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ACADEMIC DISCOURSE

An inter-disciplinary dialogue

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Introductions

As the gateway to educational success, academic discourse is a critical source of future opportunities and quality of life. Embodying worlds of discovery and imagination, academic discourse is also a key repository of accumulated human knowledge and wisdom. To access academic discourse is to access means for achieving social power, epistemological power, or axiological power. Access may lead to success in myriad ways. Of course, academic discourse is not the only form of knowledge with power. Scholars can succumb to the seductive illusion that their own professional discourse is the only legitimate currency and fail to see that non-academic knowledge possesses its own forms of power, its own wellsprings of understanding and luminous insight. Yet, academic discourse *is* particularly powerful. In its manifold forms it offers access to wealth, health and the capacity to create or destroy worlds, real or imaginative. Accessing academic discourse, that is to say the task of understanding its nature and developing ways of enabling everyone to grasp, shape and change academic discourse, is an issue of social justice. It is to explore diverse knowledge practices and determine how to enable everyone to have the opportunities offered by mastery of those knowledge practices, including the opportunity to fundamentally change them. This volume explores the nature of academic discourse from the perspective of two fields that enjoy a highly productive inter- and cross-disciplinary dialogue: systemic functional linguistics (SFL) and Legitimation Code Theory (LCT). Specifically, the papers brought together here illustrate how LCT is pushing and provoking SFL into generating greater explanatory power and theoretical innovation in its engagement with accessing academic discourse.

As you are likely to know, SFL is an approach to language originated by M. A. K. Halliday (1985, 1994) that is now the basis of an extremely wide-ranging international community of scholars and educators exploring all manner of

meaning-making. The field is well established: the *International Systemic Functional Congress* in 2020 will be the forty-seventh such conference. You may be less likely to know that LCT is a sociological approach to understanding and shaping social practice. Though quickly establishing itself through international conferences, book series, research centres and so forth, LCT is much younger. LCT extends ideas from Basil Bernstein and Pierre Bourdieu (among others) that were developed from the late 1960s and the first papers were published at the turn of the century (e.g. Maton 2000). However, it was not until 2009 that the name 'Legitimation Code Theory' appeared in print (Maton 2009) to describe the conceptual framework that had emerged as sui generis. Yet, LCT has become widely used to access academic discourse by a growing number of systemic scholars and educators. One reason is that the origins of this dialogue began earlier and built on existing foundations.

In 2002 the English sociologist Karl Maton delivered a plenary address at the annual conference of the Australian Systemic Functional Linguistics Association. This was perhaps the first occasion on which scholars in SFL encountered Maton's work. Among the audience were linguists whose work on education had already been inspired by the sociological ideas of Basil Bernstein, who had died two years earlier. Many were excited to learn that those ideas were being extended further. Of particular interest at this time were developments of Bernstein's notion of 'knowledge structures' (2000) by Maton (2000) and fellow sociologists Rob Moore (2000) and Johan Muller (2000). Inspired by this work, Frances Christie and Jim Martin organized a conference at the University of Sydney in December 2004 at which Maton and Muller presented papers alongside talks by SFL scholars. This dialogue was extended further by a second Sydney conference in December 2008, organized by Frances Christie and Karl Maton, which included both linguistics papers and sociological talks by Maton, Moore and Muller.[1]

Much has happened since that plenary address in 2002. At the time Maton's ideas were extending existing concepts from Bernstein. Subsequently those new ideas expanded and cohered into a systematic conceptual framework that became known as LCT. In 2005 Maton migrated from England to Australia, intensifying the burgeoning dialogue by bringing him into direct relations with the Sydney register of SFL. Fast forward to 2020 and there is now a large and thriving community of scholars and students enacting LCT and SFL together in the study of education and other social contexts (e.g. Maton and Doran 2017c, Maton *et al.* 2016b). This dialogue has been extended at *International Systemic Functional Congresses* and at *International Legitimation Code Theory Conferences* through keynotes, courses and workshops. Formal links have been established between the Martin Centre for Appliable Linguistics at Shanghai Jiao Tong University in China and the LCT Centre for Knowledge-Building in Sydney, Australia. Intensive collaboration has been fuelled by major collaborative research studies and a growing number of PhDs that draw on both theories. In short, scholars from SFL and LCT have continued to work closely together. This volume illustrates some of the gains made from that dialogue and collaboration.

In this chapter we review the foundations for this dialogue and comment on key aspects of current research. Our use of 'academic discourse' in the book title does not limit this dialogue, which embraces practices far beyond education, including the legal field (Zappavigna and Martin 2018), museums (Blunden 2016) and the armed services (Thomson 2014). Nor does it concede to disparaging connotations of 'academic' as impractical or insignificant, for both SFL and LCT have direct appliability and their dialogue involves impact on practice (e.g. Martin and Maton 2013). Rather, it points both towards a regular foci for dialogue, the meaning-making practices of scholars, educators and students, and to the dialogue itself, an ongoing discourse between two academic approaches to meaning-making. There is a lot more to this dialogue than can be introduced here. LCT and SFL are proving particularly productive at challenging beliefs and provoking new ideas in one another. Nonetheless, we hope this introduction will provide insight into some of the issues bringing these complementary approaches together.

We start with SFL. We begin by reviewing work on the linguistic concept of field, before discussing how this brought educational researchers in SFL to engage during the early- to mid-2000s with Bernstein's model of 'knowledge structures'. We discuss how this engagement raised a series of questions that set up the ongoing encounter with LCT, a framework that extends and integrates Bernstein's concepts. We then introduce LCT and discuss how concepts from two dimensions – Specialization and Semantics – helped resolve problems raised by systemic linguists with Bernstein's notion of 'knowledge structures'. We conclude by briefly discussing issues requiring vigilance when bringing SFL and LCT together, based on our experiences on major research studies of education.

Field (SFL)

The strand of SFL research that first attracted systemicists to LCT (via Bernstein's ideas) was work developing the register variable field. This line of work emerged as part of the literacy focused action research associated with the 'Sydney School', as documented in Rose and Martin (2012).[2] The basic challenge here concerned moving on from a mastery of genres and their staging in primary school to developing genres which help build the uncommon sense knowledge of secondary school. For this, a focus on field and mode, alongside genre, was crucial. Initial work on physical geography (Wignell *et al.* 1989) and History (Eggins *et al.* 1993) was supplemented with work on a range of secondary school and workplace fields – see Rose *et al.* (1992), Halliday and Martin (1993), Iedema *et al.* (1994), Iedema (1995), Christie and Martin (1997), Martin and Veel (1998), Coffin (2006), Wignell (2007) and Martin (2012). Most of this research was based on a collaboration between the Department of Linguistics at the University of Sydney and the Metropolitan East Region's Disadvantaged Schools Programme, in the 'Language and Social Power' and 'Write it Right' projects (see Rose and Martin 2012; Veel 2006). By the mid-1990s federal funding for such programmes was diverted away from regional

centres by state departments of education and redistributed to individual schools. This led to a brief hiatus in this trajectory of educational linguistic research.

The model of field being developed in this work was inspired by Halliday's work on the language of science (Halliday 2004) and drew heavily on Martin's conception of field (1992) as a set of activity sequences oriented to some global institutional purpose, alongside the taxonomies of entities (people, places and things, both abstract and concrete) participating in these activities (organized by both classification and composition). The linguists involved were especially interested in how everyday sequences and taxonomies (Bernstein's 'common sense') differed from the academic ones (Bernstein's 'uncommon sense') challenging students across subject areas in secondary school. Particular attention was paid to the phenomenon of technicality whereby everyday or less specialized meanings were distilled as more specialized ones and used to build the uncommon sense taxonomies and implication sequences of humanities, social science and natural science disciplines. This process, of course, flagged the critical role played by grammatical metaphor in academic discourse (Halliday 1998; Martin 1993, 2008), both in definitions and explanations and in the composition of disciplinary genres. This brought the register variable mode into the picture, since abstraction was a critical resource affording technicality, cause/effect relations inside the clause and evaluation. For overviews of this work, see Martin (2007a, 2007b).

Martin (2007a) draws on meteorology to introduce the model of field in play here, drawing on information provided by the Australian Government's Bureau of Meteorology website.[3] As far as sequencing is concerned, they offer the following explanation of cloud formation:

> [1] Clouds have their origins in the water that covers 70 per cent of the earth's surface. Millions of tons of water vapour are evaporated into the air daily from oceans, lakes and rivers, and by transpiration from trees, crops and other plant life.
>
> As this moist air rises it encounters lower pressures, expands as a result, and in doing so becomes cooler. As the air cools it can hold less water vapour and eventually will become saturated. It is from this point that some of the water vapour will condense into tiny water droplets to form cloud (about one million cloud droplets are contained in one rain-drop). Thus, whenever clouds appear they provide visual evidence of the presence of water in the atmosphere.

This uncommon sense implication sequence gives a simple explanation of how clouds form, working through a set of logically connected steps: water evaporates from bodies of water and transpires from plant life, and if it does so and rises, then it encounters lower pressures, and if it does, then it expands, and if it does, it becomes cooler, and if it does, it becomes saturated, and if it does, then some water vapour will condense into tiny water droplets (and so we see clouds). Such a sequence

typifies uncommon sense ones – you cannot often see them happening (it takes too long, our eyes are not sharp enough and we rarely have a suitable vantage point), they are generalized (happening over and over again) and their steps are logically contingent (if one step happens another must follow).

Beyond uncommon sense sequencing, the entity emerging from this process (clouds) enters into uncommon sense taxonomies of both classification and composition. The following report introduces their classification into 27 subtypes and the criteria through which they are classified (their elevation):

> [2] There are ten main cloud types, which are further divided into 27 subtypes according to their height shape, colour and associated weather. Clouds are categorized as low (from the earth's surface to 2.5 km), middle (2.5 to 6 km), or high (above 6 km). They are given Latin names which describe their characteristics, e.g. cirrus (a hair), cumulus (a heap), stratus (a layer) and nimbus (rain-bearing). It's an interesting fact that all clouds are white, but when viewed from the ground some appear grey or dark grey according to their depth and shading from higher cloud.

The main groups and subtypes construed in this classifying report are outlined below; in addition, there is a vertically developed cloud type which has one end on a high level and the other on a low level.

1   High-level clouds

    1.1   Cirrus
    1.2   Cirrocumulus
    1.3   Cirrostratus
    1.4   Contrail

2   Medium-level clouds

    2.1   Altostratus . . .
    2.2   Altocumulus
    2.3   Nimbostratus

3   Low-level clouds

    3.1   Stratocumulus
    3.2   Stratus
    3.3   Cumulus

Each of these subtypes can be further divided; a subclassification for altostratus clouds is listed below, based largely on what is considered significant about their appearance (as it reflects their origins and precipitation potential).[4] They are usually formed as air rises due to a weather front activity sequence.

altostratus duplicatus
altostratus lenticularis
altostratus mammatus
altostratus opacus
altostratus pannus
altostratus praecipitatio
altostratus radiatus
altostratus translucidus
altostratus undulatus
altostratus virga

This kind of classification typifies uncommon sense taxonomies. The criteria on which the classification is based (here precise measures of elevation based on instrumental readings) are not directly available to the senses; the classification is exhaustive (the typology covers all cloud formations); and the classification typically involves several levels of delicacy (deep fine-grained typology). Terms derived from Latin (and sometimes Ancient Greek) are often deployed, in part to signal the uncommon sense technicality, in part because we run out of English words, and in part because English speakers still associate uncommon sense with the languages from which they had to reclaim it after French conquerors destroyed their native tradition of vertical discourse.

Comparable precision and delicacy are also found for decomposition. We know from Text [1] that clouds are made of water droplets, and we can pursue this further into the realms of Chemistry, and Physics.[5] There we learn that water is a V-shaped molecule, known chemically as H_2O (meaning two hydrogen atoms and one oxygen atom bonded together into a molecule). Pushing further we might find that water molecules are symmetric (point group C_{2v}), with two mirror planes of symmetry and a two-fold rotation axis; its electronic structure is modelled in Figure 1.1. Of special interest here is the way in which decomposition draws attention to the borders of disciplines, as we move from Meteorology through Chemistry to Physics. This highlights the sense in which the borders of uncommon sense disciplines are in fact more weakly classified than their excluding field specific technicality might lead one to expect.

Turning from science to humanities, linguists exploring these issues were struck by the relative paucity of technicality in school subjects such as English, History and Creative Arts. Not, of course, that there was none. History, for example, does divide the past into a composition hierarchy of periods of time (e.g. Old Kingdom Egypt, New Kingdom Egypt, World War I, World War II) and past worlds feature unfamiliar entities (people, places, products, artefacts, etc.) that have to be mastered. In addition, there are a number of socio-economic concepts that have to be explored (e.g. colonialism, imperialism, nationalism, communism, socialism, capitalism) in order to explain struggles over the control of resources both within societies and between (Martin *et al.* 2010). However, what struck educational linguists more strongly was the abstract nature of the discourse students were expected to read and write, often featuring even more grammatical metaphor than had been found
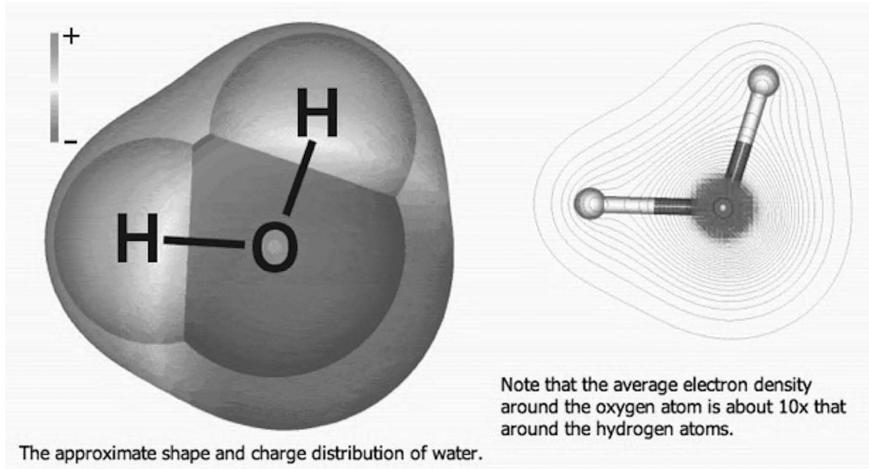
Note that the average electron density around the oxygen atom is about 10x that around the hydrogen atoms.

The approximate shape and charge distribution of water.

FIGURE 1.1   Water electronic structure (from http://www.lsbu.ac.uk/water/molecule.html)

deployed to define and explain in Physics, Chemistry, Biology and Physical Geography. The mode of the humanities in other words was equally, if not more, abstract and so equally, if not more, challenging for students moving into discourse of this kind for the first time upon entering secondary school.

So, instead of reading *Mt Vesuvius erupted*, they had to deal with *the eruption of Mt Vesuvius*; instead of writing *he excavated Pompeii*, they had to manage *his excavation of Pompeii*. What was this abstraction for? There is no simple answer to this question. Part of the answer has to do with managing information flow in academic discourse (as discussed in relation to periodicity in Martin and Matruglio, Chapter 4, this volume). Another part of the answer relates to explanation, since in history there is usually more than one factor influencing change and more than one effect ensuing (Martin 2002, 2003). There may be multiple causes in other words (i. *past neglect*, ii. *damage* and iii. *a failure to document carefully, if at all* below):

> [3] Andrew Wallace states that while Pompeii is one of the most studied of the world's archaeological sites, it is perhaps the least understood, due to past neglect, damage, and a failure [[to document carefully, if at all]].

There may be multiple effects (i. *greater documentation*, ii. *more archaeological artefacts left in site* and iii. *the breakthrough process of injecting liquid plaster into the body-shaped cavities* below):

> [4] Fiorelli's stage of occupation allowed for greater documentation, more archaeological artefacts left in site and the breakthrough process of injecting liquid plaster into the body-shaped cavities made by solidified ash and the eventual decomposition of bodies.

Grammatical metaphor allows historians to parcel up multiple causes and effects inside the clause by way of managing the complexity of what leads on to or follows on from what. Explaining the past moreover involves more than packaging up complex causes and effects; it also involves interpreting the kind of causal connection between the packages. Historical explanation is a finely nuanced process, involving degrees and types of influence. Consider, for example, just a few of the ways in which we might relate Fiorelli's archaeology to its legacy:

[4] Fiorelli's stage of occupation
   allowed for
   greater documentation, more archaeological artefacts left in site and the breakthrough process of injecting liquid plaster into the body-shaped cavities made by solidified ash and the eventual decomposition of bodies.
[5] Fiorelli's stage of occupation
   encouraged
   greater documentation…
[6] Fiorelli's stage of occupation
   contributed to
   greater documentation…
[7] Fiorelli's stage of occupation
   precipitated
   greater documentation…

Cause in the clause is thus a critical resource nuancing History's interpretation of the past. The congruent resources of spoken discourse are nowhere near delicate enough.

We should also note here the role played by grammatical metaphor in targeting the attitudes that historians cultivate towards the past. The opening and closing paragraphs of the factorial explanation considered in Martin (Chapter 5, this volume), for example, feature negative appreciation of the conservation of Pompeii as an archaeological site:

[8] While Pompeii is one of the most studied of the world's archaeological sites, it has been plagued with serious conservation problems, including poor restoration work, damage from vegetation, pressure from tourism and poor site management…
   As a result of this, the description of Pompeii as a victim of state neglect and indifference and an archaeological catastrophe of the first order is an apt one. Its ongoing destruction since its discovery in the 1590s has arguably resulted in a greater disaster than its initial destruction by the eruption of Mt Vesuvius one and a half millennia earlier.

In its introductory paragraph, cause in the clause is deployed to set up the lexical metaphor whereby various factors infect Pompeii (i.e. a plague of i. *conservation*

problems, ii. *poor restoration work*, iii. *pressure from tourism* and iv. *poor site management)*. In the final paragraph the packaging of Pompeii as a victim of neglect and an archaeological catastrophe is evaluated as *apt*; and its ongoing destruction is evaluated as an even greater *disaster* than its initial destruction by Mt Vesuvius. The requisite historical sensibility could not be more clear here – namely that archaeological sites are priceless treasures and need to be carefully conserved. In History, as in the humanities in general, demonstrating how you value what you know is as important as demonstrating what you know (see Doran, Chapter 6 and Oteíza, Chapter 7, this volume).

In summary, by 1995 language in education research informed by SFL had arrived at a characterization of science oriented to field and featuring technicality, and a complementary characterization of the humanities oriented to mode and featuring abstraction. The critical linguistic resources at play in science concerned elaboration (across ranks and strata) – the resources whereby less specialized meanings are distilled as more specialized ones. The critical linguistic resources at play in the humanities concerned grammatical metaphor – the resources whereby explanations of change are proposed and evaluated. A rough outline of this phase of understanding is presented in Figure 1.2, setting aside genre and concentrating on field and mode in relation to metafunctions.[6]
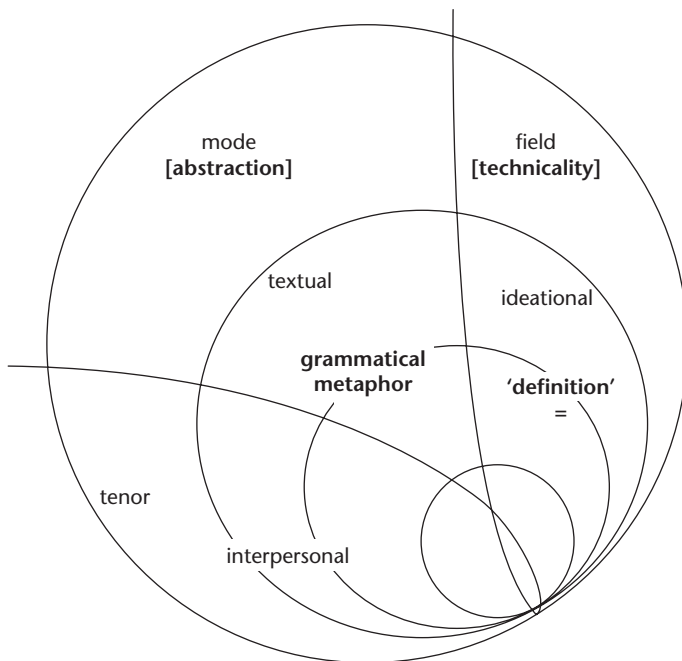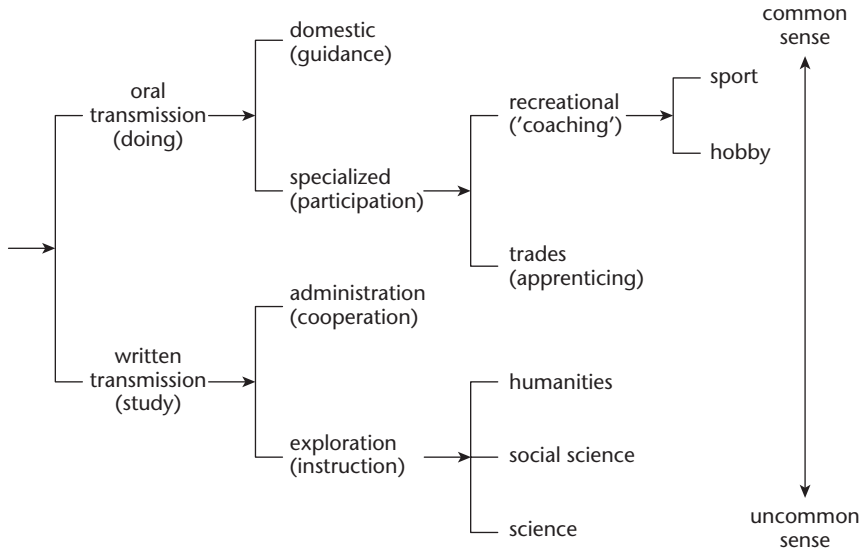

FIGURE 1.2   Knowledge structure – an SFL perspective, circa 1995

FIGURE 1.3   Field typology (Martin 1992: 544)

As far as relations among fields were concerned, Martin (1992: 544) proposed a crude mapping based on the implications of distinctive sequencing and taxonomy for the ways fields are learned. This typology is reproduced as Figure 1.3, with fields graded along a common sense to uncommon sense cline.[7] As we will see below, an orientation to field of this kind was comparable to Bernstein's late work on 'knowledge structure' and thus encouraged dialogue.

SFL and Bernstein's 'knowledge structures'

SFL and sociological research enacting the framework of Basil Bernstein have engaged in a productive dialogue for decades (Martin 2011a; Maton and Doran 2017c). Bernstein and Halliday began collaborating in the 1960s in London in a project involving sociologists and linguists that focused on Bernstein's theory of codes (Bernstein 1995; Halliday 1995). Hasan (2009) developed this work in her studies during the 1980s of semantic variation in relation to gender and class in the language of pre-school mothers and children. Throughout the 1980s and 1990s 'Sydney School' literacy programmes drew on Bernstein's notion of 'pedagogic discourse' to refine their pedagogy and curriculum and interpret the class basis of their struggles with traditional and progressivist/constructivist pedagogues (Martin 1999; Rose and Martin 2012). As flagged earlier above, by the 2000s interaction around SFL's concept of field and Bernstein's concept of 'knowledge structures' came to the fore. At this point in our introduction, we discuss this notion from the perspective of SFL: what educational linguists found valuable about Bernstein's concept and why.

Fundamental to the ideas that gripped educational linguists at the turn of the century was Bernstein's distinction between 'horizontal discourse' and 'vertical discourse':

> A *Horizontal discourse* entails a set of strategies which are local, segmentally organized, context specific and dependent, for maximizing encounters with persons and habitats. . . . 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 . . . a *Vertical discourse* takes the form of a coherent, explicit and systematically principled structure, hierarchically organized as in the sciences, or it takes the form of a series of specialized languages with specialized modes of interrogation and specialized criteria for the production and circulation of texts as in the social sciences and humanities.
>
> *(Bernstein 2000: 157; original emphases)*

This is a late development of Bernstein's abiding concern with differences between common sense and uncommon sense and their implications for success and failure in education as shaped by the social backgrounds of students. The distinction resonates strongly with the everyday versus academic discourse opposition reflected in Figure 1.3 and which was the focus of the educational linguistic work on field and mode, reviewed earlier in this chapter.

Next, Bernstein made a distinction within vertical discourse between 'hierarchical knowledge structures' and 'horizontal knowledge structures'. Bernstein defined a hierarchical knowledge structure as 'a coherent, explicit and systematically principled structure, hierarchically organized' (2000: 160) which 'attempts to create very 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' (2000: 161). Bernstein used a triangle to symbolize a knowledge structure of this kind, commenting in a footnote that there 'is likely to be more than one triangle in a hierarchical knowledge structure' but that 'the motivation is towards triangles with the broadest base and the most powerful apex' (2000: 172), where the apex refers to 'propositions' and the base to 'phenomena':

Bernstein defined a horizontal knowledge structure as 'a series of specialized languages with specialized modes of interrogation and criteria for the construction and circulation of texts' (2000: 162), such as often illustrated by the disciplines of the humanities and social sciences. Bernstein suggested that these segmented

knowledge structures can be visualized as a series of Ls (standing for their specialized languages):

$$L^1 \; L^2 \; L^3 \; L^4 \; L^5 \; L^6 \; L^7 \ldots L^n$$

The motivation in hierarchical knowledge structures to subsume more data in more cohesive and economical theories is well known. Einstein's relativity theory has to explain everything explained by Newton's classical mechanics and more, just as the search for a Grand Unified Theory attempts to embrace and go beyond the existing insights of relativity theory and quantum mechanics. Horizontal knowledge structures are in a sense more modest in their knowledge claims, offering alternative interpretations of past ideas from particular points of view. The new interpretations present themselves as offering better interpretations of past ideas without necessarily subsuming predecessors (Martin 2003). By way of illustration we might caricature traditional, Marxist, feminist and post-colonial readings of the conservation of Pompeii, focusing on agency (i.e. what is ultimately responsible for the destruction: a plague of problems, the concentration of wealth in private hands, irresponsible patriarchs or discourses of scientism):

> [8] While Pompeii is one of the most studied of the world's archaeological sites, it has been plagued with serious conservation problems, including poor restoration work, damage from vegetation, pressure from tourism and poor site management.
>
> [8'] While Pompeii is one of the most studied of the world's archaeological sites, the concentration of wealth in private hands in capitalist Italy has left the site with serious conservation problems, including poor restoration work, damage from vegetation, pressure from tourism and poor site management.
>
> [8"] While Pompeii is one of the most studied of the world's archaeological sites, the non-custodial attitudes of the irresponsible patriarchs responsible for the site have left it with serious conservation problems, including poor restoration work, damage from vegetation, pressure from tourism and poor site management.
>
> [8'''] While Pompeii is one of the most studied of the world's archaeological sites, the lack of interrogation of the prevailing discourses of scientism has left the site with serious conservation problems, including poor restoration work, damage from vegetation, pressure from tourism and poor site management.

Wignell suggested the social sciences can be characterized as 'warring triangles' – since they model themselves on science and struggle for institutional rather than epistemological ascendency – when compared with the humanities where technicality and the drive to integration via general models and propositions is less strong.[8]

These characteristics were glossed by Muller (2007) as 'verticality' and 'grammaticality'. First, 'verticality' characterized how Bernstein's 'knowledge structures' progress: via ever more integrative or general propositions or via the introduction of a new 'language' (theory or approach) which constructs 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' (Bernstein 2000: 162). This helped highlight that Bernstein's opposition of hierarchical to horizontal knowledge structures concerns how intellectual fields progress, not the number of theories struggling for legitimacy at any given time. In some intellectual fields (illustrated best by natural science) there is typically relatively collegial consensus over what counts as progress (i.e. a theory that explains more phenomena) whereas in other intellectual fields (e.g. many social sciences and humanities) such collegial consensus on what constitutes progress is typically less evident. Second, 'grammaticality' described how theoretical statements deal with their referents. The stronger the grammaticality, the more unambiguously a knowledge structure generates empirical correlates. Where correlates are clear, there are shared referents for competing knowledge claims; where correlates are unclear or vague, the tendency is for endless reinterpretation of 'data' that cannot be compared. One thinks, for example, of the aims of scientific experiment in contrast to the hermeneutic interpretations of texts common in many humanities disciplines.
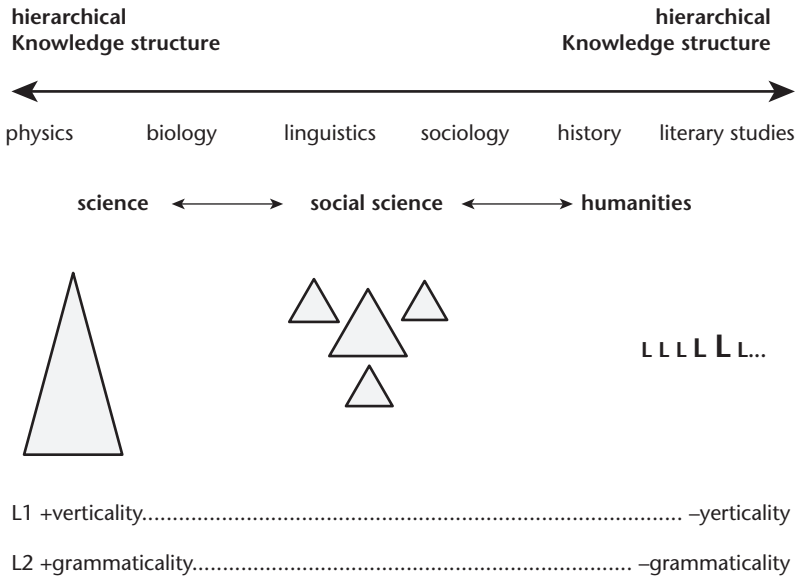
The notions of verticality and grammaticality echoed Bernstein's model of individual theories as comprising internal (L^1) and external (L^2) 'languages of description' (2000: 131–41). L^1 'refers to the syntax whereby a conceptual language is created' or how constituent concepts of a theory are interrelated; and L^2 'refers to the syntax whereby the internal language can describe something other than itself' (2000: 132) or how a theory's concepts are related to referents. Grammaticality also recapitulates Bernstein's notions of strong and weak 'grammar' (2000: 163–6). From the perspective of SFL such terminology is potentially confusing. In linguistics, L1 and L2 are generally used to distinguish between a speaker's native tongue (L1) and a second language (L2); and the term 'grammar (or 'syntax', which Bernstein also used) refers to one level of organization in language, not the conceptual organization of a theory. In addition, the term 'grammaticality' in formal linguistics concerns whether an utterance is well formed with respect to the syntactic rules formalized for a language. Such terms are thus more likely to mislead linguists than guide them. (In Legitimation Code Theory, such confusion is avoided: 'external languages' are termed 'translation devices' and 'grammar' is subsumed by 'epistemic relations'; see Maton 2016b).

This potential misreading is unfortunate because Bernstein's distinction between internal and external languages of description, or L^1 and L^2 (with numbers in superscript), is useful for clarifying relations between theory and description in SFL. Over the years, confusion has arisen in SFL about the nature of concepts within the framework. Much of the extravagant conceptual array of SFL is viewed by proponents as an internal language of description when it is in fact an external language

for engaging with a specific object of study. This is to say that much SFL theory is not a description of language *per se* but of a *specific* language or language variety. This confusion may arise in part from the name of Halliday's well-known book, *An Introduction to Functional Grammar* (1985), which is not for the most part an introduction to functional grammar (which would constitute an internal language or L^1) but rather offers a description of *English* grammar (an external language for relating functional grammar to the specific object of the study of English).[9] It may also arise in part from the widespread consumption of SFL descriptions of language and other modalities of communication by users untrained in SFL theory; Martin (2017) discusses this problem in the context of appraisal 'theory', which is not in fact a theory, but a description of English evaluative discourse semantics. To reinforce this point for systemicists, consider the book covers of the second (1994) and third (2004) editions of Halliday's grammar. The 1994 cover involves a circular image of a colour spectrum around which process types are arranged topologically: this is a part of Halliday's description of English grammar (an external language). The 2004 cover involves a series of rectangular images representing various dimensions of SFL theory − stratification, metafunction, rank and instantiation in particular (the internal language). The typical way in which linguists talk about internal and external languages of description is in terms of theory and description; their ability to enact a productive dialectic between these languages of description is another matter (see Matthiessen and Nesbitt 1996). Among the many problems which arise when description (L^2) is mistaken for theory (L^1), one is locking the specificities of one language into the central core of the theory, restricting its capacity to embrace language more generally and thereby constraining knowledge-building.

Figure 1.4 (created by Martin for the 2008 Sydney conference, noted above) summarizes the common understanding in SFL by the mid-2000s of how Bernstein's concepts of 'knowledge structures' could be viewed in relation to subject areas in education. This, we should emphasize, represented a recontextualization of sociological concepts by SFL scholars attempting to enact the ideas in research. For example, Muller (2007) stated that 'verticality' was categorical: knowledge structures either had it or did not, rather than exhibiting degrees of verticality. Instead, the SFL version arranged knowledge structures on a cline of degrees of verticality and grammaticality and adopted Wignell's metaphor of 'warring triangles' to describe the social sciences, with the larger triangle in the centre representing the tendency in such disciplines for one theory to occupy a position of institutional hegemony for a period of time before it is 'overthrown'. The size of the 'Ls' was similarly designed to reflect the wax and wane of institutional control in the humanities. The science triangle was also given a wider base and taller apex to symbolize its greater capacity for knowledge-building. As we shall see further below, these modifications are important because they point to problems with the model presented in Figure 1.4.

This interpretation of concepts originally developed by Bernstein raised a series of questions for educational linguists. How could these ideas be enacted in research? What do the concepts refer to empirically? If the humanities have no verticality or grammaticality, then in what sense do they involve vertical discourse rather than

hierarchical
Knowledge structure

hierarchical
Knowledge structure

physics   biology   linguistics   sociology   history   literary studies

science ←————→ **social science** ←————→ **humanities**

L L L **L L** ʟ...

L1 +verticality.. –yerticality

L2 +grammaticality... –grammaticality

FIGURE 1.4   SFL perspective on 'knowledge structures', circa 2008

simply being common sense knowledge? Is this not a deficit model of the arts and humanities in which everything is measured against the natural sciences, com‐ pared to which they have no verticality or grammaticality? Where can 'specialized' discourse (trades, crafts, etc.) fit? How can the highly technical yet segmentalized discipline of mathematics fit in a topology of this kind? As suggested by these and other questions, the value of Bernstein's ideas lay in highlighting issues about the cartography of intellectual fields. They represent a starting point that raised more questions than they answered. However, such questions were also being addressed within sociology that was building on Bernstein's ideas. Indeed, the answers offered by Legitimation Code Theory recast the inherited model in ways that not only enabled many of these problems to be resolved but also led to an intensification of dialogue and collaboration between the two disciplinary traditions.

Legitimation Code Theory

Legitimation Code Theory extends and integrates Bernstein's code theory to embrace a greater range of phenomena within a more systematic framework (Maton 2014b, 2016a). LCT does not begin solely from 'knowledge structures'; it builds on concepts from across Bernstein's framework, as well as from other theories, most notably the sociological approach of Pierre Bourdieu. Moreover, the direction from which SFL scholars originally reached LCT is fundamentally different to that of other scholars. Many researchers and educators from other dis‐ ciplines turn to LCT because of endemic 'knowledge-blindness' in education and

social research (see Maton 2014b). Most approaches to education focus on the ways of knowing of knowers rather than knowledge as an object in itself. The forms taken by knowledge practices in research, curriculum, pedagogy, assessment and social interactions more widely are ignored in favour of focusing on the cognitive and affective states of students. In contrast, SFL scholars were already attuned to exploring the effects of different forms of knowledge practices, but were reaching the limits of Bernstein's framework. Thus, in terms of introducing recent dialogue with SFL, the model outlined above is a useful starting point because Maton was addressing similar questions to those raised by educational linguists.

Put simply, Maton (2000, 2007, 2009, 2011, 2014b) argued that Bernstein's concepts of 'discourses' and 'knowledge structures' were good to think with but less useful to analyse with. The concepts valuably highlighted issues of how intellectual fields develop over time, but did not provide the means to engage in empirical research about those issues. The model suffered from two main problems highlighted by the modifications made by SFL scholars when trying to make it work.

The first problem is revealed by what can be called 'Wignell's mixture'. As discussed earlier, when attempting to relate the concepts to the realities of social science, Wignell suggested the notion of 'warring triangles' that mixed attributes from hierarchical and horizontal knowledge structures. However, attempts to use the concepts to study other disciplines, including the humanities, revealed this mixture of attributes was not unique to social science (Maton 2000, 2010). Every intellectual field exhibits characteristics of both knowledge structures – they all involve 'warring triangles'. The problem this reflected was that Bernstein's model offered binary types. One can easily find suggestive generalized examples that resonate with descriptions of the knowledge structures (as we did ourselves earlier). However, detailed study of empirical data soon reveals that no actual intellectual field or set of knowledge practices readily fit into either category.

A second problem reflects what can be called 'Martin's cline'. The use by Martin of a continuum of strengths (Figure 1.4) to represent 'verticality' and 'grammaticality' aimed at moving beyond the strongly-bounded types of Bernstein's model. As Bernstein himself stated, dichotomous types are 'limited' and 'very weak' in their 'generating power' (2000: 124); the key is to conceptualize the organizing principles that generate such types. However, 'verticality' and 'grammaticality' did not do so. Ironically, the concepts were characterized by weak grammar (using Bernstein's terms) and their unclear referents did not enable empirical research.

Attempts by SFL scholars in the mid-2000s to modify Bernstein's model thus reflected fundamental problems with his concepts. The key issue was that the concepts redescribed empirical characteristics: they highlighted the presence or absence of knowledge-building but not the basis of knowledge-building. The questions remained unanswered as to what gives a knowledge structure 'verticality' or 'grammaticality' and what makes internal or external languages of description 'strong' or 'weak'. The need, then, was to conceptualize the organizing principles underlying knowledge practices. This was precisely what Maton had been doing by developing LCT since the late 1990s.

LCT is a sociological framework for researching and changing practice that comprises a multi–dimensional conceptual toolkit.[10] There are currently four active dimensions: Specialization, Semantics, Autonomy and Temporality. Each dimension comprises a series of concepts centred on capturing a set of organizing principles underlying dispositions, practices and contexts as a species of *legitimation code* that is named after that dimension. The two most relevant dimensions to this volume are Specialization and Semantics, which are centred on exploring *specialization codes* and *semantic codes*, respectively. For a fuller introduction to these two dimensions see Maton (2014b, 2016a), which defines and illustrates the concepts, and Maton *et al*. (2016a), which sets out how to enact the concepts in empirical research. See also Maton and Chen (Chapter 2, this volume) for a brief introduction to how LCT construes social fields and the notion of 'legitimation codes'.

Specialization (LCT)

Specialization was the first dimension of LCT to be developed (Maton 2000, 2004, 2006, 2007; Moore and Maton 2001).[11] The concepts have been widely used in research, including by numerous studies also utilizing SFL (see Maton and Doran 2017c; Maton *et al*. 2016b). Most relevant to our focus in this paper is that Specialization helped resolve problems indicated by Wignell's mixture and Martin's cline in two main ways. First, the concept of 'knower structures' highlighted that knowledge structures were not the only attribute of social fields; and, second, the concept of 'specialization codes' revealed the organizing principles generating different structures of knowledge and knowers.
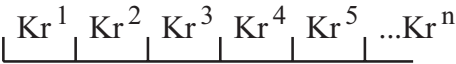
Knower structures

First, the dimension of Specialization extends Bernstein's concepts by additionally exploring intellectual and educational fields in terms of their *knower structures* which can be horizontal or hierarchical.[12] A *hierarchical knower structure* is 'a systematically principled and hierarchical organization of knowers based on the construction of an ideal knower and which develops through the integration of new knowers at lower levels and across an expanding range of different dispositions' (Maton 2014b: 70). This can be represented as a triangle, with an ideal knower at the apex and a range of novices at the base:
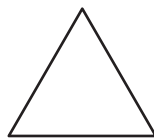
We can illustrate this knower hierarchy by considering the ways in which, as education has expanded over the past century, the humanities have aimed at embracing a greater range of learners and cultivating their dispositions to inculcate

a particular 'gaze', such as a literary or artistic gaze. In other words, over time the base widens to embrace more kinds of knowers and the aim is to cultivate or socialize their dispositions towards becoming similar to the ideal knower at the apex of the triangle and thereby move those knowers up the triangle.

In contrast, a *horizontal knower structure* is 'a series of strongly bounded knowers, each with specialized modes of being, thinking, feeling and acting, with non-comparable dispositions based on different trajectories and experiences' (Maton 2014b: 92). This can be represented as a series of segmented knowers ('Kr'):

$$\underline{Kr^1 \mid Kr^2 \mid Kr^3 \mid Kr^4 \mid Kr^5 \mid ...Kr^n}$$

A horizontal knower structure can be illustrated by claims made by many proponents of natural science that the social profile of scientists is irrelevant for scientific insight and anyone can claim legitimate knowledge so long as they follow the correct principles and procedures. In terms of their non-scientific dispositions, scientists thereby represent a segmented series of strongly bounded knowers – they can be very different to each other (Maton 2014b: 91).

Each social field of practice is, then, more than just a knowledge structure; it is also a knower structure.[13] Specialization brings these together to construe social fields as *knowledge–knower structures*. This begins to resolve the problem of binary categories and Wignell's mixture. The humanities and sciences illustrate that every social field may involve a mixture of triangles and segments: a hierarchical knowledge structure (triangle) may be accompanied by a horizontal knower structure (segments), and vice versa. Specialization moves beyond a dichotomous binary to describe four types, comprising hierarchical/horizontal knowledge structures and hierarchical/horizontal knower structures. This also avoids a deficit model of the humanities: social fields that exhibit horizontal knowledge structures may exhibit hierarchical knower structures. That is to say, the humanities primarily aim at cultivating or socializing knowers rather than cumulative knowledge-building. Moreover, as Maton (2010, 2014b) showed, such hierarchical knower structures do enable some knowledge-building within a knowledge segment. Put simply, they too exhibit a series of mini-triangles of knowledge.

Specialization codes

Martin's cline reflected a need to conceptualize the organizing principles generating these different structures of knowledge and, now, knowers. In Specialization, these organizing principles are given by *specialization codes* comprising *epistemic relations* (ER) between knowledge practices and their object and *social relations* (SR) between practices and their subject, author or actor. Each relation may be more strongly (+) or weakly (−) bounded and controlled or, simply put, more or less emphasized as the legitimate basis of practices, beliefs and identity.[14] These two strengths may be varied independently to generate *specialization codes* (ER+/−, SR+/−). As shown

in Figure 1.5, these can be visualized as the *specialization plane*, a topological space with four principal modalities:

- *knowledge codes* (ER+, SR−), where possession of specialized knowledge, principles or procedures concerning specific objects of study is emphasized as the basis of achievement, and the attributes of actors are downplayed;
- *knower codes* (ER−, SR+), where specialized knowledge and objects are downplayed and the attributes of actors are emphasized as measures of achievement, whether viewed as born (e.g. 'natural talent'), cultivated (e.g. 'taste') or social (e.g. feminist standpoint theory);
- *élite codes* (ER+, SR+), where legitimacy is based on both possessing specialist knowledge and being the right kind of knower; and
- *relativist codes* (ER−, SR−), where legitimacy is determined by neither specialist knowledge nor knower attributes – 'anything goes'.

Specialization codes generate knowledge–knower structures of different kinds. Stronger and weaker epistemic relations generate hierarchical and horizontal
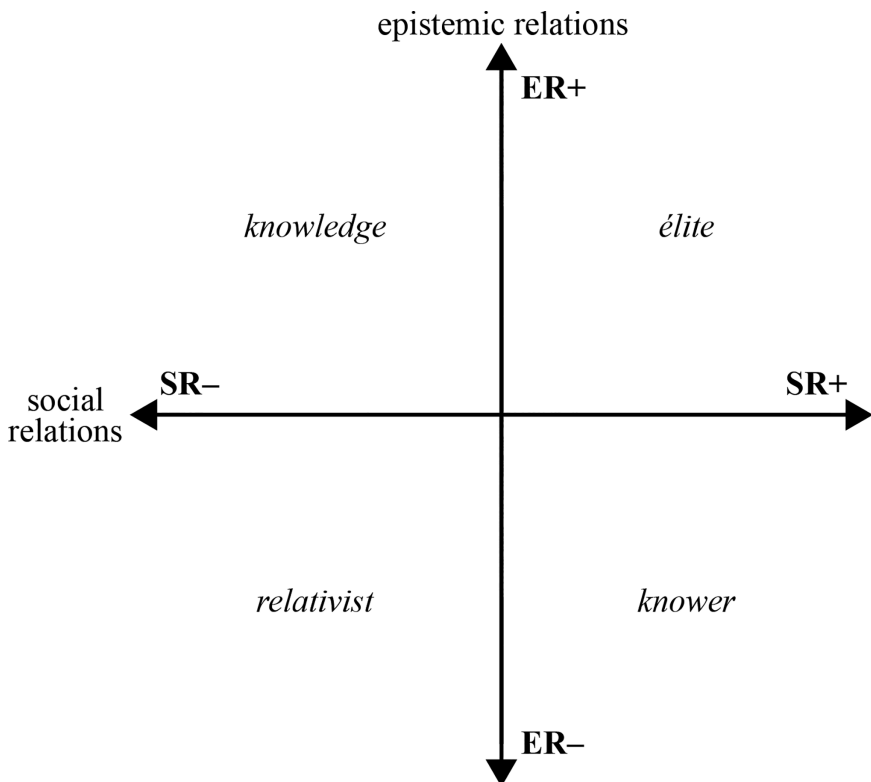

FIGURE 1.5   The specialization plane (Maton 2014b: 30)

knowledge structures, respectively; stronger and weaker social relations generate hierarchical and horizontal knower structures, respectively. In Figure 1.6 we have added these structures to the specialization plane to make clear how specialization codes are the organizing principles underlying the knowledge–knower structures of social fields. For example, knowledge codes (ER+, SR−) underlie social fields with hierarchical knowledge structures and horizontal knower structures. Specialization codes thereby offer a means of conceptualizing the organizing principles of different kinds of educational and intellectual practices. (We should emphasize that it is the specialization plane of Figure 1.5 that is used in LCT research; we have drawn Figure 1.6 only to make explicit how LCT extends Bernstein's framework).

More significantly, LCT provides a fundamentally different approach to conceiving knowledge practices that offers a number of advantages over the previous model. First, Specialization moves beyond a limited number of structures. LCT empirical research enacts the concepts of specialization codes and not those of 'structures'. The concepts of 'knowledge structures' and 'knower structures' can be
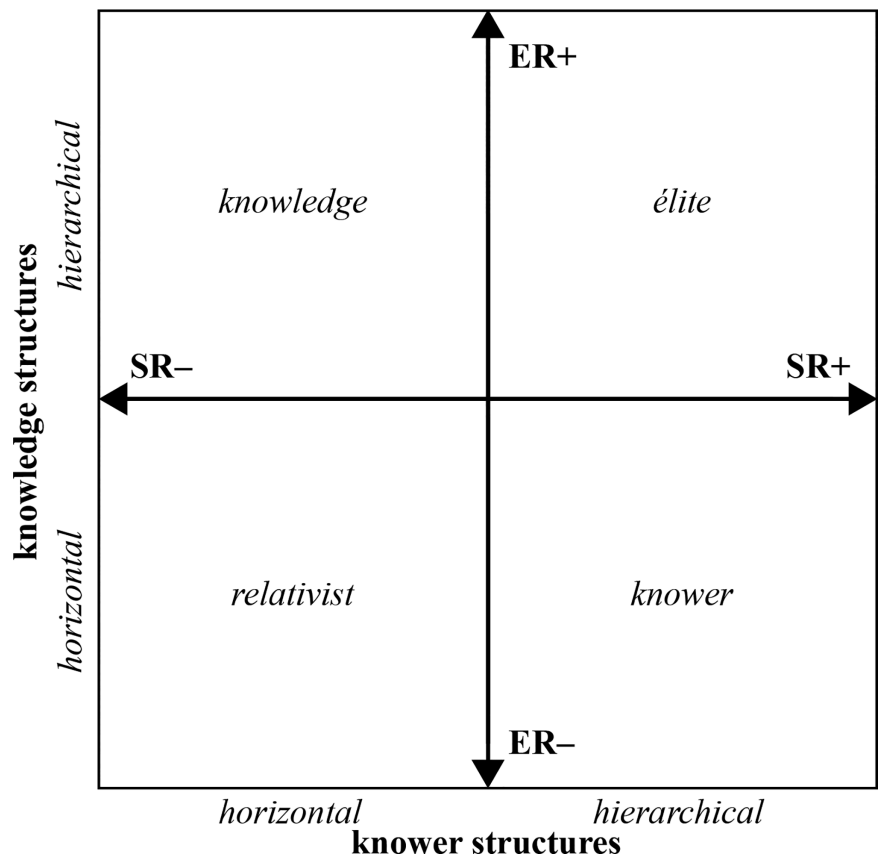

FIGURE 1.6 Specialization codes and knowledge–knower structures

left behind when one reaches specialization codes. They were useful metaphors for stimulating thinking but not useful concepts for analysing data. The new concepts offer a number of advances.

First, with specialization codes we can now think in terms of a topology in which there are endless possibilities for capturing difference. For example, returning to knowledge structures, one can describe different degrees of stronger epistemic relations (anywhere in the top half of Figure 1.5 or Figure 1.6), thereby capturing differences in how hierarchical each knowledge structure may be. (The same is true, of course, for stronger social relations and differences in how hierarchical each knower structure may be.)

Second, we can capture differences not only between subject areas but also *within* each subject area. Rather than having to fit a diverse set of practices into a single category, a set of instances can be represented as a scatter pattern across the plane, showing the diversity of codes present and which code dominates the context.

Third, the concepts are far more versatile in application. Where Bernstein's concepts were defined in terms of whole intellectual fields or theories, specialization codes can be used to analyse objects of study at any level, from subject areas to individual pedagogic or textual practices.

Fourth, instead of analysing practices in terms of static structures, we can use the specialization plane to plot changes in the pattern, tracing changes on the plane over time as relations are strengthened or weakened (ER↑/↓, SR↑/↓). This enables a more dynamic analysis of *code shift* (when the dominant code changes – movement between quadrants of the plane) and *code drift* (changes within a code – movement within a quadrant).

Fifth, specialization codes can be enacted to analyse not only forms of knowledge but also a wide variety of other practices, such as pedagogy and assessment, as well as the dispositions of actors. This enables a more relational analysis of degrees of *code clash* and *code match*, such as between learners' dispositions and pedagogic practices or between curriculum and pedagogy.

Last, specialization codes can be enacted in empirical research. As a rapidly growing body of studies is showing, the concepts can be used in fine-grained analysis of empirical data (e.g. Maton *et al.* 2016a). We illustrate an early example of this work in Chapter 2 (Maton and Chen) of this volume.

There is a lot more to the dimension of Specialization than we can cover here (see Maton 2014b). However, this gives a flavour of some key concepts that have been enacted alongside SFL in research. Specialization is, though, not the only dimension of LCT relevant to our narrative as it does not embrace all features of social fields. For example, questions remain of how some social fields can build knowledge over time while others create knowledge that is locked into its context or, from the perspective of SFL, how linguistic resources for the construction of uncommon sense knowledge, such as 'grammatical metaphor', are realized in knowledge practices. For these and other issues, we turn to another dimension of LCT.

Semantics (LCT)

The LCT dimension of Semantics (not to be confused with 'discourse semantics' in SFL) was developed from the late 2000s (Maton 2009, 2011, 2013, 2014b) in response to two stimuli.[15] First, empirical studies enacting concepts from Specialization 'spoke back' to the framework, highlighting issues of context-dependence and complexity of meaning that had yet to be theorized. Second, collaborative studies with SFL scholars raised questions of how linguistic features such as 'grammatical metaphor' were expressed in knowledge practices. The dimension of Semantics construes social fields of practice as *semantic structures* whose organizing principles are conceptualized as *semantic codes* comprising *semantic gravity* and *semantic density*.

Semantic gravity refers to the degree to which meaning relates to its context. Where semantic gravity is stronger (SG+), meaning is more dependent on its context; where semantic gravity is weaker (SG−), meaning is less dependent on its context. Semantic gravity traces a continuum of strengths. One can also analyse *weakening* semantic gravity (SG↓), such as moving from the local particulars of a specific case towards generalizations, and *strengthening* semantic gravity (SG↑), such as moving from generalized ideas towards concrete and delimited cases.

Semantic density refers to the complexity of practices. Where semantic density is stronger (SD+), more meanings are condensed within practices; where semantic density is weaker (SD−), fewer meanings are condensed. This strength is not intrinsic to a practice but rather relates to the *semantic structure* within which that practice is located. For example, 'gold' commonly denotes a bright yellow, shiny and malleable metal used in coinage, jewellery, dentistry and electronics. However, within Chemistry gold is related to an atomic number, atomic weight, electron configuration, and many other meanings which involve compositional structures, taxonomies and explanatory processes. It is thus located within a complex semantic structure that imbues the term with a greater range of meanings. Put another way, the meaning has a greater number of relations to other meanings (see Maton and Doran 2017a, 2017b). Semantic density traces a continuum of strengths which can be dynamized to describe *strengthening* semantic density (SD↑), such as moving from a simple symbol towards a more technical concept, and *weakening* semantic density (SD↓), such as 'unpacking' technical concepts into simpler terms.

The strengths of semantic gravity and semantic density may be varied independently to generate *semantic codes* (SG+/−, SD+/−). As shown in Figure 1.7, these can be visualized as the *semantic plane*, a topological space with four principal modalities:

- *rhizomatic codes* (SG−, SD+), where the basis of achievement comprises relatively context-independent and complex stances;
- *prosaic codes* (SG+, SD−), where legitimacy accrues to relatively context-dependent and simpler stances;
- *rarefied codes* (SG−, SD−), where legitimacy is based on relatively context-independent stances that condense fewer meanings; and
- *worldly codes* (SG+, SD+), where legitimacy is accorded to relatively context-dependent stances that condense manifold meanings.
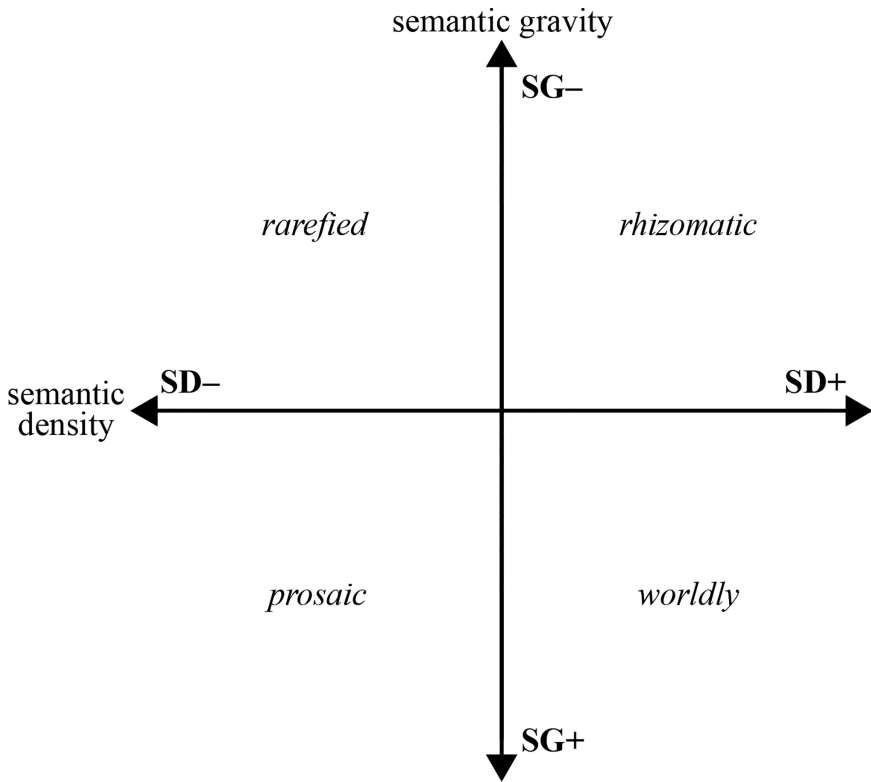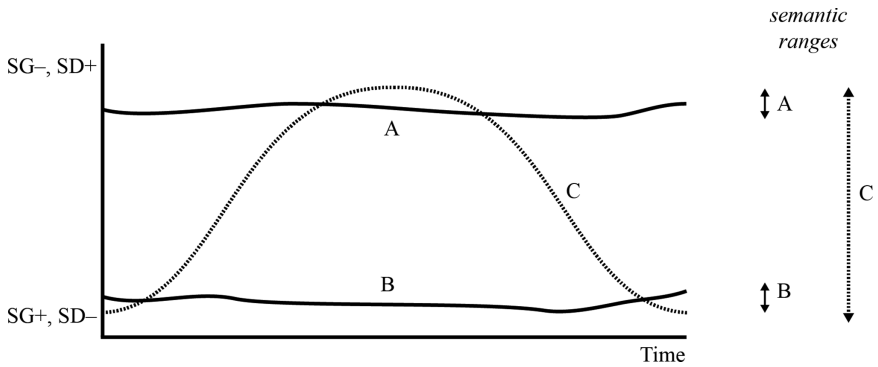
semantic gravity

SG–

rarefied   *rhizomatic*

semantic   SD–   SD+
density

prosaic   *worldly*

SG+

FIGURE 1.7   The semantic plane (Maton 2016a: 16)

The concepts should sound familiar from our earlier introduction to Speciali-zation: there are structures, two constitutive relations, four codes, a plane, etc. This is because all dimensions of LCT share analogous properties (see Maton 2016b). Rather than exploring different kinds of practices, they conceptualize different organizing principles that may underlie the same practices. Thus, dimensions can be and are often used together in research (e.g. Maton *et al.* 2016a). Accordingly, the advantages we outlined above of thinking in terms of Specialization also hold for Semantics: the concepts enable a topology, allow for analysis of code shift and code drift, can be used for all kinds of practices, and enable us to see code clashes and code matches. In doing so, they have further helped resolve questions raised of the model of knowledge structures by systematically conceptualizing and ena-bling empirical research into issues highlighted by notions such as 'verticality'. For example, unlike the earlier model, and indeed, most education debates that posit oppositions between 'theoretical' and 'practical' knowledges, semantic codes do not exclude what SFL terms 'specialized' discourse (trades, crafts, etc.). These social fields exhibit relatively strong semantic gravity (like 'practical' or horizontal forms) but also relatively strong semantic density (like 'theoretical' or hierarchical forms): *worldly codes* (SG+, SD+).

FIGURE 1.8 Three illustrative semantic profiles (Maton 2014b: 143)

Another affordance of LCT code concepts is shown by the analytic method of *profiling*. Tracing strengths of semantic gravity and semantic density over time (such as unfolding of an intellectual field, classroom practice, curriculum, or a text) reveals a *semantic profile* and an associated *semantic range* between their highest and lowest strengths. Figure 1.8 offers a heuristic representation of three simplified profiles and their ranges: a high *semantic flatline* (A), a low *semantic flatline* (B) and a *semantic wave* (C). The value of profiling is being illustrated by a growing body of research that is revealing further 'rules of the game' for achievement and bases of cumulative knowledge-building across different kinds of practices (Maton 2014a; Maton *et al.* 2016a).

These ideas from LCT are being increasingly used alongside concepts from across the framework of SFL. We began this chapter with a review of SFL work in the 1990s on the register variable field. This helped bring educational linguists into engagement with Bernstein's notions of 'discourses' and 'knowledge structures', which in turn brought them into dialogue with LCT. However, the ongoing exchange between SFL and LCT has reached far wider, involving mode, field, APPRAISAL, individuation/affiliation and many other areas of SFL. Moreover, studies enacting both frameworks range across issues in education, including academic writing (Hood 2016), school English (Christie 2016), and Physics (Doran 2018), as well as other social fields such as Law (Martin *et al.* 2014) and Politics (Siebörger and Adendorff 2015). Enacting both theories together offers greater explanatory power, challenges deeply held beliefs and provokes new theoretical developments. This book offers insights into ways this dialogue with LCT is pushing SFL forward.

Introducing *Accessing Academic Discourse*

This volume explores the dialogue with LCT from the viewpoint of SFL. Part I serves as a simple introduction to key ideas from the two dimensions of LCT we have briefly discussed above. Chapter 2 (Maton and Chen) illustrates the usefulness

of 'specialization codes' in the context of a study of Chinese students in Australia. Chapter 3 (Maton) introduces concepts from Semantics and illustrates how the ideas are revealing key attributes of knowledge-building. Part II comprises responses from SFL to provocations from LCT, most explicitly to concepts from Semantics (though Specialization serves as the backdrop). In short, the capacity of 'semantic gravity' and 'semantic density' from LCT to conceptualize organizing principles associated with complexes of linguistic practices stimulated Martin into rethinking the register variables field and mode. In these chapters, Martin highlights that linguistic theorizations of context-dependence and complexity of meaning are not as clear as many SFL scholars assume, and proposes a more comprehensive account in terms of 'presence' and 'mass'. Chapter 4 (Martin and Matruglio) defines 'presence' as concerning context-dependence and involving 'implicitness' (concerning textual resources such as exophoric reference to the outside situation), 'negotiability' (mobilizing interpersonal resources around the arguability of a proposal or proposition), and 'iconicity' (the amount of ideational grammatical metaphor). Chapter 5 (Martin) turns to the issue of complexity of meaning and explicates the notion of 'mass'. Central to this discussion is consideration of technicality (the distillation of ideational meaning in terms, symbols and diagrams), iconization (charging ideas with values) and aggregation (the synoptic accumulation of knowledge, in often multimodal texts). These new concepts characterize the array of linguistic resources potentially at stake during changes in semantic gravity and semantic density of knowledge practices – precisely which resources are enacted in a text is a matter for empirical research.

Part III illustrates how the way LCT brings knowers into the picture is supporting explorations of values by SFL. Chapter 6 (Doran) examines the highly implicit evaluative language that is often used to organize values systems that position people into different communities. Doran develops a methodology for seeing this evaluative language and the values they invoke in terms of networks of meaning known as 'axiological constellations' in LCT. This method involves a careful analysis using ATTITUDE and ENGAGEMENT in SFL to progressively uncover elements known as 'affording attitude' that are often the most evaluative yet least explicit meanings used in a range of discourses. Chapter 7 (Oteíza) analyses how events and processes are constructed and evaluated in the discourse of History, drawing on Martin and White's (2005) appraisal framework and Oteíza and Pinuer's (2012) proposals for the semantic domain of APPRECIATION. It also draws on semantic gravity and semantic density from LCT to explore levels of context-dependence and complexity that build cumulative knowledge and integrate personal and social memories of the recent past.

Part IV explores the fruits of dialogue with LCT for SFL understanding and practices in classrooms. Chapter 8 (Hood) focuses on the role of lectures as interactive multimodal events and their effect on knowledge-building in academic discourse. Drawing in particular on the concept of 'presence' outlined in Chapter 4, Hood explores the nature of intermodal explanation in a Biology lecture, relating this analysis to the LCT concept of 'semantic gravity' and changes in the

context-dependence of the knowledge being expressed, to explore how lectures can support the apprenticeship of students into the specialized, uncommon sense knowledge of their field. Chapters 9 and 10 (Rose) shift the focus to building a pedagogic metalanguage. Chapter 9 focuses on pedagogy, outlining the training programme that Rose and colleagues have developed for introducing teachers to the curriculum genres that have been designed for teaching reading and writing in his Reading to Learn programme. Rose introduces Martin's notions of 'mass' and 'presence' – developed in response to LCT – as measures of how training is enacted in practice and how it is best taught in teacher training. Chapter 10 turns to curriculum, the knowledge genres that are the focus of embedded literacy programmes informed by Reading to Learn. Here 'mass' and 'presence' are used to explore how academic metalanguage informed by functional linguistics is recontextualized for use in teacher training and in classroom practice. As such these chapters provide an invaluable model of how the ideas canvassed in this volume can be brought to bear on real world issues – in this case the challenge of providing a wider range of students with access to disciplinary knowledge in education.

While this volume is focused on influences from LCT on SFL, we should emphasize that this is not a one-way street. Collaboration with Martin and other SFL scholars provoked Maton into working with Yaegan Doran, a young scholar versed in both approaches, to develop means for semantic gravity and semantic density to be used to analyse discourse in detail. In two papers, Maton and Doran (2017a, 2017b) outline 'translation devices' for enacting semantic density in the analysis of English discourse at the level of wording, clausing and sequencing. Such granular tools that delineate referents with such precision are unprecedented in the disciplinary tradition that LCT builds upon; they bring sociological analysis closer to the kind of detailed exploration characteristic of SFL. These concepts are being followed by further translation devices for semantic gravity and for images.

We should also emphasize that influence and provocation do not equate to domination or integration. Occasionally scholars new to LCT or SFL are dazzled by the intensity of their dialogue into believing the two frameworks are one theory. LCT is *not* part of SFL; LCT and SFL are different and separate theories. This difference is crucial: the approaches stimulate each other *because* they are different. Each theory offers different insights that are complementary and which together can offer greater explanatory power. As made clear in Maton *et al.* (2016b), it is crucial to conduct SFL and LCT analyses *separately* before bringing those analyses together. Only then can their explanations inform one another. Moreover, when doing so, one must still be careful to avoid confusing the theories by, for example, wrongly identifying 'semantic density' with 'field' or reducing 'semantic gravity' to 'mode' (or vice versa). Thus it is mistaken to claim, to take one example, that 'semantic waves are caused by grammatical metaphor'. What happens in language cannot be equated to what happens to knowledge practices and may vary dramatically between modes and contexts. We can, though, bring them together to argue (in this example) that grammatical metaphor is *one* linguistic resource that *may contribute* to semantic waves *in the case being studied*. It is also extremely important

to understand which concepts belong to which approach. For example, 'semantic gravity', 'semantic density' and 'semantic waves' are concepts from LCT (not SFL) and unrelated to uses of 'wave' as a metaphor in SFL. Similarly, the 'Semantics' dimension of LCT is not related directly to 'discourse semantics' from SFL.[16] Only when understood in the proper context of their own theoretical framework can the concepts of each approach be fully understood. It is also crucial to understand their different architectures. As described earlier above, many of the most familiar SFL concepts are an external language of description for English; whereas, legitimation codes are an internal language of description for which external languages ('translation devices') are being developed. Thus, equating concepts is fundamentally mistaken. In difference lies their dialogic strength.

While working with two theories can be demanding, it is extremely rewarding. We hope that by bringing together cutting-edge papers that illustrate these theoretical developments and reveal the greater explanatory power and insights into education and knowledge offered by enacting SFL and LCT together, this volume will give you a flavour of the excitement, energy and explanatory power generated by this academic discourse.

Notes

1 Selected papers from these conferences were published as Christie and Martin (2007) and Christie and Maton (2011).
2 See also Derewianka and Jones (2012), de Silva Joyce and Feez (2012), de Oliveira and Iddings (2014), and Brisk (2015).
3 http://www.bom.gov.au/info/clouds/
4 From http://namesofclouds.com/index.html
5 Information drawn from http://www.lsbu.ac.uk/water/molecule.html
6 For discussion of the genres underpinning this profile see Martin and Rose (2008) and Rose and Martin (2012); Schleppegrell (2004) provides an engaging introduction to uncommon sense school discourse for language educators.
7 We are indebted to Jing Hao for this rendering of J. R. Martin's network from 1992.
8 Wignell's suggestion was made at the 2004 Sydney conference but not published. Martin (2014) explores the hierarchical potential of SFL; for discussion of some of the segmental tendencies in SFL, see Martin (2011b).
9 For introductions to functional grammar, see Matthiessen and Halliday (2009) and Martin (2014).
10 For the rapidly growing field of studies enacting LCT, see http://www.legitimationcodetheory.com
11 Specialization shaped the emergence of 'social realism' in the sociology of education during the late 1990s and early 2000s. This loose 'coalition of minds' (Maton and Moore 2010) comprised scholars who were influenced by Bernstein's approach and shared a concern with 'taking knowledge seriously' (Maton 2014b: 9). Once arguments for taking knowledge seriously had been made, however, the 'coalition' slowly dissolved as the ideas of its former members significantly diverged. Unfortunately, the name 'social realism' has sometimes been associated with subsequent claims that academic discourse (especially disciplinary or thereotical knowledge) is powerful and that non-academic discourse (such as practical and common sense knowledge) are lesser forms. This scholastic viewpoint is not shared by LCT (see, for example, Maton 2014a), which holds that all forms of knowledge practices possess powers and tendencies.

12 Bernstein's 'knowledge structures' were a model of intellectual fields of knowledge production only (not curriculum or pedagogy). Maton's development extended the resultant model to embrace all social fields of practice.

13 We shall refer to educational and intellectual fields as kinds of 'social fields' to avoid confusion with the SFL register variable field and to highlight that these LCT concepts are applicable not just to education but to all social fields of practice (law, medicine, politics, etc.).

14 See Maton (2014b: 31) for a distinction between *focus* and *basis* of practices. For example, knowledge claims may *focus* on a 'knower' issue (such as physical experience of pain) but on the *basis* of specialized knowledge (such as a medical report). Specialization codes concern the *basis* rather than the *focus* of practices – organizing principles underlying practices rather than their content.

15 See Maton (Chapter 3, this volume) for more detail.

16 It is also worth noting that Martin and Maton are different scholars – one has occasionally been attributed a quote by the other. Martin is the taller one; Maton is the charismatic and handsome one writing this footnote to show they are not one person.

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