

Explanatory Typologies in Qualitative Analysis

Colin Elman, Arizona State University

Explanatory typologies are likely to be most valuable for qualitative analysis when scholars systematically apply shared techniques.¹ Drawing on a forthcoming article in *International Organization*,² this memo provides a brief account of steps used in working with typologies, and an accessible vocabulary to describe them. Two groups of techniques are of particular interest when refining typologies: compression and expansion.³

Compression facilitates working with multivariable explanatory typologies that would otherwise be too large and complex to be helpful. Five forms of cell compression are considered: *rescaling compression* (reducing the level of measurement); *indexing* (treating equal totals of additive causal variables as equivalent); *logical compression* (deleting cells that are the product of impossible or highly improbable combinations of variables); *empirical compression* (deleting empty cells); and *pragmatic compression* (collapsing contiguous cells if their division serves no useful theoretical purpose).

The expansion of a partial typology allows for the rediscovery of deleted cells. This permits the analyst to discover missed combinations and suppressed assumptions, and to identify important cases.

Finally, the memo considers the potential drawbacks of a typological approach, and argues that scholars must be mindful of the risks of reification and of relabeling anomalies. Explanatory typologies are prone to a form of reification, where the labels given to a typology's categories displace the underlying theory from which the typology was derived. A second problem is that empirical puzzles for a theory can sometimes be disguised by adding cells that name, but do not explain, the aberrant predictions. This amounts to the semantic relabeling of anomalies, not the development of better theory.

¹ Political science has benefited from several recent innovative treatments of qualitative methods, including King, Keohane and Verba 1994; Gerring 2001; Brady and Collier 2004; and George and Bennett 2005.

² Elman 2005. The article from which this memo was drawn benefited greatly from extensive critiques of several drafts by David Collier, Stephen G. Walker, Miriam Fendius Elman, James Mahoney, Gary Goertz, Reilly O'Neal, John Gerring, Bear Braumoeller, Lisa Martin, two anonymous reviewers, and the participants at the January 2004 Institute for Qualitative Research Methods at Arizona State University provided valuable comments.

³ Lazarsfeld 1937; Lazarsfeld and Barton 1965; and Barton 1955 prefer the labels "reduction" and "substruction" to compression and expansion.

Explanatory Typologies

Typologies have a distinguished history in the social and natural sciences, and discussions of what they are and how they work have generated a large body of literature.⁴ This memo focuses on what I will call explanatory typologies, by which I mean multidimensional conceptual classifications based on an explicitly stated theory.⁵

Explanatory typologies invoke both the descriptive and classificatory roles of typologies albeit, as noted in Table 1, in a way that incorporates their theoretical focus. At its most straightforward, the descriptive role builds types from the "compounds of attributes" of concepts.⁶ Each unique combination of the attributes of the included concepts provides a separate compound concept. Conventional usage arrays the component attributes in rows and columns to construct an associated property space. Every cell in that space captures a possible grouping of the attributes of the concepts being organized.⁷

In an explanatory typology, the descriptive function follows the conventional usage, but in a way that is heavily modified by its theoretical purposes. The constituent attributes are extracted from the variables of a preexisting theory. The dimensions of the property space (its rows and columns) reflect alternative values of the theory's independent variables, so each cell in the space is associated with predicted values of the theory's intervening or dependent variables.⁸ This association changes the descriptive question being answered from "What constitutes this type?" to "If my theory is correct, what do I expect to see?"

The classificatory function of typologies determines to which "type" a case can be characterized as belonging. Beginning with a typology, empirical data is coded as falling into one cell or another, guiding scholars to answer the question "What is this a case of?" The property space can

⁴ For overviews and reviews see, for example, Capecchi 1968; Nowotny 1971; Marradi 1990; Bailey 1972, 1973, 1992, and 1994; and Tiryakian 1968. Mastering this literature is made difficult by the proliferation of labels for different kinds of types, including extreme, polar, ideal, pure, empirical, classificatory, constructed, and heuristic. In addition, methodologists tend to invent new terms for the different components in their "typology of typologies," and to then compare their approach with previous treatments of other scholars. As a result, the choice of labels for describing the subset of typologies and typological procedures discussed in this memo is somewhat arbitrary.

⁵ The approach to typologies taken partly parallels J.W.N. Watkins' (1953) reading of Max Weber's "individualistic" ideal types. (See also McIntosh 1977, 267, n. 11; and Lindbekk 1992, 292-295. For different interpretations of ideal types see Albrow 1990; Burger 1987, 160-167; 2001; Clarke 2001; Hekman 1983; and Rogers 1969.) It is also sympathetic to, but goes beyond, Arthur Stinchcombe's (1987, 43-47) description of type-concepts and typologies. The approach is also consistent with that taken by Charles Ragin (2000, 76-87) but without adopting his Boolean data analytic strategy of qualitative comparative analysis (QCA) or fuzzy sets (ibid., 120-145; Ragin 1987).

⁶ Lazarsfeld 1937, 120.

⁷ Lazarsfeld and Barton 1965, 169.

⁸ See McKinney 1950, 238 and 1954, 164-169 on the relationship between theories and typologies. Note, however, that McKinney's "constructive typologies" are not always, or perhaps not even usually, theoretical in the sense used in this article. For example, while McKinney (1954, 195; 1966, 63) acknowledges that typologies can be derived from theories, he also suggests (1966, 63) that they can most usefully be constructed directly from the particularities of a historical situation.

be used to map, and compare, a population of cases by their respective scores on the component attributes of the typology.

In explanatory typologies, the classificatory function focuses exclusively on evidence that can arbitrate the theoretical claims being made. For example, analysts may investigate a case to determine whether there is the anticipated congruence between its scores on the typology's dimensions, and the predictions made in the cell in which the case is expected to belong. In addition, the analyst can use the location of cases in different cells as a guide to making the most productive comparisons for testing the underlying theory.

TABLE 1. Goals of Typologies

	Descriptive	Classificatory	Explanatory
Analytic Move(s)	Defines compound concepts (types) to use as descriptive characterizations.	Assigns cases to types.	Makes predictions based on combinations of different values of a theory's variables. Places data in relevant cells for congruence testing and comparisons to determine whether data is consistent with the theory.
Question(s) answered	What constitutes this type?	What is this a case of?	If my theory is correct, what do I expect to see? Do I see it?
Example	What is a parliamentary democracy as opposed to a presidential democracy?	Are Britain and Germany parliamentary or presidential democracies?	According to the normative variant of the democratic peace theory, what foreign policy behavior is predicted from a dyad of two mature parliamentary democracies? Do the bilateral foreign policies of Britain and Germany agree with that prediction?

An explanatory typology is based on an explicitly stated preexisting theory. That theory may have been originally derived inductively from observations, or deductively using ordinary language or formal methods. Regardless of how the theory was first produced, however, an explanatory typology is primarily a complement to deductive approaches, because filling in the cells requires working through the logical implications of the theory: given its posited causal relationships, what particular outcomes are associated with different combinations of values of the theory's variables? The dimensions of the property space are provided by the theory's explanatory variables, and the content of the cells come from the logic of the theory.

The focus in this memo is on how explanatory typologies can be helpful to qualitative scholars, who have traditionally combined language theorizing with the intensive study of a small number of cases using comparative ordinary case, process-tracing, and congruence-testing methods. Qualitative scholars can enhance both the development and testing of their theories with a more self-conscious application of typological procedures. With respect to theory development,

typologies are complementary to specifying configurative or conjunctive causation,⁹ describing equifinality or multiple sufficient causation,¹⁰ and building in temporal effects.¹¹ With respect to theory testing, typologies help scholars to identify the degree of casual homogeneity between cells,¹² and to engage in counterfactual reasoning.¹³

Explanatory typologies are likely to be most valuable in the qualitative study of international politics when scholars self-consciously employ typological techniques. To date, the international relations subfield has lacked an account of what analytic moves are available, an accessible vocabulary to describe them, and concrete examples of how these techniques can be applied. The next two sections of this memo build on Lazarsfeld and Barton to develop procedures for manipulating explanatory typologies, looking first at techniques for compression, and then for expansion.

Compressing the Number of Cells in a Property Space

Lazarsfeld (1937), building on Hempel and Oppenheim (1936), provided the seminal discussion of the different techniques for compressing a property space, later developing them further with Allen Barton.¹⁴ Lazarsfeld and Barton (1965, 173) define a "reduction" (what I am calling a "compression") as "any classification as a result of which different combinations fall into one class." As shown in Table 2, available compression procedures include:

Rescaling

The number of cells can be reduced by lowering the number of attributes for one or more of the theory's variables represented in the property space. For example, changing a four variable model from trichotomous to dichotomous measurement reduces the number of cells from eighty-one to sixteen.¹⁵ One thing to keep in mind when reducing the number of attributes is that each cell in the typology becomes more inclusive, hence potentially grouping cases which may not fit comfortably together.¹⁶

Indexing

Barton (1955, 46) observes that where multiple attributes "express essentially the same underlying characteristic or have their effects in the same direction" we can "give each category

⁹ Ragin 2000, 67—82. See Brady 2002 for an outstanding review of different models of causal inference.

¹⁰ Bennett 1999a, 9. See also Bennett and George 2001, 138.

¹¹ On such phenomena, see Pierson 2000, 2003 and 2004; Mahoney 2000; Buthe 2002; Thelen 2003; and Aminzade 1992. On typologies and time, see Nowotny 1971.

¹² See Munck 2004, 111; Nowotny 1971, 6—11; Rogowski 2004, 7; McKeown 2004, 13; Eckstein 1975, 117—20; and Przeworski and Teune 1970, 32—39.

¹³ Tetlock and Belkin 1996, 4. See also Fearon 1991; and Hempel 1965b, 164—65.

¹⁴ Lazarsfeld and Barton 1965; Barton 1955.

¹⁵ On levels of measurement see Stevens 1946, 1951 23-30, and 1959.

¹⁶ For discussions of the closely related issues of conceptual differentiation and stretching, see Sartori 1970; Collier and Mahon 1993; Collier and Levitsky 1997; Collier and Adcock 1999; Sartori 1984; and Gerring 1999. On the connection between concepts and classification, see Hempel 1965a, 138—139, 146—148.

on each dimension a certain weight, and add these together to get index scores for each cell." Indexing treats all combinations that receive the same score as equivalent, in effect "folding over the typology thus rendering formerly distant types equal."¹⁷ This technique presents more complex difficulties than its seeming simplicity would suggest, requiring arbitrary decisions on the appropriate weight for the high-mid-low rank on each attribute. It should also be noted that indexing presupposes that equal scores are equivalent. It may be that interaction effects between the different variables render this assumption problematic.

Logical Compression

There may be a connection between two or more of the typology's dimensions such that some combinations are logically impossible or highly improbable. If so, we can delete these cells.¹⁸ It should be noted that logical compression is a characteristic of the underlying theory, and it will almost always be an option to add an auxiliary assumption that will render an otherwise unfeasible prediction possible.

Empirical Compression

Some combinations of variables may be logically possible or not highly improbable, but there may nevertheless be no empirical examples of those combinations. If so, we may be able to delete these cells from the typology.¹⁹ This method of reduction raises a number of concerns. First, the analyst would need to have complete knowledge of the population of cases to make a determination that some cells were empty, and could be dispensed with. Second, each cell represents a combination of codings on a number of dimensions. A mistake coding just one of those dimensions would depopulate an otherwise occupied cell. Third, the technique conflicts with one of the benefits of using property space that derives from its representation of causal possibility: the discovery of counterfactual propositions. Reducing the space to empirically present cells undercuts that possibility. Finally, it bears mentioning that empirical compression does not imply a direct relationship between cell population and the utility of a cell in a typology. An outlier cell, with a single case, may provide a severe test of the theory.

Pragmatic Compression

Scholars can collapse contiguous cells if their division serves no useful theoretical purpose. Using pragmatic compression, "certain groups of combinations are contracted to one class in view of the research purpose."²⁰

¹⁷ Bailey 1994, 28.

¹⁸ Lazarsfeld 1937, 126; Lazarsfeld and Barton 1965, 173.

¹⁹ Bailey 1994, 27; Barton 1955, 46, 49; and Marradi 1990, 144.

²⁰ Lazarsfeld and Barton 1965, 174. See also Lazarsfeld 1937, 128; Bailey 1994, 27; Barton 1955, 45-46; and Marradi 1990, 144.

TABLE 2. *Techniques for Compressing Property Space*

Kind of Compression	Operation	Examples discussed in <i>IO</i> article
<i>Rescaling</i>	Reduce the level of measurement.	Rescaling ordinal dimensions nominally (Walt)
<i>Indexing</i>	Weigh different variables to combine them into a composite index where the same scores are treated as being equivalent.	Equality of different combinations of threat constituents (Walt)
<i>Logical Compression</i>	Eliminate cells produced by impossible or highly improbable combinations of variables.	Offensive advantage requires sufficient capabilities and proximity (Walt) There cannot be two regional hegemon (Elman) Small states and mid-powers cannot be unlimited-aims revisionists (Schweller)
<i>Empirical Compression</i>	Eliminate empty cells, i.e. cells which are empirically empty.	Absence of two multipolar regions, or a multipolar region without an insular state (Mearsheimer)
<i>Pragmatic Compression</i>	Collapse contiguous cells if their division serves no useful theoretical purpose.	Deleting proximity as a threat element when using balance of threat theory to analyze the connection between revolution and war (Walt) Reduction from eighteen to eight state types (Schweller)

The two reductions by Schweller are from his 1998 typology. The others are from my reconstructions of Walt 1987 and Mearsheimer 2001.

Expanding Property Space

Explanatory typologies can be constructed directly from a theoretical statement. They can also be rebuilt from analyses that already use a typology which has previously been minimized. This section considers the technique of expanding a property space from such a partial typology.

Expansion (what Lazarsfeld (1937, 132) calls "substruction") takes an underspecified typology, or one that is implied from the use of a sub-population of its types, and provides a full account of the associated property space by 'reverse engineering' the classification. The analyst works backwards to lay out the property space from which the partial typology is derived, and the type of reduction technique that was used to produce it. As Lazarsfeld (1937, 132) notes, the procedure does not assume "that the creator of the types really had such a procedure in mind. It is only claimed that, no matter how he actually found the types, he could have found them logically by such [an expansion]."

Typological expansion allows analysts to spot important combinations of attributes that were overlooked in the partial typology, and to draw attention to cases that need further attention.²¹ The procedure may also help theorists to make explicit the assumptions that were used by the original analyst to suppress particular combinations.²² The technique can be used to draw out the implications of a theorist employing outstanding "types" with different attribute clusters, or to expand a formal but reduced typology back to its complete specification.

For example, John Mearsheimer's *The Tragedy of Great Power Politics* (2001) argues that the best strategy for states to ensure their survival is sophisticated maximization of relative power.²³ This prediction is modified by geographical context, especially the stopping power of water. Noting that distance makes global hegemony virtually impossible, Mearsheimer moves his focus to the regional level. The best that a state can reasonably hope for is (a) to be a regional hegemon; and (b) to be the only regional hegemon.²⁴ The stopping power of water also makes island states like the United Kingdom relatively safe, and allows them to take a less interventionist role. Accordingly, while the theory applies to great powers in general,²⁵ Mearsheimer distinguishes between different kinds of great powers: continental great powers acting in their own region (e.g., France and Germany); insular great powers acting in their own region (e.g., the United Kingdom); and regional hegemons acting in other regions (e.g., the United States).

Expanding the explanatory typology implicit in *The Tragedy of Great Power Politics* demonstrates a lacuna in Mearsheimer's theory, and provides an opportunity for

²¹ Barton 1955, 53.

²² Barton 1955, 50.

²³ Mearsheimer 2001, 32-36.

²⁴ Mearsheimer 2001, 140-145.

²⁵ Mearsheimer 2001, 5; 403, n. 5.

additional analytic moves.²⁶ As displayed in Table 3, the kinds of state are represented in the rows, and the columns show whether the state is acting in its own or another region: the content of the cells are the states' predicted intra and extra-regional behavior. Continental great powers like Germany from 1862 to 1945 will seek regional hegemony in their own neighborhoods when the distribution of capabilities makes such ambitions feasible.²⁷ When they are unable to achieve this dominance, such states will still maximize their relative power to the extent possible by appropriating resources from other great powers while blocking other states' similar ambitions.

TABLE 3. Typology implicit in Mearsheimer's Tragedy of Great Power Politics

Type of Great Power	Exemplar	In-regional Behavior	Extra-regional Behavior
Continental great powers	Germany	Attempt regional hegemony while balancing against other states	Unclear. Case studies suggest balance against any would-be regional hegemons.
Island great powers	Great Britain	Balance against any would-be regional hegemons	Unclear. Case studies suggest balance against any would-be regional hegemons.
Regional hegemons	United States	Balance against other states to maintain regional hegemony	Balance against any would-be regional hegemons

The second kind of great power is an insular state— "the only great power on a large body of land that is surrounded on all sides by water."²⁸ Where located in a region containing other great powers that are vying for regional dominance, such island states will balance against the rising states rather than try to be regional hegemons themselves. Accordingly, states such as the United Kingdom act as offshore balancers, intervening only when a continental power is near to achieving primacy.²⁹ The third kind of great power in Mearsheimer's theory is one which has already achieved regional hegemony.

²⁶ Note that this redacted discussion only addresses an initial substruction of Mearsheimer's typology. Elman 2005 includes additional analytical moves and the expansion of a more complex explanatory typology.

²⁷ Mearsheimer 2001, 181-209.

²⁸ Mearsheimer 2001, 126.

²⁹ Mearsheimer 2001, 126-128, 261-264.

Such great powers are status quo states that seek to defend the current favorable distribution of capabilities.³⁰ The only example in the last two hundred years is the United State's dominance of the North American continent.³¹

The expansion of the implicit typology draws attention to a key omission in Mearsheimer's discussion of extra-regional behavior. While plainly predicting that regional hegemony will be robust offshore balancers, Mearsheimer is much less clear on whether the same holds true for continental and island great powers. While suggesting (ibid., 141) that great powers "strive to prevent rivals in other regions from gaining hegemony," the discussion following that statement focuses almost exclusively on the behavior of regional hegemony. Elsewhere (ibid., 251) the volume suggests that great powers at least try to balance against rising hegemony in other regions. The unclear treatment of extra-regional great power behavior is more than just a footnote for Mearsheimer's theory. The sole success story of the last 200 years is the United States. The only plausible balancers that might have prevented its rise were the European great powers. Without explicitly addressing the reasons for their failure to contain the U.S., the theory is unable to determine whether its achievement of regional hegemony is evidence that supports sophisticated power maximization as a sensible policy prescription.

Pitfalls in Property Space: Reification and Puzzle Relabeling

The cells in an explanatory typology are best seen as "containers" of predictions made by the underlying theory. Users of explanatory typologies have to avoid a form of reification,³² where cell labels themselves become free-standing "explanations," rather than the theory from which the property space was derived. To put it another way, in the context of an explanatory typology, reification occurs when a case is "explained" because we attach a name to it, not because a theory we have deemed valid is seen as being applicable to it. This is less likely to be a problem for the original developer of an explanatory typology, but may well be an issue for scholars who read and use the typology at one remove.

A second challenge is whether a typology is really explanatory, or is instead a form of semantic relabeling which displaces questions without really answering them.³³ Although framed here in the context of increasing the number of cells in a property space, this issue arises whenever theories are amended to cover known anomalies.³⁴ Philosophers of science worry that an amendment to a theory designed to address a puzzle may just be a move to protect it from falsification, and not real scientific progress.³⁵ Typically, a

³⁰ Mearsheimer 2001, 42.

³¹ Mearsheimer 2001, 141.

³² On the dangers of reification see Bailey 1994, 15; Tiryakian 1968, 179; McKinney 1954, 148-149.

³³ Vasquez 1997 makes a similar critique.

³⁴ This kind of 'iteration' between theory and evidence is often prescribed (see, for example, Bates et. al. 1998, 16; and Morrow 2002, 187-188) and hence the problem is likely to arise often.

³⁵ The best known discussion of this issue is Lakatos 1970.

concept is redefined, or an auxiliary hypothesis is added, to allow the theory to predict the anomaly.

One way of addressing this problem is to adopt a form of what Alan Musgrave (1974, 3, 7) calls the historical approach to confirmation of a scientific theory.³⁶ The historical approach suggests that we cannot determine whether evidence supports a theory solely on the basis of whether it "fits" the current iteration of the theory. It is not enough to ask whether the theory covers known anomalies. It is also necessary to track the trajectory of a theory as it develops, and ask whether amendments did more than just relabel empirical puzzles. The question would be whether the new categories provide additional value, signaled by the prediction of novel facts.³⁷

Conclusion

While political scientists commonly employ explanatory typologies in their analysis of international politics, the sub-field has not paid sufficient attention to the logic that underlies and justifies that usage, or to the different techniques that are available for expanding and compressing property space. While the procedures described in this memo may seem habitual, even intuitive, explanatory typologies are at their most powerful when they are used self-consciously. A more grounded approach will encourage rigor, enhance transparency, and increase the likelihood of producing cumulative results.

³⁶ See also Worrall 1978b, 321; and Mayo 1996, 254-256. It should be noted that the historical approach to confirmation looks for different categories of predictions, not evidence that predicted values of the same dependent variable are repeated in additional cases. To be sure, recurring tests of the same proposition are valuable because they offer evidence about whether a prediction is empirically accurate. As Robert Jervis (1985, 146) notes, "Scholars often look at many cases to see if a proposed generalization fits the data. [But t]his is a form of confirmation, not the discovery of new facts."

³⁷ Philosophers of science disagree on which standard of novelty to apply, i.e. they differ on the answer to the question: "novel compared to what?" Potential answers to that question include: strict temporal novelty (Lakatos 1970, 118; Zahar 1973, 101; Worrall 1978a, 46, and 66, n. 7; Frankel 1979, 24; Gardner 1982, 2; Nunan 1984, 275; and Hands 1991, 96); new interpretation novelty (Lakatos 1970, 188; Koertge 1971, 171, n. 5; Musgrave 1974, 11; Nunan 1984, 275; Carrier 1988, 207); heuristic novelty (Zahar 1973, 101; Lakatos and Zahar 1975, 376, n. 65); and background theory novelty (Musgrave 1974, 15-16; Worrall 1978b, 321-322; Mayo 1996, 208).

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