'If p? Then What?' Thinking Within, With, and From Cases

Mary S. Morgan
LSE

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Abstract
The provocative paper by John Forrester: 'If p, Then What? Thinking in Cases' (1996) opened up the question of case thinking as a separate mode of reasoning in the sciences. Case-based reasoning is certainly endemic across a number of sciences, but it has looked different according to where it has been found. This paper investigates this mode of science - namely thinking in cases - by questioning the different interpretations of 'If p?' and exploring the different interpretative responses of what follows in 'Then What?'. The aim is to characterise how 'reasoning in, within, with, and from cases' forms a mode of scientific investigation for single cases, for runs of cases, and for comparative cases, drawing on materials from a range of different fields in which case-based reasoning appears.

1. Reframing the Question?

1.1 John Forrester's 'Thinking in Cases'

John Forrester offers us several historical starting points for what constitutes thinking in cases. One of the main historical roots he picks out is the medical case history or the administrative case file: the written materials enclosed inside the case, which can be opened for reasoning and analysis using those same documents. In this framing, reasoning in the case is focussed on reasoning *with* those materials *inside* the box. Second, JF recognises an historical strand

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coming from legal reasoning, legal cases (and by historical association, business school cases), where thinking in cases is focussed on bringing all the disparate elements and materials into some kind of a colligation in order to come to a conclusion about the relevant particular claims that are exhibited there, and thus to recognise which principles (legal principles or precedents) that come from outside the case should be applied in thinking within the specific case. These two historical roots of thinking in cases, with their different connotations, can be seen as broadly related to social scientists' notion of 'case studies', the gathering together of a wide range of materials on a specific situation or event for analysis (as opposed to a smaller range of evidence on lots of separate events or situations as in statistics).[1] For me their significance lies in the clues they have provided to the process of developing a satisfactory case study in the first place, and both strands can be seen as thinking *within* the case.[2] Except for the common law tradition, neither of these historical roots have much to offer in reasoning beyond the individual case to say something about other cases, nor for reasoning beyond a run of cases, although any argument which takes the form: 'If p? Then What?' seems to invite such considerations.

Significantly, Forrester also points to a strand on thinking in cases as the opposite of applying general laws - ie it is rather about thinking in/with particulars. He cites John Stuart Mill's discussion of situations in which inductive logic forms the basis for deductive logic. I take this inductive-deductive loop up below, not so much for the inductive/deductive chain, but for two other reasons. First because it offers insight into examples where we have a run of cases; and secondly because it provides an example of one way (but not the only way) that case-based thinking involves thinking *from* cases and moving beyond them (as Forrester surely believed possible), rather than *within* them.

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[1] Social scientists differ in how they describe case study work, but for a definition of case studies that seems to work across the social sciences, see Morgan, 2012,
[2] For problems of constructing cases out of different elements and the configuring processes involved, see Morgan, 2017.

My interests are less in the historical roots of case thinking (though I appreciate their importance in places that pop up below) than in the reasoning that goes on in developing and using such case materials.   Forrester put this broader question on the map when he suggested that 'thinking in cases' should be the seventh style of thinking or practical reasoning in science to join the six styles outlined by Crombie (1988, 1994) and Hacking (1992).   But he forbore to outline that mode, except in his own exemplary case work, where, as Phillips (2017) suggests, he proposed that 'A case hold, confines, protects and travels; it also categorizes and exemplifies.' (2017, p xv).   Yes indeed, but how does it do all those things?   We may get from the historical roots that cases hold, confine and protect, but what are the purposes or outcomes of its travel, what is being categorized by a case and what exemplified, and for what purposes?   And are these characteristics and uses specific to the field that Forrester worked in or do they have wider writ?   The aim here is to locate these aspects, and the wider functions found in other examples of case reasoning, in order to develop an account that fits not just to reasoning *within* the case, but more significantly reasoning *from* the case and *from* its materials in such ways that prompt various kinds of legitimate knowledge beyond the case itself.   My analysis therefore seeks to answer the question: if this is a seventh mode of scientific practical reasoning, what does it consist of and how should it be characterised?

1.2 On where to put the question marks in Forrester's 'If p, Then What'
In order to broaden this enquiry into the nature and range of modes of case-based thinking, I begin by questioning where to put a question mark in Forrester's (1996) title.   Rather than his 'If p, Then What?', one option is 'If p? Then What?', another is 'If p? Then What', or even 'If p, Then What'.   In problematizing where the question marks go, I expect to open a path into the different kinds of case-based reasoning that go on in the human and social sciences.   Since the point of this enquiry is to chase different kinds of thinking in cases, I will range across a number of fields where problematizing the question mark offers an entry key to what 'thinking in cases' involves.   I will

begin Forrester's own field, and with the two sciences that are most closely aligned with thinking about being human and being social and that rely on the study of *single cases*, namely psychiatry in comparison with anthropology.   I will then move onto the use of *runs of cases*: first in a field that, in appearance, looks least like anthropology and psychiatry, namely mathematics, and then back into the closer field of medicine.   Considering *comparative case work* takes me back to social sciences especially sociology and social science history.   The aim here is not to pin down the behaviour of different fields, but rather to elucidate these three types of case based reasoning by looking particularly at scientists who offer reflexive accounts of their case thinking, or for which/whom there are associated commentaries by historians of science such as Forrester.

2. Thinking in Single Cases

2.1 The (stand-in) psychiatrist vs the anthropologist; John vs Clifford

John Forester's framing for thinking in cases can best be understood not just from his classic paper 'If p, Then What?' (1996) but from his iconoclastic 'The Psychoanalytic Case' (2007, and which reappeared in his *Thinking in Cases*, 2017). This latter starting point enables reflective comparisons between Forrester's analysis of one of Stoller's psychiatry case histories and Clifford Geertz's (1972) account of Balinese cock-fighting - for their attitudes and their accounts share much in common.   Of course Forrester is not Stoller, but his writing is so closely engaged with the latter's psychiatric mission that I am treating him as a 'stand-in', a position I suspect he would not have objected to. For both Forrester and Geertz, there are question marks at every point: 'If p?, Then What?' is an unending sequence of asking and answering little or bigger questions as the human/social scientist gets drawn into the case and tries to make sense of it.   The sequence is connected, one question leads to another, or perhaps back round to previous ones - pointing to the importance of both figuring out the next 'If p?' and then posing possible answers in the 'Then What?'.

Both scholars, in the words of Forrester's subtitle 'thinking in cases', wrote programmatically about case-based science. Geertz (1973), in writing about the approach of the anthropologist to the society that formed her/his case of study, described the anthropologist as being faced with a knot of puzzles in the society s/he studies. His role, he argued, is not just to untie those knots, but to ravel the elements back up into an analysis of the culture of that society.[3] He thinks about a society's culture within that society's terms and analyses that within the terms of his own understanding: he thinks within the case. This un-puzzling and ravelling up process is his role as social scientist; and his process account is paralleled in the way Forrester recounts the psychiatrist's (namely Stoller's), analysis and his case history. For the latter, what is being unravelled (analysed) and ravelled up (interpreted) is the patient's experience. Forrester also shares Geertz's attachment to 'thick description'.[4] Geertz uses this expression not to mean exhaustive description, but analysed description: description in which ideas and theorizing are brought into the case to make sense of it (as with legal cases), for his ambition for case thinking is to generalize *within* the case, a mode of thinking and reasoning that he takes to be characteristic of clinical medicine. But where Geertz explicitly warned against generalisations going outside or beyond the case, Forrester's view of Stoller is that he does indeed aim to go beyond the case. According to Forrester, Stoller is ravelling up an analysis inside the case that will reach toward something more general about the behaviour of human beings that can move outside the case. This critical difference between thinking *within*, and reasoning *with* or *from*, captures the point about how materials established within one case or case study may be utilised in reasoning from that cases to other individual cases, or to a generic level (a topic I return to later).

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[3] See Morgan, 2017 on the importance of resolving those puzzles as the key to narrative explanation offered in case research.
[4] This is according to the introduction by Adam Phillips to Forrester (2017, p xiv).

2.2 Insider-outsider considerations

There is something unusual about the way that scientists from these two fields think within the case - both are active as scientists inside their own cases.   They are human and social animals researching what it is to be human and social, and so being 'resident' (Kohler's term) they chose a level of participation which affects their writing about the case with respect to the reader.[5]   Geertz, the anthropologist is, as befits his profession, 'a participant observer'. [6] This entails that he must take part to the extent he must show the reader he was really there, and in the middle of the community not just watching from the sidelines - for the credibility and authority of his account rest on his admitted presence.   In one respect, he is like Simmel's (1908/50) 'stranger' in the community, but unlike that 'stranger', the outsider who comes to stay but remains a stranger, the anthropologist goes away again.   Simmel's 'stranger' is a cultural confidant, a kind of situated observer who has the capacity to reflect back onto the village something of how they appear to the outsider.[7]   The anthropologist also has such a reflective role, but it is more active than the stranger's: this is the translator's role proposed for sociology by Stephen Turner (1980) but - importantly - it is not (by intention) to translate that community of study back onto themselves, but rather to a different, outsider, community as represented by the scientist.   The sociologist does not just reflect, or even just report, his observations, but rather explains the situation to those other outsider communities and cultures who read her/his work; this is a one-way translating role, and the reader is a quasi-participant observer not just to the society but to his analysis. The anthropologist is more actively involved in the community than

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[5] Kohler's (2019) accounts of 'resident science': science in the field, covers cases from anthropology, sociology, field primatology and field ecology.
[6] By comparison, for example, in medical cases, the scientists would not say that they were involved in participant observation, though they are often present in making observations and interacting with their case participants.
[7] This is kin-related to the standpoint theory of feminist theory because of the different communities involved, but Simmel's stranger remains a non-judgmental outsider, and so does not carry implications of difference in authority or status between the observer and those observed. See also Linstrum (2019) in the context of colonial classification, and Merton's (1972) insider-outsider account at the level of groups.

most of Kohler's 'resident' observers whose situation always enables them to observe, but who may (or may not, depending upon their scientific discipline) interact via participation or confiding. The anthropologist is at one and the same time an insider and an outsider, insider in the case, but outsider as a social scientist in reasoning about the case and for an outside audience.

In the psychiatric case history, as depicted by Forrester, the analyst narrator plays not just the confessional role, but the role of gentle extortionist in order to draw materials out of the patient for analysis.[8] It is a process of co-production, with the patient inching toward self-knowledge and the analyst inching toward an analysis, and, in Stoller's case (as picked apart by Forrester), toward developing broader theoretical and conceptual claims out of the case. The analyst too is an insider and outsider, but there are critical difference in the performance of these roles compared to the anthropologist. Stoller translates from his field knowledge to the patient in providing his analysis and treatment, but also translates it for the reader. If the analyst did not report his presence, there would be no case history, but those case histories that are made public are presumably designed to show off not just the analyst's skills, but their creative theorizing about the psyche of the patient. In such case histories, the reader of the text is drawn in as participant, more collusively than the reader of Geertz's account because their participation is not explicit but instead voyeuristic, not just of the patient but also of the analyst's reasoning (as Forrester well recognised in his subtitle for his account of Stoller's case, 2017).[9] Of course, the anthropologist writes for her/his community of readers, and if they are to follow her/his analysis, s/he needs to share her/his evidence in constructing the case account and to share their reasoning about the case. But where the anthropologist explains an 'other' society to her/his community of readers not back to the society s/he studies, the psychoanalyst 'explains' (perhaps) their patient's situation (perhaps) directly to that patient, and to their reader.

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[8] For the relation of the analyst and patient in reasoning within a case, see also Hajek (2019)
[9] See Böhmer (2019) for a discussion of the public nature of such case accounts.

For both fields, the participant observation status has implications for what it means to reason within the case - 'If p? Then What?' - and for how that reasoning is shared to bring others (outsiders) inside the case.

3. Runs of Cases

Medicine and mathematics and medicine are rarely put into the same box, and mathematics is rarely considered a human science, but any field whose activities has depended (historically) primarily on the capacities of the human brain can surely be considered such.   Both medicine and mathematics, in certain sites, rely on runs of cases - which accounts for their presence together here, although their usage of such cases is rather different.   Of course runs, sets, and sequences of cases are likely to be found in other scientific sites too (as I suggest later in an example from political science).   Here is where the possibilities of 'If p, Then What' offer scope for thinking more broadly about the natures of case-based thinking.

3.1 Inductions and conjectures

I begin with mathematics, and with two possibilities: either 'If p, Then X Follows', or 'If p? Then X Follows?'.   But I end by suggesting that we may also need 'If p, Then What X Follows?'.   That is, I problematize the practices in some examples of case thinking found in mathematical reasoning in terms of that phrase.

In some examples of mathematical argument, 'If p' means 'We Assume p' so the 'If' is conventional rather than meaningful (though of course this is not so in all domains, eg probability theorizing).   In deductive reasoning, whatever is supposed to follow from that assumption does indeed follow, so the argument seems cut and dried: p holds, so then X follows.   For example, when we know we have a case of a right angle triangle, we also know Pythagoras' theorem holds, so we can offer some deductions.   But we can only deduce because we have that

theorem: thus 'If p, Then X Holds'.   In this version of case-based reasoning, 'If p' means 'Given p', so p is not under issue, not subject to question, and other things follow from it with no question mark either.   It is the deductive standard. For example, in economics it might be something like: 'assuming (if) people behave according the standardized economists' definition of rationality, then, they will behave as follows when faced with a particular kind of circumstances (for example, they will chose in a particular order of preferences).

But paradoxically, this kind of mathematical theorem that supports such deductive reasoning might have been historically developed in an inductive argument, putting it into that tradition for case thinking from many particulars which Forrester attributed to Mill.   Indeed, Reviel Netz's (1999) account of the development of geometric proof in Greek mathematics suggests that such proofs did originate in this case-based manner.   Once we have a theorem, then we can use that general finding deductively, but deriving that theorem might depend, as Netz argued on a process of asking again and again, for each of many particular cases - each a separable, chosen point in the geometric space - 'If This Particular p? Then What Follows?'.   Putting together the results of 'If p? Then What?' for all the individual points (cases), and showing that they all have the same result validates a generalisation that all the other relevant points (in the same domain, but not individually argued for) will have the same result, and so creates the possibility of a general argument that supports deductive claims for any further points within such a given realm covered by the set of case points.   This seems to be an inductive proof, a proof by boredom (for the reasoning for each case is the same and needs to show the same outcome) followed by a leap of faith or of plausible belief, that the same result will hold for all the other particular, but not yet chosen, relevant points, and so then the run of actual and supposed cases can be developed into a theorem.

Mathematics is, in some ways the most human of sciences.   That mathematics offers the possibility of 'proof by boredom' is a manifestation of this claim, one

rather different from Descartes' 'I think, therefore I am', which seems more relevant to a different way that runs of cases are used in mathematics.   One of the best known philosophy of science tracts on mathematics: Lakatos's (1976) *Proofs and Refutations*, pointed out how informal the process of mathematical reasoning is.   His account of how mathematicians had reasoned about the relation of the number of vertices to sides to faces in polyhedra suggests something closer to the postulation and proof reasoning mode that Crombie and Hacking had marked down as first in their list of styles or kinds of scientific thinking or modes of reasoning (first because it was historically first, originating in ancient mathematics no doubt).   And the mode of reasoning in Lakatos's account seems to follow just such a hypothesis-proof or rather conjecture-refutation looping (rather than the inductive-deductive loop discussed by Netz which fitted so well to Mill's inductive account).   Lakatos's 'rational reconstruction' (supported by historical footnotes) presents a sequence of geometric figures with ever more faces and edges and vertices - that is a run of *related* cases rather than a run of *similar* cases as in Netz's account.   The argument goes from one case of a geometric figure on to the next (slightly harder) case.   His reconstruction depends on the use of a set of examples and counter-examples, and with side-moves, indicating that those proof moves depend on reasoning through each specific case of polyhedra in the sequence. The relevant phrase for each case in the series should be 'If P (as an assumption), Then What Follows?' suggesting not a completely obvious deductive process, but rather that the outcome has to be carefully developed through each one in the sequence of successively more complex cases.

3.2 Classifying and cases

While the idea that mathematical reasoning is, in some sites, case based might seem provocative, it is a conventional claim that medicine has - in large part - been built on cases as attested by our historians of medicine, and flagged by Forrester in his paper.   Unlike the maths cases, in medical cases - nothing can be (easily) assumed, so both 'If p', and 'Then What' can be questioned, and in

different ways depending on the context.   Without pretending to be exhaustive, I look briefly at two contexts which depend on case-based thinking: recognising a new disease category, and individual patient diagnosis and treatment decisions. Both types of situation depend on runs of cases. This is particularly obvious in the first case, of defining a new category of disease, where several cases with the same characteristics will likely be needed in order for a new disease to be defined and labelled.   But when thinking about the individual patient and their diagnosis or treatment, that judgement depends on there being an already defined category of disease, P, and treatment T, against which individual patients' diagnosis and subsequent treatments can be identified (see Ankeny, 2007).   But these diagnostic and treatment regimes also depend on an earlier typical or index case, or set of cases, that create such an index case, which have defined the characteristics of P and its possible treatments T.[10]

Defining a new disease category generally requires a run or series of cases, and investigating those cases to see which, within reason, can be grouped together such that whatever they have in common can be defined.   That is, a set of cases with some features in common are gradually pulled together, and the question is do these cases fit together to form a new class, a new disease category?   Here the 'If p?' asks: 'Are these the same kind of p?' where p is not yet fully defined or clarified.   Thus, this question about a new disease category differs from the patient diagnosis, and comes before it.   Once we have a run of cases that serve to characterise the phenomenon of a new disease P, from there, we can then recognise further cases of p when we meet them, and are in a position to recognise one p as a member of that class of P.   Rachel Ankeny (2011) recounts how defining HIV-AIDS involved a gradual grouping together of a set of individual cases by bringing in or noticing new characteristics and throwing out others that proved irrelevant, considering both personal and social

[10] This points to the problem of approaching case-based thinking with the initial question 'What is this a case of?', a classifying question that only makes sense when the relevant typical phenomena has been established (see also Flexer (2019)).   This classifying move parallels the point about mathematical proofs - once we have the theorem, the case answer can be deduced.

characteristics of patients and their indicative symptoms.   That is, the characteristics of the disease did not become immediately recognised as evident in a set of cases, but emerged through considering a sequence of cases which at first sight seem to have little in common.   A parallel process (discussed by Ankeny 2014) occurred with the recent recognition that excess caffeine might be dangerous to the extent that it has now been remarked as a cause of death, and become an issue of interest to the American Centre for Disease Control.   The disease diagnosis here seems to have been not so difficult as a medical problem, but as a social problem of recognition.   In contrast, Brian Hurwitz's (2014) account of the recognition of Parkinson's disease tells of a much longer, perhaps life-long, attention of medical observation and attention that lead not just to recognising and defining that eponymous disease, but to provide a full account of its characteristics and progress.

In medical diagnoses for the individual patient, certainly we need questions marks on both elements 'If p? Then What?'.   But as Hurwitz (2017) points out, the question 'If p?' should be 'Which p?' for the diagnostic question is implicitly asking 'Is it This p?' or 'That p?', and maybe where 'That p' is not a single possibility but several; that is 'If p?' is really asking 'Is it p1 or p2 or p3 or p4 etc?'.   The diagnostic case question is asking 'Which generic P is relevant in this particular case?', where the case consists of the patient and their condition.   So the diagnostic question seeks to clarify the nature of the condition against several possible alternative conditions known or unknown with similar sets of characteristics.   (Indeed, the 'If p' can even refer to a symptom, not a disease class.)   'If it is this p1?', then we would want to act in a relevant way.   'If it is that p2?', then some other action is indicated.   Hurwitz shows how surprisingly simple, or uncertainly complex, a diagnostic problem might be in recounting medical cases that include a building worker with a nail through his foot; a nurse with sudden vision problems and headaches; a young woman who over a relatively short period of time had lost movement and control of her body; and so forth.   Patient diagnosis, it seems, is not a simple question even of 'Which p?'

but rather a question of given the case in front of us, how can we put together the information to reach recognition of 'A possible p for this case'.

Suppose the diagnosis has been made, so (as in the first maths case) 'If p' means 'Given p' that is, we know the patient is diagnosed with p, then that part of the clause is no longer questioned.   That in turn indicates we know what the 'Then What' implies: it tells what treatment should follow and what the expected progress under that treatment should be.   While this seems straightforward, of course, it often turns out that the treatment, or its progress, is not so straightforward because of the combination of patient characteristics and variety of treatment options, which suggests that, after all, we still need the question mark on the 'Then What?'.   Many patient case narratives (in the narrative medicine literature) are actually a narrative about this 'Then What?' experience, the treatment case.

Of course, many (but by no means all) treatment regimens are now based on randomised control trials (RCTs) of treatments patients, but it is rarely recognised that these fundamentally involve a set of cases to which treatments have been administered under certain controls to extract information from that set of cases, each of which is an individual patient.   Each of these trials are themselves investigating an 'If Treatment p? Then What?'   Since not all patients receive the treatment, there is a valid question mark on the first part of the clause.   And there is a question mark on the second since it is typical in medicine that the patient's cases that are treated do not have exactly the same outcomes in response to treatments.   Treatment regimens and decisions based on RCT's are based directly on the results of experiments on runs of cases, but they are based on something like the averages, or overall result, of the runs of cases, so that details of the individual cases disappear.

These examples from medicine alert us to how using cases quickly runs into classifying activities, and into consideration of the factors underlying such

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classifications, and we can find these same overlaps at work in other fields that use runs of cases. For example, Sharon Crasnow (2012 and 2017) analyses how political scientists have addressed the 'democratic peace hypothesis' (that democracies don't go to war with each other) by creating data sets consisting of a series of cases, with specific associated characteristics, in order to classify cases according to whether the main thesis holds or not in the set of cases overall. She also shows how such runs of cases are not sufficient to work out explanatory mechanisms, and how those scientists revert to more detailed individual case work in 'process tracing': tracing the mechanisms that might validate the thesis in one particular case, and from thence speak to the broader claims found in other particular cases, or even the bigger data set. For political sciences there is no time-restriction: later cases can be used to shed light on earlier cases as well as earlier ones on later; and theoretical principles from the field might well be the promoter of similarity analyses.

Such classifying work, in runs, sets, and sequences, of cases, depends upon recognising and framing similarities: between points in geometric space, between medical symptoms and diseases, between political events, all as part of 'thinking in cases'. Analysing such runs of similar cases offers possibilities for generating something considered more generic by the community, which could be a category of disease, the development of a mechanistic account, or the recognition of some more abstract claim or deductive proof. These point back to Forrester's account of the historical roots for the development of common law, a kind of law which relies on the recognition of common characteristics - that is of similarities - in a sequence of cases.

These strands of reasoning within cases, and from cases - by the use of various kinds of comparative case thinking - are taken up again in section 5.

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4. Thinking With and Beyond the Single Case

Although medicine relies on a run of cases to define a disease category, and to underpin both diagnosis and treatments for patients, there are other fields in the historical and social sciences where a single case has been used to define something in such a way that it creates abstract or specific materials that can be used by others.   Such case reasoning initially involves thinking within cases, but may go on to generate thinking with cases or thinking from cases.

It is important to recognise that thinking with cases and from cases does not mean suggesting that the case 'generalises', and indeed it is difficult to understand what 'generalising' from a case could mean in any literal way.   It certainly cannot mean 'If p? Then wherever we find p, the same thing follows'. In this context, Znaniecki (quoted in Mitchell, 2006, p 34), makes a 'nice' distinction between generalising by an 'enumerative induction' from many cases with the same characteristics and findings, and 'analytical induction' which involves abstraction - the ability to abstract some essential finding from a concrete case which might then be, or presume to be, found relevant in other cases.   This captures the distinction between Mill's induction from many particulars (and that we found in Netz' account of Greek geometric proofs, and the examples in section 3 above) compared with the kinds of abstraction generalised from Athenian democracy or from the study of a slum society in *Street Corner Society* discussed here.   As I argued in Morgan, 2019 (and briefly summarise below), careful examination of the use of such exemplary cases (democratic Athens), and exemplary case studies (*Street Corner Society*), suggests that such analytical induction does indeed happen from case-based work: something potentially generic is identified, possibly at an abstract level, which is then found relevant elsewhere.[11] I label such analytical inductions as thinking *with* cases.

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[11] See Morgan, 2017 and 2019 for the background to this distinction of *exemplary cases* and *exemplary case studies*, and the different characteristics of such case-based thinking, as well as the importance of the narrative in case-study accounts.

This attention to abstraction overlooks something at least as important, namely that the community of researchers often recognises the relevance of some specific elements of a case or case study (particular findings, materials, data, examples, explanations, variables of interest, even concepts, etc) as useful (see Morgan, 2017). These elements can be taken up for their own case work, or indeed, for some other mode of scientific investigation. I label this inductive move thinking *from* cases.

For example, we see both kinds of inductive moves - thinking with and from cases - in the case of Athenian democracy as discussed by Josh Ober (2007), *an exemplary case* which has been argued over again and again. As he suggests, the case is rather like a model organism or model system - it has undergone long investigation and been used by both political theorists and political sociologists as well as by moral and political philosophers in arguments about the nature of democracy in its widest sense, that is, prompting analytical inductions in thinking with the case. Such users may also carry the generic aspects of the case when thinking about other specific cases but also in more abstract or theoretical discussions of democracy, that is, thinking from the case. Similarly, revolutions such as the French Revolution or the British Industrial Revolution continue to hold exemplary status as cases carrying generic elements that can be thought with, reinvestigated, re-framed, and from which ideas, generic characteristics, processes, outcomes can all carry freight into other cases for those communities who use them.

We also see both kinds of inductive moves with an *exemplary case study* like Whyte's *Street Corner Society* (1943). This is not an exemplary case (the specific case was not seen as unusual or significant) but Whyte's investigation and account gained exemplary status soon after its publication. The case's title became one of its main exports, gaining traction as a conceptual label developed in Whyte's thinking *with* the case about a kind of society, a society of young men who hung out on street corners through lack of employment, house-hold space,

money and the where-with-all to do other things.   This is a good example for Znaniecki's distinction, for the analytical induction here created an abstract label that gained wide currency, applied multiple times to many other cases and in many different scholarly communities suggesting that many others used the analytical induction that had involved thinking from the case.   At the same time, there was also a second kind of reasoning *from* the case, which became clear in following the path of where, how and when its details: methods, materials, vignettes, claims, and analyses were used by others.   A case study involves many things besides abstract claims and these elements can each be separately taken out and utilised elsewhere - from this case, to prompt a series of experiments on small group behaviour, to explain the relationship between mental health and social status, for theorizing social interactions, as evidence on attitudes to gambling in different communities, and so forth.

What then are we to say about 'If p, Then What?' for such single cases and case studies.   When cases provide materials that are used by others in the community, the use-value can be of two kinds.   There is first the generic analytical inductive reasoning *with* cases - where the case develops and supports theoretical or generic claims as in Stoller's account of human sexuality, or as in Whyte's conceptual label for a kind of society (and in Becker's account of 'the fixer' in sociology - see below).   Second, exemplary accounts are often also used in the community at much less generic level - that is their case materials prompt others to investigate other cases, to develop new lines of enquiry, or to ask new questions for consideration.   For this reasoning *from* cases, 'If p, Then What?' is a door opener not a door closer, it points from the case study (and its many concrete details and findings) not to the 'Then What' within the case, but to multiple 'Then Whats' beyond the case and in other cases.

5. Thinking Comparatively with Cases

There are several ways in which social scientists depend on comparative case work to develop their ideas (though comparative work does not necessarily involve a commitment to cases as we see in 5.1 below). Again, 'If p, Then What?' can be found in several form, and what is salient here is the attention paid to the differences as well as the similarities found between individual cases (as opposed to the similarities in runs of cases).

5.1 Comparative history with cases

There is a strong tradition in 20th century social science history that relies on comparative case work. One of the most salient proponents of such comparative history, with a strong programmatic statement, was Marc Bloch (1928/53) who argued vehemently for a comparative history as a series of two-way comparisons between two different cases that were evidenced in different times, or in different places. Given p was found in place X, prompted the question: was p also to be seen in place Y? Given p occurred at time t, was p also available at time t+1 or t-1? When p was caused by X here, did X also cause it there? The 'Then What' here is no longer what follows from 'If p' but rather the questions raised by the observation of p in one place and not in another. Effectively, the 'If p' is, like the assumptions of mathematicians, an already known p, and the 'Then What?' offers new research horizons, pointing towards places to look for alternative materials prompted by the other case in the comparison. This is the kind of work that social science historians do when they compare different specific cases of industrial revolution or financial crisis from different times or places (see Morgan 2019 for discussion). Bloch argued that such carefully focussed comparisons, equally of similarity and difference, were a means of locating new evidence (previously hidden because not looked for) on phenomena, a way of challenging easy interpretations, and a means of developing explanations which avoided dead ends or pseudo causes (if X was a factor in case 1, but not in case 2, then it was a pseudo-cause). And these benefits would be for both cases in the comparison, the one already on the table and the new one

brought in, for knowledge of the base case would also be expanded.

Bloch had in mind relatively bounded historical studies, enabling comparison to be specific and rooted in the particulars of those two times or places, so we can think of this comparative work as thinking within cases: learning more about each case, by thinking with them about other cases and enabling them to reflect back on themselves and each other.   Bloch had outlined the virtues of what global or economic historians later called 'reciprocal comparison' (see Austin, 2007), though for these latter folks, both the sites, and the comparisons, were often so open ended that any sense of the boundedness of the case as a thinking unit disappears.   This is immediately evident when we consider comparative case work in the context of counterfactuals in social science history.

When 'If p' refers to a counterfactual state, ie 'If Not p?', Forrester's clause is asking 'What would happen, or what would have happened, if p did not hold?', for example 'If there were no railways?, Then what would have followed?'. There are legitimate question marks on both parts of the clause.   First, the counterfactual 'Not p?' has to be very carefully specified and there are many ways to do this, so this is initially wide open to question.   It then becomes specified into a fixed 'If not p'.   Second, there are many ways of filling in the 'What follows?', so this will remain open to question.

There is of course a huge literature on counterfactuals in philosophy, history, and social sciences, and while the basic idea of counterfactual reasoning depends on a comparison between two different situations, in real versus imagined worlds, nevertheless it is invalid to think of this as, in general, a mode of reasoning dependent upon, or characterised by, thinking in cases.   At one end, a counterfactual is understood and portrayed as an imagined thought experiment, which may range from the philosophers' 'imagine I have two left hands?' to the immense historical scenarios that flow from imagining that China rather than the 'West' had become the world's dominant economic and political power

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(Tetlock, et al, 2006). To take just one example of the scenarios under that project: Kenneth Pomeranz's (2006), 'Without Coal? Colonies? Calculus?' fills in the 'Then What?' clause by offering a series of scenarios which also change the 'If Not p?' at the same time, that is, involving not just 'imagining an industrialized China and a non-industrialized Europe' but 'imagining whether there were other paths to similar results' (p267). That is, neither reference nor comparative situation are stable, each is open to alteration, reshaping, making different turning points, and reacting differently to events and to situations. The flexibility on both parts of the clause *at the same time,* does not deserve the status of thinking in cases for it does not offer the kind of necessarily bounded accounts of the actual and counterfactual imagined worlds that would look like cases.

Nevertheless there are counterfactual examples that rely on the comparison of cases, one actual, one counterfactual. Robert Fogel's (1964) famous counterfactual asked: If there were no railroads, what would have happened to American economic growth in the 19th century? He offered a well-specified counter-factual state of 'If no railroads', that then remained stable throughout his study, and defined in what respect the implications of that counterfactual world state were to be questioned: 'What would have happened to economic growth?'. His answer developed an account of alternative transport routes for agricultural goods (assuming that there were no railroads) that entailed designing a set of waterway improvements and canals that could have been built in order to enable almost the same geographical spread of agriculture over a fixed time period. There were many ways of creating the counterfactual world following his 'If Not p' and the disciplinary community criticised him roundly for his detailed choices. But the point for this argument here is that he followed the 'minimum rewrite rules' (Hawthorn, 1991) to create a limited and carefully thought-through, alternative, 'empirical' imagined world in his 'Then What?', which could be compared with the existing non-counterfactual empirical world case

<u>5.2 Analogical Cases</u>

The key comparisons of both comparative and counterfactual history rely on attention to the differences more than the similarities, but the reverse is so in the use of cases in some parts of sociology where the processes and point of comparison are understood very differently.   In Howard Becker's (2014) programmatic account of 'reasoning from cases', the notion of a case is quite elastic.   It is still self-contained but it can refer to a full blown sociological case study such as he would do himself, or it could be as slight as an anecdote overheard or told him.   While Becker found anecdotes a fertile potential for his own case work, Max Gluckman (1961) counted such little anecdotes or vignettes only as 'apt illustrations' for use within his 'extended case study method'.   This latter method, developed and practised in the Manchester School of social anthropology, sits more or less in the same space as Geertz as far as this account of reasoning in cases is concerned.   Extended case work (over a long period of time either by direct participation or by using the work of others in that same field for other times) provided the kinds of insight that would lead to some more general account of the society of that field, but for Gluckman as for Geertz (and unlike Whyte and Becker) those findings would not have any obvious generalisability.[12]

Becker was not concerned with Bloch's systematic comparison of similarities and differences in order to develop deeper, or more secure, or even new, knowledge about two separate cases.   Becker called his mode of reasoning from cases 'analogical reasoning', because he relied on recognising in a second (or third or fourth case) a sociologically salient phenomena that he had found in a previous case, or even recognised in an anecdote.   That is, he picked out analogous cases by his recognition of similarity.[13]   One of his examples stemmed from his own

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[12] See Gluckman (1961), reprinted with other essays and commentaries in Evens and Handelman, 2006.

[13] His mode was close to Hesse's (1963) argument for picking out relevant models in her work on analogical reasoning, but did not follow her mode of reasoning with the analogy (which depended on distinguishing positive from negative features between the comparative cases).

experience of the importance of having a *despachante* ('a fixer' - someone who can get things done in the social system) in order to get certain documents in order to leave Brazil.   He recognised something similar in the role played by an older woman who served as the expert for a community of poor black Americans in Chicago who needed help in their interactions with the 'system' (that is, with government agencies and so forth).   Analogical reasoning from cases for Becker meant recognising something in common, something generic in sociological terms in what might be - for all other intents and purposes - the activities and arrangements of people within societies of otherwise widely different times, places, and cultures.

Becker's argument here suggests 'Given p here, and If you find a version of p there? then look for that same, potentially generic phenomenon in several other places?'.   This p could be a social figure, a social phenomena, or something more abstract.   The analogical move invites the social scientist to extract something from one case to look for matching appearances or occurrences in other cases, in some ways similar to the use of cases in common law.[14]

6. Thinking in Cases - Again

When Forrester put the question of 'thinking in cases' on the map, recall (from section 1) he did so in a way which suggested it should be type seven in Crombie's categories of thinking, understood by Hacking as modes of practical reasoning in the sciences. Their six categories are attractive precisely because they have both an historical reality, and offer a philosophically informed account of doing and reasoning under those headings that scientists have developed over the centuries.   These ways of reasoning are not philosophically defined ways of reasoning (induction, deduction, counterfactual thinking, etc) but the acceptable modes of doing science that scientific communities have adopted to find

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[14] Forester understood the process of common law case work as proceeded by a process of analogy (see his 2017, 128-9).

justifiable knowledge.   And as Hacking pointed out: there is no appeal to any philosophical rule of approval that fits over them.   For both Crombie and Hacking, theirs was a cut through the way science goes on which helps us to understand its variety of approaches to gaining reliable knowledge about the world.

But while Forrester put the category of thinking in cases on the map, he did not fill in its characteristics as a generic mode of scientific reasoning in the way that Hacking later filled in such characterisations for some of the other kinds in his list (eg the experimental mode, the statistical mode, classification and taxonomy, etc).   Case-based thinking or reasoning is not just a technique or tool any more than experiment or statistics or classification are; rather, they are all ways of approaching certain kinds of materials with associated methods of reasoning found in particular sites of science.   The final section of this paper draws on my discussions above of the various ways case-based thinking and reasoning go on to offer a characterisation of this seventh mode of reasoning in the sciences.   These characterisations suggest the range and limits of case-based reasoning that scientists have taken to be allowable in order to create reliable case-based knowledge in their fields.

As we have seen, some examples of case thinking have exhibited degrees of overlap with Hacking/Crombie's other modes of reasoning.   Just because there are overlaps between case usage with the mathematical form of hypothesis and proof, and with the classifying type, does not mean that we don't need this separate category of reasoning.   Just because cases in medicine are associated with defining new diseases, and figuring out what kinds of disease is present and what class of treatment is appropriate does not mean that all case thinking is classificatory (nor that all medical thinking is case-based), but rather that there are some hybrids at work.[15] Just because some mathematical proof-making

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[15] For a discussion of the overlapping of cases and classification, see also Linstrum (2019).

involved the stacking up of cases or the use of a sequence of cases does not make mathematical work all case based or v.v..   Only if we could umbrella all our examples under the other styles of thinking or reasoning, could we say we don't need 'thinking in cases'.   Since we cannot do so, we do need this type no. 7.

Even so, judging by our site discussions, we might question: Is reasoning within/with/from cases one kind of thing, or is it lots of things?   We might judge that what counts as a case in different fields is so different or has such different implications, that the modes of reasoning with cases are disciplinary specific. For example Fogel's world without railways and the proofs in Greek geometry might have involved, sequentially, both inductive and then deductive reasoning chains, although the nature of the cases at each site and their reasoning processes look difficult to align.   It might be that arguing with cases in mathematics is always going to look different from arguing, say, with cases in sociology.   Thinking in cases may appear discipline specific, most probably because different traditions have evolved in different fields.   But at the same time, the co-incidences in reasoning, and the similarities between different fields, suggests these differences may not be irreducible.

First, while the category of a 'case' exhibits considerable variation it has some features in common. The three roots Forrester suggests (in section 1 above) are only partially helpful.   But if we take them along with our examples, we arrive not so much at a definition of a case, but at the characteristics of cases that enable us to understand the nature of these chunks of scientific materials.[16] From the mathematical examples, and Mill, we gain the sense of the case as a particular instance, whether it be one very small point in a geometry argument which might be not so different from the point next door, or whether it is something bigger, a particular kind of polyhedra in Lakatos's framing that is different in certain particulars from all the others.   For Becker and Gluckman,

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[16] For a broader definition of what counts as a case in the social sciences, see Morgan 2012.

the sociologists, we saw that the case could be anything from a small anecdote to a full blown or 'extended' case study.   Whether it was one or the other, it was characterised again as a particular, and significantly, each case potentially held its own set of descriptors.   That is because, for the most part, these case objects were determinedly empirically constructed (though Becker argued a case could be an imagined one), with descriptions of great density out of many varying elements in order to provide an analytical account for each case.   And from the contrast of Fogel with Pomeranz, we reinforced the nature of the case not just as defined by particular instances, situations, or events (real or imaginary), but the case as a bounded object.

Second, the kinds of reasoning associated with case work and how case-based knowledge is made are - again - also varied and here the possibilities of coming to a common stance are more problematic.   From the medical diagnostic accounts, and from Forrester's and Geertz's accounts, we learnt the importance of creating coherence: all the disparate elements of description and evidence need to be pulled together into a coherent account for reasoning within the case. But for Becker and from Bloch, insight came not so much from coherence within the individual case account, but from the similarities and differences that emerged in the comparison of particulars between cases.   For Bloch, comparison of differences between the cases was valid in its own terms to illuminate both cases via reciprocal insight, not for anything more general.   In contrast, for Becker, careful attention to the comparison of similarities in cases lead to something more generic.   This depended upon the sociologist recognising, by analogy, common elements amongst otherwise very disparate events or situations found in the cases. For runs, series, and sequences of cases, similarities formed the basis for something more generic as the outcome of case-based thinking.   In contrast, for Forrester, commenting on Stoller, for Znaniecki on case inductions, or for Ober on the Athens case, and for Morgan on Whyte's social anthropology of a slum, a scientist's careful and developed analysis of an individual case could create the abstract or conceptual materials (as well as more

empirical insights or methods) that could be taken beyond the particular case to be used more widely in their respective research communities.   Despite this variety of reasoning modes, it is surely indicative that many disciplines share the view that some form of case-based reasoning is an essential practice within their scientific tool-box.

What then, holds these different versions of 'thinking in cases' together? Forrester's phrase 'If p, Then What?' needs careful attention - in particular, the placement of question marks in the way scientists reason in their use of cases is critical to understanding, and appreciating, the full range of variations in case-based enquiry within the human and social sciences.   Those differences in the format of 'If p? Then What?' illuminate how case-based thinking can cover such a wide range of fields and kinds of enquiry.   They alert us to the different kinds of reasoning that are involved in creating reliable knowledge from using individual cases, from runs of cases, and from case comparisons.   They also make us aware of, and look out for, the differences between thinking *within* or *in*, thinking *with*, and thinking *from* or *beyond* cases.   Different human/social sciences use cases for different domains of inference within and beyond the case, but they are all fundamentally some kind of bottom up - and often comparative - form of reasoning, inductive projects that are used predominantly in the domains of discovery rather than those of justification.   But, at the same time, the framing Forrester has offered: 'If p, Then What?', asks for, and points to a deductive stance, regardless of where the question marks fall.[17] This inductive-deductive-comparative mix is one of the great difficulties for philosophers of science seeking to characterise a single mode of thinking in cases; but that same mix is the source of their charm for the many scientists and humanists who think in cases.

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[17] Flexer (2019), argues that the base form of reasoning here is abductive not deductive; case-work however appears to depend on the maintenance of rich materials during the reasoning process rather than reduced materials and inference to the best explanation.

Scientists know well that you cannot prove things with cases, and that cases don't produce generalised knowledge.[18] Cases are far more useful: they provide some of the base level particulars of our knowledge on which other scientific work depends; they provide the bits and pieces of scientific knowledge which feed into many bigger projects; they can produce generic materials which prove salient across wider terrains, and sometimes even develop grander claims directly.

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[18] In this respect, reasoning with cases is not so different from other modes of doing science marked by Hacking and Crombie. Neither a single experiment, nor a single classificatory exercise, nor a single modelling exercise, enable generalisation; all such individual results have to be made to travel to other sites and be re-situated there to contribute to more general findings (see Morgan 2014).

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