Non-Nested and Nested Cases in a Socio-Economic Village Study

By Wendy Olsen

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Abstract

In socio-economic research the case-study method offers advantages because it enables mixed-methods research to have a systematic element yet acknowledge the deeply qualitative nature of relationships in society. This paper focuses on a causal analysis in which some relationships involve nested cases (e.g. people in households) and some involve non-nested cases (e.g. class vs. caste). The south Indian village context where fieldwork was conducted offers a specially non-homogenous group of people. The methods used in this paper are cluster analysis to reduce the data to a manageable outcome variate, fuzzy set causal analysis with a mixture of fuzzy and crisp sets to look at causal mechanisms, and qualitative interpretation of interviews. Throughout I am explicit about the techniques and methods involved. The case-study method poses a stark contrast to statistical generalisation, falsification, and qualitative grounded theory. Instead we have analysis, retroduction, and discovery.

Biography

Wendy Olsen works as Senior Lecturer in Social Science Research Methods in the Institute for Development Policy and Management at the University of Manchester. She is the author of *Rural Indian Social Relations* (Oxford, 1996) and co-author of *The Politics Of Money* (Pluto, 2002, with Hutchinson and Mellor). She has published papers on critical realism in various journals. She wrote an entry on *Poverty* for the *Dictionary of Critical Realism* (Routledge; ed. M. Hartwig). In Salford, Wendy is on the management committee of two local centres for unemployed people and women. She visits India for her fieldwork, and she speaks Telugu. She is particularly interested in normative themes in social research.

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1. Introduction

In this chapter several data-management issues are brought to the foreground in a study of social class and workers' behaviour in south India. This case-study based research project used a variety of local face-to-face means to explore a complex rural situation. Both class in terms of employment relations and asset hierarchies in a place riddled with high economic inequality were part of the background of the study. In this section I'll define social class and the aims of the chapter, but the next section gives a more detailed review of the data and methods used in the study. Sections 3 and 4 explore causality in this context. They look specifically at the outcome variable 'resistance' measured as a fuzzy set in a village using 39 household cases. The complexity of the relationship between persons and households is so great that some people give up using the case-study method and prefer, instead, the two extremes of 'qual' and 'quant' research: either a smaller number of personal investigations, or a secondary statistical analysis of survey data. But the case-study method sits nicely in between these two extremes and I will show that a lot has been learned through our case-study research. Section 5 discusses the methodology further . Here I stress that the findings for classes-and-villages illustrate non-nested cases with very small N (2 villages and 5 classes). By contrast the household-and-individual relationships offer us nested cases with N=39 households. This research is also grounded in a larger random-sample study of 187 households in the same two villages. Overall, in this chapter, both the challenges and the advantages of the mixed-methods case-study approach are exposed.

Social class is usually defined in western countries in terms of how an individual's occupation or employment fits into a status hierarchy. In India, social class studies are rooted in the Marxian analysis of bourgeois, petit-bourgeois, and worker classes in mixed agrarian-capitalist societies (Patnaik, 1976). Based on these grounding principles, social class studies usually take into account assets, employment relations, and the status or stability of employment. The unit of analysis is the individual. For adapting this framework to a rural Indian situation, I would stress that the unit of ownership for assets is traditionally the household and indeed the wider patriarchal extended family (Agarwal, 1994). In India, women are widely excluded from personal ownership of land (Swaminathan, 2002; Jejeebhoy and Sathar, 2001). Social class can be defined at the household level using (again) a mixture of assets, employment relations and the status or stability of employment of the dominant occupation or highest-earning employment in the household. This method tends to mask women's labouring experiences and is andro-centric. In short, class can be operationalised either at the individual level or at the household level. Conceptually the work is similar, but empirically the results are very different. Change over time is also differentiated because of the very different sex-sterotyped patterns of occuations whether we are considering a western country scene or south Indian rural scene.

To handle the class and nested class issues, we decided to use Excel to hold survey data on persons and on households, notebooks to contain fieldnotes and family history notes, NVIVO to hold interview transcripts from MP3 sound recordings, and other software FS QCA to study the patterns in some of the data. The case-study method

did not restrict us to a single level (persons, households, classes, or villages). Instead with this range of software it enabled us to make connections and get a deeper understanding across the levels. Indeed the use of the word 'levels' is mainly metaphorical here (Heil, 2003). A higher level builds upon a lower level, but each level also suffuses and constitutes the other level so it is never clear – even where there is a hierarchy – that there is an 'up' or a 'down'. Thus it is not only true that classes consist of persons, but also that class relations are more than just a sum of persons. Classes have their own properties, their own history, their own tendencies and liabilities. I treat the farmer class, worker-with-land class, and worker class in some detail in the paper. Is class 'above' the worker? Or is it a fundamental grounding social structure upon which the worker glides through life? I do not see class as dictating or deterministic. However it represents a set of powerful causal mechanisms that are embedded into many social relationships. So although the 'levels' metaphor fails as a literal description of where class sits vis-à-vis the person, it is useful in data management. We create Serial Numbers for each person and then carry these through into the household data and various other lists. We also have household serial numbers 1-39 in this instance. Whereas there are lots of people, there are only a few classes (here five for the village context).

To complete my overview of the nested and non-nested aspects of this case-study research, consider two other sets of cases – local self-help groups and villages. We used Excel spreadsheets to hold background data such as a list of all the women members of the Microfinance Self-Help Groups for the two villages we were working in. This list had the women's real names and their household addresses. We then matched up members to the other data we have in questionnaires. We soon found a few errors in the Micro-finance Self-Help Group lists, such as women of high caste status who were listed in the membership lists as being Dalit. A Dalit person is one who comes from the families who, according to traditional Hindu thought, were considered very low status, beneath the caste set-up, and ritually polluting to the touch. In the 19th century, many Hindus used to avoid contact with Dalits, but Gandhi (1869-1948) called them Harijans (God's People) and worked to free them from caste-ism. In 1947 the newly created Indian state banned all caste-based discrimination. Still today, high-caste people can try to pretend to be Dalit or "backward caste" to get benefits that are part of reverse discrimination policies; and dalits cannot successfully pretend to be high-caste because there is still intimate, implicit, and widespread caste discrimination. The phrase "forward caste" is sometimes used to group together some of the "higher" castes such as Brahmins and landlord castes into a supposedly structurally privileged group. The data on self-help groups revealed that caste is a live issue in ways not mentioned during our interviews.

The second spreadsheet lists data horizontally for each of 187 households randomly chosen from the two villages. Call the villages Smallville and Bigville for simplicity (*Chinnapalli* and *Peddapalli* being their pseudonyms). They lie in western Chittoor District of Southern Andhra Pradesh. The state has 76 million people, of whom about 7% are Muslim. We need random samples sometimes to get good estimates of the local proportions who are Muslim (also 7%), proportion having membership in a self-help group (around 40%), and other important socio-economic variables.

The 39 households and couples who are reported on in the case-study research are a sub-set of the 187 households in the survey questionnaire dataset. Within the SPSS

data for 187 households, all individuals are listed and their education and health is recorded. Thus persons are nested all neat and tidy within households. But classes cut across households and, in a sense (taking gender into account), households cut across classes. For example this arises if you have a woman with a salaried job in a farming household. The man's 'class' is F (Farmer) but the woman's class is S (Salaried). It is hard to classify such a household's social class. Ontologically the classes are distinct. Households are non-nested with [individualised] social classes.

Nested case relationships have a 1-to-n format when notated mathematically. They are easy to record in database software such as Access, but we have preferred to use the much simpler Excel software to manage the households-and-persons data. Non-nested case relationships have an n-to-n format. In QCA we have techniques for studying both nested and non-nested cases at the same time.

2. Data and Methods

The analysis of case-study data with small or medium 'N' cannot test hypotheses using statistical inference because there are not enough cases. Indeed as a realist I am sceptical of hypothesis testing because it does not sufficiently allow for the exploration of data, the discovery of new themes through insight, or the existence of dialectics in society (Danermark, 2001; Byrne, 2002). However, if one wants to do hypothesis testing, it might take the form of testing whether a factor X is causal for an outcome Y, in various configurational contexts, using QCA. I tend to test a hypothesis within a wider context of retroduction and exploration. The three are summarised below in bullet points:

> **Hypothesis:** resistance to employers' demands is strongly associated with having a lot of assets, high social class, high education and specific assets. This hypothesis was rejected for the two villages.
> **Exploration:** Using interview data, what factors emerge as important aspects of the relationships between land-owners and workers in the land and labour markets? The answer in these villages includes resistance, exiting to migrate, conformity, and secret sources of power of workers.
> **Retroduction:** what factors seem to have occurred that were either necessary or sufficient to cause resistance among workers? No particular single factor was consistently either necessary or sufficient. However among non-workers, resistance was absent due to the absence of the exploitative wage-labour relationship; so class was very important. Among workers, those with some land or other assets were more commonly able to resist landlords' demands. However they also conformed to landlord demands.

The data for this study arise from a study involving data triangulation: a survey and interviews. I reviewed literature from five schools of thought and then set up the topics of semi-structured interviews for piloting. The questions were adapted after piloting   and   can   be   found   online   (see www.ruralvisits.org/TenantsStudyResearchDesign.htm). I already held survey data from 1994 for the two selected Indian villages, using a sample of 115 households drawn randomly from lists of village households (Olsen, 1997). From this sample, 26

households were relocated during 2006, and for these, plus 13 more, a new questionnaire was completed in 2006 using face-to-face structured interviewing. The questionnaires covered land and other assets, land tenancy, the household members' education, usual work, and secondary work if any. The 1994 set of questionnaires had also covered labour, land tenancy, and credit extensively (available from ESRC Data Archive along with 1994 interviews with 20 women). The 2006 questionnaire survey also included ten Likert scale attitude questions about their views on different forms of agricultural labouring such as exchange labour, casual labour, child labour. Data about the previous year's crops were also recorded in the questionnaire.

The respondent in the 2006 survey was an adult *person*. Male and female 'respondents' were randomly sampled from among the random-sample list of households, but data on all household members were collected. Thus the individuals are nested inside the households. A serial number identifying households was used alongside a number and a name indicating each individual. Pseudonyms were added for each individual adult in the 39 households selected for interviews.

From the 1994 survey, the household social class in 1994 was worked out and compared with social class of household in 2006. We (the research team) used the social classes of worker, worker with land, small farmer, landlord, salaried household, and self-employed trader. A worker with land may either own or rent that land, and their employment is not restricted to casual wage labour. Instead, the people in worker-with-land households also worked as 'farmer', *ryot* in Telugu. They like to perceive themselves as peasants. However the 'farmer' class are those who not only class themselves as *ryots* but also do not do any paid wage-labour. When selecting 39 households in 2006, salaried and merchant households were avoided because the study was focused on labouring and land rental. However a few households later were found to have regular salaries coming in. In practice the boundaries between these three agrarian classes were fluid and permeable. For the 26 households that can be traced from 1994 to 2006, mobility by social class is very low (Kendall's Tau-a 0.27, significance 1.9%, showing an ordinal association). There are signs of increasing poverty due to the bad conditions for agriculture in the years 1996-2006. The distribution of the five main social classes among the quota sample interviewed in 2006 appears in Figure 1 and Table 1.

>>FIGURE 1 HERE<<

In Figure 1, vertically we have a fuzzy set of household education (see Ragin, 2000; Ragin *et al.*, 2006). If all adults of a household had high school education or higher, and the children were in school, the fuzzy set was 1.0, and if all were illiterate and not in school the fuzzy set was 0.0. In between we use the numbers 0.17 or 0.33 to indicate that some adults were illiterate but that either the kids were in school or at least one adult had primary school education (more for the 0.33 level). Completing the ordinal variate, we set the markers at .67 and .87 if all kids of school age were in school but not all the adults had any education (this fuzzy set method is described in broad terms in Ragin, 2008, and Rihoux and Ragin, 2008; education sharing by proximity is described by Basu and Narayan (2001). This vertical axis represents the household's overall access to human capital (formal education). Meanwhile, the horizontal axis represents the assets of the household. Again an ordinal fuzzy set was arranged: 0 for no assets, 1 for having land and 3 of the following: bulls/cows, a well,

a tractor, buffaloes. In between 0.17 reflected having sheep or goats only; 0.33 for a radio, T.V., or bicycle as well as a small animal; 0.5 for any cow, bullock, or buffalo; 0.67 for any land possessed (besides the house plot); and 0.87 for land plus at least two of the other possible assets. The horizontal and vertical rankings are strongly associated with social class itself (Kendall's tau-a 0.41 for class by assets, p=.0001; and Kendall's tau-a 0.29 for class by education at household level, p=.0044). In each case n=39 and we have 99% confidence in a pattern of association.

Education is only weakly associated with class itself in this non-random sample. The non-randomly selected sample of 39 households is biased toward class 2, the workers with a little land. Further details of the sampling and class structure can be found in Olsen (2008a). Quota sampling was used to get strong contrasts between types of household including a range of farmers and workers in both villages.

The interviews were coded in NVIVO software, and a 'casebook' of household attributes was created. During our analysis we studied whether strategies could be read off from – and were caused by – the structural location of a household in the caste-class system. This proved impossible because strategies themselves are so complex (Olsen, 2008a). The actions embedded in a strategy mean different things depending on whether the household wanted to leave agriculture, or expand their farming. Some families tried to diversify within agriculture, too. Thus even the renting of land proved to have several meanings ranging from a desperately poorly-paid form of agricultural work to a source of self-confidence and autonomy and finally to exciting investment plans (e.g. new silk or sugar producers).

I coded within each interview a series of types of acts which are typically either 'conformist' or 'resistant' within the local social milieu, with respect to casual daily-paid work (known as '*kuulie*' work in Telugu, the local language; *kuulie* often has a negative connotation). The conformist acts include doing unpaid labour for the employer at their house; accepting late payment for casual-paid wage labour; acting respectful toward them; and accepting work from several different employers. The resistant acts reported included refusing to do the unpaid work when asked to by a landlord; renting land in order to avoid kuulie work; and picking a preferred employer over one whose behaviour is considered bad. Arguing with the landlord was coded as resistant, while criticizing the landlord's behaviour but accepting that one must go on with them was coded as conforming. A variety of other conformist and resistant acts were found, too. 'Exit' was another strategy used by many labourers who had (or had a wife or son) migrated to a nearby town or city for work. These are still workers, but they exit the kuulie labour market. Notable also were innovative acts like growing silk or renting land with tamarind trees, precisely to get revenue without doing kuulie wage labour. Another category, Avoiding, was used to code those who perceived that they had arranged to evade the labour market altogether through self-employment or a salaried job. Joining local women's groups was coded as 'Joining'. In each case the number of different *types* or *incidents* of an act, within a category, were counted up. Incidents were not counted twice, and repetitions (which were rare) were ignored.

The act types are summarized in Table 1 along with some structural fuzzy sets during the calibration process. Owning cows was reduced to a 0/1 binary (a crisp set). Owning land (measured in acres) was calibrated as the assets fuzzy set. However the wetland component of owned land was combined with renting in wet land in order to

create a fuzzy set 'wet access'. This is operational irrigated land and takes the values 0 if none, .87 if up to 1 acre, and 1 if ≥ 1 acre. For me as a sociologist, the assets and education variables represented background structural factors which were likely to be causal mechanisms for labour-market outcomes. Assets would be associated with the class structure, and education would reflect the background class structure as well as recent opportunities for developing human capital and cultural capital. The idea of these two 'variates' existing at household level reflects the widespread sharing of such resources within the family group. Thus individual ownership is nested and hidden within these two fuzzy sets. A third fuzzy set of 'wet land access' also reflected a type of asset that has recently grown in importance due to predominant groundwater shortage and strong rain fluctuations from year to year.

>>TABLE 1 HERE<<

>>TABLE 2 HERE<<

In Table 2 you see a variety of variables used in this study. The web site www.ruralvisits.org contains more details about the study.

To simplify the outcomes from six to one, I expected to be able to create a fuzzy set ranging from 'very resistant to landlords' to 'very conformist with landlord expectations'. The data reduction stage utilised all the six variates from the 39 interviews. A cluster analysis method for ordinal variables is described further in section 3 below. After clustering to get an outcome variate (i.e. a dependent variable), a fuzzy set was created so that 'resisted landlord or employer' took the value 1 and 'did not resist the landlord or employer' took the value 0. In between are some intermediate situations. This method follows the advice of Byrne (2008) [in this volume].

Having created the dependent variable and introduced the pseudonyms for the main adult man and woman of each household, the fuzzy set raw data table began to take shape. Figure 2 illustrates part of this table.

>>FIGURE 2 HERE<<

In Figure 2, you can trace the Muslim case of Syed and Farhana, the Dalit cases of Govinda and Laxmamma (and five others), and so on. The FS QCA software can create X-Y plots of variables, e.g. Assets by Education, for the 39 cases. However in Figure 1 I used STATA software in order to benefit from slightly more flexible case labelling. In STATA scatterplots, the 'jigger' function can also allow multiple dots to be grouped around the ordinal point, e.g. {1.0, 0.33}, where several households overlap. Jiggering is useful for larger studies with medium N.

Thus the study was a mixed-methods study that integrated the analysis of labour markets with the awareness of microfinance, land tenancy, gender and class relations. Mixed-methods research of this kind has been recommended in development studies

by Grootaert, et al. (2004), Jones and Woolcock (2007), and Olsen (2004). The ambitious scope of the research is interdisciplinary.

3. Resistance to Employers' Exploitation is Not the Opposite of Conformity

In setting up the outcome variate for Fuzzy Set QCA we used cluster analysis to reduce the data. Cluster analysis can use continuous variables or a mixture of categorical and continuous variables. The measurement metric in the 'continuous' variables will influence the way cases fall into types in the outcome. Another important factor is the number of types (clusters) that the user specifies should be produced by the cluster analysis software. Using SPSS, two-way cluster analysis reduces the data even when there is a mixture of continuous and categorical data. This method was used since the measurement of 'types of incidents of resistance described' and the other variables are counts and hence more ordinal than cardinal in their level of measurement. The cluster analysis was conducted in stages. Figure A1, a brief appendix, shows in detail for all 39 cases an interim stage of clustering (VAR00014) and the final four clusters (TSC_6084). Two raw counts are also graphed in Figure 3. The cluster analysis sought to divide the cases into 4 or 5 types which have maximum homogeneity within clusters while having strong heterogeneity between clusters. SPSS gives detailed measures of the contribution of each variable to each cluster. The resulting multinomial variable can be simplified to a fuzzy set.

>>>>FIGURE 3 HERE<<<

The cluster analysis results did not meet my expectation that resistance and conformity would be mutually exclusive characteristics of households. As seen in Figure 3, they were co-associated for a few households, absent for a larger group of non-labour households, and generally not associated with each other at all. The hypothesis of a negative association is rejected through Figure 3. By inspecting Figure A1, and re-running cluster analysis using six variates, I obtained four coherent clusters. These could be roughly characterised as fully resistant, strongly but not fully resistant, not very resistant, and not resistant. Fuzzy set values were set at 1 and 0.87 for the first groups (types 4 and 2 in Figure A1 righthand column), 0.17 for a group who combined innovation with exiting and avoidance behaviour, and 0.00 for the non-workers who did not resist at all because the concept was inapplicable to them. Please note that the inapplicability of a concept to a group was not an *a priori* assumption. In the rural farming scene with growing groundwater shortage, many people who were previously employers and landlords are taking up paid wage labour work. Therefore we cannot assume that class maps directly onto the labour relations in the villages that we are studying here. But having looked at the clusters, it did appear that class was the mechanism that stopped the last group (type 3) from resisting. The annotation in the column VAR00014 shows my thoughts while iterating from qualitative to cluster and toward fuzzy sets. Iteration is advised by both Kent (2008) and Rihoux and Ragin (2008). Iteration is also recommended by Danermark, *et al*. (2001) in their overview textbook about methods of post-positivist research.

Further research could investigate the frequency of these behaviours, some of which are seasonal or take place at holiday times, in more detail. The interviews caused these categories to come up without explicit prompting. Thus this is an exploratory stage of the research. It offers an ordinal variate for resistance which embeds other

aspects of strategic labour market behaviour, such as seasonal migration ("Exit"), which we had thought of as alternatives to resistance.

The fuzzy set (RESISTFZ) seen in Figures 2 and 3 is not strongly associated with class or assets. Qualitative study of individual household cases suggested that exit of one family member from the local labour market was often accompanied by one of several other ways that workers can avoid doing casual wage labour. These ways included: i) going into self-employment, e.g. rolling cigarettes; ii) joining a women's microfinance self-help group; iii) renting land. Tenancy emerged as an important tool of bargaining power in the local labour market. Those who rent land in (or have cows or grow silkworms) can afford to reject undesirable wage offers. They can offend an employer who exhibits irksome or unacceptable behaviour toward the workers. Those without a plot of land to rent in were less able to object when they felt insulted. Some very poor workers said that they felt insulted but also felt they must not offend the employers. The tenants were in a relatively stronger position in the labour market whether they had a lot of assets or not (Olsen and Neff, 2007).

We began to retroduce why these data patterns had unexpectedly turned up. There was some precedent in the literature, e.g. Kapadia notes that local labour groups bargain with employers in locally situated ways (in Kapadia, 2005). Nadkarni points out that land reforms could give more power to the poor (2002). Srivastava noted the importance of tenancy in the changing class structure of Indian agriculture (1989). It has long been known that farming, tenancy and labouring are linked for the poor and especially for poor women (Agarwal, 2003a). Studies of microfinance have shown that it has impacts in the labour market (Mayoux, 1993) and yet is not a panacea for all the problems of poverty in south India (Roesch, 2005). Agarwal (2003b) comments that there are a range of other empowering changes in the land market, and that microfinance is just part of a package if structural change is desired. In particular, our fieldwork interviews suggested that owning cows can be a risky and expensive business which may exceed some poor workers' capacity over a period of years, in spite of cheap credit to buy the cows. If a cow gets sick, the family's prospects are seriously damaged. The labouring, investment and earnings decisions are all interlinked (Olsen, 2008b).

We soon realised, looking at the data with retroduction in mind, that many resisters were also conformers. One reason is apparently that for other households being expected to conform is simply unimaginable. Some forms of conformity are aspects of debt bondage or labour tying. For example doing symbolic work at the landlord's house on a holiday morning prior to a feast is a way of indicating that one is tied to that employer. An example of debt bondage is where the worker must work without pay (e.g. cleaning dishes or cleaning up after cows, sweeping and gathering water) since the worker's household owes money to the landlord and indeed depends on their willingness to continue to rent them land and employ them in the busy season.

In some instances, avoiding 'conformity' is due to the high caste of the worker. Indeed no non-workers reported conforming behaviours. A class mechanism is behind this pattern: landlord and salaried class people would never do *kuulie* daily wage work so they do not fit easily into the labour bargaining scenario. For those who do fit into that scenario as workers, those who reported resisting were no less likely than the rest to report sometimes conforming. Many people do both.

Our dependent variable was therefore set up to focus on 'resistance' and did not have an opposite extreme of 'conformity'. Instead the fuzzy set is stipulated to represent 'resist' and 'do not resist'.

4. Causal Analysis at the Household or Couple Level

The causal analysis of factors leading to resistance reflected a return to structuralist hypotheses. In Table 3, the fuzzy set data is shown to include both structural and other factors. A structuralist argues that class relations and other major social structures *cause* people to act in specific ways. "The class structure is just such that these outcomes are inevitable" would be a deterministic way of phrasing this hypothesis. (See Sayer (1997) for an alternative approach.) In fuzzy set causal analysis, we asked, would class or caste emerge as predicting resistance? Specifically, if one is above the poorest workers and more of a 'farmer' (peasant), or of high caste, are they more likely to resist? If one is a worker but has a lot of capital (assets) or education, then is one more likely to resist?

>>TABLE 3 HERE <<

I tested large, medium and small models that embedded this hypothesis. Purely structural models (with assets, caste, and class variates, k = 1, 2 or 3) did not perform well for RESIST fuzzy outcome. Mixed models were better (k = 4 or 5). Large models (k = 6 or more)showed extremely diverse outcomes. The resist crisp set (coded 0 for no resistance and 1 for some resistance) was not a useful way to avoid the complexity that was seen in the fuzzy set analysis. Several crisp-set models were tested – each using fuzzy sets among the conditions – but they did not have good coverage or consistency. See Figure 4 for details of the interim calculations.

>>>FIGURE 4 HERE<<<

To test whether structuralist Marxism has any explanatory power at all in the villages, I then paused to test the effect of assets on education. With the random sample survey data (N=187) a regression model showed strong class effects. T-statistics had 1% significance in models that have the household education level as the dependent variable. (The sum of years of schooling for two adults was the outcome variable.) In these regressions there was no effect for respondent's gender or for 'village', but age was a significant factor. Young people tend to have more education and I controlled for this. Thus, the surrounding social scene is one in which class has massive positive, morphostatic effects on social and economic mobility through education. Fuzzy set analysis of N=39 cases also shows strong associations of class, assets, and education. See classes 4 and 5 in Figure 2 for evidence.

However the study of resistance in the villages is in part the study of agency, not of structure. Here the patterns were more varied. Agency takes many forms and involves complex strategies. Pacifying an employer one month would be followed by an assertive bargaining stance or an argument the next month. Those who had arguments turning into court cases might still behave submissively with the next employer. Mies's observation that women are submissive and exploited in Andhra

Pradesh rural labour markets can still be applied to some women and men of the working class today (Mies, 1982). Unfortunately the bad farming conditions and rapid modernisation are also causing a wave of farmer suicides which has been well documented (Chindarkar, 2007). It is widely thought that men are predominantly the ones committing suicide due to agrarian crisis (Mohanty, 2005). In such conditions, the workers told us that they bide their time and choose their arguments carefully. They were cautious about being interviewed and like the idea of using pseudonyms (aliases). Many chose their own aliases such as "Gold Man" (*Bangarappa)* which has very positive connotations of dignity. Many women had bought cows and this added to their dignity as well as their bargaining power. Having cows was considered to be a household characteristic. Family members shared the work of the cow management. However women are now more frequently considered personally the owner of the cows since the cows are for milk production not for ploughing. Less than 5% of local cattle were for pulling ploughs (based on random sample survey data, N=187).

The results from the fuzzy set analysis are summarised in Table 4. Table 4a shows the initial results, and Table 4b shows a simplified result after weakening the assumptions that go into the analysis. The only assumption made here in 4b is that we are agnostic about predicting what outcome might have occurred for the absent combinations of conditions.

>>TABLE 4 HERE<<

In this table, coverage measures the proportion of cases that are within the group represented by the configuration. This proportion is calculated using Boolean algebra to get a ratio. Boolean algebra for fuzzy sets is an algebra which uses 'AND' and 'OR' for fuzzy sets; AND means intersection, and OR means union. See Ragin, 2009 for a bivariate explanation, and Smithson and Verkuilen (2006) for the multivariate algebra. The coverage ratio is the intersection of the cases in the configuration to the total number of cases. Consistency, on the other hand, is a ratio that shows how accurately the configuration is sufficient for the outcome to have occurred, within that configuration only.[1]

5. Discussion: The Mixed Methods QCA Approach Uses Variates, Not Variables

In this paper I have examined social data using an iterative realist methodology based on mixed-methods data collection. The paper began by noting that hypothesis testing, exploration, and retroduction were all going to be carried out. In the middle of the paper I even conducted a statistical regression to test or 'check out' a hypothesis that was expected to hold in the study area. This hypothesis was a structuralist one arising from Marxian class theory. It found support in the larger data set (N=187) for an education outcome, but class was not found in the smaller data set (N=39) to influence resistance in the labour market very much. The main effect of class was simply that if one is not working class then one does not 'resist' as workers may do. However among the three working classes 'worker', 'worker with land' and 'farmer', resistance was spread out in ways not directly predictable by assets. Exploring the structuralist hypothesis more might involve further research on individuals and group resistance. Thus instead of 'falsifying' the hypothesis, I moved on to exploring the

situation and retroducing what has caused the data to follow the patterns that it does follow. For this, Qualitative Comparative Analysis was useful.

The fuzzy set analysis seemed to be testing hypotheses, since it has a cause-and-effect interpretation in my research, but in fact I was trying out different models to develop a deeper understanding of causal relationships not in the *whole sample* but in different groups of configurations. Looking closely at Table 4b, we find that overall consistency was .81 (quite good) and coverage .69 (not as wide as we might have found if class structure determined agency). The intriguing finding is that causality varies between configurations. Specifically the first two lines of the result read:

$$RESISTFZ = ASSETS*DALIT*smallville$$
$$+ASSETS*SMALLVILLE*wetaccess$$

In other words, having a lot of assets was sufficient to cause resisting if a household was Dalit caste group of was in the smaller village, and did not have access to wetland. (Recall that + means 'or', and * means 'and' in Boolean notation.) These two configurations only covered a small proportion of the cases, though. The rest of the solution reads:

$$RESISTFZ = EDUCATION*smallville*WETACCESS$$
$$+ dalit*SMALLVILLE*HAVECOWS$$

Each of these two configuration covers about 20% of the cases.   One situation where formal education is high and there is wet land; and another sufficient set of conditions is where the non-Dalit household in the small village has cows. In a broad sense, economic resources matter for all the sufficient combinations (wet land, cows, etc.). But land ownership or tenancy in itself was not sufficient to cause someone to resist the demands made by employers.

This summary ignores the other cases, each falling into smaller groups of negative or unique configurations. However I have studied all the configurations in detail. I have also written qualitative analyses of seven of the case households (see several Global Poverty Research Group working papers and Olsen, 2008 AJSS). Thus my qualitative, interpretive, and exploratory work is more central here than the testing of hypotheses. I felt that I was understanding the effects of structure better, as well as learning about other factors in the village, while I studied the case-study data.

Thus the research methodology was not just hypothesis testing. Even in so far as I did test hypotheses, my grounding assumption was that causality was not going to be universal within the 39 cases. Therefore the correct word for RESISTFZ, ASSETS and the other causal conditions is not 'variables', but 'variates' (Byrne, 2002; 2008 [*in this volume]*). The variates may not apply across all cases. They cannot really be called variables in social statisticians' usual sense.

6. Conclusion

This chapter has illustrated a case-study research method in a pair of Indian villages. The data were organised both at the person level and at the household level using Excel and NVIVO. The persons were nested in households. Other levels that were studied included social classes and villages. These were non-nested with households and with each other. Non-nested cases are in an N-to-N relation to each other,

whereas nested cases are in a 1-to-N relation to each other. The data were in this particular instance not held in Access, but in a series of different software packages which enabled the use of cluster analysis in SPSS (see Figure 5) and of qualitative comparative analysis in FS QCA. Random sampling played a role at an early stage of the research, where N=187, yet the 39 main household cases were not randomly sampled but instead were a quota sample that was embedded within a larger random sample. The methodology included some realist assumptions about the kind of outcome that was of interest – here, how workers and small farmers relate to the landlord class – and included doing retroduction (asking why) not only on this outcome but on the data themselves. An iterative process began with qualitative enquiry in re-analysing semi-structured interviews, then moved to a QCA stage where configurations and patterns were explore, next moved to cluster analysis to simplify the outcome variable, and finally concluded with a causal analysis (see Byrne, 2005; 2008).

The findings based upon the causal analysis gave new insights into class relations in the area. For example, structures of access to land – especially wetland – proved important as factors enabling resistance to landlords' exploitative and tying behaviours. While class was initially specified in terms of employment relations and assets, the QCA indicates that wetland is a different kind of asset from dryland. Owning wetland with water was a very important differentiating factor among the workers and small farmers. Other important factors included having a person migrate to the city; and education. We allowed education to be a fuzzy set at household level because of proximate sharing of school-based skills. This enabled the causal relationship with resistance to show through in some configurations. Conformity with landlord demands was also widespread but especially among the poorest households.

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Table 1: Calibrated Data for Household Caste and Landholding (Crisp and Fuzzy Sets) Along With Qualitative Variates for Resistance, Conformity Etc.

This is a fair copy of the early data for QCA analysis of resistance fuzzy set.

Hhid	Assets	Education	classlab	Ownw	tenancy	rentinwet	rentindry	wetaccess	totoland	NonKuulie	ConformN	AvoidN	ExitN	ResistN	InnovateN	JoinN	resistf
1	0.87	0.17	W+	2	1	2	0	1	2	0	1	2	1	0	0	0	0.17
	0.5			0	1	0	2	0									
2		0.5	W+						0	0	0	1	1	0	3	0	1
3	0.5	1	W+	3	0	0	0	1	3	0	3	3	1	1	1	1	1
4	0.67	0.33	W+	0	0	0	0	0	0.5	0	1	1	0	0	0	0	0
5	0.33	0.17	W+	0	1	0.5	0.5	0.87	0	0	3	1	1	0	1	1	0.17
6	1	0.67	W+	0.5	1	1	0	1	1	0	2	1	1	1	0	0	0.17
7	0.5	0.87	W+	0	0	0	0	0	0	0	2	2	0	2	1	1	1
8	0.87	0.67	W+	0.5	0	0	0	0.87	2	0	0	0	1	0	1	1	0.17
	0.87			0				1				1	0		0	0	
9		1	L	30		0	0		30	1	0			0			0.87
10	1	1	S	3	0	0	0	1	18	1	0	0	0	0	1	2	0.87
11	0.87	0.17	W+	0	1	1.5	0	1	3	0	2	0	0	1	0	0	0
12	1	0.17	F	1.50	1	0.75	0	1	6.5	0	0	0	0	0	1	2	1
13	1	0.33	F	1	1	1.5	0	1	3	1	0	1	1	0	1	0	0.87
14	0.17	0	W+	0	1	0	1	0	0	0	1	1	0	4	0	0	0
15	0.87	0.67	S	0	0	0	0	0	0.75	0	0	0	1	0	0	0	0.17
16	0.33	0.87	W	0	0	0	0	0	0	0	1	1	1	1	2	1	1
17	0.87	1	L	10	0	0	0	1	45	1	0	0	0	0	0	0	0.87
18	0.87	0.33	W+	0	1	0	2	0	0.5	0	2	1	0	3	3	3	1
19	0	0.33	W	0	0	0	0	0	0	0	2	1	1	0	1	0	0.17
20	1	0.33	W+	0	1	0.5	0	0.87	1	0	0	3	0	1	1	2	1
21	0.5	0	W+	0	1	0	2.5	0	0	0	0	1	0	0	2	0	1
22	0.87	0.87	W+	0	0	0	0	0	7	1	0	0	0	0	2	0	0.87
23	0	0.17	W	0	0	0	0	0	0	0	0	0	1	0	0	0	0.17
24	0	0.17	W	0	0	0	0	0	0	0	2	1	0	1	0	0	0
25	0.87	0.87	L	5	0	0	0	1	12	0	0	0	1	0	1	0	0.17
26	1	0.87	F	2.5	0	0	0	1	3	0	0	1	0	1	0	1	0
27	0.33	0.5	W	0	0	0	0	0	0	0	3	1	0	1	0	0	0
28	1	0.33	W	0	1	0.5	1.5	1	1	0	4	0	0	3	0	0	0
29	1	0.87	F	2	1	0	3	1	4.5	0	1	1	0	1	0	0	0
30	0.87	0.17	W+	0	1	1	0	1	1	0	0	1	0	0	0	0	0
31	0	0.5	W	0	0	0	0	0	0	0	0	0	1	0	0	0	0.17
32	0	0.67	W+	0	0	0	0	0	0	0	5	0	0	1	0	0	0
33	0	0.87	S	0	0	0	0	0	0	1	0	0	1	0	0	0	0.87

Key: ConformN= No. of incidents of conformity described in a one hour interview; ResistN – No. of different incidents of resistance described in a one hour interview; etc.

Table 2: Conformist and Resistant Actions Vis à Vis the Local Employers – as Mentioned in One Interview (Per Household)

Social Class	Number of House-holds	% Which Acted to Conform to Landlord's Wishes	Examples of Conforming	% Which Acted to Resist Landlord's Wishes	Examples of Resistance
1=worker	10	60%	Accept given constraints, ask landlord for help, accept given employment terms & conditions, negotiate within given parameters	40%	Negotiate, shame, criticize, bargain with the employer; buy or otherwise obtain a bullock or cow pair to enable self to do more highly-paid kuulie work
2=worker with land	18	11/18 i.e. 61%		56%	
3=farmer	5	20%		40%	
4=landlord	3	Not applicable		Not applicable	
5=salaried	3	0		0	
All	39	50%		41%	

Note: The number of different reported actions of each type was measured by studying the transcripts from 39 household interviews in two Indian villages 2006/7.

Table 3: The Truth Table for Fuzzy Set Analysis, Final Model

resistfz Fuzzy	assets Fuzzy	education Fuzzy	dalit Crisp	smallville Crisp	wetaccess Fuzzy	havecows Crisp	Number i.e. Case Count	Config'n Number
0	0	0	1	0	1	0	1	**1**
0	0	0	1	1	0	0	4	**2**
0	0	1	0	0	0	1	1	**3**
0	0	1	1	0	0	0	2	**4**
0	1	0	0	0	1	1	3	**5**
0	1	1	0	0	0	0	1	**6**
0	1	1	0	1	1	0	1	**7**
0	1	1	1	1	1	1	1	**8**
1	0	0	0	0	0	1	1	**9**
1	1	0	0	1	1	1	4	**10**
1	1	0	1	0	0	0	1	**11**
1	1	0	1	0	1	1	1	**12**
1	1	0	1	1	0	1	1	**13**
1	1	0	1	1	1	1	1	**14**
1	1	1	0	0	1	0	2	**15**
1	1	1	0	0	1	1	4	**16**
1	1	1	0	1	0	0	1	**17**
1	1	1	0	1	1	1	1	**18**
						SUM:	31	

NOTE At this point, the remainders had been omitted.

Table 4: Fuzzy Set QCA Results For Resistance, N=39

4a) Unreduced Form:
** Sufficient Conditions for Resistance Fuzzy to be High:

```
                                                    Raw Coverage   Consistency
ASSETS*EDUCATION*dalit*smallville*WETACCESS+            0.240         0.836
ASSETS*education*DALIT*SMALLVILLE*HAVECOWS+             0.075         0.831
ASSETS*education*DALIT*WETACCESS*HAVECOWS+              0.077         0.834
ASSETS*dalit*SMALLVILLE*WETACCESS*HAVECOWS+            0.161         0.734
assets*education*dalit*smallville*wetaccess*HAVECOWS+  0.061         0.910
ASSETS*education*DALIT*smallville*wetaccess*havecows+  0.031         0.837
ASSETS*EDUCATION*dalit*SMALLVILLE*wetaccess*havecows   0.040         1.000
```
solution coverage: 0.650
solution consistency: 0.830

Note: The coverage figures for each part of the solution are the raw coverage. There is some overlap between the configurations covered here. The cutoff of consistency for the fuzzy set outcome to be deemed positive in a configuration was   .77.

4b)   Reduced Form In Which The Contradictory Configurations Are Specified As

'Don't Cares' Rather Than 'Removed'

** Sufficient Conditions for Resistance Fuzzy to be High:

```
                                       Raw
                                    Coverage    Consistency
                                   ----------  -----------
ASSETS*DALIT*smallville+             0.110       0.877
ASSETS*SMALLVILLE*wetaccess+         0.133       0.905
EDUCATION*smallville*WETACCESS+      0.271       0.802
dalit*SMALLVILLE*HAVECOWS+           0.208       0.746
```
solution coverage: 0.686
solution consistency: 0.812

Note: The cutoff of coverage for the fuzzy set outcome to be deemed positive in a configuration was   .77.

Figure 1: Social Class, Education, and Assets of 39 Households
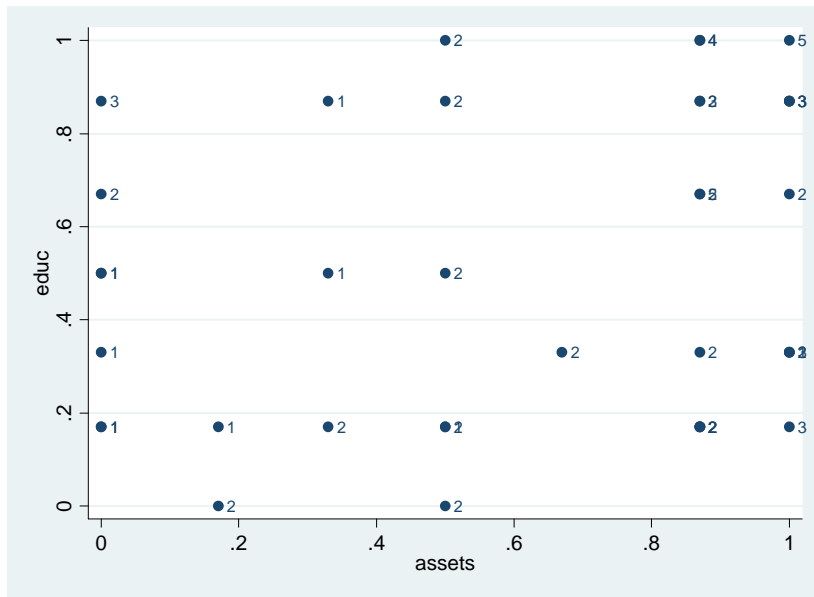
Key: horizontal axis is a fuzzy set of assets, and vertical axis is a fuzzy set of education. Both are at household level. The annotation numbers indicate the social class. Household class 1=worker, 2=worker with land, 3=farmer, 4=landlord.   In a few cases, two households overlap on one point.

Figure 2: Qualitative Comparative Analysis (FS QCA) Spreadsheet

| Case	hhid	resistf	class	assets	education	pseudman	pseudfem	classlab	dalit
1	1	0.17	2	0.87	0.17	Venkatramana	Laxmi	W+	0
2	2	1	2	0.5	0.5	Khaleed	Pathima	W+	0
3	3	1	2	0.5	1	Kistappa	Kumari	W+	0
4	4	0	2	0.67	0.33	Pullayya	Nagamani	W+	1
5	5	0.17	2	0.33	0.17	Chinnayappa	Uma	W+	1
6	6	0.17	2	1	0.67	Khaleel	Hajbee	W+	0
7	7	1	2	0.5	0.87	Chandran	Sita	W+	1
8	8	0.17	2	0.87	0.67	Sridhar	Padmavathi	W+	1
9	9	0.87	4	0.87	1	Ramaiah	Lakshmidevi	L	0
10	10	0.87	5	1	1	Vasanth Reddy	Jayasri	S	0
11	11	0	2	0.87	0.17	Chitram	Swati	W+	0
12	12	1	3	1	0.17	Narayana	Parvatha	F	0
13	13	0.87	3	1	0.33	Manju		F	0
14	14	0	2	0.17	0	Akbar	Nagamani	W+	0
15	15	0.17	5	0.87	0.67	Syed	Farhana	S	0
16	16	1	1	0.33	0.87	Jayanth	Yasmeen	W	0
17	17	0.87	4	0.87	1	Venkateswaralu	Savita	L	0
18	18	1	2	0.87	0.33	Ranga	Mangamma/Manju	W+	1
19	19	0.17	1	0	0.33	Govinda	Laxmamma	W	1

File: FairQCAFuzzySheet39Cases.csv

Key: Class Labels W = Worker, W+ = Worker with land, F = Farmer, L = Landlord, and S = Salaried. These are also numbered 1 to 5, respectively.

Figure 3: Resistance's Very Low Association with Conformity

Resistance Reported in Interviews (By Conforming)
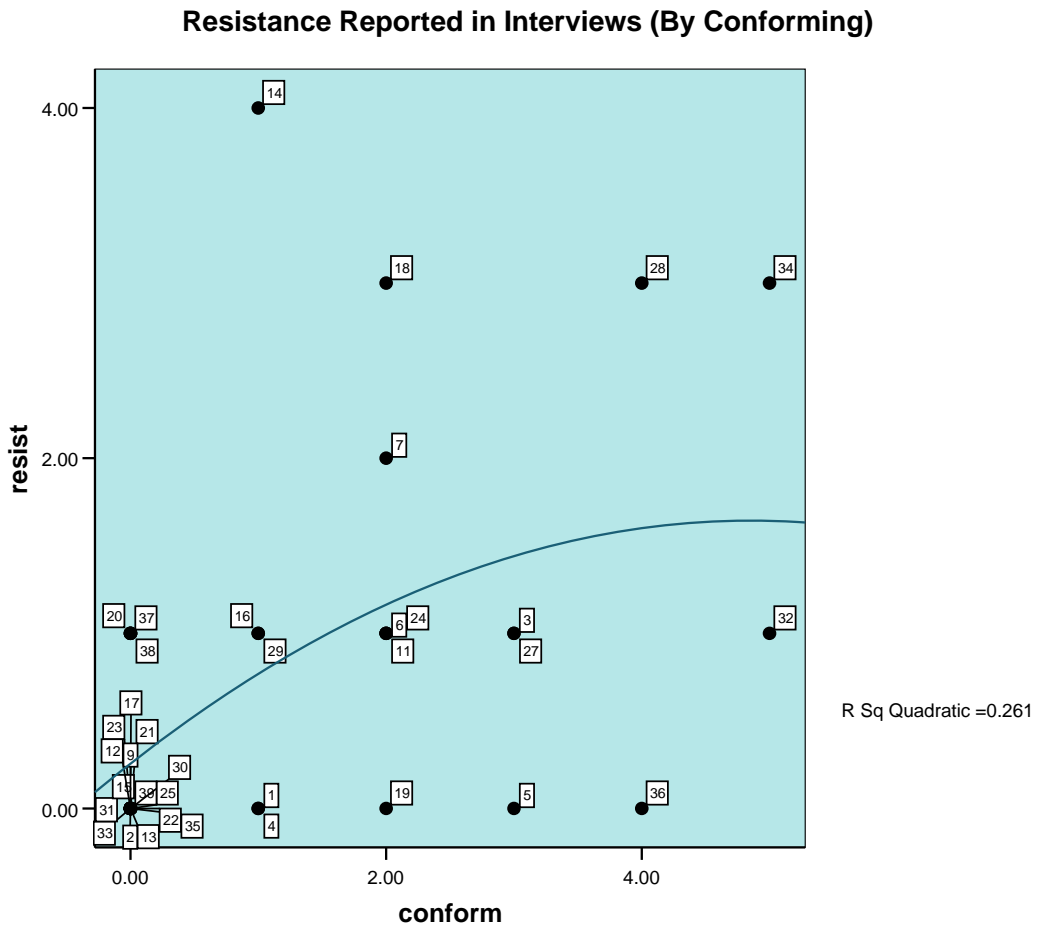
NOTE: Markers indicate the household ID number for the scattergram of two ordinal variates. In this diagram, the absolute number of recorded instances of types of resistance and conformity in a one-hour interview are shown. These range from 0 to 5 for each scale and are shown in the data set as variates RESISTN and CONFORMN.

Figure 4: The Truth Table While Deciding on Model Form

tenancy	wetaccess	havecows	number	resistf	consist ▽
0	0	1	0		1.000000
1	1	1	3		1.000000
0	0	0	0		1.000000
0	1	0	2		1.000000
1	0	1	0		1.000000
0	1	1	0		1.000000
0	1	1	0		1.000000
0	0	1	1		1.000000
1	0	1	0		1.000000
0	1	0	0		1.000000

Continue   Cancel   Standard Analysis

Note: In this truth table, a fuzzy set and 2 crisp sets are visible. Consistency is 1 for the visible cases, but the table needs to be cleaned yet by (i) removing configurations which have no cases, and (ii) sorting by consistency and then filling in the empty column.   After cleaning, fewer rows will exist and some will be 'positive' configuration marked 1 while many others will be 'negative' configurations marked 0. My consistency cutoff point for a positive configuration varied from model to model but was around .77 in the final models.

Figure 5: SPSS Data for 39 Household Interviews During Cluster Analysis

	Nonkuulie	conform	avoid	exit	resist	innovate	join	TSC_6792	TSC_1079	VAR00014	TSC_6084	var	var	var	var	var	var
1	.00	1.00	2.00	1.00	.00	.00	.00	1	1	migrants, exiters	1						
2	.00	3.00	1.00	1.00	.00	1.00	1.00	2	1		1						
3	.00	2.00	1.00	1.00	1.00	.00	.00	1	1		1						
4	.00	.00	.00	1.00	.00	1.00	1.00	1	1		1						
5	.00	.00	.00	1.00	.00	.00	.00	1	1		1						
6	.00	2.00	1.00	1.00	.00	1.00	.00	1	1		1						
7	.00	.00	.00	1.00	.00	.00	.00	1	1		1						
8	.00	.00	.00	1.00	.00	1.00	.00	1	1		1						
9	.00	.00	.00	1.00	.00	.00	.00	1	1		1						
10	.00	.00	1.00	1.00	.00	.00	.00	1	1		1						
11	.00	.00	1.00	1.00	1.00	1.00	.00	1	1		1						
12	.00	.00	1.00	1.00	.00	3.00	.00	2	2	joiners and resisters	4						
13	.00	3.00	3.00	1.00	1.00	1.00	1.00	2	2		4						
14	.00	2.00	2.00	.00	2.00	1.00	1.00	2	2		4						
15	.00	.00	.00	.00	.00	1.00	2.00	2	2		4						
16	.00	1.00	1.00	1.00	1.00	2.00	1.00	2	2		4						
17	.00	.00	3.00	.00	1.00	1.00	2.00	2	2		4						
18	.00	.00	1.00	.00	.00	2.00	.00	2	2		4						
19	.00	.00	1.00	1.00	1.00	1.00	2.00	2	2		4						
20	.00	1.00	1.00	.00	.00	.00	.00	1	3	conformers	2						
21	.00	2.00	1.00	.00	.00	.00	.00	1	3		2						
22	.00	1.00	1.00	.00	4.00	.00	.00	1	3		2						
23	.00	2.00	1.00	.00	1.00	.00	.00	1	3		2						
24	.00	.00	1.00	.00	1.00	.00	1.00	1	3		2						
25	.00	3.00	1.00	.00	1.00	.00	.00	1	3		2						
26	.00	4.00	.00	.00	3.00	.00	.00	1	3		2						
27	.00	1.00	1.00	.00	1.00	.00	.00	1	3		2						
28	.00	.00	1.00	.00	.00	.00	.00	1	3		2						
29	.00	5.00	.00	.00	1.00	.00	.00	1	3		2						
30	.00	4.00	.00	.00	.00	.00	.00	1	3		2						
31	1.00	.00	1.00	.00	.00	.00	.00	3	4	non-kuulie class	3						
32	1.00	.00	.00	.00	.00	1.00	2.00	3	4		3						
33	1.00	.00	1.00	1.00	.00	1.00	.00	3	4		3						
34	1.00	.00	.00	.00	.00	.00	.00	3	4		3						
35	1.00	.00	.00	.00	.00	2.00	.00	3	4		3						
36	1.00	.00	.00	1.00	.00	.00	.00	3	4		3						
37	1.00	.00	.00	.00	.00	.00	.00	3	4		3						
38	.00	2.00	1.00	.00	3.00	3.00	3.00	2	5	/ mixalso conformed.	4						
39	.00	5.00	1.00	1.00	3.00	3.00	.00	2	5	/ mixed/ conformedjoi	4						

(The data are sorted here by the early cluster analysis in Column 9. The final cluster analysis used shows here in Column 11 and some labels in Column 10 that correspond to the findings in Column 9.)

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[i] In Rihoux and Ragin, 2008, an algebraic definition of both ratios is provided. For the study of sufficient causes, the minimum of $\{X_i, Y_i\}$ is very important because it allows us to calculate the proportion of cases in which the outcome, Y_i, is lower than the causal variate X_i. ("Lower" in ordinal, not cardinal, measurement terms.) This ratio can be represented as Coverage $(Y_i \leq X_i) = \sum(\min(X_i, Y_i)) / \sum(Y_i)$. Since X_i can be a vector of conditions (i.e. a mixture of fuzzy sets), this algebra can be extended to the multivariate case (Rihoux and Ragin, 2008, Chapter 3:11). The numerator of coverage is visible in an X-Y plot as the horizontal distance from the axis to each point in the graph. For sufficiency to be strongly supported by the data, most points should lie in the upper left, not the lower right diagonal.   We are measuring how close the cases lie to the diagonal line, relative to the average.

On the other hand, consistency is defined by using a different denominator (*ibid.*, Chapter 3:17), X_i. Consistency is the relative scale of the sum of the $\min\{X_i, Y_i\}$ to the sum of all the cases. Here, counting the $\min\{X_i, Y_i\}$ focuses on those cases whose ordinal Y value exceeds the X value – again the upper left triangle. In other words outcomes only give a high value of Consistency [for sufficiency] if the outcome is ordinally higher than the causal factor. This is where QCA becomes non-symmetrical in Y. If we reverse the procedure and study not-Y, we would get different results. The specific ratio that is used to measure consistency is represented as Consistency $(Y_i \leq X_i) = \sum(\min(X_i, Y_i)) / \sum(X_i)$.

Ragin defines consistency as follows (a) for crisp sets: "a straightforward measure of the consistency of set relations using crisp sets: the proportion of cases with a given cause or combination of causes that also display the outcome." (Ragin, 2008, forthcoming, page 5 of Chapter 3); (b) for fuzzy sets: "One straightforward measure of set theoretic consistency using the fuzzy membership scores is simply

the sum of the consistent membership scores in a causal condition or combination of causal conditions divided by the sum of all the membership scores in a cause or causal combination", *Ibid.*

Causal necessity is measured using the same concepts with different measurement equations. Specifically the Boolean denominators are switched around. See Rihoux and Ragin, ch. 3, 2008, for the details. In the fsQCA software, the causal analysis of sufficiency is found in the 'analyse >> fuzzy set >> truth table algorithm' menu option, but the causal analysis of necessity is found separately under 'analyse >> necessary conditions'.