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Research Article

Evaluation of an Explicit Intervention to Teach Novel Grammatical Forms to Children With Developmental Language Disorder

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Purpose: Unlike traditional implicit approaches used to improve grammatical forms used by children with developmental language disorder, explicit instruction aims to make the learner consciously aware of the underlying language pattern. In this study, we compared the efficacy of an explicit approach to an implicit approach when teaching 3 novel grammatical forms varying in linguistic complexity.
Method: The study included twenty-five 5- to 8-year-old children with developmental language disorder, 13 of whom were randomized to receive an implicit-only (I-O) intervention whereas the remaining 12 participants were randomized to receive a combined explicit–implicit (E-I) intervention to learn 3 novel grammatical forms. On average, participants completed 4.5 teaching sessions for each form across 9 days. Acquisition was assessed during each teaching session. Approximately 9 days posttreatment for each form, participants completed probes to assess maintenance and generalization.
Results: Analyses revealed a meaningful and statistically significant learning advantage for the E-I group on acquisition, maintenance, and generalization measures when performance was collapsed across the 3 novel targets ($p < .02$, $\Phi s > 0.60$). Significant differences between the groups, with the E-I group outperforming the I-O group, only emerged for 1 of the 3 target forms. However, all effect sizes ranged from medium to large ($\Phi s = 0.25–0.76$), and relative risk calculations all exceeded 0, indicating a greater likelihood of learning the target form with E-I instruction than I-O instruction.
Conclusions: Study findings indicate that, as compared to implicit instruction, children are more likely to acquire, maintain, and generalize novel grammatical forms when taught with explicit instruction. Further research is needed to evaluate the use of explicit instruction when teaching true grammatical forms to children with language impairment.

It is estimated that approximately 7% of kindergarten children have developmental language disorder (DLD; Bishop, Snowling, Thompson, & Greenhalgh, 2016; Bishop, Snowling, Thompson, Greenhalgh, & CATALISE Consortium, 2017; Norbury et al., 2016; Rice, Tomblin, Hoffman, Richman, & Marquis, 2004; Tomblin et al., 1997; Tomblin, Zhang, Buckwalter, & O'Brien, 2003). Children with DLD exhibit significant weaknesses in language despite not meeting the criteria for intellectual disability. One of the core language weaknesses of children with DLD is poor use of grammatical forms, such as third-person singular present tense *–s*, regular past tense *–ed*, and copula and auxiliary forms of BE and DO (Bedore & Leonard, 1998; Rice et al., 2004; Rice & Wexler, 1996). Grammatical and general language weaknesses have long-term detrimental effects on reading and writing development (Catts, Bridges, Little, & Tomblin, 2008; Mackie & Dockrell, 2004), academic achievement (Conti-Ramsden & Botting, 2004), social interactions (Fujiki, Brinton, & Todd, 1996; Redmond & Rice, 1998), and independence (Conti-Ramsden, Botting, & Durkin, 2008; Conti-Ramsden & Durkin, 2008). It is therefore imperative that children with DLD receive early, effective language intervention to remediate one of their core weaknesses: poor use of grammatical inflections. Current grammatical treatment approaches for children with DLD yield only moderately significant gains after extensive treatment periods and are therefore inadequate (e.g., Leonard,

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Camarata, Brown, & Camarata, 2004; Leonard, Camarata, Pawlowska, Brown, & Camarata, 2006, 2008).

Traditional grammatical language treatments use implicit approaches (e.g., providing models and recasts of problematic forms at a high frequency) in which the learner is expected to unconsciously acquire and generalize target grammatical forms. Evidence from an early efficacy study (Finestack & Fey, 2009) suggests that the inclusion of an explicit teaching approach is more effective than an implicit approach alone. Unlike traditional implicit approaches, explicit instruction aims to make the learner consciously aware of the underlying language pattern by directly presenting the pattern or pedagogic rule. Such an approach is thought to draw upon learners' metalinguistic abilities to support their language development. The current study builds on previous investigations by examining the use of an explicit teaching approach when targeting three novel grammatical forms varying in linguistic complexity.

Implicit Versus Explicit Teaching Approaches

Implicit Approaches

Grammatical interventions for young children traditionally increase the number of exposures to target forms (e.g., third-person singular present tense *–s*, regular past tense *–ed*) by providing models, imitation requests, and conversational recasts (see Fey, 1986; Fey & Proctor Williams, 2000). Such approaches, also referred to as grammar facilitation approaches (see Ebbels, 2014), rely on typical acquisition processes by using implicit teaching approaches. With these approaches, the learner is expected to unconsciously learn and generalize target inflections. The interventionist does not attempt to make the learner conscious of the targets or the patterns guiding the target forms. For example, when teaching the past tense *–ed* using an implicit approach, the interventionist may provide the child with many sentences to model the target form, such as "Yesterday, Mom walked to the store" or "I already played with the train." In addition, the interventionist may follow incorrect child productions (e.g., "I already play") with a recast using the correct form (e.g., "Oh, you already played").

Although implicit teaching approaches facilitate language learning in young children with language impairment (Camarata, Nelson, & Camarata, 1994; Connell, 1987; Ebbels, 2014; Ellis Weismer & Murray Branch, 1989; Fey, Cleave, Long, & Hughes, 1993; Leonard et al., 2006; Plante et al., 2014), many interventions employing implicit-only (I-O) approaches achieve only moderate effects. For example, in a study examining generalization effects of an implicit treatment targeting the tense and agreement forms produced by 3- and 4-year-old children with developmental language delay, Leonard and colleagues (2004) found that after forty-eight 20-min sessions, no children achieved mastery levels on the target grammatical forms (group means < 35% accuracy). In a follow-up study (Leonard et al., 2006) that extended the total number of treatment sessions to 96, 21 of the 25 children showed either no use or variable use of the target forms on experimental probes (group means < 55% accuracy).

As another example, Plante et al. (2014) examined the use of enhanced conversational recasts, which is primarily an implicit grammar facilitation approach, to improve production of grammatical targets. Interventionists presented grammatical targets in either the context of 24 unique verbs (high variability condition) or 12 unique verbs (low variability condition) to eighteen 4- to 5-year-old children with language impairment. Participants in the high variability group made significant gains ($p = .02$, $d = 0.92$) on target forms after approximately 23 sessions. No significant gains were noted for the low variability group or for control, untreated targets. However, it is important to note that, in the high variability group, only three of the nine participants had end treatment accuracy scores of greater than 70%, with the group average being 36%. Thus, although a significant treatment effect was found for the implicit high variability intervention in relatively few sessions, the overall gains were modest.

Explicit Approaches

An alternative to traditional inductive approaches is an approach that integrates explicit instruction or metalinguistic methods (see Ebbels, 2014). When applying an explicit approach, instructors attempt to engage the learners' metacognitive abilities in the learning process. To do this, the instructor helps the learner become conscious of the intervention target by providing explicit descriptions of the underlying rules or patterns guiding the language form to be learned. In contrast to implicit instruction, explicit instruction directs and focuses learners' attention on the target forms (Reber, 1989). For example, when teaching regular past tense forms to a 6-year-old child using an explicit approach, the interventionist may provide the child with the following pedagogic rule, "Whenever you talk about something that already happened, you have to add *–ed* to the action." Explicit presentations may be integrated with implicit strategies, such as models and recasts, to facilitate language learning.

In an early efficacy study, Finestack and Fey (2009) directly compared grammatical learning of children with DLD when taught with an I-O approach or a combined explicit–implicit (E-I) approach. In this study, the intervention target was a single novel grammatical marker, which required a suffix marker on the verb to indicate whether the subject of the sentence was a boy (–pa) or a girl (–po). The participants included thirty-two 6- to 8-year-old children with DLD who were randomly assigned to either the I-O or the combined E-I treatment. Participants in both treatment groups received models of the novel marker used in context (e.g., "Sara can runpo") while viewing a corresponding picture. Participants in the I-O group received no additional information; however, children in the E-I group were also explicitly told the rule for when to use each form of the morpheme (e.g., "When it's a boy, you add *–pa* to the end. When it's a girl, you add *–po* to the end."). After the 4-day instruction period, 10 of 16 participants in the E-I group accurately produced the novel grammatical marker with at least 80% accuracy on a learning probe, whereas only three of 16 children in the I-O group reached this level of accuracy. The group difference was statistically and clinically significant (p = .03, Φ = 0.44), indicating an advantage for E-I instruction. Major limitations of this study were that only one novel form was targeted, and not all participants in the E-I group learned the novel form.

Other researchers have examined alternative explicit approaches to teach syntactic and grammatical forms. For example, Ebbels (2007) developed the shape-coding approach, which uses shapes, colors, and arrows to represent phrases, parts of speech, and verb tenses. This visual support is paired with explicit descriptions of corresponding grammatical rules. The approach also incorporates traditional implicit techniques including elicited imitation and recasting. Early efficacy investigations (Ebbels, 2007; Kulkarni, Pring, & Ebbels, 2014) support the use of the shape-coding approach when targeting forms such as prepositions, datives, wh– questions, and past tense. Kulkarni and colleagues (2014) evaluated shape coding with a 9-year-old child with language impairment and an 8-year-old child with autism spectrum disorder. After 10 sessions, both participants made gains on the targeted regular past tense form and no gains on the control form. However, gains were not equivalent. After therapy, one participant produced the targeted form correctly 100% of the time during a structured sentence completion probe and only 55% of the time during a conversation task. The other participant produced the targeted form correctly approximately 50% of the time in both contexts posttherapy. Thus, although the treatment was beneficial, there were disparities in intervention gains across the two participants and neither participant completely mastered and generalized use of the targeted form. Thus, it appears that treatment approaches that combine explicit and implicit techniques may be beneficial for children with language impairment; however, more evidence is needed to better understand the intervention targets and learner profiles for which such an approach may be best suited.

Current Study

The current study is an extension of the Finestack and Fey (2009) early efficacy study. A major limitation of the Finestack and Fey study was that the investigators evaluated the acquisition of only a single novel grammatical marker. Moreover, although the novel marker resembled gender markings in other languages, it did not closely reflect English grammatical markers. Thus, in the current study, investigators randomly assigned participants to receive either an I-O or combined E-I intervention to learn three novel grammatical markers. One marker was a gender marker similar to that used in the Finestack and Fey study. The other novel markers included a habitual aspect marker similar to an English tense marker and a first-person marker reflective of the third-person singular marker in English. The study questions were as follows:

1. Do more children with DLD *acquire* a novel grammatical marker when taught with a combined E-I approach than an I-O approach? If so, are there learning differences based on the targeted form?
2. Do more children with DLD *maintain* use of a novel grammatical marker when taught with an E-I approach than with an I-O approach? If so, are there learning differences based on the targeted form?
3. Do more children with DLD *generalize* use of a novel grammatical marker when taught with an E-I approach than with an I-O approach? If so, are there learning differences based on the targeted form?
4. What is the relationship between age, language ability, cognitive ability, and outcomes for children who receive I-O instruction and for those who receive E-I instruction?

Method

Participants

Participants included 25 children between the ages of 5 and 8 years who were receiving special speech-language or reading–writing services or who had been identified by speech-language pathologists or the classroom teacher as being at risk for needing special language services as part of a response-to-intervention model (Fuchs & Fuchs, 2006). Researchers recruited participants through local school districts and clinics and through public postings. Prior to completing any study sessions, parents signed consents to participate that were approved by an institutional review board for human subjects. A majority of participants completed study sessions in their school either before or after regular school hours. A few participants completed sessions in their homes or at a clinic. The first study participant was enrolled in March 2012; the last study participant completed the study in April 2015.

All participants met the following eligibility criterion: (a) 5–8 years of age; (b) currently receiving speech-language, reading, or special learning services or identified as at risk for needing special services; (c) scored above −2 *SD*s (standard score > 70) on the Leiter International Performance Scale–Revised (Leiter-R; Roid & Miller, 1997) test of nonverbal IQ; and (d) obtained a standard score on the Structured Photographic Expressive Language Test–Third Edition (SPELT-3; Dawson, Stout, & Eyer, 2003) equal to or below 95. One participant, who achieved a standard score of 67 on the Leiter-R, was included in the study because her Leiter-R score was only slightly below criteria and her expressive and receptive language scores were well within the range of the other participants' scores. All participants were monolingual English speakers, had no history or indication of neurological disorders (e.g., stroke, traumatic brain injury, seizure disorders, cerebral palsy), and passed a hearing screening in which they detected 20 dB pure tones at 1000, 2000, and 4000 Hz in both the right and left ears. Participants were also required to pass a phonological probe, which included the phonological forms of the targeted novel grammatical markers (/sh/, /f/, and /ɪp/). See Table 1 for more details regarding participant characteristics.

The study criterion we used is consistent with a diagnosis of DLD, which includes children with below average nonverbal cognitive abilities (Bishop et al., 2016; Norbury et al., 2016). In our sample, 12 participants had nonverbal IQ scores more than 1 *SD* below the mean. Given that the participants were all referred by speech-language pathologists with established concerns regarding language development, the study participants closely reflect current caseloads. This allows for greater generalizability of our study results. Also, because of the variability, we were able to carefully examine the influence of cognitive ability on study outcomes.

We used a cutoff of a standard score equal to or below 95 on our expressive language measure because the SPELT-3 has been shown to have 0.90 sensitivity and 1.0 specificity with this cutoff for 4- to 5-year-old children with language impairment (Perona, Plante, & Vance, 2005). Although this age range overlaps with only the youngest children included in this study, we applied this criterion to the entire sample. Meeting this criteria in conjunction with previous identification by a professional of language concerns allowed us to confirm a diagnosis of DLD.

We employed a parallel group design with qualifying participants randomly assigned to either the E-I or I-O instruction group. Prior to study recruitment, the principal investigator developed the randomization order in blocks of 12 to ensure that, after every 12th participant, an equal number of participants would be assigned to each instruction group and that the stimuli would be equally balanced. Within each block, computer-generated randomization was used to determine the sequence. The randomized sequenced assignments were kept in sealed envelopes. Upon confirmation of qualifying for study enrollment (determined by a research assistant), the researcher opened the first envelope in the queue to learn the participant's instruction group assignment. Only the researchers implementing the intervention were privy to group assignment; researchers did not inform parents of their child's group assignment. Randomization resulted in 13 participants assigned to the E-I condition and 12 participants assigned to the I-O condition. The study sample size resulted in 70% power to detect a large effect size using the traditional .05 criterion of statistical significance.

The randomized E-I and I-O instruction groups were compared on seven preexperimental variables (see Table 1). Significant group differences emerged for both age ($p = .05$) and performance on the Test for Auditory Comprehension of Language–Third Edition (TACL-3; Carrow-Woolfolk, 1999; $p = .03$). Although not statistically significant, the *p* values for performance on the Leiter-R ($p = .10$) and SPELT-3 ($p = .39$) and sex ($p = .25$) were not above .50 to confirm reasonable group matching (Mervis & Robinson,

Table 1. Study participant characteristics.

Characteristic	Explicit–implicit (*n* = 12)	Implicit-only (*n* = 13)	*p*[a]
Age (years)			
M	6.77	7.35	
SD	0.66	2.46	.05
Min–max	5.50–7.75	5.92–8.08	
Leiter-R (SS)			
M	96.83	85.38	
SD	19.18	12.77	.10
Min–max	71–124	67–107	
SPELT-3 (SS)			
M	77.58	71.31	
SD	17.48	17.77	.39
Min–max	40–94	44–95	
TACL-3 (SS)			
M	93.75	77.62	
SD	18.69	15.03	.03
Min–max	64–121	55–117	
Sex			
Female:male	2:10	6:7	.25
Race			
White:other	5:7	3:10	.57
Household income			
$0–$25,000	5	8	.56
$25,001–$50,000	1	2	
$50,001–$100,000	3	1	
$100,001–$150,000	2	2	
No response	1	0	

Note. SS = standard score with *M* = 100, *SD* = 15; Lieter-R = Leiter International Performance Scale–Revised (Roid & Miller, 1997); SPELT-3 = Structured Photographic Expressive Language Test–Third Edition (Dawson et al., 2003); TACL-3 = Test for Auditory Comprehension of Language–Third Edition (Carrow-Woolfolk, 1999).
[a]Group comparisons using *t* tests or chi-square (sex, race, income) analyses.

2003). The *p* values associated with the race and income comparisons were both greater than .50. Because of the imbalances that resulted from the randomization procedure, we examined the potential impact of the variables with significant group differences in our study analyses.

Novel Grammatical Treatment Targets

Regardless of group assignment, each participant received instruction for three different novel grammatical forms. Table 2 includes descriptions of the novel grammatical inflections. We chose to use novel forms to make certain that all participants had no experience with the targets, which increased our experimental control. To help ensure generalization of the study results, we selected novel targets that resembled true English grammatical forms based on meaning or function. For example, the gender inflection marked whether the sentence subject was male or female, similar to the way pronouns specify subject gender; the aspect form characterized the action in terms of habituation similar to the way English tense characterizes actions in terms of time; and the first person form marked speaker perspective similar to English third person.

Participants received instruction for three forms to allow for examination of the generalizability of treatment effects to morphemes of varying levels of complexity. Complexity of the rules required to explain target forms has been cited as a factor related to outcomes associated with deductive teaching (Long & Robinson, 1998). We considered complexity based on the linguistic complexity required to explain the form's pattern of occurrence (Robinson, 1996) and the semantic complexity of the inflectional marking used. Linguistically, the gender target was designed to be the least complex because the description of the rule provided to the participants comprised the fewest grammatical morphemes (25 morphemes). The aspect and person targets were designed to be the most linguistically complex with 40 and 38 morphemes, respectively. Semantically, the gender target was the least complex because the marking was the most transparent. The gender target marked biological gender with the gender cues based on physical cues embedded directly in the sentence (e.g., John = male). The aspect and person targets were both relatively more semantically complex with the marking attached to abstract concepts represented outside of the sentence. The person target was semantically the most complex given the need to understand multiple perspectives to mark first person. Structurally, each form was very similar, with the novel grammatical inflection always marked on the sentence's final verb.

A single consonant or syllable with low phonetic saliency was used to mark each of the novel grammatical inflections: /f/ ("f"), /θ/ ("th"), and /ɪp/ ("ip"). We counterbalanced the phonetic forms across each of the three targets. The forms were selected to resemble true phonetic markers used for English grammatical inflections, such that the voiceless fricative consonants /f/ and /θ/ resembled the voiceless fricative third-person singular /s/ marker. The vowel + voiceless stop consonant /ɪp/ marker resembled the vowel + voiceless stop consonant past tense /ɪt/ allomorph.

Procedure

After completing the initial assessments to verify study eligibility, each participant completed up to five computer-based teaching sessions for each of the three novel grammatical targets. These sessions were completed as close to one another as possible, but with only one session per day. There was a 1-week waiting period after the completion of one target. Before teaching the next target, participants completed a maintenance probe and a generalization probe. Table 3 includes the average timeline for completion of each target.

Teaching Sessions

With the exception of the first teaching session, each session began with a learning check, followed by a teaching task and an acquisition probe. An examiner presented each of these tasks via computer to ensure consistency of delivery across participants. Participants wore Sennheiser HD 280 pro headphones during all tasks. Sessions required approximately 20 min to complete.

Table 2. Novel grammatical treatment targets.

	Target		
Feature	Gender (male/female)	Aspect (habitual action)	Person (first person)
English counterpart	Pronouns *he/she*	Past tense *–ed*	Third-person singular *–s*
Pedagogic rule	"When it is a boy, you have to add x to the end. When it is a girl, you don't add anything to the end."	"When the animal is always/3s do/ing the action, you have to add x to the end. When the animal has been do/ing the action for a short amount of time, you don't add anything to the end."	"When the creature talk/3s about herself or if you talk about yourself, you have to add x to the end. When you or the creature talk/3s about someone else, you don't add anything to the end."
Morpheme count	25	40	38
Examples	John can swim + novel marking. Ashley can read.	See the horse sleep + novel marking. See the sheep jump.	Now I drive + novel marking. Now you skate.

Table 3. Intervention timeline.

Timeline detail	Gender		Aspect		Person	
	E-I	I-O	E-I	I-O	E-I	I-O
No. of teaching sessions						
Mean	4.92	4.33	4.67	4.83	4.83	4.92
Min–max	4–5	3–5	4–5	4–5	4–5	4–5
Days to complete teaching sessions						
Mean	7.08	8.83	8.33	7.64	10.00	10.58
Min–max	4–11	4–29	4–18	4–11	4–29	6–27
Days to maintenance/generalization						
Mean	8.72	8.75	8.83	8.89	10.42	10.82
Min–max	7–13	3–14	5–12	6–13	1–27	7–24

Note. E-I = explicit–implicit; I-O = implicity-only.

For each target, at the beginning of the teaching task, the computer delivered instructions that informed participants that a creature from outer space just came to Earth. Participants were instructed that the space creature uses many of the same words that we do, but there is something a little different about the way the space creature talks. The instructions further informed participants that they needed to figure out the space creature's language so that they could talk just like the creature. Next, the computer delivered eight models or examples of the space creature's language. For each model, a graphic depicting the target sentence appeared on the laptop, and the corresponding sentence was aurally presented (e.g., "Emma can dance," "See the horse sleep-ip"). Half of the models included a verb that required the novel marking. Before the first model, after the fourth model, and after the eighth model, the computer presented participants in the E-I group the rule guiding use of the novel target form (see Table 2). At these same intervals, the computer presented participants in the I-O group the filler statement, "Listen carefully so you can talk just like the space creature."

During the second half of the teaching task, the computer prompted participants to try to complete each sentence just as the space creature would. For each of these eight trials, a graphic depicting the target sentence appeared on the laptop, and the computer presented the beginning of the corresponding sentence (e.g., "John can…," "See the horse…," "Now you…"). For these cloze sentence trials, the computer also delivered feedback to the participants. If a child correctly completed the sentence, the examiner prompted the computer to deliver the feedback, "That was right. Listen to the space creature again," and the participant would hear the entire target sentence. If a child responded incorrectly, the computer delivered the feedback, "Oops, that isn't how the space creature talks. Listen to the space creature again," followed by aural presentation of the entire target sentence. Just as in the first half of the teaching task, half of the prompts required a verb with a novel marking. In addition, before the first prompt, after the fourth prompt, and after the eighth prompt, the computer presented participants in the E-I group the pedagogic rule guiding the target form and participants in the I-O group the filler statement.

At the end of each teaching session, the examiner delivered an acquisition probe also via computer. The format of the acquisition probe was the same as the cloze trials used in the teaching task. The only difference was that no rules, filler statements, or feedback were provided. The acquisition probe comprised 20 trials. The first 10 trials contained subjects and verbs identical to those used in the teaching task. These 10 trials were randomly selected with the constraint that half required a verb with a novel marking. The last 10 trials introduced new sentence subjects and/or verbs. Both the gender and aspect targets included three trials with a subject that was seen in the teaching task paired with a new verb, three trials with a new subject paired with a teaching task verb, and four trials with both a new subject and a new verb. Each of the last 10 trials for the person target included verbs not used in the teaching task. Performance on the acquisition probe served as the dependent variable for Study Question 1.

For Sessions 2, 3, 4, and 5, the teaching session began with a learning check. The learning check comprised the exact same items delivered in the acquisition probe of the previous session. All trials included cloze prompts. The examiner or computer did not provide rules, filler statements, or feedback. If a participant performed at a level equal to or greater than 80% accuracy, this was viewed as mastery of the target form, and the examiner did not proceed with the session's teaching task. The participant completed no other teaching sessions for that target form.

Follow-Up Session

A follow-up session occurred approximately 1 week after performing at or above 80% accuracy on a given target's learning check or after Teaching Session 5, whichever occurred first. During this session, participants completed a maintenance probe followed by a generalization probe. Unless the follow-up session was for the third (and final) target, after completing these two probes, participants completed the teaching session tasks for the next novel target assigned to them.

The 1-week maintenance probe was identical in format to the acquisition probe and learning check. It comprised 20 cloze trials with no examiner provision of rules, filler statements, or feedback. The purpose of the probe was to evaluate if participants maintained their acquisition of the novel target form previously taught. Performance on this probe served as the dependent variable for Study Question 2.

The generalization probe comprised 16 items. This probe assessed generalization in two ways. First, the probe assessed generalization of the target form to a play-based context. Second, the probe examined generalization of the target to new subjects and verbs. For the probe, the examiner used toy figurines and objects to create opportunities for the participant to talk like the space creature. For example, for the gender target, the examiner told participants that they need to describe what the male and female figurines ("Dan" and "Abby") can do using the space creature's language. The examiner then used the figurine to depict an action (e.g., "dance") and prompted the participant to describe what the figurine can do just as the space creature would (e.g., "Dan can dance-f"). If necessary, the examiner would provide the first few words of the target sentence for participants to include in their responses (e.g., "Dan can…," "See the cat…," "Now I…"). Percent accuracy on this probe served as the dependent variable for Study Question 3.

Experimental Stimuli Randomization

We developed two sets of stimuli for each novel marker. The sets differed in the agents and actions. More specifically, the difference was whether the agents and actions served as items in the teaching task or the acquisition probe. For example, for the gender target, Set 1 teaching probe agents and actions included Mike, Jake, Sara, Maddy, dance, laugh, write, and drink. The new agents and actions introduced in the acquisition probe included Matt, John, Ashley, Emma, swim, cry, read, and eat. Set 2 items were reversed such that the teaching task agents and actions included Matt, John, Ashley, Emma, swim, cry, read, and eat and the acquisition probe items included Mike, Jake, Sara, Maddy, dance, laugh, write, and drink. Half of the participants received the Set 1 stimuli, and half received the Set 2 stimuli. Counterbalancing in this manner helped to ensure that outcomes were not due to the specific stimuli used for teaching or testing. In addition, for the presentation of the teaching task, acquisition probe, maintenance probe, and generalization probes, we created two randomization sequences. Half of the participants received each sequence. This randomization helped to diminish learning and performance effects based on order of presentation of experimental items.

Data Coding and Reliability

All sessions were audio-recorded using a portable digital recorder with an internal microphone. Each task was then segmented into a unique file, in which participant, session number, and teaching condition were deidentified. Trained research assistants, blinded to the overall purpose of the study and treatment group assignments, coded each child response as correct or incorrect.

Responses were considered correct if they contained a verb plus the appropriate phonetic marking in utterances requiring the marking. Responses were judged as incorrect if they did not use the target when required (e.g., "Mike can eat"), applied the phonetic marker from a previously taught form or another random marking, or applied the marker to an utterance not requiring marking (e.g., "Ashley can read-sh"). Responses were coded as "other" if the marking produced was unclear, ambiguous, or inaudible (less than 1% of all responses). The percentage of correct application of the target (no. of correct/no. of correct + incorrect responses) was used to determine performance accuracy for each task and probe.

To determine coding reliability, a second blinded assistant coded at least 20% of the deidentified files. Applying the absolute agreement definition, the intraclass correlation coefficients (ICCs) for the percentage of items correct on the acquisition probe, learning check, and maintenance probe were all very high (.98, .98, and 1.00, respectively). This indicates that the judges contributed only a very small part of the variance in the children's scores.

For the generalization probe, the examiner scored each child's responses while administering the probe. A trained research assistant, blinded to the participants' group assignment, independently scored 20% of the probes to determine the reliability of the online scoring. Applying the absolute agreement definition, the ICC for the percentage of items correct on the generalization probe was .98, indicating strong reliability.

Fidelity of Treatment

The presentation of models, explicit rules, and implicit filler statements was preprogrammed into the stimulus presentation software. Therefore, for both groups, the delivery of the teaching task items was computer-controlled. However, in the second half of the teaching task, the cloze task required the participants to complete each sentence just as the space creature would. The examiner then prompted the computer to provide appropriate feedback (corrective or reinforcing). Trained assistants coded the appropriateness of the feedback provided on these eight trials. For these eight trials, the examiner provided the appropriate feedback 96% (SD = 7.68%) of the time across both treatment groups. A t test revealed that there was not a statistically significant difference in treatment fidelity across the I-O and E-I groups, $t(331) = -0.06$, $p = .95$. For one participant in the E-I group, treatment fidelity on the first day of teaching was exceptionally low (i.e., 50%), this was because the examiner judged the child's progressive marking on a verb that should not have been marked (e.g., "See the mouse standing") as incorrect. Immediately after this session, the research team determined that such responses would not be considered an error. Across the teaching task cloze trials, errors in examiner-prompted feedback were present 3.7% of the time. Approximately 3.6% of the errors were due to the examiner applying negative feedback when the child produced the correct response; 1% of the errors were due to the examiner applying positive feedback when the child produced the incorrect response. The majority of these errors occurred because children often changed their response after the examiner signaled the computer to apply feedback. In these cases, the examiner reinstructed the child.

To determine coding reliability of the feedback provided by the examiner, a second assistant coded 20% of the deidentified files. Applying the absolute agreement definition, the ICC for the percentage of feedback trials accurately presented was .82, indicating good reliability.

Statistical Analyses

Participants were classified as either pattern users (PUs) or non–pattern users (non-PUs) for each target form based on performance on experimental probes. PUs were participants whose performance was greater than or equal to 80% on a given probe. We classified all other participants as non-PU. The number of participants classified as PU and non-PU for each assessment probe is provided in Table 4. This categorization was necessary because the participants' performance, when plotted on a histogram, represented a bimodal distribution with one cluster of scores at approximately 60% accuracy and another cluster at approximately 90% accuracy across target forms. As was the case in previous works (Finestack, 2014; Finestack & Fey, 2009), participants' performance generally followed one of two patterns: (a) accuracy scores 80% or greater, reflecting acquisition of the novel inflection, or (b) accuracy scores near 50%, characterized by the participant producing the novel inflection for every item or no inflection for every item.

For Study Questions 1, 2, and 3, to determine whether more children with DLD acquired, maintained, and generalized use of novel grammatical markers when taught with an E-I approach than with an I-O approach, we completed the nonparametric Fisher's exact probability test for 2 × 2 tables for each target form. This nonparametric test was selected due to the categorical nature of participants' performance. We also calculated relative risk (RR) and absolute risk reduction (ARR) and their corresponding 95% confidence intervals (CIs) for each analysis. RR reflects the risk of an outcome given exposure to a particular condition; ARR is the difference in risk between the exposed and unexposed groups (Spitalnic, 2005). Finally, we evaluated the effect size based on phi (Φ), with phis of 0.10, 0.30, and 0.50 representing small, medium, and large effect sizes, respectively (Green & Salkind, 2003). We used Cochran's *Q* (Field, 2009) to compare performance across the novel markings for the E-I and I-O groups.

For Study Question 4, we completed multiple regression analyses to determine if age, language ability, or cognitive ability significantly predicted performance on the acquisition probe, controlling for the treatment effect. We also visually inspected the data to examine the relationships between these variables and performance on the acquisition probe.

Table 4. Intervention outcomes.

	Overall		**Gender**		**Aspect**		**Person**	
Outcome status	**E-I**	**I-O**	**E-I**	**I-O**	**E-I**	**I-O**	**E-I**	**I-O**
Acquisition probe								
PU	10	3	10	1	3	0	7	3
Non-PU	2	10	2	12	9	12	5	7
p	< .01		< .01		.22		.23	
RR [95% CI]	3.6 [1.3, 10.1]		10.8 [1.6, 72.4]		7.0 [0.4, 122.4]		1.9 [0.7, 5.6]	
ARR [95% CI]	60.3 [29.1, 91.4]		75.6 [50.1, 101.2]		25.0 [−1.3, 51.3]		28.3 [−11.5, 68.1]	
Φ	0.60		0.76		0.38		0.28	
Maintenance probe								
PU	9	3	7	1	3	0	6	3
Non-PU	3	10	4	11	8	9	5	7
p	.02		.01		.22		.39	
RR [95% CI]	3.2 [1.1, 9.2]		7.6 [1.1, 52.6]		5.8 [0.3, 100.04]		1.3 [0.5, 3.5]	
ARR [95% CI]	51.9 [18.4, 85.5]		55.3 [22.9, 87.8]		27.3 [−1.8, 56.3]		24.6 [−16.4, 65.4]	
Φ	0.52		0.58		0.38		0.25	
Generalization probe								
PU	8	1	8	1	3	0	7	2
Non-PU	4	12	3	12	9	10	5	8
p	< .01		< .01		.22		.10	
RR [95% CI]	8.7 [1.3, 59.4]		9.5 [1.4, 64.3]		5.92 [0.3, 102.6]		2.9 [0.8, 11.0]	
ARR [95% CI]	59.0 [28.6, 89.3]		65.0 [35.0, 95.1]		25.0 [−2.1, 52.1]		38.3 [1.0, 75.7]	
Φ	0.61		0.67		0.36		0.39	

Note. E-I = explicit–implicit; I-O = implicit-only; PU = pattern users; RR = relative risk; 95% CI = 95% confidence interval; ARR = absolute risk reduction.

Results

A total of 25 participants were enrolled in the study: 13 were randomized to the E-I group, and 12 were randomized to the I-O group. Two participants in the I-O did not complete the study due to scheduling conflicts. Neither participant completed any of the person probes or the aspect maintenance and generalization probes. One of these participants also did not complete the aspect acquisition probe. Another participant in the I-O group had poor attendance for the duration of the sessions targeting the person target, completing only two teaching sessions. This participant's data were omitted from all of the person probes analyses. Other data were seemingly missing at random due to failure to record participant responses during sessions as follows: gender maintenance probe: one E-I participant and one I-O participant; aspect maintenance probe: one E-I participant and two I-O participants; aspect generalization probe: one I-O participant; person maintenance probe: one E-I participant; person generalization probe: one I-O participant.

Study Question 1: Acquisition Probe

To determine if more children with DLD acquired a novel grammatical marker when taught with E-I or I-O instruction, we conducted nonparametric Fisher's exact tests to compare proportions. On the acquisition probe, there was a significant group difference ($p < .01$) based on the number of participants classified as a PU (≥ 80%) for at least one of the novel target forms. This effect was characterized by significantly more PU participants in the E-I group ($n = 10$, 83%) than in the I-O group ($n = 3$, 23%). The RR indicated that the risk of response with E-I instruction was 3.6 times greater than the risk of response with I-O instruction (95% CI [1.3, 10.1]). The corresponding ARR estimates that E-I instruction results in approximately 60% more PUs than I-O instruction (95% CI [29.1, 91.4]). Follow-up analyses revealed that this trend only held true for the gender target ($p \leq .01$). For gender, in the E-I group there were 10 PUs (83%) compared to one PU (8%) in the I-O group. Although there were no significant differences based on instruction for aspect and person (*p*s = .22 and .23, respectively), the associated effect sizes were medium.

Cochran's related samples *Q* test indicated statistically significant differences among the three target forms for the E-I group, $\chi^2(2) = 10.57$, $p < .01$. McNemar pairwise comparisons revealed a significant difference between performance on the gender and aspect target forms ($p < .01$) with participants performing better on the gender form. Cochran's related samples *Q* test for the I-O group was not significant, $\chi^2(2) = 4.67$, $p = .10$.

Study Question 2: Maintenance Probe

To determine if more children with DLD maintained their learning of novel grammatical markers when taught with E-I or I-O instruction, we employed another series of Fisher's exact tests. Based on performance on the maintenance probe, more participants in the E-I group (75%) were classified as a PU than in the I-O group (23%) for at least one target form ($p = .02$). The RR indicated that the risk of response with E-I instruction was 3.2 times greater than the with I-O instruction (95% CI [1.1, 9.2]). The ARR estimates that E-I instruction results in approximately 52% more PUs than I-O instruction (95% CI [18.4, 85.5]). Follow-up analyses revealed that for gender there were significantly more PUs in the E-I group (64%) than the I-O group (8%, $p < .01$). No significant differences emerged for person ($p = .22$) or aspect ($p = .39$). The effect sizes for the overall analysis and the gender analysis were large, whereas the aspect analysis effect size was medium.

For the E-I group, Cochran's *Q* test did not indicate a significant difference, $\chi^2(2) = 2.00$, $p = .37$, in the number of PUs for the three target forms. There was not a significant difference for targets for the I-O group, $\chi^2(2) = 4.67$, $p = .10$. However, visual inspection of Table 4 suggests that the aspect target (E-I PUs = 3; I-O PUs = 0) was the most difficult form for participants to learn.

Study Question 3: Generalization Probe

We also used nonparametric Fisher's exact tests to determine if more children with DLD generalized their learning of each of the novel grammatical markers when taught with E-I or I-O instruction. Similar to both the acquisition probe and maintenance probe results, on the generalization probe, significantly more participants in the E-I group (67%) were classified as a PU than in the I-O group (8%) for at least one target form ($p < .01$). The RR indicated that the risk of response with E-I instruction was 8.7 times greater than with the I-O instruction (95% CI [1.3, 10.1]). The ARR estimates that E-I instruction results in approximately 59% more PUs than I-O instruction (95% CI [28.6, 89.3]). Follow-up analyses revealed that, for the gender target, there were significantly more PUs in the E-I group than the I-O group ($p \leq .01$). Significant group differences did not emerge for aspect ($p = .22$) or person ($p = .10$). The effect sizes for the overall analysis and the gender analysis were large. The effect sizes for aspect and person were medium.

Similar to the maintenance probe, Cochran's *Q* test revealed a significant difference in performance across the three targets for the E-I group, $\chi^2(2) = 7.00$, $p = .03$. Follow-up McNemar tests revealed significant difference between the gender and aspect targets ($p = .04$), but not the other pairs (person vs. aspect, $p = .14$; person vs. gender, $p = 1.00$). Visual inspection also suggests that aspect, in which there were only three PUs, was more difficult than the gender target (eight PUs) and person target (seven PUs).

Study Question 4: Participant Characteristics

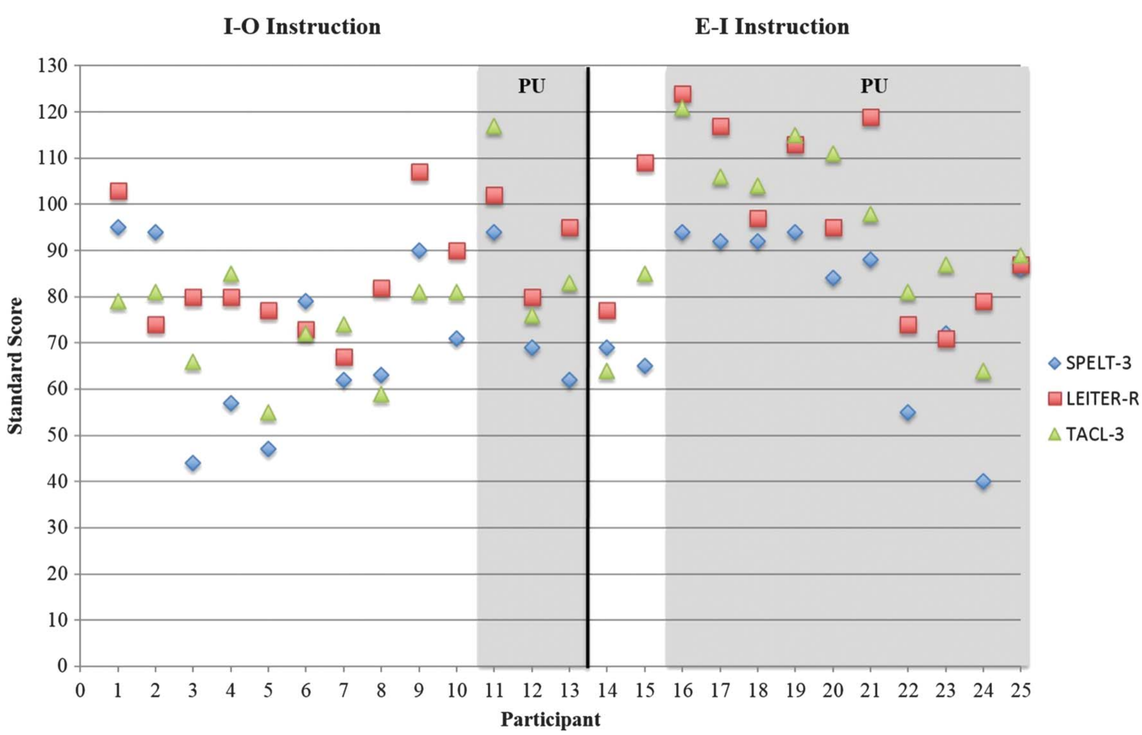
To investigate the relationships between age, language ability, cognitive ability, and treatment outcomes, we conducted a set of multiple logistic regression analyses. The dependent variable was the binary outcome measure of PU versus non-PU. First, a regression analysis was conducted to predict whether a participant became a PU based on the instruction type received (i.e., E-I or I-O). Results of this analysis indicated that instruction did account for a significant amount of performance variability, $R^2 = .36$, $F(1, 23) = 13.11$, $p < .01$, confirming results from Study Question 1. Next, we conducted a regression analysis to evaluate whether age, language ability, and cognitive ability predicted whether a participant became a PU over and above instruction received. Variables were entered into the equation simultaneously. The variance accounted for by this regression was significantly greater than zero, $R^2 = .25$, $F(4, 19) = 3.01$, $p = .04$. We found that, although treatment type continued to significantly predict PU status, $\beta = .60$, $p < .01$, performance on the TACL-3 (receptive language) was also a significant predictor, $\beta = .82$, $p = .01$. Age ($\beta = .26$), SPELT-3 scores ($\beta = -.26$), and Leiter scores ($\beta = -.08$) were not significant predictors (all *p*s > .05).

To further examine the relationships between age, language ability, cognitive ability, and treatment outcomes, we used visual analyses. Figure 1 includes the standardized scores for each participant for the nonverbal cognitive assessment (Leiter-R; Roid & Miller 1997), the expressive language assessment (SPELT-3; Dawson et al., 2003), and the receptive language assessment (TACL-3; Carrow-Woolfolk, 1999). The figure is divided by treatment group, with the PU participants (based on acquisition probe performance) highlighted in each section. Within each section, participants are ordered by chronological age such that the youngest participants are on the far left of each section and the oldest on the far right.

Inspection of Figure 1 reveals that, for the I-O group, participants who did not become PUs had heterogeneous profiles with Leiter-R scores ranging from 67 to 107, SPELT-3 scores ranging from 44 to 95, and TACL-3 scores ranging from 55 to 85. The I-O PU scores were all within these ranges, with one exception: Participant 11 received the highest score (SS = 117) on the TACL-3. The ages of the non-PUs and PUs in the I-O group also overlapped considerably with the non-PU's ages ranging from 5;11 to 8;1 (years;months) and the PU's ages ranging from 6;3 to 7;7. Thus, it was not the case that only the participants with the highest cognitive or language scores or the oldest participants became PUs with I-O instruction. However, the finding that the participant with the highest TACL-3 score became a PU supports the regression analysis in which receptive language was a significant predictor of PU status.

For the E-I group, one of the two participants who did not become a PU earned a Leiter-R score (SS = 109) well within the range of the E-I participants who became PUs (min–max = 71–124). However, the other scores for these participants were at the low end of the E-I range. Participant 14's Leiter-R score was the third lowest of the

Figure 1. Relationships between age, language ability, cognitive ability, and performance on acquisition probe for implicit-only (I-O) and explicit–implicit (E-I) groups. PU = pattern users; SPELT-3 = Structured Photographic Expressive Language Test–Third Edition; Leiter-R = Leiter International Performance Scale–Revised; TACL-3 = Test for Auditory Comprehension of Language–Third Edition.



E-I participants, and both participants' SPELT-3 and TACL-3 scores were among the lowest five scores in the E-I group. The low TACL-3 scores for the non-PUs in the E-I group further support the regression analysis results. Similar to the I-O group, there were no clear age differences between E-I non-PUs and PUs. The ages of the E-I non-PUs were 6;6 and 6;7, well within the E-I PU age range of 5;6–7;9.

Discussion

This study compared the acquisition, maintenance, and generalization of three novel grammatical forms by children with DLD when taught with implicit instruction (I-O) or a combined E-I instructional approach (E-I). Findings revealed significant learning advantages for the E-I group on each of the three probes when performance was collapsed across the three novel targets. Participants' performance across the three novel forms was variable. On the acquisition probe, the E-I group significantly outperformed the I-O group for the gender target. The comparison for the aspect and person targets was not statistically significant, although the comparison yielded a medium effect size. On the maintenance probe, there was a statistically significant advantage for the E-I group only for the gender target. The effect sizes for the aspect and person targets were medium and small, respectively. On the generalization probe, the E-I group significantly outperformed the I-O group on the gender target. Although not statistically significant, the effect sizes for the aspect and person targets were medium, favoring the E-I group. Inspection of participant characteristics revealed that receptive language was a significant predictor of PUs in addition to treatment type.

The study results indicate different outcomes based on the language target and assessment probe. These findings were not unexpected. The treatment targets were purposely selected to vary in terms of semantic and linguistic complexity. Counter to our predictions, the aspect target was more difficult for both treatment groups to learn compared to both the person and gender targets. We predicted that the person target would be the most difficult to learn because it required perspective taking. However, the aspect target required participants to analyze and compare features across a set of three pictures, instead of a single picture as was the case for the other target forms.

The probes were designed to increase in difficulty. We expected that the participants would demonstrate the strongest performance on the acquisition probe, followed by the maintenance probe and generalization probe, respectively. The acquisition probe occurred immediately after teaching trials, whereas both the maintenance and acquisition probes occurred approximately 1 week after teaching. The generalization probe additionally demanded that the participants use the target form in a play-based, rather than computer context, and with new subjects and verbs. Although there were differences in performance across probes, the variability was small. Overall, participants were able to maintain and generalize their learning of target forms.

Altogether, these findings indicate that children can acquire the use of novel grammatical forms varying in complexity. All but two participants in the E-I group acquired use of at least one target form, and more than half of the E-I participants acquired all three novel targets. It is important to note that, in this study, we classified participants as PUs if they correctly produced target (e.g., Now I sleep-ip) and contrast (e.g., Now you sleep) forms at least 80% of the time. It is also important to note that, for each target form, participants received a maximum of five teaching sessions. Compared to previous grammatical intervention studies relying on I-O teaching approaches, the results of the current study are impressive. For example, results of the Leonard et al. (2004, 2006) studies indicated that only 16% (4/25) of the participants reached accuracy levels of 85% or greater during the final assessment session, which occurred after 96 sessions. As another example, in the Plante et al. (2014) study, only 33% (3/9) of the participants in the high variability group, which was the more favorable teaching condition, obtained accuracy scores greater than 70% after approximately 23 sessions.

Results of the current study broadly support the use of explicit approaches to teach grammatical forms to children with language impairment and align closely with previous investigations of explicit approaches. Our study findings replicate and extend the results of the Finestack and Fey (2009) study, which also examined the use of a combined E-I approach. Specifically, an E-I advantage was found when targeting a similar novel gender marking. Findings were extended given that in the current study there was evidence of both maintenance and generalization of the gender marking.

Findings from the current study are also similar to study findings of Ebbels and her colleagues (Ebbels, 2007; Kulkarni et al., 2014), which have indicated a clear advantage for the use of explicit techniques when targeting true grammatical forms. The current study adds to the emerging body of evidence supporting the use of explicit approaches to teach grammatical forms in three important ways. First, the current study is one of the first to demonstrate maintenance and generalization of target forms using a group design. Second, compared to the shape-coding approach evaluated by Ebbels et al., which relies heavily on visual cues, our E-I approach relied only on verbal instructions. This suggests that visual cues may not be necessary for all children when using explicit approaches. Third, our study findings also extend previous investigations of explicit interventions to younger children. The shape-coding studies included children aged 8–12 years of age, whereas the participants in the current study ranged from 5 to 8 years of age. Although it is important to note that, in contrast to our study, which targeted novel forms, evaluations of shape coding targeted true grammatical forms, which may be more difficult for children to acquire.

Study Limitations

Overall, results of the current study indicate a clear advantage for combining explicit and implicit intervention approaches when teaching grammatical forms to children with language impairment. Despite evidence of this advantage, these findings must be qualified in several ways. First, this study serves as an early efficacy study (Fey & Finestack, 2009). As such, it is a tightly controlled randomized study that targets three discrete novel grammatical markings. We attempted to select novel markings that mirrored grammatical markings found in English, but the novel markings were dichotomous in nature (e.g., if X condition is met, produce Y; otherwise, do nothing) and followed strict patterns. English forms often have multiple variants and rule exceptions (e.g., plural allomorphs and irregular forms). Moreover, it is often necessary to apply multiple grammatical morphemes to a single utterance, which was not the case in the current study. Thus, we cannot immediately generalize findings from this study and conclude that the same effect would emerge if targeting true English grammatical forms.

Second, the participants in this study included a heterogeneous group of children with language impairment. We broadly included children who had nonverbal IQ standard scores ranging from 67 to 124, which could be characterized as below average, average, and above average. Similarly, TACL-3 standard scores ranged from 55 to 121. The participants' SPELT-3 standard scores ranged from 40 to 95. We applied the cutoff of a standard score of 95 or below recommended by Perona et al. (2005) as a study inclusionary criterion; however, it is clear that there was considerable heterogeneity in the grammatical abilities of the participants. In future studies targeting true grammatical forms, it will be imperative that children have weaknesses on targeted forms to ensure the appropriateness of the intervention and generalizability of study findings.

Third, results of our regression analyses suggest that receptive language ability may be a significant factor that influences treatment outcomes. Unfortunately, our randomization procedure resulted in significant group differences based on receptive language, favoring the E-I group. Because of the small number of participants in the E-I group, it is difficult to fully understand the impact of receptive language on treatment outcomes. In future studies, investigators should specifically recruit participants with average and below average receptive language skills to better understand the profiles that are most likely to make gains with an E-I treatment approach.

Fourth, although we attempted to examine both maintenance and generalization of the novel target forms, we only evaluated short-term maintenance, which occurred, on average, 8–10 days after the last treatment session. Thus, we do not know if the children would demonstrate long-term mastery of the target forms. Moreover, although our generalization probe altered the assessment context from a computer probe to a play situation using toys, the probe items were all prompted by the examiner. To more completely assess generalization, use of targeted forms in spontaneous language would be a more robust measure. However, given that we were targeting highly specified novel markings, the frequency of use of these forms in spontaneous conversational samples was likely to be low.

Fifth, not all participants who received E-I instruction acquired, maintained, and generalized use of all of the forms. Analyses suggest that receptive language is likely a contributing factor to learning; however, other factors such as skills associated with executive functions, including cognitive flexibility, selective attention, working memory, and inhibitory control (Diamond, 2013; Zelazo, Craik, & Booth, 2004), may be more sensitive to accounting for differences in performance. Additional research with larger sample sizes is needed to better understand the factors that contribute to learning with either explicit or implicit instruction.

Finally, for both the E-I and I-O groups, the number of teaching sessions was very limited. Although the E-I group demonstrated significant gains in acquisition with few sessions, it is unknown how performance on the maintenance and generalization probes was affected by the number of teaching sessions. It may be the case that implicit instruction requires more sessions for acquisition, but that acquisition with implicit instruction enhances long-term maintenance and generalization. Future research will need to closely examine the long-term effects of learning with both explicit instruction and I-O instruction.

Future Directions

The current study extends the findings of Finestack and Fey (2009), which indicated a significant advantage for a combined E-I instructional approach when teaching a single novel grammatical marking to children with DLD. Both the current study and the Finestack and Fey study were early efficacy studies (Fey & Finestack, 2009) designed to examine the utility of explicit instruction under highly controlled conditions. Results from both studies indicate a significant relationship between the use of explicit instruction and the acquisition of novel grammatical markings. Thus, these findings support further examination of explicit instruction to teach grammatical forms to children with language impairment in a large-scale efficacy study. Such a study should aim to eliminate study limitations inherent in the current study by targeting true English grammatical forms (e.g., past tense *–ed,* third-person singular *–s,* present progressive *–ing*) in varied contexts, including more valid assessments of maintenance and generalization, closely examining factors that moderate treatment outcomes and extending treatment periods for all treatment groups. Moreover, it will be essential to evaluate explicit instruction using an approach that can be easily translated to clinical practice (Finestack & Fey, 2017).

Conclusion

Study results indicate that grammatical intervention that incorporates the use of explicit instruction is more efficacious than intervention that relies solely on implicit instruction when targeting a variety of novel grammatical forms. Further research is needed to determine if the incorporation of explicit approaches positively impacts the long-term outcomes of children with DLD when targeting true English grammatical forms.

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