if they include triangulation of perspectives and data sources regarding the central phenomenon of interest (Merriam, 2009; Patton, 2002; Ruona, 2005), which Madill *et al.* (2000) called realist triangulation that helps assess trust in the analysis. Confidence in a finding or interpretation from an interview is strengthened if it is also observed in practice because the evidence is stronger than one person's opinion or perspective. Additionally, phenomena may be at a group or shared level, requiring a collective unit of analysis.

Qualitative researchers check interpretations by looking for negative or discrepant cases (Patton, 2002) or alternative explanations (Merriam, 2009), which shows that qualitative research is interested in plausibility of findings. One of the ways researchers gauge the credibility of qualitative interpretation is by addressing "the congruence of findings and reality, and the wholeness of the depiction" (Ruona, 2005, p. 247). Quality checks may provide implicit acceptance of some level of external reality even as researchers focus on variation of perspectives inherent when human meaning is studied. In fact, adopting the language of logic in problematizing a study and writing up a thick description of findings implicitly uses the syntax of cause-and-effect logic (Goertz and Mahoney, 2012), especially when we discuss how one thing shapes, influences or impacts another (Maxwell, 2012a).

Some research questions may deliver findings that hint of causality within the data – think of answers to what or why questions – although the cause-and-effect analysis may not be the intent of the study, and thus causal processes remain underexplored. Other research questions are process questions that explicitly attempt to answer relationship questions (Maxwell and Miller, 2008; Maxwell, 2012b). For example, a question that asks how X impacts Y seeks to reveal patterns of influence and potentially refined causal mechanisms and observations. Inductive studies, however, can report findings in such a way so as to fragment causality into discrete categories rather than tracing causal explanations and relationships through a case narrative (Maxwell, 2012b).

Categorization in qualitative research – or the development of themes – typically relies on delineating similarities and differences, whereas analyzing data for contiguity can be used to find causal processes by using *connecting strategies* (Maxwell and Miller, 2008), such as Miles and Huberman's (1994) use of networks and, to a lesser extent, matrices. These can also appear as mind maps or schematics. Establishing motivations, temporal sequences, chronological flow and mapping actions are important contiguity components for causality, which makes narrative and context critical. Contiguity expresses actual relationships in the data, whereas similarity expresses virtual relationships (Maxwell, 2012b; Maxwell and Miller, 2008). Given the aforementioned notions of reality in qualitative methods with regard to

causality, we look next at philosophical views that may help resolve tensions between quantitative and qualitative traditions.

Ontological and epistemological considerations

Behind the discussion of causality is a conversation about philosophies of research that has both epistemological and ontological aspects. Lincoln (2005), whom Maxwell (2012b) considered a radical constructivist, started the discussion of qualitative research in organizations along the lines of epistemology when she discussed the importance in qualitative research of how humans create new knowledge. Although she identified causality as an epistemological concern, she acknowledged that research needs a "healthy mix of paradigms" (p. 230) that includes multiple ontologies. Thus, we have a bifurcation of epistemology and ontology that is useful for this discussion on causality (more on this later), and we propose that the epistemological notion of multiple perspectives (Friedman, 2001; Hitchcock and Newman, 2013) and the ontological stance that there are multiple realities (Hanley-Maxwell *et al.*, 2007) are not equivalent philosophical ideas in qualitative research.

Crotty (1998) stated that the contrast of quantitative and qualitative methods is a false dichotomy because the argument lies at the level of epistemology, or how humans come to know. Constructionism and the closely related constructivism are well aligned with qualitative research because they are interested in the construction of meaning or knowledge (Crotty, 1998; Lincoln, 2005; Merriam, 2009; Ponterotto, 2005). Crotty (1998) further compared epistemology and ontology when he pointed out that "existence of a world without a mind is conceivable. Meaning without a mind is not. Realism in ontology and constructionism in epistemology turn out to be quite compatible" (p. 11). Similarly, Miles and Huberman (1994, p. 4) acknowledged a realist stance with regard to qualitative research and causality, while rejecting positivism and its "covering laws".

Even when a researcher takes a specific lens to HRD research, such as critical theory, there may be some level of realist ontology. For example, critical theory indicates that there are real power dynamics and oppressive structures that affect people (McGuire *et al.*, 2001), even if they are unaware of the effect (Pfohl, 1994). In other words, social power has a real effect on people. Working with causation seems to be predicated on scientific realism that neither simultaneously precludes interpretivism (Bennett and Checkel, 2015), an oft-cited philosophical paradigm in qualitative research (Ponterotto, 2005), nor closely relates constructionism/vism. In the discussion thus far, methodological issues in qualitative research and philosophical perspective can jointly support qualitative research's role in addressing causality.

Tenets of realism

There are a number of tenets or fundamental beliefs held by scholars ascribing to realism. One tenet involves the world itself. For instance, researchers hold that there is a real world that exists with which we act and interact (Altheide and Johnson, 1994, 2011; Maxwell, 2013). Further, the real [external] world is only imperfectly and probabilistically comprehensible (Merriam, 1998; Sobh and Perry, 2006; Tsoukas, 1989). Additionally, Guba and Lincoln (1994) connected critical realism with experimental design using an objectivist epistemology and, to a lesser extent, qualitative research; however, as demonstrated previously, realism could be paired with other epistemologies.

Regarding research, realists hold basic beliefs about external reality and knowledge. Similar to Crotty (1998), Healy and Perry (2000) remarked that "reality exists independently of the researcher's mind, that is, there is external reality" that "consists of abstract things" (p. 120). In realism, all knowledge is contextual and partial (Altheide and Johnson, 1994, 2011) and realists believe that other perspectives and schemas are possible (Altheide and Johnson, 2011).

Altheide and Johnson (2011, p. 582) advocated that researchers who work within realism should be mindful that "human social life is meaningful and it is essential to take these meanings into account in our explanations, concepts, and theories". They further noted that realism necessitates an interpretive approach in theoretical work to capture the essence of meaning of cultural members, such as beliefs, emotions and values. They also offered a number of variations on realism they had encountered in their research and will be described next.

Altheide and Johnson (2011) located a number of specific forms of realism in the literature. For instance, *critical realism* combines ontological realism (the belief that there is a real world that exists independently of our perceptions and theories) with epistemological constructivism, or our understanding of the world is our own construction whereby no one construction can claim absolute truth (Bhaskar, 1979; Harre and Madden, 1975; Maxwell, 2013, p. 43; Maxwell, 2012, p. 7). Maxwell (2013) demonstrated how culture, meaning, diversity, and causation are real (Maxwell, 2012b, 2013).

Other variations of realism include *analytical realism* (Altheide and Johnson, 2011); also, *emergent realism* (Henry *et al.*, 1998), *ethnographic realism* (Lofland, 1995); *experimental realism* (Lakoff, 1987); *innocent realism* (Haak, 2003); *natural realism* (Putnam, 1999); and, *subtle realism* (Emerson *et al.*, 1995; Hammersley, 1992). In addition, Altheide and Johnson (2011, p. 582) noted that many realists were embracing validity issues in interpretive research "to create more trustworthy knowledge".

Realism and validity

In the preceding discussion of causality, several validity issues were addressed. Many of the validity concerns in quantitative research are also the concerns for realists. For instance, the concepts of reliability and validity communicate the credibility and trustworthiness of research findings (Roberts *et al.*, 2006). According to Lincoln and Guba (1985), credibility in the qualitative research arena is the counterpart of internal validity in quantitative research. Additionally, they noted that the concept of trustworthiness in the qualitative research tradition included internal and external validity, objectivity and reliability.

Maxwell (In press) noted that validity as a concept is fundamental to all research. He focused primarily on internal validity rather than external validity/generalizability or reliability. Yet, the concept of validity has been highly contested in social research among quantitative and qualitative researchers with no real consensus on what is meant by the term or its appropriateness for all types or research. It is noted that a number of qualitative researchers who do not align with realism (Denzin and Lincoln, 2005; Lincoln and Guba, 1985) rejected more quantitative notions of validity and instead, chose to present alternative concepts such as *credibility*, *trustworthiness* (i.e. use of methods such as prolonged engagement, member checking) and *transferability* to determine the quality of the research. Despite ontological differences, researchers are interested in

producing findings that are significant to the field to guide practice and future research endeavors, which means findings should be usable even if they simply provide a point of comparison with other contexts rather than produce generalizable findings in the statistical sense. Thus, both qualitative and quantitative researchers have relied heavily on approaches and methods to determine the validity/trustworthiness of research.

However, there are a number of researchers who reject procedural criteria as the sole basis for validity (or trustworthiness); rather, it is not about the procedures, but the credibility of the conclusions in the study (Maxwell, In press). Shadish *et al.* (2002) expressed that validity is not a function of design but of inference, and that there is no method that perfectly guarantees the validity of a given inference.

Similarly, Maxwell (2012, p. 132) reported that any evaluation of the validity of a research study's conclusions is not:

> […] simply a matter of determining *whether* specific procedures have been used or how carefully or rigorously they have been applied, but of considering the actual *conclusions* drawn from using these procedures in this particular context.

He, therefore, advocated choosing appropriate methods for the specific study rather than using "generic criteria for definitively assessing validity, no checklist or characteristics or procedures" (p. 132). Instead, validity from the realist perspective focuses on examining the context, the purpose, methods and conclusions, as well as the evidence generated in the qualitative study. Thus, the realist approach to validity is one that:

> […] sees the validity of an account as inherent, not in the procedures used to produce and validate it, but in its relationship to those things that it is intended to be an account of (Maxwell, 2012b, p. 130).

It is noted that various forms of validity have been described by Maxwell (2013). For example, *descriptive validity*– the factual accuracy of the account, *interpretive validity* – what the phenomena under investigation means to the participants or participants' perspective and *theoretical validity* – the "theoretical constructions that the researcher brings to, or develops during, the study" (p. 140) and similar to construct validity mentioned previously, *evaluative validity* – "the application of an evaluative framework to the objects of the study" (p. 143; see also Erickson, 1986) that may be helpful for the researcher to consider. The various forms of validity help to advance the usefulness of causal research and can create potential connection points with the quantitative tradition without nullifying qualitative's special characteristics.

Causal research and making causal inferences in qualitative research

Causal realism is about generative mechanisms, and it is a position oriented toward "possibilities, tendencies, powers and potentialities" (Tacq, 2011, p. 269) that may be realized or go unrecognized by humans. Thus, realism may allow for latent or potential effects, rather than only the observed effect in the Humean perspective. According to Goertz and Mahoney (2012), a useful discussion of quantitative and qualitative research with regard to causality does not have to do with the size of the *N*, but rather foci, which are, respectively, cross-case analysis and within-case analysis. Experimental studies and probabilistic causal inference are built around cross-case analysis. In their view, a researcher is typically not trying to determine *how* a specific treatment works when comparing across many cases, and, in fact, may have little understanding of particular

cases. Within-case analysis, in Goertz and Mahoney's (2012) view, is highly contextual and requires wider knowledge of particular cases where information or observations reveal "smoking guns" that support or refute a given causal theory.

Causality in qualitative research, or within-case analysis, requires process theory rather than variance theory (Anderson and Scott, 2012; Collier, 2011; Maxwell, 2012a, 2012b). Process theory began with the philosophy of David Hume and his notions of cause and effect in the physical world (Dowe, 1992; Salmon, 1994), and it has been more recently applied to causation stemming from human meaning, beliefs and actions (Mohr, 1982; Maxwell, 2012a, 2012b). Our review found that process theory is still emergent with regard to cause and effect in social phenomena. As such, it belongs in the conversation of emergent research methods in HRD (Reio, 2009).

In process theory, outcomes are not conceived as variables that can take on a range of values, but rather as discrete or discontinuous phenomena, which may be called "changes of state" (Markus and Robey, 1988, p. 591). While accepting the complexity of causal relationships, process theory is useful because it maintains the goals of generalizability and prediction (Markus and Robey, 1988). According to Harding and Seefeldt (2014):

> […] qualitative data are typically well suited to understanding *process*, or how events or outcomes unfold step by step over time, and to understanding *interpretation*, or how individuals understand and interpret their own actions, decisions, experiences, and circumstances as well as others (p. 92).

Research questions formulated using process theory are distinct from those using variance theory. Maxwell (2012b, p. 90) provided an example of a process question: "How do second career teachers decide whether to remain in teaching or to leave?". He also advocated for qualitative research's ability to identify causal processes (Maxwell, 2012a, 2012b), whereas Anderson and Scott (2012) use the term process causality, but do not define it. For the purposes of this article, we propose a definition of *process causality* as the mechanisms, interrelationships, contextual evidence and operational components that lead to explanation of effects through use of logic and deeper understanding of the phenomenon of interest.

Qualitative research can move from causal discovery to causal testing with the help of logic. Process tracing is an example of a rigorous approach for qualitatively testing causal linkages, which are already used in technology-related usability studies and political science studies (Rohlfing and Schneider, 2013). Process tracing may help answer the question of how to connect micro, meso and macro causes in social science research that have defied other types of studies (see Anderson and Scott's, 2012, discussion of the difficulty of understanding systemic racism in society when studying student performance in a school). Process tracing uses both induction and deduction (Bennett and Checkel, 2015), although qualitative theory testing is primarily through deductive logic.

Causal process observations (CPOs) are necessary for understanding causality and making causal inferences (Collier, 2011; Goertz and Mahoney, 2012). CPOs are pieces of information about a context and potential mechanisms of cause (Goertz and Mahoney, 2012) that are not unlike clues in a Sherlock Holmes mystery. Collier (2011), in fact, used another Holmes' story to demonstrate process tracing in action. Hypotheses are derived from CPOs, which can be subjected to hoop tests and smoking gun tests to determine if

they can be refuted or supported by the available evidence (Collier, 2011; Goertz and Mahoney, 2012).

Because "hypothesis" is a term often equated to positivistic research and probabilistic techniques, we suggest replacing hypotheses with *causal process statements* to delineate them from general CPOs and quantitatively tested hypotheses. Causal process statements can be derived from CPOs or they could be alternative causal explanations that rival observations. They are similar to the development of propositions in theory-building research. Process tracing uses counterfactuals to ask what might have happened if a given cause was not in play, which Bennett and Checkel (2015) noted is a particular strength of qualitative research with regard to causality. For example, one might ask whether typing pools would have remained a core function of the organization if personal computers (PC) with word-processing features had not been developed, which is counter to the acknowledged fact that PCs initiated the extinction of typing pools and eliminated much of the need for carbon copies. More refined techniques for addressing causality in qualitative research, such as using Maxwell's connecting strategies (Maxwell and Miller, 2008; Maxwell, 2012b) and process tracing demonstrate that the realm of qualitative research contains methods for building theories that can be tested qualitatively and quantitatively, as well as for extending inquiry resulting from a quantitative study in a dance of induction and deduction that we model in the next section.

Putting the ideas together: model of process causality in qualitative research

Qualitative research not only is its own important tradition focused on understanding and meaning, but it also underpins and extends quantitative research by providing theory, concepts, potential relationships and the contextual "stuff" that support the development of testable hypotheses. Inductive studies can provide CPOs from which causal process statements are derived and qualitatively tested using deductive logic. The number and quality of CPOs in a study, we expect, depend upon the intention of the researcher to find them and the research questions asked, but even similarity analysis should offer some insight into plausible alternatives either as part of the background literature or directly linked to a quantitative study. Based on the ideas generated from this section, we provide an initial model of process causality in qualitative research to foster discussion in HRD. The model is not meant to capture all the variations of qualitative research, as these variations are beyond the scope of the article, but to show potential connection points to advance discussion in the field about the role of qualitative research with regard to causality.

At the top of Figure 1, one or more within-case analyses can yield CPOs that provide the background context and interrelationships that illuminate patterns of causality. An inductive study could end there, and be used to critique existing theory and develop new theory or propositions that can be tested later. Here, causality may be conceived of as linear, but more likely as "mutual influence" (Lincoln and Guba, 1985, p. 150). In keeping with constructionism/vism, neither should we assume our understandings of reality or cause-and-effect processes to be perfect or immutable, but rather developed in dialectic between our constructions and the evidence we observe and confirm. From the CPOs, causal process statements are tested in a more deductive process. This step uses logic tests, counterfactuals, alternative explanations or negative cases analyses (Antin *et al.*, 2014; Merriam, 2009; Collier, 2011; Goertz and Mahoney, 2012; Salmon, 1997). A counterfactual may be a potential outcome rather than an observed one (Shadish, 2010),

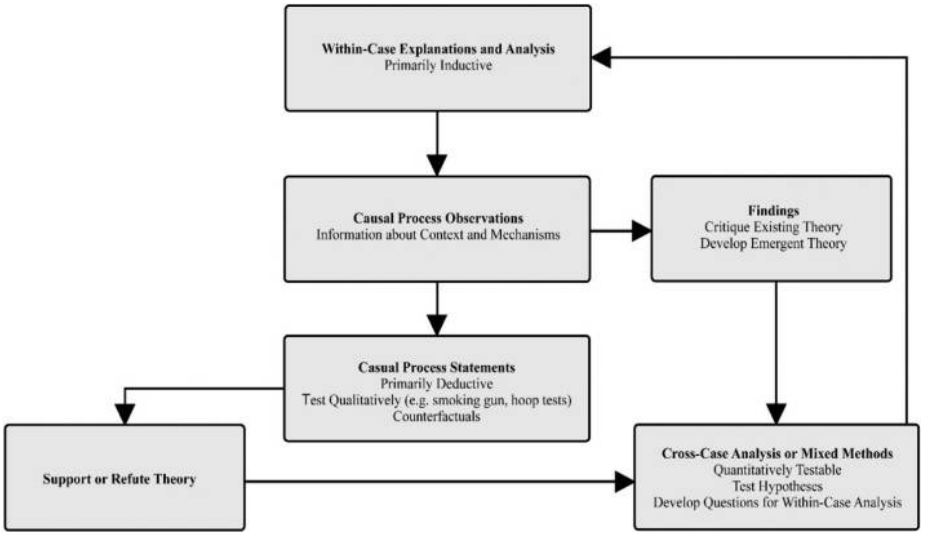

Figure 1.
Model of process causality in qualitative research

and it asks the question of what might happen (or have happened) if a causal condition did not occur. Data are then collected to test the factual versus the counterfactual. The data could be from interviews, observations, archival documents and so on, and it could include both quantitative data, such as expressed frequencies – i.e. 100 per cent of typing pools disappeared with the advent of PCs – as well as qualitative evidence. Figure 1 shows how qualitative studies can dovetail with quantitative or mixed-methods research that continue with within-case and cross-case analyses. Finally, cross-case analysis or mixed-methods can inspire new in-depth within-case analysis when there are unanswered questions that need to be investigated through qualitative methods, such as asking how and why research questions.

What we might see in the body of HRD research are studies that start and stop at various points in Figure 1. For example, many qualitative studies will stop at findings that lead to deep understanding and may discover some causal mechanisms, but do not necessarily lead directly into another study. While it is possible that one study could start at any point in Figure 1 and come back around, it is more common for discrete studies to be done in an additive way. The model has value, although, in showing how discrete studies over time could lead to greater understanding of cause-and-effect relationships in the field. It also can guide research teams who intentionally set out to use qualitative methods for causal research. The model does not assume that philosophical paradigms have to be in full alignment, but we anticipate that a realist stance could facilitate the connections. So far, this article has covered conceptual and philosophical material related to causality in qualitative research, but we also wanted to field test some of these ideas in an exploratory study.

Extending the conceptual framework into an exploratory study

An exploratory study was conducted that involved two sources of data. As an exploratory study, it was not meant to be a full-blown empirical study, but to field test the conceptual ideas we have synthesized. There were two sources of data for the

exploration. One was multiple years of literature in two top HRD journals that publish qualitative studies in HRD – *European Journal of Training and Development* (*EJTD*) and *Human Resource Development Quarterly* (*HRDQ*) – and the other source was narratives derived from interviews with two experts in HRD research. Both data sources serve as a way to provide some initial validation of the conceptual framework presented in this article. The study was guided by the research question:

RQ1. How might qualitative research inform causal inferences in HRD?

This study utilized a basic qualitative approach that sought insight through inductive analysis (Merriam, 2009) within the focus of this study. In addition, the analysis also included deductive analysis to provide summary information, particularly for the documentary information; and, it also involved coding (Merriam and Tisdell, 2016). Each data set will be described next.

Literature selection and document review

Documentary data in the form of peer-reviewed HRD literature were gathered in this study that provided conceptual and theoretical evidence for the topic of the exploration. The researchers examined published peer-reviewed journal articles from two HRD journals, *HRDQ* and *EJTD*, for the period of 2014-2015 and available 2016 literature. These journals were selected for review because they represent premiere places for HRD researchers to publish qualitative studies, but they represented variety for analysis, as *HRDQ* tends to include North American studies and *EJTD* tends to include European studies. They also were expected to have a greater variety of authors and editorial board oversight. Qualitative studies were analyzed in light of the ideas in the conceptual frame.

The total pool of articles in the time period was 108, with 30 qualitative articles that were subjected to methodological review and summarized in an analysis document. The methods for all 30 articles were then examined and analyzed for primary components of the conceptual framework including triangulation, process research questions, high and low context and evidence of connecting strategies. It was established earlier in the paper that qualitative studies tend to analyze data for patterns of similarity and difference, and so we looked specifically for connecting strategies also important for causal inference in qualitative research but likely rare in the published accounts.

Expert interviews

Two experts in HRD research were selected whose length of career and significant experience executing empirical studies indicated a capacity to offer insight into how qualitative research informs causality. The rationale for their purposive selection included consistent work and multiple studies within an established research agenda. Through semi-structured interviews, they provided ideas and examples from their own learning and scholarly activities. It should be noted that there was some hesitation in the discussion with regard to how qualitative methods can inform causality. For example, Expert One stated that some researchers are not sure "if qualitative methods allowed" for causality. This may be due to the prevailing views on causality mentioned earlier: that is, equating causality with variance theory that informs quantitative research methods. Nonetheless, the experts were selected because they were grounded in the experience of using qualitative methods to answer questions and solve real problems in HRD. The analysis was limited due to the small sample size and limited time with each

expert (average length of 40 min each), which is in keeping with an initial conceptual exploration. According to Bogner *et al.* (2009, p. 2) the purposive selection of participants for expert interviews at the onset of a research project allows for collecting "practical insider knowledge" into a topic (see also Littig and Pöchhacker, 2014). As an exploratory tool, data saturation of the expert interviews was not pursued, as the purpose was to gain initial insight into the phenomenon under investigation.

Following the collection of data in the form of semi-structured interviews from the experts, the researchers conducted analysis in a team approach until consensus was reached about the results (Merriam and Tisdell, 2016). It is noted that the conceptual frame offered sensitizing concepts (Blumer, 1954; Bowen, 2006) for the analysis. Because the interviews were done sequentially, with the first informing the second, the results are presented in narrative formative format to preserve the wholeness of the discussion while still demonstrating findings, and then we will look across the two interviews as we compare the narratives with the literature.

Findings

Findings from the literature

A general summation of articles from EJTD and HRDQ is provided in Table I. Because triangulation and context are important for causality, the table identifies the number of articles that used triangulation of multiple data sources (e.g. interviews, observations, documents, etc.). After initial review, the studies were sorted into high- and low-context categories based on the description within each article. High-context studies provided a lot of information in the write-up about the context and included thick description with participant quotes. Low-context studies provided less information on the context and much less robust, thick description. As established earlier in the paper, context and description are important features to uncover process causality. Given the notion of process questions outlined earlier in the paper, the table also provides the number of qualitative studies that asked a process question, typically using the syntax of how X affected Y, and connecting strategies such as the use of Miles and Huberman's (1994) use of networks for analysis and matrices.

Table I demonstrates that of the 30 articles published, a majority used triangulation ($N = 24$). A slight majority were highly contextual ($N = 17$) and asked process questions ($N = 15$). The rest provided much less contextual information ($N = 13$) with no use of

Year	# Triangulation	# Asked process questions	# High context # Low context	# Evidence of connecting strategies
2016* ($N = 4$)	$N = 1$	$N = 3$	$N = 3$ High Context $N = 1$ Low Context	$N = 0$
2015 ($N = 18$)	$N = 16$	$N = 8$	$N = 10$ High Context $N = 8$ Low Context	$N = 0$
2014 ($N = 8$)	$N = 7$	$N = 4$	$N = 4$ High Context $N = 4$ Low Context	$N = 0$
Total 30	24	15	High (17) and Low (13)	0

Note: *2016 includes analysis of one issue of *HRDQ* and two issues of *EJTD* articles available to researchers

Table I. Summary of analysis of research articles from *HRDQ* and *EJTD* (2014-2016*) utilizing a qualitative approach

connecting strategies evident ($N = 0$). These numbers indicate that more authors placed emphasis on common quality techniques, such as triangulation, than on describing the richness of context within which the findings emerged. This may be due to space limitations in the journals, and it is important to be careful of presumption about absence.

Findings from expert interviews

Expert One. When addressing causality, Expert One pointed out early in the interview the benefits of qualitative research that he has seen in his own experience. An example he provided was how triangulation is being used in his current qualitative study. The study involves investigating the role that critical incidents or "day-to-day happenings" played in the development of managers. Triangulation was achieved by collecting multiple sources of data such as on-site observations, managers' diaries of critical incidents and one-on-one interviews with 18 managers in the study. This would be a small *N* for a quantitative study, but provides voluminous rich and varied data for an in-depth look at the phenomenon. The expert noted that when quantitative data are "deep and rich", it "illuminates […] it describes" the phenomenon. The expert then identified how looking across data sources was useful because "it showed potentially that there could be relationships between these ideas" or patterns.

Expert One analyzed the data using a "how" question and "what" questions. One question focused on a manager's description, while the other two questions were about what the manager's development was as a result of their reflection on the critical incident. Specifically, "How did managers describe how critical incidents impacted them? What did they develop from it? What did they learn from it?" The analysis phase of the study involved a comparison table, what he called "a Miles- and Huberman-type matrix". In the column headers, he identified the incident, the description of the experience, whether it was at the manager- or cross-level incident, and then how it impacted the manager, what they developed from it and what they learned from it. When asked why he was using the matrix for his analysis, he responded that "I was trying [to] look to see if there [was] a linkage across here – are there certain things that lead to certain things, that lead to certain things?" in the study. These linkages were helping him compare the findings with theory.

Although this expert acknowledged that he did not set out to make causal inferences, he offered that he could use what he found in his qualitative study to "develop propositions that might stand up in a different, more extensive study" and related also that qualitative research provided "a different angle and a different window on the phenomenon" being studied. He recommended mixed-methods as an appropriate form of investigation to examine his topic further. Toward the end of the conversation, this expert noted that the information he gathered could be utilized in a quantitative or mixed-methods study and remarked, "I could develop an instrument to lead to critical incidents and into it variables to explain […] and could use it to design a field-based quasi-experiment design" study.

This expert identified himself philosophically as a realist, open to practical applications resulting from qualitative research, but skeptical how to mesh the two [quantitative and qualitative] together. He remarked:

> I'm a realist myself […]. I think you can deduce certain practice principles from qualitative research. But, if you are to apply the structures and rigors of quantitative positivistic designs to qualitative you are bound to fail […] absolutely will not work.

The expert identified the value of qualitative research to guide practice and advance knowledge for future studies, but acknowledged the philosophical conflict between positivism and underlying philosophies of qualitative research.

Expert Two. Expert Two was able to offer insight on mixed-methods as a possible next step in investigating a phenomenon. He had experience in conducting mixed-methods research. Early in the discussion on causality, he stated he could provide "an example of causal inferences and why qualitative was important" and then related what he learned at a recent mixed-methods conference. At the conference, he attended a session where a healthcare study was discussed. The study focused on why asthma patients were not taking their medication as prescribed by their physicians. A prior quantitative study had found that patients had discontinued life-saving medication for inexplicable reasons. The quantitative study could show a relationship but not the reasons for medical non-compliance, which necessitated a qualitative study.

He related that through the use of qualitative interviews with patients who had discontinued medication, the physician/researcher discovered that there were several surprising reasons for discontinuing medication that indicated patients had "very different interpretations of the medicine" than their physicians. One patient thought that "her body was getting stronger over time and she could stop using it". Another surprising discovery was that:

> […] many patients, particularly patients of color […] were very worried about the reason that their doctor was prescribing the pharmaceutical […] dubious about the motivation of why the medical doctor prescribed it and maybe the medical doctor got rewarded for prescribing the medication.

These findings had not been factored into an explanatory model important for a quantitative design because they were not yet known to exist.

Expert Two noted that without the qualitative data about the patient's personal habits, the physician would not have understood "why" her patients had stopped taking their medication. The way he expressed the lesson from the story was "so, by having the qualitative data, she understood the quantitative better", which indicated how using multiple methods can identify and extend causal inferences. Expert Two also remarked that when he designs his own studies, he is confident that qualitative data would be valuable in mixed-methods research "to inform qualitative causal inference/cause-effect type questions".

Philosophically, the expert noted that there were some conflicts in quantitative and qualitative. For instance, he said there is tension between people who conduct research and those who have different philosophical stances. Also, Expert Two said that from his experience, he felt that some researchers are "inflexible in thinking about different approaches" and there are those that are "epistemologically or philosophically oriented qualitative researchers" who maintain a stance that no other research is needed but qualitative. Finally, Expert Two noted that some qualitative researchers might see looking for causality as "contradictory to qualitative" research.

Discussion of the findings

The findings for this exploratory study indicate that a similarity analysis does seem to be the primary analytic strategy during this time in the HRD journals, which confirms Maxwell's (2012b) view on the prevalent analysis modes in qualitative research. Causal explanation, then, may be folded within virtual relationships found in themes and conceptual categories, rather than called out more intentionally. Although we anticipate the possibility that connecting strategies may have been part of the analysis of some of the studies, particularly any grounded theory studies, the strategies were not clearly evident in the write-ups. As the expert interviews indicated, the very nature of qualitative research, such as the ability to illuminate context, make linkages of ideas, use quality checks to bolster credibility of interpretations, can provide important detail for causal studies.

The findings also provide some initial support for realist triangulation (Madill *et al.*, 2000), as triangulation was evident in the literature and the expert interviews, particularly as researchers make linkages and develop explanations with the help of multiple perspectives and types of data. Merriam (2009, p. 216) denoted triangulation as comparing and cross-checking data collected through observations at different times or in different places, or interview data collected with different perspectives or from follow-up interviews with the same people, which enhances the integrity of the study, as well as deepens the researcher's understanding of the phenomena under investigation. A greater understanding of triangulation and causality would help researchers validate causal mechanisms and explanation.

What seemed missing are more refined methods of identifying and testing causal explanations. Both the expert interviews demonstrated the notion that some researchers in the field believe philosophically that causality could not or should not be examined through qualitative research methods, likely a carryover of positioning causal inference as primarily a quantitative concern and thus having a positivist connotation that many may feel antithetical to the aims of qualitative research, but noted value nonetheless. This line of thought is supported in the literature as early qualitative researchers were critiquing and rejecting causality for qualitative inquiry (Lincoln and Guba, 1985; Schwartz and Ogilvy, 1980).

In addition, both experts pointed to the use of mixed-methods as one way to enhance and utilize the findings from a qualitative study or to extend the findings from a cross-case analysis design. According to Rocco *et al.* (2003, p. 27), mixed-methods offer "the potential to be more useful to people making policy decisions about business, technology, education, and society". Qualitative findings are being used to "deduce" practice principles, which suggest that there are explicit and implicit CPOs in qualitative write-ups that can help HRD professionals determine potential cause and effect in their own contexts. Next we will offer a conclusion to the article.

Implications and conclusions

This article enlarged the discussion of causal inference to include new theoretical, philosophical and methodological insights that demonstrate how studies conducted using process theory and variance theory can mutually support the advance of knowledge about causality in HRD. A major conclusion of this study is that qualitative research plays a critical role in causal inference, albeit an understated one, when we take an enlarged philosophical view of causality. Equating causality

to variance theory alone leaves causal process locked in the black box (Maxwell, 2012b), whereas qualitative research opens up for examination the processes locked inside. The philosophical conundrum between quantitative and qualitative traditions may have prevented fruitful conversations among researchers about causality in the past, and could potentially be resolved to an extent if one separates ontological and epistemological issues, and develops a philosophical paradigm that allows the two to intersect.

While quantitative and qualitative traditions have been regarded as separate and competing at times, both are needed in the field, and they can work together if one recognizes the special characteristics they offer for making causal inferences. Although we have focused on qualitative research's role in causality, we absolutely defend the special characteristics of qualitative studies to promote deep insight and understanding. Not every study must address causality; understanding alone is a worthy outcome of a research study. However, qualitative methods have the potential to deepen understanding of the mechanisms of causality, which affect how we practice HRD.

Theory-building in qualitative research may help discover plausible alternatives that researchers use to address validity threats in quantitative studies, but this article also shows that there are methods by which hypotheses or causal process statements can be tested with logic. The distinction between within-case and across-case analysis (Goertz and Mahoney, 2012) is useful for considering how various study designs could advance causal inference. The findings from the exploratory study indicate that elements of the conceptual frame are present to some degree in qualitative studies in HRD and used by expert researchers, but the full explication of how the field tackles causal inference is lacking.

None of the studies reviewed in the findings involved process tracing or explicit discussion of connecting strategies, which suggests these are new tools HRD researchers can add to the toolkit. Additionally, the expert interviews provided linkages between quantitative and qualitative methods, but the more sophisticated methods of studying causality qualitatively, such as process tracing, were not identified. This suggests that far more discussion of these methods is needed in the field, which necessarily includes addressing the philosophical conflict that some see as a hard wall separating qualitative and quantitative. Ontological realism may make that wall more porous for collaborative work. For qualitative researchers, it is important to acknowledge where we function under realist beliefs or change practice in expectation of a real effect.

Narrative that includes the context of qualitative findings is important for examining causality in this larger view. Rich descriptions of qualitative studies may give the necessary details of the context of behaviors and underlying systems that help to answer "how" and "why" questions. For instance, Bryman and Bell (2011, p. 404) remarked that "it is often precisely this detail that provides the mapping of context in terms of which behavior is understood". Qualitative inquiry has utility in drawing attention to contextual factors that are crucial when designing interventions and implementing initiatives under particular conditions (Bryman *et al.*, 1996).

Although a perfect understanding of causality is impossible, practical cause-and-effect issues are a reality in messy and complex organizations. Even an imperfect understanding of causation can improve the organizational environment at the interventional level. Thus, more discussion of causation in HRD studies can provide

important fodder for practice decisions. Next we address the methodological and practical implications for HRD.

Methodological implications

The initial model of process causality we developed for this article is a useful basis for discussion of how qualitative and quantitative research inform one another as knowledge is advanced in HRD. By acknowledging that realism seems to be inherent in some qualitative techniques, we find a bridge point between quantitative and qualitative traditions without watering down what each has to offer. Qualitative methods can be intentionally applied to causal questions if a researcher so intends, and one should be explicit about methods used to seek causal relationships. Qualitative research can explore singular causation in depth, and help support research on general causation. HRD as a field can adopt qualitative techniques that other fields are using, such as process tracing and connecting strategies, which means recognizing the value of both inductive and deductive logic.

It is also important for the field to consider how to use both similarity analysis and contiguity analysis, both of which help uncover cause-and-effect relationships, and more specifically integrate connecting strategies (Maxwell, 2012b; Maxwell and Miller, 2008). This may mean publishing displays in journal articles of matrices and network analyses discussed in Miles and Huberman (1994). Publishing these analyses may help fellow researchers follow the logic of the analysis and more clearly see causal mechanisms and processes at work. Also, a disclosure of the use of these strategies is a type of data manipulation that can express experimental logic.

When qualitative studies develop mutually exclusive categories, it is possible for statistical analysis to be done based on these categories (Maxwell, personal communication). Mutual exclusivity is discussed by Merriam (2009) along with other characteristics of conceptual categories. The first author of this article regularly practices defining conceptual categories in addition to providing the category label and thick description. Developing definitions can be a difficult and challenging part of the work, but it helps foster transferability of findings to other contexts. Definitions should not be examples of the construct nor use the same words as the category label, but rather use synonyms to explain the construct. It goes without saying that the data excerpts should be consistent with the definition to show the interpretation is plausible. Definitions are often integral parts of codebooks (MacQueen *et al.*, 1998), and publishing these definitions may aid causal research where the constructs are fitted into a causal model. Definitions, in a sense, represent phenomena found in the study that may be present in other contexts.

Another implication for the field of HRD is to consider how new scholars are trained to use logic in any study so that they recognize where they use inductive and deductive logic. This may help dispense with the notion that qualitative research is only inductive and quantitative research is only deductive. In so doing, the perceived array of techniques available to the researcher may expand. Although the qualitative research is most often associated with induction, deduction is used to confirm findings in many qualitative designs, and a study can incorporate deduction from the start. For example, using theoretical codes and start lists for coding within a case is to an extent deductive even if no hypothesis is tested. Additionally, quantitative studies that are more explicit with how they used qualitative techniques to build assumptions and validate models

would help foster discussion of where and how quantitative and qualitative studies intersect. Discussion of any qualitative and inductive origins of a quantitative study – such as the logic of study genesis, relationships within models and variable selection – can further strengthen the exploration of causal relationships.

Practical implications

HRD professionals in scholarly practice may find that the methodological options for research can also be used in practice for creating models of relationships that help them address complexity and analyze situations for potential outcomes. We look at two techniques more closely: plausibility testing and usability studies that could be used with general interventions, but we focus on technology, as there have been recent calls for HRD to address technology in more explicit and expansive ways (Bennett, 2014).

Plausibility testing in scenario planning. Scenario planning has been called HRD's strategic learning tool (Chermack and Swanson, 2008), and a number of HRD scholars have been developing expertise and scholarship in this area of practice (Chermack and Nimon, 2008; McWhorter *et al.*, 2008; Moats *et al.*, 2008). The discussion has recently moved online with virtual scenario planning (McWhorter and Lynham, 2014) that utilizes sophisticated technologies to create digital spaces conducive for scenario-planning participants to meet "within" technology for strategic events (McWhorter, 2010). To test the plausibility of scenario stories built in the scenario-planning process, a technique called "windtunneling" (Van der Merwe, 2008) is utilized to examine the scenario stories in numerous environments and under various conditions. (For a detailed explanation of this process, see Chermack and Van der Merwe, 2003).

In this discussion, the value for scenario planning is in fashioning strategy in organizations that examines current opportunities and threats but also future risk to the organization. Experts in the target organization spend time brainstorming potential future situations and discussing how the organization might respond. This technique requires participants to research whether the scenarios are plausible. Plausibility testing of scenarios could be bolstered by qualitative techniques for causal inference. Beyond organizational scenario planning, plausibility testing is also a valuable exercise to develop logical thinking for graduate students, as well as for scholar-practitioners (Van der Merwe, 2008), which may foster cause-and-effect thinking. Process tracing and its variants seem useful for practice, and could potentially be applied to analysis of future events instead of past events. For example, logic tests, such as the smoking gun test (Collier, 2011; Goertz and Mahoney, 2012), might indicate the effects one might expect if a causal condition develops in the market. An example might be the energy sector recognizing the potential for fracking oil deposits to cause earthquakes. If fracking has this effect, then planners would determine the level of evidence needed to support the validity of the proposition and then make plans to mitigate the effect. Here, it is important to recognize that imagining a potential effect is not the same thing as proving an effect.

Usability studies. The current discussion of virtual HRD in the field has called upon HRD to adopt new techniques for developing technology, including usability studies (Bennett, 2014). Usability studies are an application of qualitative techniques like process tracing (Rohlfing and Schneider, 2013) that are important for HRD to adopt because they are important for testing and refining software and hardware to be user

friendly and to accomplish the tasks they were meant to do. Within the virtual HRD literature, there has been a call to add technology development as a major area of HRD activity (Bennett, 2010, 2014; Bennett and McWhorter, 2014; McWhorter, 2014; McWhorter and Lynham, 2014). *Technology development* is defined as "the integration of technology with HRD objectives and processes to improve learning capacity and performance" (Bennett and McWhorter, 2014, p. 581). Paying attention to both similarity and contiguity in practice can link development with learning and performance outcomes in learning management systems, for example, and other technical systems.

Not only should HRD learn how to interface with current usability practices that are typically handled in information technology departments, the field should recognize the many techniques and theories in HRD are uniquely positioned to help organizations develop and implement new technology (Bennett, 2014) and to effect outcomes. This article uncovered new analytic techniques that can be applied to usability studies that capitalize on the power of qualitative techniques. Usability testing is necessarily a within-case analysis and must address work processes and user characteristics to create desired outcomes within HRD. Using the ideas in this article furthers the call to make changes in how we prepare HRD scholars and consultants in the field. Next we offer final thoughts for closing the article.

Final thoughts

In one article, it is impossible to uncover all the angles of causal inference in qualitative research, but we present an emergent and exploratory discussion that Reio (2009) stressed as important to the field. Future angles might address how qualitative and quantitative techniques may be mutually supportive at a more granular level. For example, random selection is important for dealing with validity threat in experimental design (Russ-Eft and Hoover, 2005), but purposive selection is a characteristic of qualitative research (Lincoln and Guba, 1985). How to resolve these issues (and whether the field needs resolution) will take much more discussion in the future, and risk-taking is needed to try out empirical studies that intentionally set out to answer methodological concerns. HRD can also further the work on process theory, given how important process is to organizational practice.

Our work in HRD is often investigative, but it is not often like that of Sherlock Holmes. Where the Holmes' analogy falls apart is when we find that a case cannot be closed with finality because the story of research in organizations is open-ended, often messy. It defies conclusion. We open up the black box and perhaps find multiple smoking guns that lead our work in opposite directions, forcing selection of the higher and more immediate priority in research and scholarly practice.

Investigations that reveal process causality and build theory are dynamic, complex and often contextually bound in a world where the social context is continually changing. If we envision our work as poetry, meaning and insight are authentically found not only through creative insight but also through the structure of syntax and logic. We add process causality in qualitative research to the mix of techniques and theories found in the larger discussion of causality in HRD. In addition to advancing knowledge, our work is ongoing to uncover answers and methods to best meet the practical needs of HRD stakeholders. Stakeholders often ask us for a measure of confidence in what works even if we can never prove cause and effect with perfect certainty.

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Corresponding author

Rochell R. McWhorter can be contacted at: rmcwhorter@uttyler.edu