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Grammar in Mind and Brain

Explorations in Cognitive Syntax

Paul D. Deane

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Chapter one

Island constraints as evidence for a cognitive theory of grammar

1.1. The fundamental issues

What is the relation of grammar to mind and the brain? This is arguably the fundamental question of modern linguistics. Humans are the only known creatures to evince sophisticated linguistic abilities, and so it is natural to wonder what connection there may be between grammatical competence and other uniquely human abilities: i.e., mathematics and logic, metaphor and music, not to mention more mundane and less uniquely human capacities like memory, categorization and attention. Issues about the nature of mind necessarily raise questions about the structure of the brain, and so we are led to inquire not only about the relation of grammar to mind but about the physical embodiment of grammatical competence in the brain.

These are large questions, whose answers must involve a variety of disciplines: Linguistics, philosophy, cognitive psychology, artificial intelligence research, neurology and in general, cognitive science. And yet there is a widespread conviction that language is the key to the locked room, that if we could fathom the intricacies of language we would have a Rosetta Stone for the study of human cognition. There may be widespread agreement as to the importance of the question: there is not even a whisper of consensus as to the shape of the answer. Despite the welter of claims, however, two essentially opposite views stand out.

The first view stresses continuity between language and other mental capacities. Language is consistently placed in the context of its social and communicative functions. Linguistic structures, processes and categories are viewed as instantiations of the categories, processes and structures which comprise human intelligence. Emphasis is placed upon what Fodor (1983) terms *horizontal* faculties such as memory and attention. Language acquisition is looked upon largely as a learning process; it is assumed that differences between linguistic and nonlinguistic processes are a matter of degree.

The second view stresses discontinuity between core linguistic abilities (i.e., grammar) and other, broader domains. Grammar is isolated and examined as an axiomatic formal system. Linguistic structures, processes and categories are viewed as specialized aspects of what Fodor terms a *vertical* faculty—a faculty concerned with a specific type of knowledge. Language

acquisition is viewed largely as the unfolding of an innately specified bio-program.

The latter position is broadly termed *formalism* and more specifically, Chomskyan rationalism, a view which has held center stage for three decades and has provided the impetus for detailed, insightful analyses of linguistic structure. The former position is associated with such terms as functionalism or cognitive linguistics, views founded on a critique of the formalist position. The two views differ on many issues, among the most important of which are the questions of special vs. general nativism and the autonomy and modularity of grammar.

It is generally agreed, for example, that the properties of grammar involve innate aspects of human cognition. The early, extraordinarily rapid, and highly structured acquisition of language leaves no other conclusion. But it is far from clear whether the innate principles underlying language acquisition are specific to language or constitute general principles of cognitive structure which apply to a variety of different domains. Formalists prefer the former position, functionalists and cognitivists the latter (cf. Lightfoot 1982, 1984; O'Grady 1983, 1986; Putnam 1980).

Similarly, there has been continuing controversy over the question of the autonomy of grammar (what Harnish and Farmer 1984 term the *external modularity* thesis, as opposed to the question of internal modularity, whether the principles of grammar can themselves be divided into autonomous subsystems). Formalists have attempted to defend the thesis that syntactic competence is distinct in principle from the kinds of knowledge which underlie encyclopedic knowledge of the world, and that it can be analyzed independently of considerations of general cognitive structure. Functionalists and cognitivists have argued that syntax cannot be autonomous, that it forms part of a single fabric with other human abilities, as an aspect of general intelligence.

The problem with large questions of this sort is that they are so broad as to leave considerable room for interpretation and debate, raising the prospect of interminable discussion without any progress towards resolution. The formalist position has an advantage in such ruminations, if only because its answers seem to shift the burden of proof onto the functionalist/cognitive position. If grammar is autonomous, if it is based on innate abilities specific to language, then any attempt to relate grammatical theory to broader cognitive capacities is doomed to failure. The only way to falsify the formalist position, therefore, is to produce a working counterexample—a worked out, detailed account of how grammatical knowledge fits into the larger picture, that is, how it is grounded in general cognitive principles and rooted in specific aspects of brain function.

This work is an attempt to discern what such a working counterexample might be like. Its strategy is as follows:

The first goal will be to establish the relevance of cognitive concerns even for core syntactic phenomena. The present chapter will focus on that goal. First, evidence will be presented which militates against a strictly autonomist view of island constraints—a phenomenon which lies at the very core of syntax. Instead, a view will be advanced in which such phenomena depend critically on attentional states and other general cognitive variables. Second, an alternative to strict modularity will be advanced, based on what Lakoff (1987: 283) terms the *Spatialization of Form Hypothesis*, advancing the thesis that the capacity to process syntactic structure is based upon cognitive structures and processes which apply in the first instance to physical objects.

The second goal will be to present an integrated cognitive theory within which it will be possible to elaborate upon the insights gained in Chapter One. Chapter Two will focus on this goal, sketching a general theory which incorporates:

- a) the insights regarding image schemas, conceptual metaphor, and natural categorization embodied in such works as Lakoff and Johnson (1980), Lakoff (1987, 1990) and Johnson (1987).
- b) the insights into memory and recall processes embodied in John Anderson's (1983) theory of cognitive processing.
- c) the basic insights of Sperber and Wilson's (1986) theory of relevance.

The third goal will be to elaborate a cognitively grounded account of syntactic structure. Chapter Three will fulfill this goal by elaborating a detailed syntactic theory based upon the *Spatialization of Form Hypothesis*. According to this hypothesis, syntactic structures are grounded in ordinary spatial thought via conceptual metaphor. That is, constituency is considered an abstract metaphorical projection of the basic PART-WHOLE schema which applies to ordinary physical objects. Similarly, grammatical relations are considered metaphoric projections of the LINK schema which captures the relation between parts of an integrated whole. It will be argued at length that basic grammatical properties emerge as metaphoric inferences out of basic inferential patterns applicable to ordinary physical objects.

A fourth goal will be to explore the consequences of the *Spatialization of Form Hypothesis* for English syntax. Chapter Four will examine crucial grammatical patterns in English, arguing that their properties can be accounted for naturally from the theory sketched in Chapter Three. Several aspects of core grammar will be discussed, including such grammatical elements and constructions as complementizers and INFL, Raising, Equi, and

Tough Movement structures, *that*-trace effects, and Raising to Object structures.

The fifth goal will be to examine the relation between grammatical structure and the management of attention. Chapter Five will examine a variety of linguistic phenomena in which attentional considerations are directly relevant. The chapter will argue that syntactic island constraints can be derived through an interaction of the Spatialization of Form Hypothesis with a general theory of attention.

As a final goal, Chapter Six will apply the theory to the neurology of grammar. Interesting consequences ensue. The Spatialization of Form Hypothesis entails a close connection between bodily experience, spatial thought and grammar, an association which appears to be born out in the fundamental organization of the brain. The inferior parietal lobe of the brain plays a crucial role in linguistic processing, and is also the seat of the body schema and a crucial integrator of spatial information. The chapter therefore advances the *Parietal Hypothesis*, which claims that syntactic competence is normally seated in the left inferior parietal lobe. When this hypothesis is combined with the theory elaborated in Chapters Three and Four, interesting predictions emerge relating specific patterns of syntactic deficit to the location of brain damage, particularly in agrammatic Broca's aphasia.

It is impossible in any work of reasonable length to address all the issues relevant to a hypothesis whose implications and scope are as sweeping as in the present volume. There will no doubt be many places where serious objections and counterarguments will be raised. Even so, there is much to be gained even from the first blurred photographs of an alien landscape: we may locate landing sites for future explorers, or learn at the least what obstacles and barriers will confront them.

1.2. Syntactic autonomy: empirical considerations

The thesis of syntactic autonomy has often been treated as an unnegotiable given, part of the definition of the field rather than as a hypothesis to be accepted or rejected in accord with its empirical success. Yet it is, certainly, a strong hypothesis, ruling out a variety of interactions that we might otherwise expect to find.

Syntactic autonomy is, of course, a special kind of hypothesis, serving to define a framework for analysis. Confronted with an apparent exception to syntactic autonomy, the analyst has many options, including finding an analysis which eliminates the apparent counterexample or redefining the phenomenon so that the exceptional material is no longer analyzed as a matter of syntax *per se*.

For these reasons, it can be difficult to prove that autonomy has been violated. To do so, several constraints must be satisfied: (i) the phenomenon in question must be so central to syntax that it cannot be relegated to another domain (semantics, pragmatics, performance, etc.). (ii) interactions with extrasyntactic variables must be clearly present; (iii) the interaction must be intrinsic to the domain, and not submit to an account in which (for instance) syntactic overgeneration is subject to a pragmatic filter.

Island constraints are usually cited as among the best evidence for syntactic autonomy, and hence for a modular, or at least formal syntactic theory. This has been the dominant interpretation from Ross (1967) on (cf. Bach–Horn 1976; Cattell 1976; Chomsky 1973, 1977a, 1977b, 1980, 1981, 1986). According to these accounts, there are structural limits on the operations of syntactic rules. The most important hypothesis claims that syntactic movement rules can only relate *subjacent* elements—i.e., elements not separated by more than one *bounding node* (e.g., clause or NP boundary). The effect is to place depth limits on syntactic rules, accounting for the ungrammaticality of sentences like the following:

- (1) a. **Who did you know the man that saw?*
[extraction from relative clause]
- b. **Who did you talk to Bill and?*
[extraction from a coordinate structure]

Island constraints are a quintessentially syntactic phenomenon, yet close examination reveals significant correlations and interactions between extraction processes and a variety of semantic, cognitive, and functional variables (Deane 1988a, 1991; Erteschik-Schir–Lappin 1979; Kluender 1990; Kuno 1987; Takami 1989). These studies present a *prima facie* challenge to the thesis of syntactic autonomy.

1.2.1. Extraction from NP: attribution effects

One major class of examples involves exceptional extraction from NP. Typical examples include the following:

- (2) a. *Who did John take a picture of?*
- b. *Who do you have plans for?*
- c. *Which shops do you like the furniture in?*

Sentences like (2) involve extraction from an adjunct of NP—a violation of Ross' Complex NP Constraint, of Subjacency, and of a variety of other strictly

syntactic accounts of island phenomena. The problem is that these sentences involve extraction from an adjunct of NP—a pattern which usually results in ungrammaticality, as in (3):

- (3) **Who did John buy a picture that was for?*

It has long been noted that the NPs which allow exceptional extraction have special semantic properties (Bolinger 1972; Cattell 1979; Kuno 1987). Essentially, the head noun describes an attribute, characteristic, or part of the extracted NP. (4) is Bolinger's example:

- (4) a. *Which store do you own the furniture in?*
 b. **Which garage do you own the car in?*

In (4a), where extraction is possible, there is a clear sense in which furniture, as a kind of permanent fixture, helps to characterize the building in which it has been placed. In (4b), where extraction is unacceptable, no similar relationship holds.

(5) is Cattell's example. In this case, extraction works only if the head noun denotes a part:

- (5) a. *Which car do you like the gears in?*
 b. **Which car do you like the girls in?*

Finally, Kuno (1987) describes the relation as involving attribution. Specifically he claims that extraction from NP is possible whenever the head noun denotes an attribute of the extracted NP. Thus, extraction is possible in (6), where the head names an attribute, but not in (7), where the relationship is reversed:

- (6) a. *I have forgotten the name of that person.*
 b. *Who have you forgotten the name of?*
- (7) a. *I know people with the names Sue, Jeff and George.*
 b. **Which names do you know people with?*

Deane (1991) supports this interpretation at length, arguing that exceptional extraction is licensed when the head noun denotes an *attribute* and the extracted NP denotes what Langacker (1987, 1: 147-150) terms the *cognitive domain* against which the attribute is defined. There are a variety of NPs which allow extraction of an adjunct, as (8) illustrates:

- (8) a. *Which newspapers do we maintain strict editorial control over?*
 b. *Which apartments do we have security keys to?*
 c. *Which reserve divisions do you know the secret locations of?*
 d. *Which girls did you notice shapely legs on?*
 e. *Which wines did you praise the excellent flavor of?*
 f. *Which books did you enjoy the varied contents of?*
 g. *Which judgements were there significant variations in?*
 h. *What did you give me a choice about?*
 i. *Who were you astonished at the incredible treachery of?*
 j. *Which products did you praise the high quality of?*
 k. *Which subjects did you discuss the controversial status of?*

Deane (1991) argues that there is an underlying unity among these examples which can be revealed by inverting the attribute and domain nouns, in which case the resulting NPs employ one of two specialized prepositions:

- (9) a. *newspapers with strict editorial control*
 b. *apartments with security keys*
 c. *reserve divisions with secret locations*
 d. *girls with shapely legs*
 e. *wines with excellent flavors*
 f. *books with varied contents*
 g. *judgements with significant variations*
 h. *participation with no choice*
- (10) a. *someone of incredible treachery*
 b. *products of high quality*
 c. *subjects of controversial status*

Essentially, the preposition *with* is used in (9) to identify attributes of the type traditionally termed *possessions*, whereas the preposition *of* is employed in (10) to identify attributes of the type traditionally termed *qualities*. Deane (1991) terms these uses possessive *with* and predicative *of*. Consider (11) and (12):

- (11) a. **How much editorial control do you publish a newspaper with?*
 b. **What sort of security keys do you have an apartment with?*
 c. **Which locations do you have divisions with?*
 d. **What kinds of legs do you like girls with?*
 e. **What flavor do you like a wine with?*
 f. **What kind of contents do you like a book with?*
 g. **How much variation do you accept judgements with?*
 h. **How much choice do you allow participation with?*

- (12) a. **How much treachery did he commit acts of?*
 b. **How high a quality will you buy sugarcane of?*
 c. **How high a status do you read books of?*

As (11) and (12) illustrate, possessions and qualities cannot be extracted, unlike their counterparts in (8).

The data reviewed thus far suggest a correlation between extraction and semantic variables. They do not in and of themselves present counterevidence to the thesis of syntactic autonomy. Rather, these patterns are problematic because every attempt to reconcile them with the thesis of syntactic autonomy has failed, as can be gleaned from the literature reviews in Kuno (1987), Takami (1989) and Deane (1991). No syntactic generalization seems to account for the data.

Perhaps the most obvious hypothesis would claim that extraction is possible from complements but not from modifiers. In such an account, possessive *with* and predicative *of* would be analyzed as modifiers, not as complements (as many of the PPs in (8) could reasonably be analyzed). It could then be argued that this structural difference is critical: that modifiers of NP are always islands, whereas PP complements of NP marginally allow extraction.

There are two problems with this suggestion. The first problem is that it is inaccurate, except as a statistical generalization. Sentences like (13), for instance, both contain the preposition *in* used as a modifier, yet only (13a) is acceptable:

- (13) a. *Which store did you buy [the furniture in]*
 b. **Which crate did you buy [the furniture in]?*

Even predicative *with* allows extraction at least marginally in cases like the following:¹

- (14) *Arnold Schwarzenegger has the kind of muscles that your average red-blooded American male just dreams of heroes with.*

Extraction does seem more frequent with complements than with modifiers, but it is not possible to predict the distribution of exceptional extraction from the complement/modifier distinction.

Remaining proposals share one key characteristic: they place the relevant adjunct outside its apparent matrix NP when extraction takes place, thereby salvaging the generalization that extraction is impossible from adjuncts of NP. The most frequent suggestion assumes that there is a reanalysis rule which moves the PP out of its matrix NP (Chomsky 1977b; Koster 1978).

Another proposal has suggested that the PP is never an adjunct of NP (Grosu 1978). Deane (1991) argues that these proposals share two major flaws: first, they cannot predict which NPs are subject to the special rules they postulate without allowing the rules to be semantically triggered; second, they cannot account for the full range of exceptional extraction. There are sentences involving what Deane (1988a) terms *deep extraction*, with elements being extracted across two, three, or even four levels of embedding with NP. The following examples from Deane (1988a, 1991) are typical. (15) illustrates extraction across two levels of embedding within NP, (16), across three levels, and (17), across four and five levels.

- (15) a. *Which NPs are there unusual possibilities for extraction from?*
 b. *?This is one newspaper that the editor exercises strict control over the publication of.*
 c. *Which laws do you advocate an end to the enforcement of?*
 d. *Which issues are you prepared to discuss the full range of opinions about?*
 e. *Which games have you discovered workable strategies for victory in?*
- (16) a. *Which committee did he have aspirations for appointment to the chairmanship of?*
 b. *Which pages does the editor exercise strict control over the height of the lettering on?*
 c. *At the annual convention, there were several games that the experts proposed alterations to the rules for victory in.*
- (17) (In a context and sarcastic tone of voice which imply that Grice's maxim of manner is being violated on purpose:)
 a. *My dear sir, this is the only committee that I have seen fit to extend recognition to your aspirations for appointment to the chairmanship of.*
 b. *Very well, O Genius, if success at strange pastimes like playing variable rule games is how you wish to establish your credentials, then tell me: which variable rule games have YOU devised strategies for the exploitation of alterations to the rules for victory in?*

These sentences cannot be assimilated to Chomsky's, Koster's, or Grosu's proposals without requiring rules so powerful as to render the whole account vacuous. There would be little point in postulating island constraints if the grammar contained readjustment or association mechanisms which allowed the grammar to eliminate two, three or even more levels of embedding within NP.

1.2.2 Extraction from NP in light verb constructions

Another class of exceptions arises with what is now generally termed the *light verb* construction. The light verb construction is built by combining three elements: (i) a so-called *light verb* like *make* or *have*; (ii) an abstract noun like *claim*, or *hope*; (iii) a phrasal modifier of the noun which supplies most of the actual content of the sentence. The following are typical examples of the construction:

- (18) a. *John made the claim that he was happy.*
 b. *Mary has hopes that she will win the championship.*
 c. *They have a chance to tell us about their plans.*
 d. *They have opinions about politics.*
 e. *They cast votes for their favorite candidate.*

The light verb construction is set apart semantically by the fact that it usually can be paraphrased by similar sentences with a verb plus complement structure:

- (19) a. *John claimed that he was happy.*
 b. *Mary hopes that she will win the championship.*
 c. *They are enabled to tell us about their plans.*
 d. *They voted for their favorite candidates.*

As early as Ross (1967) it was noted that the light verb construction allows extraction, a pattern which is ruled out if we substitute verbs with more specific semantic content:

- (20) a. *How much money are you making the claim that the company squandered?*
 b. **How much money are you discussing the claim that the company squandered?*

It was thus natural for Ross (1967) to analyze sentences like (18) and (20) as involving a reanalysis rule in which V–NP sequences like *make a claim*, *have hopes*, etc., are restructured as complex verbs, giving the sentences in (20) exactly the same structure as their counterparts in (19). Similar effects have been achieved in recent versions of Government-Binding theory through the assumption that light verbs assign no theta-roles of their own, but instead

assign roles that are implicit in their object nouns (cf. Grimshaw—Mester 1988).

Syntactic analyses of this sort presume that the light verb construction is discontinuous from ordinary verb—object structures. This is a questionable assumption. For example, Deane (1991) cites sets of sentences like the following, where there is a gradient of acceptability:

- (21) a. *Which posts did you get an appointment to?*
 b. *Which posts did you seek an appointment to?*
 c. *Which posts did you refuse an appointment to?*
 d. *?Which posts did you appreciate an appointment to?*
 e. *?Which posts did you discuss an appointment to?*
 f. **Which posts did you describe an appointment to?*
 g. **Which posts did you study an appointment to?*
- (22) a. *Which subject do you have opinions about?*
 b. *Which subject were we expressing opinions about?*
 c. *?Which subject were we examining opinions about?*
 d. *??Which subject were we describing opinions about?*
 e. **Which subjects were we overhearing opinions about?*
- (23) a. *Who did you cast votes for the impeachment of?*
 b. *(?)Who did you find votes for the impeachment of?*
 c. *?Who did you buy votes for the impeachment of?*
 d. *??Who did you criticize votes for the impeachment of?*
 e. **Who did you describe votes for the impeachment of?*

Similar results can be noted even for examples like (24) with a complement clause:

- (24) a. *Who did you make the claim that I was acquainted with?*
 b. *Who did you advance the claim that I was acquainted with?*
 c. *?Who did you reject the claim that I was acquainted with?*
 d. *??Who did you discuss the claim that I was acquainted with?*
 e. **Who did you write down the claim that I was acquainted with?*

The gradience of the phenomenon is itself cause for doubt whether a purely syntactic analysis can be upheld. If light verbs differ in their grammatical properties as much as syntactic analyses claim, it is not obvious how one would account for gradients like those given above. Equally crucially, there is evidence for the relevance of such semantic variables as framing.

Consider the fully acceptable sentences in (21) through (24). In each case, there is a clear redundancy built into the phrase. Claims are the sorts of things that one makes or advances; votes are the sorts of thing that one casts; opinions are the sorts of things that one has or discusses; appointments to posts are the sorts of things one gets, seeks, or even refuses. This is consistent, of course, with the fact that light verbs make minimal, highly abstract semantic contributions. But note what happens with the borderline cases. They appear to be understood in terms of the same semantic frame as the fully acceptable cases. For example, to discuss appointment to a post is the same as to discuss getting appointed to a post. In the same way, to examine an opinion is to discuss it, and to buy a vote is to buy the way it is cast. The least acceptable sentences are those which are not easily construed in terms of the relevant frame. The connections between studying and appointment, voting and describing, claiming and writing are less than automatic to say the least.

Other properties of the light verb construction support the above interpretation. Various authors (Deane 1988a, 1991; Takami 1989) have noted that the acceptability of extraction is often improved considerably if the extracted phrase contains or refers back to a lexical noun. Contrasts like the following are typical:

- (25) a. *?*What did we discuss the claim that anthropologists despise?*
 b. *What view of human nature did we discuss the claim that anthropologists despise?*

If semantic frames can make it easier to parse an extraction structure, then there is a ready explanation for the acceptability of (25b): its structure guarantees that the relevant frames will be cued before the extraction structure has to be processed.

It has also been noted (Ross 1967) that the abstract noun in a light verb construction is implicitly controlled by the subject. That is, sentences like (21a), (22a), (23a) and (24a) are readily paraphrased with a possessive determiner referring back to the subject:

- (26) a. *Which posts did you get your appointment to?*
 b. *Which subject do you have your own opinion about?*
 c. *Who did you cast your vote for the impeachment of?*
 d. *Who did you make your claim that I was acquainted with?*

The ability of speakers to infer this relationship implies that speakers already know that appointments are things that one gets for oneself, that one has one's own opinion, that one casts one's own vote, and so forth. In other

words, there is every reason to believe that light verb constructions are construed directly in terms of background knowledge, or semantic frames, evoked by the object noun.

It is possible in fact to demonstrate rigorously exactly what role semantic frames play in sentences like those given above. Wheeler (1988) sets forth a variety of tests which can be applied to determine whether information is or is a matter of semantic framing. We shall apply these tests to the semantic frame of making claims about subjects to illustrate just how intimately the possibility of extraction can interact with the content of the relevant semantic frame.

Wheeler proposes that collocational restrictions may be used as a first test, since information which belongs together conceptually is likely to be used together linguistically. Let us therefore begin by examining sentences like (24a) and (24b) to see what collocational properties they exhibit. We shall focus on the relation between the verb and its object.

Verbs like *make* are quite general in meaning, so collocational tests would reveal little for that verb. Collocational patterns for the verb *advance* in the abstract sense of (24b) are rather more revealing. In this sense, *advance* collocates with abstract nouns, especially speech-act nominalizations:

- (27) *They advanced—*
 a. *a claim*
 b. *a suggestion*
 c. *a proposal*
 d. *an idea*

In short, *advance* collocates with speech-act nouns and with other abstract nouns (like *idea*) which may readily be construed in speech-act terms. It therefore falls into the same collocational class with such verbs as *retract* and *defend*:

- (28) a. *They retracted a claim, suggestion, proposal, idea.*
 b. *They defended a claim, suggestion, proposal, idea.*
- (29) a. *Which spies has he retracted the claim that I am acquainted with?*
 b. *Which spies has he defended the claim that I am acquainted with?*

As (29) illustrates, while these are not light verbs *per se* they appear to allow extraction about as easily as the verb *advance*—i.e., not as well as with a light verb, but within the pale of acceptability:

Certain other verbs, such as *reject* and *discuss*, also accept speech-act nominalizations as objects, but yield less acceptable results under extraction.

They have other properties of interest. To begin with, their object nouns are not construed as under subject control. That is, the object nouns in sentences like (30) are ordinarily construed as referring to speech acts not of the subject but of some other party:

- (30) a. *I rejected the claim, suggestion, proposal, etc.*
 b. *I discussed the claim, suggestion, proposal, etc.*

The loss of implicit subject control renders sentences like (30) less like the light verb construction, and also reduces their acceptability under extraction. And yet, at the same time, there is some reason to believe that these sentences are still being construed in terms of a speech-act frame. The subject may not denote the speaker, but it arguably denotes an addressee to whom the claim, suggestion, etc. has been directed. However, they describe the reaction of the addressee to the speech act. In terms of Austin's theory of speech acts (Austin 1975), the verbs describe perlocutionary acts, not the speech act itself. In other words, the sentences may in fact be construed in terms of a speech-act frame, but the information which must be supplied is arguably peripheral to the frame.

Finally, consider a verb like *write*. The verb itself describes a physical activity, one which may readily lend itself to the performance of such speech acts as making claims or advancing suggestions, but which need not involve the performance of a speech act at all. It is, in Austin's terms, a mere locutionary act. It may reasonably be argued that the clause as a whole is not construed in terms of a speech-act frame, even though its object is a speech-act noun. It is thus of great interest that sentences like (24e) are essentially unacceptable.

Wheeler's second test is context repair or construal, which occurs when an expression shifts from its expected interpretation in order to assimilate to information from a frame. For example, an expression like *under the tree* is normally interpreted in ways compatible with human interaction with trees—and not strictly literally. Such construal is arguably present in many of the examples discussed above. It may also be observed in the use of general abstract nouns like *idea* or *thought*. Sentences like (31) are entirely acceptable. In this context—after verbs like *advance* or *defend*—it is possible to construe nouns like *thought* and *idea* as expressing speech acts; that is, (31) has essentially similar import to (32):

- (31) a. *I advanced the thought that he should resign.*
 b. *I defended the idea that he should resign.*
- (32) a. *I advanced the suggestion that he should resign.*
 b. *I defended the proposal that he should resign.*

In other words, there is a metonymic pattern in which propositional nouns are construed as speech-act nouns; the two senses are connected by their common propositional content.

This pattern is only possible after verbs like *advance* and *defend*, whose abstract senses arguably evoke a speech-act frame. A light verb like *make* is unlikely to evoke any kind of frame by itself, in which case the metonymic interpretation is absent:

- (33) a. *I made the suggestion that he should resign.*
 b. **I made the thought that he should resign.*
- (34) a. *I made the proposal that he should resign.*
 b. **I made the idea that he should resign.*

Such patterns provide evidence that abstract senses of verbs like *advance* evoke the same frame as the nouns which usually function as their objects, and hence support the claim that the light verbs which can be used to paraphrase them are construed in the same terms. On the other hand, verbs like *write* appear to evoke rather different metonymic patterns:

- (35) a. *I wrote down the proposal that he should resign.*
 b. *I wrote down the idea that he should resign.*

In (35a) and (35b), both *proposal* and *idea* are construed as expressing *sentences*, that is, locutionary forms. Both are similar in import to (36):

- (36) *I wrote down the words "he should resign".*

The difference in construal thus supports the thesis that the phrasal verb *write down* fails to evoke a speech-act frame.

Wheeler's third test is based on the fact that frames represent stereotypic information, and so ought to count as given any time a word is used which evokes that frame. This test originates in Roger Schank's work on scripts (Schank–Abelson 1977) where he observed the possibility of sequences like the following:

- (37) *He went into a restaurant but left without paying the bill.*

The noun *bill* is definite on first mention, entailing that it is given in a restaurant context. We thus infer that it expresses information contained within the restaurant frame.

When we examine a sentence like (36) in this light it is apparent that a verb like *advance* evokes a speech-act frame:

- (38) *John advanced an idea, but his suggestion was ignored.*

The noun *suggestion* is definite when it has not been explicitly introduced, which makes sense if the verb *advance* has already evoked the relevant frame.

Similar observations apply to a sentence like (39):

- (39) *Although a claim may be widely publicized, the retraction seldom attracts much publicity.*

Here the noun, *claim*, enables the nominalization of *retract* to be definite, despite its lack of previous mention.

Wheeler's fourth test is also due to Schank. For example, there are sequences like (40):

- (40) *When the waitress came, he had no money.*

To understand this sentence, it is crucial to recognize that having money is necessary to pay the bill, so that the sentence describes an impediment to the normal sequence of events. Recognizing such an impediment entails having a background frame which specifies what the normal sequence should be. So far we have presented evidence which implies that there is a speech-act frame, specifically a frame for making claims, which includes the following information:

- (41) A claimant advances his claim to an audience. The audience then considers the claim, and may either accept or reject it. If the audience rejects the claim, the claimant may either defend it or retract it.

This describes a natural sequence, and so it is possible to recognize impediments to it—what one would expect if this information constitutes a background frame. For example, the bizarre quality of (42) derives from its

failure to adhere to the normal script for the presentation of claims to an audience.

- (42) *John claimed that he was God, but no one was even willing to discuss it with him. When a man finally stopped to listen, he neither accepted nor denied John's claim but walked off shaking his head. Finally somebody stopped to tell him he must be crazy, but John just smiled and thanked him for his support.*

Wheeler's final test concerns metaphorical patterning. When a metaphor becomes conventional, it draws upon background information about the vehicle of the metaphor—i.e., on information contained in a semantic frame evoked by the literal meaning of the metaphorical expression. Moreover, a conventional metaphor by definition expresses knowledge about the subject of the metaphor which is generally shared and hence expresses background, framing information about the subject. Thus metaphorical language provides another source of evidence about framing.

Much of the vocabulary associated with making claims is based on the conceptual metaphor A CLAIM IS AN OBJECT WHICH ONE PERSON OFFERS TO ANOTHER, as the following expressions illustrate:

- (43) a. *He put forth a new claim.*
 b. *He held out a new claim for our consideration.*
 c. *He's pushing this weird claim on everyone he meets.*

In each case, the metaphor represents the speaker as placing the claim in a position where the audience may but need not choose to take it. Various metaphors then describe the audience's response:

- (44) a. *He's latched onto this new theory of yours.*
 b. *You don't have to shove my theories back in my face.*

The structure of the metaphor is essentially that postulated for the frame: an initial proffering, with the audience having the option to reject or accept the claim.

As we have seen, there are many different kinds of evidence for the relevance of semantic framing to extraction. The sentences in (24) which freely allow extraction are precisely those which recapitulate information from the background frame, with acceptability decreasing as the sentence evokes information less central to the frame. The implication, of course, is that light verbs differ not in kind but in degree from other verbs. Because of their

minimal semantic content, they are maximally subject to construal in terms of other frames, with the apparent facilitating effect this has upon extraction.

1.2.3. Exceptional extraction from coordinate VPs

Another area where semantic factors appear to have an effect on extraction involves coordinate VP structures. In general, coordinate structures are subject to J.R. Ross' *Across-the-Board* condition on extraction, which requires parallel extraction from all conjuncts. Normally, that is, we observe patterns of acceptability like the following:

- (45) a. *What did John eat and Bill refuse?*
 b. **What did John eat and Bill refuse some bologna?*
 c. **What did John eat some bologna and Bill refuse?*

With certain coordinate VP structures like (46) and (47), however, a different pattern emerges (Ross 1967; Goldsmith 1985; Lakoff 1986):

- (46) a. *What did Harry go to the store and buy?*
 b. *How much can you drink and still stay sober?*
- (47) a. *That's the stuff the guys in the Caucasus drink and live to be 100.*
 b. *That's the kind of firecracker that you can set off and scare the neighbors.*

These sentences involve extraction from only one conjunct: either the first conjunct (in 46b and 47) or the second (in 46a). Such patterns are not supposed to occur in coordinate structures.

Two observations are critical: (i) except for their behavior with regard to extraction, these sentences appear to be normal coordinate structures, so they constitute genuine exceptions to the coordinate structure constraint; (ii) semantic variables seem to license these exceptional patterns of extraction. Lakoff notes three patterns, or scenarios: A-scenarios, or natural sequences such as (46a); B-scenarios, or violations of expectation, such as (46b); and C-scenarios, or cause-result sequences, such as (47). In short, we appear to have a semantically licensed exception to the Coordinate Structure Constraint.

Lakoff (1986) presents a variety of arguments for both of the points given above. He points out that sentences of the type under consideration display properties only observed in coordinate structures: multiple conjuncts, *Across-the-Board* extraction, and comma intonation. Among the examples cited are:

- (48) a. *What did he go to the store, buy, load in his car, drive home, and unload?*
 b. *How many courses can you take for credit, still remain sane, and get all A's in?*
 c. *Sam is not the sort of guy you can just sit there, listen to, and not want to punch in the nose.*
 d. *This is the kind of brandy that you can sip after dinner, watch TV for a while, sip some more of, work a bit, finish off, go to bed, and still feel fine in the morning.*
 e. *I went to the store, bought, came home, wrapped up, and put under the Christmas tree one of the nicest little laser death-ray kits I've ever seen.*

It is difficult to see how such sentences could be analyzed as anything other than coordinate in structure. Lakoff (1986) rebuts one counteranalysis, which suggests that these are really parasitic gap structures. There is, however, a lack of parallelism between the two structures:

- (49) a. *Sam is not the kind of guy you can just sit there, listen to, and not want to punch in the nose.*
 b. **Sam is not the kind of guy you can just sit there while listening to without wanting to punch in the nose.*
- (50) a. *How many courses can you take for credit, still remain sane, and not get bad grades in?*
 b. **How many courses can you take for credit while still remaining sane without getting bad grades in?*

Another, more plausible suggestion would treat the exceptional sentences as being like serial verb constructions. Semantically, this is appropriate, for in the languages that employ them, serial verbs are used instead of coordinate structures for precisely the kinds of narrative relationships expressed in sentences like (48). In fact, such a suggestion has been advanced in a recent working paper (Pullum 1990).

It is less clear that such an analysis is syntactically appropriate. English, of course, is not a language with explicit serialization structures, so that we are dealing with an argument whose strength depends upon indirect evidence. There is, in particular, no obvious empirical difference between postulating a semantically licensed exception to the Coordinate Structure Constraint and positing a reanalysis of coordinate VPs which just happens to occur under semantically defined conditions.

There is, moreover, at least some evidence to suggest that such an analysis would run into serious difficulties. Consider the following sentence:

- (51) *Which items does John admit that he went to the store but deny that he bought?*

This sentence appears to be acceptable or marginally acceptable for some speakers. (One factor which seems to aid acceptability is an intonation pattern which highlights the contrasting verbs *admit* and *deny*.) Yet it does not seem plausible to reanalyze such a sentence as a serial construction syntactically, for the sequence in question is buried inside a coordinate structure which explicitly contrasts the two main verbs.

The evidence reviewed thus far suggests that we are dealing with genuine exceptions to the Coordinate Structure Constraint. It is, moreover, a set of exceptions with clear semantic motivation. Deane (1991) refines Lakoff's classification, correlating specific semantic functions with specific patterns of extraction. Certain conjuncts appear to function as background or explanation within a larger, narrative sequence. These are the VPs which need not undergo across-the-board extraction.

According to Deane (1991), there are six types of coordinate VP which need not undergo across-the-board extraction:

First, there are *preparatory action* conjuncts, i.e., VPs denoting actions undertaken not for their own sake but as part of an established routine for performing some other action. Preparatory action conjuncts precede the main action conjunct, as illustrated below:

- (52) a. *What did he go to the store and buy?*
 b. *Who did he pick up the phone and call?*
 c. *Who did he grab a pen and start writing to?*
 d. *Who did he open his arms wide and hug?*
 e. *What did he sit down and start typing?*

These correspond to the majority of Lakoff's A-scenarios.

Second, there are *scene-setter* conjuncts, VPs which provide background information about the scene in which the main action(s) take place. Examples include:

- (53) a. *Sam is not the sort of guy you can just sit there and listen to.*
 b. *Who did you stand in the parlor and tell jokes about?*
 c. *Which party did we wear Halloween costumes and get drunk at?*

Third, there are *internal cause* conjuncts, which describe an internal state which causes the agent to perform the main action. These include both mental and physical states:

- (54) a. *Which problem did he get bored and give up on?*
 b. *Who did he go berserk and start shooting at?*
 c. *What did he lose his balance and fall on top of?*
 d. *Which part of your plan did he get confused and forget?*

Fourth, there are *incidental event* conjuncts, which describe events which are incidental to the main narrative line. Most often, these are sandwiched between main event conjuncts, but they can occur finally also:

- (55) a. *This is the sort of brandy that you can sip after dinner, watch TV for a while, sip some more of, work a bit, finish off, go to bed, and still feel fine in the morning.*
 b. *This is the kind of job that you can work on all morning, take a lunch break, and finish off by 2 p.m.*
 c. *What did you talk about all night, take a shower, and then have to lecture on at your 8 a.m. class?*
- (56) *This one of those unforgettable meals that you eat in front of the TV and watch Monday night football.*

Fifth, there are *violation-of-expectation* conjuncts, which describe an event which departs from the normal and expected sequence. These correspond to Lakoff's B-scenarios:

- (57) a. *How much can you drink and still stay sober?*
 b. *How many courses can you take for credit and still remain sane?*
 c. *Sam is not the sort of guy you can listen to and stay calm.*
 d. *How small a meal can you eat and feel satisfied?*

Finally, there are *result* conjuncts, which describe consequences of the main action. These correspond to Lakoff's C-scenarios:

- (58) a. *That's the stuff the guys in the Caucasus drink and live to be 100.*
 b. *What did you set off and scare the neighbors?*
 c. *What kind of herbs can you eat and not get cancer?*
 d. *This is the kind of machine gun you can shoot off and kill a thousand men a minute.*

In fact, semantic differences among the types appear to result in different patterns of extraction. Certain types normally function as islands with respect to extraction, including preparatory actions, scene-setters, and incidental events:

- (59) a. ??*Which store did he go to and buy groceries?*
 b. **Which phone did he pick up and call his mom?*
 c. **What did he grab and write his Congressman?*
 d. **What did he pick up and call me?*
 e. **What did he open wide and hug me?*
- (60) **There is no place I have sat in and listened to Sam.*
- (61) **How long a break can you work on a job all morning, take, and still finish off the job by 2 p.m.?*

Internal cause conjuncts, violation-of-expectation conjuncts, and result conjuncts are not islands—extraction from them is often possible:

- (62) *Which park did the Hollywood Hunter go berserk in and let loose with his AK-47?*
- (63) *Who can you take twelve tranquilizers and still stay angry at?*
- (64) *How many enemy troops can you take this machine gun and kill in one minute flat?*

We observe, in other words, a variety of semantically licensed exceptions to syntactically-defined island constraints. Such exceptions seem incompatible with the thesis of syntactic autonomy.

1.3. Alternatives to autonomy: functional and cognitive accounts

Thus far we have exclusively considered sentence types which seem to constitute semantically licensed exceptions to the normal syntactic patterns. Their existence establishes a *prima facie* case against the autonomy of syntax. A close examination of ordinary extraction patterns yields further arguments in favor of an account which pays heed to functional, semantic/pragmatic, and cognitive variables.

The syntactic process of extraction logically involves three aspects: (i) the extracted phrase; (ii) the extraction site (i.e the gap and/or the matrix phrase

containing the gap); (iii) what we shall term the *bridging structure*—the syntactic configuration which intervenes between the extracted phrase and the extraction site. The literature indicates that there may be special cognitive and functional properties associated with each of these aspects. Kuno (1976, 1987) and Erteschik-Schir and Lappin (1979) indicate that the extracted phrase must be a potential topic, or at least be potentially *dominant* (meaning that the speaker intends the hearer's attention to focus on it). Takami (1989) argues that the extraction site constitutes new, or "more important" information than the rest of the clause. Kluender (1990) argues that the bridging structures should contain a minimum of *semantic barriers*, phrases whose meaning blocks the capacity to attend to more deeply embedded structures. Deane (1991) argues for an analysis which attempts to integrate Erteschik-Schir and Lappin's, Kuno's and Takami's theories, arguing that the extracted phrase and the extraction site command attention simultaneously when extraction can proceed—and that potential topic and focus status are the natural means by which this can occur.

1.3.1. Functional correlates of extraction

Among the major functional theories of extraction is that proposed by Susumo Kuno, which employs the concept of sentential *topic* (or *theme*, cf. Firbas 1964). The theory argues that extracted phrases are topical, or at least potential topics:

Topichood condition for extraction: Only those constituents in a sentence that qualify as the topic of the sentence can undergo extraction processes (i.e., *Wh-Q Movement*, *Wh-Relative Movement*, *Topicalization*, and *It-Clefting*.) (Kuno 1987: 23)

Kuno tests for (potential) topic status by prefixing the participial phrase *speaking of X*. Kuno argues on these grounds that topicality correlates with extraction in a variety of structures. Consider the following contrasts:

- (65) a. **This is the child who John married a girl who dislikes.*
 b. *This is the child who there is nobody who is willing to accept.*
- (66) a. **The person who I will go to see Mary if I can't see is Jane.*
 b. *The person who I would kill myself if I couldn't marry is Jane.*

In each case, there is also a contrast in potential topic status. That is, we observe parallel contrasts like the following:

- (67) a. ?*Speaking of the child, John married a girl who dislikes her.*
 b. *Speaking of the child, there is nobody who is willing to accept her.*
- (68) a. ?*Speaking of Jane, I will go to see Mary if I can't see her.*
 b. *Speaking of Jane, I would kill myself if I couldn't marry her.*

The (a) cases are not only somewhat less acceptable than the (b) cases, but also read more as an attempt to change the subject than as a comment on the putative topic. In short there appears to be a correlation between the availability of extraction and the ease with which the extracted phrase can be treated as topic.

Another major functional theory is that of Erteschik-Schir and Lappin (1979) who argue for a direct correlation between extraction patterns and potential *dominance* (in the psychological sense). They define dominance as follows (1979: 43):

a constituent c of a sentence S is dominant in S if and only if the speaker intends to direct the attention of his hearers to the intension of c, by uttering S.

The major test for dominance is the so-called *Lie Test*, which is based on the assumption that one can only effectively deny the truth of matters on which one's audience is capable of focusing its attention. By this test, the clause *that Orcutt is a spy* is dominant in (69) but not in (70):

- (69) *Bill said: John believes that Orcutt is a spy.*
 a. *which is a lie—he doesn't.*
 b. *which is a lie—he isn't.*
- (70) *Bill said: John carefully considered the possibility that Orcutt is a spy.*
 a. *which is a lie—he didn't (consider it).*
 b. **which is a lie—he isn't (a spy.)*

The correlations between extractability and (potential) dominance of the extracted phrase appear quite systematic. For example, the dominance of a picture noun complement and its extractability both depend on the absence of a specified subject, as (71) and (72) illustrate. Likewise, the island status of relative clauses correlates with the nondominance of phrases within a relative clause, as (73) illustrates:

- (71) *You saw a picture of the Prime Minister yesterday.*
 a. *Do you remember it?*
 b. *Do you remember him?*

- (72) *You saw Mary's picture of the Prime Minister yesterday.*
 a. *Do you remember it?*
 b. **Do you remember him?*
- (73) *Bill said: I saw the man who was reading the Times yesterday and invited him home for dinner.*
**which is not true, the Times didn't appear yesterday.*

Similar observations apply to coordinate structures and sentential subjects (which fail the Lie Test and are islands under extraction) and extraction from *that*-clauses (which fail the Lie Test and are islands only with manner-of-speaking verbs like *lisp*):

- (74) *Bill said: The nurse polished her trombone and the plumber computed my tax.*
 a. **It's a lie—she didn't.*
 b. **It's a lie—he didn't.*
 c. *It's a lie—they didn't.*
- (75) *Bill said: That Shelia knew all along is likely.*
 a. *which is a lie—it isn't.*
 b. **which is a lie—she didn't.*
- (76) *Bill said: you said that he had committed a crime.*
 a. *which is a lie—you didn't.*
 b. *which is a lie—he hadn't.*
- (77) *Bill said: Jane lisped that she had committed a crime.*
 a. *which is a lie—she didn't.*
 b. **which is a lie—she hadn't.*

Both Kuno's and Erteschik-Schir and Lappin's theories link extraction to the functional status of the extracted phrase. Another theory, that presented in Takami (1989), links it instead to the status of the extraction site.

Takami's theory directly focuses on preposition stranding, although he suggests it may extend to extraction from NP as well. Essentially, Takami claims that extraction sites represent new or "more important" information (like the similar concepts of *focus* in Givón (1976) and *information focus* in Huck and Na (1990)). (78) and (79) illustrate the contrast with which Takami is concerned.

- (78) a. *John gave the book to a young girl.*
 b. *The gang opened the safe with a drill.*
 c. *John was still a small boy in 1950.*
- (79) a. *Which girl did John give the book to?*
 b. *What did the gang open the safe with?*
 c. **Which year was John still a small boy in?*

Takami characterizes the PPs *to a young girl* and *with a drill* in (73) as communicating more important information than the rest of their respective VPs. On the other hand, the PP *in 1950* is background information, and does not provide the most important information within the VP. Takami proposes that ability to function as the focus of question or negation is a useful test of the relative importance of information, pointing out a direct correlation between these tests and the extraction patterns displayed above:

- (80) a. *Did John give the book to a young girl?*
 (*no, to a grownup*)
 b. *Did the gang open the safe with a drill?*
 (*no, with dynamite*)
 c. *Was John still a small boy in 1950?*
 (**no, in 1940*)
- (81) a. *John didn't give the book to a young girl.*
 (*... but to a grownup*)
 b. *The gang didn't open the safe with a drill.*
 (*... but with dynamite*)
 c. *John was not yet a grownup in 1950.*
 (*... *but in 1960*)

He therefore postulates the following theory:

- (82) An NP can only be extracted out of a PP which may be interpreted as being more important (newer) than the rest of the sentence.

He provides the following definition of *more important information*:

- (83) An element in a sentence represents new (more important) information if the speaker assumes that the hearer cannot predict

or could not have predicted that the element will or would occur in a particular position within the sentence.

Takami modifies this position slightly after examining cases like the following:

- (84) a. **What did John eat salad without?*
 b. **What do you eat everything except for?*
 c. **Which parent's wishes did you get married against?*
 d. **What did John climb up the mountain in spite of?*

These cases, he points out, are counterexamples to Kuno's and Erteschik-Schir and Lappin's theories, for the extracted phrase is both a potential topic by Kuno's tests and dominant by the Lie test. It is also the focus of question and negation:

- (85) *Bill said: John got married against his father's wishes.*
Which is a lie: it was against his mother's wishes.
- (86) *Speaking of his father's wishes, John got married against them.*
- (87) a. *Did John get married against his father's wishes?*
(no, against his mother's)
 b. *John didn't get married against his father's wishes but against his mother's.*

Thus both Kuno's and Erteschik-Schir and Lappin's theories falsely predict the possibility of extraction, as does Takami's. However, he claims that with one modification his approach yields correct predictions. He hypothesizes that:

- (88) An NP can only be extracted out of a PP in which the NP may itself be interpreted as being more important than the rest of the sentence.

He argues that in these sentences there is an implicit negation in the preposition which makes it provide more important information than its object. That is, he claims that the problem with extraction in (84c) is essentially the same as that seen in (89):

- (89) a. *John went to Hawaii without his wife.*
 b. **Who did John go to Hawaii without?*