FEARLESS AND BOLD IN FOLLOWING IDEAS WHEREVER THEY LEAD

THE ELIZABETH BATES MEMORIAL LECTURE

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ABSTRACT

This lecture was given in honour of Elizabeth Bates whose brilliant science and personal generosity had a great impact on the study of language learning disorders. The lecture identifies three new perspectives on the nature and treatment of developmental language disorders and invites the listener or reader to follow Bates' example by investigating these ideas with imagination and boldness. In particular it is argued that advice to families concerning ways that they can facilitate their child's language growth needs to be culture specific; that children with specific language impairments have the capacity for abstract, operational thought and will demonstrate it whenever they can adequately represent the specific content of the problem; and, finally, that specific language impairment is better viewed as a family of disorders that can stem from differing causes depending upon the nature of the language and the nature of the learner.

FEARLESS AND BOLD IN FOLLOWING IDEAS WHEREVER THEY LEAD

The Elizabeth Bates Lecture - 25th Symposium on Research in Child Language Disorders

Judith R. Johnston, The University of British Columbia

I am pleased and honoured to be giving the first Elizabeth Bates lecture at SRCLD. My friendship with Liz began in the mid seventies just as I was beginning work on my dissertation. Liz came to teach at UC Berkeley for a year and to present her ideas on developmental pragmatics. For some months I actively avoided her. I was feeling a bit overwhelmed with semantics, spatial cognition, operating principles, Whorf and Piaget - not to mention Chomsky - and the thought of yet another domain of study was more than I could face. However, since Liz and I had many mutual friends, as well as mutual interests, my good sense finally won out and I invited her out for dinner. Before desert arrived, I had come to realize that whether or not I chose pragmatics as an area of scholarship, it was an area with immense clinical importance. Over a second cup of coffee, Liz and I decided to collaborate in a workshop for speech-language pathologists, and that was the beginning of a friendship that ended too soon.

I could tell many stories about Liz. I recall, for example, the 1980 bi-national seminar on developmental language disorders that Liz and I convened in Rome. That was the conference at which the professional simultaneous translators stormed out in revolt, announcing that Liz talked impossibly fast. We mollified them by promising to monitor Liz's talking speed and signal her to slow down as needed - which we did for the remainder of the week.

Today, however, I want to do more than tell stories. Today we will honour Liz's memory in the way that scholars honour their own - by thinking together. I learned much from Liz. She was generous with her ideas, a knowledgeable mentor, and someone who made me believe in the value of my own work. But most of all, I was inspired by Liz, by her excitement about science, by the breadth of her vision, by her articulate synthesis of facts and ideas from many places.

I have chosen as my theme, a line from Jeff Elman's eulogy: *" Fearless and bold in following ideas wherever they took her....*". What a compelling image: The intellectual explorer, following paths into unknown territory! Today I would like to walk with you for a few minutes down the paths of three ideas. They are ideas that I find interesting and that may even prove to be important. That remains to be seen. But for now, each of them invites us to go further, each of them requires a certain boldness, and each of them is sure to take us to a new place.

KNOWING THE DIFFERENCES

Goals and Activities

The first path began with a 1994 article by Ann Van Kleek on cultural diversity and its implications for SLP practice. In this article, Ann questioned whether interaction patterns seen in

dominant North American cultures should be our only model for advice to families. We provide such advice, not because we believe parents are responsible for their children's language delays, but because children who are poorly equipped for language learning may profit from the conscious intensification of normal interaction patterns. A small but growing body of research shows that it is possible to influence parent-child interaction patterns (e.g., Giralometto et al, 1996), and that the change will accelerate language learning, at least for the early lexicon. However, cultures differ widely in their views on the nature and goals of learning, the position of children in the family, and the proper uses of language. All of this could be expected to translate into very different practices regarding Talk to Children. Perhaps our early interventions would be more effective if we could work within the culture of a client family rather than urging them to be more like us.

#1 Advice to families regarding ways to facilitate language learning would be more effective if it were culture-specific.

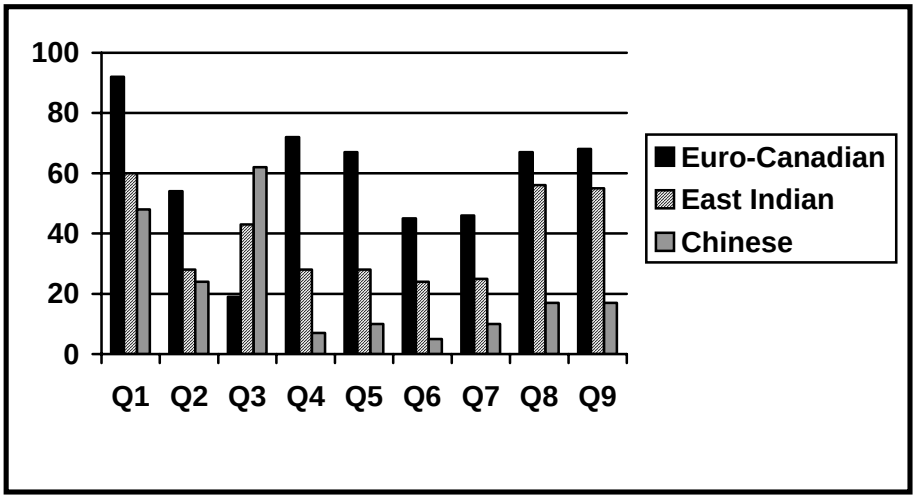
This was an intriguing idea and an opportunity to explore it further came three years ago when the Province funded research and teaching initiatives focused on "underserved special populations". I was at the time associated with a Vancouver agency known as The B.C. Centre for Ability. One of their divisions offers early intervention services to over 600 families representing more than 22 culture and language groups. Although the staff was committed to family-centred, collaborative service, differences in culture and language were compromising this ideal. We decided to address this concern directly in a project called "Knowing the Differences", the primary aims of which were to identify cultural differences that had implications for early intervention and to create alternative practice patterns.

Our initial literature search turned up a surprisingly small number of articles describing child rearing practices or patterns of parent child interaction in the cultures of interest. Reports of cultures such as the Mayan or Kaluli made important contributions to acquisition theory but told us little about the non-western families in our midst. We thus decided to conduct two survey studies of our own to compare the opinions of mothers from the Chinese and East Indian (i.e. persons from India) immigrant communities of Vancouver with the opinions of mothers from the Euro-Canadian culture. To supplement the survey data, we also conducted in-depth interviews with parents from the First Nations (i.e. indigenous peoples) as well as with parents and professionals from the Chinese and East Indian communities. There are other project activities underway, but today I will focus on the data from these two survey studies (Johnston & Wong, 2001; Simmons & Johnston, 2004).

Survey Data

In each of the studies, written surveys were sent out to mothers of young children, contacted through public health units or cultural organizations. The surveys were available either in English or in Cantonese, Hindi or Punjabi. One set of items invited mothers to indicate how strongly they agreed with statements about child rearing, and a second set asked mothers to indicate how frequently they used some particular discourse device. Approximately 50 mothers from each culture group responded. Figure 1 compares the responses to nine survey items by mothers from the three cultures. In general, survey items were designed with particular cultural characteristics in mind and thus

differed from study to study, but these nine items were used in both. The graph indicates the percentage of mothers who said they "strongly agreed" with the statements about child rearing, or who said they used a given discourse strategy "almost always." The Euro-Canadian values are averaged from the two studies. The black bars represent the Euro-Canadian mothers, the crosshatched bars the East Indian mothers, and the grey bars the Chinese mothers.



Even at this gross level of analysis, it is clear that response patterns were quite different for mothers in the three culture groups. Discriminant function analysis indicated that for both surveys, there were subsets of items that could predict group membership with 95% accuracy, accounting for 67-71 % of the variance. The value of the data becomes clear when we look at the content of these nine items.

Q1 Children learn important things while playing.
Q2 It is fine for children to participate in conversation with adults who are not family.
Q3 Speech is important because it helps children make friends/ The most important thing for children to learn is about relationships in the family.

"Q3" actually combines an item from each survey, both of them reflecting the high value placed on social relationships in the non-western cultures. These are also two of the items on which the Euro-Canadian mothers expressed less agreement than the Indian or Chinese mothers. Although few in number, these items are important because they make it unlikely that the remaining data merely indicate a response bias.

The remaining six items concern discourse features that have been widely discussed in the child language literatures and have been viewed by the clinical community as the important, perhaps even necessary, context for optimal language learning. As you can see, mothers in our surveys reported widely different frequencies of use for these discourse patterns, and this remained true even when we

controlled for income and education.

Q4 Follow along with my child's topic of conversation.
Q5 Read a book to my child at bedtime.
Q6 Ask my child to tell another family member what he/she did during the day.
Q7 Repeat what my child says, adding new words.
Q8 Talk with my child about what happened that day when I wasn't there.
Q9 Talk to my child re: what is going on during routine tasks such as dressing or bathing

The relationships between values, beliefs and child rearing practices are admittedly complex. Nevertheless, it does seem that these data on Talk to Children are consonant with what we know about the three cultures and their views on learning, individuation, and achievement. The East Indian cultures, e.g., have some similarity to the Chinese cultures in placing value on relationship, but they are more like the Euro-Canadian culture in being child-centred and holding a more interactive view of learning.

Assuming their validity, these data show us that there is more than one interactional context that will support language development - and that these alternative social contexts can be found, not only in Peru or New Guinea, but in our own multicultural neighbourhoods.

Cultural Competence Revisited

The immediate goal of this project was to describe cultural differences regarding child rearing and Talk to Children, and to identify appropriate changes in service patterns. This remains a feasible and worthwhile goal, albeit one we have not yet reached. To do so, we will need to follow the initial idea yet further (Johnston, Kwok & Harris, 2003). I have four suggestions for those who would join me on this path.

First, we can continue to use surveys, interviews, and focus groups to learn more about the culture differences that have bearing on intervention practice, but we will need to ask informants abut a wider range of parent-child interaction patterns. Our survey data obviously suffer from a failure to capture the natural interaction patterns that ***do*** occur between parents and young children in non-western homes. Lieven (1994), for example, has argued that social routines, elicited imitation and other explicit teaching activities provide an alternate route to language learning. If we had included items regarding these strategies we might be closer to our goal of culturally adapted practice.

Secondly, survey studies, even good ones, are inherently constrained by prior knowledge. What would be even more useful, would be careful observational studies of parent-child interaction in the ethnic communities we serve - the same sorts of studies that produced our ideas about Talk to Children in the first place

Thirdly, whichever methods we may use, the role of cultural interpreters will be crucial. We are not dealing simply with practices, but with the belief systems that give them meaning. A student who was puzzling with me over a factor analysis of the Chinese data posed exactly the right question when she said "maybe they do it for some other reason?" The same parental behaviour can indeed

mean entirely different things in different cultural contexts.

An excellent example of the need for cultural informants occurred recently as we worked through the data from the East Indian mothers. The single item that most differentiated the two cultures in this survey was the statement "Children usually ask too many questions." Seventy percent (70%) of the East Indian mothers strongly agreed with this statement, while only two percent (2%) of the Euro-Canadian mothers strongly agreed. I initially speculated that the East Indian mothers responded in this way because they believed that children should be "seen and not heard", or alternatively because they held an authoritarian view of parent-child interaction. When I convened a panel of East Indian women to discuss our findings, I discovered just how wrong my speculation had been. The panellists explained that for East Indian mothers, young children absolutely "come first" and thus are allowed to express their wishes and needs at anytime, even if this interrupts adult conversations or activities. Given these priorities, it is easy to see why mothers might wish for fewer questions, but this response certainly does not reflect a preference for authoritarian parenting or quiet children.

Work on this project has helped me to appreciate the strength of my own cultural roots. I have come to realize that I am unlikely to be able, no matter how hard I try, to look at the world through the eyes of a Chinese, an East Indian, or a First Nations parent. I need members of the culture to explain the likely reasons for particular response patterns.

Finally, while researchers continue to explore differences in patterns of Talk to Children, clinicians, as always, must find ways to act. The challenge is considerable. Faced with the reality of cultural diversity and committed to the ideal of adapted practice, we must move away from answers and expertise, towards questions. We can ask families about their preferences and values, and work *with* them to enhance the naturally occurring opportunities for language learning. We can do so with the sure knowledge that there are many social patterns capable of supporting language growth, but we will still face the uncertainties of collaborative practice. I once anticipated producing a pamphlet entitled "Guidelines for A Culturally Diverse Best Practice"; it's new title is "Culture Questions. The road to culturally adapted practice will be longer than I first envisioned, and will require persistence as well as boldness, but I remain convinced of the importance and feasibility of the journey.

HOW TO BE BOTH LANGUAGE IMPAIRED AND SMART

I turn now to the second idea. It comes to us courtesy of a ten-year old boy named Jay. At age 5, Jay entered Kindergarten still at the two-word stage, with no prior experience of nursery school or language therapy. In one-to-one sessions with adults, he was sociable and talkative. In the classroom he was a social isolate and seldom spoke. His SLP quickly learned that Jay understood very little of the language addressed to him, and got along by filling his turns with best guesses. The following excerpt was taken from an early conversation that occurred as they were looking through a picture book. (The square brackets surround glosses and notes.)

J Oh, oh, a black sheep. [sheep is white]

E What's this? [pointing to the white sheep]
J A black sheep.
J [starts to turn page]
E Wait, wait, what's this? [pointing to man in a tractor]
J [no response]
E Who's this guy?
J Wrecking a tree. [there is no tree in the picture]
E He's wrecking a tree?
J yeh.

At age nine, Jay showed much the same profile. He was more social and had learned more language, but he still had difficulty both with language formulation and with language comprehension. Here he is explaining the game of soccer, which he plays very well.

J But it hasta have the [there has to be a] goalie [goal], (at school), [so we] hafta play at school.
E You said there are goals?
J Yep.
E What's a goal?
J A goal has a net and there's a bar.
They hafta score in the net, n you do it,
n he saved it [unfinished] –
E Who's he?
J Oh, n (he's, n it saved, n it saved), and someone saved it, that means no goal.
E Can the Goalie use his hands?
J Yep.
E But you said that if [prompt]–
J Only not players [only the players can't].
E So the players can't touch the ball?
J But, yes feet, but not hands.
Only goalies can [use their hands], do drop kicks.

As this excerpt suggests, Jay's discourse typically contains many grammatical errors, and the errors are more likely to occur on longer, syntactically complex utterances. Text comprehension is also a challenge for Jay, and at age 9;6 he earned a score some 4 SD below age expectations on a standardized test of paragraph comprehension.

Further evidence of verbal processing difficulties comes from a recent experiment on Auditory Verbal working memory (Moser & Johnston, 2004). Jay had some success in the simple recall of a list of early-learned words (-.7 sd) but when he was required to reorder the words by referent size before saying them back, he was virtually unable to do the task (-2.5 sd).

This picture of impairment is far from the whole story, however. For despite his significant language and processing problems, Jay is smart - not just in the sense that he has intellectual

potential, but in the sense that he actually solves many intellectual problems as well as other children his age. When tested at age 5 on a nonverbal intelligence test, the Columbia Mental Maturity Scale (Burgemeister, Blum & Lorge, 1972), he earned a nonverbal IQ of 118, responding with impressive confidence and speed. At age 10 his score on the Test of Nonverbal Intelligence (TONI) (Brown, Sherbenou & Johnson, 1997) is still comfortably over 100.

THE ENIGMA OF SLI

Jay embodies the enigma that we have faced for two decades (Leonard, 1998). A substantial number of studies of specific language impairment (SLI) have reported difficulties with nonverbal tasks. The nature and diversity of the tasks has indicated to many of us that limitations in general cognitive processes are responsible for the lack of language proficiency seen in this population. If so, however, these same limitations should affect learning and performance in ***nonverbal*** areas as well. The enigma then is this: If children with SLI have pervasive general cognitive processing problems, how can they be smart?

A BROADER COGNITIVE PROFILE

The special value of case studies is that they allow us, perhaps force us, to consider many factors at the same time. By looking at a child instead of at an experiment, we can think about the ways that skills and capacities function in consort, to create vulnerabilities, affordances, and compensations. With hindsight, I now see that additional facts from Jay's cognitive profile were pointing towards a solution to the enigma.

Jay is at or above grade level in mathematics, and once he began to read, early in Grade 2, he became an excellent print decoder in a matter of months. Visual memory is Jay's area of particular strength. In a recent comparison to age peers, he scored 1.4 and 1.7 SD above the mean in tasks requiring (a) storage of visual information, and (b) storage plus reorganization. Both tasks required recall of the position of novel objects in a grid, but in the second task, children needed to recall all of the locations for members of one object class prior to those for a second object class. Of the 24 children in this study, Jay earned the third highest score in the storage task and the highest score in the storage plus processing task, showing virtually no decline as a result of the added processing load.

Not surprisingly, Jay prefers to use visual imagery when he can. In another study (Colozzo & Johnston, 2004), we put nameable object cues in each cell of the grid to see if children would use them to transform the visual task into a verbal one. After a few trials we asked children how they were remembering the locations. Jay answered "I could say the words, but I don't". Comments on other occasions have provided further clues to his cognitive profile. One day he requested to re-take the paragraph comprehension test. A week earlier, he had been virtually unable to score, but he explained, "I know how to do it now - I have to listen really hard". Some months later, he interrupted his work on a visual memory task to comment "It's like listening". These remarks suggest that Jay was aware of the importance of selective attention, and saw it as a general cognitive process, not one that is tied to language or audition. His listening comprehension score did not in

fact improve, but his metacognitive awareness is noteworthy. Jay is clearly interested in the workings of his own mind and makes conscious decisions about task strategies.

REPRESENTATION VS REASONING

These additional facts about Jay came into focus during conversations with Liz Newton, a researcher from University College London, when she visited my lab this spring. Liz was planning a study of higher level reasoning abilities in children with SLI, and planned to use the classic 4-card problem that you may remember from your undergraduate course in logic. In this problem, you are given four cards (e.g. R H 4 7) and are told that each card has a letter on one side and a number on the other. Then you are asked "Which card(s) do you need to turn over to find out if this set conforms to the rule: All cards with the letter R have the number 4?" As I listened to Liz talk about P and not-P, I recognized a solution to the enigma ---- it was logic, or more broadly, operational thought. My six years of Piagetian exegesis had not been in vain. Behind the particular content of a given reasoning task we find certain common logical or quasi-logical operators, such as "is an instance of", "equal to", or "not". Perhaps children like Jay understand such relations and operations and have the means to be smart - if they can manage to represent the problem.

Consider the 4-card problem a bit further. The task invites you to think about each card in turn, compare the visible information with the information in the rule, imagine all possible back-sides, and make a decision. There is clearly a need here for mental representation of particular facts: you have to keep the rule in mind, and you have to imagine what might be on the other side of the cards. Some of us will use words for these tasks and others of us will use visual imagery. Both are fine, but before we can reason through to the answer, we need to represent these specific letters and numbers. So here is the second idea that opens a door to further investigation:

> **#2 Children with SLI have capacities for operational intelligence and are able to solve many age appropriate reasoning tasks IFF they can sufficiently represent the problem**.

That sounds straightforward enough, but the orientation of this idea actually differs from much of the current literature on SLI in at least three ways. First, note that the ***representations*** I have in mind, are not merely the acquired contents of long-term memory, i.e. the language, conceptual or information structures we refer to as knowledge. I am talking instead about the sustained activation of those mental representations in real time, in the service of a reasoning task. These are representations of the moment that capture the nature of particular objects and events.

Second, this idea invites us to differentiate among various phases of problem solving. Instead of talking about "cognitive processing" limitations in a global fashion, we can focus on the special processing challenges of representation vs reasoning, vs other task phases yet to be identified.

Finally, notice that this idea is less concerned with the *intactness* of mental mechanisms and is more concerned with their instrumentality, and hence with the nature of the task. From this perspective, we ask not whether the cognitive processing capacities of children with SLI are equal to

those of their peers, but whether they are good enough for particular reasoning tasks.

TESTING THE HYPOTHESIS

Returning now to the hypothesis itself, I decided to rummage through some old data looking for evidence that children with SLI are indeed able to solve reasoning tasks IFF they can sufficiently represent the problem**.** Two sorts of evidence emerged.

VISUAL IMAGERY AND IQ

The first evidence concerns the relationship between visual imagery and IQ. Jay's cognitive profile, and his self-analysis suggest that he will be more successful with reasoning tasks when he can use visual imagery or external memory cues to solve a problem. This in turn implies that Jay 's intellectual achievement is closely tied to his visual working memory abilities. I tested this idea further with the data from the 24 children who had participated in our working memory study (Moser & Johnston, 2004). It turned out that nonverbal IQ (TONI) and performance on the two visual working memory tasks were significantly correlated - but only for the children with SLI. For them, correlations ranged from .7 to .9, while for the control group, correlations were only in the range of .2 to .3. Moreover, when we partialled out relative language proficiency (Clinical Evaluation of Language Fundamentals: Formulated Sentences, Semel, Wiig & Secord, 1995), the correlations did not change for children in the SLI group, but did change for the Control group, becoming even weaker. These findings are exactly what we would expect if visual imagery were playing an especially important role in the intellectual achievements of children with SLI.

TASK ANALYSIS

The second line of evidence comes largely from the work of other investigators. I reasoned that if the two major systems of mental representation are visual imagery and language, children with a language impairment should show a particular pattern of performance in nonverbal tasks. They (1) should succeed with tasks that seem to require little or no internal representational, (2) should have difficulty with tasks that seem to require inner language, and (3) given strengths in visual imagery (which are not guaranteed), should succeed on tasks that welcome, or at least accept, imagistic solutions

To test these predictions, I went to the literature and reviewed the findings from 28 nonverbal cognitive tasks that had been used with children with SLI, tasks that required hypothesis testing, conservation of number, mental rotation, anticipation of the fold lines on a piece of paper, judgements about whether a picture belonged in a story, and so on. I divided the tasks according to their representational demands, both in kind and degree. In grouping the tasks, I first paid attention to *whether* internal representation was needed. For tasks that *did* require internal representation, I then formed subgroups according to the likely mode of that representation (i.e. verbal vs. visual vs. either). Finally, for those tasks that seemed amenable to both modes of representation, I created two subdivisions (high vs. low representational demand) based on the availability of external cues, the familiarity of the content, and the degree to which the solution required integration of information

from several separate events. (Parenthetically, I will note that these same factors could have been used to draw distinctions among tasks in the other categories as well.)

Representational Requirements (N of Tasks)	**Examples**	**Predict**	**Confirm? Y/N**	**Ref**
None (2)	Copying block design w visible model.	SLI = CA	2/2	1
(5)	Perceptual discrimination	None	0/5	2
Verbal (3)	Story picture judgements re: inclusion	SLI<CA	2/3	3
	Nonverbal false belief task			4
Visual (6)	Memory for locations	SLI = C	Data not	
	Paper-fold predictions	(if high visual)	available	
Either – High (7)	Inferences re: 'right' dimension	SLI<CA	7/7	5
Either – Low (5)	Complete simple matrix of shapes/size	SLI = CA	5/5	6

Table 1 lists the resulting five groups of tasks, provides examples of each group, and summarizes the predictions about the performance of children with SLI. It also indicates the number of tasks that fell into each group, and the degree to which they confirm or disconfirm the prediction. This task analysis was admittedly subjective and incomplete, but its purpose was only heuristic, i.e. to indicate whether the hypothesis warranted further study. With this in mind, the outcomes of the analysis are encouraging: the experimental findings proved to be in accord with my predictions, with two exceptions. The first exception was the set of low-level perceptual discrimination tasks. These tasks are similar to tasks such as block designs in so far as they use nonverbal content and responses, and do not require the child to create an internal representation of the task materials. These characteristics might suggest that the children with SLI should succeed on these tasks, but by and large, they do not. This is probably best explained by the facts that perceptual discrimination tasks also involve brief stimuli and rapid responses and do not engage the same reasoning processes as the other tasks. If so, they are poor tests of the hypothesis, although they do remind us that some children with SLI may have perceptual problems in addition to difficulties with representation.

The second exception was the set of tasks requiring visual solutions. Here the prediction is that children with SLI who *do* have visual imagery strengths will do well and those without such strengths will not. This prediction thus r*equires* an independent assessment of visual imagery skills. Since such testing is not yet routine, we can neither confirm nor disconfirm the prediction for this set of tasks.

Performance on all but one of the remaining 17 tasks does conform to the predicted patterns. This fact, along with the correlational data mentioned earlier, lends credence to the idea that children like Jay have the operational means to be smart but can only demonstrate this capacity when they are able to meet the challenge of representing the initial problem facts.

NEXT STEPS

As was the case for the first idea, I have some suggestions for those who might like to follow this second idea wherever it leads.

First I think we will need studies that look at cognitive processing from an instrumental perspective, as it serves a reasoning task. This will mean not only creating tasks that reveal limitations, but also systematically varying tasks to discover the conditions for success, i.e. the points and circumstances in which representation becomes good enough to support reasoning. Donlan (2003), for example, recently demonstrated that children with SLI have an operational understanding of the mathematical principle of commutativity. When I asked him about the task they used, it turned out to involve Martian teachers who needed help with marking math papers. What intrigued me even more, however, was Donlan's comment that they had tried many versions of the task that didn't work. What were the characteristics of those tasks, what sorts of representation or processing did they require, and how finally did the Martian teachers make it possible for the children with SLI to demonstrate what they knew?

Secondly, we will need research that defines task difficulty in a multi-dimensional fashion. The parameters I invoked to describe the nonverbal tasks are not new. Taken one at a time, they have been the objects of speculation for years. Now, however, with our interest in notions such as "capacity limitations" and "processing trade-off", we need more complexity and contingency. We might, for example, vary familiarity and/or number of reasoning steps within representational mode.

Finally, we will need research that not only acknowledges individual differences among children with SLI, but uses these differences in a principled fashion to explain findings. We have long known the value of this strategy in regard to children who do and do not have language comprehension problems. Jay's profile suggests that another important distinction among children with SLI may concern the presence or absence of strong visual imagery. Until we learn otherwise, we need to add a test of visual imagery to our routine descriptive battery. We also need to respond to Jay's comment that "he doesn't do it that way", both by exploring metacognitive strengths, and by attending to children's strategies. As experimenters, we may design tasks to engage certain mental activities, but it is the children who make the ultimate decisions - to be verbal, to be visual, to use one or another approach to a task. Factoring these decisions into our experiments will certainly require boldness, not to mention ingenuity. In our lab, we have taken a few steps further down the path by asking children to tell us *how* they are approaching a task. We're not yet sure exactly what to do with this information, but the paper presented by my colleague Paola Colozzo (Colozzo & Johnston, 2004) illustrates the challenges, and importance of, such data.

LOOKING FOR SLI

The topic of individual differences leads me to my third and final idea, one that I will treat more briefly. For decades we have been trying to figure out what specific language impairment *is.* I entered the scene 40 years ago, soon after the Stanford conference that was perhaps the first gathering of researchers on this topic. Since that time we have developed a rich picture of the

language used by children who are not adept learners, and we have made considerable progress in treatment strategies, but the nature of the condition itself remains illusive.

First, we can't figure out what to make of the evident heterogeneity among children with SLI. Is our definition inadequate, or are the differences an important part of the data we need to understand the condition? Second, we are faced with growing evidence of nonspecificity. Do the cognitive problems of many children with SLI merely accompany their language delays, or are they the essential core of the condition? Third, while advances in genetics and imaging technology have moved us beyond the EEG, the new physical data are not yet illuminating. Several different types of genes have been implicated, and the latest results of imaging indicate not a local lesion, but non-localized increases in white matter (Herbert, et al, 2003). Finally, a number of research teams have compared the profiles of various diagnostic groups and have failed to find firm borders (e.g. Rapin, 1996; Rescorla, 2002). Instead, the condition we call SLI seems to shade off into Late Talking on one end of a continuum and into Autism on the other.

I think that no one has captured the challenges of SLI better than Gertrude Stein when she said "The trouble with.... [it] is that when you get there, there isn't any there there. " Now, to be perfectly honest, she was speaking about Oakland, California, but from my vantage point, her remark seems like an apt commentary on our search for SLI. There may indeed be "no there there", but what's more, perhaps there shouldn't be.

The argument goes like this. Let's assume first, as Liz Bates and her co-authors have argued so brilliantly (Elman, et al, 1996), that innateness is a matter of architecture and mechanism, not grammar, and hence that language must be learned. Let's assume also that language-learning patterns, even those that are atypical, result from the interaction of the human mind and a specific set of language data. Thus far, our search for SLI has primarily treated all language data as of a similar type, i.e. as Language, and hence has looked for one sort of mind to explain the atypical language acquisition facts. However, our assumptions would allow us to move in a very different direction.

I first began thinking about the alternative possibility 5 years ago, in conversations with my colleague Anita Wong, and I was reminded of it again as I read a recent report by Bortolini, et al (2002). This team of Italian researchers had identified three possible clinical markers for SLI children learning Italian, namely the definite singular articles, the third person plural present tense verb inflection and direct object clitic pronouns. For our purposes here, what is important about these markers is that they have little obvious connection to the markers identified for English, i.e. the finite verb phrase inflections. The three Italian forms are syntactically diverse, syllabic, and united primarily in the fact that they each disrupt the common prosodic patterns of Italian. None of these characteristics are seen in the verb forms that serve as markers in English. Apparently the language features that prove difficult for Italian children are of a different sort than those that prove difficult for children learning English.

The more I learn about the acquisition of different languages, the more plausible it seems that, as well as the features common to all languages, each language could be presenting its own

challenges to young learners. As summarized in Table 2, we can hypothesize that in English it's the impoverished, and hard-to-perceive, system of verb inflections; in Italian, the strange rhythms of the extra weak syllable; in Turkish, the unusual grammaticization of evidentiality (Aksu-Koc, 1988); and in Cantonese, the challenge of knowing when a constituent can be omitted and the message still be understood (Mathews and Yip, 1994). In so far as the language data are different from language to language, the capabilities and motivations they require may also differ. To play out the one example, learning English morphology appears to require fine-grained auditory perceptual skills in a way that learning Italian morphology does not.

Language	**Feature**	**System**	**But also**
English	Verb inflection	Perception	Degraded system
Italian	'Extra' weak syllables	Motor planning	Auditory data
Turkish	Obligatory marking of evidentiality	Auditory working memory	Synthetic tense-aspect-mood
Cantonese	Optional constituents	Social cognition	Tones

Now extend this argument to children having difficulty with language learning. We can imagine them to be the children who not only have low language proficiencies in general, but who also have cognitive profiles that are not well suited to the particular demands of their language. And who would that be? For English, given the morphological challenge, it may be the child with perceptual problems who is the impaired learner; for Italian, the child with motor planning problems; for Turkish, the child with poor auditory working memory and hence particular difficulties with forms that lack conceptual support; and for Cantonese, the child with poor social cognition. By this line of reasoning, children with SLI from these four language communities would have, on principle, four different cognitive profiles.

I may have the details wrong, but I'm sure you could follow the gist of my argument. In short, I am suggesting that SLI as single, distinct condition of the mind doesn't exist, that Gertrude is right - there is no there there. Instead,

#3 The nature of SLI differs according to the demands of the particular language.

But lets follow this idea one step further into new territory. Thus far I have argued the case in a rather simplistic fashion so as to convey it's general character. Let's try it again in more nuanced fashion. In the rightmost column of Table 2, I have listed some additional language features. Italian inflections may be syllabic and hence easier to perceive than English inflections, but they still require auditory perceptual analysis. Likewise, Cantonese may pose special learning challenges because of the pervasive optionality of its constituents, but it is also a tonal language and hence makes its own sort of perceptual demands. English inflections are difficult to perceive, but they are also part of a degraded paradigm. Although each language may present characteristic learning challenges, these special challenges clearly do not tell the whole story.

Language learning as I understand it, always draws on knowledge and skill from many domains, e.g. social, emotional, cognitive, conceptual, perceptual, and yes, even linguistic. If so, it seems reasonable that there could be more than one source of learning difficulty, even within a single language. So perhaps we need to revise this third idea, and say that

#3 The nature of SLI will differ systematically from language to language and from child to child because of the multi-determinate nature of language learning itself.

While some of you may find this idea disquieting, notice the word "systematically". This is not an unknowable territory, it is only more complex than we have wanted it to be.

NEXT STEPS

The implications of this idea are many, and I have time to sketch just a few. First, it suggests that we treat the category of SLI as a family of disorders, dare I say a 'spectrum' of disorders, all of which are marked by language delays and limitations, but which stem from a range of causal mechanisms. Diversity in the affected language behaviour will be more obvious between languages and language types, but even within a single language we should expect some variety in symptomatology Some of this variety will reflect differences in developmental level. The consequences of limitations in attentional capacity, for example, may first be seen in late onset of speech, later in 'processing tradeoffs' between morphology and syntax, and still later in fractured narrative. Other times, the differences in language behaviour will be due to differences in the nature of the underlying causes.

Secondly, this idea too suggests a new orientation towards heterogeneity. We have tended to ignore it, treat it as a nuisance factor, or attempt to eliminate it by narrowing our definitions. Moreover, when we have addressed heterogeneity directly, we have looked for systematic differences in *language behaviour* rather than systematic differences in *underlying cause*. What we need now are more complex research studies, designed to determine the relative contributions of perceptual, conceptual, social, environmental and emotional factors to difficulties in language learning, both within and across languages.

Finally, for some of us, this idea may mark the end of a road, or at least a sharp left turn. After 45 years, it may be time to stop looking for SLI and concentrate instead on developing the environments that will accelerate language learning. This will mean learning to identify cognitive, social and affective strengths as well as deficits, and discovering how best to help children use these strengths to gain the language tools they need for communication and intellectual growth.

CONCLUSION

And so this first Bates lecture comes to an end. I have introduced three ideas:

#1 Advice to families can be culturally adapted.
#2 Logic and abstract operations are possible for children with SLI - IFF they can represent the facts.

#3 The nature of SLI can differ across languages and learners because language learning is multi-determinate.

Log These are certainly ideas that invite us to follow, to muster a certain boldness and ready ourselves for adventure. In this preliminary tour, we have moved back and forth from "big" questions about language and cognition and mind, to the particulars of individual children and research methodology. I don't think Liz would have been surprised. She and I shared a conviction that child language theory should guide clinical work and that studies of disordered learners should inform acquisition theory. The worlds of theory and practice for us were the same world, one that is complex but knowable. It would be good to have Liz with us again to share the journey as we follow these ideas wherever they may lead. Such is not possible. We can nevertheless be inspired by her energy, her curiosity and her scholarship - and believe with her that the journey is worth taking.

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