

A TALL order? Legitimation Code Theory for academic language and learning

Karl Maton

Department of Sociology & Social Policy, Faculty of Arts & Social Sciences, University of Sydney, Australia

Email: karl.maton@sydney.edu.au

(Received 31 July 2014; Published online 6 September, 2014)

In searching for an adequate theory, the field of academic language and learning faces challenges of relating concepts to data and overcoming knowledge-blindness. Most approaches to education are either context-dependent or freely-floating, severing theory from data and practice, and cannot capture the nature of the knowledge practices into which students wish to be apprenticed. This paper suggests Legitimation Code Theory (LCT) as a potential approach for studying and shaping academic language and learning that addresses these challenges. In recent years LCT has grown rapidly as a basis for empirical research; studies are using the framework to explore the organising principles of knowledge practices across the institutional and disciplinary maps of education. This paper focuses on one dimension of this framework: Semantics. First, the concepts of ‘semantic gravity’ and ‘semantic density’ are defined. Second, the paper brings these concepts together to analyse data drawn from a major classroom study. Specifically, movements are traced in the degrees of context-dependence and condensations of meanings of knowledge within classroom practice in Biology and History. The analysis suggests that ‘semantic waves’, where knowledge is transformed between relatively decontextualised, condensed meanings and context-dependent, simplified meanings, are a key characteristic of academic literacy. Third, the paper discusses how these concepts are being widely used to explore diverse practices in education, revealing the generic and subject-specific attributes of academic literacy. Lastly, it is argued that LCT offers a potentially fruitful framework for exploring and shaping academic language and learning practices.

Key words: Legitimation Code Theory, social realism, semantic gravity, semantic density, semantic wave, knowledge-building

1. Introduction

... there is nothing so practical as a good theory (Lewin, 1951, p. 169).

Studies of education can set the theoretical bar so low the chief danger lies in tripping over it. Too often research offers empirical descriptions or context-dependent models that remain locked within the concrete particularities of their objects of study. Consequently, research findings are mired in a particular focus (a specific classroom, discipline, student demographic, etc.) and studies struggle to inform or build on each other. Thick description comes at the cost of thin explanation and segmented knowledge. The search for theory adequate to interpreting and changing academic language and learning (ALL) practice, evinced by this Special Issue, is thus a search for explanatory power. It is an attempt to find conceptual tools that enable research to cumulatively build powerful knowledge about transformative practice. However, in

undertaking this search the ALL field faces at least two key challenges: relating concepts to data and overcoming knowledge-blindness.

First, theories are not created equal: they can do different things. Many frameworks offer guiding metaphors or orienting ideas for how to think about issues – they are good to think with and about. However, they are not always as good to research with – they offer little analytic grip on empirical data. Theoretical ideas and arguments that make sense in the abstract often unravel when faced with the real world in research. In particular it is frequently unclear how concepts relate to their ostensible referents and how they can be enacted in substantive studies. Accordingly, many approaches prominent in educational research resemble exercises in intellectual gymnastics or theoretical veneers for arguments whose relations to empirical data remain obscure. The challenge for ALL practitioners thus lies in avoiding not only the Scylla of context-dependent empirical description but also the Charybdis of freely-floating theory. This false dichotomy affects not only research; it is reflected in oscillations between academic literacy programs emphasising highly localised, specific skills and such all-encompassing, generic notions as ‘critical thinking’.

A second problem is that most theoretical frameworks in social science exhibit ‘knowledge-blindness’ (Maton, 2014). At minimum, theories of academic language and learning must be able to delineate the forms taken by the different academic languages that students wish to learn. However, most educational theories sideline the study of knowledges in favour of knowing or knowers (see Maton, 2014). Psychologically-informed approaches typically construe ‘knowledge’ as knowing: subjective states of consciousness and mental processes within the minds of learners or, in more ‘social’ versions (such as activity theory and situated cognition theory), as aggregates of the workings of individual minds or communities of practice. Accordingly, research focuses on generic processes of learning and ignores differences among the knowledges being learned. Moreover, ‘what is being learned’ is typically understood as the world rather than a system of knowledge about the world – the physical world rather than Physics, the past rather than History, etc. Knowledge is thus treated as if it were a homogeneous and neutral medium. Sociologically-informed approaches reach comparable knowledge-blindness by a different route. They typically construe ‘knowledge’ as arbitrary reflections of differential power relations among social groups of knowers (Maton & Moore, 2010). Here knowledge is a homogeneous and neutral medium for social power. Research then focuses on revealing whose knowledge is being taught and learned, and proclaiming whose interests are being served, rather than exploring what is being taught and learned and its effects. Whatever their disciplinary provenance, most theoretical frameworks prominent in education thereby proceed as if the nature of knowledge itself has little relevance, whether for processes of learning or for social justice. Knowledge as an object of study emergent from, but irreducible to, the ways and contexts in which individuals or groups know has been largely obscured.

Knowledge-blindness poses problems for the ALL field through its tendency towards genericism across the disciplinary map. Failure to grasp that ‘academic languages’ and ‘academic learning practices’ are differentiated not only among kinds of knowing or knowers but also among forms of knowledge problematises the identification and provision of *appropriate* academic language and learning expertise. No account of academic literacy is adequate that cannot conceptualise the diverse academic languages in which students wish to become literate. This is not to argue that there are no generic attributes to academic literacy but rather to highlight the need to understand similarities and differences among academic languages in order to explore what they may be.

This is also not to claim there are no extant models of knowledge. Typologies abound, including Biglan (1973a, 1973b), Bloom (1976), Kolb (1981), Shulman (1986), and variants thereof, as well as such widely-used but ill-defined dichotomies as abstract/concrete. However, while providing a valuable first step, such models need theoretical development. Though useful for bringing knowledge into view as a potential object of study, they still exhibit knowledge-myopia. As both proponents and critics of each typology note, and as researchers attempting to enact such models experience, they struggle to capture both empirical practices, which rarely fit within their lists of types, and processes of change within and between types. This invariably

leads to the creation of further typologies with more or different types and sub-types of knowledge. However, the problem is not the list of categories but the form of the models themselves: their typological form limits their practical usefulness. They thus need developing to conceptualise the organising principles that generate diverse types of knowledge practices (or, put another way, the ‘grammars’ underlying different academic languages) and, crucially for ALL practice, which enable the analysis of how to succeed in different subject areas.

These challenges of relating concepts to data and overcoming knowledge-blindness (while avoiding knowledge-myopia) raise the question of whether finding a theory for academic language and learning is – with apologies for the punning acronym – a tall order. In this paper I address this question by introducing one dimension of a conceptual framework that overcomes both challenges: Legitimation Code Theory (LCT), a multidimensional conceptual toolkit for exploring the organising principles of practices. LCT is rapidly growing as a basis for empirical research into education at all institutional levels and across the disciplinary map – from primary schools to universities, from physics to jazz – in a widening range of national contexts, as well as beyond education, including museums, armed forces and parliaments.ⁱ Crucial for the field of ALL is the theory’s capacity for enactment and extended reach: LCT is neither freely-floating nor confined to one subject area, form of education or student demographic. It thus provides a basis for analysing and informing practice and offers the possibility of distinguishing generic from subject-specific aspects of academic literacy.

To illustrate this potential usefulness, I begin by introducing the framework and, specifically, the concepts of *semantic gravity* and *semantic density*. These concepts explore one set of organising principles of knowledge practices and enable the analysis of change over time in terms of *semantic profiles*. Secondly, I exemplify their application in a major study of secondary school History and Biology which involved a pedagogic intervention aimed at helping students improve their academic literacy and learning practices. I highlight how LCT concepts helps reveal the way knowledge-building is enabled and constrained within classrooms, offers practical implications for pedagogic practice, and distinguishes generic and discipline-specific features of academic literacy. I conclude by considering how LCT and the ALL field have much to offer one another.

2. Legitimation Code Theory: The dimension of Semantics

Legitimation Code Theory (LCT) is a sociological framework for researching and changing practice. It forms a core part of social realism, a broad ‘coalition’ of approaches which reveal knowledge as both socially produced and real, in the sense of having effects, and which explore those effects (Maton, 2014; Maton & Moore, 2010; Wheelahan, 2010). LCT extends and integrates ideas from a range of approaches, most centrally the frameworks of Pierre Bourdieu and Basil Bernstein.ⁱⁱ This ongoing theoretical development is in close relation with empirical research. LCT is a practical approach and designed to be an open-ended endeavour that foresees its own repeated refinement, deepening and extension through dialectical relations with substantive studies (see Maton, 2014; Maton, Hood, & Shay, forthcoming). The framework of LCT comprises a multi-dimensional conceptual toolkit, where each dimension offers concepts for analysing a particular set of organising principles underlying practices as *legitimation codes*. There are currently five dimensions to LCT, each centred on conceptualising a different form of legitimation code (Maton, 2014). In this paper I focus on the dimension of ‘Semantics’ which conceives social fields of practice as *semantic structures* whose organising principles are conceptualised as *semantic codes* comprising *semantic gravity* and *semantic density*.

Semantic gravity (SG) refers to the degree to which meaning relates to its context. Semantic gravity may be relatively stronger (+) or weaker (–) along a continuum of strengths. The stronger the semantic gravity (SG+), the more meaning is dependent on its context; the weaker the semantic gravity (SG–), the less dependent meaning is on its context. For example, the meaning of the name for a specific plant in Biology or a specific event in History embodies stronger semantic gravity than that for a species of plant or a kind of historical event, which in turn embodies stronger semantic gravity than processes such as photosynthesis or theories of historical causation. Semantic gravity thus traces a continuum of strengths with infinite capacity

for gradation. By dynamising this continuum to analyse change over time, one can also describe processes of: *weakening* semantic gravity ($SG\downarrow$), such as moving from the concrete particulars of a specific case towards generalisations and abstractions; and *strengthening* semantic gravity ($SG\uparrow$), such as moving from abstract or generalised ideas towards concrete and delimited cases.

Semantic density (SD) refers to the degree of condensation of meaning within socio-cultural practices, whether symbols, expressions, gestures, clothing, etc. Semantic density may be relatively stronger (+) or weaker (–) along a continuum of strengths. The stronger the semantic density ($SD+$), the more meanings are condensed within practices; the weaker the semantic density ($SD-$), the less meanings are condensed. The degree of condensation within a practice relates to the *semantic structure* in which it is located. For example, the term ‘gold’ may be commonly understood as a bright yellow, shiny and malleable metal used in coinage, jewellery, dentistry and electronics. Within the discipline of Chemistry the term may additionally signify such meanings as an atomic number, atomic weight, electron configuration, lattice structure, a capacity for reflecting infrared radiation and for conducting electricity and heat, and much more. Many of these meanings involve relations to other meanings as part of compositional structures, taxonomic structures and explanatory processes; for example, its atomic number represents the number of protons found in the nucleus of an atom, identifies it as a chemical element, and is situated, *inter alia*, within the periodic table, among many other relations. Thus, in Chemistry ‘gold’ is relationally situated within a complex and evolving semantic structure that imbues the term with a great range of meanings and thus semantic density of considerable strength. This strength is, though, not intrinsic to the word itself. The semantic density of a term in research publications is likely to be stronger than in textbooks, which in turn may be stronger than in classroom discourse or student work products, for apprenticeship into a subject area involves learning an increasingly articulated, complex and intricate semantic structure of meanings.

Semantic density thereby traces a continuum of strengths, with infinite capacity for gradation. This continuum can be dynamised to describe *strengthening* semantic density ($SD\uparrow$), such as moving from a term condensing a small number of meanings towards one implicating a greater range of meanings. For example, bringing together places, periods, customs, beliefs, etc. within ‘Mycenaean Greece’ in History, or relating cell structures, proteins, pigments, etc. of a leaf to describe ‘photosynthesis’ in Biology. Conversely, one can describe *weakening* semantic density ($SD\downarrow$), such as moving from a highly condensed symbol to one involving fewer meanings. For example, explaining a technical term from an academic source in simpler terms typically enacts only a limited number of its meanings within that source, weakening its semantic density, for ‘unpacking’ does not immediately or necessarily describe all meanings.

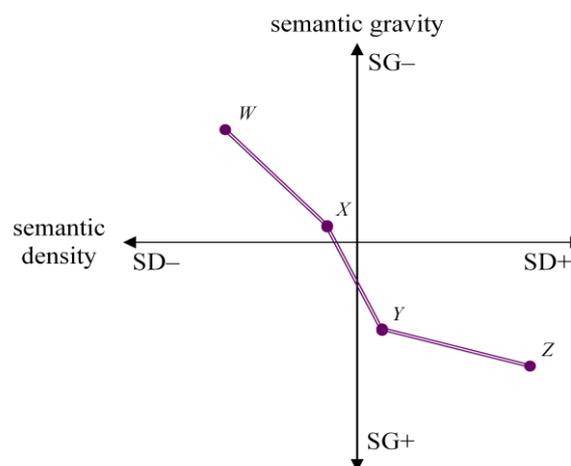


Figure 1. The semantic plane (adapted from Maton, 2011, p. 66; Maton, 2014, p. 131).*

* $SG-$ is positioned at the top of the plane (where ‘+’ may be expected) to reflect the tendency to mentally picture notions such as ‘abstract’ or ‘decontextualised’ as higher than ‘concrete’ or ‘contextualised’. Positioning is not a statement of value.

Secondly, this conceptualisation thereby embraces change over time. Analysing shifts in semantic gravity and semantic density ($SG\uparrow\downarrow$, $SD\uparrow\downarrow$) traces *semantic profiles* of practices as they unfold through time, whether in classroom discourse, curriculum, student essays, etc. For clarity, I shall illustrate such profiles through a less complex representation than a Cartesian plane. Figure 2 plots a simple example of a semantic scale on the y-axis against time on the x-axis, and traces a high semantic flatline (A), a low semantic flatline (B) and a semantic wave (C). (Semantic waves are not necessarily a bell shape, as I demonstrate below). These illustrative semantic profiles also reveals how practices possess different *semantic ranges* between their lowest and highest points; for example, A and B have much lower semantic ranges than C.

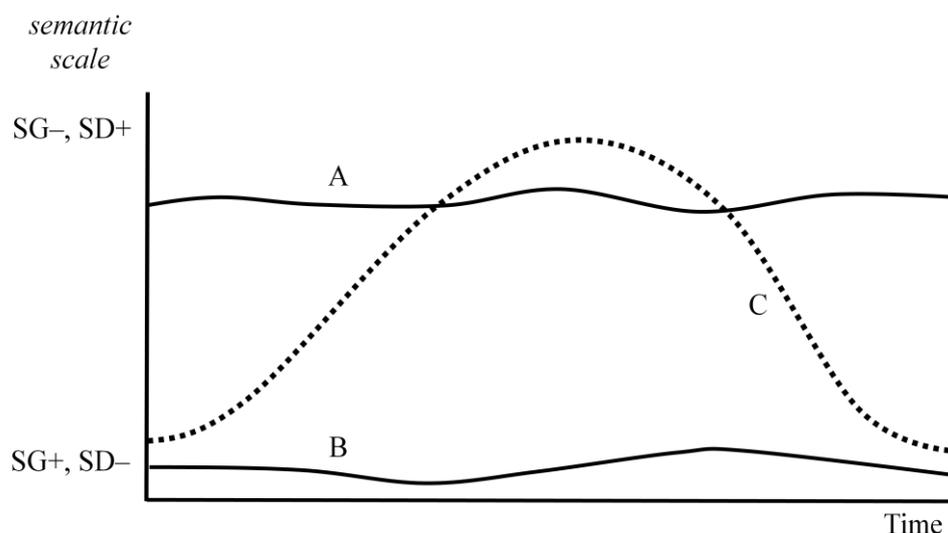


Figure 2. Semantic profiles.

As already emphasised, these profiles are simplified. The semantic scale depicted in the figures of this article trace strengths of semantic gravity and semantic density as a single line, with the two strengths moving together inversely. However, the two strengths may change independently and thus exhibit different profiles. There is also more than one possible ‘semantic scale’, and the scale used in this article does not embrace two semantic codes ($SG+$, $SD+$ and $SG-$, $SD-$). Moreover, the figures are heuristic; other studies are developing means for calibrating semantic scales and plotting profiles with greater precision. Nonetheless, as I discuss below, ‘unpacking’ must begin somewhere, and the simple semantic profiles outlined above serve to demonstrate how these concepts move beyond static types to capture processes of change.

Similarly, this introduction to the theory is simplified and partial – these are not the only concepts of Semantics, and Semantics is not the only dimension of LCT. It is, though, sufficient to now illustrate how the framework meets the other principal challenge for a theory for academic language and learning: the capacity to be enacted in research and practice. To do so I shall discuss a major study that explored pedagogic practices in humanities and science disciplines in secondary schooling.

3. Semantic waves in pedagogic practice

The DISKS (*Disciplinary, Knowledge and Schooling*) project drew upon LCT and systemic functional linguistics to explore how pedagogic practices enable and constrain knowledge-building (Martin & Maton, 2013). Data comprised curriculum documents, student work products, and video-recordings of 100 lessons in Years 8 (ages 13–14) and 11 (ages 16–17) of six secondary schools in urban and rural New South Wales, Australia. To embrace contrasting subject areas, the lessons were in Science (Year 8) or Biology (Year 11) and Ancient History or Modern History (depending on school). Analysis of this data focused on phases of classroom

interaction in which knowledge was actively transformed, such as unpacked, repacked, built on, elaborated, and so forth (e.g. Martin 2013; Matruglio, Maton, & Martin, 2013). The results of these analyses then informed a pedagogic intervention in which teachers were trained to model semantic waves in knowledge and teach the linguistic resources these involve through engaging in ‘joint construction’ with their students (Macnaught, Maton, Martin, & Matruglio, 2013).

To illustrate the usefulness of LCT I shall focus on one aspect of this study concerning ‘semantic waves’, or recurrent shifts in the degrees of context-dependence and condensation of knowledge. Their significance can be highlighted by considering the role of classroom practice in bridging between what is often called ‘high-stakes reading’ and ‘high-stakes writing’. The educational knowledge to be learned by students is typically embodied in written forms and accessed through reading textbooks, learning materials and source documents. The knowledge students must display in assessments to show their successful mastery of a pedagogic subject is often, though not always, in written form. Analyses of teaching texts and high-achieving student work suggest both kinds of knowledge are characterised by weaker semantic gravity and stronger semantic density (SG–, SD+) than found in classroom discourse, which is relatively more context-dependent and typically involves simpler meanings (SG+, SD–). In Figure 2, this would place both the knowledge students are expected to learn and the knowledge they must demonstrate in assessments higher up the semantic scale than the classroom practices intended to help them do both. This raises the question of how classroom activities can articulate between forms of knowledge that are further up the semantic scale. How can the chasm between high-stakes and high-semantics reading and writing be bridged? Put another way, how do classroom practices mediate between students’ learning and demonstrating educational knowledge?

Analyses for the DISKS project highlighted a number of semantic profiles characterising classroom practices, two of which I shall discuss here. The first is heuristically portrayed in Figure 3 and comprises ‘down escalators’ or downward shifts from decontextualised and highly condensed ideas (SG–, SD+) towards more concrete and simpler meanings (SG+, SD–). Our research suggests this profile is common in classroom practice. It was typically associated with teachers ‘unpacking’ and illustrating meanings from source documents such as textbooks. For example, teachers often focused on reading through texts with students, explaining words or ideas in less technical language and using everyday examples. This is not in itself problematic; as I discuss below, it can form part of a semantic profile that aids knowledge-building. However, rather than ‘repacking’ these contextualised and simplified meanings into terms of greater generality and abstraction and interconnecting them with other ideas, thereby moving back into the specialised academic discourses of History or Biology, teachers often returned to the text to unpack and exemplify further. Similarly, in Biology, having learned scientific principles, students enacted those ideas within practical experiments, before returning to learn more biological theory. As a Year 11 Biology teacher from the study reflected during the pedagogic intervention:

Like many, I thought I was actually very good at the unpacking aspect...taking it from highly packed wording and unpacking it. And in many instances, upon reflection, felt that, at that point, I had done my job – that students had been taught. (Macnaught et al., 2013, p. 51).

These practices represent a repeated pattern of downward shifts on the semantic scale (see Figure 3) which do not model moving from commonsense knowledge that is often segmented (such as into disparate examples) towards more condensed, technicalised knowledge plugged into the constellations of meanings constituting academic subjects. In short, they do not model how students may reach back up the semantic scale to achieve the kind of knowledge they are required to demonstrate in order to succeed.

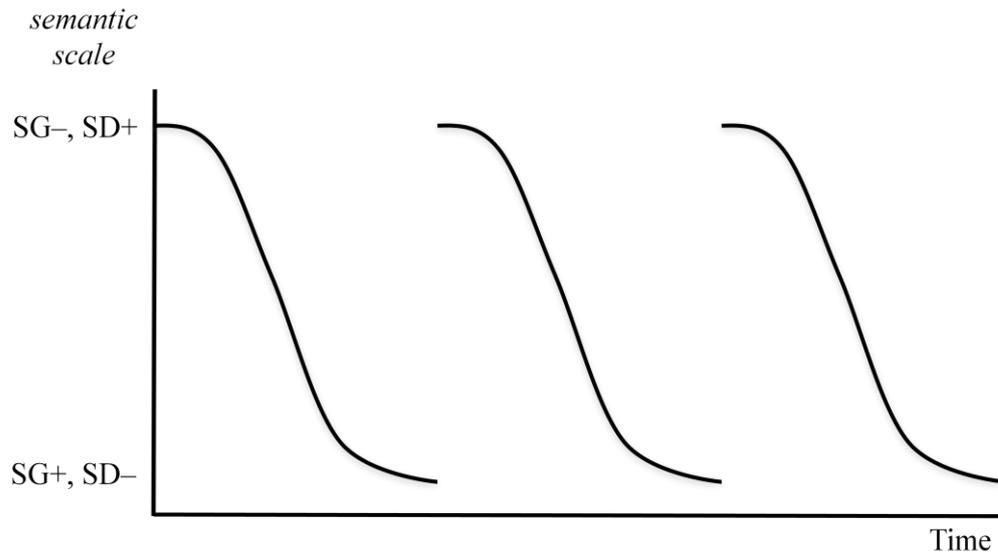


Figure 3. A ‘down escalator’ semantic profile.

A second semantic profile discovered in the study comprised not only these downward shifts but also upward shifts that together create *semantic waves*. These practices offer the possibility of modelling movements into more integrated, manifold and deeper meanings. To illustrate this profile I shall describe a single wave in two brief examples of classroom discourse from Biology and History.

3.1. A semantic wave in Biology

The first example centres on an excerpt from a Year 11 Biology classroom in which the broad topic of discussion is ‘biological lines of defence’, focusing on the nature and role of ‘cilia’. It begins after the teacher writes the word ‘cilia’ on the board as the ‘line of defence’ under discussion.

- | | |
|---------|---|
| Teacher | Okay [student’s name] what are the ‘cilia’. What was it? No? [Student’s name] do you know what cilia is? No? Someone must know what they are... |
| Student | Hairs |
| Student | The little hairs? |
| Teacher | The little hairs. And basically, they beat in an upward motion from inside your body out through to your nose. [Teacher waves her arms upwards repeatedly]. So, they beat up and they take the pathogens away with them. And, guys, I don’t know if I’ve ever told you this, but when you smoke cigarettes, the tar actually causes your cilia to, because it’s so heavy, to drop, and so your cilia don’t work properly after that because they’re too heavy, they’ve dropped, so they can’t beat the pathogens out of your body! So that’s one reason that smoking’s bad as well. |

As Figure 4 illustrates, this excerpt begins with the teacher asking about an abstract scientific term that condenses a wide range of meanings. As Martin (2013) shows, the term ‘cilia’ is situated by the pedagogic discourse of Biology within: compositional structures that describe the physical constituents of cilia and what cilia are constituents of; taxonomic structures that involve different ways of classifying parts of the body; and a range of biological processes and causal explanations in which cilia play a role. This high position on a semantic scale (‘concept’ in Figure 4) is signalled to students, whether they understand the term or not, by the specialised context of the science classroom, the focus of this particular lesson (explicitly stated at the outset), the writing down of the word as a ‘line of defence’ and solicitation of a definition by the

teacher, and the unfamiliarity of the word. With contributions from students, the teacher then describes some meanings of the term using a combination of concepts they have previously learned, such as ‘pathogens’, and everyday language, such as ‘the little hairs’, as well as body language (waving her arms upwards). She also provides an example from everyday life: smoking stops the cilia from performing a function integral to their definition. Locating the ‘cilia’ in the body and setting limits to its functions strengthens semantic gravity; ‘unpacking’ the term through explaining some (though by no means all) of its meanings weakens semantic density. The discussion thereby moves down the semantic scale towards more grounded and less condensed meanings (‘unpacking’ in Figure 4).

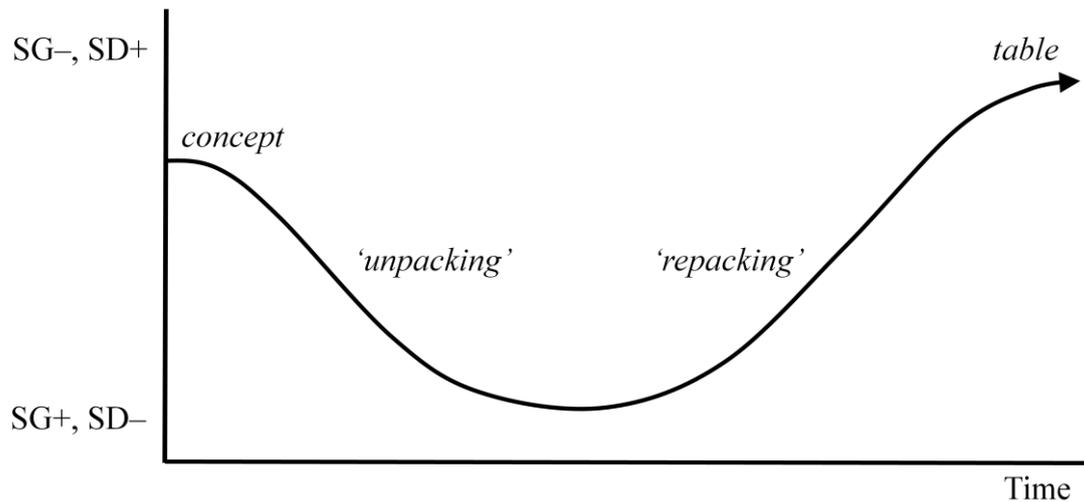


Figure 4. A semantic wave in a Biology lesson.

This shift down the semantic scale is not in itself antithetical to educational achievement. Students need points of entry into and guidance through the complex constellations of meanings that constitute academic subjects. Partially ‘unpacking’ meanings condensed within educational knowledge and grounding them in concrete examples offers a way in. What distinguishes this example from the ‘down escalators’ profile is that here the downward shift is not the only transformation of knowledge; it represents a precursor to progressively strengthening semantic density through elaborating, extending and refining additional meanings, such as by locating the term within systems of composition, taxonomies, and processes, and progressively weakening semantic gravity by moving towards meanings of greater generalisation and abstraction. In other words, in this example the teacher moves the knowledge back up the scale to create a semantic wave (Figure 4).

The classroom discourse quoted in the excerpt above concludes with the teacher instructing the students, “Okay! Alright, write this down under ‘description!’”. She then writes on the board next to ‘cilia’ the text reproduced here as Table 1: a brief definition and a description of one biological function served by the cilia. In doing so, she is not simply summarising this phase of the lesson but also beginning to ‘repack’ the term ‘cilia’ by condensing articulated meanings into a simple description and removing specific examples, such as smoking. This weakens semantic gravity and strengthens semantic density (‘repacking’ in Figure 4). Taken with the preceding passage, the classroom practice is thereby creating a semantic wave in knowledge.

Table 1. Biology teacher’s writing on board

Line of defence	Description	What it does
cilia	Hair-like projections from cells lining the air passages	Move with a wavelike motion to move pathogens from the lungs until it can be swallowed into the acid of the stomach

Indeed, this upward semantic shift is continued further, beyond the specific concept, for the definition forms part of a larger table that the class is working through together to learn about 'biological lines of defence' ('table' in Figure 4). This larger table reveals a greater range of relations within which the term 'cilia' is embedded, including biological processes and causal explanations. For example, the next 'line of defence' is 'chemical barriers', whose 'description' includes 'acid in the stomach' (the last part of the account of 'cilia') and whose function includes 'Stomach acid destroys pathogens including those that are carried to the throat by cilia'. The term is thereby woven into relations with a greater range of relatively decontextualised meanings. The semantic profile of Figure 4 thus reaches up to higher than it began.

3.2. A semantic wave in History

A second example is from a Year 11 History classroom discussion of a take-home assignment for which students must evaluate 'the influence of Greek and Egyptian cultures in the Roman Empire'. This question includes terms from the pedagogic discourse of History characterised by relatively weak semantic gravity and relatively strong semantic density: 'Greek culture', 'Egyptian culture' and 'Roman Empire' embrace a range of meanings concerning time periods, geographical locations, practices, beliefs, etc. Moreover, the question condenses more than the sum of such terms: to explore 'influence' requires understanding a range of historical processes. The teacher begins by signalling that the knowledge sits relatively high on the semantic scale ('question' in Figure 5):

Teacher This is a little bit hard, 'H. THE INFLUENCE OF GREEK AND EGYPTIAN CULTURES.' What does that mean? What would the influence of Greek and Egyptian cultures mean, okay? No idea, right?

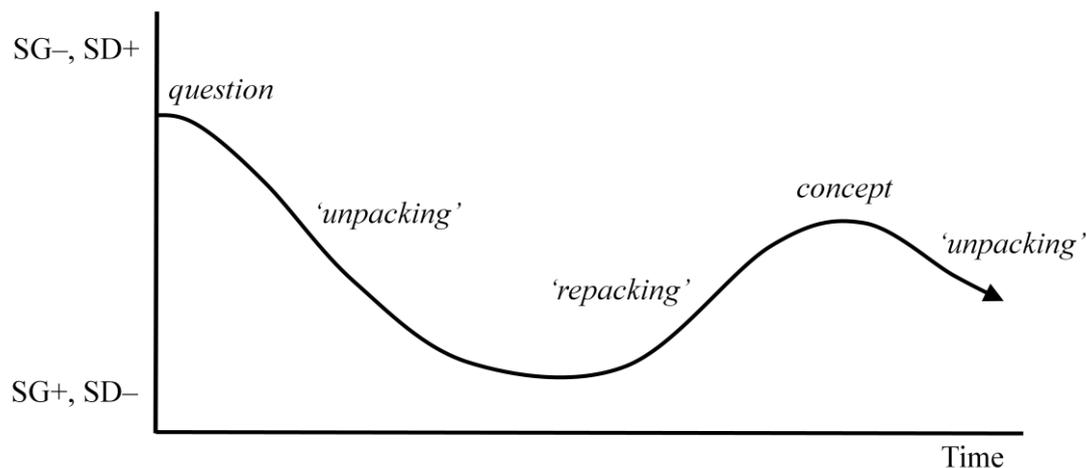


Figure 5. A semantic wave in a History lesson.

She then moves the knowledge down the semantic scale in stages (the left 'unpacking' in Figure 5) by providing a series of examples of 'influence':

Teacher What it means is, if we started to look at all the things in Pompeii and Herculaneum, what objects may be showing Greek design? Or Egyptian design? Or Greek mythology? Or Egyptian mythology? Or what building techniques, like columns? Are there Greek columns? Do, you know, are the themes of their artwork reflecting it?

With 'objects' that 'may be showing Greek design', 'Egyptian design', 'Greek mythology' and 'Egyptian mythology', the knowledge expressed by the teacher begins to move down the semantic scale by specifying and unpacking meanings from the wide-ranging, abstract terms of the question, a move continued by the more specific and concrete examples of 'building techniques' and 'columns', the latter in turn being exemplified by 'Greek columns'. The teacher

also moves discussion down the semantic scale by grounding the question in the historical period through examples of prior events in history (see Matruglio et al., 2013) and the current discussion of the question in the context of what has been learned in previous lessons:

Teacher So, it's saying...remember when we started, we said that Pompeii had originally been settled by Greeks? Okay? And if we look at where Italy is, it's not that far from Egypt at this time, umm, we've, we've had, umm...Cleopatra has been killed by the time the volcano erupts, she and Mark Antony are dead and Egypt is part of the Roman empire.

As with the Biology example, this downward shift is not simply repeated but rather followed by a move in the opposite direction. The teacher weakens semantic gravity by discussing recurrent events (trade and diplomatic visits) rather than specific events, and strengthens semantic density by 'packing up' various activities being conducted between countries as 'trade in ideas', and then into the technical term 'aesthetic trade' ('repacking' to 'concept' in Figure 5):

Teacher So, there would be massive amounts of trade going on, and umm, you know people visiting their diplomats you know or their, their, ambassadors...like their envoys and things like that all going back and forth across the countries. So, ideas. When you get trade in ideas – you wouldn't have heard this word before – we call it 'aesthetic trade'. Have you heard of it? Yeah.

Student You told us before.

Teacher Ohh! Told you before great, *excellent!* You remember aesthetic trade! 'Trade in ideas'. So, of course, when you've got contact with the country you're gonna get the trade in ideas coming as well.

Though not yet reaching the heights on the semantic scale embodied by the question (which would take a series of progressively higher wave cycles to achieve), this shift upwards almost completes a semantic wave in explaining one key aspect of the knowledge students are being asked for by the assignment question. As my parenthetical comment highlights, this excerpt is part of a longer sequence of classroom interaction. In this case, the knowledge being discussed descends the semantic scale again ('concept' to 'unpacking' in Figure 5) as the teacher provides further examples of 'aesthetic trade' and emphasises the value of explicating 'hard' knowledge in this way:

Teacher So that's what that one is. It looks hard, but all you've gotta do is have a look and think what things are there. Let me give you a big clue some of them are massive. Laah-la-lah-la- la-la-la-lahh, la-lah

Student Theatres

Student La-lahh

Teacher Theatres. Okay, theatres are a Greek design. The Greeks invented the theatre, and then the Romans take the idea because they like it too. So, some of them are very obvious.

3.3. The high stakes of semantic waves

Returning to the question of how classroom practices can mediate between the knowledge students are expected to learn and the knowledge they must demonstrate in assessments – or 'high-stakes reading' and 'high-stakes writing' – these examples suggest the potential significance of semantic waves. This is not to highlight particular pedagogic strategies as 'best practice'; there are many ways to achieve semantic waves. Rather it is to foreground transformations in the knowledge being expressed. From the wider data analyses conducted for the DISKS project, we conjecture that one means for mediating high-stakes reading and high-stakes writing is a series of semantic waves in the knowledge expressed in classroom interaction, one progressively reaching higher up the semantic scale. This is portrayed by Figure

6, where the profile is tracing the highest up the scale being reached through time. Though the two examples discussed above each describe a single semantic wave, LCT concepts are characterised by their capacity for fractal application: semantic profiles can be explored at all levels, from a single classroom exchange through phases of lessons, whole lessons, units, courses, curricula, to an entire educational career. Further research is required, but this study suggests that, as one moves from micro towards macro phenomena, waves within waves become apparent – each level involves semantic waves of its own.

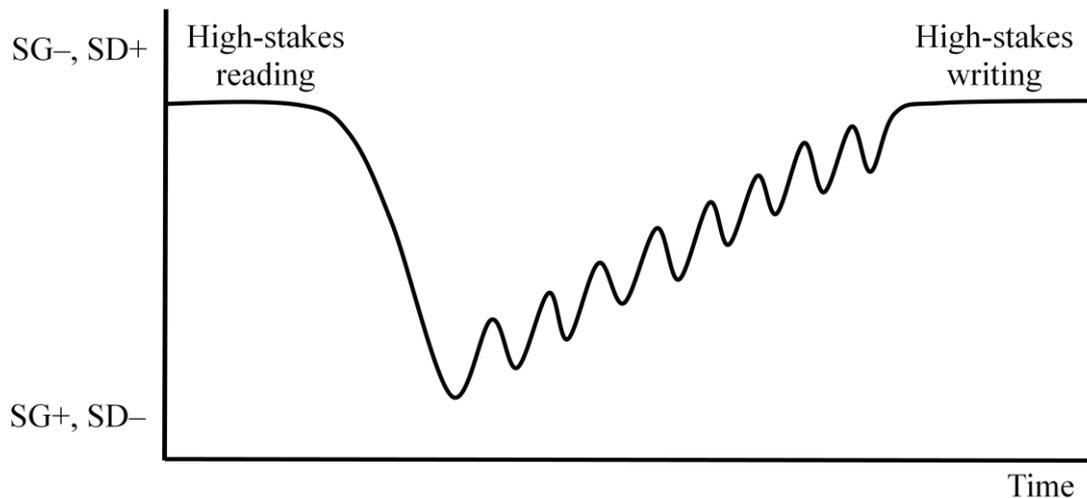


Figure 6. Cumulative semantic waves.

At the level of classroom practice, this conjecture formed the basis for a small-scale pedagogic intervention. Given the existing prevalence of ‘down escalator’ profiles, the intervention focused on modelling movements upwards through ‘joint construction’ in which teachers worked collaboratively with students to develop answers to assessment tasks. Teachers were taught both the notion of semantic waves and key linguistic resources enabling such upwards movements, which Martin (2013) termed ‘power words’ (technical terms specialised to the academic subject), ‘power grammar’ (such as grammatical metaphor) and ‘power composition’ (structures pertinent to different written genres). Space precludes detailed discussion here (see Macnaught et al., 2013), but preliminary analyses and other pedagogic studies (e.g. Liu, 2012) suggest the approach offers potential for raising educational achievement by making explicit how students can reach up the semantic scale in their written assessments.

4. Let’s go surfing now, everybody should be learning how

For illustration I have drawn on data from a study of classroom practices in two academic subjects in secondary schooling. However, research enacting the dimension of Semantics shows the applicability of these concepts beyond these specificities. Studies are exploring academic languages and learning practices across the disciplinary map, including cultural studies (Hood, forthcoming), design (Shay & Steyn, forthcoming), engineering (Wolff & Lockett, 2013), environmental science (Tan, 2012), jazz (J. L. Martin, 2012), journalism (Kilpert & Shay, 2013), physics (Georgiou, forthcoming), sociology (Stavrou, 2012), and teacher education (Shalem & Slonimsky, 2010). Similarly, while the current paper explored schooling, this growing body of work includes numerous studies of higher education, as well as informal learning contexts (e.g. Poulet, forthcoming).

These studies are also demonstrating the usefulness of Semantics beyond classroom practices. For example, analyses of student work products are suggesting semantic waves not only help mediate between reading and writing but also play a crucial role in academic literacy as the profile of high-status writing. Figure 7 draws on Maton (2014, p. 119) to represent low-achieving and high-achieving student essays in a compulsory unit of secondary school English. The essays discuss three texts in relation to an abstract idea (‘the journey’). The low-achieving

essay (dashed line in Figure 7) traces a semantic flatline of highly contextualised and simple meanings from each text; the high-achieving essay (unbroken line) traces a series of semantic waves between more abstract literary ideas and the concrete particularity of each text. Ongoing PhD studies of model answers and high-achieving student work are revealing the prevalence of semantic waves as the basis of success in subjects as diverse as social work and business studies (Szenes & Tilakaratna, 2013).

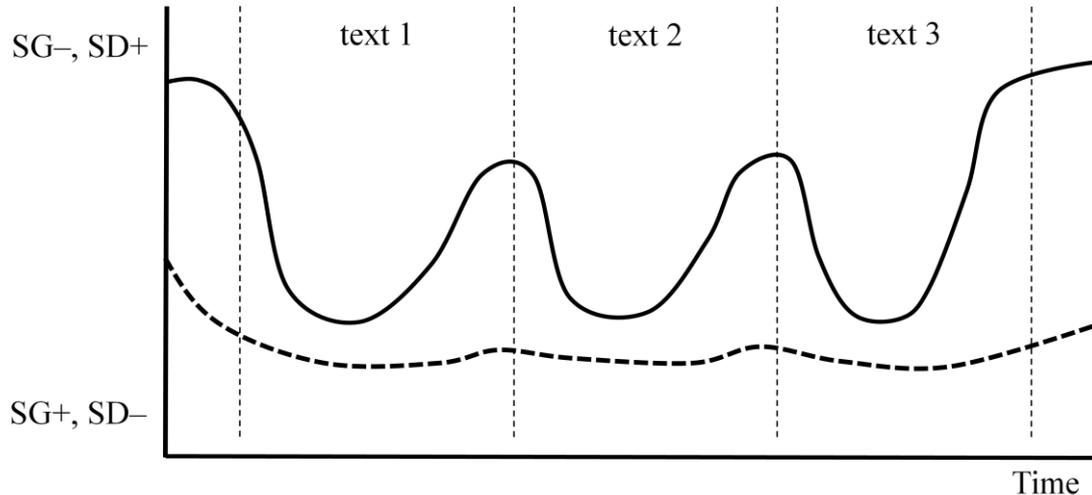


Figure 7. Semantic profiles of English essays.

Crucially, these studies are also showing differences among academic languages and learning practices. I have highlighted a potentially generic attribute of academic literacy, one shared by subject areas across the disciplinary map. However, semantic waves are not all alike – they take subject-specific forms. Some differences lie in the shape of the semantic profile, in terms of their:

- *semantic range*: as students' progress through a curriculum, waves may reach higher, though research is suggesting these may have upper limits appropriate to each stage of an educational career (e.g. Georgiou, forthcoming);
- entry and exit points: earlier examples begin and end high on a semantic scale, whereas more practical subjects may start from and end with concrete examples and simpler meanings, inverting the shape of waves;
- relative emphasis on upshifts, where theorising is emphasised, or downshifts, where applications in practice are emphasised (e.g. Shay & Steyn, forthcoming);
- *semantic flow* or degree of connectedness between points – discontinuous leaps up and down the semantic scale may or may not be permissible; and
- *semantic threshold* or degree of accuracy; for example, that the teacher's account of the function of 'cilia' (earlier above) too closely relates the respiratory system to the gastrointestinal system is not an issue at this stage of learning, though it would become significant at more advanced stages of the curriculum.

Though semantic waves may prove to be a generic attribute of academic literacy, they may thus differ for different subjects and stages of learning along 7-Gs: going in (entry), going up and down (shifts), gamut (semantic range), going along (semantic flow), going out (exit), and getting it right (semantic threshold).

Other subject-specific aspects of semantic waves are to be found in different organising principles. For example, the DISKS project also drew upon the LCT dimension of Specialisation to explore the *specialisation codes* of practices. Biology lessons embodied a *knowledge code* (where legitimacy emphasises epistemic relations to objects of study) while History lessons embodied a *knower code* (where legitimacy emphasises social relations to actors). As a wide array of research has shown, these specialisation codes have differing effects

for educational practice. Accordingly, during the training day for the pedagogic intervention, teachers from Biology and History were introduced to ‘semantic waves’ together, before dividing into discipline-based groups to explore how these profiles are realised in their own practices. The multi-dimensional conceptual framework of LCT thus offers a means of exploring and bringing together both generic and specific attributes of academic literacy.

5. Conclusion

For scholars and practitioners in the field of academic language and learning, theory is an indispensable part of their toolkit. As the well-known quote from Lewin suggests, ‘a good theory’ is practical – it provides explanatory power that serves as the basis for transformative practice. Without ‘a good theory’, empirical studies and practical programs tend to segmentalism – their findings remain locked within the specificities of their contexts of study or enactment. The field then traces a *low semantic flatline* of context-dependent ideas that struggle to build on one another. However, not all theory is ‘good’ in this sense. Even when ostensibly discussing concrete practices, many approaches trace a *high semantic flatline*: abstract rumination whose relations to empirical data are attenuated at best. While this may appear to raise the theoretical bar, it does so by removing theory from data and practice. Crucially, such approaches offer a false dichotomy between two semantic flatlines with limited semantic range.

In contrast, LCT concepts offer a semantic range that reaches from abstract, generalising, highly condensed and complex meanings as part of a wider sociological framework, to concrete, specific and simpler meanings in practical application. There is more to the dimension of Semantics than the concepts discussed above, and there is more to LCT than the dimension of Semantics. The framework is more extensively elaborated in *Knowledge and Knowers* (Maton, 2014) and how it can be enacted in research studies is reflexively discussed in *Knowledge-building* (Maton et al., 2014; see also Martin & Maton, 2013). Nonetheless, the brief examples outlined above illustrate the practical applicability of LCT. Moreover, a growing number of studies are showing that LCT can be enacted within research and pedagogic interventions into a wide array of disciplinary and institutional contexts. This is crucial for enabling studies and programs in academic language and learning practice to build powerful and cumulative knowledge over time.

The examples also highlight how LCT overcomes the knowledge-blindness (or, at best, knowledge-myopia) that afflicts much education research. The DISKS project was more extensive than discussed in this article (see Martin, Maton, & Matruglio, 2010; and papers collected in Martin & Maton, 2013). Nonetheless, the notion of ‘semantic waves’ begins to shed light on transformations in knowledge that enable and constrain academic literacy. There is, of course, more to it than this and much to learn. We do not yet know, for example, how best to introduce and assemble in classroom practice the complex semantic structures constituting disciplines in ways that apprentice diverse students into successful mastery of their organising principles. This is the focus of the PEAK (*Pedagogies for Knowledge-building*) project, which builds on DISKS by exploring in detail the pedagogic processes of knowledge-building in Year 7 and 8 secondary school classrooms, a crucial moment of entry into disciplinary distinctions. More research is required. The field of ALL is perfectly positioned for such studies, offering a wealth of opportunities for theoretically-informed practical engagement with teaching and learning. This paper suggests that LCT offers one means of enabling such work to help make theorising academic language and literacy not such a tall order.

Acknowledgements

I am extremely grateful to Rosemary Cleehan and the organising group of the *Key thinkers, key theories* symposium (Melbourne, December 2012) for inviting me to present the keynote address on which this is based. The paper revises ideas first expressed in Maton (2013). The DISKS (DP0988123) and PEAK (DP130100481) projects are both funded as Discovery Project grants by the Australian Research Council.

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Endnotes

- i Numerous examples of this rapidly growing body of work can be found at the LCT website: <http://www.legitimationcodetheory.com>.
- ii For detailed discussion of how LCT concepts extend and integrate ideas from Bourdieu and Bernstein, see Maton (2014).