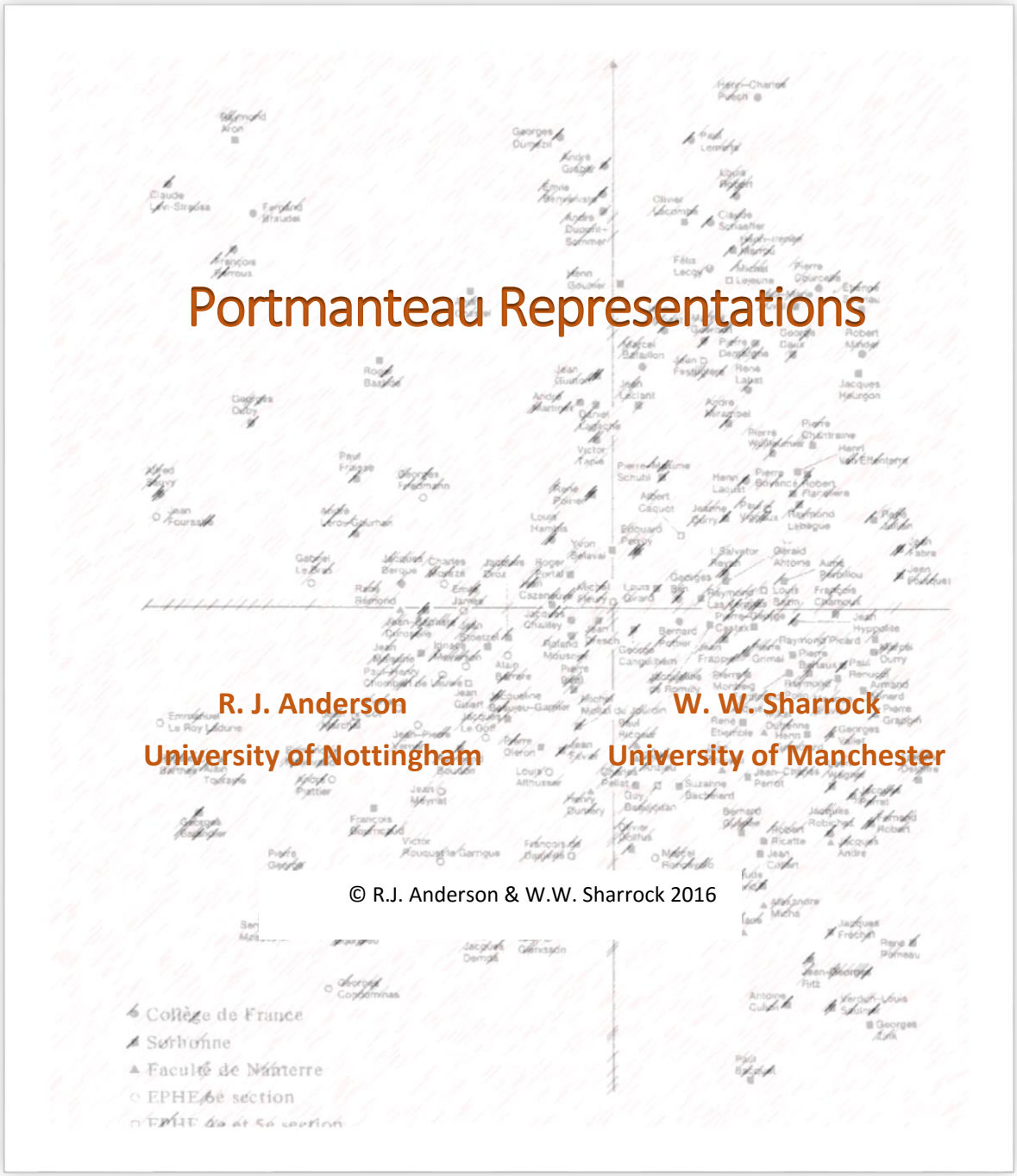

Portmanteau Representations

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Version Distribution

Portmanteau Representations

Remarks on the role of Correspondence Analysis in Pierre Bourdieu's Cultural Sociology

INTRODUCTION

Sociology is littered with the corpses of metaphors. Often they are attached barnacle-like to some analytic or mathematised method imported from classical physics.[1] 'Mechanism' and 'cause' are obvious examples, as are 'social forces', 'social structures', 'social dynamics' and the case we will examine in this discussion, 'social field'.[2] The size of the metaphoric body count testifies to a mare's nest of entangled oppositions at the heart of sociology's methodology.[3] One is the cluster of questions making up the epistemological conundrum: What does sociology know and how does it know it? Here we find contention over 'scientific' and 'interpretive methods', experimentalism, variable analysis, *verstehen* and, of course, the problematic character of ethnography. Do these techniques reveal the 'reality' of social life or are they simply narrative constructions enabling us to construe the gestalt of social experience in particular ways? Do we 'see' social reality directly or can we only 'see' it *as* phenomena organised by our theoretically given categories? A second set of oppositions make up the metaphysical conundrum: Of just what is social reality composed? Here we have the controversies over macro v micro, structure v agency, individual v collectivity. For Pierre Bourdieu, these oppositions constitute the paradox of the sociological gaze; a paradox he summarises in the following way.

> …(I)s the representation of the social world the simple recording of divisions that are in reality or is it a construction performed by the application of classificatory schemes? (Bourdieu 1993b, p.57)

In a number of previous discussions, we have suggested methodological translation is one of the main ways in which sociology has tried to overcome Bourdieu's paradox.[4] Using borrowed ideas, concepts, measures and methods as metaphors, it has sought ways of grounding the descriptions it sketches in theories or details in reports of empirical investigations. In his own work, Bourdieu himself relies on the translation of the notion of 'field' and related concepts derived from physics and the mathematical techniques of Correspondence Analysis (CA) to uncover homologies between class, power and the shaping of cultural experience. In adopting this strategy, Bourdieu faces a triple task. First, the analogy between social phenomena and physical phenomena has to be secured. Second, the analysis carried out on the basis of this analogy must be shown to be sociologically meaningful. Third, the mapping between the results of the analysis and the social facts which are held to account for them must be

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1 As sociology catches up with developments in physics, we wait (but not with bated breath) for the first example of Schroedinger's Cat being used as an image for some social process.

2 There is an irony in this borrowing. Physics takes common sense notions such as cause, force, acceleration and the like and simplifies their definition (the originals usually being cluster concepts) by fixing the term's mode of measurement. Sociology takes the concept and repatriates it with common sense by relying on the original cluster concepts to enable an understanding of its use and the measurement methods it applies.

3 This is our own portmanteau metaphor. The oppositions are both muddled and illusory.

4 See amongst others (Anderson, R.J. and Sharrock, W. W. 2013) and (Anderson, R. J. and Sharrock, W. W. 2016).

demonstrated. Bourdieu accepts there is no 'seeing' only 'seeing as', and uses a melding of metaphors together with CA to construct a *gestalt* of cultural reproduction.

Once again, then, this discussion is about the importing of 'natural science' methods, models and concepts into sociology, however, this time something more is involved. Unlike force, cause and structure etc., field has something of an ambivalent position in physics though, as we show below, its definition (at least, these days) is not ambiguous. What, for want of a better term, we will call its 'ontological status' is still unresolved. Are fields real, in whatever sense physicists think things are 'real', or are they simply a useful mathematical abstraction? This ambivalence is almost entirely a result of the investigation of what fields actually are as physical phenomena having slipped off the research agenda. The mathematics works and that is good enough. At the risk of anticipating material we cover later, it is worth quoting Mary Hesse's history at some length just to see how central this disregarding became.

> Kelvin showed in a series of mathematical papers beginning in 1842 that the same mathematical formalism could be used to express the laws of fluid flow, of heat flow, of electric and magnetic phenomena, and of elasticity. Thus a source of fluid or of heat is the analogue of an electric charge, magnetic pole or source of electric current; lines of flow are analogues of lines of force; temperature is the analogue of potential, and so on. Kelvin also showed that Faraday's representations in terms of lines of force were consistent with the inverse-square law, and that this followed without assuming any physical hypothesis about the nature of the lines of force. (Hesse 1962, p. 209)

We come back to what lies behind this. For the moment, all we want to notice is that fields have an odd position in physics and this oddness has been entirely disregarded in sociology's appropriation of the term. Those who promote 'field theory' as a means to analyse social life, seem happy to assume the force fields they identify are real in the same way stanchions, sparrows and salt are real. Indeed, Bourdieu would have us accept fields of power can actually be discovered through their observable and measurable effects.

The implication of the anomalous status of field in physics is profound for any use sociology might want to make of it. Long ago, Alfred North Whitehead warned us of the dangers of inadvertent misplaced concreteness, a warning sociology seems resolutely to have set its face against. What field theory and many of the examples we have previously discussed illustrate is how prone the discipline is not just to reification but to that other great fallacy, mistaking imagery for reality.[5] Our aim in repeating this simple point is much the same as any similar repetition. If we do it often enough, some may come to reflect on what they are doing (of course, it might actually make them more determined to do it. That we know). Spurred by that reflection, they might try to undertake sociological analyses without loading their descriptions in advance with baggage taken from physics or any other discipline. This would mean ceasing to look at the social *as if* it were the interaction of particles, communication networks, the operation of decision rules followed by finite automata, a struggle for survival, or whatever and actually looking at it in terms of the ordinary categories of our experience. What *that* would mean and what sociological phenomena might therefore be revealed would be two of the immediate questions which could then be

[5] The example *par excellence* is the way Goffman's various descriptions of social life are often treated in sociological commentary.

addressed. This discussion and our previous forays in the same vein endeavour to show why such re-specification is necessary.[6]

The "take away" from this discussion (as our friends in business like to say) is this. Bringing off the adoption of methods and approaches from the natural sciences involves overcoming the three challenges we set out above. If the attempt is unsuccessful or only weakly successful, the analysis offered runs the risk of being vacuous. Concepts which sociology imports from the natural and other sciences not only have a well-honed and precise use in their home disciplines, for the most part they had an even earlier life in our common language.[7] Science takes advantage of this usage and, by metaphorical extension, stretches it to apply forms of mathematics to particular physical phenomena or processes. Since sociology is not a physical science, in adopting such concepts, it necessarily unglues them from their scientific setting. For the concept to be applied to sociological phenomena, resort then has to be made to *Ur* common sense meanings. But now the analytic bite that it once had has been sacrificed and all that is left is the empty (and so dead) metaphor.

Our strategy in this discussion will be as follows. First we will set the scene by offering a very brief resumé of Bourdieu's objectives and method. We then turn to the use of field as a mathematical device in physics. This will allow us to detail the process by which Bourdieu translates physics' concept of force field into that of fields of power in sociology. Part of that description will require an excursus into the mechanics of CA. With this background in hand, we will turn to the narrative structure by which the abstractions generated by CA's formalism are merged with descriptions of types of cultural activities interpreted as homologies of such sociological abstractions as fields of power, the class structure and the distribution of capitals and then applied to the detail of social experience. We will end by offering some thoughts as to why Bourdieu's method has proved so attractive for contemporary sociology.

THE SOCIOLOGY OF CULTURAL REPRODUCTION

Bourdieu's approach presents the perceptions, understandings and actions of actors as both structurally overdetermined and phenomenologically open.[8] The method's origin lies in his studies of the Berbers of Kabylia (Bourdieu 1977). Adopting conventional investigative strategies of cultural anthropology, Bourdieu argues that among the Berber, esteem, honour, prestige and the like are forms of domination accruing from the possession of symbolic capital, one of the forms of cultural capital. To explicate these practices, Bourdieu develops a trinity of concepts; field, habitus and doxa. 'Doxa' refers to the body of standard perceptions, taken for granted beliefs and culturally given certitudes making up what any Berber knows. 'Habitus' is the embodied enactment of doxa as the pursuit of day to day living; that is, the Berber's experience of life under the aegis of the cosmology enshrined in the doxa. 'Field' refers to any

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6 This phrasing is deliberate. We see ourselves making a small contribution to the demonstration of what Garfinkel has called the re-specification of sociology (Garfinkel 2002).

7 Even in Quantum Physics, strange names are reserved for strange particles and not much else. The way terms like 'wave', 'uncertainty' and 'time' are used is close kin to but not identical with ordinary usage.

8 The literature on Bourdieu is voluminous, though not much concentrates on his method and narrative strategy. We have no intention of trying to summarise the variety of positions taken. Apart from Bourdieu's own writings (see the Bibliography at the end), we would recommend those coming new to his work to look at (Hilgers, M & Mangez, E. (eds) 2015) for contemporary uses of the theory together with (Blasius, J. and Frederichs, J. 2007) and (Blasius, J. and Schmitdt, A 2014) for startlingly clear expositions of the key ideas.

domain of activity (arranging of marriages, carrying out rituals, giving feasts and gifts or working in the fields) which Berbers carry out as part of living within their habitus.

Thus far, Bourdieu's account looks like any other 'Durkheimian' anthropology. Indeed, you could almost mistake it for Mary Douglas (admittedly an intellectualised Mary Douglas). However, being mistaken for Mary Douglas is just what Bourdieu does not want. To avoid this, he makes a distinctive analytic move. Rather than being programmed by culture (the standard structuralist conception, he suggests), the Berber way of life (and by extension everyone's way of life) is one of constrained improvisation. People choose what they want to do and how they will do it from the repertoire provided within their habitus.[9] Recognisable differences in the way weaving is carried out, or ploughing or ritual performance are variations on and within the culturally given pattern. Because they are improvisations within but not innovations of the pattern itself, they 'reproduce' the structural relations which give rise to it. Those structural relations reinforce the current dispositions of cultural, political and economic capital and the modes of domination associated with them. What appear to actors to be obvious choices and experienced as matters of common sense enactment are in fact *overdetermined* but not fixed.

Bourdieu's trinity is designed to resolve his paradox and break with the polarities which have stymied sociology for over 150 years. He does not want structure or agency, individual or society, micro or macro, quantitative or qualitative, objective or subjective; neither does he want an ecumenical 'if not either then both!' He wants the synthesis of agency and structure, objectivity and subjectivity, quantitative and qualitative……

Fields as Rendering Devices

A reasonable working definition of 'field' as used in physics might be this: a function which returns a value for all points in a defined space.[10] But that is not quite what Faraday and others had in mind when they introduced the term around the turn of 19th century. At that juncture, there were two tightly integrated and unresolved puzzles at the centre of thinking about physical phenomena. The first was the nature of the material universe. Of just what was it composed? The second was the nature of the relationships among the objects in that material universe. For over a century, the dominant answers had been that matter was corpuscular and relationships were causal. The universe is filled with particles of various kinds and the effects we see in daily life and science are the consequences of mechanical interactions among them. The challenge to science was to discover the particles and describe the interactions. Whilst this was the dominant answer, it wasn't the only answer. Newton's great intervention seemed to imply a partial return to the ancient notion of action at a distance and hence different orders of 'being' than the causal particularity of objects, a view anathema to those of a mechanical persuasion.

This, then, was the dilemma Faraday faced when describing his experiments on magnetism. Just how should he talk about the patterns of magnetic attraction which he had discovered? The difficulty can readily be appreciated by looking at one of his original images.

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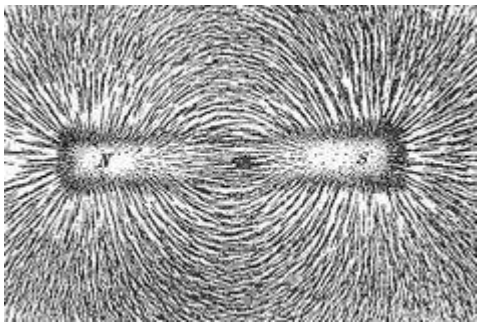
9 This is Bourdieu's version of Marx's famous "Men make history, but in circumstances thrust upon them".

10 This section relied heavily on Mary Hesse's (1962) historical account of the concept. John Levi Martin's survey (Martin 2003) connects that history to developments in sociology. See also (Mcmullin 2002)

FIGURE 1 MAXWELL'S MAGNETIC FIELD



This is a drawing of the distribution of iron filings when placed in the vicinity of a magnet. The effect is obvious enough. But how to describe it and what is causing the filings to line up in the way they do? Faraday's solution was to visualise the environment encompassing the magnet as a magnetic field whose force (somehow) kept the filings in tension. Given the drawing, we can see what he meant. The iron filings reveal the 'plough lines' of the magnetism. But precisely what this force was (that is, what it was made of) and how it filled the space around the magnet, he couldn't say (and only reluctantly speculated on).

> The term line of magnetic force is intended to express simply the direction of the force in any given place, and not any physical idea or notion of the manner in which the force may there be exerted; as by actions at a distance, or pulsations, or a current, or what not. (Faraday, quoted in Hesse (1962) p. 202 emphasis in original)

While this agnosticism with regard to ontology might have served Faraday well, it didn't satisfy everyone. Maxwell, writing a little later, was inclined to think that Faraday was being a little disingenuous anyway.

> Faraday in his mind's eye, saw lines of force traversing all space where the mathematicians saw centres of force attracting at a distance: Faraday saw a medium where they saw nothing but distance. (Maxwell, quoted in Hesse (1962) p 201).

Whatever Faraday's view actually was, it is clear that by introducing the metaphor of a field composed of lines of force, he shifted attention from the magnet and filings to the relationships between them.

It was not long before the static interpretation of field was replaced by the dynamism of *flow*. Forces were exerted by flows of a medium. This shift allowed a formal analogy to be drawn between the mathematics of fluid dynamics and the 'flows' in magnetic, gravitational and other force fields. As Hesse suggests in the quotation we cited earlier, this shifted the pre-occupation from determining what forces 'are' as physical things to how best to describe their action in ways that can be measured and used in experiments. The description was first in terms of the mathematics of vectors, an approach later extended to include tensors in general. Tensors are a way of providing a concise description of a frame of reference defined by a mathematical space. As the space increases in dimensions so the *index* of the tensor increases. A tensor of a 1 dimensional space is a scalar and has an index of 0; a 2 dimensional space is a vector with an index of 1, and so on. Space-time in General Relativity is described by a tensor of order 3 and has 4 sets of coordinates (**x, y, z, t**). Fields in a space of any dimension are defined, then, by tensors of the appropriate order or index.

What is important for us in all of this is that in the hands of Maxwell, Kelvin, Hertz and others, the metaphor of a field as an informal description of some empirical features of magnets became a mathematised abstraction, a role in which it was to be critically important for the next century. This shift

involved two central things: the ontological ambivalence we noted earlier was set aside and the concept was tightly specified. Both allowed it to do the work it does in contemporary physics. Our interest is in what happens to that specification when the formal mathematical abstraction is translated into sociology.

From mathematisation to visualisation in sociology

In a raft of studies (1986, 1988, 1989, 1993a) Bourdieu applies his cadre of concepts to the culture of contemporary (or almost contemporary) France. In every case, he argues for homologies between the distribution of prestige, honour, reputation, (high and low) taste, the distribution of cultural capital across class fractions, the possession of power and the structural conditions determining the mode of cultural production. What appear to be 'personal preferences, 'self-expression', 'imaginative revolutions', or 'the realisation of talent or ability' are, in fact, improvisations within overdetermined patterns. In the study of the Berbers, he used the image of a sine curve to represent the annual cycle of daily life and analysed particular fields of activity as synchronic and diachronic locations along it. The cyclical form of the curve is the *structural homology* of the annual agricultural round governing the habitus of the Berber. In the studies of modern France, he uses a different visualisation, the bi-plot outputs of CA, to represent the spaces or fields within which the structuring of matters of taste, what is recognised to be literary and artistic excellence, the patterns of academic reputation and success, the distributions of symbolic and institutionalised power deriving from holding differing forms of capital etc. are arranged. Again and again, he returns to the same theme. Class relations are reproduced in cultural production with doxa and habitus being realised through and contributing to the persistence of power structures within any field of activity. Enactment in a field is no more than constrained improvisation.

Each individual study takes this general frame of reference and applies it to a specific case. Here he is considering a particular form of 'art'.

> From the characteristics of the academic institution, which holds the monopoly of the production of painters and of the evaluation of their products, one can deduce properties of academic painting: academic art is a scholastic art which undoubtedly represents the historical quintessence of the typical productions of 'homo academicus'. (Bourdieu 1993a, p. 243)

To repeat: whilst artists would undoubtedly defend their artefacts and performances as the expression of creativity, Bourdieu sees their self-expression as limited by historical circumstance.[11] The particular case we will examine is the analysis of the universities in Paris just before the events of 1968 contained in *Homo Academicus* (Bourdieu 1988). In this study, Bourdieu talks of academic relationships as the struggle within the university system for various forms of symbolic capital and the power associated with them and goes on to use that analysis to explain the reaction of academic institutions and their leaders to the events of May 1968. Their position in the field of power set their perception of the student uprising.

[11] Bourdieu is well aware that the sociologist is a sub-species of *homo academicus* and hence of the reflexive implications of this framework for his own work. See the interview with Wacqwant (1989) for insights on this. That Bourdieu chooses a method developed by a personal friend that was and is identified with social science in France has not been missed by his commentators. To their "Tu Quoque!", Bourdieu just shrugs his shoulders.

METHOD AND THEORY: AN ELECTIVE AFFINITY[12]

We begin where Bourdieu begins, *in media res*; not this time with the woman setting up her loom in a particular part of the house, the farmer ploughing his fields in a special order, the driver selecting a station on the radio or the patient flicking the pages of Paris Match at the dentist, but with the academic reading Thomas Nagel on the train. As before, this scenario presents cultural consumption. Cultural resources have been fashioned into a cultural product which is being consumed. However, instead of relying solely on conventional ethnography, as he did in the study of the Berbers, now he uses large scale surveys and secondary analysis filtered through the methods of CA. CA provides him with the index of tensor defining the dimensions of the space encompassing the academic field together with a visualisation of the vectors locating the positions of objects. The symmetry with Faraday's picture of the magnetic field is clear, something Bourdieu is aware of and somewhat inconsistent about (see (Wacquant 1989) and (Bourdieu 1993b). Both images are immediate in their impact; their apparent meaning easy to grasp. But they are also very different. In Maxwell's case the metaphor is drawn from our ordinary experience and depicts a phenomenon in physics. With Bourdieu, the metaphor is drawn from physics and used to depict ordinary experience.

In a commentary on Bourdieu's mode of analysis which has more than an echo of Maxwell's comment on Faraday, Rouanet and his colleagues suggest

> .....in order to realize how strong the link between Bourdieu's thinking and Geometric Data Analysis is - so strong indeed that it amounts to genuine elective affinities (Wahluerwandtschaften) - we must start with the "spatial vision" of society (Raumvorstellung) which is a constant in Bourdieu's thinking. This spatial vision leads him to uncover and emphasize the material support of social relations in physical space surrounding us. The city map of nineteenth century Paris is the guide for Bourdieu's analysis of Flaubert's Education Sentimentale, just as the districts ("Grands ensembles des banlieues") where the poor live today is the guide of La Misere du Monde. Incidentally, it is in La Misere du Monde that we find perhaps the most thorough exposition of Bourdieu's spatial vision in a chapter entitled "Effets de Lieu"; (Effects of location). For Bourdieu, social relations and oppositions are first and foremost spatial relations and oppositions. (Rouanet, H., Ackerman, W. and le Roux, B. 2000, p. 7 emphasis in original)

The spatial organisation of data is not a *finding* but a template within which the analysis is to be cast. Other methods, such as variable analysis using regression techniques, will not give Bourdieu the spatial analogy he wants.

> I use Correspondence Analysis very much, because I think that it is essentially a relational procedure whose philosophy fully expresses what in my view constitutes social reality. It is a procedure that 'thinks' in relations, as I try to do it with the concept of field. ([Foreword of the German edition of Le Metier de Sociologue (1991)] quoted in Rouanet (2000) p8)

In the opening words of the chapter 'Principles for a Sociology of Cultural Works' in (Bourdieu 1993a), he expands on this idea.

> Fields of cultural production propose to those who are involved in them a space of possibles that tends to orient their research, even without their knowing it, by defining the

[12] We have borrowed this description from (Rouanet, H., Ackerman, W. and le Roux, B. 2000).

> universe of problems, references, intellectual benchmarks…..concepts in –ism, in short, all that must be at the back of one's mind in order to be in the game…….
>
> This space of possibles, which transcends individual agents, functions as a kind of system of common reference which causes contemporary directors, even when they do not consciously refer to each other, to be objectively situated in relation to others, to the extent that they are all interrelated as a function of the same system of intellectual co-ordinates and points of reference. (Bourdieu 1993a pp 176-77, emphasis in the original).

This is as clear a statement of the relational field theory which motivates Bourdieu's sociology as one could get. Simply substitute 'academic' or 'professor' for 'director' and you have the theme of *Homo Academicus*, namely the structure of relationships and system of reciprocal tensions which hold academics in their positions in the field of academic power. On p 276 of that study, he distils the whole book in a single image. Having surveyed 402 academics and gathered data on a variety of aspects of their lives (demographics, education, affiliations, publications, public honours etc. etc.), he uses Multiple Correspondence Analysis (MCA) to generate a map which positions of all the social science professors in Parisian universities in the field of academic power. In addition to this map, Bourdieu also presents analyses of the relationships within the Faculty of Arts and Social Science and the example we examine below, the relationships among the various Faculties.

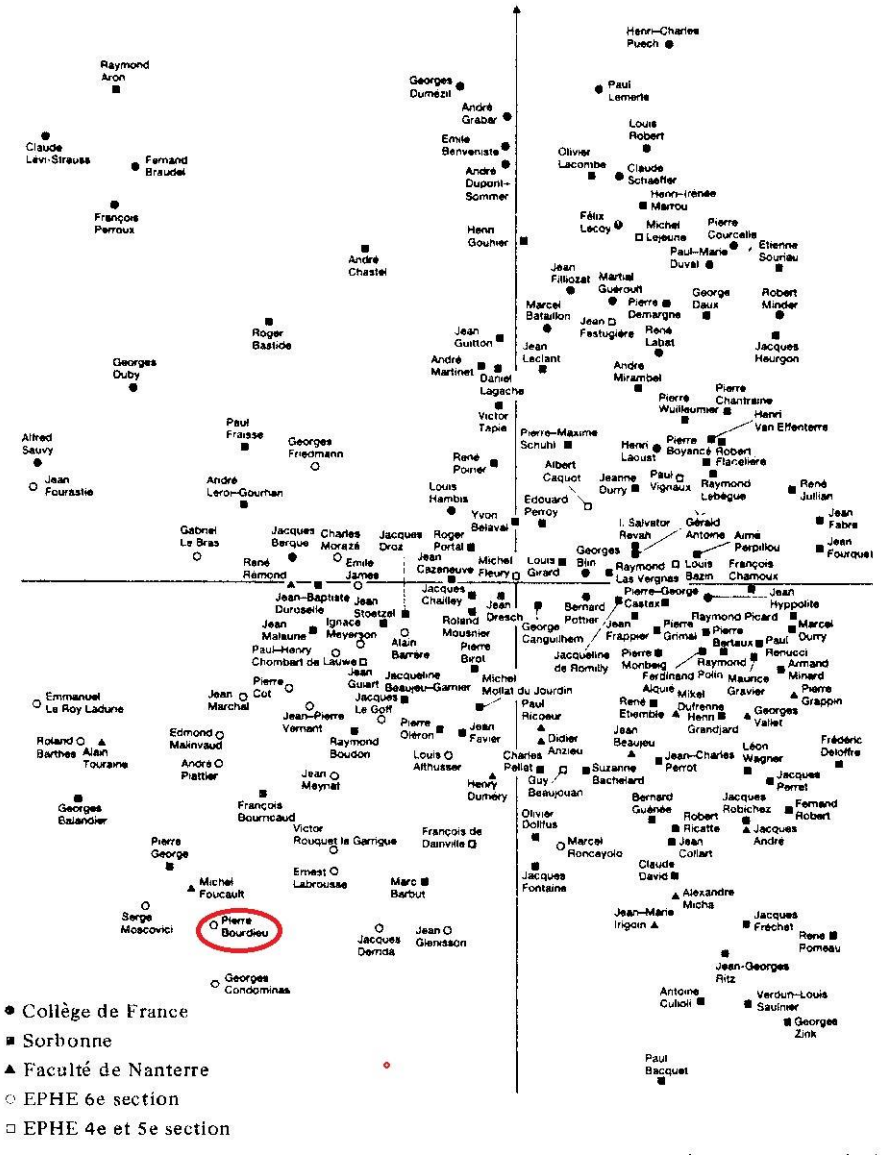
The positions of professors of social science in the field of power is given in Figure 2. We have circled Bourdieu's place in red.[13] The coordinate system for the map is a horizontal polarity between those who hold what he calls temporal or social power (right hand side) and those who hold scientific power and a vertical polarity between those who have established tenured positions (top) and those who do not.

> The plane described by axes 1 and 2 structures the data according to two principles…(o)n the one hand, along the first axis, there is the opposition between specifically academic power and the other forms of power, and on the other, along the second axis, there is the opposition between the prestigious professors and the younger professors who lack institutional distinctions……The hierarchy of factorial axes enables us to represent visually in the first planes the strongest oppositions and attractions contained in our data ((Bourdieu 1988)p.71).

The coordinates for each individual have been calculated from the range of variables listed above. Similar maps could be constructed for the members of the Faculties of Science, Arts, Law and Medicine. For Bourdieu, these maps represent a topography of academic power, that topography being a locally produced homology (i.e. defined by the social science Faculties of the Paris universities) of the general structures of economic and social power. The fraction of the ruling elite made up by the academic population is itself fractionated by the specific forms the distribution of capitals and their related powers take in academic life.

[13] In his interview with Wocquant (1989), Bourdieu reflects somewhat resignedly on the impact this particular visualisation and the analysis which went with it had on his relationships with several close friends and colleagues.

FIGURE 2 THE FIELD OF POWER OF SOCIAL SCIENCE



CORRESPONDENCE ANALYSIS AS ORDERING DEVICE

CA and MCA are forms of Factor Analysis. That is, they are geometric methods of data reduction. Their purpose is to construct lower dimension data spaces (usually 2 or 3 dimensions) from higher ones to act as underlying summarising variables for the distribution in the observed data. Finding such a lower dimension order in the high dimension distribution is not a 'discovery' in any meaningful sense. Structuring and re-structuring is what the methods do. As those who use the techniques are very aware, it is the interpretation of the structure from its visualisations rather than the fact of its extraction and mapping which is all important. And that interpretation is often more than a little tricky, something that is

amply demonstrated if one considers the balance of Bourdieu's own narrative structure.[14] Compared to the narrative he weaves around the results of his reduction exercise, the presentation of the analytic results occupies only the briefest space. Although the rhetoric of CA has always been of the data speaking for itself, Bourdieu works uncommonly hard to ensure we grasp the meaning he wants us to find in the results he presents by translating, illustrating, summarising, extrapolating and filling out what they say. Indeed, it would not be too unfair to say that Bourdieu does not really need *or use* the CA for the interpretation of academic life he gives.[15]

To get a sense of why this method is so tricky (a sense we will need when we look in detail at Bourdieu's maps of academic power), we will run through some of the conceptual background to CA and then move on to a simple example of how it works.

THE BACKGROUND CONCEPTS

Suppose we are looking at the balance of trade for a country over three years and we compile the following table (the example is adapted from (M. Greenacre 1984, pp 18 - 26)

Table 1 Erewhon Balance of Trade (£bn)

	Year 1 (**y1**)	Year 2 (**y2**)	Year 3 (**y3**)
Exports	1500	2000	2200
Imports	2000	1000	600

CA takes the balances for each year and defines them as a vector of coordinates.

$$\mathbf{y1} = \begin{bmatrix}1500\\2000\end{bmatrix} \quad \mathbf{y2} = \begin{bmatrix}2000\\1000\end{bmatrix} \quad \mathbf{y1} = \begin{bmatrix}2200\\600\end{bmatrix}$$

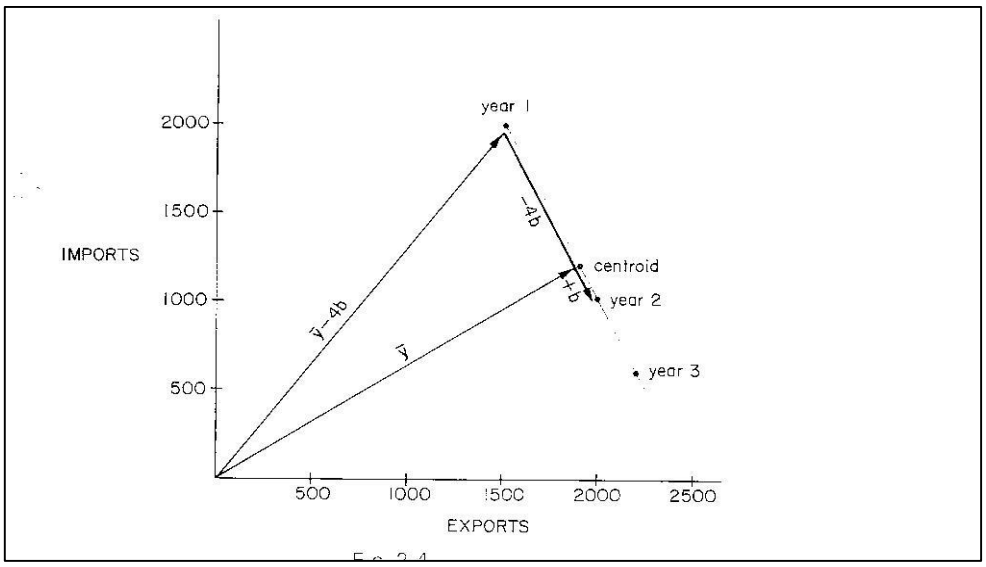
In doing so, the values in the table are extracted from the economic context in which they are set and become simply mathematical objects defining positions in a 2 dimensional space. As an object, the vector can be interpreted using a formal analogy with physical objects in a gravitational field and the associated properties of distance, mass and inertia applied to them. This is precisely the same kind of analogising move made when the mathematics of fluid dynamics was applied to Faraday's magnetic field.

Distance is defined as separation in a number space, while mass is an object's resistance to change in its state of motion when a force is applied. According to classical mechanics, the gravitational force exerted by one object on another is proportional to its mass and their distance from each other. Consequently, gravitational fields are fields of reciprocal forces. These forces hold objects in tension and determine their mass and the force necessary to change their state (their inertia). Based on this formal analogy, CA calculates the mass and inertia of the vector **y1, y2, y3**. Since each vector element is a pair of coordinates, it can be represented geometrically as a point mass in the space of exports and imports.

[14] For an example of the trickiness being pointed out by sympathisers, see (Flemmen, M. and Hjellbrekke, J. 2016)

[15] This has led some to question whether Bourdieu is actually a Field Theorist. See (Martin, J & Gregg, F. 2015)

FIGURE 3 THE SPACE OF IMPORTS AND EXPORTS



The inertia of the vector is its 'balance' around its centroid or 'moment of inertia'. If you imagine the line in Figure 2 between year 1 and year 3 to be the plank of a see-saw, the centroid is where you would put the fulcrum enabling the masses to balance. In other words, the centroid is the set of coordinates representing the mean of the vector **y1, y2, y3**; that is

$$\overline{\boldsymbol{y}} = \begin{bmatrix} 1900 \\ 1200 \end{bmatrix}$$

Intuitively we understand that if we were to increase or decrease the value of any of the coordinates (that is its mass), the centroid would move relative to it. CA talks of this effect as a change in the 'gravitational pull' of the coordinate. This metaphor of the 'gravitational pull' on the centroid is central to the analytic method CA uses.

What CA does is reduce the space of the representation. In this case it would be from two dimensions to one. To do this, a new vector **b** is calculated by recalibrating **y1, y2, y3** as 'distances' from the centroid.

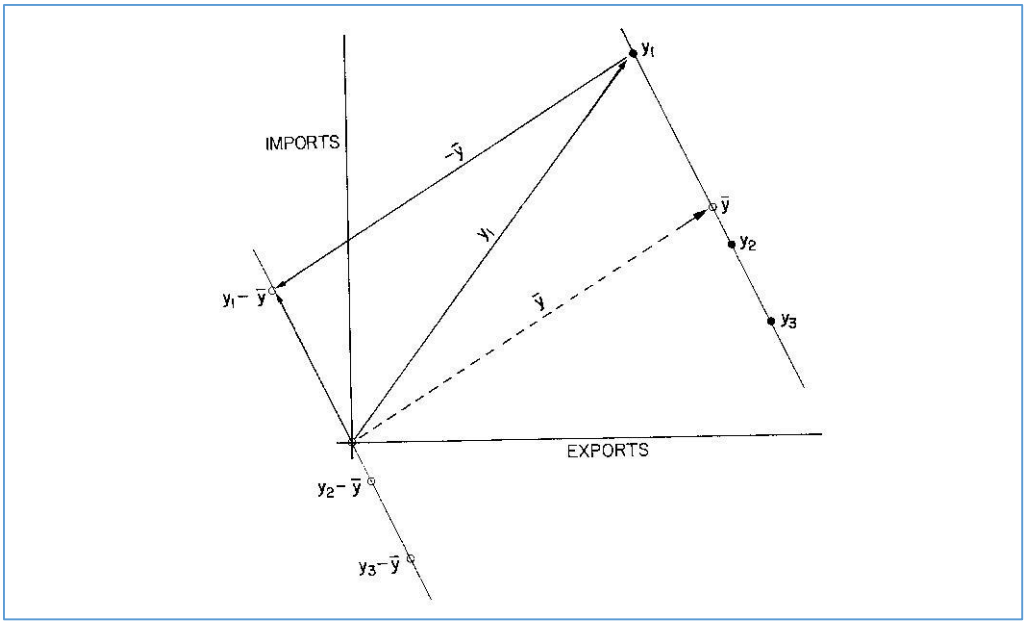
$$\boldsymbol{y1} - \overline{\boldsymbol{y}} = \begin{bmatrix} 1500 \\ 2000 \end{bmatrix} - \begin{bmatrix} 1900 \\ 1200 \end{bmatrix} = \begin{bmatrix} -400 \\ 800 \end{bmatrix}$$

$$\boldsymbol{y2} - \overline{\boldsymbol{y}} = \begin{bmatrix} 2000 \\ 1000 \end{bmatrix} - \begin{bmatrix} 1900 \\ 1200 \end{bmatrix} = \begin{bmatrix} 100 \\ -200 \end{bmatrix}$$

$$\boldsymbol{y3} - \overline{\boldsymbol{y}} = \begin{bmatrix} 2200 \\ 600 \end{bmatrix} - \begin{bmatrix} 1900 \\ 1200 \end{bmatrix} = \begin{bmatrix} 300 \\ -600 \end{bmatrix}$$

This recalibration moves the centroid to the origin of the graph and places the point masses on a new vector **b** as shown in Figure 3. **b** is now a 1 dimensional space (a single axis) representing the original coordinates and captures 100% of their inertia.

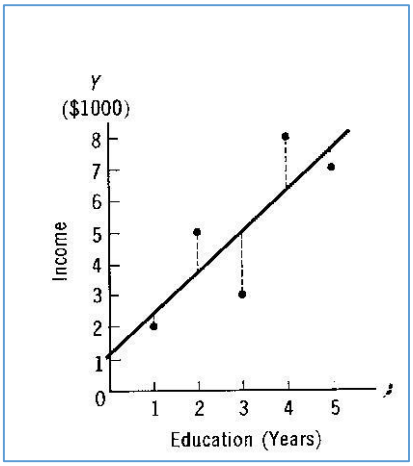
FIGURE 4 DIMENSION REDUCTION



In the trade example, the years were easily placed on a straight line (the coordinates were chosen so they would!). Most of the time, however, this won't be so. In such cases, we need to find a 'best fit' line that passes through the centroid and minimises its distance from each of the point masses. The problem is the same as finding the 'best fit' line in linear regression. The solution is easy to visualise in 2 dimensions and, with bit of imagination, for 3 dimension spaces. With spaces of higher order, visualisation is impossible. However, the method remains essentially the same.

In linear regression, the aim is to find a line which passes through the centroid and runs as close as possible to the array of data points.

FIGURE 5 REGRESSION OF INCOME AND EDUCATION



In Figure 5, the perpendicular distances (marked with dashed lines) between the coordinates and the regression line are the variances unexplained by the regression equation (i.e. the line). As we just saw, if all the points fell on the line there would be no residual variance. In effect, what regression does is shift

and rotate the matrix of points to minimise the variance whilst at the same time reducing the dimensionality of the space in which they are distributed. Instead of being expressed in terms of the x and y axis, the coordinates are now expressed in terms of a single axis, the regression line. Vector recalibration and matrix rotation are the core of CA. Although the vectors are recalibrated and rotated, their individual masses and inertia as well as the relative distances between them remain unchanged.

While we are only dealing with abstract mathematical spaces, talking of levels of exports and imports as vectors with mass and inertia is harmless. We are not trying to say anything about international trade, simply manipulating geometry. The formalisms of classical mechanics are being applied to the data we started with. Although this particular trope is harmless, it may not remain so should we start using the results of matrix rotation, vector recalibration and space reduction to infer the existence of underlying variables which are the 'drivers' of a country's exports and imports. At that point, there will be a real danger that an analytic metaphor is being taken for reality.

An example of cultural consumption

To see the steps required to apply CA to social analysis, we will use an example which draws on research on cultural consumption in cities undertaken by Mike Featherstone and his colleagues.[16] 205 people were interviewed about their leisure activities. The variables were categorical in form and we can imagine the researchers ended up with a data frame something like Table 2.

Table 2 Mock Data Matrix

	V1	V2	V3
S1	0	1	0
S2	1	0	0
S3	0	0	1

For each subject (S1, S2……) a yes/no response was coded for individual variables or sub-variables (active in sport - high to low, say). From these responses, the researchers extracted data on two variables, interest in music (M) and visits to the theatre (T). The data was then recoded on 4 point scales and summarised in the following contingency table. The variables T1…T4 and M1….M4 constitute a 4 x 4 space within which the answers to the questions are distributed. The vectors are **m1 …m4** and **t1 ….t4**.

Table 3 Relationship of Going to the Theatre and Interest in Music

	m1	**m2**	**m3**	**m4**	Margin	Mass
t1	42	33	5	5	85	0.404762
t2	21	30	7	8	66	0.314286

[16] The data is cited in (Phillips 1995)

t3	13	13	4	3	33	0.157143
t4	3	16	4	3	26	0.12381
Total	79	92	20	19	210	
Mass	0.37619	0.438095	0.095238	0.09047619		

Each of the variables has a mass calculated to be the proportion it contributes to the overall total of responses. Thus the mass for t**1** = 85/210 and the mass for **m1** = 79/210. These masses indicate how much of the total distribution is attributable to each variable**.** Each vector has a profile showing the 'shape' of its mass and hence 'spread' of its inertia. The greater the spread, the less clustered or consolidated the variable is and the greater its inertia. In that sense, the inertia of a variable is the same as its variance. The profile for **t1** is

		mm1	**mm2**	**mm3**	**mm4**	Total
Profile	**tt1**	0.494118	0.388235	0.058824	0.058824	1.00

In the profile for **t1**, the cell tt1mm1 = 42/85. The total inertia of **tt1**'s profile = 1. The scores for tt1mm1 ….tt1mm4 contribute all the mass for t1. Taking the average of the vectors **t1…t4** and **m1…m4** gives the coordinates of the centroid. Having started with answers to questions about music and the theatre, we now have a distribution of mathematical objects in a high dimension space which we have described by applying the formalisms used to analyse gravitational fields.

As we have said, the aim is to visualise the responses to the survey by reducing the 4 x 4 array of variables to a 2 or 3 dimensions. These dimensions should capture as much of the total inertia (the inertia of all the variables) as possible. The method used is based on the familiar X^2 (Chi Square) statistic. To calculate X^2 we first calculate vectors of expected values for theatre visits and interest in music based on the observed values of the contingency table. These expected values are the weighted averages of the relevant row and column totals of Table 2. Given the row total for T1 in Table 2 is 85 and the column total for M1 is 79, the expected value for ext1exm1 is (85 x 79)/210 = 31.97619.

Table 4 Expected Values

	exm1	**exm2**	**exm3**	**exm4**
ext1	31.97619	37.2381	8.095238	0.452380952
ext2	24.82857	28.91429	6.285714	5.971428571
ext3	12.41429	14.45714	3.142857	2.985714286
ext4	9.780952	11.39048	2.47619	2.352380952

We now have a second set of vectors, each with its own mass and inertia. Using the 'distance' (difference) between the two sets of vectors, the observed values in Table 2 and the expected values in Table 3, we calculate the value of the inertial force field. These differences are squared to resolve the problem of summing over positive and negative numbers and re-scaled as a ratio of the expected value. X^2 is the sum total of these values. Just as with gravity, the force field of the vectors' inertia is proportional to the masses of objects in the field and their distance from one another.

Table 5 Chi Square Values

	M1	M2	M3	M4	Total
T1	3.1422	0.4823	1.1835	0.9413	5.7493
T2	0.5904	0.0408	0.0812	0.6891	1.4015
T3	0.0276	0.1469	0.2338	0.0001	0.4084
T4	4.7011	1.8654	0.9377	0.1783	7.6825
Total	8.4613	2.5354	2.4362	1.8088	15.2417

The T1…nM1…n coordinates in Table 5 are the vectors of *Chi Square Distances* for the original contingency table and represent the inertia of the original data. The X^2 value for Table 5 is 15.2417 and the total inertia of Table 4 is given by 15.2417/210 = 0.07258.

The task is now to decompose this inertia into a new set of vectors representing a small number of summary dimensions. As in the 2 dimensional example, this is done by finding a rotation of the matrix which provides a dimension capturing the maximum variance of the inertia (that is, finds a 'best fit' topology (line, plane, cube etc.)) and hence minimises the residual variance. Once that line is found, a second dimension capturing the maximum residual variance is calculated. With CA, two or three dimensions or components usually suffices. With MCA this may be increased to 5 or 6 in order to capture a significant proportion of the variance.

The methods for carrying out this variance capture involve 'brute force'. The chosen procedure is iterated until a stable solution is generated. With the reciprocal averaging method, we take the X^2 distances just described and standardise them (the mean is set at 0 and the data re-distributed to lie within 1 standard deviation of the mean).[17] This procedure is repeated until the re-calculated values change only slightly (by < 0.0005) on each iteration. The resulting row totals and column totals are the *eigenvectors* (coordinates) for dimension 1. The sum of row totals (or column totals, they are identical) is the *eigenvalue* of the dimension. The eigenvalue tells us how much of the X^2 distance matrix's inertia the dimension explains. Once we have a stable solution for dimension 1, we find the second dimension by repeating the process on the 'unexplained' residual values of the standardised X^2 values. The sum of these iterated and standardised residual distances is the inertia explained by the second dimension. Even

[17] Standardising stops the values collapsing to the infinitesimally small. It also further reinforces their character as dimensionless numbers. They do not express any measurement units relating to interest in music or the theatre, the variables we started with. They refer to nothing outside the mathematical operations which generated them.

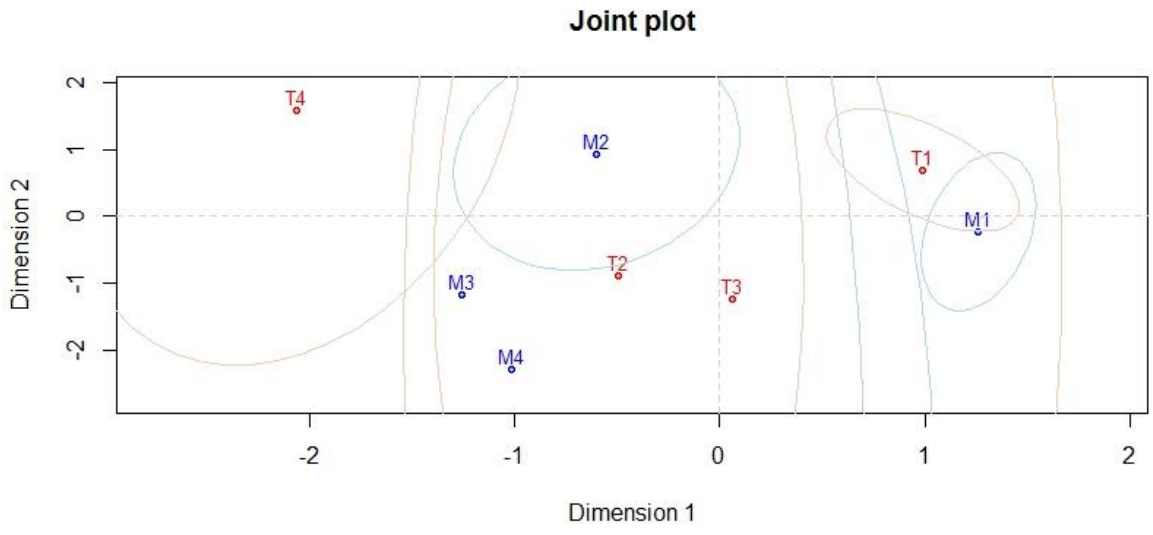
for a small table these repetitive calculations would be lengthy if done by hand. These days, eigenvectors and eigenvalues are calculated as part of a computational CA routine.

At the end of these calculations, we have a table of dimensions with associated eigenvalues and proportion of inertia (variance) captured and a set of coordinates (the eigenvectors) for the data points represented in the original contingency table. These are used to locate the points in the plane defined by dimension 1 and dimension 2. The key result is the eigenvalues. The rule of thumb is that the first 2 or 3 dimensions should account for at least 80% of the total inertia. Here is the output of using the {anacor} program in R to run CA on Featherstone et al.'s data.

```
CA fit:

Sum of eigenvalues:  0.07092399

Total chi-square value: 15.242

Chi-Square decomposition:

                Chisq Proportion Cumulative Proportion
Component 1 14.105       0.925                 0.925
Component 2 0.789        0.052                 0.977
Component 3 0.348        0.023                 1.000
```

From the results, we can see that the first dimensions (components 1 and 2) capture more than 97% of the variance in the data with dimension 1 explaining a hefty 92.5% and dimension 2 just over 5%. This imbalance is reflected in the bi-plot.

FIGURE 6 BI-PLOT OF INTEREST IN MUSIC AND THEATRE



The strongest association is clearly with the first dimension represented by the horizontal axis. This spreads the variables left to right. Relative to the horizontal axis, the vertical axis hardly distributes the variables at all. T4 and M4 contribute most of whatever variation there is on this second dimension. The centroid is the junction of dimension 1 and dimension 2. When interpreting the plot, it is important to remember that it represents a super-positioning of two individual distributions (the row profiles for the theatre and the column profiles for music) in separate spaces. This is possible because the axes of the dimensions for both are on the same scales. What we can do is look for is topographical associations between the variables. What we cannot do is directly compare their distances from each other. Thus in Figure 6 we can say that M1 and T1 are associated but we cannot say T1 is closer to M2 than M1 is. Finally, while from the map we can get a sense of the overall distribution of each set of profiles (that is, how well they are associated), the determination of the actual association can only be made by reference to the proportion of inertia captured by the principal axes. All these caveats mean that the bi-plot and the analysis which generates it can only be treated as an *exploratory* method not an *explanatory* one.[18]

Once we have a map of associations between variables in a reduced space, we have to ask what the map actually maps. Since the values it expresses are not direct measures of leisure activities, but rather transformed and filtered mathematical objects, how do we interpret their locations in a 2 dimensional space? Clearly, interest in going to the theatre or interest in music are not 'objects' in a physical sense and don't have 'mass' or 'inertia', so what, if anything, about leisure activities in the social world is being represented in the visualisation? Calculating the eigenvalues and eigenvectors gives us an abstraction derived from the relationships between the mathematical objects and the bi-plot gives us a visualisation of those relationships. But it is we who have to find a plausible and robust interpretation that ties those associations back onto the actualities of leisure preferences.

MCA follows the same logic as CA but is applied a data array (called an *indicator matrix*) composed of the responses for each subject against a permutation of all the variables. Eigenvalues and eigenvectors for pairs of variables are calculated. The output is identical to that of CA except the number of components is usually greater and the degree of inertia explained by the first few considerably reduced.[19] As a rule of thumb, in MCA the largest dimensions which together contribute more than 50% of the inertia are said to be the "interesting" ones. The rest are written off as "artefacts of the method". As mentioned earlier, with CA the threshold is generally put at 80%.

Before we start to interpret the analysis, as well as the proportion of variance captured we will want to know just how well the distribution we have depicted reflects the original data. This is the distribution's stability. Two methods are available. For data which is derived from a random sampling technique, the most preferable is re-sampling the population and replicating the analysis. Often though, this is not possible (especially in the social sciences). Instead, what is termed 'bootstrapping' is used. The sample originally obtained is re-sampled with replacement a number of times (usually 1000) using a smaller sampling frame. If the distribution moves only slightly, then it is said to be stable. If, the data is not a random sample, an examination of the column and row vectors will show which variables are contributing most inertia. Removing the largest of these and re-running the analysis will indicate just how

[18] When examining CA studies, it is important not to confuse the technical (statistical) use of 'explain' (as in "Dimension 1 explains 60% of the matrix's inertia") with an attribution of causal efficacy. To mark this difference, we have used "capture" as a synonym for the technical usage.

[19] There are well understood technical reasons for this having to do with the way the initial matrix is set up which we won't go into. Established correction factors are usually applied. See Greenacre (1984, ch.5) for an extensive discussion.

much its 'gravitational pull' was affecting the location of the centroid and hence the pattern of X^2 distances. The usual guidance is that if the matrix rotates by more than 45° (a process known as 'jack-knifing') after removing the variable, the distribution is unstable.

To summarise: CA involves a formal analogy between the geometry of variables representing social activities and the geometry of gravitation. In making this analogy, the empirical basis of the social phenomena being represented in the geometry is stripped out. Second, it is not the visualisation which is key, nor its derivation since the procedure will always be successful. The critical elements are the proportion of the inertia which is explained and its interpretation together with the stability of the distribution. Every contingency table subjected to the procedure will produce eigenvectors and eigenvalues, but not all of dimensions so measured will be mathematically "interesting" nor will the relationships they show necessarily be meaningful. For those that are above the threshold of interest and stable, the challenge is to provide a plausible interpretation of what the topography of inertia represented in the visualisation actually means.

Using CA in support of an analysis of social phenomena involves surmounting a number of hurdles. First, we have to be convinced that the formal analogy between social 'forces' and gravitational forces is an appropriate one. Second, the dimensions or components derived from the analysis based on the analogy have to capture a significant proportion of the data's variance. Third, a plausible interpretation of the location of the variables in the 'space of inertia' so derived must be provided.

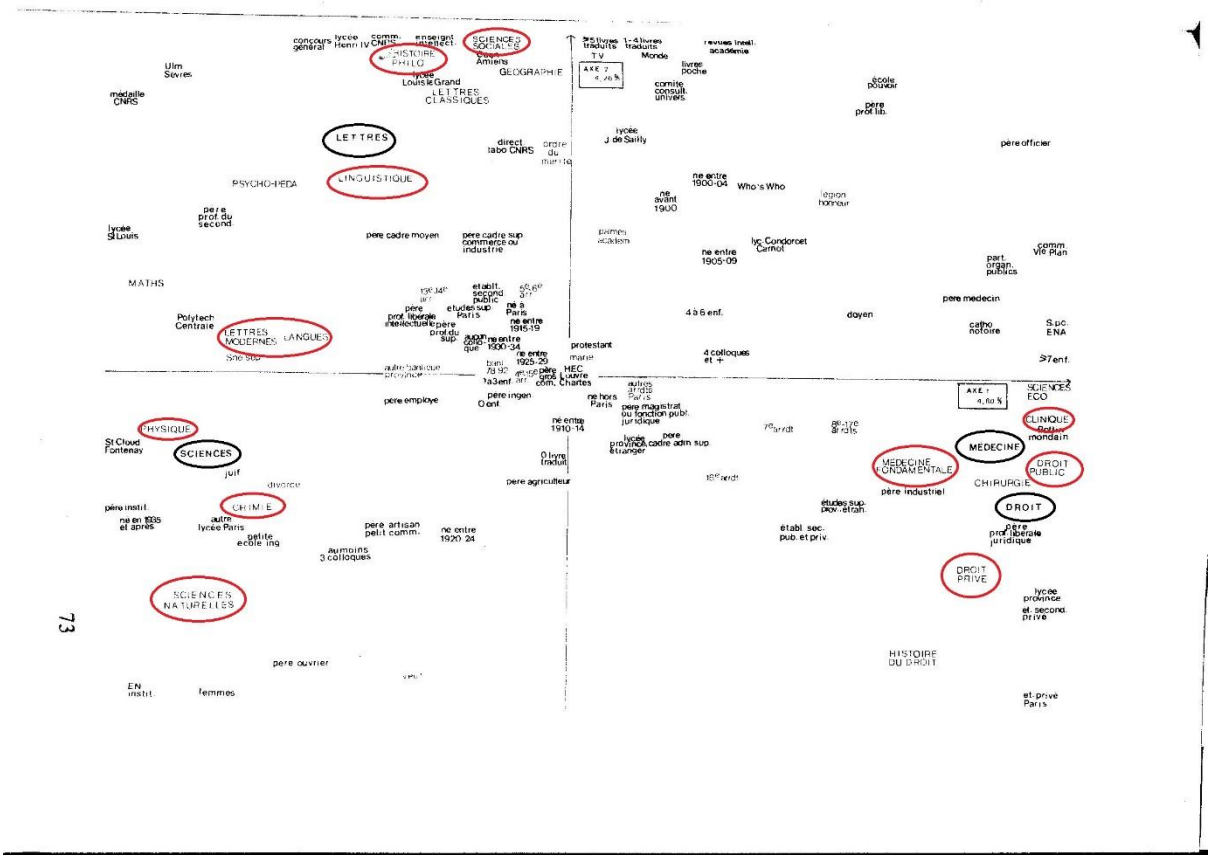
Let us now see how Bourdieu fares.

THE ELISION OF THE METAPHORS

The challenge to the investigator using CA and MCA is closing the interpretive gap (to use a phrase we have used before) between the computational process and the social facts which the output of the process is held to describe. Bourdieu faces this at three levels. First there is the general problem we have just described namely justifying the formalism used to generate the visualisations. Second, and this is peculiar to analysis à la Bourdieu, is the abstract nature of the conception he wants to use to motivate his interpretation of that visualisation. A field of power is as much an abstraction as force fields. Somehow, in applying the analysis to the 'social facts' of university life, the art world or taste, Bourdieu has to show how this double abstraction can be overcome by an analysis of the 'fields' of real social forces shaping the structure of cultural capital and power in the relevant domain.

To show what closing the interpretive gap involves, we will take just one of Bourdieu's maps, the one which on p.50 he calls "The Space of the Faculties".

FIGURE 7 THE SPACE OF THE FACULTIES



This map presents summary data for the disciplines making up the Faculties. It is, then, an integration of the 'spaces' in which the professors might be placed. Bourdieu sees a clear pattern to the distribution of academic institutions and the variables associated with the individuals who belong to them. Because the diagram is so busy (and the type so small), we have circled the Faculties in black to aid clarity. Medicine and Law are in the lower right quadrant, Science in the lower left and Arts and Social Science in the upper left. We have also circled some of the component disciplines in red. The gradient (low to high) of the axes are: axis 1, left to right; and axis 2, bottom to top. For Bourdieu

> ....the differences separating the faculties of the professors show a structure homologous to the field of power overall: the temporally subordinate faculties, the science faculty and to a lesser extent the arts faculty, contrast with the socially dominant faculties, more or less indistinguishable in this respect, the faculty of law and the faculty of medicine (Bourdieu 1988, p. 41).

The second dimension is closely related to the first, but takes a distinctive form. It is based

> ....on the purely internal criteria of success specific to the university field, establishing, at the heart of each of the sectors defined by the first factor a stark opposition, strongly connected with social origins, between the holders of different kinds of specific capital and the others. (ibid p. 53)

It is important to be clear what is happening here and so, at the risk of being pedantic, we will work through the steps.

1. A set of coordinates in a mathematical space defined by the rotation of the matrix of X^2 distances is being transformed by reversing the abstracted comparison between social 'objects' and physical objects which enabled the use of a common formalism.
2. The profiles of inertia which resulted from the formalism are being re-described via a new abstraction, namely positions in fields of power. This informal analogy is applied to relationships in academic life. The 'formal' analogy is being 'informalised' by a play on the dual connotation of 'power': as a measured effect of physical processes and as an inferred effect of social processes. This duality allows the bi-plot to work as the direct equivalent of Faraday's drawing of the magnet. Just as the iron filings in Faraday's drawing can be described as if they were being held in tension by the opposing attractions of the magnet's poles, so the objects in the power field can be described as if they were being held in tension by the opposition of different forms of power.
3. Once this elision of metaphors has been achieved, as an experienced and distinguished member of the university system in Paris, all Bourdieu has to do is present the detail of his and his colleagues' daily lives, the things he has read about and knows about simply by being an academic — in other words, the doxa of his habitus — through that lens. Just as the homologies of Berber life fell out of the analogy of the sine curve with the yearly round, so the homologies of the universities fall out of the analogy of gravitational fields with fields of power. The ethnography writes itself as the working out and working through of that analogy.

The majority of *Homo Academicus* is a discursive account of the recent history and current state of the university sector in 1967 and soon after. Deploying all his skills as an ethnographic narrator, Bourdieu links the prominent features of academic life to the power oppositions he has set out. His narrative is fluent, detailed and persuasive. As an academic, he knows 'the system' from the inside and his insider's knowledge helps cement the detail of the daily round of teaching, researching, administration and career building to the 'underlying realities' of a struggle between social competence and academic competence (his summary terms for the major polarities).

At the end of his account, we are left in no doubt that the picture he paints of French universities riven by a struggle for power between fractions of the academic class is soundly based on a robust mathematical analysis. Or, rather, we would be unless we look more carefully at the support his CA offers for the description he gives.

Let's start with the proportion of the variance in the data captured by the two dimensions of opposition. Bourdieu does not reproduce the tables of components, coordinates, captured inertia and so on which would normally be expected,[20] but looking closely at Figure 7, we can see the first axis accounts for 4.8% of the inertia and axis 2 accounts for 4.26% (these measures are given in the small boxes at the upper end of each gradient). As we have already noted, MCA is well known to provide deflated estimates of inertia and various correcting protocols have been in widespread use since its inception. Given this, it is reasonable to assume Bourdieu is presenting corrected data (though again he doesn't say so). Since

[20] (van Meter, K., Schiltz, M-A., Cibois, P & L Mounier 1994) in their history of CA are clearly less than convinced by Bourdieu's cavalier approach to his results and their interpretation. That he opts for commentary on his analysis rather than detailed exposition of it should not surprise us. Commentary rather than analysis has long been the preferred modality of sociology.

only 9% of the variance in his data is being explained by the eigenvalues of the two axes, it is hard to see how much support they offer to any interpretation. If the data is uncorrected, it is still difficult to see how any correction procedure would lift the captured inertia of the first few dimensions to the threshold of 50%. In addition, Bourdieu provides no account of the stability of his modelled distribution though, as we will see, there is reason to suspect that some of the variables contribute significantly more of the inertia than others. We have already said that CA is an exploratory and not explanatory form of analysis. Given the weakness of the model generated and our uncertainty about stability, any exploratory propositions would have to be hedged around with caveats. It is true Bourdieu does, indeed, suggest here and there in the text that any interpretation has to be handled with care. However, such circumspection is overwhelmed by the welter of ethnographic detail served up as circumstantial evidence for the factuality of the oppositions.

A second problem emerges if we look at the detail of the maps themselves and especially at the difference in the densities of the clusters within each Faculty. Law and Medicine are tightly clustered, Science is less so and the Arts and Social Sciences are (almost literally) all over the map. This differential clustering is a product of the interaction of axes 1 and 2. If axis 1 distributes the Faculties by academic or scientific capital and power (left) and other forms of social capital and power (right), what is axis 2 representing? Bourdieu calls it “academic distinctions” and yet the only Faculties it has any real effect on are the Arts and Social Sciences. It can hardly be a factor explaining power distribution across all the Faculties if it only has an effect on one, unless the argument is that the Arts and Social Sciences are the repository of ‘academic distinctions’ in the university sector; something we are fairly sure would be hotly contested and is certainly belied by many of the facts he himself cites.

Bourdieu reads axis 1 as representing an opposition between new forms of academic power associated with science and established political and economic power associated with the law and medicine. These are the ‘polarities’ of his forces. He then fits his narrative to that view. As we have just said, the difficulty is that the exploratory (let alone, explanatory) weakness of the model implies any reading of the axes must be relatively open. The ‘force’ constraining the Faculties along axis 1 could describe any number of dimensions on which Science and, somewhat less so, Arts differ from Law and Medicine. The dimensionless numbers which generate the axis are ‘measurement free’. In themselves, they refer neither to power, status, distinction nor anything else.

In same vein, we might propose that the background of ‘public intellectuals’ in France at the time is just as good an alternative description of the differentiation produced by axis 2 as ‘distinctions’ since appearing on television, being translated, writing for *Le Monde* and so on are the most strongly associated characteristics. However, much more likely (and Bourdieu does acknowledge this), axis 2 might just represent age, differentiation around which would hardly be surprising or even interesting as a finding. Whilst not necessarily gerontocracies, universities are characterised by decade long career trajectories. Inevitably young or relatively young academics are unlikely to have established profiles or reputations. Bourdieu’s opposition over the symbolic capital of ‘distinction’ might, thus, simply be another way of describing the parameters of the age distribution of academics, but that, of course, would mean that ‘power’ would now be a derived not explanatory variable and the relationship between the two would have to be documented.

What these reservations bring to the fore is the extent to which Bourdieu's narrative plausibility relies upon our indulgence as readers.[21] As long as we are prepared to skip over the detail, run with the abstractions, not examine the visualisations too closely, not ask about the significance of the calculations, not press for arguments as to why we should accept the formal analogies or elision of metaphors, nor demand circumstantial evidence for the alignment of interests — if not as definitive as trout in the milk — considerably stronger than a simple pointing to a commonality of background, then Bourdieu's account of the field of power in academic life seems solid enough. Once we withdraw this indulgence and ask about rigour and robustness, the story is far less convincing. It may still be true; the trouble is we have no way of knowing.

In the end, under a less forgiving reading than he is usually given, one would have to say Bourdieu fails to close the interpretive gap between the results of the method he has used and the story he wants to tell. As a consequence, he ends up reflecting rather than substantiating the categories which shape his description. Moreover, since the analytic power of model is so weak, the reflection given is inevitably pretty fuzzy (if not distorted). In the next section, we will see if there is any way of getting it into better focus.

RE-IMAGING BOURDIEU'S FIELDS

We don't have access to Bourdieu's original data and so cannot build the indicator matrix required to replicate his analyses. However, we do have access to the tables of 'capitals' he sets out on pp 43-47. Enough data is provided here for us to compose our own data matrix for the Faculties. Using this re-composed data, it might be possible to reproduce the patterns of association Bourdieu notes.

If we treat Tables 1 – 6 on pp 43-47 as a single 'stacked' table and run a 'Joint CA' on it, what do we see? The output is below.

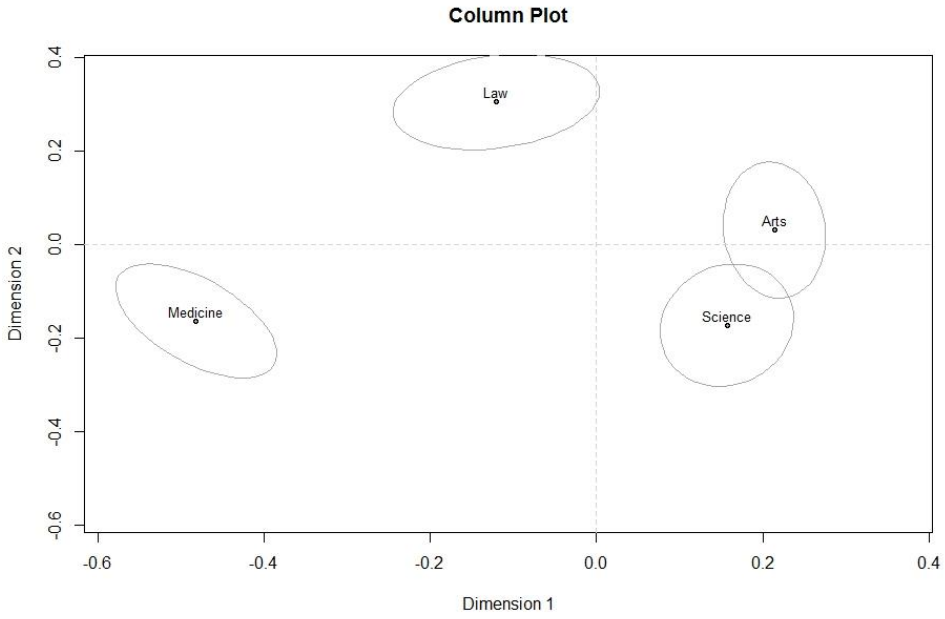
Chi-Square decomposition:

	Chisq	Proportion	Cumulative Proportion
Component 1	456.007	0.530	0.530
Component 2	239.308	0.278	0.808
Component 3	165.126	0.192	1.000

The first 2 dimensions account for 81% of the variance which is very unlikely to be random ($p \geq 0$). Like Bourdieu's plots, the bi-plot of this result is extremely busy and so it is difficult to interpret the detail. However, extracting at the distribution of the Faculties gives us the following.

[21] We have said nothing about the initial analogy between social parameters and physical ones. Bourdieu simply takes its validity for granted. Quite how methodological rigour is to be preserved by squaring the 'interpretive' character of social action with the 'determinate' character of physical action is left unaddressed.

FIGURE 8 CORRESPONDENCE ANALYSIS OF THE FACULTIES



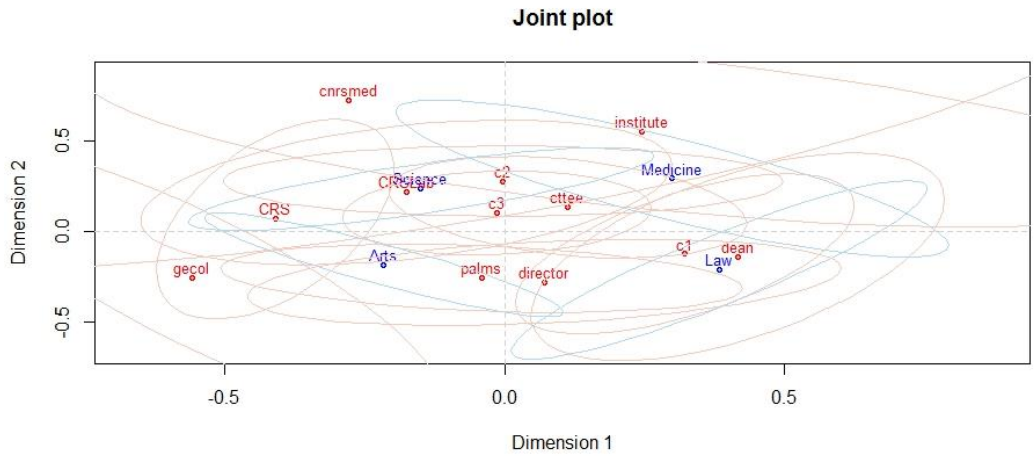
Unsurprisingly (perhaps), dimension 1 does separate Medicine and Law from Arts and Science but not nearly so clearly as in Figure 7. Notice, though, that this time the gradient locates Medicine and Law on the lower (left hand) end of the axis. This is the inverse of Bourdieu's map. On dimension 2, it is Law not the Arts which is separated from the others. However, from the plot of variables it is hard to see any clear clusters which might give some sense of what either dimension could represent.

Decomposing the stacked table into sub-tables is no more revealing. Strong associations for the first and second dimensions emerge for each table but, overall, they generate a variety of spatial configurations with the Faculties clustering differently in each. Perhaps from the point of this exercise, the most interesting are the configurations for Tables 3&4 (about academic power) and 5&6 (about academic renown and political power). For the former, the results are:

```
Chi-Square decomposition:

                Chisq Proportion Cumulative Proportion

Component 1 73.671      0.519                 0.519

Component 2 55.694      0.393                 0.912

Component 3 12.504      0.088                 1.000
```

This time over 90% of the variance is captured and the inertia is relatively evenly spread. In addition, the plot shows some interesting distributions. Dimension 1 clearly separates Medicine and Law from Science and Arts, so once again this could be interpreted in Bourdieu's terms as 'social' v 'academic' power. On dimension 2, though, Science and Medicine are separated from Arts and Law a distinction which manifestly represents the more conventional view of relationships within universities as a dichotomy between the natural and biological sciences and the humanities.

FIGURE 9 CORRESPONDENCE ANALYSIS TABLES 3&4



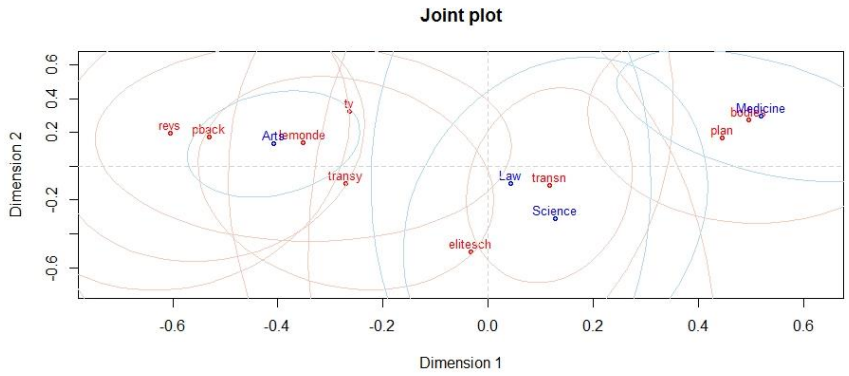
If we look at Tables 5&6, the variance is spread across 3 dimensions, with dimension 2 & 3 being of almost equal weight.

Chi-Square decomposition:

	Chisq	Proportion	Cumulative Proportion
Component 1	81.619	0.553	0.553
Component 2	35.168	0.238	0.791
Component 3	30.840	0.209	1.000

This time, dimension 1 clusters Law and Science and separates them from both Arts and Medicine. In some ways, it appears to be similar to axis 2 in Figure 7. Again unsurprisingly, Arts has a strong association with the public presses (or, as noted before, perhaps more likely public intellectual life) whereas Medicine has a close association with formal public institutions. Given that teaching in an elite institution is close to the mean of the intellectual/public body dimension and negative on dimension 2, it is not clear what it can refer to.

FIGURE 10 CORRESPONDENCE ANALYSIS TABLES 5&6



As a set, the maps we have just produced do not paint a clear picture. Nonetheless, one very strong conclusion does emerge from them. The dimensions of the individual tables do not easily aggregate into the (neat) oppositions which Bourdieu reads into his distributions. The Faculties shuffle around in the various 'spaces' and the only common feature seems to be the 'outlier' status of Medicine. The last two bi-plots do lend more weight to the narrative Bourdieu gives but that might imply that his interpretation places stronger weight on the variables they represent. The standard recommendation in CA is that interpretation of the plots has to be based on the results in the original data. On this evidence, it might be Bourdieu that stressed those variables which explicitly and easily reflected the power aspects he was seeking to demonstrate.[22]

No doubt, the response to our conclusion will be that our decomposition loses the overall structure Bourdieu is trying to describe. But if that structure is as weakly evidenced as it seems, then what basis is there for insisting on its explanatory status *contra* whatever interpretation any re-analysis might be offer? If the picture is complex and complicated and that's what makes it fuzzy, would it not be better to bring out its complex and complicated nature rather than suggest simple dichotomies which filter these complexities out. It is perfectly true Bourdieu's narrative of the fields of university power is elaborated, complicated and complex. But its complexity arises from the 'ethnographic' interweaving of the material he presents not the interpretive frame. Perhaps a simple story about the complexity of relationships might have been preferable to a complex story about relationships that are posited to be simple.

SUMMARY AND CONCLUSION

Just as Foucault and Derrida dominated debates in sociology in the years just before and Deleuze was to do just after, Bourdieu was the preeminent European sociologist of the last decade of the 20th century. This position reinforced his reputation as the foremost French public intellectual and contributed to the rise in the popularity of Cultural Sociology, the domain to which he was a central contributor. Cultural Sociology is a loose federation of studies of popular culture and the mass media, patterns of consumerism, social media, the internet and all things digital, personal identity, identification and

[22] There is some evidence for this suggestion in the way Bourdieu opts to use the tables in his narrative, especially Tables 3 – 6. The properties they represent contribute most to his account of the oppositions between the Faculties.

difference as well as somewhat precipitate overexcitement about the impact of globalisation. Compared with much of the work carried out under that broad banner, Bourdieu stands out as a beacon of intellectual depth and investigative rigour combined with critical edge. His mordant dissections of class and power, status and taste appeal not only because they are fluent and witty (which they are) but because they offer a stern critique of the ramified inequities of modernist and modernising capitalism. In an era when the old oppositional certainties, the ascetic rigour of positivism and structuralism set against the empathetic hermeneutics of interpretivism, were being overthrown not so much by the artfully constructed blurred genres noticed by Clifford Geertz (Geertz 1983) as by a theoretical and methodological *smorgasbord*, a pick and mix sociology held together by an ideology of 'openness', 'interdisciplinarity', 'multi'-ness and egocentricity, Bourdieu's transcendence of quantitative and interpretive method, his crafted re-working of Durkheim using themes from the early Marx and his insistence that his is a *consciously constructed* reflexive sociology, starkly contrasted with the torrent of investigations which laid claim to inspiration from him.

Acknowledging that Bourdieu is indeed head and shoulders above much of the rest of Cultural Sociology is not to give too many hostages to fortune though. Even at their best, sociological arguments tend to major on commitment rather than coherence. Exemplary though his work is, the case Bourdieu makes is not as conclusive nor as convincing as it might be. In that sense, Bourdieu is far from the *non pareil* some would have us believe. In fact, the narrative structure and strategy he uses is almost run of the mill. Like many before him (and since) who have sought to wrestle sociological data into submission using moves borrowed from the natural and physical sciences (he did, after all, call it a "combat sport"), the integrity and plausibility of his project turn upon a double play of analogy and metaphor. Bourdieu describes the plenum filling the spaces within and between social institutions through an empiricist construal of variegated surface confusion to be accounted for by subterranean structures.[23] Beneath the mosaics of fashion, taste, career, prestige and fame lie the struggles for power and possession of capital. What enables this construal to work is our indulgence towards its narrative device of formalisation and metaphor merging. Bourdieu's analyses are constructions, but they are not ramshackle constructions. He works hard to gather and align the pieces but fails to render the lines of conjunction invisible.

Bourdieu's sociology is certainly no worse than any other and a great deal better than most. That is why we chose to focus on him. Sociology is increasingly a taught (and hence consumer rather than producer) discipline and hence is in danger of becoming content with the facile and addicted to pre-digested summaries or easy to grasp arguments. In the current climate, discussions of theory and investigation often prefer to look for the line of least intellectual resistance rather than to puzzle over the connections (logical, empirical or theoretical) which tie an argument together. As a result, Bourdieu is admired not for the skill in his descriptive performance (or to use an old fashioned phrase, the art of his rhetoric) but because his is taken to be an omnibus sociology: stops everywhere, accommodates everything and is easy and convenient use. We think such dis-attention to the detail of narrative structuring is a mistake. There is a lot to learn about the challenge of making sociological arguments work from a close examination of any serious sociologist's thinking (and Bourdieu is a serious sociologist). However, raising our hats to the performativity of his description is not the same as being convinced by the story we are being told. A fertile sociological imagination has long been the cornerstone of any social

[23] We use 'empiricist' rather than 'positivist' because the latter term would undoubtedly set off all sorts of confused and confusing hares. If you separate what he says from what he does, though, Bourdieu looks remarkably like a good old fashioned sociological positivist, but not, of course, a Logical Positivist; a conclusion lent even more weight by the considerations touch on in note 21 above.

analysis worth its salt. Exercising that imagination is as much a discursive as an investigative art. But that exercise also poses its own challenges. Our aim in this discussion has been to demonstrate how even as confident a performer as Pierre Bourdieu sometimes can fail to bring the performance off.

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