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Sampling: bridging probability and non-probability designs

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This article reconceptualizes sampling in social research. It is argued that three inter-related a priori assumptions limit on the possibility of sample design, namely: (a) the ontology of the case, (b) the epistemological assumptions underpinning what properties are necessary to know the case and (c) the logistics involved in the process of ‘casing’ the case. In considering sampling in this way, not only are key criteria commonly used to gauge the validity of sample problematized, but a genuine epistemological bridge between probability and non-probability sample designs is also forged.

Keywords: combining qualitative and quantitative; craft; non-probability sampling; probability sampling; qualitative sampling; random sampling; sampling; sample design; sample strategy

Introduction

Sample design is a well-recognized issue in social research. As any research methods textbook will try to convey, the internal and external validity of any empirical study rests to a large extent on the adequacy of the sample to meet the research aims and objects. However, despite its importance, this is an area of methodological research that has received surprisingly little critical attention within social research (Noy, 2008). Only a handful of articles in this journal, for example, have addressed sampling in and of itself (see Browne, 2005; Hobbs, 2010; Kershaw et al. 2009; Noy, 2008; Olsen, 2002; Wilson, Huttly, & Fenn, 2006). There is a discrepancy, therefore, between the supposed importance and the focus of methodological discussions.

There is also an interesting discrepancy between *what* the focus is in these discussions. In textbooks, the emphasis tends to be on the main types of sampling design, sample size and sample error, particularly in survey research (e.g. Bryman, 2009; Gilbert, 2008; Seale, 2004). Admittedly, textbooks are not necessarily the most up to date presentation of any topic, but they nevertheless provide an overview of what the disciplinary ‘basics’ are thought to be. Yet even in peer-reviewed journal articles, sampling discussions tend to be quite narrowly defined, centring around particular sample designs (e.g. Noy, 2008), or reviews of sampling strategies within a particular field (e.g. Karney et al., 1995; Mahaffey & Granello, 2007; Onwuegbuzie & Collis, 2007; Onwuegbuzie & Leech, 2007); they also focus

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predominantly on quantitative survey sampling, with sample size (e.g. Peel & Skipworth, 1970) and especially telephone list random sampling being prominent areas of debate (e.g. Korn & Graubard, 1995; Mohadjer & Curtin, 2008; Verma, Scott, & Omuircheartaigh, 1980). Within mixed methods research, sampling is taken more seriously, in so far as there is a growing number of explicit discussions on the subject (e.g. Collins, Onwuegbuzie, & Jiao, 2007; Onwuegbuzie & Collins 2007; Teddlie & Yu, 2007), and we will come back to this point later in the conclusion, as this article also taps into the problem of sampling across different philosophical traditions.

What tends to be overlooked in all of these discussions, however, and what is the key point of this article, are the *a priori* philosophical assumptions intrinsic to any sample design and the subsequent validity of the sample criteria themselves. Hence, in extending discussions relating to sampling in social research, this article starts from a slightly different place than is perhaps expected. Instead of asking ‘What key criteria need to be considered in any adequate sample design?’, the question underpinning this article is: ‘What properties do key criteria of sample design depend on for them to be knowable objects of knowledge?’¹

Working backwards, then, with key criteria of sample design, such as sample size, sample error, representativeness, generalizability and access, it is assumed that every sample both necessitates and denotes a particular sampling strategy, i.e. a method of selecting cases from an identified population. It is also presumed that a number of trade-offs, such as cost of time and finance, sample estimates, the potential for sample bias and analytical objectives, are always to be made (DiGaetano & Waksberg, 2002). In thinking about what makes these kinds of sampling issues knowable objects of knowledge, three pre-suppositions are highlighted. The first relates to *what* is sampled, i.e. the nature of the case. The second concerns *from where* the cases are sampled, i.e. the nature of the population, which may or may not be well known or readily available. The third involves the material logistics involved in *how* cases are selected from a population. In addition, there are epistemological assumptions underpinning what properties are necessary to know the cases, revealing premises about *why* those cases are sampled from that population. These ontological and epistemological matters form the basis to methodological decisions involved in evaluating the validity of both the sample and the sampling criteria.

In turn, the necessary presuppositions underpinning any sampling design might be said to rest on the following three-pronged configuration (see Figure 1): (a) the ontology of the case(s); (b) the epistemological assumptions underpinning what properties are necessary to know the case(s) and (c) the logistics involved in what Ragin (1992) calls the processes of ‘casing’ the case(s). These three components interact recursively with one another *throughout* the research and are only determined in the context of the field. These are known issues already, but making them explicit has the advantage of coming at sampling from a different angle to what is normally done. Furthermore, this reconceptualization of sampling not only places limits on the possibility of sample design, but also minimizes the supposed differences between random and non-random sampling. As will be concluded, it is with regard to this last point that the strengths of the proposed model really come into play.

Ontology of the case(s)

The argument starts from the ontological premise of the case – the case being the unit of analysis. This is not because the sampling strategies do not ‘make’ cases,

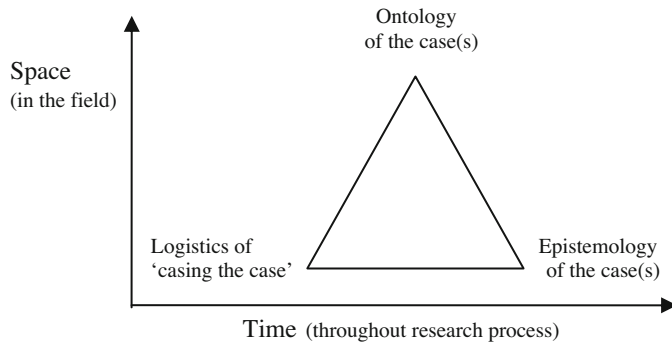


Figure 1. Necessary presuppositions of sampling.

nor that epistemological issues are absent. Rather, it is because the ontological implications of there being cases that need to be selected for particular purposes necessitate a particular praxis. After all, whether or not probability or non-probability approaches are adopted, sampling involves selecting particular cases – not just any cases, but a deliberately selected group of cases chosen from a particular population. This may be stating the obvious, but it is because of this simple idea that all samples involve a three-way relationship between: (a) knowledge of a population, (b) the cases within it and (c) the sample of cases that is subsequently chosen. This is evident in probability sampling and is explicit in sampling theory. There, the onus of the direction of knowledge construction is from the sample to the population, i.e. knowledge of the sample is used to make inferences that are generalizable to the population. Conversely, probability sampling necessitates that knowledge of the population is an explicit prerequisite, i.e. it is only possible to conduct a probability sample if the ‘sampling frame’, i.e. the list of all the possible units to be sampled – is known. Where a sampling frame is not possible, which, as Gorard (2003) points out, is often the case in social research, other probability sampling techniques have been developed. Mark–recapture designs, for example, deal with ‘not knowing’ much about the population (Pradel, 1996). However, even there, ‘not knowing’ is a driving factor of how the sample is selected. In all designs, the selection of cases is influenced by what is already known (or not known) about them. The more knowledge of the cases influences knowledge of the population (and vice versa), the less need there is to look for differences among the cases, which would otherwise help us to know (more about) the population.

These perhaps ‘basic’ assumptions apply no matter what the cases are or what sample design is conducted. Importantly, though, the weight given to the assumptions and the aim of the sampling exercise are different in non-probability and probability designs. The expectation in probability sampling is that knowledge of the sample can be used – and is intended to be used – to extend that initial knowledge of the population. In contrast, in non-probability sampling, cases are sampled not necessarily to know (more about) the population, but to simply extend and deepen existing knowledge about the sample itself. Whilst in both cases, some knowledge of the population is required from the outset, and sets up an initial knowledge referent upon which the sampling process begins, the final iteration differs not in where it commences but where it ends. The process of knowledge accumulation, if you like, ‘stops’ at different points of the knowledge ‘triangle’ (see Figure 2) depending

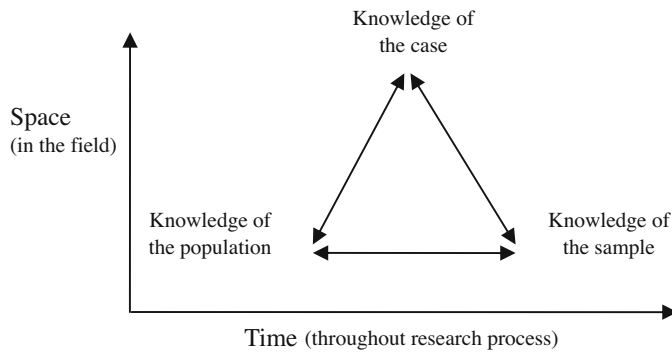


Figure 2. Knowledge triangle in sampling.

on whether one is dealing with a probability or non-probability sample design. This is a key point and is arguably one of the most important differences between probability and non-probability sampling.

Note that we are not necessarily dealing with different epistemologies *per se*. Instead, what we have are similar epistemological assumptions to begin with, i.e. sampling cases requires some knowledge of the cases and the population from which the cases are selected, but the final aim is to know more or less about the sample or the population. Of course, sampling theory assumes particular properties about random distributions within populations, but these properties do not simply disappear because a sample is not randomly selected. Instead, sampling theory ‘comes alive’ in probability theory precisely because it is assumed that cases are nested within populations in particular ways. In other words, in both probability and non-probability approaches, it is the ontology of the case (nested within a population) that makes it possible to sample at all.

Epistemology of the case(s)

Just because there are shared ontological assumptions about cases in all designs, this does not mean that no epistemological assumptions need to be negotiated. Sample designs do not happen outside of the overall epistemological approach of the research project. Therefore, epistemological assumptions are themselves predicated by some sort of notion, however well or ill defined, of what the cases might offer in terms of knowing the social world; otherwise, there would be no point in sampling them. Moreover, the kind of knowledge assumed to be appropriate to know the cases feeds into how they are subsequently sampled. As Blalock (1960, p. 415) notes in relation to quantitative sample design, it is necessary to anticipate the kind of analysis that will be conducted. The same goes for qualitative samples and is an intrinsic feature of many qualitative methodologies. For example, in grounded theory, theoretical sampling is necessary for the comparative method that then drives the generation of the data driven theory (Glaser, 1965).

Knowing the type of analytical framework that will be used to examine the cases is required before selecting the cases. As Byrne (2009, p. 5) puts it, ‘When we think about cases we have to think not just conceptually but also in relation to the actual tools we use for describing, classifying, explaining and understanding cases’. Likewise, DiGaetano and Waksberg (2002, p. 773) comment that ‘it is

important to consider the analytical approaches to be used and to make sure that the sample design will facilitate the planned analyses'. In other words, the selection of cases is intricately dependent on the epistemological assumptions associated with them.

Thus, for every sample design, underpinning why 'those' cases are sampled from 'that' population is the assumption that those cases (as opposed to any others) will potentially be able to be used to know more about the particular part of the world that is implied in the research questions. Vice versa, there are necessary conjectures about the properties of the cases that allow those particular cases to be known at all. Yet this leads us to yet another paradox of sampling, since the analytical framework itself rests on the processes of 'casing' and the specific practicalities involved in actually identifying and selecting the cases.

Logistics of 'casing' the case(s)

Ragin's (1992, p. 219) call to focus on the processes of 'casing' in social inquiry is important here, primarily because it encourages researchers to reflexively consider the ways in which their own research practices help to carve up and create the social world that they are seeking to explore. He encourages researchers to 'Consider cases not as empirical units or theoretical categories, but as products of basic research operations'. His point is that cases are 'made', both conceptually and empirically, by constantly and iteratively re-shaping and re-matching theory and empirical evidence together. Ragin only refers to the identification processes involved in 'casing' that go beyond the qualitative and quantitative divide. He actually says little about sampling. But in many ways, sampling epitomizes the casing process itself. The whole point of sampling is, after all, to identify a suitable strategy that delimits certain cases for a particular purpose. 'Casing the case' – as Ragin calls it – i.e. the processes and mechanisms involved in identifying the case or the ensembles of cases – is, at least at an implicit level, always going on in any sampling activity.

Interestingly, Ragin focuses on the methodological and epistemological issues involved in casing. However, he tends to ignore the perhaps more obvious *logistics* of casing. Yet, time constraints, geographical access to cases, the sequential order of case selection, the ethical issues involved, the gatekeepers, etc. all play a real role in shaping the final sample. In probability sampling, these kinds of issues have been long well recognized (see, e.g. Shewhart, 1939). Even the most sophisticated random sampling algorithms are, generally speaking, based on whether selection occurs with or without replacement of cases (or groups of cases). Yet in qualitative research, similar issues can arise and are best illustrated by drawing on a real example of selecting documents from an archive.² The documents that needed to be sampled were stored in three box files, one box for the men and two boxes for the women. The 'men's box' was the first box to be explored. There was no special reason for this except that it seemed a good idea to start with the smaller job, particularly given the time available on site, which was anticipated to have been insufficient to have gone through both boxes of women's documents without interruption. This meant, however, that by the time the first 'women's box' was looked at, a number of themes, issues and ways of reporting had already been covered. This in turn resulted in a particular sample of documents where proportionally fewer were written by women relative to the total number available than the

proportion of documents written by men. This may or may not have been a problem; we cannot know. But that is the point: indirect sampling errors that exist by virtue of the logistics involved in *doing* sampling may or may not be known, and they certainly cannot be known ahead of actually doing it.

The material reality of the cases necessarily and contingently places limits on which cases are selected and how they are selected. It matters immensely whether cases exist in groups or not, whether they are networked, hierarchical, chaotically or randomly scattered, etc. in space. Just as Ragin argues that the processes of ‘casing the case’ need to be paid more attention in both qualitative and quantitative research, so too is it suggested that the practical logistics of sampling be increasingly acknowledged (see also Wilson et al., 2006 on this issue). More often than not, cases are deliberately selected precisely because of their real location in space and the amount of time available to select them (see Gorard, 2003). Each case will necessarily be located in its own (virtual, physical, social, etc.) space, in a specific relationship with all other possible similar cases; the final selection of one case over another is intricately dependent on exactly where and how it exists, and how much time there is available to access it. As well as Ragin’s ‘casing the case’, we might well think of ‘spacing the case’ and ‘timing the case’. The material reality of the case is what is important here and is relevant to all sampling approaches, to the point that it often delimits not just which cases are included in the final sample, but also those which are *excluded*.

Crafting sampling criteria

The above three-pronged model to sampling sets out *a priori* presuppositions that any sampling criteria are knowable objects of knowledge. By implication, the adequacy of any sample depends on a quite elaborate series of important decisions which together contribute to how the sample is actually drawn. As Bateson writes about the steps involved in the construction of social survey data:

There is always a right decision – or at least a decision that, in the light of the aims governing the research and the facilities available for it, is best – and there are several wrong, or less good, alternatives. What the researcher needs is a knowledge of these alternatives and an approach or orientation which will help him [*sic*] in choosing whatever is best for his [*sic*] particular research purposes. (Bateson, 1984, p. 5)

The problem is, the researcher does not have knowledge of these alternatives prior to conducting the research. As Blalock (1960, p. 416) explains in describing the difficulty of probability sampling, there are no

hard and fast rules that can be used to provide ‘cookbook’ answers to the most important question of which [sample] procedure to use. It will often be almost impossible to evaluate the degree to which certain assumptions [about the population] are being violated.

Instead, researchers need to move to and fro between the knowledge of the cases sampled and the population from which the sample is drawn, what is needed to know about both and the material logistics of accessing those particular cases. As Cohen, Manion, and Morrison (2007, p. 117) sum up, ‘it is not always possible to predict at the start of the research just how many, and who, the researcher will need for the sampling; it becomes an iterative process’.

Assessing the adequacy of the sample takes place, therefore, *throughout* the entire research process. This is likely to be unsurprising to those familiar with qualitative strategies where this kind of ‘through the research process sampling’ takes place all the time. For instance, in theoretical sampling, cases might be deliberately selected according to, and depending on, what was found by exploring one or more previous case or cases. Although the process is perhaps more subtle in probability sampling, there is nevertheless a similar process at hand. The main difference is that the selection of cases and the epistemological interplay between the case and the population are compacted together in qualitative sampling, whereas they tend to be differentiated as separate activities in quantitative sampling. In both, however, the assumptions associated with particular sample designs are themselves necessarily dependent on other presuppositions relating to *which* cases need to be selected and why.

In turn, neither the description of the sample strategy that will be used in the future (as in the case of research proposals) nor the confidence with which it is often referred to (in order to persuade funding panels) is always likely to be appropriate. This is not to say that samples should not be designed without aiming for what is theoretically optimal given a particular study. However, there needs to be greater acknowledgement that *any* sample will necessarily fall short of the ideal simply because the praxis of sample design is limited by the possibilities set by the three-pronged configuration of issues, which itself becomes clearer in the context of the research itself.

Thus, whilst it is understandable that one might want a neat list of criteria that can be used to assess the validity of a sample, the reality is the criteria used to assess the validity of a sample are themselves dependent on the interplay between which cases are selected, what it means to know them and why it is deemed important to know about those particular ones. Criteria such as ‘sample size’ or ‘sample error’ – i.e. those often used to delimit quantitative and qualitative sample designs – are rendered meaningless without further explanation as to what, how and why they may matter in the first place.

There is nothing particularly new about this last point. Most will be acutely aware of the fact that a good sample does not start with the sampling criteria. The criteria are there as a part of a code of practice, but they do not reflect the practices that go on to construct that somewhat ‘secret’ code. Rookie researchers, therefore, need to go beyond the textbooks and sampling criteria in order to even begin to sketch an adequate selection procedure for their projects. Deciding on when a sample is ‘big enough’, sample error is ‘small enough’ or selected cases are ‘good enough’ are all part of the necessary learning involved in *doing* sampling.

The onus of doing sampling, then, becomes about a ‘praxis’, as Freire (1970) would call it. That is, the dialectical interplay between the action and reflection of doing sampling in the field. The term ‘praxis’ has a long history and has been used and adopted in numerous ways, dating back to Aristotle’s political theory (Balaban, 2000). Nowadays, at least in sociology, ‘praxis’ has become permeated with Marxist connotations, which indeed Freire himself developed too, to refer to a complex *mélange* of ‘action’, ‘practice’ and ‘reflection’. A similar meaning of the term is also core to Bourdieu’s philosophy of social action. Some may prefer Sennett’s (2008) notion of ‘craft’. The point is, sampling necessarily involves a set of customs, which are embedded in a related set of philosophical assumptions and disciplinary practices, which often take time to explicate and even longer to become part

of the research ‘habitus’ (Bourdieu, 1984). They are also very difficult to teach, which may also explain why the more tangible list of ‘key criteria’ or ‘sampling strategies’ have become the main pedagogical means of introducing sampling to student researchers. Yet there is value in exposing some of the unsaid, untold, taken for granted meta-methodological sampling assumptions, not least because doing so provides an alternative way of addressing different sampling standpoints.

Conclusion: bridging the qualitative and quantitative divide?

Allowing for greater acknowledgement of the inherent tensions between the philosophical, methodological and practical activities that take place throughout all research has the benefit of bridging probability and non-probability sample designs. Indeed, the boundary between random and non-random sample designs is arguably dissolved. Some readers may take issue with this since many will consider the epistemological differences between probability and non-probability sampling to be too great to be able to propose an over-arching approach that adequately applies to both. To be clear, I am not saying that epistemological issues do or do not differentiate probability and non-probability sampling approaches. Researchers working from a particular epistemological framework, for example, may assume that cases exist in the world in very particular way, and that those cases are best known through specific methodological and analytical practices, which in turn have knock-on effects on the possible logistics of casing those particular cases. This three-pronged model poses no prior assumptions on which epistemological perspectives are adopted. However, it allows an entry point for a set of conversations about the epistemological assumptions that researchers may bring with them.

This may be particularly helpful in interdisciplinary research. It is quite possible, say, that a team of positivist and interpretivist researchers disagree vehemently with one another with regard to how big a sample ought to be, or what kinds of methods might be best suited to know about certain cases. They are very likely to disagree about the point to sampling in the first place. Should it be about knowing more about the population from which the sample is drawn or should it be about knowing more about the sample? Do the logistics of the field allow for the collection of a large sample that helps to learn differences between groups or not? Is there enough time and money to access the cases that might ideally be approached to address particular research questions? The answers to these questions may or may not be clear cut, but they nevertheless help to generate an overt discussion about what a case is, what ontological assumptions surround that case, how to best go about knowing it, etc. – all things which would be helpful at the beginning of an interdisciplinary project, instead of during the project, or during the ‘analysis’ part of the project, as often tends to happen.

In an economic climate where interdisciplinary teams are increasingly working together, this is an important reconceptualization of sample design that goes beyond traditional quantitative and qualitative divisions. Moreover, this alternative provides a way of bridging different research paradigms, which tend to culminate with a set of core epistemological and ontological assumptions that can often be difficult to penetrate, let alone know about until well after the project has begun, which is far from ideal. This does not mean that core differences will be reconciled. On the contrary, they may well be reinforced. However, highlighting where separate entities lie, as well as allowing for the circulation of some elements within those same

entities, is precisely what bridges end up doing. This three-pronged configuration of sampling has simply sought to look at what different sampling designs share rather than focus on their differences, and it has been done by starting with the question of what makes key sampling criteria knowable objects of knowledge in the first place.

Whether or not this alternative reconceptualization of sampling design is considered useful will depend largely on the extent to which philosophical assumptions are seen to underpin sample designs. Either way, the aim of this article has been to bring back sampling as a core issue within contemporary methodological debates, rather than allow for the ‘politics of method’ (May, 2005) to take precedent about any impending ‘empirical crisis’ in the social sciences (Savage & Burrows, 2007). After all, sampling badly is a guaranteed way of making any empirical crisis worse. What is clear is that what it means to sample well, particularly across methods and different disciplines, remains a real methodological challenge yet to be resolved, and one, therefore, where innovation and critical discussion are both urgently needed.

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Notes

1. Some readers may recognize Bhaskar’s (1979) critical realist approach to knowing societies reflected in this question, and they would be right in doing so. That is to say, at the root of Bhaskar’s work is the question, ‘What properties do societies possess that might make them possible objects of knowledge for us?’ This is adapted to sample design because it emerges out of, and ultimately underpins, the empirical example discussed here.
2. This was part of the ongoing ESRC-funded ‘Food Matters’ project, which involved sampling documents from the Mass Observation Archive’s 1982 Winter Directive on food.

Notes on contributor

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