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For Methodological Pluralism: A Reply to Brady and Elman

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We are grateful to Henry E. Brady and Colin Elman for their commentary on our book, *A Tale of Two Cultures: Qualitative and Quantitative Research in the Social Sciences*. In this reply, we briefly respond to their concerns, especially those involving the integration of qualitative and quantitative research.

Elman usefully contrasts "pluralism" and "monism" as two approaches to methodological diversity. Whereas pluralism embraces diversity and accepts different approaches on their own terms, monism advocates a single approach that can subsume all others. Framed in this way, as Elman notes, *A Tale of Two Cultures* unambiguously embodies methodological pluralism.

The leading monist alternative in the social scieces holds that qualitative methodology is based on principles of statistical methodology (e.g., King, Keohane, & Verba, 1994). Qualitative research may have its own vocabulary and methods, but it "has no inferential machinery distinct from that of quantitative research" (Elman, p. 266). We believe that this monist position—specifically the tolerant, respectful version described by Elman—is well represented in Brady's essay. As Brady writes, "To the extent that there are differences between the Quants and the Quals, I believe that many of them are simply differences in language and tools and not in their fundamental paradigms for doing research". Brady allows for the possibility that the traditions represent separate cultures, but he rejects the idea that they are different paradigms.[1] He suggests that "with a little bit of work we can develop a common framework". In the second half of his essay, he illustrates this common

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framework by showing how qualitative methods can be translated into the language of quantitative methods (we return to this illustration below).

From a monist standpoint, our effort to systematically classify differences serves to bifurcate social science rather than unify it. From a pluralist standpoint, however, contrasting the two approaches is essential to recognizing their distinctive strengths and weaknesses as well as understanding the extent of their commensurability. A pluralist approach does not assume that unification is always possible, much less easy. Unification is difficult precisely because qualitative and quantitative methodology cannot be fully reduced to one another. Although Brady says that we do not think unification "is generally a good idea" (p. 252), in fact we strongly advocate dialogue throughout the book. However, we do not claim that we know how to achieve unification for many of the topics that we address.

We are convinced that the kind of contrast-oriented comparison we pursue is a powerful tool for elucidating the core features of methodological traditions. This approach to comparison can call attention to important practices and assumptions that normally go unrecognized. Brady quips that we "seem curiously pleased with cataloging difference after difference" (p. 252). It is true that we did enjoy systematically documenting these contrasts, but the pleasure derived from the insights we gleaned concerning the implicit and underappreciated foundations of these traditions.

Elman's essay anticipates likely critiques from quantitative and qualitative researchers, especially the latter. We agree with him that the extent to which our argument resonates with qualitative researchers will depend on whether they feel that set theory/logic usefully describes their implicit methods. Elman may be right that our assertion that within-case methods such as process tracing can be characterized with these tools is particularly controversial. Yet recent efforts at more rigorously codifying process tracing tests have all gone in the direction of using set theory and logic (Collier, 2011; Mahoney, 2012; Zaks, 2011). Moreover, as we note in the book, controversy over the correct characterization of qualitative methodology derives from the implicit way in which qualitative researchers use their methods. No characterization of qualitative methodology is without potential controversy.

Elman points out that our descriptive claims may be seen as prescriptive assertions by some readers. Likewise, depending on one's perspective, the research practices that we describe may be viewed positively or negatively. Indeed, if our argument is correct, one's reaction to specific practices generally should reflect whether one is a qualitative or quantitative researcher. For example, we are unsurprised that Brady (a quantitative researcher) might not believe that qualitative researchers devote more attention to issues of concept formation and definition than do quantitative researchers. Likewise, Brady's belief that coding democracy is problematic at the extremes because there are few cases here is what one would expect a quantitative researcher to believe (in fact, with democracy scales, cases cluster at the higher and lower ends). And Brady's feeling that Hume's two definitions of causation cannot be easily translated into the language of necessary and sufficient conditions may well be shared by other quantitative researchers (though not qualitative methodologists).

Elman concludes by highlighting some of the difficulties of achieving mixed-method research if one views social science methodology from a pluralist perspective. Monism may see mixed-method research as easily accomplished, but for a pluralist "monism achieves that easy fit by sacrificing the differences that make qualitative research worth doing in the first place" (Elman, p. 266). The challenge for pluralists is show how multimethod research can most productively proceed. Elman's discussion of mixed-method research is interesting because he assumes that one begins with a mainly qualitative perspective and then works to integrate quantitative ideas into that qualitative design. By contrast, most of the literature on multimethod research assumes that one is using qualitative tools to support what is principally a quantitative design. We believe that much more needs to be done on multimethod research that has qualitative research at the center and quantitative research playing the supporting role.

In the second half of his essay, Brady explores how statistics and economics can be used to develop a common framework that encompasses the concerns of qualitative researchers. This effort at translating qualitative methods into the language of statistics is useful: translation promotes dialogue and helps pinpoint similarities and differences between cultures.[2] Yet one must be open to the possibility that important ideas will be lost in translation.

For instance, there is a reason why "Boolean" algebra has a different name than "linear" algebra: It is because they are different algebras. One can distinguish algebras based on the properties that they satisfy, such as $A + B = B + A$. As all students of statistics know, it is impossible to imagine doing statistics without linear algebra. Yet Boolean algebra must satisfy conditions that are not satisfied by linear algebra. One difference revolves around distributive laws. A common distributive property found in both algebras is $A * (B + C) = A * B + A * C$. But Boolean algebras must also satisfy a second distributive law: $A + (B * C) = (A + B) * (A + C)$. This second distributive law clearly does not hold for linear algebras.[3] Standard books on Boolean algebra discuss other differences of this nature (e.g., Hohn, 1966; Lewin & Protheroe, 1992; McCluskey, 1965).

As an example of translation problems, consider how Brady analyzes the fuzzy logic scatterplot illustrating that "*X* is necessary for *Y*" from Figure 1a of our article (Figure 2.2a of the book). He notes that *X* is necessary but not sufficient. To carry out the translation, therefore, he must (a) introduce variable *Z* and (b) recast the relationship in terms of sufficiency, that is, $X * Z$ equals *Y*. With this translation, the logical expression "is sufficient for" is interpreted to be the equality symbol (i.e., =) of linear algebra. Yet clearly sufficiency is not equivalency. Moreover, suppose—as is often the case—that one has good reason to hypothesize that *X* is necessary for *Y*, but one has no idea of what variable *Z* is and hence no hypothesis about what might be sufficient for *Y*. How would one translate and test the *bivariate* relationship between *X* and *Y* with a bivariate statistical model? Brady's approach will not work, whereas his kind of test is easily accomplished using the tools of fuzzy logic.

When statistical researchers see a Boolean expression that includes the logical AND, such as $Y = A * B$, a natural response is to interpret it as representing a multiplicative interaction term (for a discussion of interpreting necessary conditions as interaction terms, see Clark, Gilligan, & Golder, 2006). This is also how Brady initially translates the logical AND into a statistical equation (see his Equations 4 and 5). In the book, however, we discuss the limitations of this analogy (see pp. 30, 58). Put simply, the aggregation procedure used with the logical AND in set-theoretic analysis involves Boolean multiplication using the "intersection" operator, not the multiplication of elementary arithmetic. Boolean algebra is not linear algebra.

Brady undertakes a quite interesting and important exercise in translation when he suggests that ideas about necessary and sufficient conditions can be formulated via production functions. He argues that the minimum typically used for necessary conditions (i.e., his Equation 7) can be arrived at through a slight generalization of the constant elasticity of substitution (CES) production function, which for mathematicians is known as the "generalized mean." At the extremes of the generalized mean lie the minimum and the maximum. These are well-known special cases in the literature on public goods (e.g., Cornes & Sandler, 1996), where the minimum is known as the weakest link and the maximum is known as the best shot. They are extremes from the "substitution" point of view because a necessary condition allows no substitution, whereas the maximum allows for complete substitution (Goertz, 2005, chap. 5). Hence, we agree with Brady that one way of looking at the minimum and the maximum is as special cases of a well-known production function.

At the same time, however, the limitations of the translation become apparent if one focuses on the distinctiveness of qualitative methods. In fuzzy logic, the minimum is the *largest* of a class of necessary condition aggregation functions.

By contrast, in the CES framework, the minimum is $-\infty$. The maximum is the *smallest* of the aggregation functions associated with sufficient conditions in fuzzy logic, whereas it is associated with a $+\infty$ parameter in the CES framework. The minimum and maximum are the go-to default aggregation procedures in set-theoretic approaches; the mean is not commonly used. In the CES framework, the minimum and maximum are what you arrive at when you take the generalized mean to infinity. Because of these and other differences, the CES framework fails to replicate crucial aspects of the fuzzy logic approach.[4]

Brady's Equation 8 illustrates something that is possible—CES with infinity parameters—but is almost never used in political science practice. In real existing research, which is the subject matter of our book, the weakest link production function is the natural choice in many important qualitative works (see Goertz, 2003, chap. 10). For example, Ostrom's (1991) famous work on institutions and collective action implicitly uses the weakest link production function, as does Kingdon's (1984) classic study of agenda setting. The same is true of utility functions, which are the flip side of production functions. Works on spatial voting and preference models normally use Euclidean distance (i.e., shortest distance between two points is a straight line). However, if one uses fuzzy logic to think about preferences, then one would almost never use Euclidean distance (for an extensive discussion of utility functions in this context, see Goertz, 2004). Rather, the default would be something like the fuzzy-logic S-curve discussed in our book (pp. 154-155).

In sum, Brady's translation captures important features of a set-theoretic and logic-based approach. Rather than simply dismissing or ignoring set-theoretic analysis, he took the approach seriously, and his Equation 8 captures the minimum and maximum as characteristics of a set-theoretic approach to nondichotomous necessary and sufficient conditions. Our reservations are (a) his translation does not capture all the features of a set-theoretic approach and cannot reproduce its findings, and (b) his translation yields models that do not reflect statistical practice in political science and sociology. A more faithful translation of the set-theoretic approach would have required a more complicated quantitative approach (for other efforts at translation, see, e.g., Braumoeller, 2003; Clark et al., 2006; Eliason & Stryker, 2009; Schneider & Rohlfing, 2012).

To frame this discussion using Elman's duck-rabbit metaphor, one can insist that Jastrow's image depicts only a duck: We can derive set-theoretic models using standard econometrics, and hence statistics embodies all of the features of set-theoretic analysis. Or one can argue that the image is both a duck and a rabbit: Although set-theoretic models and findings can be imperfectly replicated using econometrics (and vice versa), neither can be fully reduced to the other. As methodological pluralists, we think much progress will be made when all recognize that the image really does depict both a duck and a rabbit.

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Notes

1. Unlike Brady, we do not distinguish between *cultures* and *paradigms* in the book. We use these terms more or less interchangeably to refer to communities that share similar beliefs, concepts, values, goals, and tools.
2. For some of our own efforts at translation, see Goertz, Hak, and Dul (in press) and Mahoney (2008).
3. The second distributive law can be neatly visualized for sets with a Venn diagram of three overlapping circles. The law says $A + (B * C) = (A + B) * (A + C)$. The left-hand side of the equation marks the whole of set A plus the intersection of sets B and C, and the right-hand side marks exactly the same region.
4. An interesting exercise is to consider how one might translate core set-theoretic ideas such as "consistency" and "coverage" into statistical measures.

References

Braumoeller, B. (2003). Causal complexity and the study of politics. *Political Analysis*, *11*, 209-233.

Clark, W. R., Gilligan, M. J., & Golder, M. (2006). A simple multivariate test for asymmetric hypotheses. *Political Analysis*, *14*(3), 311-331.

Collier, D. (2011). Understanding process tracing. *PS: Political Science & Politics*, *44*, 823-830.

Cornes, R., & Sandler, T. (1996). *The theory of externalities, public goods, and club goods* (2nd ed.). Cambridge, UK: Cambridge University Press.

Eliason, S., & Stryker, R. (2009). Goodness-of-fit tests and descriptive measures in fuzzy-set analysis. *Sociological Methods and Research*, *38*, 102-146.

Goertz, G. (2003). *International norms and decision making: A punctuated equilibrium model*. Lanham, MD: Rowman & Littlefield.

Goertz, G. (2004). Constraints, compromises, and decision making. *Journal of Conflict Resolution*, *48*(1), 14-38.

Goertz, G. (2005). *Social science concepts: A user's guide*. Princeton, NJ: Princeton University Press.

Goertz, G., Hak, T., & Dul, J. (in press). Ceilings and floors: Where are there no observations? *Sociological Methods and Research*.

Hohn, F. E. (1966). *Applied Boolean algebra: An elementary introduction* (2nd ed.). New York, NY: Macmillan.

King, G., Keohane, R., and Verba, S. (1994). *Designing social inquiry: scientific inference in qualitative research*. Princeton, NJ: Princeton University Press.

Kingdon, J. (1984). *Agendas, alternatives, and public policies*. Boston, MA: Little, Brown.

Lewin, D., & Protheroe, D. (1992). *Design of logic systems* (2nd ed.). London, UK: Chapman and Hall.

Mahoney, J. (2008). Toward a unified theory of causality. *Comparative Political Studies*, *41*(4/5), 412-436.

Mahoney, J. (2012). The logic of process tracing tests in the social sciences. *Sociological Methods and Research, 41*, 560-590.

McCluskey, E. J. (1965). *Introduction to the theory of switching circuits*. Princeton, NJ: Princeton University Press.

Ostrom, E. (1991). *Governing the commons: The evolution of institutions for collective action*. Cambridge, UK: Cambridge University Press.

Schneider, C. Q., & Rohlfing, I. (2012). Does set-relational causation fit into a potential outcomes framework? An assessment of Gerring's proposal. *Qualitative and Multi-Method Research*, *10*(1), 8-14.

Zaks, S. (2011). *Relationships among rivals: Analyzing contending hypotheses with a new logic of process tracing*. Unpublished manuscript, University of California, Davis.

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