Science and Social Anthropology: Resolving Hierarchical and Horizontal Knowledge Structures

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Abstract. The relationship between social anthropology and the so-called 'natural' sciences has a long and fraught history, beginning with the field's inception in the 1870s. Despite periodic attempts at thematic reinvention, social anthropology consequently remains trapped in what has been termed a 'pre-paradigmatic' state, without consensus among social anthropologists on either a self-consistent object of study for their field, parameters of study, or a causal model for explaining that object. Pedagogic sociology offers a causal explanation for this lack of integration, by describing how formal education systems define and segregate 'natural' and 'social' sciences, and by further describing a mechanism for achieving desegregation. Corroborating observations made by both natural scientists and social anthropologists, this chapter uses a pedagogic sociological model to describe the lack of integration between natural and social science generally, and between natural science and social anthropology in particular. This pedagogic sociological model is then used to describe a potential pathway towards a resolving integration between social anthropology and natural science, with reference to incipient formal empirical methods and to *Cultural Model Theory*.

Keywords: Social Anthropology; Cultural Anthropology; Pedagogic Sociology; Social Semiotics; Philosophy of Science.

Introduction

In 1962, the physicist and philosopher of science Thomas Kuhn noted that the so-called 'social' sciences seemed incapable of the self-consistent integration that forms a foundational characteristic of the 'natural' sciences (Kuhn 1962). Whereas physics, chemistry and biology, as the three key disciplines of natural science, each integrate at their respectively most elementary and complex levels (with physics forming the basis for chemistry and chemistry forming the basis for biology), social scientific fields such as linguistics, psychology, and social anthropology appear not only unintegrated, but also contradictory both within

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and between fields.[1] Kuhn (1962) observed that such a lack of integration is not unknown in the natural sciences, but rather that it is restricted to an early developmental stage, when founding researchers disagree about their object of study, its parameters, and about causal models for effectively explaining that object. In the natural sciences, such disagreement resolves as increasingly detailed and comprehensive data becomes available over the course of continuing investigation, as the relevant parameters of study become apparent, and as causal models become increasingly accurate in response. This process of incipient consensus generates what Kuhn (1962) refers to as an emergent disciplinary 'paradigm'. Unlike the natural sciences however, the social sciences appear trapped in a persistent 'pre-paradigmatic' state of self-contradiction and conflict (Kuhn 1962), despite a wealth of data (Wilson 1998), despite well-established formal techniques for modelling and analysing that data (Dengah et al. 2020; Hamberger, Houseman, and White 2011), and despite an inherent predisposition towards the formulation of a paradigm (de Munck and Bennardo 2019; Leaf and Read 2012).

Pedagogic sociology provides a causal model for explaining this developmental bifurcation between the natural and social sciences. Bernstein (1999) points out that formal education systems progressively segregate the distribution and acquisition of expert knowledge regarding the 'natural' and 'social' worlds over the course of primary and secondary education, culminating with university-level qualification. Instead of developing through progressively integrated 'discoveries' of new knowledge as in the natural sciences, social scientific knowledge is presented to students as developing through successive instances of 'contestation' between different authors. Development in the field is thus construed in the form of newly changing perspectives or themes, rather than in the discovery of substantively new information. As a key field of the social sciences, the developmental history of social anthropology presents an illustrative case study, with successive authors introducing ostensibly new and distinct themes and perspectives, which replace rather than integrate older knowledge. As in other social sciences, this gives rise to an intellectual genealogy of social anthropological authors, rather than a substantive history of discoveries.

Social anthropology's first generation of proponents appropriated themes from then-novel discoveries in biology in an attempt to characterise the nascent

1 The distinction between the terms 'discipline' and 'field' reflects the distinction between general areas of expert knowledge sharing generally common objects of study, generally common parameters of study, and generally common causal models on the one hand, and, on the other hand, more specific branches of knowledge that do not share in common one or more combinations of these three defined features (see Rose 2022, 30).

field as a science of pseudo-evolutionary cultural and ethnic hierarchies (Morgan 1871; Tylor 1871). Subsequent generations, including some of the inaugural chairs of newly-founded social anthropology university departments, sought to characterise their field as a science of human social 'structure', akin to what they perceived to be the objective of other sciences, and searching for what they misunderstood to be the 'structures' of chemistry and biology (Boas 1936; Malinowski 1936; Lévi-Strauss 1949; Radcliffe-Brown 1940). This effort reached its zenith in the 1960s, driven primarily by increasingly formal empirical work on kinship terminologies (Lee and DeVore 1968), before collapsing in the 1970s. At this point, another new generation of social anthropologists sought to detach the field completely from any aspiration to scientific empiricism or formalism, and to convert it instead into a branch of literary philosophy (Geertz 1973; Leach 1989). The content of major contemporary social anthropological journals suggests that literary philosophy remains the predominant form of social anthropological research today.

This chapter draws on a pedagogic sociological model of the teaching and learning of natural and social sciences in the academy (Bernstein 1999) to illustrate why social anthropology was not able to be properly formalised as a natural science during the 20th century (despite the aspirations of its early proponents), and why the field's mainstream practice continues to manifest as a form of literary philosophy rather than as an evidence-based natural science. The paper draws attention to the underlying structures and functions of pedagogic culture in the academy, which actively reinforce the segregation of natural science and social science in general, and the segregation of natural science and social anthropology in particular.

The chapter is organised into six parts. The first part introduces a pedagogic sociological model of social anthropology, as it has been taught in the academy since its inception more than a century ago. The second, third and fourth parts elaborate each key element of this model and their specific implications for the teaching and learning of social anthropology. The fifth part of the chapter illustrates how certain specialised branches of social anthropological expert knowledge have persistently bucked the downward pressure of pedagogic culture, rendering them resistant to appropriation by literary philosophy, and amenable to a consilient scientific formalisation. Finally, building on Kuhn (1962), the sixth part of the chapter describes how the theoretical scaffolding provided by Wilson (1998), writing from the perspective of natural science, and Leaf and Read (2012) and de Munck and Bennardo (2019), writing from perspectives within social anthropology, sketch the contours of an emergent paradigmatic coherence for social anthropology.

Social anthropology from a pedagogic sociological perspective

As elaborated below, pedagogic sociological theory differentiates expert knowledge from 'everyday' or 'common sense' knowledge, as necessary for engaging in specialised activities and as transmissible only within the regulated social settings of education institutions, particularly universities (Bernstein 1999). Social anthropology comprises such a form of expert knowledge (Bernstein 1999, 164). In this model, expert knowledge exhibits three features: a 'discourse', a 'knowledge structure', and a 'grammar'. As elaborated over the following three sections of this chapter with reference to Bernstein (1999), Maton and Muller (2009), Moore (2009), Moore and Muller (2002), and Muller (2009), each of these three features either constitutes or realizes the other. While a field's discourse is constituted by its knowledge structure, its knowledge structure is realized by its grammar. When exhibited together in the context of institutional education, these three features give rise to what is termed the 'pedagogic code', used by both teachers and students to enable transmission of expert knowledge.

Depending on the variable combinations of each feature, as elaborated below, the pedagogic code may function to either 'integrate' or 'segment' expert knowledge. In its integrating configuration, the pedagogic code organises knowledge into a vertically ordered 'stack', with each elemental 'layer' of knowledge forming a more specific 'lower' logical base for successively more generalised and 'higher' logical layers. By contrast, in its segmenting configuration, the pedagogic code does not integrate elements of knowledge but rather separates them into specific and discrete 'packets', organised side-by-side in an 'unintegrated series'. The vertical and horizontal axes of this model are analogic insofar as any given system of measurement comprises a means for construing self-consistent comparison between otherwise unrelated entities. In this sense, each of the three features exhibited by a form of expert knowledge may be distributed along 'vertical' and 'horizontal' axes, according to their contribution to either integration or segmentation of that expert knowledge (Bernstein 1999). In what follows, the field of social anthropology is modeled using this pedagogic sociological theory, and shown to be caught in a persistent tension between a segmenting pedagogic code maintained by education institutions on the one hand, and, on the other hand, an inexorable propensity towards a vertically integrating logic, as observed by natural science philosophers (Kuhn 1962; Wilson 1998), by social anthropologists (de Munck and Bennardo 2019; Leaf and Read 2012), and by pedagogic sociologists (Bernstein 1999; Maton and Muller 2009; Moore 2009; Moore and Muller 2002; Muller 2009).

The analogic vertical and horizontal axes of discourse, knowledge structure, and grammar are visualised in Figure 1. The most elementary pedagogic sociological feature of any form of knowledge is its discourse, which, as described in the following section, is constituted by the aggregate of all forms of knowledge held by a given population. As illustrated in Figure 1(a), discourse is differentiated as either vertical or horizontal, where vertical discourse is dependent on institutional teaching and learning, but where horizontal discourse is independent of such institutions (Bernstein 1999). Subsidiary to discourse is knowledge structure, which is constituted by the combination of both ideas and logical relations between ideas comprising a form of expert knowledge. As illustrated in Figure 1(b), knowledge structure can be differentiated as either hierarchical, as in the case of the natural sciences, or horizontal, as in the case of the social sciences. Finally, subsidiary to knowledge structure is grammar, which constitutes the degree of self-consistent formality of linguistic features through which the ideas and logical relations comprising an expert form of knowledge are realized. As illustrated in Figure 1(c), grammar can be differentiated as either 'strong' or 'weak' according to the relative degree of its self-consistent formality (Bernstein 1999; Maton and Muller 2009; Moore 2009; Moore and Muller 2002; Muller 2009).

As elaborated below, from a pedagogic sociological perspective, both natural and social scientific forms of expert knowledge, including social anthropology, exhibit a vertical discourse but otherwise differentiate in terms of knowledge structure and grammar. Whereas all forms of natural scientific knowledge exhibit a hierarchical knowledge structure and strong grammar, all forms of social scientific knowledge exhibit a horizontal knowledge structure and either a strong or weak grammar.

The vertical and horizontal axes across which these three features are distributed are expressed by the manner in which expert knowledge is taught and learned. In the language of pedagogic sociology, teaching and learning are described respectively as the 'distribution' and 'acquisition' of knowledge, which together give rise to patterned instances of knowledge transmission and ultimately to the circulation of all knowledge across a population. As noted above, the pedagogic code is used by distributors and acquirers to organise instances of knowledge transmission by one of two modes, either 'integrating', or 'segmenting'. In both modes, the pedagogic code "selects and integrates meanings, forms of realization, and evoking contexts" (Bernstein 1999, 101; Maton and Muller 2009, 14). However, the effects of each mode on the discourse, knowledge structure, and grammar are different. The effects of an integrating, hierarchical code are

measured across an analogic vertical axis, while the effects of a segmenting, serial code are measured across an analogic horizontal axis. Figure 1 illustrates vertical and horizontal distributions for each of the three features in this model, as an outcome of these two types of pedagogic code.[2]

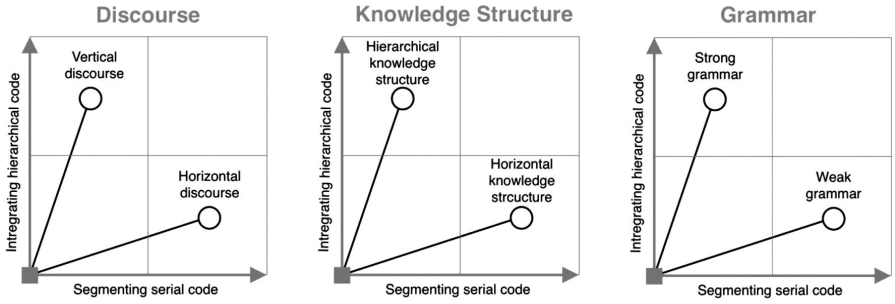

Figure 1. Analogic vertical and horizontal distributions of knowledge features – (a) discourse, (b) knowledge structure, and (c) grammar.

Following Bernstein (1999) and Moore and Muller (2009), the integration of these three features and their distribution on vertical and horizontal axes may be construed as a collection of sets and subsets, and graphed as nodes and ties in a cladistic network tree, as shown in Figure 2. The logical relations between discourse and knowledge structure are described as 'constitutive' and 'realizing', such that a discourse is described as constituted by one of two types of knowledge structure, and a knowledge structure is described as realized by one of two types of grammar (Maton and Muller 2009; Moore 2009; Muller 2009). In Figure 2, the three separate features shown in Figure 1 are integrated into a single elaborated model, illustrating the differential effects of a vertical integrating code, and a horizontal segmenting code upon them. For any given form of knowledge, an integrating code has the effect of 'pushing' each of its features 'upward' into more self-consistent, formal, and integrated states, while a segmenting code has the differential effect of pushing each of its features 'sideways' into more disintegrated, contested, and segmented states. In the case of discourse, shown in the lower left quadrant, vertical discourse is situated in a greater vertical and lesser horizontal position, while horizontal discourse is situated in a greater horizontal and lesser vertical position. In the case

2 Although the contrasting adjectives 'strong' and 'weak' do not convey a spatial distribution in the way that the adjectives 'vertical', 'hierarchical', 'horizontal', and 'segmental' do, they may nevertheless be aligned on the same axes without disrupting the consistency of the model's schema.

of the subsidiary feature of knowledge structure, shown in the upper-left quadrant, hierarchical knowledge structure is situated in a greater vertical and lesser horizontal position, while horizontal knowledge structure is situated in a greater horizontal and lesser vertical position. Finally, in the case of the subsidiary feature of grammar, shown in the upper-right quadrant, strong grammar is situated in a greater vertical and lesser horizontal position, while weak grammar is situated in a greater horizontal and lesser vertical position. At each subsidiary bifurcation in the network model, the respective effects of either an integrating or a segmenting pedagogic code push the features of expert knowledge by variable degrees in either vertically integrated or horizontally segmented directions.

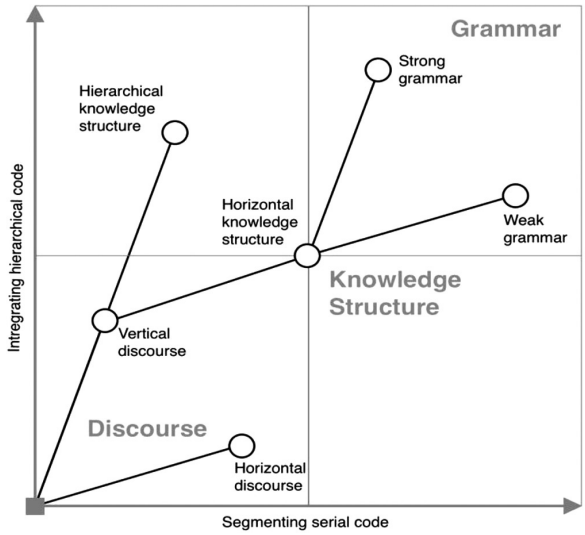

Figure 2. An integrated cladistic network model of discourse, knowledge structure, and grammar distributed along vertical and horizontal axes according to the effects of integrating and segmenting pedagogic codes.

Historically, from a pedagogic sociological perspective, social anthropology has been characterised as reflecting several distinctive combinations of features from among those available in this cladistic network model of optional branches. Specifically, the field is said to constitute a vertical discourse, which is, in turn, constituted by a horizontal knowledge structure, and which is itself, in turn, realized by a weak grammar (Bernstein 1999, 164). Figure 3 reconstrues the network model shown in Figure 2, emphasising the cladistic signature of social anthropological expert knowledge. Here, social anthropological knowledge is shown to comprise a vertical discourse and horizontal knowledge structure, realized by a weak grammar.

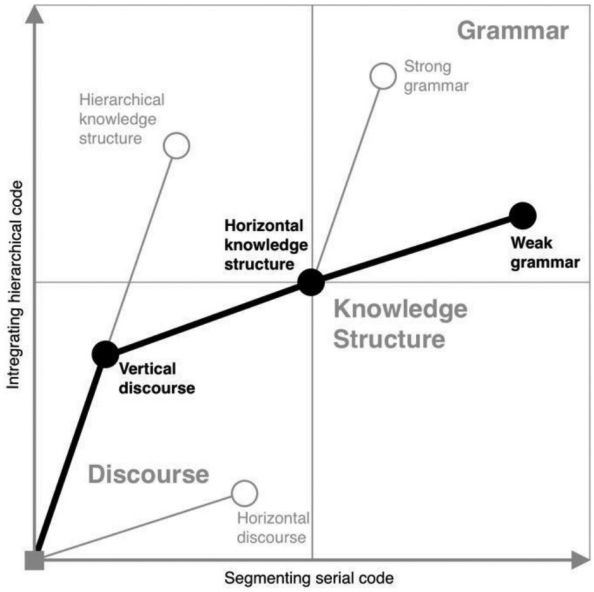

Figure 3. Social anthropology's location in an integrated cladistic network model of discourse, knowledge structure, and grammar.

Throughout its history, social anthropological knowledge has remained distinguishable both from natural scientific disciplines such as chemistry, biology, and physics, and from other social scientific fields such as linguistics and psychology. At various points in the historical development of social anthropological knowledge, favoured authors have attempted to claim that the field is more or less scientific, yet the field as a whole has remained steadfastly pre-paradigmatic in Kuhn's (1962) terms. Social anthropology has thus continued to be taught and learned without any widely agreed or formally defined object of study, parameters of study, model of causality for explaining and predicting that object of study, or any widely agreed or formally defined technical methods for collecting and modelling data in order to test such a model were it to be developed.

Despite 20th century aspirations to natural scientific formalisation of their expert knowledge, social anthropologists themselves have intuited this differential configuration of their field.

As early as 1940, Radcliffe-Brown (1940) noted that, despite its secure status within the academy, social anthropological knowledge exhibited neither a coherently integrated knowledge structure nor a consistent grammar. Referring to the perspectival theme of 'social structure', which he had attempted to define as social anthropology's object of study, Radcliffe-Brown observes:

> I am aware, of course, that the term 'social structure' is used in a number of different senses, some of them very vague. This is unfortunately true of many other terms commonly used by [social] anthropologists. The choice of terms and their definitions is a matter of scientific convenience, but one of the characteristics of a science as soon as it has passed the first formative period is the existence of technical terms which are used in the same precise meaning by all the students of that science. By this test, I regret to say, social anthropology reveals itself as not yet a formed science. (Radcliffe-Brown 1940, 3)

Discourse: the internal principles and social bases of expert knowledge

From a pedagogic sociological perspective, distinct areas of knowledge that are held by a given population, collectively constitute that population's 'reservoir' of knowledge. Each member of the population acquires over the course of their life distinctive repertoires of knowledge, which are drawn from this reservoir. Within the frame of this perspective, discourse comprises the complete system of transmission in which distinct areas of knowledge move from reservoir to repertoire via distinctive modes of distribution and acquisition. As noted above, two distinct types of pedagogic code – integrating and segmenting – determine the form of this transmission, such that discourse takes on either horizontal or vertical characteristics. Bernstein describes horizontal discourse as follows:

> [W]e are all aware and use a form of knowledge, usually typified as everyday or 'common-sense' knowledge. Common because all, potentially or actually, have access to it, common because it applies to all, and common because it has a common history in the sense of arising out of common problems of living and dying. This form has a group of well-known features: it is likely to be oral, local, context dependent and specific, tacit, multi-layered, and contradictory across but not within contexts. However, from the point of view to be taken here, the crucial feature is that it is segmentally organised. By segmental, I am referring to the sites of realization of this discourse. The realization of this discourse varies with the way [any given social] culture segments and specialises activities and practices. The knowledge is 'segmentally differentiated'. (Bernstein 1999, 159)

Figure 4 highlights the bifurcation of horizontal and vertical discourse in the pedagogic sociological model illustrated in Figure 2 and Figure 3. In the lower-left, Figure 4 illustrates the effect of an integrating pedagogic code in pushing the discourse of expert knowledge towards the more vertical position of integrated organisation. Meanwhile, the effect of a segmenting pedagogic code is to push the discourse of everyday knowledge towards the more horizontal position of segmental organisation (Bernstein 1999, 159).

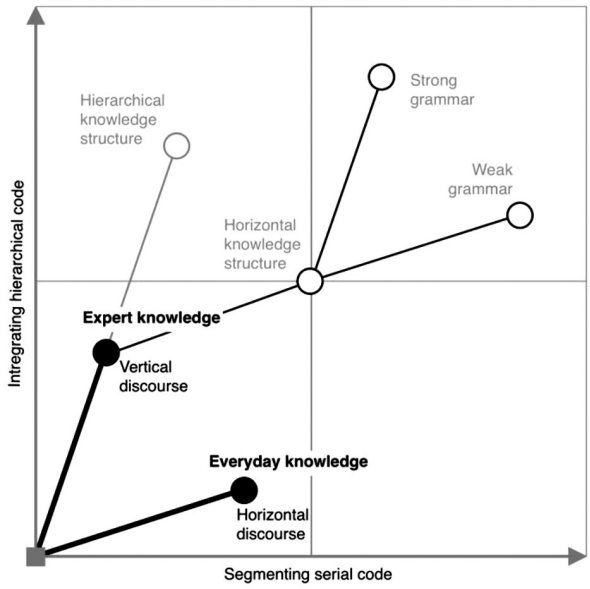

Figure 4. Horizontal and vertical distribution of expert knowledge and everyday knowledge, distinguished by, respectively, vertical and horizontal discourse.

In Bernstein's (1999) example of horizontal discourse, comprising knowledge about tying shoelaces and using toilets, the internal principles and social bases of this knowledge are expressed in two ways. Firstly, with regard to internal principles, knowledge about tying shoelaces and using toilets is not interrelated in pedagogic sociological terms. This is illustrated by the self-evident fact that the ability to tie shoe-laces is not required in order to use a toilet, and vice versa. The internal principles of the knowledge are thus said to be segmental.

Secondly, in relation to social bases, segmentation of the internal principles of horizontal discourse also extends to the mode of its transmission. Knowledge about tying shoelaces and about using toilets requires face-to-face demonstration until the knowledge is successfully acquired. This means that both the distributor and the acquirer have to be present in the same place and

time.[3] However, it also means that contexts themselves are segmented, insofar as the context for transmitting knowledge about tying shoelaces does not need to be the same context as that for transmitting knowledge about using toilets. Social cultures associated with the transmission of such knowledge therefore tend to be tacit rather than overt, such as in family households, where elder relatives typically teach young children to tie their shoelaces and to use the toilet, whenever and however necessary, without reference to any manuals or timetables.

In contrast to horizontal discourse, vertical discourse encodes forms of what may be termed 'expert' knowledge, where internal principles and social bases must be integrated in order for the knowledge to be produced and reproduced effectively. Bernstein (1999) describes the features of vertical discourse as follows:

> [A] vertical discourse takes the form of a coherent, explicit, and systematically principled structure, hierarchically organised, as in the [natural] sciences, or it takes the form of a series of specialised languages with specialised modes of interrogation and specialised criteria for the production and circulation of texts, as in the social sciences and humanities. (Bernstein 1999, 159)

With regard to the social bases of vertical discourse, integration is extended to the organisation of education institutions. Not only is institutional education the remit of government and business because of the complex and standardised organisation of the discourse, but the degree of its formalisation and the social standing of its evaluative principles are overtly hierarchical. Primary and high school education are generally considered a basic condition of universal human rights, while tertiary education of any type is considered essential for individual financial autonomy, and postgraduate university education tends to be associated with upper-middle-class socio-economic status and political influence. The relative cultural authority of the corresponding institutions is reflected in the requirement for their successful evaluation in a hierarchy of employment types. Unskilled labouring work generally requires basic literacy and numeracy, whereas surgery requires a doctorate in medicine. Accordingly, primary schools are regarded as less socially and economically important than university medical faculties, which is in turn reflected in the remuneration of the staff employed in each.

3 Notwithstanding the function of video as a medium for synthesising co-location of teacher and student.

Social anthropology, like all fields of expert knowledge taught in the academy, forms part of a vertical discourse. Acquirers of social anthropological knowledge are vetted from among other prospective students by their preparatory study of social science and humanities subjects in senior high school, such as geography, history, literature and so on. These fields of knowledge introduce principles that are common to social anthropology, including explanation by rhetorical argument and narrative sequence, writing genres that make heavy use of metaphor, and evaluation by recital of favoured idiolects and their originating authors. Absent are formal and empirical modelling skills such as those used to collect data and build causal models, or to develop self-consistent causal models by using reproduceable methods, such as in physics, chemistry and biology. Once at university, students of social anthropology are introduced to a special subset of the former features, including rhetorical devices for further rationalising the distinction between the social sciences and the humanities on the one hand, and the natural sciences on the other. The latter are often presented in social anthropological texts as 'oppressive' and 'hegemonic' (Smagorinsky 2007), and tend to be represented by examples drawn from literature and philosophy, rather than from science itself (Scholte 1987).

Hierarchical and horizontal knowledge structures

In this pedagogic sociological model, the forms of knowledge comprising vertical discourse may be further distinguished into two types of knowledge structure, one hierarchical, and the other horizontal. As with the distinction between types of discourse, the distinction between types of knowledge structure is an outcome of the interaction between internal principles of the expert knowledge in question, and the social bases from which that knowledge arises. Also as with the distinction between discourses, the distinction between knowledge structures utilises analogic vertical and horizontal axes, as illustrated in Figure 1 and Figure 2. In this model, the term 'knowledge structure' corresponds with what linguists refer to as 'ideational meaning' (Halliday and Matthiessen 2006), or, in other words, both ideas themselves and their organisation in relation to one another. Bernstein explains the distinction between vertical and horizontal knowledge structures this way:

> [A hierarchical knowledge structure] attempts to create general propositions and theories, which integrate knowledge at lower levels, and in this way shows

> underlying uniformities across an expanding range of apparently different phenomena. Hierarchical knowledge structures appear, by their users, to be motivated towards greater and greater integrating propositions, operating at more and more abstract levels. Thus, it could be said that hierarchical knowledge structures are produced by an 'integrating' code.
>
> In contrast, horizontal knowledge structures consist of a series of specialised languages with specialised modes of interrogation and criteria for the construction and circulation of texts. Thus, anyone of the specialised disciplines within the form of a horizontal knowledge structure found within the humanities and social sciences can be portrayed as [an unintegrated series].
>
> Thus, in the case of English literature, the languages would be the specialised languages of criticism; in Philosophy, the various languages of this mode of inquiry; and in Sociology the languages refer, for example, to functionalism, post-structuralism, post-modernism, Marxism, etc. The latter are the broad linguistic categories and within them are the idiolects (theories) of particular favoured or originating speakers. Horizontal knowledge structures, unlike hierarchical knowledge structures, which are based on integrating codes, are based upon collection or serial codes; integration of language in one case and accumulation of languages in the other. (Bernstein 1999, 162)

Figure 5 highlights the bifurcation of hierarchical and horizontal knowledge structures illustrated in the pedagogic sociological model in Figure 2 and Figure 3. In the upper-left and centre, Figure 5 illustrates the effect of an integrating pedagogic code in pushing the knowledge structure of natural scientific knowledge towards the more vertical position of integrated organisation. Meanwhile, the effect of a segmenting pedagogic code is to push the knowledge structure of social scientific knowledge towards the more horizontal position of segmental organisation (Bernstein 1999, 164).

Enrolment in university-level social anthropology and other social science and humanities degrees does not conventionally require any prior training in mathematics or natural science. Conversely, enrolment in such degrees does conventionally require study of subjects such as history and geography in senior high school. These social science and humanities pre-requisites are not only distinguished from science and mathematics, they also prepare university students of social anthropology to accept that the authority of this field's expert knowledge is conferred not by pervasive integrating principles, empirical evidence, or the formal mathematical language used to model them, but by the value attributed to what Bernstein (1999) terms "favoured or originating speakers" of associated idiolects (162). Currently,

in social anthropology, a useful example would be Geertz (1973; 1988; 2005) who remains especially favoured for having introduced the idiolect of 'thick description' some 50 years ago. This idiolect is literary in perspective, construing the work of social anthropologists as similar to that of editorializing journalists (Leach 1989). From an historical perspective, the idiolect of thick description has in turn replaced that of previous generations of favoured or originating speakers, such as Boas, Malinowski, Lévi-Strauss, Radcliffe-Brown, and others, who advanced scientifically themed idiolects rather than literarily themed idiolects, albeit using a grammar not significantly more formal or empirical than that of Geertz.

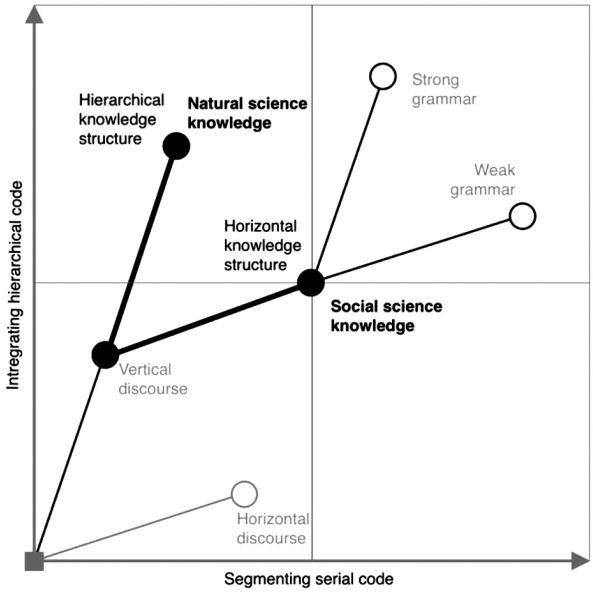

Figure 5. Horizontal and vertical distribution of natural scientific knowledge and social scientific knowledge, distinguished by, respectively, vertical and horizontal knowledge structures.

This transition, also known as social anthropology's 'literary turn' (Scholte 1987) represents an instance of what in pedagogic sociology is termed the 'development of knowledge', which, as outlined above, follows distinct patterns in the natural sciences and in the social sciences and humanities. Bernstein describes the development of knowledge in the social sciences and humanities as follows:

> Development, in the case of a horizontal knowledge structure, cannot be a function of the greater generality and integrating property of the knowledge because, as has been shown, such developments simply are not possible in the case of a horizontal knowledge structure. So what counts as development?

> I suggest that what counts as development is the introduction of a new language. A new language offers the possibility of a fresh perspective, a new set of questions, a new set of connections, and an apparently new problematic, and most importantly, a new set of speakers. This new language is likely to be taken up by the younger speakers of the particular horizontal knowledge structure. This new language can then be used to challenge the hegemony and legitimacy of more senior speakers. The latter may be cut off from acquiring the new language because of trained incapacity arising out of previous language acquisition, and a reduced incentive, arising out of the loss of their own position. (Bernstein 1999, 163)

As Maton and Muller (2009) explain, "Horizontal knowledge structures legitimate themselves in terms of who knows rather than what is known. They authorize themselves through the 'voice' of those whose experiences they claim to represent" (Maton and Muller 2009, 27). As Bernstein (1999) corroborates, production of new knowledge in the social sciences and humanities is thus typically construed as the introduction of new idiolects. Such introduction usually follows a pattern of alternately opposing epistemological and ideological assumptions, which can take no form other than critique: "Each [new] specialised language, or rather their sponsors and authors, may accuse the other of failures of omission and or epistemological/ideological/social inadequacies" (Bernstein 1999, 171).

Grammars: strong and weak

Grammar, in this pedagogic sociological model, forms the organizing mechanism for realizing horizontal knowledge structures. Just as both hierarchical and horizontal knowledge structures constitute only vertical discourse, so too do both strong and weak grammars realize only horizontal knowledge structures in the model. In other words, hierarchical knowledge structures are always realized by a strong grammar and never a weak grammar, and both hierarchical and horizontal knowledge structures always constitute a vertical discourse, and never a horizontal discourse. Bernstein's explanation of the realizing function of grammar is concise:

> It might be useful here to make a distinction within horizontal knowledge structures, distinguishing those whose languages have an explicit conceptual syntax capable of 'relatively' precise empirical descriptions and/or of generat-

> ing formal modelling of empirical relations, from those languages where these powers are much weaker. The former I will call strong grammars and the latter weak grammars. It is important to add here that 'strong' and 'weak' must be understood as relative within horizontal knowledge structures. From this point of view, economics, linguistics and parts of psychology would be examples of strong grammar. … Examples of weak grammars would be sociology, social anthropology, and cultural studies. (Bernstein 1999, 164)

Figure 6 highlights the bifurcation of strong and weak grammars illustrated in the pedagogic sociological model in Figure 2 and Figure 3. In the upper-right, Figure 6 illustrates the effect of an integrating pedagogic code in pushing the strong grammar of linguistics, economics and psychology towards the more vertical position of integrated organisation. Meanwhile, the effect of a segmenting pedagogic code is to push the weak grammar of sociology, social anthropology, and cultural studies towards the more horizontal position of segmental organisation (Bernstein 1999, 164).

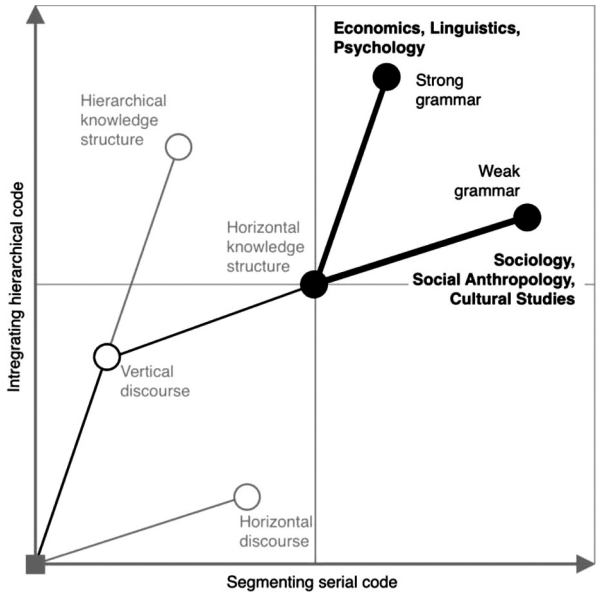

Figure 6. Horizontal and vertical distribution of fields of social science and humanities, distinguished by, respectively, strong and weak grammars.

While strong grammars are those that develop over time with emerging consensus on relevant repertoires of terms and associated definitions, weak grammars are those in which few if any terms and definitions are agreed (Maton

and Muller 2009). Taking as examples those provided above, in economics, terms such as 'asset', 'investment', 'capital', interest', 'stock', etc., all have settled definitions, and the logical relations linking these terms and definitions together are equally agreed. Disagreement within the field thus tends to occur at the level of higher-order theory, such as the origin of profit, or relative utility of fiscal and monetary policy in the management of inflation. Similarly, in linguistics, terms such as 'noun', verb', 'adjective', 'preposition', 'conjugation', 'nominalisation', and their accompanying definitions are all agreed, as are the logical syntactic and grammatical relations between phoneme, clause, and text. What is disagreed in linguistics is the origin of meaning, and the relative contributions of social context and lexicogrammatical function to semogenesis. In psychology, terms such as 'affect', 'mood', 'emotion', 'cognition', and 'behaviour' are all agreed, whereas the relative contributions of neurology, social context, culture, and language to individual behaviour remain uncertain.

In contrast to these strong-grammar social sciences, in weak-grammar social sciences and humanities fields, such as sociology, social anthropology and cultural studies, definitions of even the most elementary terms like 'culture' remain hotly contested, as do the fields' objects of study themselves. The result tends to be statements of extreme ambiguity, such as the following, from a 21st century *Encyclopedia of Anthropology*:

> [T]he concept of culture itself has obstinately resisted final definition ... It is clear that throughout the history of [social] anthropology, scholars have adapted their notions of culture to suit the dominant concerns of the day, and they will no doubt continue to do so. Little is to be gained, therefore, from attempts to legislate on the proper meaning of the term. (Ingold 2002, 330)

Not only do such statements avoid consensus on critical elementary terms and definitions, but they actively discourage any expectation that agreed terms and definitions should be sought at all. Weak grammar construes as logical the otherwise inexplicable assertion that a concept can 'resist definition' even though it is acknowledged in the same statement as *being* a concept. Given the central status of social culture for the field of social anthropology, a comparably inexplicable claim in biology, for example, might be that 'the concept of the cell' resists definition, in linguistics that 'the concept of grammar' resists definition, or in psychology that 'the concept of emotion' resists definition. Weak grammar thus tacitly distracts attention away from the incoherence of what is being claimed, and focuses it instead on the author as the only coherent element in the text, just as

Bernstein (1999) and Maton and Muller (2009) predict. Despite Radcliffe-Brown's (1940) concern regarding social anthropology's weak grammar, the grammar was never thought to be so weak that the very object of social anthropological expert knowledge, social culture, would have been considered beyond definition. That such a claim could be made 60 years later may well illustrate the tenacious effect of the segmenting code described by Bernstein, highlighted by the fact that the latter quote is taken from an *Encyclopedia of Anthropology* in the 21st century. The distinction between the striking effects of such a profoundly weak grammar is captured by Kuhn (1962), who observes:

> What scientists never do when confronted by even severe and prolonged anomalies[,] though they may begin to lose faith and then to consider alternatives, [is to] renounce the paradigm that has led them into crisis. (Kuhn 1962, 77)

Integrative specializations in social anthropology: kinship, language, religion, and economy

Despite the tenacious effects of weak grammar on the development of social anthropology as a whole, the pervasiveness of these effects is not so total as to have prevented the development of coherence among more specialised branches of the field. In 1949, Lévi-Strauss made the over-arching discovery that systems of ideas maintained by all of the world's peoples seemed to conform to a common pattern of dyadic classification (Lévi-Strauss 1949). In this model, distinct domains of social activity appeared to be identifiable according to self-reportedly discrete sets of terms and definitions used by society members to describe their social activity. Each set of terms and definitions appeared to be constituted by elementary pairs of opposing terms, linked together by logical relations consisting of oppositional steps. This discovery marked a breakthrough in a – then – 80-year-long effort, which had commenced with Morgan (1871) and Tylor (1871), to detect and classify specific instances of patterned human thought and its instantiation in patterned social interaction, which could in turn be integrated into generalised unifying principles of a range of forms of human social culture. By the time of Lévi-Strauss' discovery, this range had developed across four approximately discrete research specialisations, in which progressively more coherent forms of 'puzzle-solving' (Kuhn 1962) had developed, and which have continued to develop subsequently.

Today, kinship, language, religion, and economy comprise four specialised branches of social anthropology, in which there have been, during one period or another in the field's developmental history, distinct efforts to create stronger grammars, to the extent even of pushing the field's knowledge structure to the brink of hierarchical integration. The integrative consistency in empirical description and formal explanation, both within and between each of these research specialisations, reflect not only Kuhn's (1962) generalised account of an emergent scientific paradigm, but also Bernstein's (1999) account of integrative, hierarchical knowledge structures.

With specific regard to kinship, there was recognition by the mid-20th century that the world's kinship terminologies conform to a limited set of common organising principles, with a limited number of distinct regional variations (Boas 1913, 1920; Kroeber 1909; Lévi-Strauss 1949; Morgan 1871; Radcliffe-Brown 1918, 1929; Rivers 1914, 1924; Tylor 1871). Lévi-Strauss's breakthrough in modelling these principles was formalised by the mathematician Weil (1949), and subsequently elaborated by Boyd (1969), giving rise to the highly formal empirical social anthropological specialisation of kinship network analysis (Hamberger, Houseman, and White 2014).

With regard specifically to language, by the mid-20th century, there was widely accepted recognition that the world's languages similarly conform to a common set of lexical and syntactic principles for the generation of socially relevant meaning (Boas 1920; Sapir 1929; Voegelin and Harris 1947, 1952). Sapir's insights went on to form the basis for further recognition that the distinctive semantic characteristics of identifiably discrete languages give rise to distinctive individual construal of sociality from the perspective of language speakers (Bernstein 1965; Trager 1959).

With specific regard to religion, there was a recognition by the mid-20th century that interrelated mythology and ritual form the primary vehicles by which associated populations maintain and reproduce social cohesion over space and time (Astuti and Bloch 2016; Evans-Pritchard 1956; Firth 1939; Frazer 1890; Malinowski 1922, 1936). Malinowski's work was foundational in illustrating that commonly-held models of cosmogenesis and social structure are a key function of religion (Malinowski 1922). This hypothesis has subsequently been demonstrated using large empirical data sets and formal modelling (Whitehouse 2022).

With specific regard to economy, by the mid-20th century, there was widespread recognition that the sustainability of a population's productive capacity is directly tied to the regulation of material accumulation and distribution among that population's members (Firth 1939; Godelier 1978; Malinowski 1922; Mauss 1925;

Polanyi 1968). Malinowski's insights here too formed the basis for a generalised model of relative exchange value, delimited by material constraints, which motivates populations to cooperate systematically in the generation of essential products. Proof of this hypothesis has also subsequently been formally and empirically demonstrated (Hann 2017).

As elaborated in the following section, these discoveries are broadly 'consilient', to use Wilson's (1998) term. The idea systems that were, by the mid-20th century, shown by Lévi-Strauss (1949) to comprise distinct but interrelated sets of terms and definitions, and which were subsequently shown to divide up broadly into domains identifiable as kinship, language, religion, and economy, can be modelled using a common set of logical principles. Furthermore, the systemic characteristics and effects of these idea systems can be demonstrated using relatively standardised classes of research data. Such standardisation in turn permits self-consistent causal modelling that can be used to predict commensurate and interdependent influences on population dynamics, where a perturbation in one system of ideas causes flow-on effects in both other systems of ideas, and the instantiation of those ideas in measurable, real-world social interactions.

From segmentation to integration in social anthropology

Although pedagogic sociology construes the segregation of social and natural sciences as an inherent feature of institutional education, it does not proscribe the re-organisation of specific fields in such a manner that they might traverse this segregation. With respect to social anthropology's specialisations in kinship, language, religion, and economy, the emergence of integrative consensus in terms of both empirical descriptive data and formal causal models is construed by Kuhn (1962) as indicative of an emerging paradigm for any given incipient discipline or field of natural science. Why then has no such paradigm apparently yet emerged for social anthropology, and what threshold remains to be crossed in order for that emergence to be complete? The integrative consensus described in the previous section is reflected in the perspectives of both natural scientists (Kuhn 1962; Wilson 1998), and social anthropologists (de Munck and Bennardo 2019; Leaf and Read 2012), with regard to the current formal empirical capacity and future potential of the field.

As confirmed by Bernstein (1999), Moore (2009) and others, Wilson (1998) locates the origins of this segregation in the social context of social science's foundation and reproduction within the academy, where the authors and

speakers of new idiolects vie for supremacy, rather than explanatory integration of their respective fields. However, unlike Bernstein (1999), who portrays this inequality as an intractable feature of pedagogic culture, Wilson (1998) advocates for what he calls 'consilience' between the natural and social sciences:

> [T]he social sciences are intrinsically compatible with the natural sciences. The two great branches of learning will benefit to the extent that their modes of causal explanation are made consistent. The first step in the approach to consilience is to recognize that while the social sciences are truly science, when pursued descriptively and analytically, social theory is not yet true theory. The social sciences possess the same general traits as the natural sciences in the early, natural-history or mostly descriptive period of their historical development. From a rich data base they have ordered and classified social phenomena. They have discovered unsuspected patterns of communal behavior and successfully traced interactions of history and cultural evolution. But they have not yet crafted a web of causal explanation that successfully cuts down through the levels of organization from society to mind and brain. Failing to probe this far, they lack what can be called a true scientific theory. Consequently, even though they often speak of 'theory' and, moreover, address the same species and the same level of organization, they remain disunited. (Wilson 1998, 205)

From the perspective of contributors to social anthropological knowledge, and experienced readers and speakers of its idiolects, Leaf and Read (2012) go further than Wilson (1998) and argue that, for social science generally, and, for social anthropology in particular, the absence of a paradigm requires the complete reorganization of the way in which human sociality is defined. Referring to Kuhn's assessment of the social sciences as pre-paradigmatic, as noted above, Leaf and Read (2012) observe:

> Of course, saying 'pre-paradigmatic' rather than simply 'non-paradigmatic' implies a judgment about the future. There are indeed [social] anthropologists who believe that [social] anthropology will one day engage in scientific practice as sound, powerful, and widely accepted as those in the physical sciences. But there are others who say this never can be, and indeed never should be. We are among those that say that we [the field of social anthropology] are a science – and not just at some point in an unknown future. It can be done now.
> [...]

> Human beings have two outstanding characteristics compared to all other species: the apparently enormous elaboration of our thought through language and symbolism and the elaboration of our forms of social organization. … [Thought and social organization] are, however, two sides of one problem: we cannot understand what social organization is without recognizing that it is an ongoing construction involving thought, and we cannot understand what thought is without recognizing that its foundation and primary functions lie in developing and implementing social organization. (Leaf and Read 2012, 16–17)

As Leaf and Read (2012) highlight, multiple domains of human life, together with their corollary systems of ideas, are interdependent in distinct combinatorial permutations. These combinations give rise to what we recognise as distinctive social cultures characteristic of populations distributed in certain regions of space and time, recognisable as certain populations resident in certain parts of the world over certain periods of history. In this chapter I have focused on four such systems of ideas: kinship, language, religion, and economy. This is because they are the most well-developed in the expert knowledge of social anthropology, and certainly the most integrated in terms of the pedagogic sociological model used to analyse their knowledge structures and grammars. By comparison, Leaf and Read (2012) range more widely in their account of social anthropology's capacity for formally and empirically modelling social organisation. In their analysis of idea systems and associated instantiations of social interaction, Leaf and Read (2012) reason that there are likely to be as many as seven distinct idea systems operating in distinct combinations within any given social culture. These include both the canonical social anthropological specializations of kinship, language, religion, and economy, as described here, as well as what Leaf and Read (2012) term 'factions', 'management', and 'technical systems' (324). Whereas Leaf and Read (2012) suggest that this upper limit may be tied to the cognitive capacity of human neurology, an interesting and fruitful collaboration between social anthropology and pedagogic sociology may detect an intermediate boundary in the semiotic potential of human language, which is in turn bounded by the limits of neurologically-based human cognition (Halliday and Matthiessen 2006).

Taking up the question of how the boundary layer between cognition and social culture may be modelled and analysed, de Munck and Bennardo (2019) propose *Cultural Model Theory* (CMT) as an answer. CMT construes the observable patterns of human social culture as an outcome of autochthonously shared representations, not only of self-consistent idea systems, but of shared intentions or joint commitments (de Munck and Bennardo 2019). CMT specifies a model of

shared systems of ideas and their instantiation as a precursor to organised social activity. Models of roles and relations need not be 'believed' as self-evidently true by individual members of a cultural community, but rather treated as providing cognitive scaffolds for reaching shared objectives, independent of motivation. A key distinguishing analytical function of CMT is its specification that idea systems are neither necessarily axiomatic for culture bearers, nor necessarily discretionary. Social anthropological models of normative 'laws and customs' (Morgan 1871; Tylor 1871) tend to represent them as either one or the other, with perspectival and thematic trends in social anthropology valuing either one or the other at different times in the field's developmental history.

Until social anthropology's literary turn (Scholte 1987), axiomatic models of idea systems were more highly valued, especially in the so-called structural-functionalist approach to predicting the normative potency of such systems. In this 'strongly axiomatic' configuration, idea systems were construed as variably prescriptive and proscriptive sets of laws and customs communally held by discrete populations (Lévi-Strauss 1949). After the field's literary turn, favoured theories tended to construe all laws and customs as fundamentally discretionary, with hardly any predictable normative function of any kind (Geertz 1973, 1975; Ingold 2002). CMT resolves this contradiction first, by acknowledging what White and Denham (2008) refer to as the 'weakly axiomatic' normativity of idea systems, and secondly by introducing 'commitment' as a feature of all human social activity, where individual representations of such models must correspond in order to be rendered functional for the purposes of reaching a common social goal, irrespective of their normative potential (de Munck and Bennardo 2019). This specification neutralises the so-called 'structure-vs-agency' debate that has crippled social anthropology since the 1970s, and instead construes structure as an emergent property of systemic agency. As de Munck and Bennardo (2019) explain:

> The collective representation of culture is actually an individual representation of a collective representation shaped through the constraints of experiences, interactions, and secondary information about the 'culture'. The collective representation (i.e., our individual representation of the collective representation) works to the degree it matches the representations of others, and this matching emerges through seeing how it works in social interactions, noting and experiencing the expressions of the coercive force of members of one's group (e.g., parents, teachers, peers, fellow drivers, etc.). (de Munck and Bennardo 2019, 174)

The pedagogic sociological explanation for the persistent segregation of the so-called 'natural' and 'social' sciences (Bernstein 1999) is convincingly reflected in the four expert accounts presented in this section, from the perspectives of both natural scientists and social anthropologists. From the perspective of natural scientists, this reflection includes the pre-paradigmatic or 'descriptive' developmental stage of social anthropology as consistent with the early development of any given scientific field (Kuhn 1962). This is a stage that is in turn followed by the development of a field's consilience with other extant or concurrently developing fields (Wilson 1998). From the perspective of social anthropologists, this reflection includes the incipient emergence of a paradigmatic object of social anthropological study, comprised of culturally specific idea systems and their instantiation in patterned social activity, supported by empirical data-based evidence and formal causal models (Leaf and Read 2012). This feedback between idea systems and predictable social activity is further elaborated and integrated by the specific role of individual cognition of those idea systems and their selective instantiation according to cognised context and shared commitment (de Munck and Bennardo 2019).

Conclusion

This chapter has described the production and reproduction of the expert knowledge of social anthropology from the perspective of pedagogic sociology, as one among a number of other potentially innumerable forms of expert knowledge distributed and acquired within the academy. This includes both the natural sciences and other forms of social science and humanities knowledge. The purpose of taking this perspective has been to illustrate the origins and persistence of the distinction between the natural and social sciences on the one hand, and, on the other hand, a prospective pathway to the dissolution of this distinction, for those working within the academy who may be interested in such an endeavour. While the currently popular literary idiolect of 'thick description' may persist indefinitely for the reasons elaborated above, there remains possible the option of forming a new school of social anthropology, based not only on an aspiration to a scientific idiolect, but on a formal modelling of the production and reproduction of expert knowledge within the academy.

More specifically, it has been suggested here that where scientifically-oriented social anthropologists have focused their attention on particular, clearly defined domains of human thought and social organisation, such as kinship, language,

religion, and economy, the grammars that we have developed are not weak, but strong. As a consequence, and notwithstanding the countervailing effects of the 1970s segmentation induced by social anthropology's so-called 'literary turn' (Scholte 1987), the knowledge structures that have been realized by using these strong grammars since the early 20th century, have bypassed the segmentally organised, unintegrated idiolects of other fields of the social sciences and the humanities. They have instead formed the foundation for social anthropology's hierarchical integration into a consilient science.

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