

Clinical Forum

What Works in Therapy: Further Thoughts on Improving Clinical Practice for Children With Language Disorders

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Purpose: In this response to Kamhi (2014), the author reviewed research about what does and does not help children with language impairment (LI) to learn grammatical features and considered how that research might inform clinical practice.

Method: The author reviewed studies about therapy dose (the number of learning episodes per session) and dose frequency (how learning episodes are spaced over time) and also reviewed studies about dose form, including input characteristics and therapy strategies.

Conclusion: Although the research is limited, it offers implications for how clinicians do therapy. Children with LI

need many learning episodes clustered together within sessions but spread out over time across sessions. Input must be grammatical and consistent while providing varied exemplars of the target features. Learning episodes should actively engage children in producing utterances with the target form, but only after they have had the chance to hear some utterances with that feature. The author suggests a session plan that starts with a structured activity and then incorporates the target form into an embedded activity such as storytelling.

Key Words: therapy, language disorders, children

For children with language impairment (LI), learning language is not easy or quick (Leonard, 1998). LI affects all stages of learning. Children with LI demonstrate a late onset and slower rate for learning linguistic features (Rice, Wexler, & Hershberger, 1998; Schuele & Dykes, 2005) and more restricted use of those features (Bellaire, Plante, & Swisher, 1994; Hadley & Short, 2005). Involvement in language therapy does not eliminate these characteristics. Children with LI who are receiving therapy continue to lag behind not only age peers but also younger language-matched children (Goffman & Leonard, 2000); their use of linguistic features may remain appreciably below mastery level even after large amounts of therapy (Leonard, Camarata, Pawtowska, Brown, & Camarata, 2008). Yet clinicians want and even expect children with LI to make immediate change in response to therapy strategies and to achieve therapy goals after only a brief period of intervention (Fey, 1988; Kamhi, 2014). This expectation could lead us to reject therapeutic approaches that may have less immediate impact on performance but ultimately achieve broader and deeper learning.

In his lead article in this forum, Kamhi (2014) discusses erroneous assumptions about language therapy and gaps in the research on therapy efficacy for language disorders. In this article, I further consider the research, albeit often limited, about what does and does not help children with LI to learn language and consider how that research might inform clinical practice. I have chosen to focus on therapy for grammatical features because these are common targets for therapy (Fey, Long, & Finestack, 2003). In doing so, I will use the terminology suggested by Warren, Fey, and Yoder (2007) for assessing therapy efficacy. Although my focus is mostly on the oral communication skills of younger children from preschool through early elementary grades, my remarks are relevant to children of varying ages in a variety of clinical settings and to written communication. I will focus as much as possible on studies about individuals with LI as there is evidence that children with LI may not learn in the same way as children with typical development.

Most of my remarks will address how we do therapy. In each of the following sections, I will start by defining the relevant terms and stating the main conclusions about that aspect of therapy based on the studies I reviewed. I will then provide a brief summary of the research studies so that readers can see the evidence that I used to support those conclusions. Finally, I further discuss the implications of the

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research evidence. Kamhi (2014) also discusses the content of therapy, and I will briefly comment on that issue as well.

Dose and Dose Frequency

Therapy dose refers to the number of learning episodes provided within a single session. *Dose frequency* refers to the number of times a dose of therapy (i.e., a specified number of learning episodes) is provided per day or week (Warren et al., 2007). The evidence suggests that children with LI need a higher dose of learning episodes than children with typical language (TL; Gray, 2003; Proctor-Williams, 2009). It further suggests that exposure below a critical dose level will not be effective (Proctor-Williams, Fey, & Loeb, 2001). The critical density of exposure can be achieved by clustering learning episodes together within a session. Across sessions, however, the research suggests that learning episodes should be spaced out over time rather than condensed into a single shorter amount of time (Riches, Tomasello, & Conti-Ramsden, 2005; Smith-Lock et al., 2013). Therapy for grammatical features thus takes time and many learning episodes. Improvement is not immediate but does occur with repeated exposures spaced out over time.

Studies About Therapy Dose

Some of the clearest evidence that children with LI need higher exposure doses than children with TL comes from studies about vocabulary learning. In a study by Gray (2003), for instance, 4- and 5-year-old children with LI required an average of 27 trials to comprehend a new word and 49 trials to produce a new word compared with a mean of 13 for comprehension and 24 for production by same-aged children with TL. The children with LI thus required approximately twice as many trials as children with TL first to map a new word with its referent, then to imitate the new word, and finally to use the word spontaneously. Also of note was that the children with LI required more trials to comprehend new words than the TL group did to produce them.

Several therapy studies by Camarata and Nelson and their colleagues (Camarata & Nelson, 1992; Camarata, Nelson, & Camarata, 1994; Nelson, Camarata, Welsh, Butkovsky, & Camarata, 1996) suggested the dose amounts that are needed for children with LI to learn grammatical features. Across their studies, children with LI required an average of 60.6 to 102 exposures to a grammatical feature during conversational recast therapy before they began to use that feature spontaneously. In contrast, 147.5 to 173.2 exposures were needed for achieving spontaneous production when exposure was provided via elicited imitation drills. I will have more to say about these studies in the therapy procedures section below.

Studies About Dose Frequency

Dose Frequency Within Sessions

It is not enough to just consider the number of exposures. The density of exposure to grammatical features is also

important. Although parents of children with LI produce recasting at the same rate as parents of children with TL at the same level of language (Fey, Krulik, Loeb, & Proctor-Williams, 1999), this level of recasting was only correlated with subsequent language usage for children with TL and not for children with LI (Proctor-Williams et al., 2001). In contrast, studies of clinical interventions show that recasting has a significant impact on learning for children with LI. The difference appears to be the rate at which the recasts are provided (Fey et al., 1999; Proctor-Williams, 2009; Proctor-Williams & Fey, 2007). In the clinical interventions, recasts were given more frequently, at rates ranging from 0.7 to 1.4 per minute—approximately 3.5 times the rate at which recasts were reported in parent-child interactions (Proctor-Williams, 2009). Children with LI thus require both a higher density and a larger number of learning episodes than do children with TL in order to learn grammatical features and new words.

Dose Frequency Across Sessions

Studies of children with typical development found distributed practice that spaces out learning episodes over time to be more effective than massed learning in which learning episodes are condensed into a shorter time span. Studies of children with LI show the same advantage of distributed over massed practice. Evidence for this comes from studies of both vocabulary and grammar.

In a study about verb learning, Riches et al. (2005) compared children ($M_{\text{age}} 5;6$ [years;months]) who received training on novel verbs during a single session (i.e., massed exposure) to children who received the same number of exposures in the same amount of time spread over four daily sessions (i.e., spaced exposure). Children in the spaced exposure condition showed a significantly higher performance in their production of the novel verbs than children in the massed exposure condition. It is important to note that the density of learning episodes within sessions was the same in both conditions. That is, children in the spaced exposure condition received fewer exposures per session and, consequently, had shorter sessions, so that density of hearing the novel verbs was the same. The higher performance in the spaced condition cannot, therefore, be attributed to the amount of time spent within therapy sessions because children received the same amount of therapy time in both conditions.

A similar finding was reported by Smith-Lock and colleagues (2013) for children receiving eight sessions of grammar intervention in a school setting. Session length and number of exposures per session were the same for both groups. One group was seen once a week for 8 weeks and the other group was scheduled daily for 8 consecutive days. Testing for production of target forms occurred immediately after treatment for both groups. The 8-day group was also tested at the conclusion of treatment for the 8-week group. There was significant improvement in production of the target form for the 8-week group. The 8-day group did not show a significant improvement at either test time.

It is important to note the confound in both studies between dose frequency and *total intervention duration*,

defined by Warren et al. (2007) as the time period over which therapy is provided. In both studies, the spaced condition also had a longer total intervention duration: 4 days versus 1 day in the Riches et al. (2005) study and 8 weeks versus 8 days in the Smith-Lock et al. (2013) study. The evidence from these studies suggests that spreading out a child's exposure to linguistic features over a longer time period will be more effective than condensing the same amount of exposure into a shorter time period.

However, this does not mean that therapy for a grammatical feature could not be provided in blocks. Rather, it suggests that a single block of therapy will not be as effective as working iteratively on a grammatical feature in time blocks that are spaced out over time with breaks in between. This scheduling is illustrated in a training study for a grammatical morpheme by Kiernan and Snow (1999). In this study, only nine out of 30 children with LI (ages 4;0 to 5;11) generalized usage of the bound morpheme *-ish* to novel word roots after a single 4-day training block. An additional 12 children showed generalization after completing a second training block scheduled after a 1-week break.

Implications for Dose Management

Evidence from the research studies suggests that children with LI need many more exposures to learn grammatical features and new words than are needed by children with TL. The research evidence also suggests that speech-language pathologists (SLPs) would want to organize learning episodes by clustering them together within each session to achieve a critical density of exposure while spacing out exposures across sessions over time. This suggests to me that the organizational strategy for working on grammatical features should be both horizontal and cyclical: horizontal because SLPs would target several linguistic features per session rather than devoting sessions to intensively working on a single linguistic feature; cyclical because SLPs would rotate the features that they work on over time rather than focusing on the same features in session after session. This does not mean that SLPs would work on a completely different set of features every session because that would not be likely to achieve the requisite dose. Rather, SLPs would work on each feature in a block of sessions, shift to working on other features, and then revisit the earlier targets for another block of sessions, as needed.

Dose Form

Dose form refers to the type of task or activity that is used for delivering learning episodes in combination with the strategies used within the learning episodes (Warren et al., 2007). I will first consider the type of input provided within therapy and then consider strategies for delivering that input and involving the child.

Input Variables

Children must hear grammatical features in order to learn them. The research evidence suggests that this exposure

must include different exemplars of a feature so that children learn a general pattern rather than individual items (Kiernan & Snow, 1999; Savage, Lieven, Theakston, & Tomasello, 2009; Torkildsen, Dailey, Aguilar, Gómez, & Plante, 2013). Exposure to grammatical features also must be consistent. This means providing grammatical input that always includes obligatory grammatical morphemes (Bredin-Oja & Fey, 2013). It also means reducing the proportion of utterances in the input that might provide counterevidence to the child about the target form. As an example of this, Hadley, Rispoli, Fitzgerald, and Bahnsen (2011) noted that present tense verbs do not get marked for verb tense when they occur with first person and plural subjects (e.g., *I walk, they walk*). These kind of utterances might make it seem to a child as if verb tense marking were optional. The research evidence suggests that hearing fewer potentially confusing sentences helps children to learn grammar.

Studies about input variability. Kamhi (2014) discussed the importance of varying the conditions of instruction and practice in order to achieve broader learning. One type of variation has to do with the number of different exemplars provided for a linguistic feature. This was investigated by Savage et al. (2009) for typical 4-year-old children in a priming task for *got* passive sentences such as *I got pushed by it*. To prime the target form, the examiner showed the child a picture and said a sentence about the picture five times before asking the child to repeat the sentence. The child was then asked to produce a new sentence about a second picture. Some of the children heard five prime sentences with the same verb and other children heard prime sentences with five different verbs. Children in both conditions were able to generate new passive sentences about the second picture immediately after hearing the model sentences. However, only the children who had been exposed to passive sentences with different verbs demonstrated retention, continuing to produce passive sentences during follow-up sessions 1 week and 4 weeks after exposure to the model sentences. This finding suggests that the experience of hearing the passive sentences with varied input resulted in learning the rule for the passive sentence form, whereas hearing the passive with only a single verb affected only immediate performance.

Another study by Torkildsen et al. (2013) investigated the effect of input variability on the learning of invented combinations of *X+koo* and *poe+Y* by young adults with and without LI. In the high-variability condition, participants heard 24 different exemplars four times each. In the low-variability condition, participants heard three different exemplars 32 times each. Participants were tested by having them make a yes–no judgment about whether each test item followed the rule. The LI group showed better performance for untrained as well as trained items for the high-variability set. In contrast, in the low-variability (i.e., three-exemplar) set, they showed no difference in acceptance of items that either conformed to or violated the rule for trained items, and performance was below-chance for untrained items. The participants in this study thus only learned to judge usage of bound morphemes when they heard the morphemes with a larger variety of word roots.

A similar finding was reported by Kiernan and Snow (1999) for their study of bound morpheme usage (previously discussed with the studies on dose frequency). Only nine of the children with LI generalized the morpheme *-ish* after the first training block, and an additional 12 children generalized the morpheme after a second training block. During the first training block, the children heard the target morpheme with three different word roots. In the second training block, the children heard the morpheme with three additional word roots. The authors suggested that it was hearing the morpheme with more word roots rather than the additional time in therapy per se that helped the children to generalize the morpheme to untrained word roots.

The implication from all of these studies is that children need to hear a grammatical feature with different vocabulary in order to learn the pattern for that feature rather than replicating the specific trained items. This applies to syntactic forms as well as to grammatical morphemes. Torkildsen et al. (2013) and Kiernan and Snow (1999) suggest more specifically that many children with LI may need to hear more than three different exemplars in order to achieve generative use of grammatical features.

Studies about input consistency. The studies discussed show that exposure to multiple exemplars of the same form with different content is needed for broad learning. There is another kind of variability, however, that might make it more difficult for a child to learn linguistic features. This kind of variability involves exposure to utterances in which a linguistic feature is variably expressed. Hadley et al. (2011) investigated this type of input variability for tense marking by looking at the relationship between what they called *input informativeness*, the extent to which parent utterances to the child provided clear and consistent information about tense marking, and the child's subsequent growth in use of tense marking. Input informativeness for tense marking in the parent samples varied from 33% to 70%. Higher use of tense marking by children at age 30 months was correlated with higher levels of input informativeness by parents from ages 21 to 27 months, whereas growth in use of tense marking was slower for children exposed to more bare stem and ambiguous verb forms. That is, children learned more when they heard utterances that more consistently included verbs with tense marking.

Hadley et al. (2011) included bare infinitives such as *you made me put them on* among the types of input sentences that would present ambiguous information about verb tense marking. Leonard and Deevy (2011) provided an explanation about how these utterances might provide misleading information about verb tense marking. In this study, children were tested on their comprehension of simple progressive sentences (e.g., *the horse is eating*) and complex sentences with nonfinite subordinate clauses (e.g., *the cow sees the horse eating*). All of the children scored 100% for comprehension of the simple progressive sentences. Children with TL correctly interpreted 87% of the subordinate clause sentences and made random errors among the foil pictures. Children with LI correctly interpreted only 69% of the subordinate clause pictures, and their errors were not

random. For the sentence *the cow sees the horse eating*, correct responses required the child to select a picture that showed both the horse eating and the cow looking at the horse. Most of the errors by the children with LI involved selection of the picture that showed the cow looking away from the horse and the horse eating. Note that the other two foils each showed an animal other than the horse eating and thus pertained to interpretation of the second clause. The children with LI apparently failed to interpret the structure of the entire sentence and focused only on the nonfinite subject-verb sequence in the second clause. Because this sequence provides an apparent model of a present participle verb form (i.e., *eating*) without auxiliary *be*, hearing sentences of this form might make it more difficult for a child to learn that auxiliary *be* is obligatory in the progressive verb form.

It may be hard to eliminate or even identify counterexamples of this sort when talking to young children. What they can do is increase the exposure dose to the target form. That is, SLPs can provide input in which the child hears proportionally more exemplars of the target form and a correspondingly lower proportion of apparent counterexamples.

Studies about input grammaticality. Although Kamhi (2014) listed the necessity for grammatical input as the one true assumption held by SLPs, my impression is that there is considerable disagreement among experts about this (van Kleeck et al., 2007) and that many SLPs assume the opposite: that children benefit from simplifying input to eliminate grammatical morphology and reduce the number of constituents. Until very recently, parent-training programs, including the Hanen program, advocated the use of telegraphic speech, although that seems to be changing (Conklin, 2010). There are still some advocates for using telegraphic speech at early stages. Hancock and Kaiser (2006), for instance, recommend modeling telegraphic utterances for the child to imitate as part of enhanced milieu teaching.

One reason SLPs eliminate grammatical morphemes is to help children focus on the content words. However, children's ability to pick out content words is facilitated by the presence of adjacent weak syllables (Bedore & Leonard, 1995), and children have been shown to use grammatical morphemes to identify nouns and verbs (Golinkoff, Diznoff, Yasik, & Hirsh-Pasek, 1992; as cited in Bedore & Leonard, 1995). My own thoughts about this are that children with LI need to hear grammatical morphemes as much as possible. The English morphological system is sparse and irregular. English-learning children acquire grammatical morphology more slowly than children learning languages such as Italian, for which morphology is more consistent and regular (Leonard & Sabaddini, 1987). Children exposed to a higher proportion of bare stem and ambiguous verb forms showed a slower growth trajectory for learning verb tense marking (Hadley et al., 2011). Grammatical morphology is an area of particular difficulty for children with LI (Leonard, 1998). Telegraphic input is likely to make it even harder for these children by reducing the amount and consistency of exposure.

Several researchers found that there is no advantage to telegraphic input for either comprehension or production. Van Kleeck et al. (2007) reviewed studies comparing children's responses to telegraphic and grammatical sentences. Studies of children with typical development showed better comprehension for grammatical utterances. Studies about production and about children with LI were insufficient to make conclusions. A recent study by Bredin-Oja and Fey (2013) of young children with LI compared responses to grammatical and telegraphic prompts within enhanced milieu therapy. There was no difference in the rate of responding to prompts between the two conditions for any of the five children. Three of the children produced a higher usage of grammatical morphemes in the grammatical condition. The other two children did not produce any grammatical morphemes in either condition. Thus, the telegraphic utterances did not make adult utterances easier to understand or promote more responding. Rather, the telegraphic utterances showed a negative impact on children's usage of grammatical morphemes similar to the effect found by Hadley et al. (2011) for lower input informativeness. The research evidence does not support telegraphic input but rather suggests that we should produce grammatical morphemes when we talk to children.

Implications for managing input. In reviewing the literature about input, I separately considered variability, consistency, and grammaticality. However, it seems to me that all of these variables contribute to making input more informative about grammatical features for the child. One reason telegraphic input is likely to be detrimental for language learning is that it reduces input informativeness. In light of evidence that there is no advantage to using telegraphic utterances (Bredin-Oja & Fey, 2013), we should use grammatical utterances in therapy even when targeting single words and word combinations. Note that this does not mean that we must always talk in full sentences. For instance, it is acceptable to produce just a noun phrase when labeling an object (e.g., *a doggie*) although we might want to make this part of an utterance sequence (e.g., *a doggie; the doggie is barking so loud!*). It is also important to keep in mind that telegraphic input reduces informativeness about word class and sentence structure and not just about morpheme usage.

However, just making sure that our utterances are grammatical may not achieve input that is sufficiently informative. Among our grammatical utterances may be some that present potentially misleading information about specific target features (Hadley et al., 2011; Leonard & Deevy, 2011). This may be why children with LI need a higher density of recasts and other models than children with typical development. Hadley et al. (2011) suggested that there is a critical level of input informativeness that may be necessary for children with LI to learn grammatical features. A study by Walsh (2010) showed that informativeness for tense marking could be increased by training parents to produce "toy talk," a type of other-focused discourse in which adults talk about toys rather than about their own and the child's actions and, therefore, produce a higher

proportion of utterances with third-person singular subjects and overt tense marking.

Another way of making our input informative is to use linguistic features in a variety of contexts. This is important to help children achieve broad learning of patterns rather than narrow scope achievement of individual items. What this variability looks like will depend on the type of linguistic feature. For bound morphemes, children will need to hear the morpheme with different word roots. For complement clauses, children would benefit from hearing different complement-taking verbs with the same complement clause and the same complement-taking verb with different complement clauses. We can also provide information about a grammatical feature by contrasting it with another form that is semantically and/or grammatically related to the target (Connell, 1982).

Therapy Procedures

Activities can be categorized on a continuum of naturalness (Fey, 1988). Activities along this continuum vary in their structure and embeddedness (Eisenberg, 2004). At one end of the continuum are activities that involve highly structured and decontextualized drills. At the other end of the continuum are activities that are lower in structure and that embed linguistic targets within meaningful activities. Activity type affects the choice of therapy strategies, with explicit instruction and elicited production being used in more structured activities and recasting being used in more embedded activities.

The research evidence supports several suggestions for managing the structured activities typically used in pull-out sessions. One suggestion is that explicit instruction about grammatical features may be beneficial if it is not given too often (Finestack & Fey, 2009). Another suggestion is that children will learn more when therapy includes production of grammatical features rather than just listening (Connell, 1987; Connell & Stone, 1992; Ellis Weismer & Murray-Branch, 1989). However, the research further suggests that we should not start therapy by presenting single models for immediate imitation but should first provide exposure to a set of utterances with the target feature (Courtright & Courtright, 1976).

Investigators suggest that imitation training leads to rapid production of grammatical features not previously produced by the child (Camarata et al., 1994). As pointed out by Kamhi (2014), however, this type of activity results in performance changes rather than in true learning. Although fewer trials may be needed to achieve prompted production in imitation training than in embedded therapy incorporating recasts, the opposite is true for spontaneous production. Subsequent carryover to spontaneous speech is likely to be slower with imitation training than for recast therapy (Camarata et al., 1994). This raises an important issue about how to sequence these types of activities. I will discuss this in the implications section after first reviewing the evidence from research studies.

Studies About Explicit Instruction

Instructions describe how to do something. Although some textbooks on language therapy discourage this practice (e.g., Owens, 2010), it is my impression that it is quite common for SLPs to explain to children how and when to use linguistic features. Teaching children in regular education classes about grammatical constituents has not been shown to affect children's production of those grammatical features (see Weaver, 1996, for a review). Two studies considered whether this type of instruction facilitates bound morpheme learning by children with LI in therapy-type activities.

Swisher, Restrepo, Plante, and Lowell (1995) compared therapy for an invented noun morpheme with and without explicit instruction. In both conditions, children heard stories that contained 10 inflected and 10 uninflected nouns and were prompted to produce an inflected noun six times and an uninflected noun four times. In the explicit rule condition, children were given an explanation about use of the morpheme ("when it's small you say *pim* but when it's big you have to say *lul*, *pimu*") before the stories in both sessions as well as explanatory feedback in session two after production trials ("yes, for the big one you say *lul*, *pimu*"). A filler statement about the story was provided in the implicit rule condition. Few children with LI generalized the morpheme to novel nouns (six out of 25). Of those that did, more showed generalization in the implicit rule condition than in the explicit condition (four vs. two). The authors did not report data on production of trained items. This study suggests that explicit feedback is not helpful.

In contrast, Finestack and Fey (2009) concluded that explicit feedback can be helpful. These authors investigated explicit instruction for somewhat older children, ages 6 to 8 years, for invented morphemes (*-pa* and *-po*) that marked the verb for gender of the agent. The first two sessions involved a modeling procedure in which the clinician described 20 pictures about four different characters each doing five different actions. The third and fourth sessions involved a recast procedure in which children were prompted to describe the same pictures, and recasts were given after utterances in which the child either omitted or used an incorrect verb morpheme. The children were given prompts after every fifth item in both the modeling and recast sessions. In the deductive condition, the prompt provided explicit instruction ("when it's a boy you add *-po* to the end; when it's a girl you add *-pa* to the end") versus a filler prompt in the inductive condition ("listen carefully so you can talk just like Tiki"). When tested for production of previously heard utterances, 12 of the 16 children in the deductive group achieved 70% usage compared with five children (out of 16) in the inductive group. On a generalization probe for usage of the morpheme in new subject-verb combinations, with new subjects, and with new verbs, 10 children in the deductive group achieved 80% accuracy, with most of these children achieving generalization after the second session. Only three children in the inductive group achieved this level of generalization, and they did not do so

until the fourth session. In explaining why their results differed from Swisher et al. (1995), Finestack and Fey suggested that explicit feedback may be helpful only for older children who have developed metalinguistic awareness. However, as I will discuss in the implications section, there were other differences in how the instruction was given that may account for the discrepant results.

Studies About Elicited Production

Several investigators reported better performance in learning to produce linguistic features when the therapy involved imitation than when the procedure involved listening only. In two studies by Connell (1987; Connell & Stone, 1992), children with LI showed higher rates for producing an invented noun morpheme with untrained nouns after training that involved immediate exact imitation of a model than after a listening-only condition. Ellis Weismer and Murray-Branch (1989) also compared accuracy between an immediate imitation condition and a listening-only condition for grammatical morphemes and subject-case pronouns. In their study, the child imitated the structure of the modeled sentence with different content rather than producing an exact replication of the model sentence. These authors found no difference in posttherapy accuracy between the two conditions. However, the learning pattern within the imitation condition was more stable, with fewer fluctuations in performance from session to session. These studies suggest that learning may be enhanced by having the child imitate the target feature.

Studies of structural priming also show the immediate effect that a model sentence can have on the sentence form that is subsequently produced. In these studies, children heard and exactly imitated a model sentence about a picture before attempting to produce a sentence about another picture. Performance was reported on the sentence form produced in response to the second picture. In Leonard et al. (2000), children with LI as well as children with TL were more likely to produce sentences with auxiliary *is* after they had been exposed to a prime sentence that included auxiliary *is* or *are* (mean usage rate of 68%) than after hearing sentences with the copula or past tense. In a second experiment, the children were more likely to produce a sentence with regular past after exposure to a prime sentence with regular past (mean usage 91%) than after exposure to a sentence with auxiliary *is*. Similarly, in a study by Miller and Deevy (2006), both children with LI and children with TL were more likely to produce transitive sentences after they had heard transitive primes than after hearing intransitive primes. These studies show that hearing and imitating sentences with a particular grammatical feature affects the immediately following performance for that feature.

In the therapy studies by Connell (1987; Connell & Stone, 1992) and by Ellis Weismer and Murray-Branch (1989) and in the priming studies, the child's productions alternated with examiner models. Courtright and Courtright (1976) compared this type of immediate exact imitations of adult models (as in the Connell studies) with a modeling

condition in which the child first listened to an entire set of models before being asked to attempt those same utterances for production of subject-case pronouns. The immediate imitation condition resulted in a higher rate of target production after the first session than did the modeling condition. However, there was little subsequent change in accuracy for the imitation condition after the first session. In contrast, accuracy showed a steady increase over the three therapy sessions for the modeling condition and surpassed the imitation condition by the second session. This suggests that an initial period of exposure prior to a child's production attempts may be more beneficial than an immediate start with imitation training.

Studies About Recasting

The studies showing an advantage of having the child imitate model utterances all involved highly structured activities in which the target features were not embedded within a communicative activity. This result seems to be contradicted by studies demonstrating the efficacy of embedded therapies that do not involve prompts for the child to repeat model utterances. In conversational recast therapy, the clinician adds grammatical and/or informational elements to a prior child utterance (Camarata et al., 1994). In vertical structuring, the clinician follows up on a child utterance by querying the child for more information and then combining the newly provided information with the child's original utterance (Schwartz, Chapman, Terrell, Prelock, & Rowan, 1985). In neither therapy is the child prompted to repeat the recast utterance that includes the target feature. It may be that it is the child's active involvement in constructing utterances rather than imitation per se that is the necessary active ingredient.

Camarata and Nelson (1992) compared conversational recast treatment and imitation training. These authors distinguished between elicited and spontaneous production by the child. Elicited productions of a linguistic feature included productions with trained words that occurred within the training context for that feature and, therefore, under conditions in which the child was hearing models of that feature. In contrast, spontaneous production was defined not only as production that was not after a model but also as production with untrained words outside of the training context for that feature. Elicited production thus represented a more limited performance, whereas spontaneous productions demonstrated broader learning. There was no difference in number of learning trials prior to the first elicited production (61.6 for the recast treatment versus 60.1 for imitation training). Children achieved their first spontaneous production after an additional 10.1 learning episodes (71.1 total) in the recast therapy but required an additional 87.4 learning trials (147.5 total) in the imitation treatment to achieve spontaneous production. Note that this is in spite of the fact that immediate exact imitations can be achieved after only a few trials (Camarata et al., 1994).

Implications for Managing Therapy Procedures

It may be that, as suggested by Finestack and Fey (2009), explicit instruction is effective only for older children who have achieved a certain level of metalinguistic ability. However, there were other procedural differences between the studies that are worth considering. One difference involved the frequency and timing of the instruction. Finestack and Fey spaced out the instruction after every five trials. In contrast, Swisher et al. (1995) provided instruction after each response, thus exposing children to a higher dose of instruction delivered as evaluative feedback after responses. However, as noted by Kamhi (2014), too much evaluative feedback could disrupt the interaction and is likely to be tuned out by the child. Less frequent evaluation has been found to result in greater learning and retention (e.g., Austermaier et al., 2008, as cited in Kamhi, 2014). When explicit instruction is used, it may be more beneficial to provide that instruction intermittently rather than continuously.

The research evidence suggests that active engagement by the child is important for learning. The form of that engagement is not clear and may depend on the type of activity. In highly structured activities, imitation seems to be more effective than just listening. However, the child's production attempts should be preceded by listening to model sentences (akin to the auditory bombardment in therapy for phonological disorders suggested by Hodson & Paden, 1983) before being asked to attempt the target. Imitations need not be exact replications of model sentences but can involve partial imitation of a sentence form with different vocabulary. Within more embedded therapies, it does not seem to be necessary to have the child imitate model utterances provided as recasts.

It is common to organize activity types sequentially, first working on linguistic features until they are produced at a high criterion within highly structured decontextualized drills and subsequently incorporating those features into lower structured embedded activities in order to achieve generalization (Hegde & Maul, 2006; Paul & Norbury, 2012). Camarata and colleagues (Camarata & Nelson, 1992; Camarata et al., 1994; Nelson et al., 1996) suggested that this may be inefficient, necessitating a larger dose of learning episodes to achieve broader learning and communicative use. It is important to keep in mind that this superiority for recast therapy is only true if there is a sufficient dosage of recasts (Proctor-Williams & Fey, 2007). This may be difficult to achieve as it can only happen if the child produces a sufficient number of platform utterances to be recast. We may not want to throw out imitation training just yet. Although it may take longer than recast therapy, children do achieve spontaneous production after imitation training. Priming studies, whose procedure involves having the child imitate model utterances, show that children do extend linguistic features beyond trained items when exposed to a variety of exemplars (Savage et al., 2009). In addition, imitation training may serve to prime children to produce the target feature and thus might potentially increase the number of platform utterances available to be recast.

We might, therefore, want to combine activity types within each session, first highlighting linguistic features

within a structured drill and immediately following this with an embedded activity in which the features can be used meaningfully (Eisenberg, 2005, 2013). This type of combined approach was successfully used in a study by Fey, Cleave, Long, and Hughes (1993). Linguistic targets were first highlighted in a highly structured activity in which children imitated the target feature and a form that was contrastive with the target (based on Connell, 1982). This was followed by focused stimulation procedures that provided a high density of exposures to the target, including recasts and vertical structuring, and encouragement to attempt the target.

Therapy Content

Kamhi (2014) suggested that what we work on in therapy may be more important than how we work on those therapy goals. I think both are equally important and focused my remarks on how we do therapy. However, I do want to say something about the content of therapy.

Like Kamhi, I want to encourage SLPs to work on complex syntax at earlier ages. Complex sentences emerge fairly early (Limber, 1973), before children have mastered many other elements of basic syntax, such as verb tense morphemes, verb forms with modals, negative sentence types, question formation, and sentences with double objects. Leonard and Deevy's (2011) findings—that children misinterpret complex sentences and that this misunderstanding may provide misleading information about tense marking—suggest that learning about complex sentences may help children to learn about other aspects of grammar. Thus, there seems to be no reason, from a developmental perspective, to delay working on complex syntax.

My second comment about content has to do with prioritizing goals based on their starting baseline of usage. In their discussion about goal selection, Paul and Norbury (2012) suggested that partially mastered grammatical forms should be given priority over absent forms. Interestingly, most of the therapy studies targeted grammatical features that were never or rarely produced at baseline and showed that children were able to learn those absent features (Camarata et al., 1994; Fey et al., 1993). There does not seem, therefore, to be any need to avoid linguistic features that are completely unknown.

Concluding Thoughts

In this article, I reviewed studies about three major aspects of therapy: dose management, input characteristics, and therapy procedures. The research evidence suggests that children with LI need sessions offering a concentrated high dose of instruction in order to learn grammatical features. This may not be available in the child's classroom, suggesting that clinical management may need to include pull-out sessions for high-dosage training rather than being totally inclusive. I question the need to train linguistic features to a high criterion before moving on to a new set of features. Rather, it seems better to keep introducing new features and

periodically returning to previous goals in a cyclic fashion. The typical schedule for school-based speech-language services involves once- or twice-weekly sessions for the entire school year (Blosser, 2012). I see nothing in the research evidence to suggest that we should not use this scheduling pattern—and the research may actually favor this type of distributed scheduling—as long as a sufficient amount and rate of learning episodes for grammatical feature goals can be provided within each session.

I focused on studies about discrete therapy procedures rather than on studies of therapy approaches with multiple components. My aim in this article was to look at specific active ingredients of therapy and consider what therapy that incorporates those ingredients might look like. My review of the research evidence suggested that therapy should involve the child in actively constructing utterances with the target features. The nature of this active involvement would depend on the type of activity and would not need to happen in every moment of therapy. Rather, some amount of just listening is valuable prior to engaging the child in activities that involve imitation or generating utterances. My review did not suggest that we need to first target goals with highly structured activities, nor did it suggest that we should abandon such activities. Instead, different activity types might best be used in a complementary way within our therapy sessions, using high-structure drills to highlight and prime linguistic features and then immediately incorporating those features into embedded activities. This is easily implementable in school-based settings, using story-based activities such as the ones used by Fey and colleagues (1993). This type of therapy can also be used to work on grammatical features within written language (see Eisenberg, 2005).

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