death penalty, have already affected the normative culture and public policies, though they are less advanced than those listed above.

The opening up of many societies (especially former communist ones), the spread of education, the widening of people's attention horizon from the local toward the national and even global public affairs, the rise of worldwide TV networks (the "CNN effect"), increased travel and immigration, and the World Wide Web—all arising over the past few decades—have led to the development of transnational moral dialogues, in general, and dialogues about what is considered legitimate, in particular. These are global not in the sense that all citizens participate, let alone agree, but in that these dialogues reach across most borders. Thus, concern for the environment now is very widely shared; following transitional moral dialogues, a widely shared understanding evolved that the 2003 invasion of Iraq by the Bush administration was not legitimate; and shared moral understandings have been inching forward on matters as different as the bans on sex tourism, land mines, and whale hunting.

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See also Civil Society; Republicanism; Social Capital

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COMPARATIVE METHODS

At the most general level, the term *comparative methods* may be used to refer to any research technique that focuses on patterns of similarities and differences across cases. More commonly, however, the term is used to refer to a family of techniques employed by small-N researchers. It is this family of techniques that is the main focus of this entry. Though comparative methods do have particular advantages for small-N researchers, there is no inherent connection between comparative methods and small Ns. The development of formal methods of comparative research—specifically, qualitative comparative analysis (QCA) and related techniques—has facilitated the extension of comparative logic, which is configurational in nature, to large-N studies.

This entry has six major sections. The first emphasizes the case-oriented nature of comparative research. This feature clearly differentiates it

from conventional variable-oriented research and underscores its broad links to qualitative inquiry in general. The second section considers the goals of comparative research, linking comparative research to both inductive theory building and deductive theory testing. The logic of comparative analysis is the central focus of the third section. The importance of the analysis of set-theoretic relations to comparative research is emphasized, and the analysis of sufficiency and necessity is linked to subset and superset relations. These connections are important because much of social science theory is formulated in terms of set relations, and it is important to use analytic methods that are true to theoretical formulations. The language and logic of sets underlie both informal and formal methods of comparative analysis, which is the topic of the fourth section. Traditionally, comparative researchers have made use of informal methods, explicitly or implicitly relying on John Stuart Mill's methods of agreement and difference. Over the past 2 decades, Charles Ragin has formalized the comparative method as QCA, which is discussed in detail in this section. In the fifth section, discontinuities between comparative research and conventional variable-oriented research are addressed, and in the closing section, current development in formal methods of comparative analysis is described.

The Case-Oriented Nature of Comparative Research

Comparative researchers tend to conceptualize causality in terms of necessity and sufficiency. A common concern is the combination of conditions that are sufficient for an outcome. Often, comparative researchers find that different combinations of causal conditions generate the same outcome. This approach to causal conditions is distinct from that of variable-oriented research programs, which seek to identify the net effect of each independent variable on the dependent variable, isolating its effect from that of competing variables.

While the sufficiency of causal combinations is a major preoccupation of comparativists, necessary conditions are also important, especially to theory. For example, Barrington Moore's famous maxim, "No bourgeoisie, no democracy," exemplifies the

necessary condition: The rise of a capitalist class is necessary for—but by no means guarantees—the development of democracy. The bourgeoisie would also need to resist domination by the aristocracy and peasantry, promote the development of commercial agriculture, and participate in a revolutionary break with the past. This combination of conditions, Moore found, was sufficient to produce a democratic state in the cases he studied.

The analysis of necessity and sufficiency requires that cases be considered on their own terms, as interpretable wholes. To identify and make sense of the bourgeoisie's revolutionary role, Moore conducted a series of historical case studies. For each case, Moore examined how various aspects of the case (e.g., the relationships among the bourgeoisie, aristocracy, and peasantry and the development of commercial agriculture) interacted with and influenced each other. This is the defining characteristic of case-oriented research: A case constitutes a coherent whole, and its various aspects are understood relationally. Thus, case-oriented research is inherently *configurational.* The comparative aspect of comparative research, therefore, is the comparison of configurations of interconnected aspects—the cross-case analysis of configurations of similarities and differences.

Within the social sciences, comparative research is most commonly associated with small-N macro-comparative research. But in fact, its logic may be applied at any level of analysis. The same techniques that a macrolevel comparative researcher might use to examine the relationship between economic development and the emergence of democracy could be used by a microlevel comparative researcher exploring the relationship between religious beliefs, socioeconomic status, and divorce. What matters is not the number of cases under investigation but that the researcher make sense of these cases by treating them as instances of interconnected aspects, respecting their coherence and integrity as cases.

There is, of course, always a trade-off between the breadth and the depth of an analysis, and it is the researcher's responsibility to determine whether a given research question is best answered by examining fewer cases in great detail or more cases in less depth. Generally, this choice is dictated by the goals of the research.

The Goals of Comparative Research

Comparative methods can be used for either theory development or evaluating hypotheses. When developing theory, the researcher conducts a series of case studies, strategically selecting cases so as to produce an accumulation of knowledge. For example, a specific type of evidence that is not available in one case may prompt the investigator to select for his or her next study a case that offers this evidence. Questions raised by previous case studies direct the investigator's subsequent case selection. In this manner, comparative researchers can develop their theoretical arguments inductively, building their theories from the bottom up. This grounded approach of theory development can be contrasted with a deductive, hypothesis-testing approach that begins with multiple cases. Here, the researcher starts with a preliminary specification of the relevant cases. For example, a researcher interested in testing Theda Skocpol's theory of social revolution would begin by identifying cases that fall within her specified scope conditions, as explained by Gary Goertz in his book *Social Science Concepts: A User's Guide*. The researcher would then examine the characteristics of these cases to see if they are consistent with Skocpol's theory—namely, that countries experiencing social revolutions exhibit the relevant causal conditions (e.g., state breakdown combined with peasant revolts and some form of international pressure).

The inductive approach to comparative research seeks to develop an individual explanation for each case, in relative isolation from other cases. Of course, it is impossible for researchers to wear blinders or forget what they have already learned, and knowledge of one case will invariably influence one's understanding of subsequent cases. Nor would such a "clean-slate" approach be desirable—the knowledge gained during the research process assists the researcher in determining where to focus his or her attention next. Still, the goal of the inductive approach is to produce a series of individual case studies, allowing for maximum diversity. It is only on completing the individual case studies that the researcher turns to the task of making an encompassing comparison. The researcher examines each case against the others, sometimes by applying formal techniques, such as QCA. The goal of this cross-fertilization of case studies is to identify what the cases do and do not have in common. The researcher uses these comparisons to develop an analytic frame that clarifies the nature of the cases under investigation and their relationship(s) to one another. The construction of this analytic frame produces a structured theoretical account of the cases that may be used to identify cross-case patterns of similarity and difference (e.g., different paths to the same outcome).

Where the inductive approach concludes with the development of an analytic frame, the deductive approach begins with it. Based on existing theoretical and substantive knowledge, the researcher develops an analytic frame to guide his or her investigation of the hypothesis that he or she intends to test. Here, think of an analytic frame as akin to a survey instrument that "interrogates" each respondent (case) in a uniform manner. The analytic frame directs the researcher's investigation, identifying plausible cases for inclusion in the analysis and telling him or her which characteristics of the cases to examine, what questions to ask, and how to record the information. Fundamental to the deductive approach are the goals of unbiasedness and efficiency, both of which a clearly defined analytic frame helps achieve. Having completed data collection, the researcher then seeks to assess the hypothesis. As in inductive comparative research projects, a formal technique such as QCA may be used to simplify the analysis. In fact, it is somewhat more common for QCA to be used in deductive comparative research than in inductive research because Ns tend to be larger.

The inductive and deductive approaches are combined when a researcher seeks to study a theoretically specified range of cases. As with the deductive approach, the researcher relies on a preexisting analytic frame to guide case selection. Here, the analytic frame serves as a device for classifying cases according to aspects of theoretical or substantive interest. For example, the researcher might construct a contingency table cross-tabulating the level of development of countries with their level of democracy. The researcher then seeks to fill each cell of this table with at least one case. He or she can then subject these cases to in-depth, inductive analysis, confident in the knowledge that important case aspects are well represented in the study.

Inductive comparative research proceeds in a bottom-up fashion, accumulating case knowledge

so as to generate new theory. By contrast, deductive comparative research follows a top-down formula. Beginning with theory, the deductive comparative researcher seeks out cases to subject to some form of hypothesis testing. Of course, neither of these strategies is practiced in pure form, and there are many examples where the two are explicitly blended. Regardless of the direction in which the research proceeds, however, the same basic analytic logic is employed.

The Logic of Case-Oriented Comparison

As noted previously, comparative research is fundamentally case oriented. Cases are conceived as configurations, and comparison of these configurations is achieved by categorizing cases into sets. Thus, the logic of comparative research is fundamentally set theoretic. Set-theoretic social research, based on Boolean algebra, involves the analysis of set relations, especially the identification of subset relationships. Most social theoretical statements are framed in terms of subset relationships. For example, when social researchers observe that "religious fundamentalists are politically conservative," they are specifying a subset relationship: Religious fundamentalists constitute a subset of political conservatives. The observation that economically developed countries are democratic follows the same pattern; the conjecture is that the former constitute a subset of the latter.

Subset relationships such as these—ones in which the cause (e.g., religious fundamentalism or economic development) is a subset of the outcome (e.g., political conservatism or democracy)—are consistent with a relationship of sufficiency. That is to say, membership in the set of religious fundamentalists (economically developed countries) is sufficient for membership in the set of political conservatives (democratic countries). Conditions of necessity, by contrast, are identified by establishing that the outcome is a subset of the cause. Referring again to Moore's maxim, which may be understood as the specification of a subset relationship, democratic countries (outcome) constitute a subset of countries with a bourgeois class (causal condition).

Of course, subset relationships need not be perfect. For example, there are certainly some religious fundamentalists who are politically liberal. Some

relationships, therefore, might be more accurately characterized as "rough" subsets. Ragin has proposed a measure of set-theoretic consistency that assesses the degree to which a given set of evidence conforms to the subset relationship. Clearly defined subset relationships produce high consistency scores; as consistency drops, the claim that a rough subset relationship exists is less tenable.

While having a measure of set-theoretic consistency is useful for assessing subset relationships empirically, researchers ultimately must rely on their theoretical and substantive knowledge (which includes their knowledge of the cases under investigation) when determining whether the claim that a subset relationship exists—even a rough one—is justified. Social life is complex, and perfect subset relationships are rare, especially when the number of cases is large. Individuals, for example, are notoriously inconsistent. Although it is highly unlikely that an individual with little education will achieve a high-prestige occupation, it has happened. Whether such occurrences are considered common enough to challenge the claim that a rough subset relationship exists between education and occupational prestige is a determination that the researcher must make. Is a high level of education "almost always necessary" for a high-prestige occupation? Such questions cannot be answered through the rote execution of a consistency calculation but instead require that researchers apply their theoretical knowledge and interpretive skills.

The analysis of set-theoretic relations has other uses, in addition to the assessment of conditions of necessity and sufficiency. Set-theoretic analysis also facilitates theoretical development by providing an empirical basis for constructing and evaluating ideal types. Max Weber conceived of the ideal type as a "one-sided exaggeration" that serves to distinguish a class of social phenomena. The usefulness of the ideal type, Weber argued, is that it is not designed to perfectly represent all aspects of the phenomenon under investigation but, rather, its essential aspects. Once these essential features have been established, it is possible to assess, using set-theoretic methods, the degree to which empirical cases conform to the ideal-typical formulation.

The categorization of cases according to their degree of memberships in sets (using fuzzy sets) is crucial to assessing their degree of conformity to

an ideal type. Gøsta Esping-Andersen's distinction among types of welfare regimes is a case in point. There are, of course, no pure cases of liberalism, social democracy, or corporatism. In practice, states of each type borrow from the others. How, then, does one decide on the proper categorization of welfare states? The first step is to conceive of each welfare regime as an ideal type and to specify the essential elements that constitute it as a type. These elements can then be formulated as sets, and the degree of membership of each empirical case in each set can be assessed (via fuzzy-set membership scores). The membership of each empirical case in each ideal-typical regime type is given by the minimum of its memberships in the constituent sets for each regime type. (Using the minimum in this way is known as fuzzy-set intersection.) The use of the minimum is based on the simple idea that degree of membership of an empirical case in an ideal type is only as strong as its weakest link (lowest membership score), a principle that follows from the theoretical notion of the ideal type as a specific combination or coalescence of essential elements. The analysis of necessary and sufficient conditions and the construction of ideal types are not necessarily independent of one another. Frequently, the results of one analysis will prompt the researcher to reconsider the results of the other. Whether they recognize it or not, comparative researchers commonly engage in both forms of analysis.

Formal Versus Informal Methods of Comparative Research

Classical studies in comparative political economy such as Barrington Moore's *Social Origins of Dictatorship and Democracy* and Theda Skocpol's *States and Social Revolutions* rely on informal methods of comparative analysis, and to date, most comparative researchers continue in this tradition. It was with the publication of *The Comparative Method* in 1987 that formal methods of comparative analysis first gained prominence. Informal and formal comparative methods share an underlying logic and, in the hands of a capable researcher, will produce the same general conclusions. The difference is that formal methods explicitly make use of Boolean algebra to structure the analytic process.

The logic of comparative analysis and inductive inquiry in general can be traced to the work of John Stuart Mill and George Boole. In *A System of Logic*, Mill proposed a series of methods of inductive reasoning that would lay the logical foundation of informal methods of comparative research. Contemporaneously, Boole was developing his calculus of truth values. Boolean algebra, as it came to be known, would develop into set algebra and, ultimately, be integrated into formal methods of comparative research, especially QCA.

Mill's Method of Agreement and Indirect Method of Difference

The simplest of all comparative logics are Mill's method of agreement and his indirect method of difference, both of which assume that any given outcome has one and only one cause. Although Mill described these methods in terms of individual causes, it is straightforward to extend these methods to accommodate combinations of causal conditions when it makes sense to conceptualize them as decisive causal conjunctions. A researcher using the method of agreement examines a set of cases, each of which exhibits the same outcome. If the researcher finds that all the cases share one or more causal conditions, he or she can infer that this causal condition (or combination of causal conditions) is linked to the presence of the outcome. The indirect method of difference operates under related premises, except that both positive and negative instances of the outcome are examined. This method applies agreement and difference *seriatim*; for this reason, it is often referred to as the joint method of agreement and difference. The researcher first applies the method of agreement to cases exhibiting the outcome. On identifying a causal condition (or causal combination) linked to the outcome, the researcher examines the negative cases to see if the absence of the outcome is associated with the absence of the cause or causal combination. This double application provides researchers with stronger evidence on which to base their conclusions.

Comparative researchers continue to employ these methods today, albeit under different monikers. The method of agreement is the basis of the most different systems design, which is better conceived as a most different/same outcome design (MDSO). This alternate labeling makes it clear that in this design, diverse cases share the same outcome.

The researcher attempts to identify the decisive, causally relevant conditions shared by these diverse cases. The other popular design implements the indirect method of difference. It is commonly known as most similar systems design, but it is better understood as a most similar/different outcome design (MSDO), making it clear that there are both positive and negative cases. Ideally, negative cases should be matched as closely as possible with positive cases.

Mill's methods also provide the underlying logic of the "most likely," "least likely," and "crucial" case study research methods. The most likely case study employs cases that theory predicts should strongly exhibit the outcome, while the least likely case study employs cases that would do so weakly, if at all. Least likely cases that conform to predictions serve to marshal support in favor of a given theory. In contrast, most likely cases that do not behave as predicted cast doubt on a theory's validity. The strongest claim is made by the crucial case study, which asserts that a case must exhibit the outcome if the theory is not to be falsified.

The limitation of Mill's methods and derivative techniques is that they are incapable of addressing various forms of causal heterogeneity, especially equifinality and multiple conjunctural causation. Mill himself noted that his techniques fail when an outcome has more than one cause. Researchers are able to overcome this deficiency by immersing themselves in the cases. This immersion, however, necessarily restricts the breadth of analysis. It is perhaps for this reason that comparative research has become so closely associated with small-N analysis. QCA challenges this affinity by formalizing many aspects of the comparative research process and enables comparative researchers to address larger Ns.

Qualitative Comparative Analysis

QCA was originally developed for use with binary data or "crisp sets." The logic of QCA, however, extends to fuzzy sets in which set membership scores can be coded in the interval from 0.0 to 1.0. The present discussion encompasses both types of data. Note that crisp-set analysis is easier for novices to grasp, while fuzzy-set analysis provides more nuanced results. There are four basic steps in most applications of QCA. In practice, of course, these are intimately connected, and

researchers should view the research process as a dialogue among four analytic moments. In other words, comparative research is usually retroductive rather than predominantly inductive or deductive.

Step 1: Calibration

As has been emphasized, comparative research is fundamentally set theoretic. The classification of cases into sets, therefore, is of primary importance. This classification process is referred to as calibration. Calibration is a routine practice in the natural sciences. Simply put, calibration refers to the practice of adjusting measuring instruments so that they conform to dependable, known standards. The act of adjusting one's watch is an act of calibration as is checking the accuracy of a thermometer. While calibration is routine in the natural sciences, most social scientists make use of uncalibrated measures that merely show the positions of cases relative to one another. Uncalibrated measures, however, are clearly inferior to calibrated measures. With an uncalibrated thermometer, for example, it is possible to know that one object has a higher temperature than another, but one still does not know whether either object is hot or cold. This is the key: Calibrated measures provide directly interpretable values. Calibration permits researchers to classify a country as democratic or autocratic, not merely more versus less democratic than the next (or the average).

The reason that crisp-set analysis is more accessible is because the calibration process is more straightforward. When calibrating crisp sets, the researcher need only determine whether each case is part of the target set or not. So, for example, a poverty researcher might seek to classify respondents as "poor" or "not poor." When calibrating fuzzy sets, by contrast, the researcher must determine the degree to which each case belongs to the target set. The relevant distinctions here might be between respondents who are poor (membership = 1.0), somewhat poor (membership = 0.67), not that poor (membership = 0.33), and not poor (membership = 0). As with a calibrated thermometer, a calibrated fuzzy set integrates both qualitative and quantitative assessments in a single instrument.

Regardless of whether the researcher is calibrating crisp or fuzzy sets, the process demands that he or she carefully consider the nature of the target set—specifically, what the target set represents and

how it is labeled. In other words, conceptualization and calibration are closely intertwined. With crisp sets, a case is either in or out of the target set, and sometimes, cases must be force-fitted into categories. Alternatively, the researcher may generate new crisp categories to capture wayward cases. Fuzzy-set calibration, by contrast, permits the use of finely grained distinctions. When calibrating fuzzy sets, it is important for the researcher to specify thresholds for set membership and non-membership in the set, as well as what is known as the crossover point (fuzzy membership = 0.5), which distinguishes cases that are "more in" the target set from those that are "more out." The calibration process concludes with the production of a data set. As with a conventional data set, cases occupy the rows. The columns, however, do not represent conventional variables but instead represent sets, and the values in the cells indicate the degree to which each case belongs to each set.

Step 2: Necessity Analysis

Having generated the calibrated data set, the researcher next tests for the presence of necessary conditions. As described earlier, the necessity test takes the form of a set-theoretic analysis. A necessary causal condition is one that is a superset of the outcome. Visually, a set relation consistent with necessity is represented by a scatterplot of two fuzzy sets (with outcome membership scores on the Y axis and membership in the causal condition on the X axis) in which all cases reside in the lower-right triangular region. With a calibrated data set, this situation can easily be tested, and a relationship of necessity can be established if, for each case, the value of the causal condition is greater than or equal to the value of the outcome (i.e., $X_i \geq Y_i$), within the bounds of the consistency threshold. This test can be extended to combinations of causal conditions, and software packages such as fuzzy-set QCA (fsQCA) contain functions to automate the procedure.

Step 3: Truth Table Construction

Truth tables are used to assess the sufficiency of causal conditions, especially in combinations. Necessary conditions are excluded from the truth table analysis, which is why the researcher tests for them first. Sufficiency is indicated when a causal condition (or, more commonly, a combination of

causal conditions) constitutes a consistent subset of the outcome and is mathematically represented by the equation, $X_i \leq Y_i$. Again, the consistency test is conducted within the bounds of the consistency threshold established by the researcher.

Superficially, a truth table appears similar to a conventional data set in that it presents a cases-by-variables format. But the rows of a truth table are not observations as they are in a conventional data set. Rather, each row represents a logically possible combination of causal conditions (which, in turn, can be seen as constituting an ideal-typical case or configuration). Consisting of one row per logically possible combination of conditions, a truth table has 2^k rows, where k equals the number of causal conditions. As the number of causal conditions increases, the size of the truth table grows exponentially, and analysis becomes increasingly complex. Software packages help manage this complexity; nevertheless, most practitioners restrict their analysis to between 4 and 10 causal conditions.

To construct the truth table, the researcher refers to the calibrated data set and uses the consistency measure to determine which combinations of causal conditions are linked to the presence of the outcome and which are linked to its absence. With a large number of cases and/or causal conditions, this process can become error prone. Software packages facilitate the conversion of a calibrated data set into a truth table and should be used for all but the simplest analyses. Researchers should keep in mind that the process of converting the calibrated data set into a truth table will frequently force them to reconsider the measurement and calibration of both their causal conditions and outcome. In many ways, the process of constructing the truth table is the heart of the comparative research process, and it must not be approached mechanically. It is during this phase of research that the researcher refines and, ultimately, finalizes his or her analytic frame. Indeed, for a descriptive project, the researcher may choose to conclude simply with a presentation of the truth table. Functionally, the truth table is a compact way of presenting a multidimensional typology.

Step 4: Truth Table Reduction

The analysis of a truth table involves a process known as truth table reduction or Boolean minimization. This process results in a Boolean equation that expresses the various causal combinations that

are linked to the presence of the outcome. Researchers interested in the mechanics of this process are directed to Ragin's three books on this subject: *The Comparative Method, Fuzzy-Set Social Science*, and *Redesigning Social Inquiry*. The following discussion focuses on the results of the reduction procedure. The truth table reduction produces two main types of solutions, known as the complex and parsimonious solutions, depending on whether or not the researcher chooses to make use of remainders. Remainders are rows of the truth table that lack cases (empirical instances). Remainders are not uncommon. The social world is characterized by limited diversity, and many combinations of causal conditions simply do not exist.

Remainders are best understood as potential counterfactual cases—combinations of conditions that do not exist empirically, at least not in the investigator's data set, and are thus subject to conjecture. By including remainders in the truth table reduction process, the researcher is able to use QCA to conduct counterfactual analysis. The most common use of remainders in QCA is to produce a parsimonious solution in addition to the usual complex solution. The parsimonious solution allows the use of any remainder, as along as its inclusion in the solution results in a logically simpler formula for the outcome. The complex solution bars the use of remainders altogether on the assumption that all the different combinations that are linked to the outcome in question are represented in the investigator's data set.

QCA also provides researchers the opportunity to use their theoretical and substantive knowledge to produce intermediate solutions. This knowledge is input into the software via a simple table and is used to bar the inclusion of untenable counterfactuals from the solution. In general, intermediate solutions are best because they more closely mimic the use of counterfactual cases in traditional case-oriented comparative research. Of necessity, complex solutions constitute subsets of intermediate solutions, and intermediate solutions constitute subsets of parsimonious solutions. In other words, the three solutions are logically nested, according to the degree to which each incorporates counterfactual combinations. Complex solutions incorporate no counterfactual combinations and thus are often needlessly complex; parsimonious solutions are the simplest, but they often incorporate counterfactual

combinations that contradict existing theory and knowledge. Intermediate solutions, by contrast, are based on counterfactual analysis that is guided and constrained by theoretical and substantive knowledge.

As has been repeatedly emphasized throughout this discussion, the process of comparative research is iterative. It is likely that the results of the truth table reduction will motivate the researcher to revisit one or more of the previous steps. It is also quite common for researchers to reconsider not simply the calibration process but also whether they are, in fact, capturing the appropriate causal conditions and outcome. Comparative researchers regularly reflect on the nature of their research questions and frequently refine their questions as the research proceeds. QCA does not eliminate the necessity of this process. On the contrary, it makes it explicit. Both overly simplistic solutions and overly complex ones serve as warnings, directing the researcher to reconsider their solutions, revisit their evidence, and sometimes reformulate their analytic frames.

Discontinuities Between Comparative and Variable-Oriented Research

It is best to understand comparative analysis as a distinct methodological approach, one that can be conducted using either informal or formal methods. Far too often, QCA is viewed as a methodology in and of itself when, in fact, it is a formalization and extension of case-oriented comparative research. As has been emphasized throughout this discussion, the comparative approach is fundamentally case oriented, and as such, its tools are designed to answer questions that differ from those of conventional variable-oriented research. Nevertheless, the distinctiveness of comparative research is often overlooked, with the result that comparative researchers and variable-oriented researchers often talk past each other when discussing their research.

Ironically, the popularity of QCA has, to some degree, exacerbated this issue. Just as the rise of desktop statistical software has made it easy to estimate a poorly designed regression model, it is now straightforward for naive users to conduct a QCA without recognizing the different assumptions that they are taking on board. This does not

refer to philosophical debates regarding epistemological and ontological differences between case-oriented and variable-oriented strategies. Rather, there are substantial differences between what the research tools themselves produce in terms of social-scientific representations.

The importance of these differences can be seen clearly in the contrasts between how each perspective establishes causality. As this entry has discussed, comparative researchers establish causality by identifying subset relationships: "No bourgeoisie, no democracy." But such a claim does not make sense from the variable-oriented perspective. Subset relationships typically exhibit little to no covariation, which is the foundation for the variable-oriented researcher's causal inference. Similarly, the covariation of variables is insensitive to subset relationships—the type of explicit connection that is central to case-oriented comparative analysis. From each perspective, the other's claim to an empirical basis for causal inference appears flawed. Although both approaches use theory and data to construct representations of social life, they do so in ways that involve sharply contrasting orientations regarding the consideration of cases, the relationship between causal conditions and outcomes, and the criteria of a successful analysis.

The Consideration of Cases

From the perspective of a comparative researcher, the primary problem with variable-oriented methods is that they veil cases. When a variable-oriented researcher, for example, computes a correlation between two variables, it is the variables that take center stage. The cases essentially disappear. In contrast, it is the cases that take center stage in a comparative analysis. It is a simple matter, for example, to map cases onto the rows of a truth table, and some software packages automate this procedure. The two approaches also differ in their methods of case selection. As previously noted, comparative researchers choose cases purposefully, based on either theoretical or substantive criteria. Further, the set of cases included in an investigation may shift as the researcher decides that one or more cases do not "fit" with the others or realizes that an important type of case is missing from the analysis. Variable-oriented researchers, by contrast, typically delineate their samples of cases at the outset of their research. What matters most is that the cases are selected in a manner that ensures that the sample is representative of the larger population, however conceived and defined.

The Connection Between Causal Conditions and Outcomes

Variable-oriented research is usually concerned with explaining variation in the values of a dependent variable—an outcome that varies across cases. The goal of such research is to explain how changes in the values of independent variables affect the value of the dependent variable. Techniques such as linear regression accomplish this by identifying the net contribution of each independent variable. Comparative research, in contrast, is concerned with how causal conditions combine to produce a particular outcome. The solutions of a QCA application, for example, represent different paths or recipes for a given outcome.

In a variable-oriented study, causation is inferred from patterns of covariation. Usually, the researcher measures the relative strength of several causal variables simultaneously. Frequently, the goal is to assess the relative strength of competing theories by determining which independent variable (or set of independent variables) explains the most variation in the outcome variable. In other instances, the goal may be simply to appraise the relative importance of the different independent variables or simply to establish that the causal impact of a theoretically important variable is significant and can be estimated. In virtually all types of variable-oriented analysis, variables compete with one another to explain variation. The moniker of *independent* is important here. Each independent variable is considered on its own terms, capable of affecting the outcome variable regardless of the presence or level of the other causal variables. The comparative researcher, by contrast, does not assume that causal conditions are independent of one another. Independence is the exception rather than the rule, and causation is understood to be conjunctural in nature. The goal of the investigation is to identify combinations of causal conditions that are shared by sets of cases and, in tandem, produce the outcome.

The Criteria of a Successful Analysis

It is useful as well to contrast the different criteria used to judge a successful conclusion of a study. For the variable-oriented researcher, the analysis is successful when a theory can explain why changes in the values of the independent variables affect the value of the dependent variable in a particular manner. For the comparative researcher, by contrast, a successful conclusion is one in which the various paths to the outcome are clearly and convincingly articulated and cases can be associated with the different paths. In short, to justify their conclusions, comparative researchers point to their cases, while variable-oriented researchers point to theory.

From the perspective of variable-oriented researchers, comparative research is replete with analytic sins and errors. Samples are purposively constructed, and their sizes are small. Researchers may add or drop cases at any stage of the analysis. Important causal factors do not vary. In a variable-oriented analysis, any of these situations would undermine attempts at causal inference. Likewise, common practices in variable-oriented research would seriously undermine the validity of the conclusions when viewed from the perspective of comparative research. There are too many cases for an in-depth analysis to be conducted. A fixed sampling frame assumes a level of comparability among cases that may be unwarranted. And the focus on independent effects of variables violates the configurational assumption of comparative analysis. Comparative research is fundamentally case oriented, and consequently, its practices fundamentally clash with those of variable-oriented research. It is therefore not surprising that researchers frequently talk past one another.

Current Developments in Comparative Research Methods

The use of informal methods of comparative research is, of course, well established among social researchers, as is the use of crisp-set QCA. The extension of QCA to encompass fuzzy-set analysis has been welcomed by researchers, although there is a lag between new developments in the approach and their adoption by researchers. For example, the inclusion algorithm (using the principle of set inclusion) described by Ragin in *Fuzzy-Set Social Science* has been superseded by a hybrid algorithm that uses truth tables to synthesize the results of the analysis of fuzzy-set relationships. Although the transition to the truth table algorithm has been widely documented, a number of researchers continue to rely on the procedures discussed in the 2000 text. The publication of Ragin's *Redesigning Social Inquiry* establishes the superiority of the truth table algorithm.

The popularity of QCA has encouraged a number of researchers to propose various extensions to the method. Many of these proposed extensions can be found in working papers at the COMPASSS website, which serves as a hub for researchers interested in the development of formal methods of comparative analysis. Although a number of these proposals aim to incorporate variable-oriented techniques into QCA, such proposals have not gained much traction. The most promising of these extensions are those arising from or inspired by the concerns of traditional small-N researchers. Particularly promising is the application of QCA to the analysis of scope conditions, which are used to distinguish between cases that do and do not apply to a given theory. Also promising is the application of QCA to possibility analysis. A relatively recent development, the analysis of possibility seeks to identify those cases that are within a theory's scope but for which the outcome is nevertheless impossible or virtually impossible. The question of whether an individual born into poverty can acquire a high-status occupation, for example, is a question of possibility: What conditions serve to make social mobility possible? The appeal of extending QCA to the study of scope and possibility is easy to see: Such questions are set theoretic in nature. They are theoretically important questions but outside the grasp of conventional quantitative methods.

The popularity of multimethod research suggests that researchers will increasingly seek to use QCA in tandem with other analytic methods. Such projects have proved to be most successful when QCA is combined with both case-oriented and variable-oriented techniques. The combination of QCA and techniques of social network analysis have also proved to be particularly fruitful, and development in this direction is expected to continue. Initiatives to implement the QCA techniques in statistical environments such as R and Stata have begun. By and large, these translation efforts are incomplete, and the canonical package remains

Ragin's fsQCA. Cronqvist's Tools for Small-*N* Analysis (TOSMANA) is also popular. Although lacking fuzzy-set capabilities and procedures for counterfactual analysis and intermediate solutions, TOSMANA includes a number of attractive features such as a threshold-setting tool—to aid the construction of crisp and multivalue sets—and the ability to graphically represent Boolean solutions as Venn diagrams.

The popularity of formal comparative methods is expected to continue to grow. There are two reasons for this. First, QCA permits comparative researchers to include more cases in a given study. Research projects previously too complex to conduct due to the limitations of informal comparative methods are now feasible. Second, and perhaps more important, the process of formalizing the comparative approach served to highlight the fact that despite the popularity of variable-oriented methods, most social theory is actually set theoretic in nature. Many research questions are actually more appropriately answered using comparative methods, because of their set-theoretic nature, than variable-oriented ones. Researchers who previously would have turned to variable-oriented techniques are more likely today to recognize the value of comparative methods.

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See also Boolean Algebra; Case Studies; Causality; Conditions, Necessary and Sufficient; Configurational Comparative Methods; Fuzzy-Set Analysis; Qualitative Comparative Analysis

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