



Laureate's Language Development Programs: Theory and Research

*First Words, First Words II, First Verbs, First Categories, Simple Sentence Structure, LanguageLinks®: Syntax Assessment & Intervention, Prepositions!, and Nouns & Sounds Sterling Editions*¹

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How do children around the world, no matter what their native language, begin speaking in sentences at the same age? The uniformity and rapidity of first language acquisition is possible because human infants are born with a biologically endowed innate language faculty within the brain that drives the course of language development. Although this premise was doubted fifty years ago, today biologists and linguists alike accept it. Our human language faculty orchestrates and shapes the acquisition of language. Typically developing children need only the surrounding language input to acquire language. In contrast, children with language disorders will need more than exposure to language if they are to develop adult competence in their native language. This monograph focuses on the theory and research bases of the programs in Laureate's *Language Development Packages: Levels 1 and 2*. Included in these packages are evidence-based assessment and intervention programs to train early vocabulary, categorization, basic syntax, prepositions, and environmental sounds associated with Nouns. These packages are designed to help children master language and become better communicators.

In the mid-twentieth century, Noam Chomsky's generative grammar proposals triggered what many called a revolution in linguistic theory (Chomsky, 1955; 1957; Harris, 1993). Suddenly the focus of linguistic inquiry shifted from description to explanation. Chomsky proposed that a grammar of a language must not simply describe sentences rather it must account for how sentences are created or generated, hence the term generative grammar. From the beginning, generative grammar has been concerned with not only adult knowledge of language but also how language is acquired. There is no longer any doubt that typically developing children acquire language primarily through exposure rather than direct teaching. How is this possible? Linguists explain that all human languages share a common underlying biologically endowed structure. While the lexicon or vocabulary of a language must be learned, language structure is based on universal principles. It has been over two decades since Chomsky introduced the *Principles and Parameters Theory*² (Chomsky, 1981) currently the dominant linguistic theory. In the *Principles and Parameters Theory*, biologically based linguistic universals guide the course of language acquisition (Chomsky, 2004). Without an innate capacity, or Universal Grammar, human beings would be unable to acquire and master a language. In the theory, Universal Grammar consists of a set of universal principles and a small set of parameters that are unique to human language.

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² The Pisa Lectures given in 1979 were subsequently published in 1981 as *Lectures in Government and Binding* and for a brief period of time the theory was referred to as "Government-Binding Theory." Chomsky and others adopted the *Principles and Parameters* terminology as more accurately describing the theory.

The *Minimalist Program* (Chomsky 1995, 2002) represents the latest effort within the *Principles and Parameters Theory*. As its name suggests, the goal of the *Minimalist Program* is to reduce the complexity of linguistic theory and enhance its explanatory power (Chomsky, 1995; Abraham, Epstein, Thráinsson, & Zwart, 1996; for a recent overview of the *Minimalist Program* by Noam Chomsky see “An Interview on Minimalism,” Chomsky, 2002). While some of the terminology we’ll use in this monograph may be unfamiliar to those who have not studied linguistics, conceptually the *Minimalist Program’s* model is much simpler than its predecessors. For example, those who struggled trying to learn all the phrase structure rules and the numerous transformational rules of earlier versions of generative grammar will be happy to learn they have been completely eliminated. The *Minimalist* model is a simpler, more elegant system of describing and explaining syntactic operations. Also gone from the *Minimalist Program* are the layers of Deep and Surface Structure that characterized earlier versions of generative grammar (Chomsky, 1965).

Universal Grammar Principles and Parameters

Children all over the world learning thousands of different languages do so in a very similar manner. First words emerge, word combinations occur, and syntax is mastered at about the same age regardless of language or culture. What exactly is the nature of the genetic endowment of a language faculty that enables children to acquire all languages on a very similar timetable? Linguists and biologists believe that the innate Universal Grammar humans are born with is composed of principles that are not dependent upon language input and only a small set of parameters that vary in a binary fashion across languages (Baker, 2001; Hornstein, Nunes, & Grohmann, 2005).

Unlike universal principles that require no language experience, parameters do require language input for their setting. Since all parameters have two possible settings, children must need language input to select the proper setting. A fixed set of parameters account for most of the syntactic variations among human languages (Atkinson, 1992; Baker, 2001; Chomsky, 1981; Crain, 1991; Leonard & Loeb, 1988; Radford, 1990; Radford, 2004; Roeper & Williams, 1987; Wexler, 1998). Parameters determine such things as word order in a language and whether question words (e.g. Who, What, How) move to the front of a sentence (they do in English; they don’t in Chinese).

The acquisition of language competence can be viewed as a matter of “setting” grammatical parameters through exposure to appropriate receptive language input combined with the learning of a lexicon. In children with language disorders this does not happen with exposure to language alone. Language intervention must help them in learning words and setting grammatical parameters.

The Lexicon

In the *Minimalist* model, the lexicon (the mental dictionary of lexical items or words with their linguistic properties) has taken on a greater role in the grammar than it had in earlier generative grammar theory. Each representation of a word in the lexicon consists not only of phonological and semantic properties (sound and meaning), but also syntactic features such as categorial membership (i.e., whether it is a Noun, Verb, Determiner, etc.), inflectional behavior (e.g., how it is marked for number, person, and gender), and in the case of Verbs, syntactic Argument Structure (e.g., run requires only one argument, a subject “*The girl runs*”; kiss requires two arguments, a subject and an object “*The father kisses the baby*”; and give typically requires three arguments “*The girl gives the baby a toy*”).

Developing an early core lexicon is an important step in the acquisition of language. Most think of word learning as simply a process of linking a word’s sound to meaning. The acquisition of word meaning, however, describes only part of what a child is learning even in the single-word stage of language development. Contemporary linguistic theory emphasizes that the child must also be learning the syntactic features of words in relation to the parameter settings of the language being acquired – the grammatical options that distinguish one language from another. Further, children are learning a great deal about the inflectional properties of the language they are acquiring. That includes such things as how a language marks number agreement of Subjects and Verbs (e.g. “*The boy_ runs/The boys run_*”) and how time is expressed (e.g. “*The boy is playing/The boy played*”). There is also evidence that by this time a number of crucial parameters have already been set. Hirsh-Pasek, Golinkoff, et al. showed that when children as young as sixteen months (still in the one word stage) were presented with

televisions showing *Big Bird* tickling *Cookie Monster* and vice versa, and then were told, “Oh look! **Big Bird** is tickling **Cookie Monster!**” or vice versa, they preferentially attended to the appropriate visual stimulus (Hirsh-Pasek & Golinkoff, 1996). This finding demonstrates that the two word order parameters had already been set. The children already knew that English is a Subject-Verb-Object word order language.

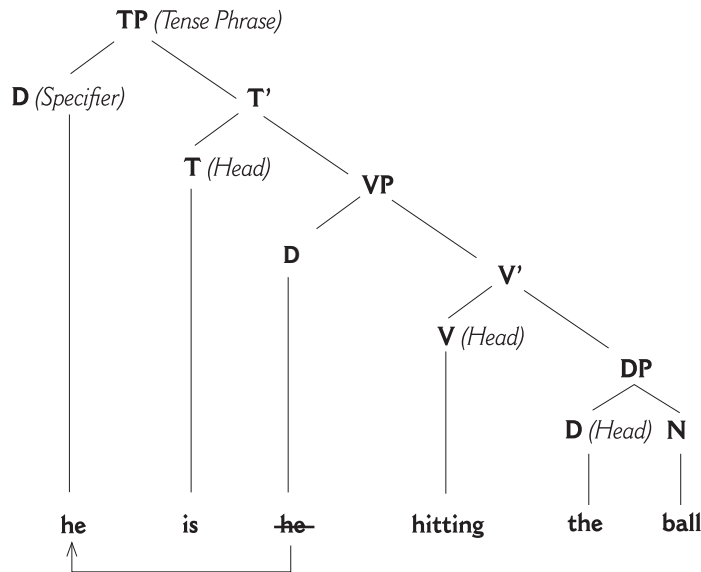
Important within the *Principles and Parameters Theory* is the division of the lexicon into two categories. *Lexical Category* words are the familiar Nouns, Verbs, Adjectives. *Functional Category* words and elements serve essentially grammatical functions. This category includes such things as Pronouns and the inflections associated with Verbs. The *Functional Categories* include Determiners which are associated with Nouns, Tense which is associated with Verbs (in earlier work called Inflection or INFL), and Complementizers which includes question formation. Table 1 gives examples of Determiners, Tense, and Complementizers.

Functional Categories	Examples
Determiners: Specify or determine that to which a Noun expression refers.	
Pronominal Determiners Pronouns Nominative Accusative Pronominal Possessives Independent Possessives Anaphors (Reflexives)	<i>this, that, these, those</i> <i>I, we, you, he, she, they, it</i> <i>me, us, you, him, her, them, it</i> <i>my, your, our, his, her, their, its</i> <i>mine, yours, ours, his, hers, theirs, its</i> <i>myself, yourself, ourselves, himself, herself, themselves</i>
Tense: Refers to elements that inflect and mark Verbs.	
Tense & Aspect Regular Past “-ed” Future Modal “will” Present Progressive (Aux. “be”+V+“-ing”) Negation Auxiliary “be” + Negative Auxiliary “do/have” + Negative Agreement Copula “be” Auxiliary “be” Third Person Singular	. Joe fixed the house. He will set the table. He is driving the car. <i>He is not wearing a hat.</i> She doesn’t, hasn’t , set the table. I/we/you/he/she/it/they... ... am, are, is, was, were hungry. ... am, are, is, was, were skiing. Joe fixes the house.
Complementizers: Includes words that introduce complement clauses as well as operations involved in question formation.	
Complementizers Auxiliary Inversion Wh-movement+NP+VP	We know if, that, whether you are here. <i>Is Joe ___ setting the table?</i> <i>Will, Can Joe ___ set the table?</i> <i>Who, what, where, when, why, how is Joe ___</i> <i>V+“-ing” ___?</i>

Table 1. Functional Categories with Examples

Using these operations, the computational system builds sentence structures that can be interpreted for sound and meaning. Unlike in earlier versions of generative grammar where sentences were built from the top down, within the *Minimalist* model sentences are built from the bottom up. To generate the sentence “*He is hitting the ball*” the computational system would first Merge “*ball*” with “*the*” and the Determiner “*the*” would become the *Head* that dominates the structure. When a Noun Merges with a Determiner the *Functional Category* Determiner becomes the *Head*.

After a succession of Merges and one Move, the sentence “*He is hitting the ball*” would have the following simplified form:



The syntactic structures generated by Merge and Move must be interpreted into sound and meaning. The syntactic component interfaces with the external sound or Articulatory-Perceptual system via Phonetic Form. It interfaces with the external meaning or Conceptual-Intentional system via Logical Form. The *Minimalist Program* is still in its infancy but the insights into language and language acquisition it has provided have inspired the development of new approaches to language intervention. In the next section we’ll discuss the instructional research bases for the *Sterling Editions* programs in the *Language Development Packages*. Readers who would like a more detailed description of sentence generation are referred to the *LanguageLinks®: Syntax Assessment & Intervention* monograph which can be found on the *LanguageLinks* page of Laureate’s web site (www.LaureateLearning.com).

Instructional Research

Linguistic theory should guide the choice of content in any language intervention plan, but how to deliver that content should be driven by what we have learned from research into the effectiveness of various instructional methods. While pragmatic competence in social situations revolves around expressive use of language, research has shown that language (vocabulary and syntax) is acquired through listening, not speaking. Language *input* provides the data necessary to trigger parameter setting and lexical learning. Pinker (1994) stated this succinctly when he wrote,

“It is not surprising that grammar development does not depend on overt practice, because actually saying something aloud, as opposed to listening to what other people say, does not provide the child with information about the language he or she is trying to learn.” (Pinker 1994, p. 280)

Critically then, receptive language training whether it be in the realm of vocabulary or syntax should play a central role in any intervention plan for children with language impairments regardless of etiology. While the ultimate goal may be to develop communicative competence, that goal cannot be reached without first establishing language competence. Studies have validated the receptive approach to developing language competence. Research has shown that receptive procedures are in fact more effective than expressive imitation procedures in language intervention and can produce gains in production as well as comprehension (Courtright & Courtright, 1976, 1979; Zimmerman & Pike, 1972; Zimmerman & Rosenthal, 1974).

The well-established learning principles of behavioral analysis (Holland & Skinner, 1961) provide a foundation for instructional design in Laureate's language assessment and intervention programs. The programs also use principles of explicit or discrete trial instruction which uses carefully controlled instruction and stimulus presentation. Over the past thirty years, research has demonstrated that explicit instruction is effective in teaching a variety of language skills (Justice et. al., 2003; Maurice, Green, & Luce, 1996). Laureate's language intervention programs include several kinds of instructional support in training all of which have been proven to be effective in research studies (Gilman, 1969; Tait, Hartley & Anderson, 1973) including Laureate's language development software (e.g., Finn, Futernick, & MacEachern, 2005; Gillam, Crofford, Gale, & Hoffman, 2001).

Computers provide a cost-efficient delivery system for individualized language intervention. Most importantly, however, research has shown that language intervention software works. Significantly improved language development and communication skills have been documented when regular use of language intervention software was added to the ongoing curriculum in special education classrooms. Moreover, using language intervention software with non-professional adult assistance, children with special needs can make language gains comparable to those seen during individual language therapy with a speech-language pathologist (Gillam & Loeb, 2005; Wilson & Fox, 1983, 1986). One investigation even demonstrated that three to six year old children with autism were more attentive and motivated when using a computer, and actually learned and retained more vocabulary than they did during one-on-one instruction with a teacher (Moore & Calvert, 2000).

To acquire a language, children must be exposed to primary linguistic data or language input. Based on this input, they must learn the lexicon, set parameters, and become competent users of the computational system to generate sentences. Children with language disorders can experience difficulties in any or all of these linguistic components. As discussed earlier, receptive training is best suited to developing a lexicon, setting parameters, and establishing syntactic competence. Receptive language intervention should be an essential component in all programs for children with language disorders until they have mastered grammar. For busy clinicians and educators, finding time to provide evidence-based receptive language intervention is difficult. That's where software can help.

All the *Sterling Editions* feature two pioneering advancements. *Optimized Intervention*[®] technology provides automatic assessment, research-based instruction, highly individualized intervention, and extensive data collection. The *Sterling Administration System* offers control over all aspects of learning, a single interface for unlimited numbers of students, easy student management, and built-in reports to ensure accountability.

Optimized Intervention[®]

The *Optimized Intervention* system in Laureate's *Sterling Edition* software is the culmination of research and development efforts which have been supported by Small Business Innovation Research (SBIR) grants from the National Institutes of Health, National Institute on Deafness and Other Communication Disorders (NIDCD), and the National Institute on Child Health and Human Development (NICHD). The system uses artificial intelligence methodology to select appropriate training material and to adjust instructional support in relation to emerging skills and competencies, resulting in highly individualized and efficient language instruction. Each *Sterling Edition* language intervention program has an *Optimized Intervention* uniquely designed to test and train the curricular targets. Words, concepts, and forms are arranged in developmental order for testing and training. All the programs begin by probe testing in developmental order to ascertain the appropriate place to begin training. Once training begins, *Optimized Intervention* determines what material a student needs to work on and how much instructional support the student may require to make progress. As a training session proceeds, the training material and degree of support are adjusted continually based on the student's performance. As powerful as *Optimized Intervention* is, it couldn't be easier to use:

- Enter or choose the student's name
- Select the program
- Press *GO*

Once the student has achieved mastery over the material being trained, *Optimized Intervention* continues to probe and introduce new stimuli until the student has achieved mastery over the entire curriculum for that program.

The Sterling Administration System

The *Language Development Packages* include all *Sterling Editions* programs that operate under the *Sterling Administration System* which provides for extensive data collection, management, and reporting. Student data collection, analysis, and reporting are necessary to ensure accountability. In addition to the attention we have paid to instructional integrity in the *Sterling Edition* programs, through the *Sterling Administration System* we provide tools for making data collection, analysis, and reporting easy. The *Sterling Administration System* carefully tracks all variables related to a student's progress through the curriculum and stores that information in the Student File. The Report Writer has been designed to access this Student File and extract meaningful information to include in student reports and other documentation. All *Sterling Edition* programs come with built-in reports.

In addition to built-in reports, *Sterling Edition* programs provide several hundred labeled data items that can be used to customize the built-in reports or to create entirely new custom templates that can be applied across students. For example, you could create a *LanguageLinks* report to send home to parents that showed what forms a student had mastered and what they could encourage in production. You can then simply apply the report to any student using the program. You can also export student data into spreadsheets for graphing and statistical analysis. The *Sterling Administration System* makes this easy. With the *Sterling Administration System* and *Optimized Intervention*[®], the *Sterling Edition* programs promise to deliver more effective and efficient assessment and intervention while at the same time providing the data clinicians, special educators, teachers, and administrators need for accountability. Laureate's two *Language Development Packages* include *Sterling Editions* programs that address building a core lexicon, setting word order parameters, establishing syntactic competence, and assisting with auditory processing.

Applying Theory & Research: Language Development Package- Level 1

Programs included in this package are: *First Words*, *First Verbs*, *First Words II*, *First Categories*, and *Simple Sentence Structure*. Developmentally, the first programs in the package are *First Words*, *First Verbs*, and *First Words II Sterling Editions*. Laureate's early vocabulary development programs. They help build an initial core vocabulary of 100 Nouns and 50 Verbs. Current linguistic theory and research suggest that even early language intervention intended to develop a core lexicon during the one word stage should not merely focus on teaching the phonological and semantic features of the lexical categories such as Nouns and Verbs. Rather, intervention should also place considerable emphasis on illustrating the syntactic features of the word; i.e., the use of the *Functional Categories* in association with those Nouns and Verbs in various syntactic settings. Without this input, children with language impairments will find it more difficult to establish a rich and complete lexicon and to acquire syntax.

In *First Words*, *First Verbs*, and *First Words II Sterling Editions*, we enhanced traditional approaches to vocabulary instruction based on current research findings. During instruction and feedback, words in training are always presented in the context of full sentences. By using full albeit short sentences we are providing multiple examples of appropriate parameter settings for English. Additionally, the sentences employed are designed to provide systematic receptive language input illustrating *Functional Categories* associated with the *Lexical Category* of the word being trained. In the case of Noun instruction, Determiners are included such as the use of articles (a, the) before and after reference is established, and the proper use of pronominal determiners in singular and plural contexts (*this/these*). In the case of Verbs, systematic input illustrates the Tense elements associated with Verbs. Verbs are more complex than Nouns, however, so in addition to including examples of Tense elements, we have included systematic receptive input focusing on the Argument Structure(s) and Thematic Roles (e.g. *Agent*, *Theme*) associated with each Verb. *First Verbs* includes examples of Verbs with only one argument also known as Intransitive Verbs (e.g. *run*, *jump*), Transitive Verbs with two required arguments (e.g. *hit*, *wash*), and finally Ditransitive Verbs with three required arguments (e.g. *give*, *bring*). Once a student has moved past the basic training levels, each word is associated with a unique reinforcement animation that provides additional examples of the word in full sentences. Nouns are presented in additional sentences that illustrate Determiner constructions; i.e., the Noun is Merged with a Determiner to form a Determiner Phrase. Included are sentences featuring articles, Pronouns, the Genitive (Possessive) 's inflection, and Determiner Phrases that include one or more Adjectives. In the case of Verbs, these sentences provide receptive language input illustrating Tense and Tense Phrases; i.e., several morphological forms of the Verb (e.g., *past tense*, *simple present*, *third person singular*, and *future modal "will"*) in complete sentences. All of this happens during reinforcement animation; a point when one would expect the student's attention to be most fully engaged.

After a student has established a core Noun vocabulary, *First Categories Sterling Edition* can be introduced. Categorization is a key component in language and concept development. In terms of objects, three levels of

categorization have been described: basic (e.g. dog, apple, shoe), superordinate (e.g. Animal, Food, Clothing), and subordinate (e.g. Poodle, Boxer, Golden Retriever). *First Words* and *First Words II* train basic category Nouns. This level is essentially one of object labeling and is associated with the establishment of an initial Noun vocabulary. It is at this level that semantic divisions are applied to abstract categories of objects in the world. The number of members in a basic level semantic category can be infinite. For example, there is no practical limit to the number of different dogs, apples, or chairs in the world. The superordinate level is more general than the basic level and includes heterogeneous items. For example, “furniture” is a superordinate category that includes such diverse objects as chairs, table, and dressers. In terms of order of acquisition, basic level categories are acquired first, followed by superordinate categories, and finally subordinate categories (Mervis & Crisafi, 1982). *First Categories* tests and trains six superordinate semantic categories (Animals, Food, Body Parts, Clothing, Furniture, and Vehicles) using ten basic level semantic categories (e.g. chair, hat, nose) for each superordinate category.

For children who are in the late one word or early word combination stage, the introduction of training materials designed to appropriately trigger the two word order parameters that yield the Subject-Verb-Object canonical word order in English sentences is important. The Minimalist model suggests that the acquisition of syntactic competence can be viewed as a matter of “setting” grammatical parameters through exposure to appropriate receptive language input. In terms of word order, English follows a pattern of Subject-Verb-Object (SVO). This order is determined by two different parameters. One parameter determines whether an Object (Complement) comes before or after the *Head* of the phrase. In English an Object comes after the Verb. The other word order parameter determines whether Subjects (Specifiers) come before or after the *Head* of the phrase. In English the Subject comes before the *Head*. These two parameters and their settings determine word order in all the languages.

Clinically we all have encountered children who produce “mixed up” sentence order and encounter difficulty interpreting reversible sentences. Linguistic theory provides us an explanation for their difficulties. The word order parameters have not been set to their appropriate English values. *Simple Sentence Structure* was designed to provide what are believed to be salient “triggering” data for setting the Subject-Verb-Object canonical word order of English. The program systematically takes the student through contrasting Verbs, contrasting Complements (Objects), contrasting Specifiers (Subjects), and finally to a set of reversible sentences (e.g., The girl is splashing the boy/The boy is splashing the girl). In a clinical study using an intervention strategy based on *Simple Sentence Structure*, Loeb and Armstrong (2001) found the SVO strategy was effective in increasing the production of SVO constructions.

Applying Theory & Research: Language Development Package- Level 2

The *Language Development Package- Level 2* takes students from the early two word stage through the establishment of base syntax forms (Determiners and Tense), Prepositions, and the auditory processing of Nouns and the sounds associated with them. The programs included on this level are: *LanguageLinks*[®]: *Syntax Assessment & Intervention Levels 1-6*, *Prepositions!*, and *Nouns & Sounds*. The programs in Level 2 build on the language competencies children have established on the first level. Following the progression suggested by current linguistic theory, the next step in language intervention after the word order parameters are set is to provide targeted training on *Functional Category* forms beginning with Determiners and Tense which emerge before Complementizers. An important step towards mastering syntax is learning Determiner and Tense forms and the syntactic structures associated with these forms. Complementing this should be instruction in Prepositions. In typically developing children Determiners, Tense, and Prepositions begin appearing in the early two-word stage.

LanguageLinks is a new software system that covers a broad range of Determiner and Tense forms in six developmentally ordered levels. *LanguageLinks* provides an evidence-based practice approach to helping children with syntactic deficits achieve language competence. It is the first comprehensive syntax intervention system to be based on current linguistic theory, instructional research, and have field test data to support its use. In Table 2, you'll find a listing of Levels 1-6 included in *LanguageLinks*. Each of the Levels in *LanguageLinks* contains six Modules which train either two or three grammatically contrasting Determiner or Tense forms per Module. The *LanguageLinks* system will take children with language impairments from the early two-word development stage (typically developing children are in this stage from 18-24 months of age) through the mastery of a broad range of syntactic forms in the Determiner and Tense categories. In typically developing children this takes place by five years of age. Children with language disorders, however, may need to work on these *Functional Category* forms throughout their elementary school years.

LanguageLinks® (Determiner and Tense Forms)

LanguageLinks 1 Modules	Examples
1. Gender with Genitive 's	Girl's Noun/Boy's Noun
2. Regular Noun Singular/Plural	Noun/Nouns (Sing/Pl)
3. Determiner 'No'	With/With No
4. Accusative 1 st & 2 nd Person Singular	Me/You
5. Noun/Verb Agreement Copular 'Be'	Is/Are
6. Nominative 3 rd Person Gender	He/She
LanguageLinks 2 Modules	Examples
1. Negation	Is/Is Not
2. Nominative 3 rd Person Number/Gender	He/She/They
3. Accusative 3 rd Person Number/Gender	Him/Her/Them
4. Locative Pronominals	Here/There
5. Auxiliary 'Be'/Regular Past -ed	Is Verb+(-ing)/Verb+(-ed)
6. Prenominal Determiners Singular	This/That
LanguageLinks 3 Modules	Examples
1. Prenominal Determiners Plural	These/Those
2. Pronominal Possessive 1 st & 2 nd Person Singular	My/Your
3. Accusative 1 st Person Singular/Plural	Me/Us
4. Nominative 1 st & 2 nd Person Singular	I/You
5. Noun/Verb Agreement Auxiliary 'Be'	Is Verb+(-ing)/Are Verb+(-ing)
6. Nominative 1 st Person Singular/Plural	I/We
LanguageLinks 4 Modules	Examples
1. Negation	Does/Does Not
2. Accusative 1 st Person Plural & 2 nd Person	Us/You
3. Pronominal Possessive 1 st Person Singular/Plural	My/Our
4. Nominative 1 st Person Plural & 2 nd Person	We/You
5. Pronominal Possessive 1 st Plural & 2 nd Person	Our/Your
6. Noun/Verb Agreement 3 rd Person Singular/Plural	Has/Have
LanguageLinks 5 Modules	Examples
1. Pronominal Possessive 3 rd Person Number/Gender	His/Her/Their
2. Future Modal Will/Auxiliary 'Be'/Regular Past -ed	Will Verb/Is V+(-ing)/V+(-ed)
3. Independent Possessive 1 st & 2 nd Person Singular	Mine/Yours
4. Independent Possessive 1 st Singular/Plural	Mine/Ours
5. Independent Possessive 1 st & 2 nd Person Plural	Ours/Yours
6. Noun/Verb Agreement 3 rd Person Singular/Plural	Sing Noun+Verbs/Pl Noun+Verb
LanguageLinks 6 Modules	Examples
1. Independent Possessive 3 rd Person Number/Gender	His/Hers/Theirs
2. Anaphors Singular Masculine	Himself/Other DP
3. Anaphors Singular Feminine	Herself/Other DP
4. Anaphors Plural	Themselves/Other DP
5. Genitive 's	Boy Noun/Boy's Noun
6. Present Passive	Is Verb+(-ed) By (Passive)

Table 2. LanguageLinks: Syntax Assessment & Intervention Levels and Modules

Prepositions! trains 10 important Prepositions and can be introduced at the same time a student is working on *LanguageLinks*. Spatial or locative Prepositions are especially important in early syntax development. They are used to express concepts of location or position. Knowledge of spatial Prepositions is critical to commenting on the position of objects in the environment. These Prepositions enter the lexicon early in the word combination stage. The Prepositions “in” and “on” are typically cited as the two earliest developing spatial Prepositions. They were among the 14 grammatical morphemes studied in Brown’s classic 1973 book *A First Language: The Early Stages*.

During the 2004-2005 school year, a study was conducted in the Medford Massachusetts Public Schools Early Education Program using prototype *LanguageLinks* and *Prepositions!* software (Finn, Futernick, & MacEachern, 2005). Given the syntax deficits students with language impairments have, it was hypothesized that the use of syntax intervention software designed to train *Functional Category* Determiner and Tense forms would result in greater increases in language scores than use of software designed for vocabulary and concept building.

Subjects in the study were 22 children with language-impairments enrolled in the Medford preschool program . Using classroom computers, half the children used the *LanguageLinks* syntax intervention system and the other half used other Laureate software that focused on vocabulary and concept acquisition. The language status of each child was evaluated using the Comprehensive Assessment of Spoken Language (CASL: Carrow-Woolfolk, 1999) both prior to computer use and twelve weeks later.

As anticipated both groups made significant progress. On each subtest of the CASL, score increases were larger among children using the *LanguageLinks* syntax software. Considered in terms of Test-Age Equivalents, advances in the functional language of children using the vocabulary and concept software averaged 5.3 months across the three core subtests, while advances of those using the syntax software averaged 8.7 months.

While the effectiveness of using language intervention software has been demonstrated previously, those experiments have often involved impracticably intensive intervention schedules. The outcome of the Medford study using the prototype *LanguageLinks* software is noteworthy because the intervention was conducted under entirely naturalistic conditions with the aim of maximizing validity. This demonstrates that syntax assessment and intervention software can provide intensified language intervention services in the classroom.

The last program in the *Language Development Package: Level 2 is Nouns & Sounds*. This program encourages individuals to listen to and discriminate environmental sounds. Students learn to match common environmental sounds with 100 Noun photographs. Activities which help children perceive, identify, and discriminate environmental sounds are frequently included in intervention programs for children with autism and other communication disorders (Maurice, Green, & Luce, 1996). *Nouns & Sounds* includes seven different activities that provide students with opportunities to develop their auditory awareness, perception, and discrimination skills.

The evidence-based software programs included in the *Language Development Packages* can provide consistent encouraging language intervention to help children more quickly master the vocabulary and syntax necessary for communication competence.

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