

## Forum

### Is your syntactic component really necessary?

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Current, popular views in linguistic science continue to emphasise a pre-eminent role of syntax in models of language and in theories of language evolution, despite the considerable evidence pointing to the importance of semantics. Observations from language pathologies, arising from psychosis, dementia, and stroke, suggest that successful communication is more dependent on semantic than syntactic processes. Linguistic models focusing on syntactic structure have also failed to describe fixed, familiar expressions which are important in normal and impaired communication. Evidence is given to argue that in human verbal communication, verbal meaning can proceed successfully without benefit of grammar, but grammar is ineffectual without meanings. A valid description of human language requires greater attention to semantics.

#### THE ARGUMENT

Recent reflections on a number of years of clinical research in language disorders, which followed as many years of formal linguistic studies, have brought to mind Roger Lewin's (1980) essay in *Science* entitled "Is your brain really necessary?". In that essay, Lewin discusses a conference presentation by Professor John Lorber in 1980 (published as Lorber, 1983), who described persons with gross (50–90%) or extreme (more than 90%) hydrocephalus who were functioning well despite having only a thin rim—the thickness of an orange peel—of cerebral tissue, with 50–90% of the supratentorial intercranial contents consisting of cerebral spinal fluid. In one of a large number of examples, the cranium was 99% fluid in a 25-year-old university student who had a Full Scale IQ of 126 (Verbal IQ 143, Performance IQ 99) and who graduated with honours in mathematics. These observations challenge the prevailing working principles of the field committed to understanding brain-behaviour relationships. Similarly, the view from neurolinguistics suggests that syntax, currently placed by linguistic models at the centre of human language ability, is less required for verbal communication than is meaning, or semantics, which has a relatively peripheral status in linguistic science. Neurolinguistic views suggest that the strong emphasis on syntax is misplaced.

#### CHOMSKY'S REVOLUTION

Since Chomsky's 1957 and 1965 publications, and in the subsequent school of grammatical theory emanating from MIT, syntax has taken the kingpin position, held to be the keystone that makes possible the great arch of human language. Previous to those

two publication dates, historical and then structural-descriptive approaches to the study of language, with their emphases on sounds, phonology or phonemics, and lexical formation, had dominated linguistic thought. During the 1970s and 1980s following the Chomskyan revolution, many scholars-within and outside the generative grammar camp in fact worked to propose and solve compelling questions about the participation of meaning in language structure, but no coherent model or approach for semantics has gained general acceptance (Harris, 1993).

The dominance of transformational-generative grammar, facilitated by Chomsky's leadership, has continued to prevail over the relatively scattered efforts to develop perspectives of language structure that assign a central role to meaning. Linguistics programmes offer phonology and syntax as core courses, but course offerings for semantics are less common, and the content more diversified than phonology or syntax. There is much productive activity in sociolinguistics and pragmatics, and related disciplines focusing on language use, but nothing in the way of a coherent model of meaning has emerged to relate the disparate discoveries in these fields. In fact, "serious open questions still lie at the very foundations of semantics" (Akmajian, Demers, Farmers & Harnish, 1997, p. 214).

The relationship between syntax and semantics persists as "unquestionably one of the most confusing issues in cognitive science" (Schank & Birnbaum, 1984, p. 211). Bates and Goodman (1997) have argued that grammar and lexicon are inseparable. MacDonald, Pearlmutter, and Seidenberg (1994) support a number of other researchers (e.g., Marslen-Wilson, 1987; Tanenhaus & Lucas, 1987) in positing a model whereby lexical representations resolve syntactic ambiguities, reducing the need for syntactic interpretation principles in sentence processing. A necessary access to conceptual pragmatic information in sentence processing is proposed in language comprehension studies by Marslen-Wilson and Tyler (1987) as well as by artificial intelligence approaches (Schank & Birnbaum, 1984), which argue against any notion of a computed independent level of syntactic representation in language processing. Nonetheless, the assumption about the *sine qua non* position of syntax in human language ability is promoted unquestioningly by recent popularisations, leading to claims of a specific cerebral "grammar organ" emergent as the result of a "grammar gene" in human evolution (Pinker, 1995) or a biological development from human tool use to crucial syntactic skills (Lieberman, 1991, 1998).

It is often noted that language and thought are closely bound together; conceptual meanings are associated with semantic, pragmatic, and inferential processes. It is obvious that language serves to express thought and emotions, utilising the identified "components" (phonology, morphology, syntax, semantics) to achieve this goal. Yet in characterising language structure as a vehicle to express ideas, there is a crucial asymmetry of syntax and semantics that is seldom highlighted. Semantics can be studied quite productively and successfully with little reference to grammar, whereas it has proven extremely difficult to build a comprehensive grammar without features of semantics. Put another way, relevant relational meanings find a comfortable place in semantic models, whereas meaning is handled poorly by those describing syntax. This fact has led to several meaning-based grammars (e.g., Goldberg, 1995; Jackendorf, 1984) and models that place more and more "grammatical" information in the lexical items, first proposed in the "unified lexicalist account" (Bresnan, 1982). Sentences have words, and words have meanings, and these meanings typically interact crucially with grammatical structure. On one classic example, only inanimate nouns carrying temporal meanings, such as "time", can "elapse" so that "the tree elapsed" is ungrammatical

because of semantic features. Acknowledgment of semantic facts is necessary to an accurate grammar.

Lexically based theories of language structure (MacDonald et al., 1994) take supportive evidence from child language acquisition, aphasia, and sentence processing by normal subjects (Bates & Goodman, 1997). In the pragmatics of discourse, linguistic and extralinguistic context determines the interpretability of sentences (Miller, 1981); thus in order to communicate, interlocutors must be able to process topic and theme, to perform inferences, and to make guesses about speakers' beliefs and intentions. Although a number of studies demonstrate a significant role of syntactic structure in language processing, as would be expected in certain types of sentences (Kac, 1982; Rayner, Carlson & Frazier, 1983), a large body of work shows that language understanding utilises contextual knowledge to resolve ambiguities (e.g., Marslen-Wilson, 1987; Schank & Birnbaum, 1984). All kinds of meaning come naturally into play in communication; none has been successfully or systematically incorporated into current syntactic models. These facts are well known and generally accepted in linguistic teaching. Despite these facts, and despite considerable progress in the areas of pragmatics and semantics in human communication, the reigning focus in linguistics is on syntax and the ability it putatively provides to form ever more novel sentences.

### THE VIEW FROM NEUROLINGUISTICS

Experience with persons who have suffered language deficits associated with neurological impairment suggests a different perspective with respect to communicative function. Such deficits point to a more crucial role of meaning in human language, taking "capacity to verbally communicate" as a measure of language function. The thought disorder underlying schizophrenic speech affects meaning structures, not grammatical forms, which remain brilliantly intact; in schizophrenia, the derailed processing of meanings leads to severe, devastating communicative dysfunction. Among the dementias, Alzheimer's disease, which initially affects posterior cortical areas and disrupts management of meaning in language (Cummings, Benson, Hill, & Read, 1985; Kempler, 1991), disables communication much more than Parkinson's disease, which affects frontosubcortical areas (Cummings, 1993) and syntactic function (Cummings & Benson, 1989; Grossman et al., 1993; Lieberman, Friedman, & Feldman, 1990).

In aphasia, communicative efficacy is relatively retained in nonfluent "agrammatic" aphasia, compared to the fluent "semantic" aphasias. Granting that semantic and syntactic deficits may fall along a continuum in aphasia (Bates & Goodman, 1997), nonfluent speakers provide more information, typically, than fluent speakers. When asked "What happened to you?", consider a typical Broca-type reply:

of "stroke, and ah, I, hot tub, and ah, two weeks, hospital, and ah, ambulance"

Compare this with a representative response to the same question from a prototypical Wernicke patient of approximately equal severity:

It just suddenly had a feffert and all the feffert had gone with it. It even sted my horn. They took them from earth, you know, to make my fevert nine to severt and now being haid by the, ah, stama-port-noy by nome, which is now forever.

Despite severe paucity of grammatical function words and structures, typical persons with Broca's aphasia can verbally impart communicative content to a listener notably

better than those with Wernicke's aphasia, who, like the Alzheimer's patient, retain an elaborate grammatical scaffolding.

In the spontaneous speech of Alzheimer's patients with a range of scores on the MiniMental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975), several types of syntactic structures were catalogued, not dissimilar to those observed in a matched normal-control group of speakers. All the Alzheimer (AD) patients produced semantic errors in spontaneous speech and in writing to dictation, suggesting that "syntactic ability is significantly better preserved than lexical semantic ability in AD" (Kempler, Curtiss & Jackson, 1987, p. 347). For example, an 82-year-old, female, moderately progressed Alzheimer speaker (MMSE score of 15), describing the "Cookie theft" picture in the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan, 1972) produced the following (Kempler, 1984):

Well, this is a mother that Emily—and she's seeing that things are all run—getting in nice condition. She has two children here but she isn't paying much attention to this boy that's nearly falling over. But otherwise, she seems to be alright. Things are going along. I would not want to have this because it's running out and going onto the floor and I don't know . . ."

A 75-year-old male with Alzheimer's disease who was severely involved (MMSE of 2) still shows some retention of syntactic form, alongside the even more obvious semantic deficiency:

This picture incorporates a certain amount of going and coming, and coming and going, and cheating, and doing the things in the world that . . . some for the uh money on the floor, not worrying about it. Falling over onto the ground . . . Oh, that has the ability to—she has the ability to change the timing and then and then the wind is blowing in the wind, blowing in the floor. Wind is blowing on the canned goods.

Marvelling at the syntactic sequences produced by Alzheimer's and Wernicke's patients does not compare to apprehending the meanings provided by their grammar-impooverished counterparts, Parkinsonian and Broca's patients.

Parkinsonian deficits in syntactic form are more subtle, but consistent reports have appeared. For Parkinsonian spontaneous speech, shorter phrase length (Cummings et al., 1988) and a decrease in syntactic complexity have been reported (Gordon & Illes, 1987; Illes, Metter, Hanson, & Iritani, 1988). However, there is seldom a problem understanding the talk content of the Parkinsonian speaker, as long as the dysarthria is not too much of an impediment.

After many years of experience with neurologically induced language deficits, it is difficult to square the intense linguistic emphasis placed on syntax in human language ability with the relatively worse handicapping inflicted by semantic deficits.

A dramatic example comes from a stroke victim, Mr A, with chronic transcortical sensory aphasia. His presentation matched the description provided by Benson (1979) in that his language ability appeared to be cut off from the "concept area". Word and phrase meanings were unavailable to him as output or input, in written or spoken modes. He could not correctly name items or identify items by name, although he provided fluent and enthusiastic guesses. His response to yes-no questions and to single-stage commands was at chance or nearly random. However, his language disability was essentially missed by caretakers and psychologists working with him in a day treatment programme, because he retained grammatical structures and was able to efficiently communicate social meanings; they concluded he had a memory problem. He correctly used question

and statement forms, as well as many introductory clauses, as is often observed in aphasic speech (in Buckingham, Avakian-Whitaker, & Whitaker, 1975; Code, 1982), such as “I know that the...”; “I think that there’s...”; “I want to...”; “I can...”; “I did not...”. He produced natural-sounding, articulate speech of the sort exemplified below, made up of strings of grammatical and conventional expressions, which he could manipulate:

Mr A: (addressing the clinician) Did you have a nice weekend?

Mr A: (addressing the clinician in LA, who had never mentioned New York): Do you *miss* New York?

Mr A: (addressing the clinician) You’re doing a fantastic job. Sure. I really hope so.

Mr A: (addressing the clinician) I want to ask you something: How am I doing here? Tell me something: How am I *really* doing? Tell me the truth, honey.

Clinician: You’re doing just fine.

Mr A: I’m trying. I really am. I came, I saw, I conquered. I’m starting to catch on to this. I’m doing well. It’s reading, writing, and ’rithmetic.

Repetition in these patients is excellent, as a diagnostic feature of transcortical aphasia. Mr A. had developed to an art the skill of using selected words spoken to him, and working the word or words into his response, grammatically well-formed, leading to conversational interactions such as this:

Q: Now you’re saying you’re from Chicago.

Pt: Yes, I’m from Chicago.

Q: I thought you were from New York.

Pt: Yes, that’s it, I’m from New York. New York.

Q: Well, Mr. A., which is it: Chicago or New York?

Pt: I’m from New York.

With good eye contact and a confident tone, this strategy goes a long way towards giving the impression of intact verbal ability. And like the case reported by Whitaker (1976) of the severely demented, 59-year-old woman (HCEM) who never produced a single meaningful utterance, Mr A. retained explicit grammatical skills. He, like HCEM, was able to correct ungrammatical sentences; he would repeat “I walks to the store” as “I walk to the store” when instructed to say the sentences “right”. He could also complete idioms and other familiar conventional expressions (Van Lancker, 1988). However, he could not verbally impart information—he had no way to manage linguistic meanings. Because meaningful word generation was unavailable to him, I could never find out from him about his activities over the weekend; what he did prior to the stroke; anything about his current or former habits or interests. Despite a large amount of fluent, socially appropriate speech and intact grammar, these are severely language-handicapped patients. Their deficits are selectively linguistic-semantic.

Another insight from neurolinguistics comes from observations in a left hemispherectomised adult. It is assumed that the left cortical hemisphere is specialised not only for speech, but also for the properties of speech and language (e.g., stimuli requiring temporal, analytic, and/or sequential processing) (Bogen, 1969). Claims about intrinsic hemispheric specialisation, as well as findings of impaired grammatical skills in left- as compared with right-hemispherectomised children (Dennis, 1980; Dennis & Kohn, 1975; Dennis & Whitaker, 1976), led us to test BL, a 49-year-old son of two right-handed parents. BL’s left hemisphere was removed at age 5½. At age 21, BL scored 113 Verbal IQ

on the Wechsler Adult Intelligence Scale, and performed in the average range or above on neuropsychological testing (Smith & Sugar, 1975).

When tested in 1997 (Bogen et al., 1998), BL's performance scores on language and visuospatial tests were again average or superior. The only exceptions were the Active–Passive Test (Dennis & Kohn, 1985) and a specially designed Linguistic-Prosodic Test, both of which required syntactic judgements. Thus our results supported Dennis's findings of intrinsically lesser ability of the right hemisphere in tasks requiring processing of linguistic syntax. However, BL's language function in everyday interaction is outstanding. He reads a great deal and has a superior receptive and productive vocabulary, informally as well as on formal testing. Despite a formal deficiency on syntax tests, BL is fluent, articulate, and able to communicate relevant, detailed information efficiently. His case, and others like him, benefiting from the well known but little understood phenomenon of brain plasticity, indicate that the left hemisphere is not necessary, and mild syntactic deficits are no hindrance, to successful verbal communication.

### A MATTER OF EMPHASIS

Whether cachet, political correctness, the attraction of logical intricacy, or whatever, the lure of siren syntax has persisted way beyond the voice of reason pointing in other directions to solve the mysteries of human language. The emphasis on syntax in linguistics has sources that are sociopolitical (influences of trends and persons), practical (the greater convenience of studying formal structure), and substantive (the importance of grammar), as is the case in the dynamics of any prevailing set of scientific tenets (Feyerabend, 1993); uncovering the reasons for contemporary preoccupation with syntax is not the purpose of this essay. Nor is it my intention to propose that most of the attention given grammatical analysis is misguided or ill-conceived. The point is that syntax fever has led, over the years, to myopia, omission, and distortion in commentary about language behaviour. Intellectual excitement placed on a topic is a powerful force in influencing the general view of its importance. There are signs of wearing on this excitement, giving the opportunity to consider other models of language, leading, in particular, to better understanding of lexical operations.

### IT'S REALLY SEMANTICS

Generally, generative syntax has been promoted as the essential source of productivity in human language, or, put another way, the fount of the infinite set of sentences. Sentences are invariably presented in introductory texts to exemplify this productivity, sentences that “probably [have] never before been written or uttered” (Akmajian, Demers, & Hanish, 1984). In that popular linguistics text, one example is:

A man being boiled alive in a pot of stew is in no position to finance a leftist revolution.

Syntactically, the sentence has a subject, subjective complement, a predicate, and a predicate complement (Frances, 1958). The implied point is that grammar—its potential for infinite combinatorial output—accounts for the uniqueness of the example. The combinatorial potential of language in general is, of course, an undeniable point. However, the contribution of the lexical meanings in these types of linguistic examples is highly pertinent. In the example just given, the image is shocking, and the juxtaposition of the ideas is socially unlikely (boiling to death, financing, revolution). Compare the

grammatical shape without the semantics: The X (being X) is (X (to X (an X))); or, at another level, the X is X. The impressive aspect has disappeared. Examples in another typical linguistics text (Trask, 1995, p. 6) to illustrate sentences “it is most unlikely that you have ever encountered” follow the same principles:

1. I find that polythene banjo strings give a most unsatisfactory twang.
2. Luxembourg has invaded New Zealand.
3. A large pink spider wearing sunglasses and wielding a feather duster boogied across the floor.

The grammatical forms of these sentences actually are quite quotidian and probably not uncommonly encountered; again, the alleged uniqueness of these sentences is due to *semantics*, which is not mentioned or discussed, much less highlighted. In sentence 2, change “Luxembourg” to “Germany” and change “New Zealand” to almost any other European country, and you have sentences that have been very frequently encountered.

### SOME ARE, SOME AREN'T (NOVEL)

Not all sentences are novel. This is an additional reason why Pinker's hyperbolic assertion (1995, p. 22) (he calls this a “fundamental fact”) that

... virtually every sentence that a person utters or understands is a brand-new combination of words, appearing for the first time in the history of the universe.

is wrong. A large proportion of utterances (including sentential forms) used in everyday language behaviours are conventional expressions that **MUST** be said in exactly the right (same) way in the appropriate context to constitute “normal” communication. Not to do so signals that the speaker is verbally out of sorts or is using a second language. This is a well known phenomenon.

Over the years, many distinguished linguists have discussed the importance of conventional expressions, such as “I'm on cloud nine”, “Don't let the bedbugs bite”, “I'll be there with bells on”, “What a small world”, “You're going to catch your death of cold”—mainly idioms, speech formulas, and proverbs—and their special manner of incorporating meaning (Fillmore, 1979; Gibbs, 1994; Haiman, 1988; Honeck, 1997; Jespersen, 1933, p. 18; Lakoff, 1973; Makkai, 1972; Mieder, 1984; Pawley & Syder, 1980; Sadock, 1979, pp. 46–63; Searle, 1975). Other categories are fixed order conjunctions such as “salt and pepper”, “signed and sealed”, “rise and shine”; collocations of many varieties (e.g., “sitting pretty”, “run amok”, “rude awakening”, “pack of wolves”); numerous three-part phrases such as “going, going, gone”, “up, up and away” (Kac, 1999). No one has found every last one of these expressions—so far they are countless. Bolinger (1976) asserted that memorised expressions play a significant role at all levels of the grammar—that these unitary expressions interact continuously with rule-governed, newly created output. Fillmore, Kay, and O'Connor (1988), exploring the phrase “let alone” in English, similarly argue that the “realm of idiomaticity” pervades competence, utilising semantic and pragmatic interpretation principles that cannot be handled by formal compositional rules. An interplay of holophrases—whole constructions having complex meanings—with linguistically reanalysed forms has been identified in child language learning (Peters, 1977; Locke, 1997; L.W. Fillmore, 1979). Attempts to characterise the structure of familiar literal expressions have met with mixed success (Katz, 1973; Nunberg, Sag, & Wasow, 1994).

A plea for “serious grammatical consideration” of the “realm of idiomaticity in a language” appears in Fillmore et al. (1988, p. 534).

Little of actual incidence data are available for familiar nonliteral expressions. An exception is found in Haim (1951), who lived in a small village in Germany for several years and catalogued speech formulas, proverbs, and other collocations in actual use. Jay (1980) has tabulated use of cursing in several sampled populations; Gallahorn (1971) recorded use of taboo words during weekly professional meetings of psychiatric ward personnel. On a smaller scale, a recent analysis of the dialogue in the film, *Some Like It Hot*, (Wilder, 1959), catalogued hundreds of familiar, prepackaged social formulas and idioms occurring at the rate of approximately 10 per minute. A few examples are “And I intend to keep it that way”, “Are you crazy or something?”, and “We got time off for good behavior”. The prolixity of fixed expressions, when documented in this single exercise, was astounding. Yet one’s impression while watching the movie is of fast-moving action by characters using natural-sounding talk.

The importance and frequency of conventional expressions, and how they communicate meanings of all kinds, is brushed aside by the current emphasis on newly created expressions allegedly generated by grammatical rules. Conventional expressions can be conceptually and grammatically played with in many ways (Cutting & Bock, 1997; Gibbs, Nayak, & Cutting, 1989; Glucksberg, 1991; Hoffman & Honeck, 1980; Hoffman & Kemper, 1987); how this interplay of unitary and newly created utterance formation and comprehension occurs, and the ubiquity and operation of idiomatic usage, doubtless holds an important key to human management of meaning in communication. In fact, it is arguable that much meaning in human language proceeds with little (in the sense of trivial) or no special contribution from syntactic skills. But this is impossible to discuss without benefit of actual incidence data available for actual syntactic form usage in normal speakers.

## A VIEW FROM LINGUISTIC MODELS

The reigning emphasis on syntax studies has overshadowed unifying progress in these other important processes in verbal communication. Linguists themselves have complained that this formalist emphasis has marginalised linguistic studies, contributing to the removal of academic linguistics in some college environments (LinguistNetwork, 1999). And although, as mentioned earlier, current linguistic views of evolution seek to explain how syntax emerged into view, another perspective of language evolution by Deacon (1997) convincingly places associative, hierarchical meaning systems at the centre and beginning of human language development. But this hypothesis, stating that in evolutionary history meaning was primary and central, and syntactic relations developed secondarily, has had little chance of gaining ground when the prevailing valuation maintains the view of syntactic relations as key to human language.

Some of these comments depend on one’s definition of language and of grammar. If human language is defined as a grammatical system of rules, then, of course, we are committed to a permanent focus on syntactic studies. Human language has frequently been defined more generally as a (systematic) pairing of sound and meaning (Martinet, 1970), a type of structure called “duality of patterning”, whereby a small number of meaningless elements (sounds) combine to produce many meaningful elements (words, phrases, and sentences). If the role of human language is to verbally communicate meaning, then how this is done by the various means at our disposal would appear to be a proper object of study. Interestingly, as the focus of linguistic study turns more towards



communication, despite the hegemony-in-spirit of the Chomskyan school of syntax, more and more meaning-based models are being developed in linguistics and psychology. Increased study of language behaviour may be a factor: an overview of papers presented at major linguistics conferences confirms the amount of research activity in studying features of language use.

The definition of “grammar” has suffered its own systematic ambiguity. It has frequently been used, in generative times, “to refer to the theory of the language”, covering, in that usage, everything in the language faculty that makes it possible “to speak and understand” (e.g., Chomsky, 1997, p. 16). However, the term “grammar” commonly refers to structural relationships, rules, or syntax in language. For example, in the description by Fillmore et al. (1988, p. 503), “most current formal models of grammar assume a limited categorial base and a limited set of configuration types upon which the rules of semantic interpretation are allowed to do their work.” And the “commonly accepted categorial base” has been the main concern of generative grammar. The original assumption of autonomous syntax has not changed through progression from the standard theory to the extended standard theory, through trace and government/binding theories, despite the fact that psycholinguistic studies have cast continuous doubt on its psychological reality (e.g., MacDonald, 1993; Tyler & Marslen-Wilson, 1977). Thus for some time, the proper study of the language faculty, both implicitly and explicitly, has been the study of syntactic relations.

## LINGUISTIC TURNS

There are signs of a shift from this exclusive focus. First, according to Reber (1987), psycholinguistics—as a field devoted to the testing of linguistic theories—suffered a sharp decline due to several factors: rapid turnover of linguistic models, ambivalence in linguistic theory about the role of performance data, and the “uncompromisingly strong version of nativism” espoused by generative grammarians (Reber, 1987, p. 327). Pritchett (1988, p. 539) emphasises the difference between the parser (the language processor) and the competence grammar, stating that “the role of grammatical theory within models of natural language processing has been continually reduced.” Recent findings that probabilities (or biases derived from exposure) at several linguistic levels may figure importantly in sentence processing present a challenge to traditional combinatorial models (MacDonald, 1993; Mitchell, 1994).

Time has not changed the truth in McCauley’s comment that “no proposed grammar for any particular natural language has achieved descriptive adequacy” (1987, p. 347). Others note that the modular view of language isolates it from psychological studies (McCauley, 1987). Trouble between linguistics and psychology may also arise from their different notions of explanation—one related to the strongly rationalist stance of generative linguistics, the other embedded in empiricist trends (Miller, 1990). An essential dissonance may lie in what qualifies within each discipline—generative linguistics versus psychology—as a *fact*.

Similar discontinuities between theory and practice are seen in neurolinguistics. Neurolinguistic observations, which ought to give confirmatory findings, are consistently impervious to the claims of linguistic models featuring grammatical rule systems. There is little about aphasic speech that is supportive of anything about generative linguistics, except for the traditional “level” differences between phonology, syntax, and semantics (and this latter division has been questioned: see later). Syntactic models have fared extremely poorly as tools to study aphasic disorders. Answers to even the simpler

questions—whether or not aphasic speakers have grammatical deficits—are inconsistent and contradictory. Standard aphasic typologies (e.g., Cummings, 1985) provide a much more usable descriptive apparatus. Fluent versus nonfluent aphasic speech, automatic versus propositional speech, comprehension versus production, are dichotomies that pertain better than any classifications provided by the finer elements or processes postulated in generative linguistic studies.

### SYNTAX AS PROCEDURAL KNOWLEDGE (OR “SYNTACTIC STRUCTURES ARE DEEPER THAN WE THOUGHT”)

One seemingly reliable distinction—that between grammatical and semantic deficit in aphasic clinical presentations—has been challenged as artificially drawn. Bates and Goodman (1997) propose a continuum, with lexical deficits predominating across linguistic disorders. Although theirs is a convincing argument, we are left having to explain the apparent sparing of “pure” grammatical forms in some neurological disorders, exemplified earlier. A more careful look at fluent speech samples may shed some light on this question. We can look first at another dichotomy, modal versus referential, which is useful in typing aphasic speech (Nespoulous, Code, Virbel, & Lecours, 1998). Using modal speech, the patient communicates expressions of feeling and attitude (“I want . . .”); these expressions are in contrast to single, substantive word usage, referential speech, which communicates information. Modal speech consists of apparently grammatical or well-formed phrases, many of which are common or conventional expressions, as in these two Wernicke’s aphasic patients (Nespoulous et al., 1998, pp. 312–313) (jargon is indicated in parentheses):

I am very happy to . . . very happy . . . oh, my God!—I am very . . . very well. I must admit that . . . hmmm My God! I have . . . I have . . . I enjoy . . . because . . .—how can I tell you? hmmm . . . I (jargon) . . . I will put—won’t I?—it is silly, really. I will start to . . .

Patient two, answering the question “Have you already been here?”:

O, yes, always . . . Oh . . . The fact is that I had a (jargon) . . . oh . . . what’s the word for that? . . . (jargon) . . . what’s the word? (jargon) . . . I don’t remember how it was exactly . . . Oh, surely, . . . surely . . . yes, certainly.

Frequently occurring expressions and syntactic forms appear here, as they do in the recurrent utterances of severe nonfluent aphasia (Blanken, Wallesch, & Papagno, 1990; Code, 1987, 1989). Some examples from Code (1982, p. 143) are:

I bin to town  
I can’t (2 occurrences)  
I can talk, I can try, I can talk and I try,  
I did not hear  
I told you  
I think one two  
I said  
it’s a pity pity pity  
I want to (2 occurrences)  
I want to one two one two  
I try one two and I can’t and I want to

now wait a minute wait a minute wait a minut;  
 paper and pencil  
 so and so  
 well I know

Comparable examples are given by Blanken and Marini (1997):

*ich bin* (I am)  
*das war wesentlich wichtig gewesen* (this has been essentially important)

The fact that severely nonfluent patients, often carrying a diagnosis of global aphasia, are producing this type of utterance has been perplexing, given the generally held distinction between propositional (newly created) and nonpropositional speech (e.g., Van Lancker, 1973, 1988), which depicts recurrent utterances as overlearned expressions. The question becomes more emphatic in cases of variations on the utterance, as in the German examples in each of two patients:

*ich will arbeiten und lernen* (I want to work and learn);  
*ich will arbeiten und arbeiten* (I want to work and work)

*das ist alles hinten* (it's all in the back);  
*kommt von hinten* (comes from the back);  
*da hinten immer* (back there always)

An analysis of the stereotyped speech of a patient with extensive posterior left hemisphere damage (Buckingham et al., 1975) described preservation of considerable linguistic structure, interspersed with jargon:

I would say that the [jargon] or [jargon]  
 I say right now she doesn't [jargon]  
 Well, the only thing I can say again is [jargon] or [jargon]  
 I think my [jargon]  
 I think that there's an awful lot of [jargon], but I think [jargon]  
 I don't think I can [jargon] and I can't say that they might be what  
 I don't think it's really my [jargon]  
 I know my [jargon]  
 I know that the [jargon]  
 I know somebody here's [jargon]  
 I know that the [jargon] are [jargon] them

Even EC, (Smith, 1966), a right-handed adult who was profoundly aphasic following removal of his left hemisphere for treatment of malignancy, produced four sentence stems during a 6-minute interview a few months following surgery:

I can't  
 that's a  
 I don't  
 I couldn't say in (sic) then

Thus, retention of constructions as well as "rule-governed" construction types is seen in an array of left hemisphere dysfunctions associated with aphasia.

The preserved formal structures in Alzheimer's speech, coupled with the impoverished semantic content, have been described and exemplified previously. A corresponding preservation linked to loss has been described by W. Beatty. Persons with advanced Alzheimer's disease retain a musical or game-playing skill, long past the time that they are able to discuss, or even recognise, the specific cognitive content of the activity. For example, 81-year-old pianist GW, with a clinical diagnosis of Alzheimer's disease, scored 17, 10, and 8 (of 30, over 10 months) on the Mini Mental Examination (MMSE) (Folstein et al., 1975). Other testing, including naming, memory, verbal fluency, and drawings revealed moderate to severe cognitive deficits. GW could still play songs on the piano with considerable proficiency. She also played scales, read brief passages of unfamiliar musical scores, and transposed a familiar melody from right to left hand. She was able to perform the same familiar song by means of the keyboard, singing, and a xylophone (an instrument she had not seen for 11 years). However, she could not identify time or key signatures, chromatic scales, or musical tempo; she could not identify well-known songs or classical works. She could not recognise or recall the titles of Christmas songs, but she could play them (Beatty et al., 1988). Beatty et al. (1994) studied five Alzheimer patients with retained skills for playing contract bridge, canasta, dominoes, trombone, and working jigsaw puzzles. Four of the patients were tested on an array of neuropsychological protocols. Their MMSE scores ranged between 10 and 22. B, the bridge player, scored 10/30 on the MMSE, and 12/60 on the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1983). Despite this severe intellectual deterioration, he plays contract bridge competently. However he is unable to keep score, name or rank the suits or face cards, define "trump", or state how many points are assigned to cards in the bidding system. These cases reveal a stark contrast between the preserved procedural abilities and loss of the cognitive content associated with them, analogous to the linguistic profile with preserved syntactic constructions but loss of semantic knowledge.

In describing the relatively retained syntactic ability in the Alzheimer's patients, Kempler (1991) refers to a "limited number" of syntactic structures and notes that each sentence is "frequent" (p. 104). Aphasic errors on complex syntactic tasks may be attributable to reference to a "default" construction form (Rindfleisch, Reeves, & Kac, 1992). Syntactic sparing in dementia and other neurological disorders, functioning with little or no benefit of semantic, conceptual input, is suggestive of an automaticity in grammatical ability that may be likened to the kinds of abilities identified as procedural learning (Saint-Cyr, Taylor, & Nicholson, 1995). In fact, a strong role of the basal ganglia has been implicated in syntactic processes in several recent studies (e.g., Illes et al., 1988; Lieberman et al., 1992), not only suggesting that deep structure is cerebrally deeper than previously thought, but also that grammatical ability is closer to habitual than novel behaviours (Mishkin, Malamut, & Bachevalier, 1984; Nauta, 1982). In addition to the numerous studies on persons with the subcortical disease associated with Parkinson's disease, investigations of single cases of selective damage to subcortical nuclei have revealed syntactic deficits: Pickett et al.'s (1998) patient with bilateral caudate damage due to hypoxemia, and the group of patients studied by Brunner et al. (1982). In the Brunner et al. study, nonfluent aphasia was severe and chronic only when associated with subcortical lesions, as has been observed by many aphasiologists (e.g., Alexander, Naeser, & Palumbo, 1987; Stuss & Benson, 1986). Interestingly, automatisms and recurrent utterances occurred only in the case of cortical and subcortical lesions in combination.

Bates and Goodman (1997) and others have suggested that so-called agrammatism in Broca's aphasia is primarily a word-retrieval deficit. The syntactic disorders claimed for

Parkinson's disease may be associable more validly with impairments in the initiation, monitoring, and managing functions of the basal ganglia for skilled motoric behaviours (Baev, 1997; Marsden, 1982). For example, Gabrieli (1995, p. 290) attributes to the basal ganglia importance "for psychomotor sequencing performance (motor, cognitive). One may speculate that an essential contribution of the basal ganglia to human learning and memory is to support the speeded execution of component processes of a multistep cognitive or motor action." Of course, the basal ganglia are part of a corticostriatal loop (Cummings, 1993), but there have been some claims that the frontal lobes have primarily a modulating effect on subcortical motor-organisational programs (Ridley, 1994).

The fluent, apparently "grammatical" speech of Alzheimer's (and other dementias), Wernicke's and transcortical sensory aphasia, weak in informational meaning, may deceive us a bit, because we haven't looked carefully at it. In Alzheimer's disease, the basal ganglia remain functional the longest as the disease progresses (Cummings & Benson, 1983). As in "modal" speech, language output in these disorders preserving grammatical form may well be made up of highly frequent sentence "stems" (Pawley & Syder, 1983), frequent and common syntactic structures, and conventional, common expressions, often carrying simple emotional messages. These are the more "automatic", according to Kempler (1991), whereas the more "controlled" are the semantic processes, more vulnerable to neurological compromise. In this view, syntactic output resembles the preserved musical and game-playing skills observed in Alzheimer patients in being habitual and routinised but still, in some sense, "rule-governed" behaviours, now having impoverished cognitive content. In this view, expanding from the "constraint-based" model developed by MacDonald (1993) which gives evidence for an important role of probabilistic information in language processing, the most frequent and most highly probable formal structures are retained in language disorders. Instead it is, then, primarily lexical processes that are damaged.

### AN IRREVERENT CONCLUSION: THE SEMANTIC BASE

Rescue may come from the new interdisciplinary studies. Considerable research in the multidisciplinary studies of neuroscience is converging on a primary role of complex entities of meaning in language processing, acquisition, and breakdown. Generative grammar theories may be catching up with this change, in recently proposing a rejection of rules and constructions as central to human language, in favour of a radical new approach that posits principles and parameters (Chomsky, 1997, p. 18). These shifts portend new and fresh perspectives, as we are in a time when "Neither psychology nor linguistics is dominated by a single theoretical viewpoint" (Carroll, 1999). This allows for broader consideration of language, as in the view of Fillmore et al. (1988), in which pragmatics pervades grammar (p. 503), such that "a large part of a language user's competence is to be described as a repertory of clusters of information including, simultaneously, morphosyntactic patterns, semantic interpretation principles to which these are dedicated, and, in many cases, specific pragmatic functions..." (p. 534).

Here follows a modest proposal. We've seen that semantic creativity is the primary contributor to the novelty in sentence production. We've discussed numerous studies proposing lexical processes as central to language structure and processing. Some of the inconsistencies in cerebral structure-function correlations in aphasia studies may be ameliorated by considering posterior cortical representation with lexical retrieval, subcortical function with negotiation of syntactic form. In Brunner et al.'s study (1982),

posterior cortical damage alone, without accompanying subcortical damage, was sufficient to effect serious and lasting aphasia, whereas Broca's area damage without basal ganglia involvement produced only transient aphasia. That these concepts are complex, and involving lexical as well as sentence form processing, is reflected in the fact that three of these four patients with damage restricted to the postrolandic cortical area carried the diagnosis of Broca's aphasia, with marked word-finding difficulties in spontaneous speech. However, their syntax abilities (using the scale in Goodglass & Kaplan, 1972) were rated higher (4.75) than patients with both postrolandic and subcortical damage (2.8). These various observations, coupled with the apparent diminution of performance involving sentence length and complexity of Parkinson's patients and preservation of these abilities in the Alzheimer's patient, converge on a strong role of the basal ganglia in negotiating syntactic form.

The modest proposal suggests that perhaps an honest and informed field study of ordinary usage in normal speakers will reveal a core repertory of syntactic forms, or form types, available for common communicative needs. Interspersed will be the cache of familiar, unitary expressions, many of which are also submitted to rule-governed variations. The repertory will doubtless differ somewhat from speaker to speaker. These form types become habitual and frequent, susceptible to definable variations, but leave the creative and controlled processes to do the work of lexical selection and arrangement. It would follow from these arguments that the long-held notion of language as occupying the domain of higher cortical function will devolve exclusively on associational semantics.

The ways that brain damage affects language function, accurately viewed, endorse a seminal, central role of meaning in language ability. An evaluation of neurogenic language impairments indicates that, equating severity, deficits to a "meaning component" are more devastating to communication than those of "the syntax component". With respect to two current controversies in linguistic theory—Is there a separate syntactic component? Is syntax central in language processing?—neurolinguistic data support a separate "competence" for a repertory of syntactic forms, but viewed, at least in manifestations of impairment, as habitual skills—also currently known as procedural memory. This conclusion is inevitable from observations in the fluent aphasias of Wernicke's and Alzheimer's patients, and is suggested by residual grammatical constructions in nonfluent aphasia. In understanding language deficits, formal combinatorial processes are less important than semantic ones. More crucial and more compelling in language function or language ability are semantic and conceptual systems, which, when afflicted, create all the aphasic deficits that there are. These observations suggest that syntactic relations grew out of a more primary elaboration of semantic relations. In normal as well as aphasic speech, in many instances of communicative function, *verbal meaning can proceed without benefit of grammar, but grammar is not much use without meanings*. Rather than standing as a paradox for linguistic modelling, this observation is more productively viewed as a reason to shift the focus in research on linguistic structure to meaning.

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*Commentaries on this Lead Paper follow below and the Reply to the Commentaries appears on p. 396.*