

## Clinical Focus

# Five Additional Evidence-Based Principles to Facilitate Grammar Development for Children With Developmental Language Disorder

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### ABSTRACT

**Purpose:** Because the development of grammatical forms is difficult for many children with developmental language disorder (DLD), language interventions often focus on supporting children's use of grammatical language. This article proposes five additional principles to those suggested by Fey et al. (2003) to facilitate the development of grammatical forms by children with DLD. Three of the five additional principles address the selection and presentation of linguistic contexts to be used with target grammatical forms (Principles 11–13); two principles encourage the incorporation of additional intervention components: auditory bombardment and explicit instruction (Principles 14 and 15, respectively).

**Method:** We present empirical evidence and, when available, describe the theoretical motivations to support each of the five additional principles. We then describe how we have integrated the five principles into 20- to 30-min intervention sessions that target regular past tense *-ed*, third-person singular *-s*, present progressive *is/are verb+ing*, or *do/does* questions for 4- to 8-year-olds with DLD. Each session includes four activities: sentence imitation, story retell, structured play, and auditory bombardment. We provide details of each activity, relevant materials, and illustrative examples that highlight the incorporation of each of the principles.

**Results:** When targeting the development of grammatical forms in intervention, current evidence supports the use of a high degree of linguistic variability (Principle 11), the presentation of target forms in contexts that vary in difficulty (Principle 12), the presentation of target forms in sentences that vary in syntactic structure (Principle 13), the use of auditory bombardment (Principle 14), and the incorporation of explicit instruction (Principle 15). Clinicians can use these principles when targeting a range of grammatical forms in relatively short intervention sessions comprising a variety of activities.

**Conclusions:** This article encourages the employment of five additional principles into grammatical language intervention. Descriptions, materials, and examples demonstrate how the principles can all be addressed within a single intervention session.

Children with developmental language disorder (DLD) experience difficulties in the acquisition and use of language that is not associated with another biomedical condition, such as Down syndrome, hearing impairment, or seizure

disorder. A common area of weakness for children with DLD between the ages of 4 and 8 years is the use of grammatical forms, including past tense *-ed*, third-person singular *-s*, present progressive *-ing*, and *do/does* questions (Leonard, 2014; Rice et al., 1998). Such weaknesses have been suggested to be clinical markers to assist in the diagnosis of DLD for children within this age range (Rice et al., 2004; Rice & Wexler, 1996). Thus, grammatical language is often an area in which children with DLD require support through intervention services (Finestack & Satterlund, 2018).

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Twenty years ago, Fey et al. (2003) identified 10 evidence-based principles to support the implementation of interventions targeting the grammatical language skills of children with DLD (see Table 1). These principles guided the selection of intervention goals (Principles 1–4) and intervention procedures and activities (Principles 5–10). Since then, researchers have identified additional evidence-based approaches that support children’s acquisition and use of grammatical forms. Much of this work is grounded in principles learning, including both statistical learning (Plante & Gómez, 2018) and explicit learning (Ellis, 2015) processes. Statistical learning processes account for learners’ abilities to extract regularities and patterns from their environment to learn skills such as

language. Central to the success of statistical learning processes is consistent and frequently occurring input in varied contexts (see Plante & Gómez, 2018). Evidence suggests that these features can enhance language learning across a range of language domains, including morphosyntax (Aguilar & Plante, 2014; Plante et al., 2015) and semantics (Aguilar et al., 2018; Alt et al., 2014), for children with language impairment despite evidence of weaknesses in implicit learning (Lammertink et al., 2017; Obeid et al., 2016). Principles 11–14 are supported by statistical learning processes.

In contrast, Principle 15 is grounded in explicit learning processes that rely heavily on executive attention, working memory, and logical reasoning (Ashby & Maddox, 2011; Maddox & Ashby, 2004). Explicit learning typically requires learners to memorize patterns, facts, and rules. Despite evidence of weaknesses in attention and working memory (Ebert & Kohnert, 2011; Gray et al., 2019), children with language impairment may benefit from explicit learning approaches to learn relatively simple patterns and rules (Baron & Arbel, 2022). Interventions based on explicit learning principles are likely to be more structured, use more direct approaches, and require greater awareness of learning than interventions grounded in implicit approaches (see Baron & Arbel, 2022).

Following is a review of this research, which adds five additional principles to support the grammatical language development of children with DLD (see Table 1). These principles further guide the approaches clinicians use within an intervention session.

### ***Principle 11: Present Target Forms in High-Variability Contexts***

Findings from Plante et al. (2014) suggest that when targeting grammatical forms, clinicians should present targets in sentences that include a large number of unique verbs. The Plante et al. (2014) study included eighteen 4- and 5-year-old children with DLD. Researchers randomized the children to either a “low verb variability” or a “high verb variability” intervention group, each receiving 35 sessions that were approximately 30 min in length. For the high verb variability group, in each session, clinicians produced 24 conversational recasts of the child’s targeted grammatical form (e.g., past tense *-ed*, third-person singular *-s*), with each recast including a unique main verb. For the low verb variability group, in each session, clinicians also produced 24 conversational recasts of the child’s targeted grammatical form, but with only 12 unique verbs. In this condition, each unique verb was included in two conversational recasts. In both groups, clinicians used verbs expected to be familiar to preschool children in their recasts. Study results revealed that the high verb

**Table 1.** Fifteen principles of language interventions targeting grammatical forms.

| Principles guiding the selection of intervention goals                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *1. The basic goal of all grammatical interventions should be to help the child achieve greater facility in the comprehension and use of syntax and morphology in the service of conversation, narration, exposition, and other textual genres in both written and oral modalities. |
| *2. Grammatical form should rarely, if ever, be the only aspect of language and communication that is targeted in a language intervention program.                                                                                                                                  |
| *3. Select intermediate goals in an effort to stimulate the child’s language acquisition processes rather than to teach specific language forms.                                                                                                                                    |
| *4. The specific goals of grammatical intervention must be based on the child’s “functional readiness” and need for the targeted forms.                                                                                                                                             |
| Principles guiding the selection of intervention procedures and activities                                                                                                                                                                                                          |
| *5. Manipulate the social, physical, and linguistic context to create more frequent opportunities for grammatical targets.                                                                                                                                                          |
| *6. Exploit different textual genres and the written modality to develop appropriate contexts for specific intervention targets.                                                                                                                                                    |
| *7. Manipulate the discourse so that targeted features are rendered more salient in pragmatically felicitous contexts.                                                                                                                                                              |
| *8. Systematically contrast forms used by the child with more mature forms from the adult grammar, using sentence recasts.                                                                                                                                                          |
| *9. Avoid telegraphic speech, always presenting grammatical models in well-formed phrases and sentences.                                                                                                                                                                            |
| *10. Use elicited imitation to make target forms more salient and to give the child practice with phonological patterns that are difficult to access or produce.                                                                                                                    |
| 11. Present target forms using a large number of unique verbs.                                                                                                                                                                                                                      |
| 12. Present target forms using verbs that vary in difficulty.                                                                                                                                                                                                                       |
| 13. Present target forms in sentences that vary in syntactic structure.                                                                                                                                                                                                             |
| 14. Incorporate the use auditory bombardment to teach target forms.                                                                                                                                                                                                                 |
| 15. Incorporate the use of explicit instruction to teach target forms.                                                                                                                                                                                                              |

\*One of the original Fey et al. (2003) principles.

variability group outperformed the low verb variability group on the use of target grammatical forms.

This study was motivated by statistical learning research comprising artificial language learning studies. Findings in this area suggest that learners extract information from linguistic input to understand language structure at the word (e.g., Kittleson et al., 2010; Pelucchi et al., 2009; Saffran et al., 1996), morphological (e.g., Gerken et al., 2005; Richardson et al., 2006), and phrase (e.g., Gomez, 1997; Saffran, 2001a, 2001b; Thompson & Newport, 2007; von Koss Torkildsen et al., 2013) levels. Under this framework, it is believed that with enough exemplars, individuals can learn predictable relationships between linguistic elements. Moreover, findings demonstrate that individuals who hear a greater number of unique exemplars have better learning outcomes than those who hear the same number of examples with fewer unique exemplars (Gómez, 2002; Grunow et al., 2006). Although Plante et al. (2014) increased the variability of verbs used in the intervention when targeting morpho-syntactic forms, this principle can be extended to the variation of other linguistic contexts when targeting grammatical forms. For example, when targeting adjectival noun phrases, the phrases can be modeled using a wide range of unique adjectives and nouns.

### **Principle 12: Present Target Forms in Contexts That Vary in Difficulty**

Findings from Owen Van Horne et al. (2017) suggest that when targeting grammatical forms, specially verb inflections, clinicians should present targets with verbs that vary in difficulty based on frequency, phonological complexity, and telicity (completeness of the action). In the Owen Van Horne et al. study, 18 children with DLD aged 4–10 years were randomly assigned to receive intervention supporting the production of the past tense *-ed* grammatical marker. Each child participated in up to 36 treatment sessions. Half of the participants were randomly assigned to receive intervention with initial sessions incorporating the use of 30 unique “hard” verbs. The other half of the participants received intervention with initial sessions incorporating the use of 30 unique “easy” verbs. Owen Van Horne et al. characterized *hard verbs* as verbs that were heard less frequently with the target form, phonologically complex with stems ending in obstruent or alveolar consonants (e.g., “rake”), and low in telicity. In contrast, they defined *easy verbs* as verbs that were heard more frequently with the target form, phonologically simpler with stems ending in nonobstruent or nonalveolar consonants (e.g., “cry”), and high in telicity. Verbs that are high in telicity, such as “kick” or “jump,” refer to completed events (e.g., kicked, jumped), whereas verbs

that are low in telicity (e.g., “walk,” “cry”) refer to events that progress over time. Study results indicated that the children who began treatment with the hard verbs made greater accuracy gains on the past tense *-ed* verb form, with both the target verbs used in intervention and the nontarget verbs used in a grammatical probe measuring intervention outcomes, than the children who began treatment with the easy verbs.

Owen Van Horne et al. (2017) designed their study to test the hypothesis that learning is maximized when underlying linguistic features of the target are taken into account. On the basis of computational models of acquisition of morphological forms, Li and Shirai (2000) hypothesize that learning may be accelerated when children’s input comprises unusual verb and morphological pairs, described as pairings not frequently encountered by the child. These unusual pairings allow children to separate the meanings of verbs and inflectional morphemes more readily, relative to prototypical pairings that they often encounter and comprehend without processing the word’s individual components. In a sense, the unusual pairings allow the child to expand boundaries of morphological use. This hypothesis runs counter to the more traditional viewpoint that teaching should occur in a developmental sequence, beginning with targets that are the easiest to acquire and progressing to targets that are typically acquired later in development (e.g., Crystal, 1985; Weiler, 2013). These developmental sequences typically allow the child to experience success quickly, especially when targets are well within the child’s zone of proximal development (Vygotsky, 1978), but may not help children to fully understand the meaning of inflectional morphemes and their full range of use. Thus, pushing the child slightly outside their zone of proximal development, whether targeting verb inflections or other grammatical forms such as prepositions, may help the child develop more complete representations and a greater understanding of the targeted grammatical form.

### **Principle 13: Present Target Forms in Sentences That Vary in Syntactic Structure**

There is a body of research demonstrating that children are more sensitive to verb inflections when they occur in the sentence-final position. For example, Sundara (2018) and Sundara et al. (2011) found that 2-year-old, English-speaking, neurotypical children were more successful at both producing and detecting the presence or absence of the third-person singular *-s* inflection when in the sentence-final position than when in the sentence-medial position. Similarly, Dalal and Loeb (2005) found that 5-year-old, English-speaking, neurotypical children were more successful at imitating the regular past tense *-ed*

inflection when it occurred in the sentence-final position than when it occurred in the sentence-medial position. Collectively, these results suggest that it is easier for children to both perceive and produce English grammatical inflections when they occur in the sentence-final position.

Dalal and Loeb (2005) hypothesized that the sentence-final advantage may be driven by inherent increases in saliency related to the sentence position. Specifically, sentence-final syllables carry acoustic cues, such as decreased fundamental frequency and increased duration, that signal their end (Bedore & Leonard, 1998; Gerken et al., 2005; McGregor & Johnson, 1997). Dalal and Loeb also noted that there may be a recency effect (Slobin, 1973) that supports children's imitation of sentence-final inflections. Thus, for children at the beginning stages of acquisition, presenting target inflections in the sentence-final position may be of greatest benefit. However, as children begin to demonstrate detection and use of target inflectional forms in the sentence-final position, it is important for their input and production expectations to include more challenging inflections that occur in other sentence positions, including initial and medial. This will help ensure that acquisition is not constrained by sentence position and support true mastery of the inflectional form. Thus, it may be the case that children's learning is maximized when targets are first presented in the harder sentence-medial position, rather than when a more developmentally driven sequence is used to teach grammatical inflections. However, it should also be noted that we know of no research that has specifically evaluated the most efficient and effective sequence of inflection target placement within a sentence or that has examined this principle with other grammatical constructions aside from verb inflections.

#### ***Principle 14: Incorporate the Use of Auditory Bombardment to Teach Target Forms***

Auditory bombardment is an approach that has been used when targeting a wide variety of speech and language targets. When using auditory bombardment, the clinician presents the child with a mass of target models with no expectations other than for the child to attend to the models. There is a long history of using auditory bombardment as part of Hodson and Payden's (1983) cyclical approach for treating children's speech sound disorders (e.g., Brosseau-Lapr   & Roepke, 2022; Jesus et al., 2019; Monahan, 1986; Montgomery & Bonderman, 1989; Rvachew et al., 1999). More recently, researchers have incorporated the use of auditory bombardment to support children's acquisition of grammatical forms with positive outcomes (Encinas & Plante, 2016; Michalek et al., 2021; Plante et al., 2018).

Like Principle 11 described above, the use of auditory bombardment is supported by statistical learning principles, which purport that learning is driven through statistical regularities. Auditory bombardment allows learners to amass several target exemplars in a short period of time as well as to reactivate and update their memory for the target form (Plante & G  mez, 2018). Additionally, in contrast to other language intervention approaches, such as elicited imitation and conversational recasting, the child is not required to say anything. Thus, few demands are placed on the learner, allowing more cognitive resources to be dedicated to acquiring the target form. Depending on the timing of auditory bombardment within an intervention session, its use has the potential to serve different functions. For example, auditory bombardment of learning targets at the beginning of an intervention session may function as a type of structural priming to support children's productions later in the session (Leonard, 2011), whereas auditory bombardment at the end of an intervention session may help facilitate consolidation of learning through other more demanding session activities (see Dudai, 2004).

Plante et al. (2018) examined the impact of the positioning of the auditory bombardment activity during intervention sessions that teach grammatical forms. The study involved twenty-eight 4- to 6-year-old, monolingual English-speaking children with DLD. Half of the children completed an auditory bombardment activity at the beginning of each intervention session, followed by activities allowing for enhanced conversational recasts. The other half of the children completed an auditory bombardment activity at the end of the session after the enhanced conversational recast activities. Both groups demonstrated significant gains on targeted forms, and the difference between the auditory bombardment first and last conditions was not significant. Thus, although auditory bombardment may help facilitate children's learning of grammatical forms among other activities, its placement within the session does not appear to mediate overall outcomes.

#### ***Principle 15: Incorporate the Use of Explicit Instruction to Teach Target Forms***

Explicit approaches to teach grammatical forms to children with DLD aim to make the learner consciously aware of target forms and the patterns guiding their usage. This awareness can be achieved in different ways. One way of providing explicit instruction is to do so verbally. For example, when teaching present progressive forms to a 6-year-old child using an explicit approach, the interventionist may provide the child with the following instructions: "When you talk about what one person is doing, you say *is* and add /*ing*/ to the end of the action word." Explicit approaches can also use visual modalities. For example, in studies conducted

by Ebbels (e.g., 2007, 2014), shapes, colors, and arrows were used to illustrate pertinent information in a sentence, which included verb morphology. It is important to note that all intervention approaches fall on a continuum, with some approaches considered more implicit than others and some approaches considered more explicit than others. Traditional interventions that only employ modeling and recasting approaches fall on the extreme implicit end of the continuum. Interventions that directly present the patterns or rules guiding target forms fall on the extreme explicit end of the continuum. Interventions in which the clinician provides corrective feedback, such as “Yes, you said that right!” or “Oops, that isn’t right,” fall in the middle of the continuum (Edeal & Gildersleeve-Neumann, 2011).

Evidence supporting the use of explicit instruction to target the grammatical skills of children and adolescents with language impairment is amounting (e.g., Calder et al., 2018, 2020, 2021; Ebbels, 2007, 2014; Finestack et al., 2020; Finestack & Fey, 2009). Recently, Calder et al. (2021) conducted a randomized controlled trial using the visual SHAPE CODING system developed by Ebbels (2007, 2014). In this study, twenty-one 5- to 6-year-old children with DLD completed 10 intervention sessions that targeted past tense *-ed* through the explicit SHAPE CODING system and through systematic cueing. Compared to a control group, the children undergoing intervention made significant gains on their production of past tense *-ed* as measured by a criterion-referenced assessment.

Although the root cause of language impairment—including the underlying mechanisms that must be intact for language to develop typically—remains largely unknown, the use of explicit approaches has several possible advantages. For example, explicit instruction may facilitate the engagement of the learner’s metacognitive processing skills, increase perceptual saliency, and decrease overall processing demands, resulting in more accurate production and efficient learning of grammatical forms compared to more implicit interventions. The use of explicit instruction may also help children learn the regularities of tense and agreement linguistic relationships more rapidly and help children with DLD master difficult grammatical forms.

In alignment with Principles 11–15, we have designed an intervention for 4- to 8-year-old children with DLD that targets weaknesses in grammatical forms. In the next section, we provide detailed descriptions of how we have incorporated these principles into a single 20- to 30-min intervention session.

## Principles Into Practice

As part of a randomized clinical trial (ClinicalTrials.gov: NCT04902508), we designed an intervention for 4- to

8-year-old children with DLD that targets weaknesses in grammatical forms. The intervention uses a cyclical approach (Fey et al., 1993) to address four different grammatical targets that children with DLD often have difficulty with: regular past tense *-ed*, third-person singular *-s*, present progressive *is/are verb+ing*, and *do/does* questions (Leonard, 2014; Rice et al., 1998). Interventionists address each target in four consecutive 20- to 30-min sessions, for a total of 16 sessions. This cycle is then repeated, for a grand total of 32 sessions. Each session includes four core activities: sentence imitation (Eisenberg et al., 2020; Owen Van Horne et al., 2017), story retell (Fey et al., 2017), structured play (Owen Van Horne et al., 2017), and auditory bombardment (Plante et al., 2018). Descriptions and examples of each activity are available in Table 2. The sessions include a mix of treatment approaches, such as drill, imitation, modeling, and recasting (Ebbels, 2014; Eisenberg, 2013). We carefully planned out each intervention session to incorporate Principles 11–15, which we describe below. Session materials are available publicly at <https://www.finestackclil.com/resources/>.

### ***Include 24 Unique Verbs per Session (Principle 11)***

In each session, the interventionist models 24 unique verbs across the four core activities (see Table 2). In the *sentence imitation* activity, the interventionist presents a sentence with the target or a contrastive form for the child to repeat. For regular past tense *-ed*, the contrastive form includes the modal auxiliary *will* plus a verb (e.g., “They will try soup”). For third-person singular *-s*, the contrastive form includes an unmarked verb with a plural noun (e.g., “Parties happen a lot”). For both present progressive *is/are verb+ing* and *do/does* questions, the alternative singular or plural form serves as the contrast (e.g., “The bell is ringing” or “The bells are ringing”; “Does he try?” or “Do they try?”). This activity includes seven contrastive pairs, for a total of 14 sentences, and the use of seven unique verbs. In the *story retell* activity, the interventionist reads a story with corresponding pictures. The story script includes models of the targeted grammatical form with five unique verbs. After the story model, the interventionist prompts the child to retell the story and uses question prompts to elicit productions of the targeted form. In the *structured play* activity, the interventionist models the target form with at least five unique verbs and prompts the child to produce the target form while playing with a variety of toys and manipulatives (e.g., toy cars, Play-Doh, Magic 8 ball). Each session concludes with the *auditory bombardment* activity in which the interventionist reads a sentence with the target or the contrastive form while the child listens and looks at corresponding pairs of

**Table 2.** Intervention session activities.

| Activity              | Description                                                                                                                                                                                                                                              | Example                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Sentence imitation | The interventionist presents a sentence with the target or the contrastive form for the child to repeat. This activity includes seven contrastive pairs, for a total of 14 sentences.                                                                    | Target: present progressive <i>is/are</i> verb+ <i>ing</i><br>1. The tree <b>is changing</b> colors.<br>2. The trees <b>are changing</b> colors.<br>3. The girl <b>is waving</b> .<br>4. The girls <b>are waving</b> .<br>5. The tiger <b>is sneaking</b> around.<br>6. The tigers <b>are sneaking</b> around.<br>7. The dog <b>is walking</b> .<br>8. The dogs <b>are walking</b> .<br>9. The teacher <b>is leaving</b> .<br>10. The teachers <b>are leaving</b> .<br>11. He <b>is letting</b> the dog outside.<br>12. They <b>are letting</b> the dog outside.<br>13. She <b>is peeking</b> around the corner.<br>14. They <b>are peeking</b> around the corner. |
| 2. Story retell       | The interventionist reads a story with corresponding pictures to model the targeted grammatical form. The interventionist then prompts the child to retell the story and uses question prompts to elicit productions of the targeted form.               | Target: past tense <i>–ed</i><br>Story:<br>The Lees were so excited for their road trip vacation! They all got into the van. When they got to a busy street, the van <b>turned</b> right. At the river, they <b>crossed</b> over a bridge. Finally, the Lees made it to the beach. Everyone quickly <b>closed</b> their door and ran to the ocean. The ocean waves <b>poured</b> onto the shore. It was so cool! At the end of the vacation, everyone <b>missed</b> home. It was still the vacation of a lifetime!                                                                                                                                                 |
| 3. Structured play    | The interventionist uses modeling and question prompts to elicit child productions of the target form while playing with a variety of toys and manipulatives. Example materials include toy cars, animals, small figurines, playdough, and kinetic sand. | Target: third-person singular <i>–s</i><br>Activity <sup>a</sup> with cars:<br>1. Look at these cars. Amir <b>drives</b> a bus. What does your person drive? Target: He drives a X.<br>2. Look at the sky. Amir's car <b>matches</b> . What does your car match? Target: It matches X.<br>3. Amir <b>beats</b> Lance in the race. Who does Amir beat in the race? Target: Amir beats Lance.<br>4. This time, Amir <b>loses</b> . What happens in the race this time? Target: Amir loses.<br>5. Lance won the race. He <b>feels</b> happy. How does Amir feel about losing? Target: He feels X.                                                                     |

(table continues)

pictures. This activity includes seven contrastive pairs, for a total of 14 sentences, with seven unique verbs. Table 3 provides an example of 24 unique verbs used within a session targeting present progressive *is/are* verb + *ing*. Although some verbs may appear in more than one session, each of the 32 sessions has a unique list of 24 verbs.

### Use Verbs That Vary in Complexity (Principle 12)

The 24 verbs selected for each session ranged in difficulty based on frequency and phonological complexity. For this intervention, we defined frequency as how often children produce a verb *in its target grammatical form* (based on transcripts from the CHILDES [Child Language Data Exchange

**Table 2.** (Continued).

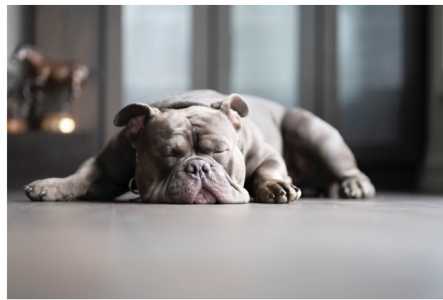
| Activity                | Description                                                                                                                                        | Example                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. Auditory bombardment | The interventionist reads a sentence with the target or the contrastive form while the child listens and looks at corresponding pairs of pictures. | Target: <i>do/does</i> questions<br>1. Do the cats <b>knock</b> over the cup?<br>2. Does the cat <b>knock</b> over the cup?<br>3. Do the children <b>talk</b> ?<br>4. Does the child <b>talk</b> ?<br>5. Do the ducklings <b>follow</b> their mother?<br>6. Does the duckling <b>follow</b> its mother?<br>7. Do the pictures <b>show</b> the dresses?<br>8. Does the picture <b>show</b> the dress?<br>9. Do the kids <b>touch</b> the slime?<br>10. Does the kid <b>touch</b> the slime?<br>11. Do the dogs <b>mess</b> up the house?<br>12. Does the dog <b>mess</b> up the house?<br>13. Do the owls <b>sleep</b> ?<br>14. Does the owl <b>sleep</b> ? |

<sup>a</sup>Children named characters to use in the activity. Amir is one example. “X” indicates that responses will vary based on context and child preferences.

**Table 3.** Example of 24 unique verbs used within a single intervention session targeting present progressive *is/are* verb+*ing*.

| Verb          | Intervention activity | Verb frequency | Phonological complexity |
|---------------|-----------------------|----------------|-------------------------|
| 1. Changing   | Sentence imitation    | High           | Low                     |
| 2. Waving     | Sentence imitation    | Low            | High                    |
| 3. Sneaking   | Sentence imitation    | Low            | High                    |
| 4. Walking    | Sentence imitation    | High           | Low                     |
| 5. Leaving    | Sentence imitation    | Low            | High                    |
| 6. Letting    | Sentence imitation    | Low            | Low                     |
| 7. Peeking    | Sentence imitation    | Low            | Low                     |
| 8. Pretending | Story retell          | Low            | High                    |
| 9. Listening  | Story retell          | High           | Low                     |
| 10. Chasing   | Story retell          | Low            | High                    |
| 11. Putting   | Story retell          | High           | Low                     |
| 12. Messing   | Story retell          | Low            | Low                     |
| 13. Lying     | Structured play       | Low            | Low                     |
| 14. Climbing  | Structured play       | High           | Low                     |
| 15. Wrecking  | Structured play       | High           | Low                     |
| 16. Building  | Structured play       | Low            | Low                     |
| 17. Going     | Structured play       | High           | Low                     |
| 18. Showing   | Auditory bombardment  | Low            | Low                     |
| 19. Dying     | Auditory bombardment  | Low            | Low                     |
| 20. Surviving | Auditory bombardment  | Low            | High                    |
| 21. Spinning  | Auditory bombardment  | High           | Low                     |
| 22. Rolling   | Auditory bombardment  | Low            | High                    |
| 23. Thinking  | Auditory bombardment  | Low            | High                    |
| 24. Doing     | Auditory bombardment  | High           | Low                     |

**Figure 1.** Example photos used in the auditory bombardment activity. Text is for illustrative purposes only. Children do not view text. All photos reprinted from <https://unsplash.com/>.



*The dog sleeps.*



*The cats sleep.*

System] TalkBank database [MacWhinney, 2018]). We determined phonological complexity using the Word Complexity Measure developed by Stoel-Gammon (2010), which reflects complexity based on the syllabic and phonetic components of the verbs. We selected a mix of verbs for each session that had high and low frequency ratings as well as high and low phonological complexity. See Table 3 for an example of verbs with their frequency and phonological complexity levels specified. A detailed description of how we identified and characterized these verbs is available in Finestack et al. (in press). Full verb lists for each target grammatical form are openly available at <https://conservancy.umn.edu/handle/11299/241882> (Finestack et al., 2022).

### **Vary the Sentence Position of Target Forms (Principle 13)**

Throughout each session, the interventionist models and prompts the child to produce the target form in varying sentence positions. As illustrated in Table 2, the sentence position typically alternates between medial and final for all forms. In the sentence imitation activity, for example, the target form occurs in the medial position for four sentence pairs (i.e., 1/2, 5/6, 11/12, and 13/14) and in the final position for three sentence pairs (i.e., 3/4, 7/8, and 9/10). An exception to this is the *do/does* question targets, in which “do” and

“does” always appear in the sentence-initial position (e.g., “Do they like milk?” and “Does he like milk?”), whereas the position of the main verb varies. For example, the auditory bombardment activity targeting *do/does* questions has the main verb in the final position for two sentence pairs (i.e., 3/4 and 13/14) and in the medial position for five sentence pairs (i.e., 1/2, 5/6, 7/8, 9/10, and 11/12).

### **Incorporate Auditory Bombardment Into Session (Principle 14)**

The interventionist ends each session with the auditory bombardment activity to facilitate the consolidation of session learning. As noted in the description of implementation of Principle 11, this activity includes seven contrastive pairs, for a total of 14 sentences. During this activity, the interventionist instructs the child to listen to the sentences and to look at pictures that correspond to the sentences. Figure 1 contains an example of a contrastive sentence set with its corresponding pictures for a third-person singular *-s* session.

### **Use Explicit Instruction (Principle 15)**

During the sentence imitation, story retell, and structured play activities, the interventionist provides feedback to

**Table 4.** Explicit rules for each grammatical target form.

| Target form                                | Explicit rules                                                                                                                                                                                                                            |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regular past tense <i>-ed</i>              | When you talk about something that has already happened, you add a /t <sup>a</sup> sound to the end of the action word.<br>When you talk about something that is not in the past, you do not add anything to the end of the word.         |
| Third-person singular <i>-s</i>            | When you talk about what one person or thing does, you add an /s <sup>a</sup> sound to the end of the action word.<br>When you talk about what more than one person or thing does, you do not add anything to the end of the action word. |
| Present progressive <i>is/are verb+ing</i> | When you talk about what one person or thing is doing, you use “is” and add “ing” to the action word.<br>When you talk about what more than one person or thing is doing, you use “are” and add “ing” to the action word.                 |
| <i>Do/does</i> questions                   | When you ask a question about one person or thing, you begin the question with “does.”<br>When you ask about more than one person or thing, you begin the question with “do.”                                                             |

<sup>a</sup>Substitute with the appropriate allomorph based on the context of the target form.

the child based on the child's production or attempted production of the session's targeted grammatical form. If the child accurately produces the target form when prompted, the interventionist provides a recast of the sentence and positive feedback (e.g., "A baby babbles. That was right"). If the child does not accurately produce the target form, the interventionist provides a corrective recast and feedback and then prompts the child to try again (e.g., "A baby babbles. What you said wasn't quite right. Listen and try again").

Half of the children in our randomized clinical trial also receive explicit instruction throughout every session. To implement this instruction, the interventionist verbally presents the grammatical rule that guides the use of the targeted form. The interventionist initially provides this instruction 12 times throughout the session: 6 times during the sentence imitation activity and 2 times during each of the other activities. During the sentence imitation, story retell, and structured play activities, the explicit rule is presented along with the recast and feedback. During the auditory bombardment activity, the explicit rule is presented directly after two of the sentence presentations. When the child produces the target form incorrectly, the interventionist presents the explicit rule. If the child consistently produces the grammatical form accurately, the interventionist fades the rule presentations while ensuring that the rule is presented at least once during each activity. The rules for each of the four grammatical target forms are included in Table 4. The interventionist may adjust the exact wording of the rule to highlight certain aspects of the rule and ensure that the therapeutic interaction is natural.

## Conclusions

The body of research informing grammatical language intervention for children with DLD continues to grow. The consolidation of research is essential to ensure that evidence-based recommendations are practical in the clinical setting and accessible to interventionists. We drew from recent evidence to add five principles to the 10 principles offered by Fey et al. (2003) to support interventions targeting grammatical forms for children with DLD. Three of the five additional principles address the selection and presentation of linguistic contexts to be used with targeted forms (Principles 11–13), and two principles recommend the incorporation of specific intervention components of auditory bombardment and explicit instruction (Principles 14 and 15, respectively). To support the implementation of these principles into practice, we described how we have incorporated each of the principles in 20- to 30-min sessions with 4- to 8-year-old children with DLD. The principles are integrated throughout four intervention activities: sentence imitation, story retell, structured play, and auditory bombardment. Although we have

demonstrated this intervention approach with four grammatical forms, namely, regular past tense *-ed*, third-person singular *-s*, present progressive *is/are verb+ing*, and *do/does* questions, these principles may also be applied in intervention with other grammatical targets.

## Author Contributions

**Lizbeth H. Finestack:** Conceptualization (Lead), Funding acquisition (Lead), Methodology (Lead), Writing – original draft (Lead), Writing – review & editing (Lead). **Elizabeth Ancel:** Writing – original draft (Lead), Writing – review & editing (Supporting). **HaeJi Lee:** Writing – original draft (Supporting), Writing – review & editing (Supporting). **Kirstin Kuchler:** Writing – original draft (Supporting), Writing – review & editing (Supporting). **Miriam Kornelis:** Writing – original draft (Supporting), Writing – review & editing (Supporting).

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