

Syntactic Difficulties in Children with Specific Language Impairment (SLI); *why do they have difficulties in complex sentences and what are the intervention options?*

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■ Abstract ■

The purpose of this tutorial is to provide speech-language pathologists(SLPs) with updated general information regarding language intervention techniques for children with syntactic language impairment. This clinical resource was compiled to support SLPs who need to understand the functions and effects of diverse interventions available for children with syntactic language impairment. Intervention studies have demonstrated that treatment of these deficits is indeed effective, and to date, the most effective treatment methods are explicit, direct teaching of structures containing movement.

Key Words: children with syntactic language impairment, intervention, language treatment

I. INTRODUCTION

Specific language impairment (SLI) can be defined broadly as a delay in language development in the absence of cognitive impairment, hearing impairment, neurological damage or motor speech impairments (Leonard, 1998). Because these language deficits occur in the absence of an obvious underlying cause, pinpointing the best focus for intervention of the disorder creates a challenge for speech-language pathologists. Not only do children with SLI demonstrate language deficits in the absence of a known etiology, but practicing clinicians are also faced with the challenge of developing specific intervention programs for children who have what sometimes can seem, and is often referred to as, a general difficulty with language

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formulation. Furthermore, the variable presentation of linguistic deficits in SLI adds to the challenge of creating a comprehensive program best suited to each individual child's needs. This article attempts to aid speech-language pathologists in identifying specific areas of difficulty some children with language impairment may exhibit by providing a review of the current literature on one specific group of children—those with Syntactic Specific Language Impairment (S-SLI). In order to identify these children and provide effective intervention, a clinician must have a solid understanding of the linguistic profile found in S-SLI and understand the theoretical explanation of the deficits as well as be familiar with the current evidence supporting intervention strategies.

1. Linguistic profile of syntactic skills in children with SLI

In order to understand the distinctions of the variable presentation of SLI, we must first briefly discuss some of the linguistic difficulties found in children with language impairment.

It is important to note that children with language impairment are a heterogeneous group who may present with a variety of deficits in any or all of the domains of language (Bishop & Rosenbloom, 1987; Rice, Wexler, & Hershberger, 1998; Clahsen, 1989). Various researchers (Conti-Ramsden, Crutchley, & Botting, 1997; Rapin & Allen, 1983) have suggested that definable subgroups of children exist within the umbrella of SLI, including children with purely semantic (Dockrell, Messer & Murphy, 2005) or syntactic deficits (Davies, 2002; Friedmann & Novogrodsky, 2007; van der Lely, 2005; van der Lely & Christian, 2000). According to Friedmann and Novogrodsky (2007), children may present with pure deficits in syntax, phonology, lexical retrieval or pragmatics as well as with combinations of the majority of the above. For example, a child with a word finding disorder could also have grammatical and/or phonological deficits.

While the body of literature on intervention for young children with SLI is quite broad, some researchers have paid particular attention to the grammatical deficits found in this population. Children with SLI frequently have difficulty with morphosyntactic rules. As such, a hallmark of their early language development is omission of markers such as third person singular -s, past tense -ed and auxiliary forms such as *be* and *do* (Bedore & Leonard, 1998; Rice, Tomblin, Hoffman, Richman & Marquis, 2004; Rice & Wexler, 1995, Rice, Wexler & Hershberger, 1998). As these children grow, they continue to have difficulties in a range of areas and especially when they become school-aged, their most prominent difficulties are presented in

morpho-syntactic aspects of language. Additionally, these morphosyntactic problems in spoken language may show in school age when tested in writing (Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; Mackie & Dockrell, 2004; Windsor, Scott, & Street, 2000). This school aged child with syntactic deficits poses a challenge to clinician, which partly arises from a lack of research addressing the specific areas of difficulty that older children have with syntax and more specifically, how therapy should target these skills.

The remainder of this article provides an in depth examination of the current body of literature regarding school-aged children with syntactic deficits and evidence for successful intervention targeting these deficits. Unfortunately, very few systematic treatment studies have been conducted to provide a foundation of knowledge for clinicians to determine appropriate strategies to remediate developmental syntactic deficits. By the end of this article, the reader should have a solid understanding of the best answers to the following questions based on the current literature. 1) What is the language profile of school aged children with syntactic deficits? And 2) Is treatment of these deficits effective? Is one type of treatment more effective than another?

Researchers commonly refer to SLI with a primarily syntactic component as Grammatical Specific Language Impairment (G-SLI) or Syntactic Specific Language Impairment (S-SLI). Findings across studies have been relatively consistent in their description of the profile of syntactic deficits that exist in school-aged children with language impairment affecting their syntactic systems.

School-aged children with syntactic deficits have been found to have increased difficulty comprehending certain syntactic structures, including passive sentences (Bishop, 1979), sentences with dative shift (van der Lely & Harris, 1990), object WH-questions, focalization (Ebbels & van der Lely, 2001; Friedmann & Novogrodsky, 2003; 2005), and object relative clauses (Adams, 1990; Friedmann & Novogrodsky, 2004, Levy & Friedmann, 2009). The common theme in all of these examples is that the structure involves a non-canonical ordering of argument structures. In English, canonical order is subject-verb-object (SVO), for example "Susie ate the apple." When a sentence takes on a non-canonical order, which violates the typical SVO pattern as in the structures described above, more complex syntactic processing is required.

To understand these concepts further, it is helpful to refer to Chomsky's Government and Binding theory (1981). This theory states that there are two levels of representation of a syntactic structure - the deep structure and the surface structure. The surface structure is what

is produced by the speaker while the deep structure can be thought of as the most basic semantic-syntactic form of an idea. For example, consider these sentences:

- 1) The dog chased the cat.
- 2) The cat was chased by the dog.
- 3) It was the cat who the dog chased.

These three sentences share a deep structure but have different surface structures. The surface structure is derived from movement of elements of the deep structure.

These elements (referred to as thematic roles) are determined by the argument structure of a verb. For example, the verb "chased" requires an agent ("dog" in this example) and a theme ("cat"). The verb is the action carried out by the agent. Example 1) above follows canonical order, i.e. the agent, action and theme follow a subject-verb-object order. Examples 2) and 3) are non-canonical as they do not follow this order.

In creating the surface structure from the deep structure, traces (\hat{A}) are left in the tree when elements move from one location to another. In order for a listener to understand an utterance with a non-canonical surface structure, an individual must be able to correctly create the syntactic structure through phrasal movement and the creation of traces, then correctly assign thematic roles to the sentence constituents. Foreexample, if a listener defaults to interpreting all utterances as if they had canonical structure, they would incorrectly assume that the cat chased the dog in sentences 2) and 3) above.

Various studies (Bishop, Bright, James, Bishop, & van der Lely, 2000; Norbury, Bishop, & Briscoe, 2002; van der Lely, 1996; van der Lely & Battell, 2003) have examined the profile of deficits in children with S-SLI and have found a particular difficulty with structures involving syntactic movement as described above. For example, Ingham, Fletcher, Schletter & Sinka, (1998) and Leonard (1998) found that children with S-SLI use fewer complex verb phrases, particularly those involving movement. In longitudinal studies, Cipriani, Bottari, Chilosi, & Pfanner (1998) and van der Lely (1996) found that children with SLI rarely produced relative clauses in spontaneous speech.

Novogrodsky & Friedmann (2006) examined relative clause production in a group of Hebrew-speaking children aged 9-14 with S-SLI. They used a preference task and a picture description task to compare the production of subject and object relative clauses in this group with that of a control group of 7-11 year-old children with language skills within normal limits.

They found that the children with S-SLI made significantly more errors than the control group on both subject and object relative clauses and that the object relative construction proved more difficult than the subject relative for the S-SLI group. Upon analysis of the children's responses, they found that the children with S-SLI did not make structural errors; they did not omit complementizers (e.g. "the dog chased the cat" for "it was the dog that chased the cat"). This lack of structural errors suggests that the children have developed intact representations of high-level syntactic trees and are able to accurately build these trees upon elicitation. Their errors fell instead in the inclusion of the correct number of thematic roles and their assignment to moved constituents. For example, children in the S-SLI group frequently produced sentences with only one participant instead of two (e.g. "the child that washes himself" for "the child that the mother washes") or role assignment that does not coincide with the picture or question provided (e.g. "the teacher that teaches one child" for "the child that the teacher teaches"). Based on this profile of errors, the authors argue that older children with syntactic deficits have difficulties in the assignment of thematic roles to sentence elements after movement has taken place. As such, although they correctly construct the syntactic structure, they cannot correctly interpret which noun is the agent and which is the theme in a non-canonical sentence.

Friedmann, Gvion, and Novogrodsky (2006) provided further evidence for this interpretation in a study comparing performance of children with S-SLI and adults with agrammatic aphasia on syntactic measures. The authors examined the profile of syntactic deficits in children with syntactic deficits (aged 9-14) and adults with agrammatic aphasia through a relative clause reading and paraphrasing task in Hebrew. The participants were presented with written sentences in which each contained a verb which was a heterophonic homograph of a noun ("to *insult*" vs. "an *irsult*" with differing stress patterns but identical spelling).

All words were frequent enough to be familiar to the participants and participants and the meanings of the homographs differed enough to ensure reliable judgment of interpretation. This verb was placed immediately following the trace position of the relative clause. The adults with agrammatic aphasia made reading errors consistent with an incorrect construction of the syntactic structure and were therefore unable to paraphrase the sentences. Their most common error was reading the homograph as a noun instead of a verb. The children with syntactic impairments did not make such errors in reading; they correctly read the homographs as verbs at a rate comparable to age-matched controls. Instead, they made paraphrasing errors consistent with an incorrect assignment of thematic roles such as theme role reversal and ascribing the main predicate to an argument in the relative clause (e.g. "the guy that loves the boy cut

newspapers” for “the guy that the boy loved cut old newspapers”). In conclusion, Friedmann and colleagues (2006) argued that these results further supported the idea that children with S-SLI have impairment not in the creation of complex syntactic structures including traces, but in the application of thematic roles to constituents in the resulting structure.

van der Lely (2003, 2005) has proposed the “representational deficit for dependent relations” (RDDR) hypothesis to explain this type of difficulty that children with SLI. This hypothesis presumes that children with SLI have major syntactic difficulties; first, (a) the tendency to process passive sentences as active constructions when, in fact, the thematic roles of subject and object are reversed (e.g., *The fish is eaten by the cat* is processed as *The fish is eating the cat* or, even *The eaten fish*); (b) less frequent production of subordinate, or embedded, clauses; and (c) the inconsistent formulation of grammatically permissible “Wh-questions” (e.g., *Which cat did Mrs. White stroke?* is produced without the auxiliary verb *did* as *Which cat Mrs. White stroke?*) (van der Lely, Rosen, & McClelland, 1998, p. 1254). These difficulties may significantly influence the complexity of syntactic production in children with SLI.

Recent findings from Montgomery & Evans (2009) provided evidence that the difficulty described above maybe be due to broader cognitive deficits such as memory capacity. When children are exposed to complex sentences, they have to store noun phrase in working memory even before semantic and syntactic information are processed and integrated into verb phrase. It is known that individuals can only store two to three syntactic dependencies while processing (Lewis, 1996). Thus, it may be an overwhelming burden for children with SLI in order to store these several different information simultaneously. Montgomery & Evans (2009) provided the evidence of the working memory importance in comprehending complex sentences. Children with SLI were compared to typically developing children and language and memory matched children. Children were tested on Nonword repetition, the Competing Language Processing Task and a sentence comprehension task (both simple and complex). Results showed that all children performed comparable on simple sentence comprehension but children with SLI and language and memory matched group performed poorly in complex sentences compared to typically developing children. They concluded that sentence comprehension requires significant working memory resources.

From this discussion, we can see a profile of the typical pattern of syntactic deficits in older children with S-SLI. These children have increased difficulty with more complex structures such as wh-questions, passives and subject and object relative clauses, structures that involve syntactic movement and non-canonical word order. They have difficulty interpreting these

sentences and use them less frequently than controls in their spontaneous speech. Upon further examination of these patterns, it appears that older children with S-SLI have a deficit in the assignment of thematic roles to sentence constituents after movement has taken place, rather than a problem with the construction of the structure itself. These findings have implications for both the diagnosis and treatment of S-SLI in school-aged children, suggesting that interventions targeting thematic role assignment might be more effective for these children than those focusing purely on syntactic structure.

Cirrin and Gillam (2008) recently searched 19 databases for intervention outcomes on language therapy delivered by SLPs in school settings (K-5). They found only two studies targeted syntax, and morphosyntax. Intervention studies for sentence- and discourse-level syntax with school-aged children and adolescents with SLI are scarce. However, in this paper we plan to review recent intervention literatures that will help us guide better intervene children who have difficulties in complex syntactic structures.

2. Treatment of Syntactic Deficits

With a thorough understanding of the nature of children with S-SLI's inability to produce and comprehend complex syntactic structures containing movement, effective treatment approaches must attempt to address these underlying deficits. While there are few studies that systematically examine treatment programs, current research does reveal promising trends in the rehabilitation of complex grammatical structures in school aged children. In order to systematically explain the current literature, studies have been grouped based on four major trends in intervention approach: 1) *Explicit training of target items*, these studies focus on explicitly explaining grammatical rules and movement to students using a variety of instructional methods; 2) *Complexity approaches and generalization*, these studies focus on targets election and document changes in performance based on the complexity of items trained; 3) *Computerized programs*, these studies focus on the efficacy of employing computerized methods for intervention delivery; and 4) *Narratives*; these studies focus on the usage of training syntactic structures within narratives in order to facilitate carry-over into connected discourse.

1) Explicit Training of Target Items

A significant trend found in the following studies is the use of explicit teaching methods to train complex grammatical structures—that is, students are “told” the rules that govern

complex syntactic forms and their movement first, and then provided with examples of these structures. This assumption in and of itself is significant, as many traditional language therapy techniques adopt a more inductive approach, which stimulates children to produce certain forms and then draws their attention to what they did.

Ebbels & van der Lely (2001) examined the efficacy of an explicit remediation program in improving comprehension and production of *wh*-questions and passive sentences. They hypothesized that teaching explicit information on both grammatical relations between words and the hierarchical nature of the sentence will increase students' ability to use and comprehend both passives and *wh*-questions. Participants were 4 children with severe receptive and expressive SLI aged 11 to 13 who scored 1.65-3.33 standard deviations below the mean on various standardized language tests. Participants went through a course of treatment of approximately 20 half-hour sessions that used explicit instruction in the form of a shape coding system, which employed color and shapes as visual input to teach the grammatical relations between words. The system used colors to differentiate parts of speech and shapes to code constituents according to their role and position in the sentence. The intervention consecutively targeted passive constructions and *wh*-questions. Following intervention, three of four participants showed improvement on targeted structures. Overall, the authors concluded that the results of this study present good preliminary evidence for visual coding as an effective way to explicitly teach syntactic structures involving movement.

Ebbels (2007) expanded on these early findings and presented the results of three studies, all of which demonstrated the efficacy of using explicit instruction that capitalizes on hypothetical strengths in visual processing rather than language input to improve language abilities (including complex syntactic structures involving movement) of children aged 11-14 with below average scores on standardized language tests. The intervention goal was comprehension of the dative construction, comparative questions and past tense forms using Ebbels' Shape Coding system as developed for Ebbels & van der Lely (2001).

The first study targeted the dative construction (e.g. the cow is giving the pig the sheep) and 3 children aged 11-14 participated in the therapy. Shapes were used to illustrate the agent, the patient and the theme. In the initial phase of teaching, the children and the clinician placed toy animals on shapes printed on paper and then acted out each sentence according to the roles dictated by the shapes. Once the children were familiar with these roles, the dative construction was taught and practiced. Children were required to choose which order of roles was correct from a field of two combinations printed on paper. Later, children were asked to visualize

these combinations in their heads before acting out the sentence. The number of sessions varied with the child depending on how quickly they were able to grasp the concept. Following the intervention, two of three children showed marked improvement in their comprehension of the dative construction. The third child did not show reliable improvement, but the author concludes that this could be due to this child's weakness in auditory processing.

In the second study, the authors used shape cards as a method to visualize the movement in *wh*-movement in comparative questions. Two children participated in the study. Initially, their understanding of comparative questions was assessed once a week for a period of four weeks, and then once per term for the period of time leading up to direct work on comparative questions. The comprehension test included 12 questions all including comparative terms, 6 with movement, and 6 without. Treatment began with introduction of the shape template for the sentence without movement. The children participated in a brainstorming activity, first using declarative sentences rather than questions, and using shapes to represent all the things that could be bigger than a cat. Once children had mastered the questions, without movement, then sentences with movement were introduced, using the same approach. Both children in this study showed improvement following a term of direct treatment targeting comparative questions with movement.

In the third Ebbels (2007) study, the author used the shape coding system to teach past tense to 9 children with SLI between ages 11 and 13. The intervention was administered to the children, who were all in the same class, as a group English lesson using an arrow and timeline as a visual representation. Measurements were taken via a writing sample analysis before and after treatment. Six of the 9 children showed improvement in past tense usage. The results of this study further supported the use of visual coding as a method of explicit teaching of syntactic structures.

In order to more fully assess the importance of using this shape coding explicit approach, Ebbels, van der Lely & Dockrell (2007) compared the efficacy of the shape coding approach with a semantic driven intervention approach to determine if direct training of syntactic movement is truly necessary to improve students' understanding of complex grammatical structures. The authors hypothesized two possible outcomes: 1) If the children's difficulty is due to an underlying observational bias, making it more difficult for them to form semantic representations of less salient verbs, then the two treatment techniques should be equally efficient and 2) If their difficulty lies in linking the "patient" to the direct object position, then the syntactic-semantic treatment should be more effective.

Twenty-seven students aged 11;0 to 16;1 participated in the study. They had scores of 1.5 standard deviations below the mean on the CELF-3 (Clinical Evaluation of Language Fundamentals-3, Semel, Wiig & Secord, 1995) and Performance IQ scores no greater than 1.5 standard deviations below the mean on the Matrices and Pattern Construction subtests of the British Ability Scale-II (Elliot, Smith & McCulloch, 1996). The children were randomly assigned to 3 groups; semantic, semantic-syntactic and control for nine 30-minute treatment sessions. The semantic treatment consisted of sessions of brainstorming definitions for change of state and change of location verbs, followed by opportunities to act out these definitions. In order to avoid explicit training of the verb's argument structure, the therapist and child only used the gerund form of the verb (for example, the child and therapist would act out verbs such as "pouring" and "filling"). The syntactic-semantic treatment used Ebbels's shape coding system to train change of state and change of location verbs. Both groups participated in homework activities. The control group received indirect stimulation in order to determine if other factors such as increased language stimulation or attention from adults would be sufficient to lead to increases in understanding of argument structure. In order to create this environment, the control group participated in group intervention sessions that included working out "clues" from words in texts in order to draw inferences about stories.

The semantic group and the semantic-syntactic group both showed positive change with respect to performance on an argument structure video test as compared to their pre-therapy scores but the control group did not. Furthermore, the children in the two test groups also showed improved performance on control verbs that were not targeted in the intervention, thus suggesting that both methods were effective in generalizing to non-trained verbs. Children in both the semantic and semantic-syntactic group showed significant improvement in their correct linking of arguments to syntactic positions. However, there was no significant improvement in use of obligatory arguments for any of the groups. When analyzing if improvement occurred for use of optional arguments, only the children in the syntactic-semantic group showed significant improvement. Overall, children in semantic and syntactic-semantic groups both showed improvement in their use of verb argument structure. While this study presents strong evidence that children with deficits in understanding argument structure benefit from a specifically designed treatment approach that addresses these deficits, it fails in its ability to account for the large degree of variability among children and their specific areas of difficulty—perhaps some children would benefit more from a semantic-based approach because the underlying cause of their deficit is an observational bias, while others may in fact need a

syntactic element because of different underlying difficulty. In order to correct for this, more in depth diagnosis of children with SLI is needed to detect subtleties in syntactic deficits.

Explicit grammatical instruction using sentence-combining, sentence completion, and sentence deconstruction activities have been shown to be effective (Fang, 2006; Graham & Perin, 2007). A systematic review of the effects of sentence-combining instruction compared with more traditional grammar-teaching methods reported intervention effectiveness of sentence combining (Andrews et al., 2006). Studies also have shown positive effects of sentence-combining practice on reading comprehension (Wilkinson & Patty, 1993).

Lastly, one important issue that must be considered is that grammar instruction should be integrated into child's curriculum and living surroundings which highlight the functional intervention approach (Fang, 2006, 2008; Weaver et al., 2001).

2) Complexity and Generalization

While the previous section focused primarily on an intervention approach that explicitly teaches the child with S-SLI to use complex syntactic structures, we will now focus on studies that examine the importance of what type of treatment targets make up intervention sessions. What these studies find, in fact, is that training more complex targets results in generalization to less complex structures. This finding is important when we consider the child with S-SLI who may exhibit difficulty with assigning themes in non-canonical sentences with movement, but may have an intact understanding of basic argument structure. This is precisely the profile Levy & Friedmann (2009) presented in their case study of a student, age 12, with syntactic deficits. The student demonstrated difficulty with complex syntactic structures but not basic argument structure. The authors determined that a treatment approach geared towards addressing his underlying difficulty with complex movement was necessary as the child had age-appropriate skills in comprehending simple sentences as well as those with movement where the canonical order is preserved.

Treatment was conducted over 16 sessions in 6 months and each session had 3 components: explanation, training and testing. Each structure was first trained in writing before oral presentation. At the commencement of treatment, the authors explained argument structure and assigned colors for color-coded movement visualization during teaching, beginning with verb-movement structures and then moving on to wh-movement structures. The least problematic structures for the participant were introduced first - i.e. treatment went from focalization to object relative to subject relative. Treatment of each structure went from most

tangible to least tangible, i.e. from single written words to written color-coded sentences to oral presentation, non-reversible before reversible. Wh-questions were *not* treated.

The single participant showed a statistically significant improvement on almost all structures taught (with the exception of comprehension of subject relatives). Significant improvements were also found on untreated wh-questions. Based on these results, the authors conclude that training of a more complex sentence structure (in this case, object and subject relative sentences) led to improvement in related sentence types. Such a phenomenon explains the generalized improvement in wh-questions and several researchers have pursued multiple studies demonstrated this complexity effect (See Thompson (2007) for an overview of research addressing complexity in speech-language therapy).

Scott & Balthazar (2010) proposed 'sentence combining' to be the best option for school aged students. In this paradigm, students are presented with short one-clause sentences that are combined into one longer sentence using deletion, insertion, addition, switching, and other syntactic operations. When children manipulate the structure and meaning of the short sentences, they are to create many different sentences with diverse complexities (e.g., relative, adverbial, or object complement subordinate clauses; NP pre- or post-modification).

Eisenberg (2006) suggested sentence combining should be embedded into a real life context where children can see how complex sentences are used in real academic tasks (Scott, 1995; Scott & Balthazar, 2008; Ukrainetz, 2006). The goal of the activity would be to recognize sentence complexity when children see the sentence in a particular content domain, to be able to deconstruct the complexity so that they can comprehend the sentence, and to be more fluent with complexity when they talk or write about the same content.

3) Computerized Therapy

One topic of interest in speech-language pathology that deserves mention in this literature review involves the efficacy of using computer-delivered therapy. A few studies have examined the use of computerized programs to deliver therapy directly related to syntax. Bishop and colleagues (2006) attempted to determine if computerized training is effective in improving comprehension of grammatical structures in 24 children ages 8 to 13. The program used in the study applied principles of errorless learning to training comprehension in two altered conditions-Slow Speech and Modified speech.

The study found no improvement in children's grammatical skills after the computerized intervention in either condition; however, wide variation in the amount of practice received by

each child is noted by the authors. The authors postulate that because the children performed above chance on all measures, their deficit is not in auditory discrimination or knowledge of grammatical constructions; instead, they suggest that it is a difficulty in syntactic computation that accounts for these difficulties. They suggested further research on the scope of these difficulties.

Finestack & Fey (2009) demonstrated the efficacy of a computerized treatment program in training grammatical structures. While this study did not target wh-movement, it did explore the issue of explicit versus implicit training of grammar (in this case, the usage of gender-marking morphemes), revealing better performance of children in treatment groups who were explicitly told the grammatical rule and then provided with examples and practice, rather than those who were simply cued to listen to examples. This finding may help explain why Bishop and colleagues did not see improvement using a computerized program-in that study design, children were not told whether responses were incorrect or not, but rather had to continue to attempt to respond correctly in order to move on to the next item. This distinction is important for clinicians attempting to examine the usefulness of a computerized therapy tool, and while findings seem contradictory at this point, based on the results of Finestack & Fey (2009), it appears that a computer program designed to explicitly teach a grammatical concept may yield success.

4) Narratives

One limitation of all of the studies discussed thus far lies in their focus on clinical lab results on post-test measures, typically evaluated through comprehension probes or structured sentence formulation tasks. Can explicit treatment also lead to increases in complex syntactic usage in discourse?

Hirschmann (2000) provided some data regarding this issue, as the purpose of the treatment was to provide the children aged 9 to 10 with metalinguistic awareness which would increase their ability to produce and comprehend complex sentences. The children were asked to produce narratives, which were then coded with respect to adverbial clauses, relative clauses, nominal clauses, and subject implicit non-finite clauses in order to yield an overall Index of Complexity. Therapy occurred in a group setting and targeted basic metalinguistic concepts such as knowledge of sentences, verbs and their associated verb phrase structures, subjects and objects of sentences, and nouns and pronouns. Nearly all students showed significant improvement in the Index of Complexity scores post-therapy while the control groups showed

virtually no improvement. These results suggest that using explicit instruction of grammatical targets can indeed lead to increases in the use of complex grammatical forms in discourse. It should be noted, however, that this study focused on training metacognitive awareness of syntactic concepts to be used in narrative production throughout the duration of the study-it does not suggest that structured syntactic training used in verb-centered approach (such as the shape coding systems used by Ebbels) could also result in generalization of improved syntactic abilities in discourse.

II. CONCLUSION AND DISCUSSION

Results from the intervention studies outlined above are promising as they suggest that direct instruction of complex syntactic structures can indeed lead to an increase in production and comprehension of these structures. However, what we are missing from the above studies is a clear picture of the best treatment targets, the most appropriate course of therapy with respect to duration and frequency, and whether all methods are as effective in improving the skills of all students both in structured clinical settings and during conversation and writing tasks.

For example, while the studies of Ebbels and Van der Lely (2001), Ebbels (2007), and Ebbels, Dockrell, and Van der Lely (2007) provide support for the use of a visual shape coding system to bolster explicit training of complex syntactic structures, the results of Ebbels, Dockrell, and Van der Lely (2007) raise interesting questions regarding the need for further understanding of what the underlying deficit leading to a child's difficulty with complex movement may be. Perhaps children with S-SLI may have different causes for their difficulty with assigning thematic roles to structures containing movement. Levy & Friedmann (2009) address this issue with their case study of a child with specific deficits in only complex movement but not basic argument structure—a diagnostic distinction that is not explicit in Ebbels, Dockrell and Van der Lely (2007). Such a distinction has relevance for practicing speech-language pathologists, as it suggests that perhaps assessment of these higher level syntactic structures is lagging, and the field must respond with an increase in our ability to accurately identify syntactic deficits for school-aged children.

The current literature also contains contradictions regarding the efficacy of computerized intervention for syntactic deficits. Such a contradiction undoubtedly arises partially from the

lack of studies that examine the usage of computerized programs in intervention. The benefit of these programs lies in the possibility of increasing the frequency and intensity of treatment, but the literature lacks a study that utilizes well-established intervention techniques such as positive reinforcement following discrete trials using a well-designed program that has the support of a theoretically sound target choice and intervention timeline.

Perhaps the most promising studies that may inform our future target choices have been those that show generalization to untreated structures—namely those studies that hit upon the idea of complexity (in the realm of S-SLI, Levy & Friedmann , 2009).

However, the literature does not currently have a study with an explicitly designed a hierarchy of complexity for informing their decisions, or educating the conclusions, regarding the observed generalization results. What is needed in the literature is a study that attempts to outline the expected generalization results, and systematically assess the use of explicit therapy techniques to train the most complex of these in order to assess generalization to least complex structures. Furthermore, we need to know if such a treatment method will improve the complexity of structures used in connected narrative, not simply structured sentence formulation.

Much more research is needed to address intervention for syntactic deficits in school-aged children with language impairment. The literature to date reveals that this is a diverse population with respect to presentation of language deficits, but many children with SLI show particular difficulty with syntactic structures requiring movement. Intervention studies have demonstrated that treatment of these deficits is indeed effective, and to date, the most effective treatment methods are explicit, direct teaching of structures containing movement.

■ References

- Adams, C. (1990). Syntactic comprehension in children with expressive language impairment. *British Journal of Disorders of Communication, 25*, 149-171.
- Andrews, R., Torgerson, C., Beverton, S., Freeman, A., Locke, T., Low, GH., Robinson, A., & Zhu, D. (2006). The effect of grammar teaching on writing development. *British Educational Research Journal, 32*, 39 - 55.
- Bedore, L., & Leonard, L. (1998). Specific language impairment and grammatical morphology: A discriminant function analysis. *Journal of Speech, Language, and Hearing Research, 41*, 1185 - 1192.
- Bishop, D. V. M. (1983). Test of Reception of Grammar. Manchester, UK: Manchester University.
- Bishop, D. V. M., Adams, C. V., & Rosen, S. (2006). Resistance of grammatical impairment to computerized comprehension training in children specific and non-specific language impairments. *International Journal of Language and Communication Disorders, 41*, 19 - 40.
- Bishop, D., Bright, P., James, C., Bishop, S., & van der Lely, H. (2000). Grammatical SLI: A distinct subtype of developmental language impairment? *Applied psycholinguistics, 21*, 159 - 181.
- Bishop, D.V.M., and Rosenbloom, L. (1987) "Childhood language disorders: Classification and overview." In: Yule, W., Rutter, M. (Eds.), *Language Development and Disorders*. MacKeith Press, London.
- Bishop, M. V. D. (1979). Comprehension in developmental language disorders. *Developmental Medicine and Child Neurology, 21*, 225-238.
- Bryan, A. (1997). Colourful semantics: Thematic role therapy. In S. Chiat, J. Law, & J. Marshall (Eds.), *Language disorders in children and adults: Psycholinguistic approaches to therapy* (pp.143 - 161). London: Whurr.
- Chomsky, N. (1981). Lectures on government and binding. Dordrecht: Foris.
- Cipriani, P., Bottari, P., Chilosi, A. M., & Pfanner, L. (1998). A longitudinal perspective on the study of specific language impairment: The long term follow-up of an Italian child. *International Journal of Language and Communication Disorders, 33*, 245 - 280.
- Cirrin, F., & Gillam, R. (2008). Language intervention practices for school-age children with spoken language disorders: A systematic review. *Language, Speech, and Hearing Services in Schools, 39*, 110 - 137.
- Clahsen, H. (1989). "The grammatical characterization of developmental dysphasia," *Linguistics, 27*, 897-920.

- Conti-Ramsden, G., Crutchley, A., and Botting, N. (1997). The extent to which psychometric tests differentiate subgroups of children with specific language impairment, *Journal of Speech Language and Hearing Research*, 40, 765-777.
- Davies, L. (2002). Specific language impairment as principle conflict: Evidence from negation. *Lingua*, 112, 281-300.
- Dockrell, J.E., Messer, D., and Murphy, V. (2005). Language profiles and naming in children.