INTEGRATING SURVEY AND ETHNOGRAPHIC METHODS FOR SYSTEMATIC ANOMALOUS CASE ANALYSIS

*Lisa D. Pearce**

This paper describes how the salience of research findings can be enhanced by combining survey and ethnographic methods to draw insights from anomalous cases. Using examples from a research project examining the influence of religion on childbearing preferences in Nepal, the author illustrates how survey data can facilitate the selection of ethnographic informants and how semistructured interviews with these deviant cases leads to improved theory, measures, and methods. A systematic sample of 28 informants, whose family size preferences were much larger than a multivariate regression model predicted, were selected from the survey respondent pool for observation and in-depth interviews. The intent was to explore relationships between religion and fertility preferences that may not have been captured in the initial multivariate survey data analyses. Following intensive fieldwork,

the author revised theories about religion's influence, coded new measures from the existing survey data, and added these to survey models to improve statistical fit. This paper discusses the author's research methods, data analyses, and resulting insights for subsequent research, including suggestions for other applications of systematic analyses of anomalous cases using survey and ethnographic methods in tandem.

1. INTRODUCTION

Researchers sometimes elect to study a single research question using multiple methods. Using more than one approach reveals multiple pieces of evidence that serve as "building blocks" in the research endeavor (Lieberson 1992). Also, methods that vary in form and focus act as checks on one another, adding supplementary features and compensatory strengths to the mix (Axinn, Fricke, and Thornton 1991; Burgess 1982; Denzin 1970; Massey 1987; Sieber 1973). This complementarity may be achieved by allowing a set of different research methods to interactively evolve, using one to inform the other, strengthening the overall research process, yielding richer data, and increasing the depth of insight for interpreting the findings. This paper demonstrates how using survey methods to systematically select anomalous cases for ethnographic study can lead to improved theories, suggest alternative measures, and reveal sources of error in the methods being used.

Studying anomalous cases often leads to important refinement of social theories and measurement strategies (Kendall and Wolf 1949; Lazarsfeld and Rosenberg 1949–1950). This approach of studying anomalous cases has been coined *deviant case analysis*. A well-cited example of this approach is the analysis of a union organization characterized by a high level of democratic procedures in Lipset, Trow, and Coleman's (1956) *Union Democracy*. The authors highlight how the "internal politics" of the union cause it to deviate from the predictions of Michels's iron law in an attempt to refine theories of organizational power structures. Other examples include Burgess and Cottrell's (1939) study of couples for which marital adjustment was incorrectly predicted. They found that personality factors played a big role in marital adjustment and needed to be included in the theories and models leading to prediction. Merton (1946) found that not all radio listeners with close relatives in the armed services were vulnerable to the Kate Smith war-bond selling marathon accounts of sacrifices that soldiers were making in the war. He discovered that those who

were unaffected by the accounts of soldier sacrifice were unaffected because their close relatives were stationed in safe areas such as the United States or other inactive theaters. This led Merton to readjust his classification scheme and compare respondents with close relatives serving in the armed forces in places of danger to all other respondents. Through intensive interviews with a subgroup of a large sample, Kahl (1953) discovered that parental pressure to attend college had as much influence on some young men as the more common predictors—socioeconomic status and IQ. These are examples of how deviant cases inform researchers about how predictive schemes can be expanded and how inadequate measurement strategies can limit predictive power.

The logic behind deviant case analysis continues to motivate a wide variety of ethnographic studies aimed at developing and/or refining theories. In studies of criminal motives and emotions, Katz (1988, 1999) advocates an analytically inductive approach that invites the confrontation of negative cases so that theory can be continuously revised. Agar (1996) speaks of continually "checking" recurrent themes and using falsifications to revise theories. Burawoy et al. (1991) suggest an approach called the *extended case method* in which a researcher finds a case that contradicts an existing theory and then uses findings from an in-depth study of the case to reconstruct the theory instead of rejecting it. These approaches are all useful applications of the logic that studying anomalous cases can lead to valuable knowledge regarding the shortcomings of theories and models.

The majority of studies employing the logic of deviant case analysis to improve theories are of an intensive nature, focusing on one or two individuals, groups, organizations, and/or countries. In this paper, I suggest that further applications of deviant case analysis can be developed by combining survey analysis and sampling techniques with ethnographic methods to identify and study cases that seem anomalous to predicted patterns. The suggestions for ways to identify and sample anomalous cases from representative survey data provide a unique way for ethnographers to pinpoint subgroups of a population that are difficult to locate. The rich information provided by ethnographic analysis of these anomalous cases reveals a depth of understanding rarely achieved by standard survey research methods. This is not to say that other approaches to studying deviant cases or to combining survey and ethnographic methods are flawed. Instead, this paper is meant to inspire new methodological possibilities that can widen the range of options for studying social dynamics.

The procedures discussed here are illustrated with a study of fertility preferences in Nepal; however, the approach itself can be tailored to fit other substantive research interests. In addition, while the study described in this paper ultimately uses insights from semistructured interviews to modify survey measures and models, other situations may call for different ethnographic methods to be used or for the ethnographic analysis itself to be the core focus. In other words, I hope that readers will see a set of possibilities that could be applied to their primary research interests and methods while reading this piece.

The approach presented here is motivated by ideas that surfaced a few decades ago to encourage continued creativity in the interaction of survey and ethnographic methods. Kendall and Wolf (1949) suggest that, "Through careful analysis of the cases which do not exhibit the expected behavior, the researcher recognizes the oversimplification of his theoretical structure and becomes aware of the need for incorporating further variables into his predictive scheme" (pp. 153–54). Commenting on this, Sieber (1973) writes, "But often the researcher does not have in hand the additional information necessary for measuring the further variables. Since it is extremely rare for a survey researcher to reenter the field for intensive interviewing after the completion of a survey, the needed information is almost never collected." The approach described in this paper explicitly searches out the "additional information necessary" by using information available from regression diagnostic techniques employed during initial survey analyses to locate anomalous cases and then sending the researcher back into the field to do follow-up interviews with these cases. The results support the call for continued creativity in the design of multimethod research projects in the advancement of a holistic social science.

The outline of this paper is as follows. I first briefly describe the background for the specific research project in which I used systematic anomalous case analysis; I will continue to refer to this example throughout the paper. Second, I discuss the mechanics of and benefits to systematically sampling anomalous cases from survey data analyses for further investigation. Third, I describe the fieldwork I conducted. Fourth, I illustrate three types of useful insights that can be drawn from in-depth study of anomalous cases. I show how findings from this ethnographic part of the study can help revise theory, suggest new measurement strategies for subsequent survey analyses, and reveal sources of measurement error. Finally, I conclude with suggestions for how this type of approach can be applied in a wide variety of settings.

2. SETTING UP THE STUDY: RELIGION AND CHILDBEARING PREFERENCES IN NEPAL

The research used in this paper to demonstrate this particular application of combining methods examines the influence of religion and other factors on childbearing preferences in Nepal. The basic sequence of methods went as follows. First, multivariate models of factors affecting family size preferences were designed and tested using survey data. Second, regression diagnostic tests of these models were used to identify a list of statistical outliers as potential ethnographic informants. From this list, 28 ethnographic informants were selected. Next, in-depth interviews and observations were carried out with these informants. Insights gained from these interviews were then used to recode survey data and to suggest additional predictors in the multivariate survey analyses.

The survey data used in the survey analyses described here are from the 1996 Chitwan Valley Family Study (CVFS). These data come from a survey administered to a probability sample of 5,271 men and women between the ages of 15 and 59 living in the Chitwan Valley of south-central Nepal. The survey collected data on current attitudes and preferences as well as past experiences and behaviors regarding a variety of demographic and social processes.

For the study here, I focus on two groups among the CVFS survey respondents: a *pre-family formation group* of unmarried men and women, aged 16–25 years ($n = 959$), and a *completed fertility group* of married men and women, aged 45–59 years, who had at least one child ($n = 864$). For each group, I specified a preliminary model to predict family size preferences.

The dependent variable for both preliminary statistical models was a scale created from a set of questions designed by Lolagene Coombs (1974) to ascertain ideal family size. The first item in the Coombs Scale measure was as follows: "People often do not have exactly the same number of children they want to have. If you could have exactly the number of children you want, how many children would you want to have?" Using this ideal number as a basis, subsequent questions attempted to further delineate preferences. The second item was: "If you could not have exactly [the number the respondent gave] children, would you want to have [one number lower] or [one number higher]?" The answer to the second question was then used in a third question: "If you could not have [the second choice number] of children, would you

want to have [one number lower] or [one number higher]?" Figure 1 displays the options a respondent has when answering the Coombs Scale questions. Depending on the path a respondent followed in answering these questions, she or he was coded as somewhere between a 1, representing the lowest underlying ideal family size preference, and a 25, representing the highest underlying family size preference. Treating the Coombs Scale as an interval level measure, I developed ordinary least squares (OLS) regression models to predict Coombs Scale scores for each of these two groups.

For the pre-family formation group, the model takes into account religio-ethnic identity, the importance of religion, gender, age, number of siblings, parents' ability to read, education, media exposure, travel to the capital city or another country, expectance of an inheritance, and the hours from the home to the nearest urban area. The estimates from this model are displayed in the first column of estimates in Table 1.

The preliminary model used to predict family size preferences among the completed fertility group of CVFS respondents is displayed in the second column of estimates in Table 1. The predictors used in this model are similar to those used in the model for younger, unmarried respondents, except that age at marriage and number of children ever born to the respondent are included as control variables.

In developing these preliminary models, I tested a variety of models to arrive at one that best explained the relationship between religion and childbearing preferences for each group. This process began with simple models and then moved on to model the influence of religion as a combination of one's religio-ethnic identity and the importance of religion in one's life. In the end, two dummy variables were created for each of the five religio-ethnic groups in these models, one representing those in each group who felt religion was very important, and a second for those who placed little or no importance on religion. The reference category in this model is High Caste Hindus who find religion very important. The other variables in the models are controls selected on the basis of theories of fertility preferences and results of previous research. The adjusted R^2 is .09 for the pre-family formation group model and .12 for the completed fertility group model. Because the focus of this paper is not on these substantive results, they are not discussed in detail here. The focus is instead given to how this multimethod approach for studying childbearing preferences was conducted.

First preference

Second preference

Third preference

Coding of Coombs Scale
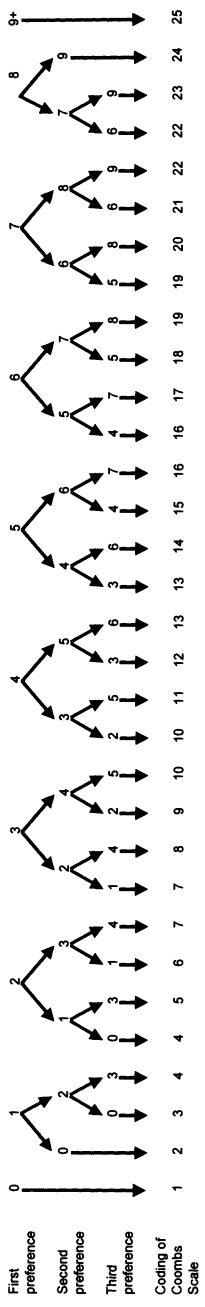
FIGURE 1. Response alternatives and coding scheme for Coombs Scale family size preference measure.

TABLE 1
Preliminary OLS Estimates from Models of Family Size Preferences
Among Two Subsamples of the Chitwan Valley Family Study

Religio-Ethnic Group by Importance of Religion[a]	Coombs Family Size Preference Scale			
	Pre-Family Formation Group (Unmarried, Ages 15–29)		Completed Fertility Group (Married, Ages 45–59)	
High Caste Hindu				
Finds religion unimportant (0,1)	−.20	(1.22)[b]	−.26	(.65)
Low Caste Hindu				
Finds religion important (0,1)	−.74*	(2.18)	−.34	(.93)
Finds religion unimportant (0,1)	−.75**	(2.42)	−.76	(1.29)
Hill Tibeto-Burmese				
Finds religion important (0,1)	−.56*	(2.18)	−.22	(.70)
Finds religion unimportant (0,1)	−.20	(.88)	.39	(.72)
Newar				
Finds religion important (0,1)	.17	(.45)	.49	(1.09)
Finds religion unimportant (0,1)	−.14	(.50)	−.35	(.41)
Terai Tibeto-Burmese				
Finds religion important (0,1)	.22	(.86)	1.18***	(3.22)
Finds religion unimportant (0,1)	.19	(.75)	2.61***	(4.97)
Controls				
Gender (female = 1)	−.59***	(4.68)	.03	(.11)
Respondent's age	−.05*	(1.98)	.05*	(2.07)
Number of mother's children	.06*	(1.93)	.05	(1.46)
Mother and/or father could read (1 = yes, 0 = no)	−.04	(.38)	−.45*	(1.90)
Education (highest grade completed)	−.11***	(4.80)	.01	(.27)
Age at marriage	.03	(1.21)		
Number of respondent's children ever born	.16***	(3.49)		
Newspaper and radio exposure scale	−.19*	(2.28)	−.33*	(1.92)
Travel to Kathmandu or other country (1 = yes, 0 = no)	−.19	(1.48)	−.22	(1.01)
Expecting inheritance from parents (1 = yes, 0 = no)	.00	(.01)	−.43*	(1.86)
Travel time to Narayanghat	−.05	(.78)	.22*	(1.86)
Intercept	8.05		3.61	
Adj R-squared	.09		.12	
N	959		864	

[a]Reference group is High Caste Hindus who find religion important.
[b]T-ratios in parentheses.
*p < .05
**p < .01
***p < .001 for one-tailed t-tests

3. SYSTEMATICALLY SAMPLING ANOMALOUS CASES

Researchers wanting to be able to reliably generalize findings from any type of study to a larger population must achieve a representative sample of that population (Kish 1965). For many ethnographic studies, a representative sample is not the goal and other types of sampling procedures are useful (Babbie 1992; Strauss and Corbin 1990). However, when the ability to safely generalize about the anomalous cases in a study is desirable, one approach is to systematically select a sample of these deviant cases using regression diagnostic tests from survey data analyses to provide a sampling frame. Information available from the data and diagnostic tests of its analysis can help identify subgroups of the population who are of great interest and who are otherwise very difficult to locate.

The aim of this project was to gain a deeper understanding of the relationship between religion and childbearing preferences by identifying cases that were incorrectly predicted and studying these cases in depth to look for limitations in theory, measures, and methods. Although data analysts may view statistical outliers as dubious in value and may even exclude them from their analyses, I show here that outlier respondents may offer information that can help researchers improve preliminary models and increase their scope of applicability. Therefore, for this study, I randomly selected, interviewed, and observed a set of informants drawn from CVFS survey respondent outliers with the intent of uncovering new factors linked to religion and family size preferences in this region.

For all CVFS respondents in both the pre-family formation and completed fertility groups, I computed residual values, or the difference between the Coombs Scale Score predicted by the preliminary model and their actual answers to the survey questions. The residual value distributions for both models were graphed using SAS. Figure 2 displays the distribution of residual values for the pre-family formation group.

I was particularly interested in learning more about respondents in both groups who desired more children than the preliminary statistical model predicted. Therefore, respondents from the right tail of the residual distribution were selected for further study. For both groups, respondents whose residual values were approximately two or more standard deviations to the right of the mean residual, zero, were identified as outliers. Among the pre-family formation group, the outliers consisted of 31 respondents with residual values of +3 and higher, or those who scored at least 3 points higher on the Coombs Scale than the statistical model predicted.
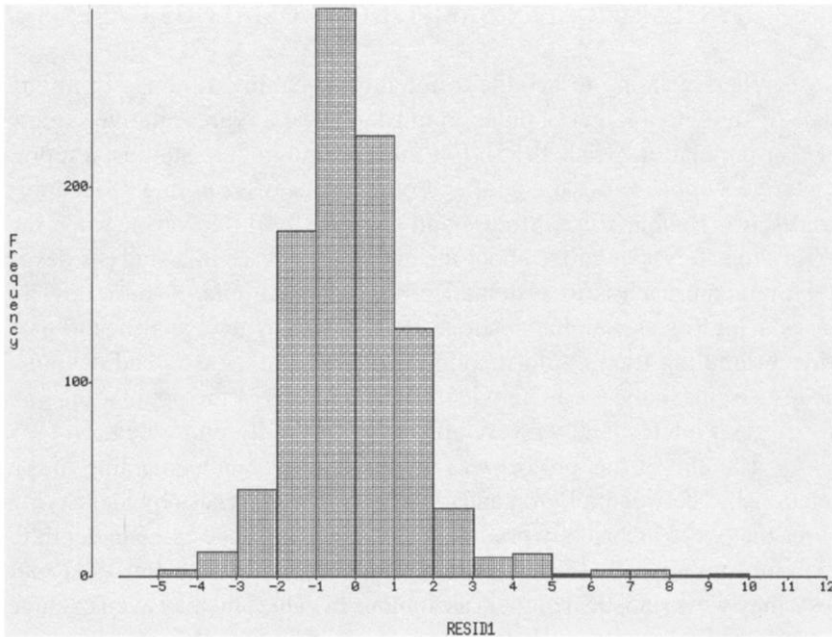
FIGURE 2. SAS Graph displaying the distribution of residual values for Coombs Scale measure of family size preference among pre-family formation group (ages 15–29).

Among the completed fertility group, the outliers consisted of 31 respondents with residual values of +6 and higher.

   To check for spatial patterns among the outliers, each outlier's neighborhood was plotted on a map of the study area (Figure 3). Clusters of outliers in a particular area may suggest residential variations in the social processes under study. No strong spatial patterns were found for either set of outliers in this case, but for other topics of study, this may be a useful technique to identify key locations for ethnographic inquiry.

   To generate random samples from each of the preliminary regression models, I first categorized each group of outliers by gender; seven men and seven women were then randomly selected from each of the two groups. These 28 informants served as the sample of ethnographic informants used to learn more about religion and childbearing preferences from the perspective of model outliers.

   In addition to providing a sampling frame, another way that survey data can be a useful tool for beginning fieldwork is by providing a source

Pre-Family Formation Group
 ○ 1
 ○ 2   Number of outliers in neighborhood
 ○ 3
Completed Fertility Group
 ■ 1
 ■ 2   Number of outliers in neighborhood
 ■ 3
 ☐ Strata Boundaries
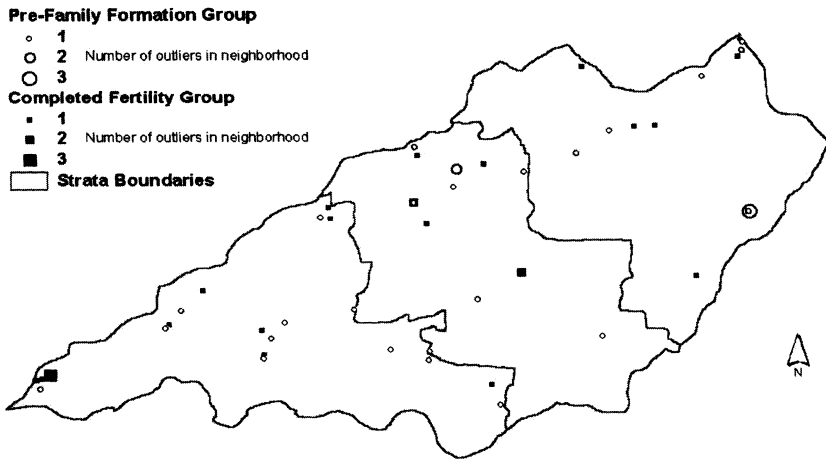
FIGURE 3. Residential location in the CVFS study area of statistical outliers from two preliminary regression models of family size preference.

of valuable information about informants. This can help in preparing for interviews by suggesting important topics to discuss, making it easier to physically locate informants, and providing a preestablished rapport with the informants. For example, before meeting informants, I examined and made notes to myself about their completed questionnaires and life history calendars from the 1996 CVFS survey. Although spending time with informants and members of their social world is vital to understanding the dynamics of their lives, and certainly influences the direction and shape of the interview, the availability of biographical information before an interview allows for important preparation. A life history calendar, for instance, reveals past events such as moves, parental separations, or periods of school dropout that can be explored in greater detail during an interview.

The maps and records kept by the survey project staff made locating respondents relatively easy. Also, the selected informants were familiar with the staff interviewers who accompanied me to the field and served as interviewing assistants. Because a good rapport had been established with the informants during previous CVFS data collection projects, the informants were more open and at ease during my fieldwork. Of course, these kinds of benefits are only as good as the survey research project with which a more qualitative study is linked. If the CVFS records had

been incomplete or wrong, or if the interviewing staff had established poor rapport with respondents, the survey study would have made my field-work harder, not easier, and perhaps would have tainted my findings. For this type of integrated design, it is important to carefully choose a survey research project with which to collaborate.

4. THE FIELDWORK

Once the anomalous cases are sampled, the ethnographic fieldwork begins. This is when cases that have not been predicted correctly can speak back to the process and suggest improvements in theory, measures, and meth-ods (Horst 1955). A variety of intensive methods—such as participant observation, unstructured interviews, content analysis, archival studies, and others—can be employed at this stage to gain a full and rich under-standing of the factors involved with these anomalous cases.

   For the project discussed in this paper, I spent five months living in the field, observing, and carrying out semistructured interviews. Analysis of these interviews is the main focus here. Averaging about 90 minutes, the interviews took place in Nepali and a native Nepali-speaking assistant came to each interview in case translation problems arose. Each interview began with the three structured survey questions on ideal family size that make up the Coombs Scale, the dependent variable from the analyses of CVFS survey data. A substantive issue was how informants' answers to these questions in this interview would vary from their answers during the original survey, nearly two years earlier. After this structured inquiry, I probed in an unstructured manner about the informant's personal family size preference and issues related to family size in general. I also engaged informants in a discussion of religious beliefs and practices, asking them about their own as well as those of their family and friends, and making note of the specific words they used to compare people. By the end, 27 of the 28 selected informants were interviewed.

   During each interview, I took detailed notes.[1] Interview or field notes have two important uses. First, the researcher can examine the notes many times during and following the interview phase, exploring content for themes and meanings common among the anomalous cases (Agar 1996;

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[1]In initial interviews I tried using a tape recorder, but the informants seemed distracted by its presence. This led me to rely on interview notes. However, I would recommend, whenever possible, using a quality recorder to tape interviews and mak-ing full transcripts for data analysis.

Spradley 1979; Strauss and Corbin 1990). In a comparative approach, non-deviant cases could be selected for in-depth analysis as well, and the themes and meanings could be compared to those found when studying the deviant cases. Second, the researcher can code and count themes that emerge in the unguided reading of notes to quantify various meanings or phenomena (Emerson, Fretz, and Shaw 1995; Miles and Huberman 1984). For example, I used my notes to count the number of times a particular phrase was used or idea mentioned to gauge the strength of an attitude, belief, or behavior. Both kinds of analysis helped identify underlying issues and the common language of informants, and thus informed subsequent hypotheses. Because I was interested in applying these findings in subsequent survey measurement and analysis, I used the ethnographic findings to improve statistical analyses and their interpretations. It is the analysis of these in-depth interviews, or other ethnographic methods used to study deviant cases, that reveals the knowledge needed to refine theories, measures, and/or methods for whatever the next research step may be.

5. USING ETHNOGRAPHIC INSIGHTS TO REVISE THEORIES, MEASURES, AND METHODS

The in-depth study of anomalous cases can provide meaningful insights on three levels. First, researchers may be able to uncover additional factors that had not previously been considered (Kendall and Wolf 1949; Sieber 1973). Second, intensive deviant case analysis can reveal ideas for refining the measurement of key variables if further survey data analyses will be conducted (Kendall and Wolf 1949). Third, the ethnographic study of anomalous cases can reveal methodological phenomena responsible for the cases' deviance and suggest ways to correct for these problems in the future (Horst 1955).

Gathering and analyzing field notes sharpened the project examined here in several ways. First, I learned more about the dynamics of religious influence in Nepal, and from this deepened understanding, I was able to code new, more informed measures of religion from the survey data for further analyses. Second, I realized the pervasive effect of family planning media messages on individuals in Nepal, which also led to new measurement strategies in my statistical analyses. Finally, I was reminded of important methodological issues and how they can influence the fit of survey data to a statistical model. I developed a better understanding of sources of error and what they mean for the study of anomalous cases.

5.1. *Revising Theories: New Dimensions of Religion*

For the preliminary survey data analyses of religion and childbearing pref-
erences, relying on theories about religion's impact, I had hypothesized
about how various dimensions of religion would influence childbearing
preferences. First, I expected that each different religio-ethnic group was
characterized by a distinct formulation of religious meanings. Next, I
hypothesized that respondents in all religio-ethnic groups would vary in
the extent to which religion was a salient part of their identity. I also rea-
soned that, above and beyond an individual's religious identity, the level
of religious belief and activity within the community in which the respon-
dent lives would have an influence on childbearing preferences. Initial
findings did not support the hypothesis about community-level effects.
Also individual-level beliefs and practices did not have the effect I had
hypothesized among the younger respondents. Therefore, one priority of
my fieldwork was to ask questions and explore issues around the form,
function, and meaning of religion in the study area.

   Throughout my interviews and observations, I often noted the influ-
ence of the religious beliefs and practices of senior members of house-
holds. Especially during my interviews with the pre-family formation
group, I realized that young people define their religious identity mostly
as a reflection of their mother, father, or a grandparent. If a young person
visits a temple or performs a religious rite in the home, it is often with
other family members. When I asked informants where they learned their
religious beliefs, or why they worship a particular god or goddess, they
most often cited the traditional beliefs and practices of their parents and
other family members. When I asked if they saw themselves as more reli-
gious or less religious than their parents, all the pre-family formation infor-
mants responded that one or both of their parents were more religious.
The majority of religious activity was either led or practiced alone by the
matriarchs of the family, although in many cases fathers and grandfathers
were quite religious as well.

   Shanti,[2] an 18-year-old High Caste Hindu, described how religious
worship of Hindu gods and goddesses within her home was a form of
religious education.

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   [2] All personal names have been changed to protect the identity of my
informants.

> My parents teach *dharma* (religion) to me. Each morn-
> ing I do *puja* (worship) with my mother to *Ganesh* (a
> Hindu god). Then, in the evening, I worship five *devis*
> (gods) with my father. When I pray with my mother or
> father, *ghan* (knowledge of religion) comes to me.

From conversations like this one, I learned that religion in Nepal is very family-centered, and that young family members were expected to gradually learn from time to time rather than always being preoccupied with religious activities or thoughts. Particularly for young adults in this setting, religious identity seemed to be based largely on the religious practices and beliefs demonstrated in their families. This led me to reevaluate my theoretical framework and incorporate more ideas about the levels of religious influence above individuals' own religiosity, especially about the impact of family members' religiosity.

Discovering the importance of religion at the family level, I used the survey data to create measures reflecting the household religious environment. Because the CVFS contains interviews with all members of a household between the ages of 15 and 59, it was possible to use the survey responses of all family members on their religious practices and beliefs to create average household-level measures. For example, I created household measures for the average frequency of visiting religious temples and the average importance given to death rituals.[3] I used these measures to predict childbearing preferences.

Model 1 in Table 2 displays the results from a revised model, predicting family size preferences among the younger age group, which includes a measure of the average frequency with which household members visit religious temples and the measure of average importance of death rituals among household members. Both measures have a positive and statistically significant effect on family size preferences. That is, the more often family members visit temples and the more strongly they believe in the importance of death rituals, the more children an individual desires. These measures contribute to the higher adjusted R^2 for this model (.11) than for the preliminary model in Table 1 (.09), suggesting that these measures help explain the influence of religion on childbearing preferences.

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[3] I also created measures of mothers' religiosity and the religiosity of the oldest female in the household. The measures of average household religiosity had stronger effects, so I chose to use those in my analyses. In addition, this allowed me to keep respondents who had no elder female relatives living in the household in the analyses.

TABLE 2
Revised OLS Estimates from Models Predicting Family Size Preferences Among Two Subsamples of the Chitwan Valley Family Study

	Coombs Family Size Preference Scale			
	Pre-Family Formation Group (Unmarried, Ages 15–29)		Completed Fertility Group (Married, Ages 45–59)	
Religio-Ethnic Group by Importance of Religion[a]	Model 1	Model 2	Model 3	Model 4
High Caste Hindu				
Finds religion unimportant (0,1)	−.05 (.31)[b]	−.01 (.07)	−.20 (.50)	−.19 (.48)
Low Caste Hindu				
Finds religion important (0,1)	−.65* (1.91)	−.69* (2.04)	−.30 (.76)	−.26 (.65)
Finds religion unimportant (0,1)	−.52* (1.67)	−.57* (1.83)	−.72 (1.20)	−.26 (.65)
Hill Tibeto-Burmese				
Finds religion important (0,1)	−.49* (1.91)	−.50* (1.94)	−.12 (.39)	−.09 (.28)
Finds religion unimportant (0,1)	.01 (.03)	.03 (.13)	.48 (.87)	.46 (.83)
Newar				
Finds religion important (0,1)	.27 (.67)	.29 (.77)	.50 (1.10)	.49 (1.09)
Finds religion unimportant (0,1)	.02 (.07)	.05 (.17)	−.40 (.46)	−.42 (.49)
Terai Tibeto-Burmese				
Finds religion important (0,1)	.49* (1.84)	.55* (2.08)	1.29*** (3.32)	1.21*** (3.07)
Finds religion unimportant (0,1)	.56* (2.07)	.03 (.13)	2.74*** (4.93)	2.25*** (3.82)

Household Religiosity				
Household members' average temple visits per month	.68*** (3.76)	.70*** (3.87)	.30 (1.00)	.40 (1.32)
Household members' average importance of death rites	.43* (1.70)	.45* (1.79)	-.13 (.30)	-.17 (.40)
Controls				
Gender (female = 1)	-.60*** (4.74)	-.62*** (4.89)	.01 (.05)	.03 (.10)
Respondent's age	-.05* (1.95)	-.06* (2.14)	.05 (2.00)	.05* (1.81)
Number of mother's children ever born	.05* (1.85)	.05* (1.89)	.05 (1.34)	.05 (1.30)
Mother and/or father could read (1 = yes, 0 = no)	-.04 (.33)	-.05 (.39)	-.48* (2.03)	-.46* (1.91)
Education (highest grade completed)	-.12*** (4.75)	-.11*** (4.80)	.01 (.18)	.00 (.03)
Age at marriage			.03 (1.24)	.03 (1.21)
Number of respondent's children ever born			.16*** (3.58)	.17*** (3.63)
Newspaper and radio exposure scale	-.23** (2.76)	-.33*** (3.40)	-.33* (1.89)	-.34* (1.77)
Travel to Kathmandu or other country (1 = yes, 0 = no)	-.19 (1.48)	-.17 (1.36)	-.23 (1.06)	-.22 (1.01)
Received/expects inheritance (1 = yes, 0 = no)	-.02 (.10)	-.03 (.16)	-.45 (1.93)	-.45* (1.91)
Travel time to Narayanghat	-.02 (.28)	-.02 (.27)	.24* (1.99)	.20* (1.67)
Intercept	6.90	7.16	3.45	3.68
Adj R-squared	.11	.12	.12	.10
N	958	953	859	827

[a]Reference group is High Caste Hindus who find religion important.
[b]T-ratios in parentheses.
*p<.05, **p<.01, ***p<.001 for one-tailed t-tests

119

An *F*-test comparing these two models confirms that the revised model is a statistically significant improvement over the initial model at the $p < .001$ level.

     Model 3 in Table 2 displays the revised model of family size preference for the married, older respondents. Including the household-level measures of temple visits and the importance of death rituals did not change the adjusted R^2 (.12), and thus does not improve the predictive value of this model over the preliminary model. This is not particularly surprising given that interviews with the pre-family formation group brought the influence of elder relatives' religiosity to my attention.

5.2. *Revising Existing Measures: Media Influence*

Every informant in both groups who responded to the Coombs Scale questions during the interview with me (22 of the 27 interviewed) gave an answer lower than the response they had given two years earlier. In many cases the answer they gave was very close to what the statistical model predicted for them. Figure 4 plots three scores for 12 of the 14 members
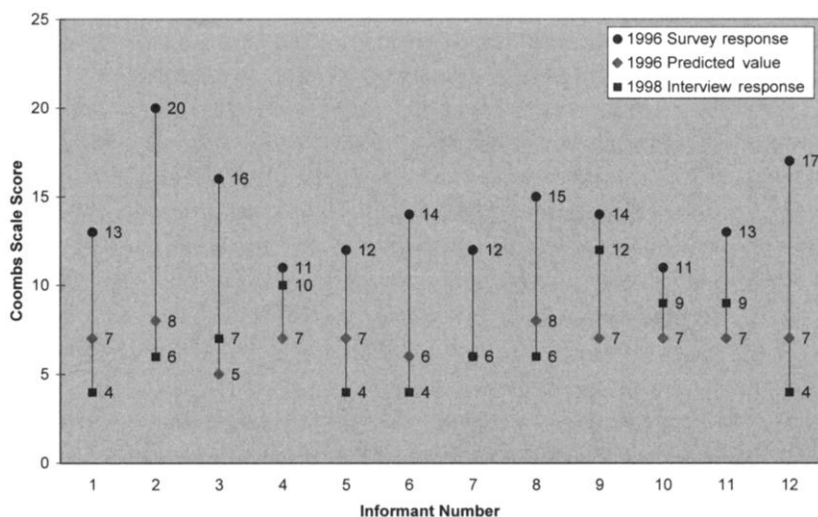
FIGURE 4. Comparison of Coombs Scale scores for 1996 survey responses, 1996 predicted values, and 1998 interview responses of unmarried informants (ages 16–25).

TABLE 3
Mean Coombs Scale Responses for Two Subsamples of Outliers:
1996 Survey Response, 1996 Predicted Value, and 1998 Interview Response

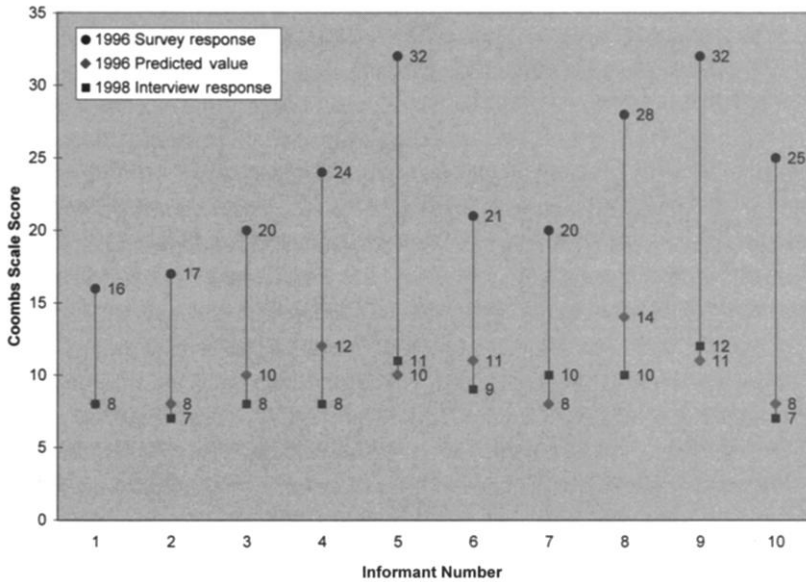|	Coombs Scale Score (1–25)		
	1996 Survey Response Mean	1996 Predicted Value Mean	1998 Interview Response Mean
Pre-family formation group	13.64	6.86	6.75
Completed fertility group	22.86	10.64	9.00

of the pre-family formation group:[4] the original score derived from their responses to the Coombs Scale questions on the 1996 survey, the predicted score derived from my preliminary model, and the score derived from their responses to the Coombs Scale questions in the 1998 interview. The 1998 Coombs Scale scores for all these informants are significantly lower than those calculated from the 1996 survey data, and match much more closely the score predicted by the preliminary model. Table 3, which presents group means for the three scores, provides an overall picture of this pattern.

Figure 5 plots the three Coombs Scale scores (1996 survey score, predicted score, and 1998 interview score) for 10 of the 14 members of the completed fertility group.[5] The same pattern is evident for these respondents: Their scores fall significantly two years after the survey, coming very close to the score that the statistical model predicted for them. The means for the three Coombs Scales scores, presented in the bottom row of Table 3, illustrate this. Drawing on my analysis of interview texts, I determined that one possible cause of this uniform decrease in preferences might be the influence of recent family planning media campaigns.

During the unstructured portion of all of the interviews, I initiated discussions with informants about ideal family size and the changes in their responses over time. I noticed similarities in how informants described their reasons for wanting a small number of children during the inter-

[4]There was one informant I could not locate and one who repeatedly refused to give answers to the Coombs Scale questions.

[5]Four informants were uncomfortable answering the Coombs Scale questions; their interviews provided insight on the cognitive challenges these questions can pose.

FIGURE 5. Comparison of Coombs Scale scores from 1996 survey responses, 1996 predicted value, and 1998 interview responses for married respondents with children (ages 45–59).

views. For instance, 5 of the 13 unmarried young adults used exactly the same phrase, *dui jana thikai chha* (two children are good), and several other informants used similar phrases. One informant remarked, "Having two children will bring me happiness." Several unmarried informants who had taken English language courses used the words "quality versus quantity" in the midst of sentences in Nepali. One informant spoke of a teacher at her school who had explained the benefits of investing in fewer children; another stated that she wanted only two children who would both be *thulo manche* (important people). Overall, 20 informants discussed the financial advantages of raising fewer children, such as cutting down on the cost of food, clothes, and schooling, and distributing land among fewer adult children.

In probing the source and significance of these phrases and common language, I learned that informants were aware of family planning slogans featured in newspapers and magazines, on billboards, and on radio or television. These messages overtly encourage families to limit their

family size to two children. The one that was most often quoted word for word during my interviews was the one mentioned above: *Dui jana thikai chha*. Three other messages that were common in the media and expressed in different variants during my interviews were *Dui bhanda badi santan dhann dhau dhau parchha* (It is difficult to raise more than two children), *Buddhiman babu ama le dui bhanda badi santan janmaudainan* (Wise parents do not give birth to more than two children), and *Dui bhai thikka; dherai bhai dikka* (Two children are just right; many children mean trouble). On the radio, a thrice-weekly drama promotes small families as happier than large families because more can be invested in each child and it is easier to feed them, send them to school, and keep them healthy.

It is logical to posit that if exposure to these kinds of messages influenced the language with which informants discussed their attitudes about family size, it may also have influenced their responses to the Coombs Scale questions. And if media exposure to these messages affected responses, then perhaps the outliers had less exposure in 1996 than they did in 1998. Therefore, the ethnographic findings suggested going back to examine more survey data for answers.

The CVFS data provide evidence that outlier respondents had less media exposure than other survey respondents in 1996. Table 4 reports the means and statistical tests of difference for various media-related mea-

TABLE 4
Average Media Exposure of the Outliers and Nonoutliers from
Preliminary Models of Family Size Preferences

	Outliers (N = 62)	Nonoutliers (N = 1792)	Difference of Means T-Test Results
Frequency of reading the newspaper (0–3)	.82	1.04	+
Frequency of listening to the radio (0–3)	2.06	2.21	+
Ever listened to family planning programs (0,1)	.63	.72	+
Frequency of watching television (0–3)	1.34	1.64	*
Household owns a radio (0,1)	.42	.48	

+P < .10, *P < .05

sures for the original group of all outliers from which I sampled infor-
mants and for all other CVFS respondents. The outlier respondents had
significantly less exposure than all other CVFS respondents on four of the
five measures. Outliers read the newspaper less often, listened to the radio
less often, watched television less often, and were less likely to listen to
family planning programs on the radio. Their households were also less
likely to own a radio, but this difference is not statistically different. There-
fore it is possible that the media campaigns promoting small families, and
two-child families in particular, had less influence on these outlier respon-
dents than on other participants in the 1996 survey. Another possibility is
that the frequency of family planning messages in the media increased
from 1996 to 1998 and so even if these respondents' frequency of media
exposure was unchanged, they became exposed to more messages about
fertility limitation.

     No survey data are available to examine changes in media content
or exposure among outlier respondents during the two years between the
CVFS survey and the interviews. However, given the wide use of phrases
and rationales for small families in my interviews that echoed those in the
family planning media, it is likely that media exposure had some reduc-
tive influence on their Coombs Scale scores in 1998.

     Although my preliminary models included measures of newspaper
reading and radio listening, I was convinced by what I learned from the
interviews and my observations of television programming to expand the
measure of media exposure to include data on the frequency of television
watching. I had not initially included television in my media measure
because I did not know how common it was to watch television in this
area, and I did not realize that there were such overt messages on televi-
sion regarding ideal family size. This is an example of how ethnographic
observation and interviewing corrected the false assumptions that I had
made about the situation. This is one of the most valuable benefits ethno-
graphic fieldwork brings to the research process; being able to put the
researcher more directly in the shoes of those being studied helps avoid
fatal biases (Becker 1996; Blumer 1969).

     Models 2 and 4 in Table 2 incorporate the revised measure of media
exposure. As shown in Model 2, when television watching is added to
media exposure for the pre-family formation group, the coefficient
increases from $-.23$ to $-.33$, and the adjusted R^2 increases from .11 to
.12, suggesting that this revised measure improves the predictive value of
the model for the unmarried group. For the completed fertility group, how-

ever, adding television viewing to the measure increases the coefficient only slightly, from $-.33$ to $-.34$, and decreases the adjusted R^2 from .12 to .10. Overall, this age group may watch less television than the younger group, which would lessen the impact of adding it to the media exposure measure.

At this point, some would argue it was not necessary to have used multiple research methods to arrive at the findings about the importance of family members' religion and the wide reach of media campaigns. It is possible that these ideas could have emerged from an independent ethnographic study in a Nepalese village or from running survey data analyses on every possible variable in the data set, but the possibility remains they would not. In fact, an experiment by Sieber (1973) indicates that both surveys and ethnographic fieldwork tend to miss findings that the other type of method can more easily bring to light. For example, high-quality survey research provides the power to do a variety of comparisons across large groups but is limited in its ability to find new ideas or suggest misunderstandings of concepts. Ethnographic methods are better at revealing new information and the rich context of issues under study (Brannen 1992).

5.3. Understanding the Methods: Sources of Error

When considering other reasons for obtaining different responses to the same questions at two points in time, another factor to be weighed is survey error and its various sources. Survey data are subject to errors in validity, errors in reliability, and interviewer effects. These different types of error hold important implications for studying extreme cases from survey data.

Validity. A survey item is considered valid if it measures what it is intended to measure (Carmines and Zeller 1979). Problems of differential validity arise when some respondents have a different way of understanding a survey question than others. For example, some respondents may misunderstand the question or may not be used to the cognitive process involved in formulating an answer (Caldwell 1985; Caldwell, Hill, and Hull 1985; Sudman and Bradburn 1974).

Evidence from the interviews conducted here suggests that a few of the outlier respondents from the survey did not fully understand the Coombs Scale questions or how to formulate responses. For a few of the older completed fertility group informants, the confusion over the ques-

tions seemed to be based in their skepticism that fertility could (or should) be planned. This may emanate both from the fatalistic nature of the dominant Hindu culture in Nepal (Bista 1994) and from the relative novelty of modern birth control methods in this setting. An older man named Shyam typified the response of five other older informants to the questions about family size preference. He chuckled and replied: "People cannot have the exact number of children they want. It is not up to us. We have the number of children that we have." When these informants were asked to consider whether they would want one more or one less child if they could not have the number they had in reality, they seemed uninterested in rethinking their past and how they would do it differently if they could. Even those who formulated a response to the Coombs Scale questions often added a condition. This happened in five out of 14 cases. For example, an older High Caste Hindu woman said that she would choose two sons and one daughter as her ideal, but that "people do not usually get what they wish for."

    When members of the completed fertility group had a difficult time answering questions about the ideal number of children to have, I asked them questions about their own children and what it was like raising them. During these discussions, a few informants said that they would have done things differently if they could have, or if they had known what they know now. In fact, some of them said they advise their children to have smaller families and use family planning methods. Therefore, some of these informants were probably outliers in the original survey because they had not understood how to answer a question about the ideal number of children when asked by a survey interviewer. However, once they discussed many of the issues surrounding childbearing in an unstructured way they were more comfortable discussing the possibility of a family size different from the one that they had.

    In the larger research process, one benefit that can emanate from this mixed-method approach is the researcher's ability to use the intensive interviews as an opportunity for detecting problems of differential validity. During fieldwork, a researcher can adapt the interview process to make the measuring tool more valid for all respondents and incorporate this in subsequent surveys or interviews.

Reliability.   The reliability of a survey item is the degree to which repeated measures will yield similar responses. Problems with reliability come from random errors. Sometimes a random shock will result in an unexpected

response to a particular survey item (Carmines and Zeller 1979). For example, a respondent may be tired, not pay attention to a question and give a nonsensical answer, or a coder might make an error. For some of the outliers selected in the project described here, the high residual value may have been due to a random shock causing an accurate measurement of an atypical state in the subject, an inaccurate measurement of a typical state in the subject, or a combination of both. Revisiting these types of outlying respondents, either with a repeated survey or ethnographic interviews, helps us to understand how to reduce these types of random error.

  For the research project discussed in this paper, one explanation for the change in family size preferences given between the two interviews may be the phenomenon of regression to the mean. This occurs when a random shock causes an extreme value response once, but repeated observations result in more expected or consistent results. For example, among my informants, there may have been someone who heard the question wrong and thought they were being asked to state the number of children they actually had, which may have been more than they now feel is ideal. In biomedical clinical trials, researchers have found that subjects selected on the basis of having unusually high or low values of a particular measurement will tend to have values closer to the population mean in subsequent measurements (Beath and Dobson 1991). To test this effect among the outliers, similar interviews would need to be conducted with a subset of CVFS left-tail outliers whose family size preferences were much lower than predicted in 1996. If an increase in media exposure was playing a role, I would expect to see still lower Coombs Scale scores. If regression to the mean was at work, I would expect these left-tail outliers to have higher scores that were closer to the population mean. A test of this effect is beyond the scope of this paper, but I find it plausible that both factors are at work, meaning there may be some regression to the mean *and* increased media exposure may be lowering fertility preferences in this context.

  The possibility that regression to the mean is partly responsible here suggests that a more complex sample design is desirable for systematically sampling anomalous cases. The limit to the particular sampling approach used in my case was that no informants were selected from the opposite tail of the residual distribution or from the small residual cases. This limited the ability for comparisons between the informants I interviewed and others who wanted fewer children than the model predicted, or others who wanted exactly the number of children the model predicted.

For future studies of this kind, unequal probability sampling may be a better approach. One could pick respondents for ethnographic reexamination by randomly sampling the original survey data cases, giving each case a sample selection probability proportional to the error (or squared error) of its residual in the statistical model. This type of approach would generate ample extreme cases, from both ends of the continuum, while simultaneously including cases with less extreme residual values that would make it possible to distinguish regression to the mean effects from other types of change.

Interviewer Effects.   Research methods that require face-to-face interaction inherently involve interviewer effects (Bradburn 1983; Lyberg and Kasprzyk 1991). Interviewer effects can lead to response bias. Therefore, another hypothesis for why all 22 informants who responded gave lower answers during the 1998 interviews than they did two years prior is that my presence in the interview had an effect. The 1996 CVFS survey interviews were conducted in person by a trained staff of local Nepali interviewers. In the case of my unstructured interviews, the informants probably had few, if any, prior interactions with a woman from the United States, which may have made them feel less open with their responses. Also, any similar interactions would probably have been with Westerners working for nongovernmental organizations promoting family planning and/or development projects, which may have motivated them to describe a low family size preference to me. In addition, whether or not they had any such previous interactions, the informants may have known about low fertility rates in countries such as the United States, and they were probably aware that I was studying population issues. Although I tried to establish a nonjudgmental presence, the outlier informants may have felt that the desired response was to express preference for a smaller number of children (Bradburn 1983; DeMaio 1984).

　　　　When methodological errors produce outlier respondents in survey data, subsequent ethnographic interactions with these respondents may provide little substantive insight for theoretical or analytical revisions of the sort discussed earlier. However, these types of cases do bring to light important ideas for improving sampling, survey instruments, and data collection efforts in the future. Therefore, a value still exists in sampling these types of deviant cases, and it is important to try to understand the processes leading to the definition of each particular case as anomalous.

6. CONCLUSION

As described in this paper, there are several benefits to integrating survey and ethnographic methods to learn from anomalous cases in a population. First, a large-scale survey can provide a useful sampling frame from which to systematically select deviant cases as ethnographic informants. Regression diagnostics are a unique way to identify a sampling frame from which one can systematically select a sample of ethnographic informants who can provide much theoretical and methodological insight. Second, access to informant characteristics measured in the survey data enables researchers to learn valuable information prior to observations or interviews. This information can help researchers prepare for interviews by suggesting conversation topics or probes and by providing background and context descriptions. Also, survey data collections can help by establishing prior rapport with informants and by providing records explaining where to locate them. Finally, the insights that emerge from ethnographic study lead to improved theories, measures, and methods which can then inform subsequent survey data collection and/or analysis. In the example used here, developing new measures of religion and media exposure significantly improved a regression model's ability to explain variance in family size preferences among the young, unmarried adults in the sample.

The lessons learned from this specific study can benefit those interested in using a similar approach for their own work. First, careful attention must be given to the sampling procedures. Unequal probability sampling is strongly suggested to obtain informants from both extremes as well as from the pool of cases for which the model works well. This allows for the comparisons that are necessary to understand the sources of each anomalous case's deviance. Second, during the ethnographic field study of the selected informants, attempts must be made to distinguish which cases are anomalous because theories were misspecified and which cases are results of errors in validity, reliability, or interviewer influence. There is much to be learned from the multiple types of outliers.

In this study, anomalous cases were selected based on their residual values. In other words, these are cases in which the observed value of the dependent variable was very different from the value predicted by the model. These are the types of cases referred to in most standard deviant case analyses. However, based on a modern regression diagnostics modeling framework, cases can also warrant investigation when their indepen-

dent variable values give them undue influence over the model.[6] Future
systematic analyses of anomalous cases should sample cases with both
large residuals and values for independent variables that have dispropor-
tionate influence. This is because a large residual is not as much of a con-
cern if the values of the independent variables do not exert undue influence
on the model, and disproportional influence of independent variable val-
ues is not worrisome when the case's residual is low. Selecting anomalous
cases requires careful consideration of the statistical issues surrounding
extreme cases.

Hopefully, this paper encourages others to think of ways to tackle
other research topics and questions with similar methods. There are many
studies in the United States and abroad that could incorporate these meth-
ods in an attempt to push theoretical and analytical processes further than
what can be achieved with one method.[7] The opportunities are great for
using the well-designed methods of regression diagnostic techniques to
suggest cases that could teach us more about a wide variety of phenomena
in the social world.

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     sity of Chicago Press.

[6] When using the statistical package SAS for data analysis, the DFBETA test
statistics will identify cases that are having undue influence on the model due to a
particular independent variable value.

[7] For example, an anonymous reviewer of this paper has suggested that one
might run models using an existing representative data set to predict the probability of
marriage for black women. This would involve performing regression diagnostics and
selecting a range of informants using unequal probability methods to generate enough
anomalous cases for ethnographic analysis. Then, an ethnographic study of these cases
could lead to a better understanding of the meaning of marriage and relationships for
these women. A study like this could point to factors that cause current predictive
models to fall short.

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