The acquisition of complex sentences: a case study in the role of theory in the study of language development

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1 Introduction[1]

The acquisition of syntax is a central issue in both linguistic theory and in the branches of cognitive science devoted to the study of language, but there is considerable disagreement among child language researchers as to the relevance of linguistic theory to the investigation of language development. This issue can be characterized as follows. The most prominent syntactic theories making claims about language acquisition are Principles & Parameters theories (e.g. Chomsky 1986, 1995), and they focus exclusively on syntax rather than the communication-related interactionist aspects of acquisition or non-linguistic cognition. Issues of language acquisition are framed entirely in terms of an autonomous language acquisition device [LAD]. Many language acquisition researchers, on the other hand, are very interested in exploring connections between language acquisition and learning in other cognitive domains, on the one hand, and are also concerned with the interaction between learners and their environment, especially caregivers, and the role that it plays in the acquisition of knowledge in different domains. Hence the issues of greatest interest to many researchers are not considered in the syntactic theory-driven view of acquisition.

These different perspectives lead to very different analyses of child language. As an example of the contrast, consider the issue of inversion of the subject and auxiliary verb in non-subject WH-questions in English-speaking children. When children learning English begin to produce WH-questions, the general pattern is the following. First, they produce auxiliary-less questions with an initial WH-word, e.g. *what you doing?*, and then when auxiliary elements start to occur, they appear in both inverted, e.g. *what are you doing?*, and non-inverted forms, e.g. *what he can do?*. De Villiers (1991) presents a syntactic theory-driven account of these phenomena, assuming a Principles & Parameters analysis in terms of WH- and verb movement. Rowland & Pine (2000), on the other hand, take a rather different approach, one that does not involve syntactic analysis or theory and emphasizes the interactionist aspect of language learning. They maintain that at this stage children are simply learning collocations of WH-word and auxiliary, not any kind of syntactic rule or principle; moreover, they claim that the explanation for whether a given WH-word+auxiliary pair will be inverted is simply the frequency of that pair's occurrence in the caregiver input: the more frequent a pair is, the more likely it is to be inverted in the child's speech, and conversely the less frequent a pair is, the less likely it is to be inverted by the child. The contrast

between de Villier's analysis, on the one hand, and Rowland & Pine's, on the other, nicely illustrates the distinction between syntactic theory-driven accounts and interactionist accounts.

How do the two accounts fare empirically? De Villier's account posits that inversion is obligatory with argument WH-words and optional with adjunct WH-words, but this fails to account for the fact that different adjunct WH-words (*why, how*) behave differently with respect to inversion and that inversion is not uniform with all argument WH-words. Rowland & Pine's analysis also has empirical difficulties. The majority of inverted and uninverted WH-word+ auxiliary combinations have the same frequency in the input sample, and consequently it is difficulty to maintain that input frequency is the relevant factor. How then can the pattern of inverted and uninverted forms be explained?

Van Valin (2000) proposes an analysis based on Role and Reference Grammar [RRG] (Van Valin 1993, Van Valin & LaPolla 1997), a syntactic theory which is concerned with the communicative functions of language and which seeks to relate linguistic concepts and principles to those in other cognitive domains. Hence it combines a rigorous syntactic theory with concern for the communicative and cognitive functions of language. The analysis of inversion is based on the RRG account of illocutionary force [IF] marking in English. English signals IF through the placement of the tense-bearing verbal element: internal (post-subject) tense indicates declarative IF, initial tense signals interrogative IF, and the absence of tense in a main clause signals imperative IF. This analysis of IF marking points to the importance of the tense morpheme on the auxiliary as a potentially significant factor. If children are learning to place the tensed verbal element in initial position to signal a question, then one might predict that the first auxiliaries to be correctly placed in initial position will be those which are explicitly tensed, e.g. *is, are, did, has*, and not those that are not overtly tensed, e.g. *might, can*, and those that do not end in a tense morpheme, e.g. *isn't, didn't, couldn't*. This is in fact exactly what occurs in Rowland & Pine's data, and the full RRG analysis accounts for 175 of the 176 WH-word+auxiliary combinations discussed by Rowland & Pine.

Theories are principled and constrained ways of looking at phenomena. The Principles & Parameters framework assumed by de Villiers directs the analyst's attention to WH-words and the rule that affects them and to auxiliaries and the rule that affects their position, whereas RRG's analysis of IF marking leads

the analyst to consider as a primary factor whether the verbal element is explicitly tensed or not. Each view makes different predications about the data, and in this instance it turns out that the RRG perspective provides a more empirically accurate and more explanatory account. True explanations are only possible in the context of well-defined theoretical frameworks, and explanation in the study of child language must involve linguistic and cognitive theories.

The purpose of this paper is to exemplify this basic point further through an investigation of the acquisition of complex sentence syntax in a number of languages. RRG has a particularly rich theory of the syntax and semantics of complex sentences, and it will be the framework for the analysis. In the next section, a brief summary of the relevant features of RRG will be given. In section 3, the predictions derived from this model for acquisition will be presented. In section 4, data from seven languages will be summarized, and in the final section, the predictions from section 3 will be evaluated in light of the data from section 4.

2 The RRG theory of the syntax and semantics of complex sentences

RRG has a very distinctive theory of complex sentence syntax. It has three main components: the theories of juncture, nexus, and interclausal semantic relations. The theory of juncture deals with the clausal and subclausal units which make up complex sentences. The theory of nexus concerns the syntactic relationship between the units in the juncture. The theory of interclausal semantic relations deals with the semantic relationship between the units in the juncture.[2]

The three primary units which enter into complex sentence construction are the three components of the clause: the nucleus, the core and the clause as a whole. RRG posits a semantically-motivated theory of clause structure, called 'the layered structure of the clause', which is presented in Figure 1.

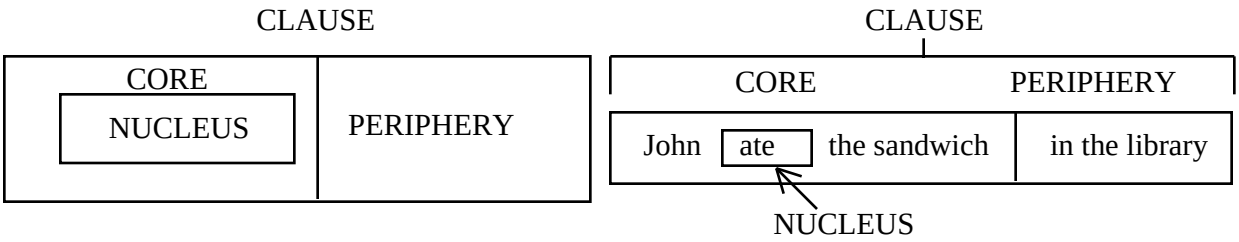

Figure 1: Components of the layered structure of the clause

The nucleus of the clause contains the predicating element, usually a verb. The core contains the semantic arguments of the predicate in the nucleus, and the periphery contains temporal and locative adjuncts. The semantic motivations for these distinctions are summarized in Table 1.

Semantic Element(s)	Syntactic Unit
Predicate	Nucleus
Argument in semantic representation of predicate	Core argument
Non-arguments	Periphery
Predicate + Arguments	Core
Predicate + Arguments + Non-arguments	Clause (= Core + Periphery)

Table 1: Semantic units underlying the syntactic units of the layered structure of the clause

Grammatical categories like tense, aspect and modality are called ‘operators’ in RRG, and they modify different layers of the clause: aspect modifies the nucleus and therefore is a nuclear operator, deontic modality is a core operator, and tense and IF are clausal operators.

The theory of juncture refers to the units making up the complex sentence, i.e. whether it contains multiple nuclei, multiple cores or multiple clauses. Complex sentences are analyzed as falling into three juncture types: nuclear junctures, core junctures, and clausal junctures. This is represented in Figure 2.

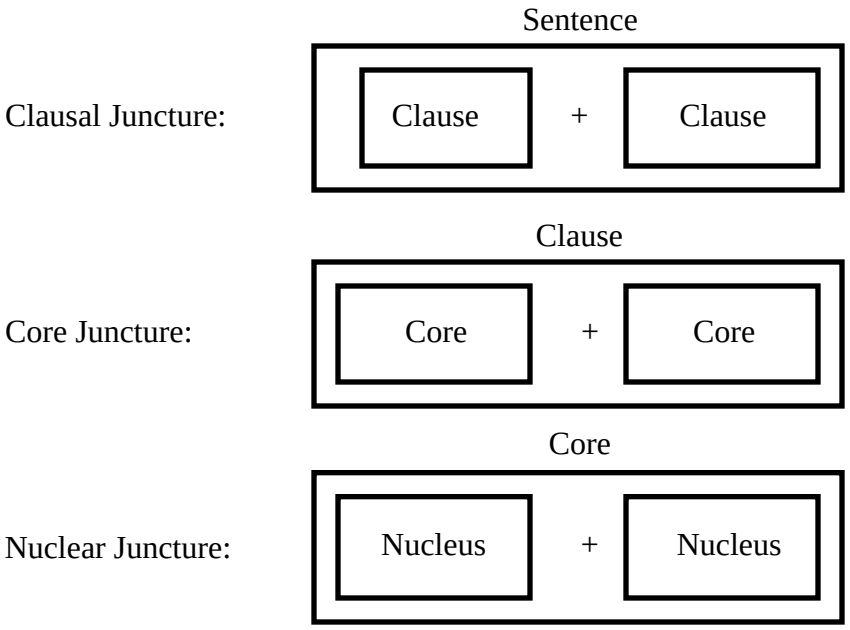

Figure 2: Types of Juncture

In a nuclear juncture, there is a single core containing multiple nuclei; in a core juncture, there is a single clause containing multiple cores, and in a clausal juncture there is a sentence containing multiple clauses.

Typical nuclear junctures are causative constructions in French or Italian with *faire* or *fare*, or causative serial verb constructions in Mandarin. Examples from French and Mandarin are given in (1).[3]

(1) Nuclear Junctures

a. Je fer-ai mang-er les gâteaux à Jean. French
1sg make-1sgFUT eat-INF the cakes DAT John
'I will make John eat the cakes.'

b. Tā qiāo pò le yī ge fànwǎn. Mandarin Chinese
3sg hit break PRFV one CL bowl
'He broke (by hitting) a ricebowl.'

The pattern in these constructions is [$_{CORE}$ NP [$_{NUC}$ V]+[$_{NUC}$ V] NP (PP)], with the 'eater' argument appearing as an indirect object in the French example. In these constructions the two nuclei form a single complex predicate, and the clause has the same morphosyntactic properties as a clause with a simple ditransitive verb (French) or transitive verb (Mandarin). It is impossible for an NP to occur be-

tween the two nuclei in this construction in Mandarin and French. These nuclear junctures contrast with core junctures, as in (2).

(2) Core juncture

a. Je laisser-ai Jean mang-er les gâteaux. French
1sg let-1sgFUT John eat-INF the cakes
'I will let John eat the cakes.'

b. Tā jiāo wǒ xǐe zì. Mandarin Chinese
3sg teach 1sg write characters
'She teaches me to write characters.'

The pattern in these constructions is $[_{CORE}$ NP $[_{NUC}$ V] NP]+$[_{CORE}$ $[_{NUC}$ V] NP]. The English translations of (2a, b) are core junctures as well. In a core juncture each core contains a separate nucleus with its own core argument(s), and in (2a,b) one of the core arguments functions semantically as an argument of both verbs. In (2a) *Jean* 'John' is semantically the undergoer of *laisser* 'let' and the actor of *manger* 'eat', for example. It occurs between the two nuclei, unlike in (1a). Clausal junctures are exemplified by sentences like *Pat talked to Kim this morning, and they will go shopping later in the afternoon,* which contains two clauses.

The theory of nexus specifies the possible syntactic relations between the units in the juncture. Traditional grammar recognizes two nexus relations, coordination and subordination, which are decomposable into two more basic notions, dependence and embedding. In coordinate structures, the two units are independent and neither is embedded in the other (they are juxtaposed to each other), while in subordinate structures one unit is embedded in and hence is dependent on the other. On the basis of evidence from a wide variety of languages, RRG posits a third nexus relation, one which is like coordination in that no unit is embedded in any other (they are juxtaposed like coordination), but which is also like subordination in that non-matrix units are dependent on the matrix unit, in this case for the expression of certain grammatical categories. This nexus relation, termed *co-subordination* in Olson (1981), is exemplified in (3a).

(3) a. The delivery man having left the package on the porch, Mary opened the door and picked it up.

b. The delivery man left the package on the porch, and Mary opened the door and picked it up.

The initial clause, *the delivery man having left the package on the porch,* is not an argument of either verb in the main clause, nor is it a modifier akin to an adverbial subordinate clause; hence it is not embedded in the main clause. Rather, it gives the first of a sequence of events, just like the first clause in (3b). It is, however, clearly dependent on the matrix clause for the expression of tense and IF, and therefore the nexus type here is cosubordination. In other words, in cosubordination there is operator dependence, i.e. shared aspect, tense or IF. In the Mandarin example in (1b), the perfective aspect marker *le* obligatorily has scope over both verbs, and therefore the nexus type in (1b) is likewise cosubordination. The three nexus types are presented schematically in Figure 3.

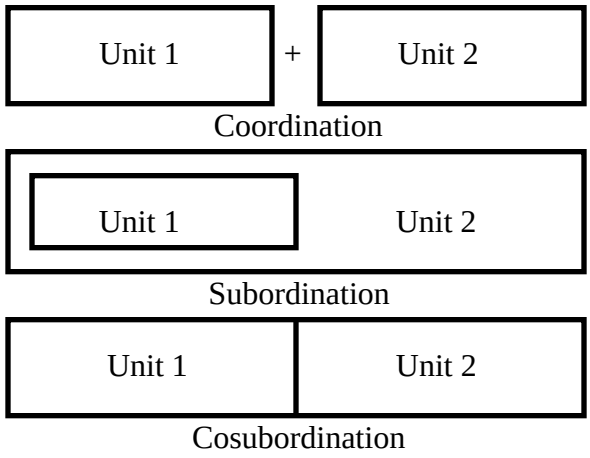

Figure 3: Types of Nexus

Each of the three nexus types can in principle occur at each of the three levels of juncture, and this generates nine possible juncture-nexus types. These may be ranked hierarchically according to the tightness of the linkage, and this yields the clause linkage hierarchy in (4).

(4) [Tightest] Nuclear cosubordination > nuclear subordination > nuclear coordination > core cosubordination > core subordination > core coordination > clausal cosubordination > clausal subordination > clausal coordination [Weakest]

These nine categories are abstract clause linkage types, not labels for formal construction types; more than one type of complex sentence construction may fall into a given category, as illustrated in the English examples in (5).

(5) a. Mary made the woman leave. — Nuclear coordination
Vince wiped the table clean.

b. Ted tried to open the door. — Core cosubordination
Sam sat playing the guitar.

c. David regretted Amy's losing the race. — Core subordination
That Amy lost the race shocked everyone.

d. Louisa told Bob to close the window. — Core coordination
Fred saw Harry leave the room.

e. Harry ran down the hall laughing loudly. — Clausal cosubordination
Paul drove to the store and bought some beer.

f. John persuaded Leon that Amy had lost. — Clausal subordination
Bill went to the party after he talked to Mary.

g. Anna read for a few minutes, and then she went out. Clausal coordin.

Korean (Yang 1994) exhibits all nine juncture-nexus types, and English appears to have seven categories, Jacaltec (Mayan) six, and Cree (Algonquian) two.

The final component of the clause linkage theory is the interclausal semantic relations hierarchy. The syntactic constructions which fall under the interclausal syntactic relations hierarchy are used to code a set of semantic relations holding between the units in the construction. These relations may be ranked hierarchically in terms of how much the content of the two units is construed as constituting distinct situations: the more the two units are interpreted as coding aspects of a single situation (action, event, or process), the closer the semantic relation is; conversely, the more distinct the situations coded by the units are, the looser the semantic relation is. Thus the closest relations are often lexicalized in languages and not expressed by syntactically complex constructions at all. The hierarchy of interclausal semantic relations is presented in (6).

(6) [Closest] Causative > aspectual > psych-action > purposive > jussive > direct perception > propositional attitude > cognition > indirect discourse

> temporal adverbial > conditionals > simultaneous actions > sequential actions: overlapping > sequential actions: non-overlapping > action-action: unspecified [Loosest}

The most relevant relations for this discussion are at the top, from causative to indirect discourse. Causative is at the top because it involves the merging of the content of two units into a single one coding a single situation, as in the French and Mandarin causatives mentioned above. This relation is almost universally lexicalized in at least some verbs in a language, although there are some interesting exceptions. Aspectual refers to phase verbs like *begin, start, continue,* and *cease,* notions which again are often lexicalized in verbal systems. Psych-action predicates code an actor's mental disposition toward an action, e.g. *want/intend/forget/try/decide to go.* The other terms are used in their standard senses. (See Van Valin & LaPolla 1997 for detailed discussion.)

The hierarchies in (4) and (6) interact in very complex ways. There is no one-to-one mapping between them; while all languages can express the semantic relations, languages differ as to their inventory of clause linkage categories, and therefore the mapping will vary across languages in terms of both what syntactic linkage categories a language has and which syntactic categorie(s) realize(s) which semantic relation(s). However, an important claim regarding the interaction of the two hierarchies is that more tightly bound syntactic linkage categories should be used to express the closer semantic relations; that is, there is a direct correlation between the strength of the syntactic link between two units in a juncture (normally realized as the reduction or deformation of the linked unit(s)) and the closeness of the semantic relation between the units. There is, then, an *iconic* relation between the two hierarchies (Silverstein 1976, Givón 1980). This is captured in Figure 4, the Interclausal Relations Hierarchy [IRH].

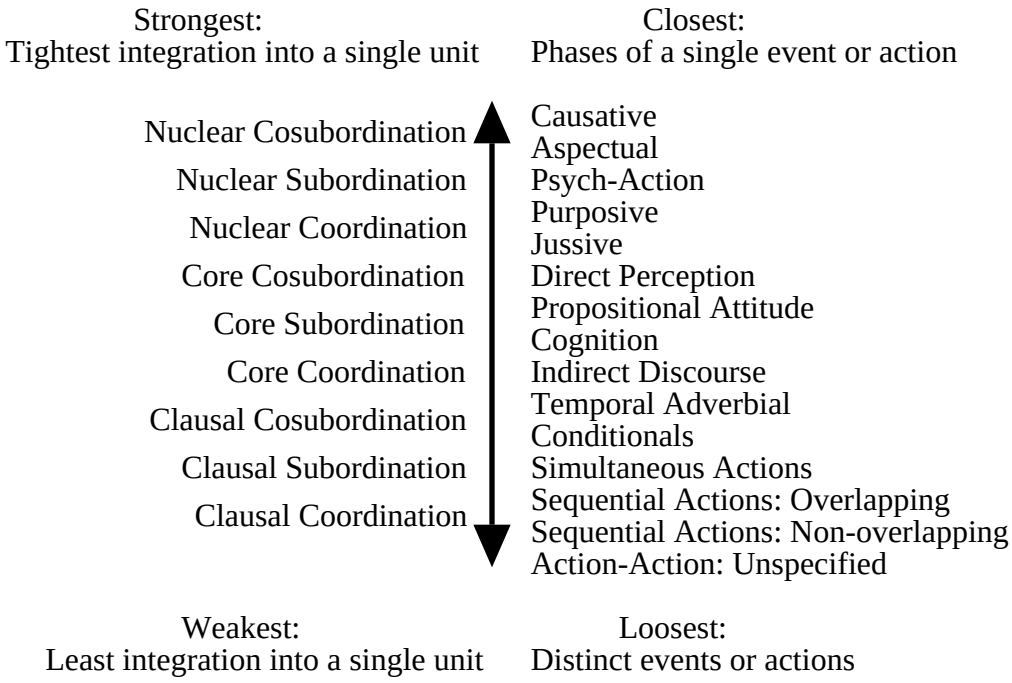

Figure 4: Interclausal Relations Hierarchy

The IRH is the heart of the RRG theory of complex sentences, and it has important implications for language acquisition, as we will see in the next section. It is also the basis for comparing complex constructions across languages. How does one decide that construction 'X' in one language is comparable to construction 'Y' in another? The primary criteria are based on the IRH: (1) the interclausal semantic relation expressed (e.g. psych-action), and (2) the juncture-nexus type (e.g. core cosubordination). In addition, the formal construction type (e.g. same-subject infinitive) is relevant.

3 Predictions for language acquisition

The basic RRG view of language acquisition, elaborated in Van Valin (1991) is that children construct a grammar based on (1) the linguistic data to which they are exposed and (2) a rich cognitive endowment of the kind proposed by e.g. Bruner (1983), Slobin (1985), Karmiloff-Smith (1992), Braine (1992). RRG does

not posit an autonomous LAD of the kind proposed by Chomsky. Previous work in RRG on language acquisition is summarized in Van Valin & LaPolla (1997).

How could a child acquire the IRH? On the syntactic side, there are two components, juncture and nexus. The levels of juncture correspond to the units of the layered structure of the clause, and Braine (1992) shows how these can be learned by the child based on the kind of rich cognitive endowment mentioned above. Nexus relations are combinations of the notions of embedding and juxtaposition (loose and tight), which are important cognitive concepts which are relevant to language and other cognitive domains; hence if they are part of the child's cognitive endowment, they are nevertheless not strictly linguistic concepts. The semantic relations of the IRH are derived from important cognitive concepts like causation, intention, purpose, belief, etc. Finally, the relationship between the syntactic and semantic hierarchies is fundamentally iconic, and this would facilitate the combining of the two hierarchies into the IRH.

Once having learned the IRH, a number of important grammatical properties of complex sentences can be deduced by the child. Together with the RRG theory of operators, the IRH makes a number of important predictions about the form of the non-matrix units(s) in complex sentences. Recall that operators such as tense and aspect are linked to particular clause layers, e.g. tense is a clausal operator and aspect a nuclear operator. Consequently, it follows without further stipulation that in a core juncture the linked core will not have any clausal operators, i.e. will lack independent marking for tense and IF, and that in a nuclear juncture the dependent nucleus will lack all independent specification for core and clausal operators. The well-known reduction in the inflectional possibilities in non-matrix units in complex sentences follows directly from the RRG theory of clause structure and the hierarchy in Figure 4. This means that children do not have to learn that the linked core in a core juncture cannot be marked for tense; it can be deduced from independent principles.

This view of complex sentence syntax and semantics makes rather different predictions about the acquisition of complex sentences from the standard generative accounts. Each side of the IRH has implications for the acquisition process. With respect to syntax, children begin to use clause linkage constructions before mastering the total range of constituents and operators possible in simple sentences, and accordingly junctures involving sub-clausal units will appear before those involving whole clauses. This is also related to some of the semantic

considerations to be discussed below. Second, in regard to nexus relations, the juxtaposition relation of coordination and cosubordination is arguably conceptually simpler than the embedding relation of subordination, and consequently, it is to be expected that the first clause-linkage forms would involve non-subordinate nexus types, coordination and cosubordination. This is a major point of contrast between the generative and RRG theories of complex sentences. Limber (1973) and Bowerman (1979) assert that the first complex sentences to appear in English-learning children's speech are "object complements" like *I wanna read book;* since these are analyzed as a type of subordination in other theories, it appears that the RRG prediction is incorrect. However, as argued in Foley & Van Valin (1984) and Van Valin & LaPolla (1997), constructions like *I want to go* and *Bill forced John to leave* do not involve embedding and therefore are *not* examples of subordination. They are, rather, non-subordinate nexus types. Typically, cosubordination at the core level is associated with same-subject constructions, e.g. *Fred remembered to close the gate,* whereas coordination at the same level of juncture is usually not same-subject, e.g. *Fred reminded Bill to close the gate.* Consequently, it might be further supposed that at a given level of juncture cosubordinate structures should be the first non-subordinate nexus type to appear, given that same-subject constructions at the core level are simpler syntactically than different-subject ones.[4] This is because it is easier to interpret a shared argument as having the same function with respect to multiple verbs (same-subject core juncture) than to interpret it as simultaneously the actor of one verb and the undergoer of another (different-subject core juncture). While this is apparently true for some children learning English, it is not true for all, and the explanation for this may lie in semantic considerations.

There are further predictions for languages with extensive core and nuclear junctures, and they depend upon the transitivity of the infinitive or linked verb in the juncture. Core junctures with transitive infinitival verbs will appear before nuclear junctures with transitive infinitival verbs, because core junctures present arguments in their canonical position with respect to their verbs while nuclear junctures do not (compare (2a) vs. (1a)). When nuclear junctures emerge, those with intransitive linked verbs will appear before ones with transitive linked verbs, as they are syntactically and semantically simpler. In languages with extensive serial verb constructions like Mandarin, nuclear junctures will appear early and will appear first in complex predicate formation, as in (1b).

Thus on the syntax side, the predictions are (1) that the first levels of juncture to appear will be sub-clausal rather than clausal, (2) that non-subordinate nexus (juxtaposed constructions) will appear before subordinate nexus (embedding constructions), (3) that same-subject constructions will appear before different-subject constructions, (4) that core junctures with transitive linked verbs will appear before nuclear junctures with transitive linked verbs, and (5) that when nuclear junctures emerge, they will first have only intransitive linked verbs, and (6) that in serializing languages nuclear junctures will appear early and will be used in complex predicate formation.

Consideration of the semantic side of clause linkage leads to predictions which conflict to some degree with those based purely on syntactic considerations. In general, it is to be expected that children's first complex sentences would code the semantic relations at the top of the hierarchy, e.g. causality, mental dispositions such as desiring and wanting, and purpose, rather than the complex temporal sequencing and other relations in the bottom half. There is, however, an interesting contrast among these relations with respect to the constraints they impose on the complex sentence. Causative relations between two events must involve a causer and a causee, and this entails that the actors of each nucleus in the juncture must be different. This is also true for jussive and direct perception relations, since the participant giving the order or doing the perceiving must be different from the one to whom the order is given or who is in the perceived event. On the other hand, aspectual, psych-action, and purposive constructions require that the actors of the units linked to signal these relations be the same; they all express something about the actor's role in a situation. The other relations, propositional attitude, cognition and indirect discourse, impose no such restrictions on the constructions; the actor of the verb of propositional attitude, cognition or saying may or may not be an argument of the verb in the linked unit.

On the assumption that simpler structures should precede more complex ones, the following conflict between syntactic and semantic concerns arises. It was argued above that same-subject constructions are less complex syntactically and therefore ought to appear before non-same-subject ones, and this would seem to be reinforced by the semantic restriction placed on constructions expressing aspectual, psych-action, and purposive relations. However, causality is an extremely important concept, and the expression of it necessitates using a syntactic form which cannot be same-subject by virtue of the semantics of causality. There

is an additional interfering factor, namely the level of juncture of causative constructions. Languages typically express causal relations in junctures at the nuclear level, at the core level, or both; core junctures involves less deformation of the linked unit than a nuclear juncture, and one of the consequences of this is that in a core juncture arguments remain in their canonical positional relation to the predicate, whereas in a nuclear juncture this is not the case. This contrast can be seen in the French causative examples in (2a) with *laisser* (core) and (1a) with *faire* (nuclear), repeated in (7).

(7) a. Jean manger-a les gâteaux.
John eat-1sgFUT the cakes
'John will eat the cakes.'

b. Je laisser-ai Jean mang-er les gâteaux. Core juncture
1sg let-1sgFUT John eat-INF the cakes
'I will let John eat the cakes.'

c. Je fer-ai mang-er les gâteaux à Jean. Nuclear juncture
1sg make-1sgFUT eat-INF the cakes DAT John
'I will make John eat the cakes.'

(7a) represents a simple transitive clause; *Jean* in (b) is in the canonical position for interpretation as direct object (undergoer) of *laisser* and as subject (actor) of *manger*, whereas in (c) *Jean* is coded as the indirect object of the complex nucleus *faire manger*, and in simple clauses indirect objects are not interpreted as being an actor-like argument. Hence the semantic relations of the arguments are more transparent in a core juncture than in a nuclear one. In languages in which causation is expressed primarily or exclusively in nuclear junctures, the greater semantic opacity of the argument coding in them could serve as a factor retarding their appearance. Constructions like (7b) should, therefore, appear before ones like (7c). In contrast, psych-action and purposive relations are normally realized in core rather than nuclear junctures, and hence they do not suffer from the same coding complexities as causatives. Thus, the semantic (and cognitive) importance of causation is counterbalanced by the formal complexities it entails, whereas the syntactic requirements of aspectual, psych-action and purposive relations correlate positively with the typically less complex morphosyntactic form of same-

subject constructions and of core junctures in general. Moreover, there is the additional natural salience of the child's own desires, wishes and intentions for him/her (see Budwig 1986). No unequivocal prediction emerges from the IRH in Figure 4, but a significant set of factors favors the initial (or at least very early) appearance of non-subordinate junctures expressing aspectual, psych-action, and/or purposive relations; other factors favor the early appearance of causative constructions of some kind. In general, it may be concluded that a correlation exists between the degree of deformation of the linked unit in the juncture and the timing of its appearance in child speech: the lower the degree of deformation, the earlier it will appear.

When clausal junctures begin to appear, the first semantic relations to be coded will be those at the bottom of the IRH, following the development of the child's narrative discourse competence (Berman & Slobin 1994). This predicts that the initial clausal junctures will not have a specific semantic relation between them ('action-action: unspecified' in the IRH), and then the coding of temporal relations among clauses will emerge.

4 Cross-linguistic data

In this section child language data involving complex sentences from English, Hebrew, Kaluli, Korean, Mandarin, Italian and Polish will be examined in light of the predictions made in section 3.

4.1 English

The English data are from: Limber (1973), Clancy, Jacobsen & Silva (1976), Bowerman (1979), Pinker (1984) (based on Brown 1973 and other sources), Bloom (1991), Berkeley Crosslinguistic Acquisition Project (from Dan Slobin), Frog stories transcripts (from Dan Slobin). The thirteen English-speaking children in the Berkeley Crosslinguistic Acquisition Project all had psych-action with some form of *want* by 2.0; two had purposive and two had causative constructions; and only one child produced propositional attitude expressions. By 2.4 all had produced some kind of complex sentence and psych-action is the predominant interclausal relation expressed. This is summarized in (8).

(8) a. By 2.0

1. Psych-action Verbs: *want/wanna, let's, let me*

ex.: ‘want sit down’, ‘let me get it’ Core cosubordination

2. Causative Verbs: *make, let* [different subject], *help*

ex.: ‘make boy walk in park’ Core coordination

3. Purposive Verbs: *go, sit down*

ex.: ‘no no can go see the toys’, ‘sit down sleep’ Core cosubordination

4. Propositional attitude Verbs: *want*

ex.: ‘I want the animals go home’ Core subordination

b. Starting around 2.4:

1. Aspectual Verbs: *go*

ex.: ‘cow wanna go sleep’ Core cosubordination

2. Cognition Verbs: *know, wonder*

ex.: ‘I know put this here the pen’ Core subordination

c. Starting around 2.8:

1. Indirect discourse Verbs: *say*

ex.: ‘but you said so you need tape’ Core subordination

2. Direct perception Verbs: *see*

ex.: ‘see him laying there?’ Core coordination

When the data from all of the above sources is pooled, the following syntactic and semantic patterns emerge.

(9) a. Syntactic pattern:

1. Core non-subordination (constructions with *want* [same-subject] then *go* [Purposive], *make/let*) [< 2.0 – 2.4] –>
2. Clausal non-subordination (parataxis or conjunction with *and*) [2.0-2.2] –>
3. Core subordination (WH-complements, different-subject with *want*) [2.4-2.7] –>
4. Clausal subordination (other complements, adverbial clauses, etc.) [2.7-3.0]

b. Semantic pattern:

1. Subclausal junctures (based on data in (8)):
   Psych-action –> Causative –> Purposive –> Propositional Attitude –> Aspectual –> Cognition –> Indirect discourse –> Direct perception

2. Clausal junctures (based on Clancy, Jacobsen & Silva 1976, Bloom 1991):

'Additive' –> Temporal sequence –> Adversative –> Causal –> others

('Additive' means that there is no particular semantic relationship between the clauses in the juncture.) The English data support the predictions from section 3. The semantic pattern is close to that of the IRH, the main discrepancy being psych-action higher than causative; this may be due to the conflict noted in section 3 between the syntactic complexity of causative constructions and the cognitive salience of causation. In the initial clausal junctures, the semantic pattern follows the hierarchy, with 'additive' ('action-action unspecified' in the IRH) being the semantics of the initial clausal coordinate constructions followed by clausal constructions expressing temporal sequences.

Things are a bit more clear-cut on the syntax side, since there are fewer constructions types being produced than semantic relations being expressed. Two predictions are clearly confirmed: (1) the first levels of juncture to emerge are sub-clausal, and the vast majority of utterances at 24 and 28 mos. are core junctures; and (2) the initial nexus types to appear are non-subordinate, with the first example of subordinate nexus appearing in only one child at 28 mos., and all of the others were still using non-subordinate nexus only at that age. This prediction is strikingly confirmed in Limber's data: the first true cases of subordination appear late in the third year, about the same time as the first examples of clausal coordination, with clausal subordination (adverbial clauses) appearing even later.

Thus the sequence appears to be: core non-subordination -> clausal non-subordination, core subordination -> clausal subordination. With respect to the question of which non-subordinate nexus type appears first, the conflict between the salience of causality and the simpler syntax of same-subject forms arises. The vast majority of early forms are same-subject (i.e. cosubordinate) core junctures expressing wants and desires (psych-action), but there are an increasing number of causative forms with *make* and *let* which are realized as nuclear (e.g. *He made the door open*) and core (e.g. *He made her open the door*) coordinate linkages.

4.2 Hebrew

There is not much discussion of complex sentences in Berman (1985), but she does note that verb + infinitive constructions, e.g. *roce la-léxet* 'want to-go', ap-

pear before tensed propositional complements marked by *še* 'that'. This is significant for a number of reasons. It shows first, that the first complex constructions are subclausal rather than clausal and, and second that the nexus is non-subordinate rather than subordinate. Third, the first semantic relation expressed is psych-action, just as in English. All of this is in line with the predictions from section 3.

4.3 Kaluli

Kaluli is a Papuan language, and the acquisition of Kaluli is discussed in Schieffelin (1985). Psych-action (intentions) and aspectual (inception) relations are expressed by inflectional forms of verbs, not by complex sentences. Causatives are not mentioned in the article. Same-subject serial verb constructions with purposive semantics appear around 2.0 to 2.2. Example from adult and child Kaluli are given in (10).

(10) a. Ne a-ya sɔfɛni hɔnɔl. Adult example
1sg house-LOC cook.PURP go.1sgPRES
'I'm going to the house to cook.'

b. Diɛ-hɔnɔl. Child example (2.2)
take.PURP- go.1sgPRES
'I'm going [in order] to take'

The most common main verbs in this construction are *mena* 'come' and *hamana* 'go', which Foley & Olson (1985) note are universally the most basic main verbs in serial verb constructions of this type. Purposive constructions with different subjects appear after 2.8. The next complex construction to appear is what Schieffelin calls the 'past consecutive' construction; it emerges starting at around 2.1 to 2.3. It is illustrated in (11).

(11) a. Di-ɛsɛgɛ miɛnɔ.
take-CONSEC come.1sgFUT
'Having taken I will come.' (= 'bring')

b. Di-ɛsɛgɛ hɛnɛnɔ.
take-CONSEC go.1sgFUT
'Having taken, I will go.' (= 'take away')

c. Gul-ɛsɛgɛ mina!
break.CONSEC give.IMP
'Having broken in half, give!'

This construction is initially used with *dima* 'take' as the linked verb and *mena* 'come' and *hamana* 'go' as the main verbs, although *mina* 'give' also occurs as a main verb in the children's constructions. Clausal junctures linked paratactically start to appear around 2.6, and clausal junctures with switch-reference morphology begin to appear around 3.0.

Despite its being typologically very different from the other languages discussed in this section, Kaluli nevertheless exhibits the same acquisition pattern. The initial constructions are subclausal junctures, in this case core junctures, and they are same-subject. Clausal junctures appear later. Semantically, the first semantic relation expressed is purposive, followed by the tight temporal sequence signalled by the past consecutive construction.

4.4 Korean

The child language data are from Y.-J. Kim (1989). Korean is a serializing language, and the initial complex constructions are all nuclear junctures (1.9-1.11), following Yang's (1994) RRG analysis of Korean clause linkage. Semantically, they are psych-action (*po*- 'try', *siph*- 'want'), valence-increasing (*cwu*- 'give', which adds a beneficiary argument), and aspectual (e.g. *peli*- 'finish'). Syntactic causatives do not appear until after 2.0; first uses are with adjectives, and the first uses with verbs begin to appear around 2.5. It should be noted that there is also a morphological causative in Korean, which means that complex predicate formation can be also done morphologically.

Korean supports the predictions in section 3 in several ways. First, the initial complex forms are subclausal rather than clausal. Second, the initial nexus types are non-subordinate. Third, the initial junctures are all same-subject. Fourth, since it is a serializing language, nuclear junctures appear very early and are used in complex predicate formation. Fifth, the first syntactic causatives to be formed involve adjectives, which are intransitive predicates, and then full verbs, both transitive and intransitive.

4.5 Mandarin

Mandarin is a serializing language, and the first complex constructions are modal + verb constructions and nuclear junctures, following Hansell's (1993) RRG analysis of Mandarin serial verb constructions. The basic psych-action predicate *yào* 'want' is analyzed as a modal rather than as a full verb; it is one of the earliest to appear. Examples of early serial verb constructions in the order that they appeared, from Erbaugh (1992), are given in (12).

(12) a. nòng-huài-le — 3.0 MLU[5]
do-break-PRFV
'broke' — Nuclear cosubordination (causative)

a´.*pèng-fàng — Error; impossible combination
bump-put.down

b. yào qù kàn diànyǐng
want go see movie
'want to go see a movie' — Core cosubordination (purposive)

c. kāi che kàn Xíngxing Jiějie — Age 1.9
drive car see big.sister
'drive car to see big sister Xingxing' — Core cosubordination (purposive)

d. Jiějie dài wo qù shàng xué — Age 2.5
big.sister take 1sg go enter school
'Big sister takes me to go to school' — Core coordination (causative)

The earliest complex forms, (12a), are just like the one in (1b). It is striking that children learning Mandarin make errors with these nuclear junctures, e.g. (12a´), analogous to the causative verb errors reported by Bowerman (1974) and others for children learning English. In this case, the child is trying to describe smashing a balloon. It should also be noted that *huài* 'break' in (12a) is an intransitive verb. The first core junctures are same-subject, as in (12b, c); different-subject core junctures appear later, e.g. (12d), which is the same type as (2b).

The Mandarin data support the claims made in section 3. First, the initial complex forms are subclausal, and nuclear junctures occur very early. Second, the nuclear junctures are used in complex predicate formation. Third, the initial constructions all involve non-subordinate nexus. Fourth, the initial core junctures are same-subject. The semantic pattern of the IRH is supported as well. The ini-

tial complex constructions are causative; psych-action is expressed by a modal rather than a full verb, and the next constructions to appear express purposive semantics, the next semantic relation on the IRH. The semantic relation that is missing from early child Mandarin is the aspectual relation.

4.6 Italian

Parisi and Antinucci (1974) present data from two Italian children from 1.0 to 2.5. Examples of the first complex sentences produced by the children (1.8 to 2.1 for one and 2.0-2.2) for the other, are given in (13).

(13) a. Ado a prende il pentolino. Purposive
go.1sg to take the saucepan
'I'm going to fetch the saucepan.'

b. O voe mangiare. Psych-action
NEG want.3sg eat
'He doesn't want to eat.'

c. Lo faccio girare. Causative
it make.1sg spin
'I'm spinning it,' lit. 'I cause it to spin.'

d. Ho fatto arrabbiare Lellina. Causative
Have.1sg made angry Lellina
'I made Lellina angry.'

e. Faccio vedere qui. Causative
Make.1sg see here
'I'm showing it to him,' lit. 'I cause [him] to see [it].'

These sentences exemplify both core and nuclear junctures in early child Italian. The first two are core junctures in adult Italian, while (13c-e) are all nuclear junctures analogous to (1). The infinitive verbs in (13c, d) are both intransitive, and what is interesting about (13e) is that even though *vedere* 'see' is a transitive verb, it is treated here as if it were intransitive, with one argument not expressed and the other implied by the deictic *qui* 'here'. The adult form for (13e) would (14), analogous to (1a) from French.

(14) Lo faccio vedere a lui.
It make.1sg see DAT him
'I'm showing it to him,' lit. 'I cause him to see it.'

Finite subordinate clauses appear two to three months after these constructions. They include both finite complement clauses and adverbial subordinate clauses. Thus, Italian supports the predictions in chapter 3. The first complex constructions are subclausal rather than clausal, and the first nexus type is cosubordinate, not subordinate. The problem of different-subject constructions is avoided by using only intransitive verbs in causatives and treating transitive verbs as if they were intransitive in this construction. Finally, the earliest semantic relations expressed are those at the top of the IRH. Clark (1985) states that in this early phase French and Italian pattern alike, but she give no examples from either language.

4.7 Polish

With respect to the emergence of complex sentences in child Polish, Smoczyńska (1985) states "In general, the acquisition of complex sentences matches the universal pattern described by Clancy, Jacobsen & Silva (1976), as well as that for English presented in Limber (1973) and Bowerman (1979)"(654). The first complex expressions involve *chce* 'want', e.g. *Jabłko chce jeść* [apple want eat] 'want to eat an apple'(1.6). Since the patterns in Limber and Clancy, et al. follow the predictions from section 3, as the discussion of English showed, the Polish data support them as well.

5 Conclusions

The data from these seven languages confirm to a striking degree the predictions made in section 3. They are repeated below, beginning with the syntactic predictions.

1. Sub-clausal levels of juncture will appear before clausal junctures.
   Children consistently put together complex constructions involving nuclei and cores before putting whole clauses together.
2. Non-subordinate nexus will appear before subordinate nexus.
   While this is clearly true at the clause level, only the RRG analysis appears to be consistent with this claim at the subclausal levels. The conven-

tional analysis of 'want' + infinitive constructions is that the infinitive is a subordinate (embedded) VP or CP, whereas in the RRG account it is co-subordination, a non-subordinate nexus type. True subordination at both clause and sub-clausal levels appears later.

3. Same-subject constructions will appear before different-subject constructions.
   This follows from general principles of simplicity and is clearly confirmed.
4. Core junctures with transitive linked verbs will appear before nuclear junctures with transitive linked verbs
   This is true for all of the languages with nuclear junctures.
5. When nuclear junctures emerge, they will first have only intransitive linked verbs.
   This is true for all of the languages with nuclear junctures. Italian is particularly interesting here, as the in the one example involving a transitive infinitive in a nuclear juncture, (13e), the transitive verb is treated as if it were intransitive.
6. In serializing languages, nuclear junctures will appear first in complex predicate formation.
   This is true for both Korean and Mandarin but not for Kaluli, which, however, does not use serialization for complex predicate formation as in the other two languages.

The semantic predictions are given below.

1. In sub-clausal junctures, the first semantic relations to be coded will be those at the top of the IRH.
   This is true, and a strong generalization that emerges from the data is that the first relation to be expressed is always psych-action, an expression of the child's desires.
2. In clausal junctures, the first semantic relations to be coded will be those at the bottom of the IRH.
   All discussions of the first clausal junctures describe them as being 'additive' semantically, which corresponds to 'action-action: unspecified' in the

IRH, followed by junctures expressing temporal relations between the clauses.

Thus, the predictions about the syntax and semantics of complex sentences in early child language are supported by the data from these seven, typologically diverse languages. Data from more languages are needed, of course, before these predictions can be viewed as strongly confirmed, but the facts from these languages are suggest that they are on the right track. While one or two of these predictions might be derived from general simplicity considerations, e.g. the early preference for same-subject constructions, the majority of them are specifically derived from the RRG theory of complex sentences, and consequently it provides a framework in which this consistent cross-linguistic behavior of language learners can be explained. This illustrates in an important way the main point raised in section 1: theories are principled and constrained ways of viewing phenomena, and because of the perspective they impose on the analyst they generate predications about the phenomena in question; at the same time their principles and concepts provide a framework in which explanation is possible.

This discussion has illustrated the claims made by the RRG theory of clause linkage and shown how it can be an explanatory theoretical model for the analysis of children's emerging complex constructions. Unlike Principles & Parameters syntactic theories, RRG seeks to link language development to general cognitive development and the mechanisms of language learning to those for learning in other cognitive domains. Furthermore, it strongly emphasizes the importance of the communicative functions of language for the analysis of grammar. Thus it attempts to bring together language structure, language function and cognition in the study of language acquisition.

Notes

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2. This discussion includes only those constructions involving predicate-based units and does not include relative clauses.

3. Abbreviations in glosses: CL ‘classifier’, CONSEC ‘past consecutive’, DAT ‘dative’, FUT ‘future tense’, IMP ‘imperative’, INF ‘infinitive’, LOC ‘locative case’, MLU ‘mean length of utterance’, NEG ‘negation’, PRES ‘present tense’, PRFV ‘perfective aspect’, PURP ‘purposive’.
4. RRG does not employ ‘subject’ as a theoretical construct, but since grammatical relations are not the focus of this discussion, the traditional term will be used for simplicity’s sake.
5. Erbaugh (1992) does not give the age of the child who produced (12a), only his/her MLU. She does day that it represents the first type of complex construction produced.

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