

Towards a Language-Based Theory of Learning

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Despite the fact that educational knowledge is massively dependent on verbal learning, theories of learning have not been specifically derived from observations of children's language development. But language development is learning how to mean; and because human beings are quintessentially creatures who mean (i.e., who engage in semiotic processes, with natural language as prototypical), all human learning is essentially semiotic in nature. We might, therefore, seek to model learning processes in general in terms of the way children construe their resources for meaning—how they simultaneously engage in "learning language" and "learning through language." A number of characteristic features of language development, largely drawn from systemic-functional studies of infancy, childhood, and early adolescence, offer one possible line of approach towards a language-based interpretation of learning.

When children learn language, they are not simply engaging in one kind of learning among many; rather, they are learning the foundation of learning itself. The distinctive characteristic of human learning is that it is a process of making meaning—a **semiotic** process; and the prototypical form of human semiotic is language. Hence the ontogenesis of language is at the same time the ontogenesis of learning.

Whatever the culture they are born into, in learning to speak children are learning a semiotic that has been evolving for at least ten thousand generations. But in some cultures, including those comprising the Eurasian culture band, during the past hundred generations or so the nature of this semiotic has been changing: A new form of expression has evolved, that we call **writing**, and following on from this a new, institutionalized form of learning that we call **education**. Children now learn language not only in home and neighbourhood but also in school; and with new modes of language development come new forms of knowledge, educational knowledge as distinct from what we call common sense. At the same time, the process of language development is still a continuous learning process, one that goes on from birth, through infancy and childhood, and on through adolescence into adult life.

Most theories of learning, including those that take account of language

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learning, come from outside the study of language. They tend either to ignore language development, or to treat it as just one learning domain; and sometimes they take on board preconceptions about the nature and history of language that are quite remote from reality. If we try to translate such theories into practice, into activities in which language is involved (and these include all educational activities), we may seriously miss the mark. Language is not a **domain** of human knowledge (except in the special context of linguistics, where it becomes an object of scientific study); language is the essential condition of knowing, the process by which experience **becomes** knowledge.

With this in mind, I would like to suggest an alternative: that we might explore approaches to learning theory that are based on consideration of language. In other words, we might interpret learning as something that is inherently a semiotic process. And this in my opinion imposes certain constraints. One is that the theory would be based on natural data rather than experimental data: that is, on language that is unconscious, not self-monitored; in context, not in a vacuum; observed, not elicited. The reason for this is that, of all forms of human activity, language is perhaps the one that is most perturbed by being performed under attention—not surprisingly, because all other learning depends on the learner not having constantly to attend to the way experience is being construed. Another constraint is that the theory would not dissociate the **system** from the **instance**: language from text, *langue* from *parole*, competence from performance, or other related oppositional pairs.

I am not presuming to offer any general theory, but I would like to offer certain considerations that such a theory would have to address. These come from the study of children's language development. It seemed clearer if these could be enumerated one by one; so in the remainder of this article I have listed a total of 21 features, aspects of child language development that I think are critical to a language-based theory of learning (a summary of these features can be found in the Appendix). They are drawn from my research and that of colleagues in the field, and they derive largely from direct observations of (1) children's spontaneous language in the home and neighbourhood, (2) their use of language in construing commonsense knowledge and enacting interpersonal relationships, (3) their move into primary school, and the transition into literacy and educational knowledge, and (4) their subsequent move into secondary school and into the technical knowledge of the disciplines. Where possible I have given specific references; but many of the points raised are generalizations made from various sources among the items listed in the references, especially those of Halliday, Hasan, Martin, Oldenburg, and Painter.

FEATURES OF CHILD LANGUAGE DEVELOPMENT

Feature 1

A human infant engages in symbolic acts, which I have referred to as **acts of meaning**. Children are predisposed, from birth, (a) to address others, and be

addressed by them (i.e., to interact communicatively); and (b) to construe their experience (i.e., to interpret experience by organizing it into meanings). **Signs** are created at the intersection of these two modes of activity. Signs evolve (a) in mediating—or, better, in enacting—interaction with others, and (b) in construing experience into meaning; specifically, in exploring the contradiction between inner and outer experience (between what is perceived as going on “out there” and what is perceived as going on “in here,” within the child’s own consciousness) (cf. Trevarthen, 1980).

Thus, typically, at 0;3 to 0;5 (years;months) babies are “reaching and grasping,” trying to get hold of objects in the exterior domain and to reconcile this with their awareness of the interior domain (they can see the objects). Such an effort provokes the use of a sign, which is then interpreted by the adult caregiver, or an older child, as a demand for explanation; the other responds in turn with an act of meaning. There has been “conversation” before; but this is a different kind of conversation, in which both parties are acting symbolically. A typical example from my own data would be the following, with the child at just under 0;6 (Halliday, 1984a, p. 2):

There is a sudden loud noise from pigeons scattering.

Child [lifts head, looks around, gives high-pitched squeak]

Mother: Yes, those are birds. Pigeons. Aren’t they noisy!

Feature 2

When symbols begin to be established as regular signs, typically at about 0;6 to 0;10, they are characteristically **iconic**: They embody a natural relationship between expression and meaning. Such symbols are created by the child in interactive contexts. Examples from my own data (Halliday, 1979a, p. 173) are:

[grasp object and release] ‘I want (to hold) that’

[touch object lightly, momentarily] ‘I don’t want that’

[touch object firmly for measurable time] ‘go on doing (what you were doing) with that (e.g., throwing it up in the air)’.

There seems to be a clear distinction between these and nonsymbolic acts (e.g., grabbing and pulling, or hitting out of the way); moreover the symbolic acts are clearly addressed to a person, and again the caregivers are tracking and responding: “Oh, you want to hold that yourself, do you?”, “Shall I do that again? all right!”

These particular signs were gestural in expression; others may be vocal, for example, a high tone expressing ‘curiosity’ (construing experience), a low tone ‘togetherness’ (enacting interpersonal relationship). What emerges is a varied repertory of signs, fluid both in meaning and expression but by no means randomly variable, so that the caregivers continue to track and also to respond. The child creates the symbols, using vocal and gestural resources in acting out the

role of learner, and by the same token enabling the “others” to act out their roles as teachers (Oldenburg, 1990; Trevarthen, 1987).

Feature 3

These sets of symbolic acts develop into **systems**. An act of meaning implies a certain choice: If there is a meaning ‘I want’, then there can be a meaning ‘I don’t want’, perhaps also ‘I want very much’, as alternatives. If there is a meaning ‘I’m content’, this can contrast with other states of being: ‘I’m cross’, ‘I’m excited’, and so on. Sets of alternative meanings of this kind form semiotic paradigms called “systems”: Each term in a system excludes, and hence presupposes, the other(s).

This stage when children are construing their signs into sign systems, the protolanguage, typically extends somewhere in the range of 0;8 to 1;4, and it is associated with freedom of movement. Semantically, the systems develop around certain recognizable functions (the **microfunctions**, as I have called them): instrumental and regulatory, where the sign mediates in some other, nonsymbolic act (e.g., ‘give me that!’, ‘sing to me!’); interactional, where the sign sets up and maintains an intimate relationship (‘let’s be together’); and personal, where the sign expresses the child’s own cognitive and affective states (e.g., ‘I like that’, ‘I’m curious about that’). There may also be the beginnings of an imaginative or play function, a ‘let’s pretend!’ sign, often accompanied with laughter (Halliday, 1975, 1978, 1979a).

Although some protolanguage signs may be imitations of adult words, the protolanguage is not yet mother tongue; I have referred to it as “child tongue” (Halliday, 1983; Oldenburg, 1987). Hearing it, one could not yet tell what the mother tongue was going to be (cf. Qiu, 1985, on Chinese children’s protolanguage). Studies by Painter (1984) and Oldenburg (1987) reveal the significance of the protolanguage as a stage in human learning. At the same time, they show its limitations: It cannot create information, and it cannot construct discourse. To do these things it has to be transformed into something else.

Feature 4

The system as a whole is now deconstructed, and reconstructed as a stratified semiotic, that is, with a **grammar** (or, better, because this concept includes vocabulary, a **lexicogrammar**) as intermediary between meaning and expression. The grammar interfaces with a semantics at one edge and with a phonetics, or phonology, at the other. In other words, the protolanguage becomes a language, in the prototypical, adult sense.

This process no doubt took many hundreds or even thousands of generations in the course of linguistic evolution. Children take the step quickly, so that those around are aware of the discontinuity; they say “now he’s beginning to talk!” They have been conversing at length with the child already for 6 months or more, but they do not recognize the protolanguage as “talk.”

The change is highly complex, and needs to be broken down into a number of

analytic components (see also Halliday, 1984b). The grammar opens the way to naming and reference, and hence can function as a theory of human experience. It allows for an ongoing exchange of roles between speaker and listener, and hence can function as the enactment of human relationships. It makes it possible to create discourse (text that is operational in its environment), and hence brings into being the commodity we call “information.” It opens up a universe of meaning, a multidimensional semantic space that can be indefinitely expanded and projected. In other words, the grammar brings into being a semiotic that has unlimited potential for learning with. The next six features relate to this “explosion into grammar”, beginning with one or two localized (but still general) principles and strategies.

Feature 5

The symbols now become **conventional**, or “arbitrary”: Typically, there will no longer be any natural relationship between expression (sound) and meaning. Two conditions were necessary for this step to be taken: (a) that the principle of symbolic action (acts of meaning) should already have been established; and (b) that there was now a level of purely abstract coding—the grammar—mediating between meaning and expression. Only with this step can it become possible to separate reference from analogy (e.g., *quack* is no longer the imitation of the noise of a duck, it is the name of that noise, so we can say *it quacked*), and hence to construe all experience as meaning. Of course there will continue to be iconic symbols in language (and deaf sign, being a visual semiotic, makes very positive use of this resource in its construal of experience). What is important is that the fundamental principle of conventionality has been established.

Feature 6

One of the strategies that children seem to adopt in learning language is that of the **trailer**: a kind of preview of what is going to come. Children take a new step forward, and leave a footprint as it were, showing that they have been there; but then back off for a while before consolidating this step and building it into the overall learning process. It is as if they are satisfying themselves that they will be able to cope with this new demand on their semiotic powers when they need to.

There is often a gap of this kind between the very first acts of meaning, referred to under Feature 1, and the beginning of the protolanguage proper. More noticeably, in the middle of the protolanguage period, a child will suddenly use an expression in a context which seems clearly referential; yet it will be another 2 or 3 months before that same child starts building a system based on referential meaning. Instances of this kind continue through early language development (cf. the example under Feature 7).

When we observe an occurrence of this type we have a name for it: We call it a “fluke,” meaning by that, that it is a purely chance event. There is no doubt that there are such things as flukes, and that they can happen in the course of

learning. But the trailer seems to be a more consistent feature, perhaps having to do especially with the construction of a semiotic system.

Feature 7

The trailer is also perhaps related to another learning strategy, that which I call the **magic gateway**. This is the strategy of finding a special way in, a magic gateway to a different world of meaning. In a sense the magic gateway may be complementary to the trailer: The learner may sense where he or she has to go next, but have to find a route by which to pass.

One example may be found in what I have discussed already; the iconic sign, as a magic gateway between nonsymbolic and symbolic modes of action. But let me give a more specific example from the present context, that of the move into grammar: Where is the magic gateway into the grammar? This is again from my own data, when Nigel was 1;3. He was beginning to incorporate names (Mummy, Daddy, Anna) into his protolanguage, but they were not yet referential; they were still microfunctional signs meaning 'play with me', 'I'm giving this to you', and so on. Then, within three consecutive days he constructed the system shown in Table 1 (cf. Halliday, 1975, pp. 67, 154–155, 1983, p. 210). By separating articulatory from prosodic features in the expression, Nigel had deconstructed the sign; in doing so, he had succeeded in varying one dimension of meaning (one system, in the technical sense) while keeping the other one constant, and in the process marked out one of the two meaning systems as referential. Thus, the combination of "proper name" (Mummy/Daddy/Anna) with mood, or protomood (seeking/finding), provided the magic gateway into this new stratum of lexicogrammar; it enabled him to mean two things at once, so that one of the two meanings became a name. Then (on the trailer principle) he stayed content with that, not following it up until another 10 weeks had gone by.

Feature 8

The next step is that of **generalization**, whereby the principle of naming evolves from "proper name," which is not yet a sufficient condition for a grammar, to "common name," which is the name of a class: of entities, of processes, or of

TABLE 1
Dimensions of Meaning in a Protolanguage System

Expressed by Prosody	"Where are you?" (Mid Level + High Level)	"There you are!" (High Falling + Low Level)
Expressed by Articulation		
"Mummy" [ama]	[ā m ā]	[à m ā]
"Daddy" [dada]	[d ā d ā]	[d à d ā]
"Anna" [an:a]	[ā n: ā]	[à n: ā]

properties (noun, verb, or adjective in a typical early stage of transition into English mother tongue). This is the origin of words, in the technical sense of the word as a lexical item, or lexeme. A “common” (that is, class-naming) word functions first of all as an **annotation** of experience; when the child uses it, it is frequently checked out by the “other” acting as a consultant. For example, the child sees a large object moving along the road on wheels and says “bus.” The caregiver responds, saying “yes, that’s a bus”; or “no, that’s not a bus, it’s a van.” The second kind of response shows that annotating also involves **classifying**.

The problem is that the phenomena of experience tend to be paradigmatically unbounded; there is no obvious distinction between one class and another. (They may also be syntagmatically unbounded, in that it is not clear where they begin and end, although that does not apply to objects like buses!) The lines between ‘car . . . bus . . . van . . . lorry’ are hardly clearer than those between ‘purple . . . blue . . . green . . . yellow’. There may indeed be **objects** of intermediate or mixed class, half van and half lorry, for example; but the name has to be one or the other; since the sign is conventional, we cannot create an intermediate expression between *van* and *lorry*. (As Tigger did, when he was accused of bouncing. “All I did was I coughed,” said Tigger. “He bounced,” said Eeyore. “Well, I sort of boffed,” said Tigger [from A.A. Milne, *The House at Pooh Corner*]. We do of course play with the system in this way, as A.A. Milne was doing, using a mixed expression as metaphor for a mixed class in the content. But even where a new word is created by mixing two expressions, as with *smog* (*smoke* + *fog*), it still classifies; the classification has merely become more delicate.)

A class name is therefore several steps away from a protolinguistic sign. In protolanguage, *mamamama* . . . may mean ‘I want (that)’, then ‘I want mummy to (do/give me that)’, then ‘I want mummy!’ Then, by some such gateway as described previously, it becomes ‘Mummy’; it now refers, so beginning on the transition from protolanguage into language. But since ‘Mummy’ is a unique member of a class, this “proper name” annotates but does not yet classify. Only when “common names” emerge, like *bus* or *run* or *green*, does annotating come to involve classifying; and, by the same token, it also implies **outclassifying**, as in “That’s not a bus, it’s a van,” “That’s not green, it’s blue,” or “Walk, don’t run!”

The system now has the potential for creating information; the more so because one class may include several other classes, thus creating a **taxonomy**. Fruit is a kind of food; berries are a kind of fruit; raspberry is a kind of berry. Early investigators of language development tended to foreground problems of classification; it takes time, of course, for young children to sort out the details, but they have no problem with the taxonomic principle. Words are learnt not as in a dictionary but as in a thesaurus, each one being progressively located in the expanding topological space by reference to the “others” to which it is taxonomically related. (It should perhaps be made explicit, however, that the vocab-

is now also grammaticalized, the nondeclarative then evolving into imperative versus interrogative.

The child has now established the metafunctional principle, that meaning consists in simultaneously construing experience and enacting interpersonal relationships. The mood system is part of the interpersonal grammar: here the meaning is ‘what relationship am I setting up between myself and the listener?’. The transitivity system is part of the experiential grammar; here, the meaning is ‘what aspect of experience am I representing?’. From now on (subject, obviously, to specific localized constraints), any content can combine with any speech function. But the more significant aspect of the metafunctional principle, for learning theory, is that in language (as distinct from protolanguage) it is the **combination of the experiential and the interpersonal** that constitutes an act of meaning. All meaning—and hence all learning—is at once both action and reflection.

We shall see later (Feature 16) that the metafunctional principle also implies a third component of meaning, simultaneous with the other two.

Feature 10

With a semiotic system of this kind, one that is stratified, having a distinct stratum of lexicogrammar as its core, children now have a range of strategies available for expanding their meaning potential; let us call them **semogenic strategies**. Such a grammar defines a multidimensional semantic space, highly elastic, which can be expanded (if we follow the usual representational metaphor) horizontally, vertically, or by a combination of the two.

First, children who have construed a system of this kind can refine further the meanings they have already built up, introducing more delicate distinctions within the same topological region. For example, they can interpose ‘it may be’ between ‘it is’ and ‘it isn’t’; or elaborate ‘go’ into ‘walk, jump, run, climb’ and so on.

Second, they can extend their meaning potential into new semantic domains, areas of experience or forms of interpersonal relationship that were not previously accessible. (They are now moving around freely on two legs, from home to neighbourhood and from family to peer group.) They will use the grammar to explore any field that interests them, and to establish their own *personae* in interaction with others. Much new vocabulary is added on “vertically” in this way; an example from grammar is the move into logical-semantic relations of ‘when’ and ‘if’ and ‘because’ (see Phillips, 1985, for a detailed account of the development of comparison and contrast at this stage in children’s grammar).

The third strategy is really the intersection of these two, which is why it is a very powerful way of expanding a semiotic system; this is the strategy of dissociating associated variables, or deconstructing and recombining, like demanding iced coffee when the alternatives offered are hot coffee and iced tea. We saw under Feature 8 that it was with this strategy that Nigel opened up the road to grammar in the first place. An example from the subsequent phase was his gradual dissociation of polarity from modality: at first certain modals were al-

ways positive (e.g., *might*), others always negative (e.g., *can't*), then at a later stage the two systems became independent.

Feature 11

The last of the effects of grammatical stratification to be mentioned here is the emergence of **information**, that is, imparting meanings that are not already shared by the person addressed. At the beginning of the transition from proto-language, when children are first using language to annotate and classify experience, the particular experience that is being construed in any utterance is one that the addressee is known to have shared. When the child says *green bus*, the context is 'that's a green bus; you saw it too (and can check my wording)'. What children cannot do at this stage is impart the experience to someone who has not shared it. Parents often notice how, if they ask their child after an outing to "tell Granny what you saw," the child is unable to do this. He may look at Granny and remain tongue-tied, or else turn back and tell the parent what they had seen together. But he cannot tell it to Granny; she had not been there to see (cf. Halliday, 1984b; Painter, 1989, pp. 52–57).

As they approach the end of the transition, children learn to create information: to use language not just as a rehearsal of shared experience but as a surrogate. They learn to tell people things they do not already know. This is a complex operation, because it involves using language to "give" a commodity that is itself made of language (as distinct from using language to make an offer, where what is being "given" is a nonlinguistic commodity, some object or service that is independent of the language being used to offer it). Some children actually construe such "telling" with a different grammar: In my own data, from about 1;9 to 2;4, Nigel consistently distinguished between rehearsing an experience that had been shared and imparting an experience to someone who had not shared it with him (Halliday, 1975, pp. 105–106).

Once children can impart information, they also learn to ask for it. The generalized meaning of 'demand', as originally embodied in utterances of the "pragmatic" type, now splits into two: a demand for goods and services, which is how it first evolved, and a demand for information. This distinction is grammaticized as the distinction between imperative and interrogative (where previously there had been a single nondeclarative form). Of course, children have begun asking questions long before they develop an interrogative category of mood; but only of a limited kind, typically asking what something is called, and with limited potential for dialogic learning. Now for the first time learning becomes a two-way semiotic process, based on the reciprocity of learning and teaching. And just as children are predisposed to learn, so parents, and other "others," are predisposed to teach (cf. Hasan & Cloran, 1990, especially Section 5). Lemke (1984) has shown that a theory of learning must take account of the human predisposition to teach—as well as of the teaching function, in a broader sense, that is a feature of the environment as a whole.

Feature 12

Let us return to the notion of a learning gateway. Under Feature 7 I referred to what is undoubtedly the single most critical step in learning language, and arguably the most critical step in the entire experience of learning, namely, the move into grammar; and suggested that since this step involves leaping over many generations of semiotic evolution, children have to find a magic gateway through which to pass.

This move into grammar is a unique event in the life of any individual. But the evidence suggests that the gateway principle has a more general application in language learning. There are numerous smaller steps that have to be taken; and it seems to be the case that, most typically, each critical step in learning language is taken first of all in the interpersonal metafunction—even if its eventual semiotic contexts are going to be primarily experiential.

These terms are being used here in their technical sense in systemic theory, as outlined under Feature 9: The interpersonal is the “active” principle, whereby language enacts interpersonal relationships; the experiential is the “reflective” principle, whereby language construes experience. Here, in fact, it would be appropriate to introduce the more general term **ideational**, encompassing the logical as well as the experiential mode of meaning. It appears that we can recognize a generalized **interpersonal gateway**, whereby new meanings are first construed in interpersonal contexts and only later transferred to ideational ones, experiential and/or logical.

We can identify a number of such “interpersonal occasions” when the meaning potential has been extended in this way, as shown in the following five examples: (1) imparting unknown information, (2) extending into new experiential domains, (3) developing logical-semantic relations, (4) learning abstract terms, and (5) moving into grammatical metaphor.

Imparting Unknown Information

This is the step discussed in the previous section, that of learning to “tell.” Painter (1989, p. 52) recorded the context in which Hal first learnt to impart unshared experience (i.e., give information previously unknown to the listener): She heard a noise from the next room, after which the child ran up to her crying “Bump! Bump!”: ‘you weren’t there to see, but I hurt myself, and I need your sympathy’. We naturally think of information as something inherently experiential, and so, eventually, it will turn out to be, but its origins seem to be interpersonal.

Extending Into New Experiential Domains

Oldenburg (1990) described how Alison, at 2;0, learnt about the principle of sharing. Hasan (1986) cited part of an extended text in which Kristy’s mother talks to Kristy, 3;9, about dying. In the first instance the semantic domain is itself largely interpersonal; in the second, however, it is entirely experiential—but the way in is through interpersonal meanings: Kristy has been upset by observing the death of a moth, and she needs new knowledge for comfort and reassurance.

Developing Logical-Semantic Relations

The logical component of natural languages includes, as a central motif, the grammar's construal of logical-semantic relations, among which cause and condition play a critical part. Such logical-semantic relations are part of the ideational grammar, but, again, they are first built up, it seems, in interpersonal contexts. Phillips (1986) showed how Nigel, at 1;7 to 2;7, developed the potential for hypothetical meanings; examples such as *if you walk on the railway line the train would come and go boomp! and knock you over (you = 'I, me'), if you (= 'I') make it fall on the floor how will Daddy be able to cut it?* are typical of the warnings and threats in which these meanings first appear—modelled for children by adults saying such things to them, like 'don't touch that because it's hot', 'if you don't stop that . . . !', and so on. Hasan's (1992) exploration of rationality in everyday talk shows the same principle at work in the age range 3;6 to 4;0.

Learning Abstract Terms

It seems likely that abstract meanings are first understood when children come to terms with strongly interpersonally oriented expressions such as 'you're a nuisance', 'that's not fair'. Thus, Nigel at 1;10 learnt to use *right* and *wrong* in expressions such as *that not right* (when someone misquoted a verse he knew), *that the wrong way to put your bib* (when it kept falling off the chair), *that not the right record to put on* (when he wanted a different one) (Halliday, 1984a). Cloran's (1989) account of the social construction of gender contains many instances of interpersonal abstractions being foregrounded in discussions between parents and children aged 3;6 to 4;0. The abstract conceptualization of experience is still a source of difficulty at this age, but it is necessary for the move into literacy (cf. Feature 18), and once again, the gateway seems to be through the interpersonal metafunction.

Moving Into Grammatical Metaphor

Likewise, when at a later stage children begin to develop the principle of grammatical metaphor, this appears to have been first construed in interpersonal contexts. Children learn to "unpack" expressions such as *if you'd just keep quiet for a moment* (= 'keep quiet!'); compare examples in Cloran (1989, p. 135) such as "*I don't think Nana wants her blind cord chewed.*" Butt (1989) showed that rhetorical strategies of this kind may themselves become the object of discussion with the child concerned. Such exchanges probably serve as models for subsequent unpacking of ideational metaphors based on nominalization, for example, *in times of engine failure* 'whenever an engine fails' (see Feature 20).

Feature 13

By the **dialectic of system and process** I mean the principle whereby (a) from acts of **meaning** children construe the **system** of language, while at the same time, (b) from the **system** they engender **acts of meaning**. When children learn

language, they are simultaneously processing text into language and activating language into text.

The effect of this ongoing dialectic is a kind of leapfrogging movement: Sometimes an instance will appear to be extending the system, sometimes to be lagging behind. So, for example, when Nigel at 1;8 built up a story about one of the day's events (a goat in the zoo had tried to eat a plastic lid he was clutching), this was a frontier text, going beyond his previous powers of meaning (e.g., the clauses *goat try eat lid*, *goat shouldn't eat lid*). He then routinized this story, repeating it at frequent intervals over a long period with identical phonology and grammar; meanwhile, however, the system had moved on, so that the text had become fossilized at an earlier stage of development (Halliday, 1975, pp. 111–112, 1980).

Firth (1950; cf. Pawley, 1985) pointed out many years ago how much of what we say as adults is similarly routinized, stored in ready-coded form, as what he called our “lines”: It does not emerge each time freshly processed from the system. This is a natural consequence of the way language has been learnt. A language is not a mechanism for producing and understanding text. A language is a system–text continuum, a meaning potential in which ready-coded instances of meaning are complemented by principles for coding what has not been meant before.

Feature 14

The principle of **filtering**, and the “challenge” zone, is that whereby learners decide what is and what is not on their agenda, identifying which aspects of the ongoing phenomena may appropriately be tackled for learning.

Children will attend to text that is ahead of their current semiotic potential, provided it is not too far ahead. They will tackle something that is far enough beyond their reach to be recognized as a challenge, if they have a reasonable chance of succeeding (cf. Vygotsky's “zone of proximal development”). Whatever is too far beyond their powers of meaning they will simply filter out. It is impossible to illustrate this point without locating the example text in the total context of the child's meaning potential at the time; I have given a fairly detailed account of one such example (Halliday, 1975, pp. 134–135) in which Nigel, at 1;8, returns to something his father had said to him earlier in the day. They were looking at a museum clock, often seen before, and his father said: “I wonder why that clock's stopped? I've never known it stopped before. Perhaps they're cleaning it, or mending it.” Later in the day, Nigel asked: *Why that clock stop?* “I don't know,” his father said. “Why do you think?” Nigel said: *Mend it!* It is possible to recognize, in this brief dialogue, a number of features that Nigel has taken up from the earlier discourse and built into his own grammar, and other features, still beyond his reach, that he has effectively filtered out.

Here the learning energy is being concentrated, so to speak, to attack at points that are accessible and ready to yield. The importance of this strategy is that, once a new semiotic quantum is brought into the meaning potential, not only is it

available for instantiation in text, but it is also immediately transformed into a resource for further learning.

Feature 15

Learning a semiotic system means learning its options **together with their relative probabilities**, and so building up a quantitative profile of the whole. This concept is familiar in linguistics with regard to word frequencies: It is accepted that speakers have a rather clear sense of the relative frequency of the words in their mother tongue; for example, in English, that *go* is more frequent than *walk*, and *walk*, in its turn, is more frequent than *stroll*. But remarkably little attention has been paid to probabilities in the grammar.

Grammatical probabilities are no less part of the system of a language; and they are more powerful than lexical probabilities because of their greater generality. Children construe both kinds from the very rich evidence they have around them. By 5 years of age, a child is likely to have heard between half a million and a million clauses, so that, as an inherent aspect of learning the principal grammatical system of the language, he has learnt the relative probabilities of each of their terms. An important corollary of this is that children are able to sequence their learning of the grammar, beginning with those options that stand out as being the more frequent. The longitudinal data suggest clearly that this is what they do, and examples will be found throughout.

It is necessary here to distinguish between quantitatively unmarked (more frequent) and formally unmarked (simpler). In most cases, the two coincide; thus, in polarity (positive/negative), positive is unmarked in both respects, so if children learn the positive first (as they do) this might have to do as much with its formal simplicity as with its frequency. A case where the two are reversed is the system of mood in questions: Here the interrogative is quantitatively unmarked while the declarative is formally unmarked—**as a question** (both on rising tone), *do you like it?* is very much more frequent in adult speech than *you like it?*, as can be attested from Svartvik and Quirk (1980). There is a time, of course, when children have not yet developed the 'question' feature at all; but when they do, they use the interrogative form for some time before introducing the declarative as a marked alternative to it.

It is conceivable that grammatical frequencies in natural languages follow a fairly regular pattern, such that the options in the most general grammatical systems display one or the other of two probability profiles: either equiprobable (e.g., number: singular/plural), or noticeably skew, perhaps by about one order of magnitude (e.g., polarity: positive/negative; Halliday & James, 1993). This would be the quantitative analogue of the distinction between systems having no unmarked term and those having one term unmarked. If this was so, it would have significant consequences for a learner, because a semiotic of this kind would be learner-friendly in a way that one displaying all possible probability profiles would not.

Feature 16

We now return to the metafunctional principle (cf. Features 9 and 12) and consider a third metafunction, the **textual**, which is the resource for creating discourse. I have suggested that learning consists in expanding one's meaning potential, and up to this point, meaning potential has been defined in terms of the ideational (experiential plus logical) and interpersonal metafunctions. The interpersonal component of the grammar is that of "language as action"; this builds up into a rich array of speech functions, modalities, personal forms, keys, and various dimensions of force and attitude by which the speaker enacts immediate social relationships and, more broadly, the whole pattern of the social system with its complexity of roles, statuses, voices, and the like. The experiential component of the grammar is that of "language as reflection"; this expands into a theory of human experience, construing the processes of the "outside world," as well as those of inner consciousness, and (in a related but distinct "logical" component) the logical-semantic relations that may obtain between one process and another. Together these make up a semiotic resource for doing and for understanding **as an integrated mode of activity**.

The intersection of these metafunctions defines a multidimensional semantic space. This becomes operational through being combined with a further component, the **textual**. From about midway through the transition from protolanguage to mother tongue, children begin to create discourse: that is, text that is open-ended and functional in some context of situation. This means that they develop a further set of grammatical resources, learning to structure the clause as a piece of information (a "message"), and also learning to construct semantic relationships above and beyond those construed by the grammatical structure—but still using lexicogrammatical resources: patterns of conjunction, ellipsis, coreference, synonymy, and the like (for an informative case study, see Nelson & Levy, 1987). An early example of a child learning to structure the clause as a message is the following from Nigel at 1;8 (Halliday, 1979b, p. 82). Walking past some road repair work, his mother had exclaimed at the noise made by the pneumatic drill. *Big noise*, said Nigel when they reached home. He often said this as a comment on one of his own raucous yells. "Who makes a big noise?" his mother asked. But this time Nigel was not talking about himself. *Drill make big noise*, he said, giving a marked intonational prominence on the appropriate word *drill*.

These resources constitute a distinct metafunctional component, by which the language creates a semiotic world of its own: a parallel universe, or "virtual reality" in modern terms, that exists only at the level of meaning but serves both as means and as model, or metaphor, for the world of action and experience (see Matthiessen, 1992, for the source of this important insight). Children learn to navigate in this universe, producing and understanding discourse that "hangs together" (coheres with itself) as well as being contextualized by events on the nonsymbolic plane. This step is a prerequisite for construing any kind of theoret-

ical knowledge, because all theories are themselves semiotic constructs, and theory building is a semiotic process.

Feature 17

Related to the last point is the principle of **complementarity** in the grammar. In its ideational metafunction, a natural language is a theory of human experience. But natural language grammars do not present experience in rigid, monosystemic terms. Rather, they frame up a highly elastic space, within which the phenomena of experience can be construed from different angles of vision. I am not talking here about elaborated scientific metalanguages—these do tend to be somewhat rigidified; but about the commonsense grammars of daily life. They embody complementarities of many kinds, contradictory interpretations of some aspect of experience, each illuminating one facet of it, such that the whole is construed in terms of the tension between them. Different languages exploit this potential in different ways; these are some examples drawn from English:

- Number (countable) versus mass (uncountable) as different models of matter and substance (e.g., *a stone/stones* vs. *stone*).
- Aspect (manifesting: realis/irrealis) versus tense (eventuating: past/present/future) as different models of time (e.g., *doing/to do* vs. *did/does/will do*).
- Transitive (action: +/– goal) versus ergative (realization: +/– agency) as different models of material processes (e.g., *they're building/what are they building?* vs. *they're breaking/what's breaking them?*).
- Active versus middle as different models of mental processes (e.g., *it didn't strike me* vs. *I didn't notice it*).

In construing these complementarities children come to see their own experience in depth. Note how Nigel (just 7;0) is playing with transitivity in the following.

“I wish I lived in a caravan with a horse to drive like a pedlar man.” Roger thinks it’s a horse to *ride*. He thinks you can’t drive horses. But horses can drive caravans. He thinks you can’t drive horses—well you can’t, really; but horses can drive caravans—you know, pull them: you can call that driving, can’t you? Roger thinks it’s a horse to ride; but pedlars don’t ride horses—they ride in the caravans, and the horse drives the caravan.

Nigel is interpreting *with a horse to drive* in the original verse both ergatively ‘a horse for me to drive’ and transitively ‘a horse to drive it’. The grammar of daily life is rich in multiple perspectives of this kind.

Feature 18

The next heading concerns **abstractness**, which has particular significance for the development of **literacy**. In making the transition from protolanguage to mother tongue (cf. Feature 8) children learn to generalize: to construe “common” terms, which make reference to a class. This used to be seen as a major problem in learning language; as noted earlier, children have to work at defining class boundaries—but they have no problem with the classifying principle itself, or with that of constructing such classes into taxonomies. It is important to distinguish here, however, between generalization and abstraction, that is, between the opposition of general/specific and that of abstract/concrete. To follow up the example used earlier, *fruit* is more general than *raspberry*, but it is no more abstract. What children cannot cope with, in the early stages of learning language, is abstractness: that is, words of which the referents are abstract entities.

It appears that this threshold is typically crossed at around the age of 4 or 5. As mentioned under Feature 12, it may be that the “magic gateway” is via the interpersonal metafunction, with words such as *fair* in *that’s not fair*; such words have an evaluative feature that is readily associated with concrete actions and behaviour. For example, at 5;2, Nigel was watching a shadow on the wall, and said “That looks like a person, carrying something which is very precious, the shadow.” “Why precious?” his father asked. “Well look,” said Nigel, “he’s got his hands like this,” and he cupped his hands together to make it clear. However that may be, until they learn to exchange abstract meanings children cannot gain entry to education, because without this one cannot become literate. Writing is learnt as a second-order symbolic system, with symbols standing for other symbols; hence the learner has to recognize two sets of abstract entities, and also the abstract relation between them (e.g., *word*, *letter*, *stand for*, *spell*, or analogous terms in other languages and writing systems).

So when children learn to read and write, they have to enter a new phase in their language development, moving on from the general to the abstract. This then enables them to attend to language itself, a necessary condition for becoming a reader and writer (see Rothery, 1989). In the process of becoming literate, they learn to reconstitute language itself into a new, more abstract mode.

Feature 19

Reconstituting language means reconstituting reality: Children have to reinterpret their experience in the new mode of written language. This is not just a matter of mastering a new medium, one made up of marks on paper or screen instead of sound waves in the air. It is mastering a new form of knowledge: written, educational knowledge as against the spoken knowledge of common sense. Because this knowledge is construed in a different kind of language, building it up involves **reconstruction** and **regression**.

Consider the following example of written knowledge from a primary school science text (Vickery et al., 1978):

Animal protection. Most animals have natural enemies that prey upon them. To survive, these animals need some protection from their enemies. Animals protect themselves in many ways.

Some animals rely on their great speed to escape from danger. . . . Animals like snakes and spiders protect themselves with bites and stings, some of which are poisonous. These bites and stings can also help the animals capture food.

Now children know very well by the time they go to school that some animals bite and sting, although they may not think of the stinging ones, mainly insects, as “animals.” But they have to learn it over again, in a different context: as systematic, educational knowledge. They may not even recognize that it is something they know already; partly because of the grammatical metaphor in which it is presented (see Feature 20), but partly also because they have to reconstrue it in the new medium of writing. They have to be able to recall it, in a purely semiotic context (i.e., as classroom knowledge, rather than bush knowledge), and to reproduce it in an acceptable form.

In the first years of schooling these two factors come together: children have to struggle with the written medium, and they have to monitor their own learning process. The result is that when they have to present their knowledge in written form, they typically regress in semiotic age by anything up to 3 years. A teacher may get a class of 7-year-olds, in preparation for a writing task, talking on some topic with a high level of fluency and commonsense understanding; yet, when they come to write about the topic, their text is in the language of a child of 3, for example, *I am a dinosaur. I was hatched out of an egg. Today I was hungry. I ate some leaves.* This kind of semiotic regression may make it easier for children to **reconstrue** their experience in the form of systematic knowledge (Hammond, 1990).

Feature 20

But there is yet another reconstruction still to come: that in terms of **grammatical metaphor**. Children know very well, as already remarked, that animals bite and sting. They also know why. Nigel himself said this, quite unprompted, at age 3;5:

Cats have no else to stop you from trossing them—cats have no other way to stop children from hitting them; so they bite.

Notice how he said it first of all in his own lexicogrammar and then translated it into adult speech. But he could not have expressed it in the way that it is presented in the book. For one thing, children would say *by biting and stinging*,

using a verb instead of a noun to name these actions. In the classroom text, meanings that would typically be expressed by verbs, because they are construed as actions, have been represented instead by nouns: with *bites and stings*. The experience has been reconstrued, in metaphorical terms; but with the metaphor being in the grammar, instead of in the vocabulary like metaphor in its traditional sense (Halliday & Martin, 1993).

A written text is itself a static object (or has been until the advent of computers): It is language to be processed synoptically. Hence it projects a synoptic perspective onto reality: It tells us to view experience like a text, so to speak. In this way writing changed the analogy between language and other domains of experience; it foregrounded the synoptic aspect, reality as object, rather than the dynamic aspect, reality as process, as the spoken language does. This synoptic perspective is then built into the grammar of the written language, in the form of grammatical metaphor: Processes and properties are construed as nouns, instead of as verbs and adjectives. Where the spoken language says *whenever an engine fails, because they can move very fast, . . . happens if people smoke more*, the written language writes *in times of engine failure, rely on their great speed, . . . is caused by increased smoking*.

Pairs of this kind are not synonymous. Each of the two wordings is representing the same phenomenon, but because the prototypical meaning of a noun is a **thing**, when you construe a process or property as a noun you objectify it: endow it with a kind of "thinginess." It is this particular feature which is at the centre of grammatical metaphor; while numerous other, concomitant changes take place, they combine to form a syndrome around such nominalizations. If there was no natural relationship between the semantics and the grammar, the difference between the two kinds of wording would be purely formal and ritualized; but there is such a natural relationship, and so the metaphor brings about a reconstrual of experience, in which reality comes to consist of things rather than doing and happening.

Children apparently do not normally come to grips with grammatical metaphor until they are approaching the age of puberty, say round about the age of 9. We thus have to postulate a three-step model of human semiotic development:

(protolanguage →) generalization → abstractness → metaphor

with a 3- to 5-year gap between the three postinfancy steps. As grammatical generalization is the key for entering into language, and to systematic common-sense knowledge, and grammatical abstractness is the key for entering into literacy, and to primary educational knowledge, so grammatical metaphor is the key for entering into the next level, that of secondary education, and of knowledge that is discipline-based and technical. As Martin (1990) has shown, specialized technical discourse cannot be created without deploying grammatical metaphor. Such discourse evolved as the language of technology and science,

and was molded by the demands of the physical sciences into its modern form; but today it invades almost every register of adult English that is typically written rather than spoken, especially the institutionalized registers of government, industry, finance, commerce, and the like. We are so familiar with wordings like *prolonged exposure will result in rapid deterioration of the item* (from a care label), *he always credits his former big size with much of his career success* (from a television magazine), that we forget how far these are from the language of daily life—or how far the language of daily life has had to evolve for these to become a part of it.

Feature 21

This leads to the final heading, which is that of **synoptic/dynamic complementarity**. All learning—whether learning **language**, learning **through** language, or learning **about** language—involves learning to understand things in more than one way. In a written culture, in which education is part of life, children learn to construe their experience in two complementary modes: the dynamic mode of the everyday commonsense grammar and the synoptic mode of the elaborated written grammar. Any particular **instance**, of any kind of phenomenon, may be interpreted as some product of the two—once the adolescent has transcended the semiotic barrier between them. Modern scientists have become increasingly dissatisfied with their own predominantly “written,” objectified models and often talk of trying to restore the balance, the better to accommodate the dynamic, fluid, and indeterminate aspects of reality (cf. Lemke, 1990, especially chapter 7). They do not know how to do this (I have commented elsewhere on Bohm’s 1980 search for the “rheomode”; cf. Halliday & Martin, 1973, chapter 6). One suggestion we might make, as linguists, is that they should go back and replenish their meaning potential at the fountain of everyday speech.

Teachers often have a powerful intuitive understanding that their pupils need to learn multimodally, using a wide variety of linguistic registers: both those of the written language, which locate them in the metaphorical world of things, and those of the spoken language, which relate what they are learning to the everyday world of doing and happening. The one foregrounds structure and stasis, the other foregrounds function and flow. The kind of complementarity that we have already seen in the grammar (cf. Feature 17) exists also between these two grammatical modes, the congruent commonsense grammar of daily life and the metaphorical grammar of education and of the workplace. This dynamic/synoptic complementarity adds a final critical dimension to the adolescent learner’s semantic space.

SUMMARY

It seems to me that, when we are seeking to understand and to model how children learn, we should not isolate learning **language** (especially using the very

inappropriate metaphor of “language acquisition”) from all other aspects of learning. When the Language Development Project was launched as a national curriculum project in Australia in 1977, I proposed adopting a threefold perspective of “learning language, learning through language, learning about language.” With this formulation I was trying to establish two unifying principles: that we should recognize not only a developmental continuity right through from birth to adult life, with language in home, neighbourhood, primary school, secondary school, and place of work, but also a structural continuity running through all components and processes of learning. The expression “learning through language” was designed to bring out this structural continuity and to locate it with respect to those contexts where the learning is actually focussed on language (cf. Christie, 1989; Cloran, 1989; Rothery, 1989).

It should be possible to capture these two continuities in a theory of learning by seeing learning itself as a semiotic process: learning **is learning to mean**, and to expand one’s meaning potential. The important new initiatives now taking place in language education in Australia (see, e.g., Christie et al., 1992) are exploiting these two dimensions of continuity. The notion of learning as a semiotic process is obviously consistent with verbal learning, which includes all learning in educational contexts and much commonsense learning as well (cf. Hasan, 1992). But even nonverbal learning is learning systems of meaning, whether we envisage learning the rights and duties of kinship or learning to swim or play a musical instrument. This is a characteristic of the human species: once having evolved the power of semiosis, we encode all of our experience in semiotic terms.

The prototypical resource for making meaning is language. Language also functions as the “signifier” for higher level systems of meaning such as scientific theories (Lemke, 1990; Martin, 1991). In this perspective it seems appropriate that a general theory of learning, interpreted as “learning through language,” should be grounded in whatever is known about “learning language.” I have tried in this article to set out some of the salient features of what happens when children learn language, which could be taken account of within the framework of a language-based theory of learning.

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APPENDIX: SUMMARY OF FEATURES

1. Symbolic Acts (“Acts of Meaning”): Starting to construct signs.
2. Iconic (Natural) Symbols: Constructing signs that resemble what they mean.
3. Systems of Symbolic Acts: Organizing signs into paradigms (protolanguage).
4. The Lexicogrammatical Stratum: Constructing a three-level semiotic system (language).
5. Non-Iconic (Conventional) Symbols: Taking up signs that do not resemble their meanings.
6. “Trailer” Strategy: Anticipating a developmental step that is to come.
7. “Magic Gateway” Strategy: Finding a way in to a new activity or to a new understanding.
8. Generalization (Classifying, Taxonomizing): Naming classes (“common” terms) and classes of classes.
9. The “Metafunctional” Principle: Experiential and interpersonal meanings (from single function utterances, either pragmatic [doing] or mathetic [learning], to multi-functional ones, both experiential and interpersonal).
10. Semogenic Strategies: Expanding the meaning potential (refining distinctions, moving into new domains, deconstructing linked variables).
11. Construal of “Information”: From rehearsing shared experience to imparting unshared experience.
12. The Interpersonal “Gateway”: Developing new meanings first in interpersonal contexts.
13. Dialectic of System and Process: Constructing language from text, constructing text from language.
14. Filtering and the “Challenge” Zone: Rejecting what is out of range and working on what is accessible.
15. Probability—The Quantitative Foundation: Construing relative frequencies.
16. Discourse—The Third Metafunction: Construing a parallel world of semiosis.
17. Complementarities: Construing experience from different angles of vision.
18. Abstraction and Literacy: Understanding abstract meanings and moving into the written mode.
19. Reconstruction and Regression: Backing off to an earlier semiotic “moment” while reconstruing both content and expression.
20. Grammatical Metaphor (Nominalizing, Technologizing): From commonsense grammar to the grammar of objects and technical hierarchies.
21. Synoptic/Dynamic Complementarity: Reconciling two semiotic models of human experience.