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Research Article

Individual Versus Small Group Treatment of Morphological Errors for Children With Developmental Language Disorder

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Purpose: This study examines the effects of enhanced conversational recast for treating morphological errors in preschoolers with developmental language disorder. The study assesses the effectiveness of this treatment in an individual or group ($n = 2$) setting and the possible benefits of exposing a child to his or her partner's treatment target in addition to his or her own.
Method: Twenty children were assigned to either an individual ($n = 10$) or group ($n = 10$, 2 per group) condition. Each child received treatment for 1 morpheme (the target morpheme) for approximately 5 weeks. Children in the group condition had a different target from their treatment partner. Pretreatment and end treatment probes were used to compare correct usage of the target morpheme and a control morpheme. For children in the group condition, the correct usage of their treatment partner's target morpheme was also examined.
Results: Significant treatment effects occurred for both treatment conditions only for morphemes treated directly (target morpheme). There was no statistically significant difference between the treatment conditions at the end of treatment or at follow-up. Children receiving group treatment did not demonstrate significant gains in producing their partner's target despite hearing the target modeled during treatment.
Conclusions: This study provides the evidence base for enhanced conversational recast treatment in a small group setting, a treatment used frequently in school settings. Results indicate the importance of either attention to the recast or expressive practice (or both) to produce gains with this treatment.
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Children with developmental language disorder (DLD) have language expression and comprehension difficulties in the absence of intellectual disabilities, hearing loss, neurological impairments, or developmental delays (D. V. Bishop et al., 2017). Terminology to describe the disorder has included such terms as *specific language impairment* and *primary language impairment.* In the United States, these children often receive services under the label *speech-language impairment*. Speech-language pathologists who serve young children with DLD have a variety of models of service delivery at their disposal. One very common decision involves whether treatment will be delivered to children individually or in group settings. Optimally, the decision between these two models is based primarily on the characteristics of the child and then on other considerations (e.g., can a compatible group be formed). However, speech-language pathologists frequently group children for service delivery despite potential differences in disorder profiles, severity, age, and grade levels (Brandel & Loeb, 2011; Mullen & Schooling, 2010). Mullen and Schooling (2010) reported that 91% of children seen in schools were treated in group therapy, and use of group treatment was associated with caseload size (Dowden et al., 2006). Groups of two to four children are a common form of service delivery for school speech and language services (Brandel & Loeb, 2011; Mullen & Schooling, 2010).

Given the prevalence of group treatment, it is important to understand its impact on remediation of language disorders. In this study, we compare treatment outcomes for intervention delivered in groups of two children versus treatment delivered to children individually. The few available

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studies on this topic indicate lack of significant differences between the two service delivery models (Boyle, McCartney, O'Hare, & Forbes, 2009; Cirrin et al., 2010; Sommers et al., 1966; Wilcox, Kouri, & Caswell, 1991). In addition, in a meta-analysis of interventions for children with speech and language impairments, Law, Garret, and Nye (2010) reported no significant differences between group and individual treatment delivery. Likewise, no significant differences between these service delivery models were identified in the context of expressive language therapy (Boyle et al., 2009), articulation treatment (Sommers et al., 1966), or vocabulary acquisition in treatment (Wilcox et al., 1991).

Although the existing studies point to no difference between group and individual treatment settings, the study designs also had important limitations. These studies did not always control for the treatment parameters that affect comparability across group condition versus individual condition or did not provide relevant information for comparing the outcomes across conditions and across different studies (cf. Warren, Fey, & Yoder, 2007). Two critical dose parameters that were not consistently reported or controlled in these previous studies were dose number and method of delivery within the group. More specifically, it is not clear whether the doses were delivered to the group as a whole, with the hope that all children would benefit equally, or whether separate doses were targeted to individual children within the group. This is important because doses delivered to a group as a whole may not have the same effectiveness as doses directed to specific children. Group sizes also varied, even within a single study, potentially masking differential effects for different group sizes. Therefore, the conditions that promoted similar outcomes in these studies are unclear in that the results occurred in the context of important differences in the number of doses, dose density, or dose delivery.

Treatment-related conditions that facilitate or undermine the success of individual children who are treated in group settings have also not been considered. When children are treated in group settings, they hear input from the clinician and their peers. This potentially offers the opportunity for incidental teaching by the clinician or observational learning by the child (Colozzi, Ward, & Crotty, 2008), as they hear input provided to other children. Children with language disorders are capable of learning simply from input provided during treatment, without overt demands for expressive practice (e.g., Courtright & Courtright, 1976; Kouri, 2005; Weismer & Murray-Branch, 1989), allowing for observational learning. If multiple children are all working on the same language target, the number of therapeutic doses provided across individuals during the session could be multiples of what an individual child might hear in a session by themselves. When different language goals are targeted across children in the group, the additional input to other members of the group could either produce learning on its own or provide a "head start" on additional targets each child needs to acquire. Alternatively, varied input to different group members could serve to consolidate prior learning for individual children.

These potential facilitative effects within group treatment assume certain preconditions. First, it is not clear how many language targets can be learned simultaneously. Children with DLD do not learn normally from the highly varied natural language input provided in their daily language environment. Treatment that broadly addresses any grammatical error in the child's repertoire is not as effective as treatment that focuses on a limited number of morphemes (Yoder, Molfese, & Gardner, 2011). This suggests that there may be an upper bound on how many treatment targets a child with DLD can learn simply from hearing them within a group treatment session. Some studies have targeted classes of grammatical errors (e.g., auxiliary verbs; Fey, Leonard, Brendin-Oja, & Deevy, 2017; Leonard, Camarata, Brown, & Camarata, 2004; Leonard, Camarata, Powlowska, Brown, & Camarata, 2006), but it is not clear whether this is more or less efficient than targeting each class member individually (Plante & Gómez, 2018; e.g., first "is," then "are").

The potential benefit of hearing the treatment of other children's morpheme targets depends further on whether children pay as much attention to input directed to others as to input directed to themselves. There is now ample evidence that children with DLD often have difficulties with different aspects of attention that do not necessarily rise to the level of a clinical diagnosis (e.g., Ebert & Kohnert, 2011; Kapa & Plante, 2015; Kapa, Plante, & Doubleday, 2017; Spaulding, 2010; Spaulding, Plante, & Vance, 2008). These appear to be related to language skills. Sustained attention and attentional control predict word recognition performance (Montgomery, 2008). Both inhibition and attentional switching predict spoken word recognition (Evans, Gilam, & Montgomery, 2018), and attentional shifting predicts syntactic processing (Montgomery, Evans, & Gillam, 2015). If children are less able to switch their attention between multiple individuals in a group and to focus their attention on input not given specifically to them, they may not benefit from ambient exposure to treatment doses provided to other children in the group.

A final issue involves the nature of the input children receive in group therapy sessions. Children treated individually receive therapeutic, presumably grammatical, input solely from the clinician. Children in group sessions hear not only the clinician input but also ungrammatical input from other children with language impairment. Studies of language input show the importance of grammatical over ungrammatical clinician models in treatment (Bredin-Oja & Fey, 2014) and the relative difficulty of learning when the target form is heard in alternative syntactic forms (Fey et al., 2017; Leonard & Deevy, 2017). In addition, basic research (Gómez & Lakusta, 2004) indicates that the presence of ungrammatical examples in the input can undermine learning. Although young language learners (mean age of 12 months) were able to tolerate low levels of ungrammatical input, those that heard ungrammatical input more than 33% of the time did not learn an artificial grammar. We have no data concerning whether children with disorders are capable of this at all, much less at what percentage of counterexamples their learning fails, but the presence of children with multiple impairment in a group can certainly

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increase the overall rate of ungrammatical input heard during a session.

This study is an early efficacy study (Fey, Finestack, & Schwartz, 2009), designed to identify treatment differences between group and individual treatment contexts. The purpose of an early efficacy study is to identify cause–effect relationships between treatment variables and outcomes in a controlled context with a small participant sample. In this study, we tested the relative effect of treating children individually versus in small groups (n = 2). We targeted morpheme errors during treatment because they are considered a hallmark feature of DLD during the preschool years (D. V. M. Bishop, 2006; Leonard, 1989; Rice & Wexler, 1996). Children were placed in small groups of two because this is a common group delivery context used by speech-language pathologists (Mullen & Schooling, 2010). If the format (enhanced conversational recast) of the treatment matters more than the context (group vs. individual), there will be no difference in treatment outcome for morphemes directly treated. However, if the factors discussed above exert a negative effect on children treated in pairs, then individual treatment will produce better results than group treatment. Furthermore, we examine the possibility that children treated in groups benefit from hearing doses delivered to their treatment partners by tracking growth on morphemes directly treated versus those overheard during treatment. If children treated in pairs benefit from hearing treatment doses provided to their treatment partner, then children should show gains on both morphemes treated within the group session.

Method

Participants

Twenty children (seven girls, 13 boys), ranging in age from 4;8 to 6;7 (years;months), participated in this study (M = 5;6, SD = 5.8 months). All children were classified as having DLD, defined as a language impairment that occurs in the absence of other handicapping conditions, including intellectual, neurological, or sensory impairments. The children were reported by their parents to be native speakers of English, and parents spoke English to their children at home. All attended preschools and day care centers where English was the language of instruction. For five children, parents reported their child also heard Spanish on occasion but confirmed that their child did not speak Spanish. Thirteen children were reported to be White, two were Black, one was multiracial, and one was Native American. Race was not reported for three children. Thirteen were reported as Hispanic, and two were reported as non-Hispanic, with no ethnicity reported for five children. Mother's education level served as a proxy for socioeconomic status as it has been shown to have a stronger association with child outcomes (see Bradley & Corwyn, 2002, for a discussion), including language development (Hoff & Tian, 2005) than do other aspects of socioeconomic status. This ranged from 12 to 17 years (M = 14.1 years). The children all participated in the study during the summer when they were not enrolled in treatment elsewhere. However, 17 children had received therapy during the school year.

Children were assigned to one or the other of the two treatment conditions (individual vs. group). In total, 10 children were assigned to each condition. This was achieved by pseudorandomization to obtain the best balance of boys and girls across groups and the best balance of treated morphemes across groups, while maintaining equal group numbers. Children were paired by gender in the group condition. Of the children who had received therapy previously, nine were assigned to the individual treatment condition and eight were assigned to the group condition.

Demographic factors did not differ significantly between the two treatment groups when calculated with independent-samples t tests (two tailed, p >.05 for all): age, $t(18) = -0.801$, p = .434, d = 0.004, and mother's years of education, $t(18)$ = 0.227, p = .823, d = 0.00. Also, chi-square tests showed no group differences for either race, $\chi^2 = 0.2198$, p = .639, or ethnicity, $\chi^2 = 0.9524$, p = .329.

Prior to the study, all children completed a battery of tests to confirm their status as having DLD and to describe their language and cognitive skills. Demographic and pretest data are presented in Table 1. All children also passed a pure-tone hearing screening. Nonverbal IQ was tested using the nonverbal scales of the Kaufman Assessment Battery for Children–Second Edition (Kaufman & Kaufman, 2004). Children whose nonverbal IQ score suggested intellectual disability were excluded from the study, as were children with additional handicapping conditions by parent report. The children who participated in the study all scored below the empirically established cutoff score of 87 (Greenslade, Plante, & Vance, 2009) on the Structured Photographic Expressive Language Test–Preschool 2 (SPELT-P 2; Dawson et al., 2003), indicating language impairment. Children's informal spontaneous speech also evidenced difficulty with grammatical morphology, according to the clinical judgment of a certified speech-language pathologist who interacted with the child informally during the test session. Additional testing was administered to describe receptive vocabulary (Peabody Picture Vocabulary Test–Fourth Edition; Dunn & Dunn, 2007), comprehension of morphosyntax (locally normed Shirts & Shoes Test; Plante & Vance, 2011), and single-word articulation skills (Goldman-Fristoe Test of Articulation–Second Edition; Goldman & Fristoe, 2000). These scores can also be found in Table 1. Independent-samples t tests revealed no significant differences in the standardized pretest scores between the two groups (two tailed, p >.05 for all): Kaufman Assessment Battery for Children–Second Edition, $t(18)$ = 0.000, p = 1.000, d = 0.000; SPELT-P 2, $t(18)$ = 0.774, p = .449, d = 0.000; Peabody Picture Vocabulary Test–Fourth Edition, $t(18) = -0.397$, p = .692, d = 0.000; Shirts & Shoes Test, $t(18) = -0.147$, p = 0.885, d = 0.000; and Goldman-Fristoe Test of Articulation–Second Edition, $t(18)$ = 0.000, p = 1.000, d = 0.000.

In addition to the 20 children who participated in the study, we included two additional children (one girl and one boy) who attended group sessions if one of the two

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Table 1. Demographic and pretest data for children in the individual and group treatment conditions.

Participant ID	Tx partner	Age (years;months)	Gender	K-ABC2	SPELT-P 2	PPVT-4	Shirts & Shoes	GFTA-2
Individual treatment								
I-1		5;1	M	93	68	96	2	67
I-2		4;8	F	79	64	90	3	105
I-3		6;4	M	98	77	93	9	73
I-4		5;8	M	111	76	85	5	89
I-5		5;8	M	89	47	87	4	63
I-6		5;8	F	94	56	80	7	67
I-7		5;6	M	100	80	85	7	97
I-8		5;5	F	81	74	91	7	102
I-9		4;10	M	124	75	107	9	69
I-10		5;7	M	130	61	112	8	76
M		5;4		99.9	67.8	92.6	6.1	80.8
(*SD*)		(5.6 months)		(17.0)	(10.7)	(10.1)	(2.5)	(15.9)
Group treatment								
G-1	G-3	5;8	M	79	53	85	7	68
G-2	G-4	4;9	F	130	85	91	7	86
G-3	G-1	5;9	M	99	67	109	6	79
G-4	G-2	5;0	F	96	72	92	8	106
G-5	G-8	5;6	M	95	65	88	4	75
G-6	G-7	5;10	M	91	58	94	5	70
G-7	G-6	6;7	M	82	56	97	5	60
G-8	G-5	5;10	M	109	68	122	15	83
G-9	G-10	5;9	F	98	56	80	2	108
G-10	G-9	5;6	F	120	63	88	4	73
M		5.6		99.9	64.3	94.6	6.3	80.8
(*SD*)		(5.7 months)		(15.9)	(9.5)	(12.4)	(3.5)	(15.7)

Note. All test scores are standard scores with a mean of 100 (*SD* = 15), with the exception of the Shirts & Shoes Test (*M* = 10, *SD* = 3). Tx = treatment; K-ABC2 = Kaufman Assessment Battery for Children–Second Edition, Nonverbal scale; SPELT-P 2 = Structured Photographic Expressive Language Test–Preschool 2; PPVT-4 = Peabody Picture Vocabulary Test–Fourth Edition; GFTA-2 = Goldman-Fristoe Test of Articulation–Second Edition; F = female; M = male.

children in the group condition were absent for a treatment session. The substitute children were provided the recasts intended for the absent child. This allowed us to keep the treatment context of the group session constant despite occasional absences. The substitute children attended 17 group treatment sessions with different children. They also attended the half-day preschool program and received articulation therapy.

Materials and Procedure

This study closely followed the methods of previous treatment studies by Encinas and Plante (2016), Plante et al. (2014), Meyers-Denman and Plante (2016), and Plante, Tucci, Nicholas, Arizmendi, and Vance (2018) but included new participants. The study included a pretreatment probe period, treatment sessions, and probe sessions that occurred within a 6-week period. The children were also tested approximately 8 weeks after the treatment ended (range of 7–10 weeks) in order to measure retention.

The study was conducted in a clinic facility at The University of Arizona, where the children were also included in a half-day summer preschool program. Note that, because all children participated in the preschool program, this was constant across treatment conditions. The half-day summer program accommodated children with working parents, which minimized absences that would otherwise occur if parents were required to bring children only for the treatment period during the work day. When not in treatment, children were engaged in different types of activities, both indoor and outdoor. In the classroom setting, the curricular focus was on preliteracy skills and vocabulary enrichment, along with free-play periods. In addition to the classroom activities, 15 children received individual articulation training. Purposefully, grammar learning was a target neither in the classroom setting nor during articulation training, and those sessions were not a part of this study. The classroom staff were also explicitly instructed not to address children's grammatical errors.

Pretreatment Probe Sessions

The design and general sequence of events for the current study is displayed graphically in Figure 1. Morpheme use was probed for 3 days prior to the treatment in one-on-one sessions lasting approximately 45 min each. Based on prior test results and conversational interactions with each child (see above), four to six potential treatment targets were probed for each child. These included past tense *–ed,* plural *–s*, masculine and feminine pronouns, question forms, auxiliary *is*, third-person *–s*, possessive *–s*, and negatives. During the pretreatment probe sessions, the children were engaged in conversation centered around three activities

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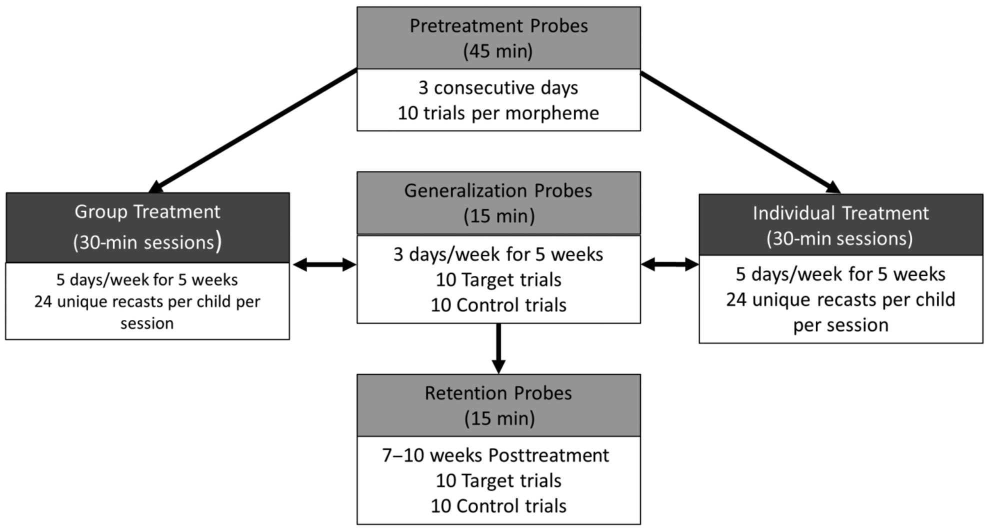
Figure 1. The treatment design. All children were probed on potential morpheme targets for three consecutive days. Children were assigned to one or the other treatment condition with an effort to balance age, sex, and target morphemes trained. Treatment occurred 5 days a week. All children were probed for generalization of morpheme use to untrained words and materials 3 days a week. Retention testing for target and control morphemes occurred 7–10 weeks after the last treatment day.



(e.g., play activities, dialogic reading, arts and crafts). Clinicians were free to use any materials of their choosing (e.g., books, toys), in a conversational context, to obligate the child's use of the specific morpheme. For example, while playing with a toy, the clinician verbally presented the target verb three times without using the target morpheme (e.g., "The horse likes to jump."; "Can you make the horse jump over the fence?"; "Watch the horse jump."). The clinician then provided a prompt to obligate the use of the target morpheme (e.g., "What does the horse always do?"; target: jump<u>s</u>). Clinicians obtained 10 child attempts (spontaneous or elicited) for each morpheme. Probed morphemes that were used with greater than 30% accuracy on any given pretreatment probe day were dropped from subsequent probe sessions.

Assignment of Target Morphemes and Control Morphemes

After establishing pretreatment use, grammatical morphemes were selected for each child. Although some studies have limited the morphemes treated to those conforming to a theoretical model (e.g., Fey et al., 2017; Leonard et al., 2004), we elected to treat a variety of morphemes to assure that the procedure was not limited to only a small subtype of all morpheme errors (e.g., only tense or agreement morphemes). This assured that the work maximized external validity in terms of the diversity of morphemes the treatment addressed. We did, however, constrain morpheme selection to avoid interaction with articulation deficits. For example, children treated for *–s* morphemes had to be able to produce a final /s/ in other speech contexts. Therefore, children were not treated simultaneously for the same sounds in language and articulation contexts.

Children treated individually were assigned two morphemes: one morpheme for treatment (the target form) and one that was tracked but not treated (the control form). The control morphemes were tracked to evaluate potential treatment–external effects on performance (e.g., maturation, general language stimulation). For children in the group condition, three morphemes were assigned: one as the target form, another as the control form, and a third as the ambient form. The ambient form was the morpheme that served as the target form for that child's treatment partner. Each child in the group condition heard recasts for their ambient form, but these recasts were directed to the other child of the pair. An overview of the target, control, and ambient forms for each child is provided in Table 2. A Mann–Whitney U test confirmed that the treatment groups did not differ significantly in terms of pretreatment use of their target morpheme, $U = 41$, $p = .521$, $z = 0.643$. Likewise, children's pretreatment use of target and control morphemes did not differ significantly for either the individual treatment, Wilcoxon's $T = 13.0$, $p = .866$, $z = 0.169$, or the group treatment, $T = 5.5$, $p = .295$, $z = 1.048$. Note that, in all cases, pretreatment morpheme use was quite low, averaging 5.4% or less pretreatment use.

Most children had multiple morpheme errors that met the criterion for inclusion in the study. Because of this, morphemes were assigned to children in ways that balanced their occurrence as target or control morphemes both within and across groups to the greatest extent possible. When a morpheme served as a treatment target for one child, we assured that it also served as a control target for another child (see Table 2). For the pairs of children in the group condition, their target and ambient morphemes mirrored

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Table 2. Treatment variables for children in the individual and group treatment conditions.

ID	Treatment partner	Target form	Control form	Ambient form	Treatment days	Total verbs recast	Unique verbs recast
Individual treatment							
I-1		3ps	*–ed*		25	601	333
I-2		she	3ps		23	555	206
I-3		Aux. *is*	She		24	576	225
I-4		3ps	doesn't		25	600	226
I-5		*–ed*	Aux. *is*		25	562	287
I-6		*–ed*	3ps		25	600	288
I-7		3ps	*–ed*		23	552	263
I-8		*–ed*	3ps		23	552	227
I-9		3ps	*–ed*		25	600	335
I-10		*–ed*	3ps		23	552	292
M					24.1	575.0	268.2
(*SD*)					(1.0)	(22.87)	(46.2)
Group treatment							
G-1	G-3	3ps	Aux. *is*	*–ed*	23	575	292
G-2	G-4	she	3ps	*–ed*	25	600	303
G-3	G-1	*–ed*	questions	3ps	23	553	251
G-4	G-2	*–ed*	3ps	she	25	600	313
G-5	G-8	*–ed*	Aux. *is*	3ps	24	555	241
G-6	G-7	Aux. *is*	questions	3ps	22	480	251
G-7	G-6	3ps	she	Aux. is	24	530	262
G-8	G-5	3ps	can't	*–ed*	22	521	263
G-9	G-10	3ps	Inf. *to*	*–ed*	23	552	210
G-10	G-9	*–ed*	Aux. *is*	3ps	25	602	205
M					23.6	556.8	259.1
(*SD*)					(1.17)	(39.5)	(36.1)

Note. 3ps = third-person singular form; *–ed* = past *–ed*; Aux. = auxiliary; Inf. = infinitive; Questions = yes/no questions.

each other exactly. This helped to assure that the target morphemes did not happen to be "easier" than the control morphemes across children. However, given that all of these morphemes should have been acquired by or well before the age of our participants and their low pretreatment use, it is likely that all were difficult for these particular children to acquire.

Treatment Sessions

All children were treated using the enhanced conversational recast method (see Meyers-Denman & Plante, 2016; Plante et al., 2018). The treatment sessions in this study applied the principle of high variability of input (see Plante et al., 2014) in a massed condition (see Meyers-Denman & Plante, 2016) for both treatment conditions (individual and group treatment). As previously indicated, this method includes the standard elements of conversational recast treatment (e.g., Camarata & Nelson, 1992; Camarata, Nelson, & Camarata, 1994; Leonard et al., 2006). Conversational recast treatment involves a child–clinician conversation centered around an activity or set of activities (e.g., book reading, arts and crafts, games). The activity is arranged to elicit use or attempts to use the target morpheme. The utterance produced by the child, called the *platform utterance,* can either be produced spontaneously or be elicited by the clinician. Both appear to be equally effective (Hassink & Leonard, 2010). The *recast* is the clinician's grammatically correct restatement of the child's platform utterance. An important aspect of the conversational recast treatment is that the recast follows the child's platform utterance immediately and that it follows the general form of the child's utterance (Meyers-Denman & Plante, 2016). The recast given by the clinician can either be corrective (a grammatical version of the child's incorrect utterance) or noncorrective (repeating a child's correct use of the morpheme in the platform utterance). In this study, focused recasts were used for all children. This means that recasts only targeted one morpheme (i.e., the target morpheme) throughout the treatment period for each child. Other ungrammatical forms used by the child were not recast.

As described by Meyers-Denman and Plante (2016), the enhancements to the traditional conversational recast method include two specific modifications to the basic treatment. First, the clinician attempted to gain the child's attention when the recast was delivered. The principle behind this requirement is that reduced attention eliminates learning effects, as shown experimentally (Toro, Sinnett, & Soto-Faraco, 2005). In this study, attention was defined as an attempt to get the child's eye contact during the recast. Establishing attention often involved auditory, tactile, or visual cues to encourage attention at the critical time. For some children, the clinician gently touched the child's hand, shoulder, arm, or face to get his or her attention. Other clinicians initially used a visual attractor (e.g., a sticker placed on the clinician's fingertip, which they brought to their chin or lips to attract the child's attention to the clinician's face during the recast). Others were given an auditory cue, which consisted of making the verb and target morpheme the

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loudest word in the utterance (i.e., she walked, for targeting past tense *–ed*). The cues used for each individual child were ultimately determined by which drew that child's attention most effectively. For most children, more than one cue was attempted before an effective cue was identified. Attentional cues were discontinued after the child could establish visual attention on his or her own.

The second modification of the conversational recast treatment involves a high degree of variability, both regarding linguistic input and conversational context (see Plante et al., 2014). In this study, this required providing 24 lexically unique recasts to each child during each treatment session. Each recast represented a different utterance frame for the morpheme targeted for treatment. This included an obligatory varying of the verb used when targeting pronouns (e.g. *She* **walk**ed, *She* **bike**s, *She* is **skat**ing, for targeting *she*) or targeting verb morphology (e.g., The boy **walk***ed,* Sarah **bik***ed,* He **skat***ed*). Note that both the subject and object (when present) were also varied as much as possible in addition to the verb.

For children who were grouped in pairs, both heard 24 unique recasts per session directed toward themselves and 24 that were directed to the other child. Children who were treated individually heard 24 unique recasts per session directed solely to themselves. To assure this, clinicians recorded the verb used for all recasts given throughout all sessions. There was no attempt to assure that recasts were completely unique across sessions. Verbs were tracked because they are the context for verb morphology and also directly follow pronouns. The number of unique verbs heard per child across sessions is reported in Table 2. For each child, more than 200 verbs were heard during recasts across treatment days. There were no group differences on the number of verbs recast to children in the two treatment conditions (group vs. individual), $t(18) = 0.491$, $p = .630$, $d = 0.197$.

To assure that the child understood which verb was to be used in conjunction with the targeted grammatical morpheme, the clinician was encouraged to model the verb stem several times prior to eliciting an utterance using that verb from the child, as described earlier for the pretreatment probing. However, clinicians were not permitted to directly model the target morpheme while modeling the intended verb. The clinician was also free to model other verb tenses (e.g., "There is a girl running. Can you see the girl run? The girl runs so fast! What is happening?"—in the case of auxiliary *–is* as a treatment target). This technique was used heavily during the first half of treatment to indicate to the child which verb should be included in his or her own utterances.

As children began to use their target morphemes during treatment, clinicians were able to decrease the number of presentations of each verb prior to child elicitations. If the child's platform utterance used a different verb than what was being modeled and the child's verb could be used in the clinician's recast, then the child-provided verb was recast. If the child provided a potential platform utterance containing a verb that had already been recast, a verb reserved for probe sessions only (explained below), or a verb that could not be inflected (e.g., irregular verbs), the clinician followed up with the recast that generally corresponded to the model semantically (e.g., "The girl ran."; "The girl sprinted."). Clinicians would also substitute frequently occurring words in the child's utterances (e.g., pronouns, character names) to increase input variability (e.g., Child: "He waved."; Clinician: "The boy waved!").

For some children who initially made no response after the verb was modeled, the clinician provided the recast as their next conversational turn. This demonstrated to the children their expected response within the treatment context. Most children, including those with high initial nonresponse rates, typically began providing platform utterances of their own within the first 2 days of treatment. Some clinicians implemented an "expectant pause" after a child's incorrect response to an elicitation. This pause provided an opportunity for the child to self-correct so that a correct platform utterance could be recast. This was used particularly with children who had already begun to use their target morpheme but used it inconsistently. Regardless of the specific technique used to elicit platform utterances and whether or not the target morpheme was correct, the clinician's recast always included the correct grammatical form.

In addition to varying the linguistic features of the recasts, the clinicians were instructed to vary the training context and material used. Varied materials naturally helped to vary the nouns and the verbs used in treatment sessions, as different content (including verb use) was appropriate for different materials and activities. Clinicians typically used three different activities within a 30-min treatment session (ranging from two to four activities). The clinicians were free to use whatever activity they wanted, except for materials from the probe kits (described below) or materials similar to those of the probe kits. Clinicians were required to use book reading as one of the activities for giving these preliterate children experience with books. Clinicians were not permitted to repeat books and materials within 2 weeks of their initial use, and materials could not be used more than twice during the 6-week treatment period. For the majority of children, treatment materials and activities were used only once. Books were never repeated for the same child.

Overview of Treatment Dose and Intensity

In order to compare treatment studies, Warren et al. (2007) proposed a standard definition of elements of treatment intensity in language intervention that should be reported. These include the following: treatment dose, dose form, dose frequency, total intervention duration, and cumulative intervention intensity. Recall that *treatment dose* refers to teaching episodes during a treatment session. *Dose form* refers to the specific clinician actions thought to effect behavioral change. In this study, dose form consisted of high-variability focused recasts provided with an attempt to assure the child's attention. In this study, we varied one parameter of dose form; whether focused recasts were

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provided in either one-on-one ($n = 1$) or in small group ($n = 2$) settings. *Dose number* is the number of properly administered teaching episodes. In this study, we provided 24 unique conversational recasts targeted at each child per day during each 30-min session. As expected, there were no significant differences (two tailed) in the number of doses heard for the two groups, $t(18) = 1.26$, $p = .223$, $d = 0.48$. For children in the group condition, hearing recasts directed to the other child in the group had the potential to act as a dose as well. Whether these actually functioned as effective doses was tested in this study. *Dose frequency* refers to the number of times the treatment is provided per day or per week. As described earlier, the children enrolled in this study had one session per day, five times per week. The treatment lasted for approximately 5 weeks, which represents the *total intervention duration*. The number of treatment days ranged from 22 to 25 (see Table 2). A two-tailed t test confirmed that the number of treatment days children attended did not differ between the two conditions (group vs. individual), $t(18) = 1.028$, $p = .318$, $d = 0.005$. In order to get a general indicator of the overall treatment intensity for this study, the cumulative intervention intensity was calculated as Dose Number (24) × Dose Frequency (5) × Total Intervention Duration (5) (see Warren et al., 2007). This led to an average of 600 doses per child over the course of treatment.

Generalization Probe Sessions

The purpose of probe sessions was to obtain measurements of the children's ability to generalize their target morpheme use to new materials and untrained lexical contexts. During the treatment period, probe sessions took place three times a week (Mondays, Wednesdays, and Fridays). Each session lasted for 15 min and was completed before the treatment session in order to reflect previous learning rather than the immediate effects of that day's training. Daily generalization probe sessions were not administered because pilot studies showed that this could lead the children to develop a "generalization set" in which their ability to use the target (and control) morphemes generatively was not truly reflected. Therefore, if a child was absent on a probe day, the probe was not administered again until the next scheduled probe day to avoid administering probes on consecutive days.

Five different probe kits were available to the clinicians from which they chose one kit for each probe session. Clinicians used materials from all probe kits over the course of the study. Probe kits were not used during treatment. The probe kits included a zoo kit, an ocean kit, a farm kit, a play dough kit, and two sets of cut-out figures (a soccer set and a race car set). Each kit contained multiple items (e.g., many animals, a selection of human figures, environmental objects), such that clinicians could select a different subset of items each time they used a probe kit. This provided variation of materials and, subsequently, clinician elicitations across probe sessions.

In order to test generalization to untreated vocabulary, clinicians were given a list of 20 verb stems that were only used during probe sessions. These included early developing words that could be used easily with a variety of items from the different probe kits. Clinicians used these words to probe both the child's target and control morphemes. Probe sessions (and treatment sessions) were recorded on video. This enabled the clinicians to look at the recordings immediately after the session if they needed to verify their coding of child responses.

Each child was probed individually by the treating clinician. To account for the possibility of clinician bias, we collected information on scoring reliability. This is discussed in more detail below. Probe sessions included 10 elicitations of the target morphemes and 10 control morphemes using the probe kit materials and designated probe words. The elicitations obligated the child's morpheme use.

In addition to measuring the child's morpheme use when elicited, the child's correct spontaneous use of target morphemes during treatment and generalization probe sessions were also measured. Spontaneous use was considered a secondary measure of treatment progress. We considered spontaneous productions in terms of their total number and the number of different spontaneous productions produced by each child.

We measured retention by bringing children back between 7 and 10 weeks after treatment ($M = 8$ weeks) and completing another probe session. The probe session was conducted using the same materials and procedures for all other probes, with the exception that the data were collected by someone other than the treating clinician. Clinicians were again free to organize the probe sessions in a variety of ways to accomplish this objective. They were free to select from any of the probe kits and free to determine the order and types of probes used to elicit the target, control, and ambient morphemes.

Treatment Fidelity and Scoring Reliability Procedures

Six research clinicians were trained by a certified speech-language pathologist to administer the treatment. Prior to the study, they received two formal group training sessions. In addition, the clinicians were encouraged to practice procedures on their own. Training included assigned readings on recast treatment, verbal explanations of the treatment procedures, and analysis of video clips from past treatment studies (e.g., Meyers-Denman & Plante, 2016; Plante et al., 2014, 2018). Training covered both probe and treatment procedures. The clinicians were also supervised during the study by a certified and licensed speech-language pathologist to assure adherence to the procedures.

Reliability and fidelity scoring were conducted by students in speech-language pathology who were not involved in administering treatment or probes. The aim of the reliability scoring was to assure that two persons observing the same child scored the child's responses in the same way. Coding was distributed almost equally (allowing for absences) across children and over the full course of the study period. Those coding the reliability of the probe sessions were blind to the identity of target, control, and ambient morphemes. Fidelity coding addressed whether the components of the treatment thought to be critical were performed correctly by the clinician. Those coding treatment fidelity were not

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blinded to the target morpheme. This was because the treatment itself made the child's target obvious, and they needed to know the session target in order to code. Therefore, separate individuals coded fidelity versus reliability to maintain blinding for reliability coding.

The persons obtaining reliability and fidelity data sat in the treatment room together with the child and the clinician during the treatment sessions. This arrangement was based on prior experience that the scoring was less accurate if the person administering the reliability scoring was sitting in an observation room or attempted to score from a video recording. In particular, coding from video has proven to be suboptimal because children move during sessions, often providing less than ideal video and audio signals. In order to minimize the influence of extra persons present in the session, there was never more than one reliability or fidelity coder in a session at the same time. Clinicians were instructed not to interact with the reliability scorer or to discuss the results for the session. Reliability and fidelity data were entered daily into a data set by a third person so that the results did not influence future reliability or fidelity coding.

Fidelity of Clinician Treatment and Probe Administration

Treatment fidelity data were coded for 49 (10.2%) of the treatment sessions. Sessions were coded concerning accuracy of the number of unique recasts provided per session (99.1% and 98.7% accuracy for the individual and group conditions, respectively) and whether probe kit materials or probe words were used during recasts (neither occurred for either group).

The fidelity of probe sessions was coded for 50 (16.4%) of the probe sessions. Probe fidelity was calculated for each of these sessions as the number of deviations from the required probe protocol out of 20 probes possible. The possible deviations tracked included modeling the morpheme prior to the probe, failing to obligate use of the probe, multiple probes of the same morpheme that used the same probe word, and failure to use probe materials. Clinicians correctly performed probes with 95.9% (SD = 20.3%) and 99.5% (SD = 2.5%) accuracy for the individual and group conditions, respectively, and probe kits were used (100% accuracy for both groups). The lower value in the individual sessions is accounted for by an outlier fidelity rating of 70%, whereas all other values were 100% fidelity for this group. Likewise, for the group sessions, all values but one at 87.5% were also 100%.

Reliability of Child Response Coding

Children's productions during the probe sessions constituted the dependent variable in this study. Sixty-two (20%) of probe sessions were coded for scoring reliability. Scoring reliability was coded as point-to-point agreement for each item elicited out of 20 items total per session (10 target and 10 control morphemes). Agreement was based on whether both coders scored the same child production in the same way (correct vs. incorrect). The average scoring reliability for probe sessions was 97.1% (SD = 3.4%) for children in the individual condition and 96.8% (SD = 6.2%) for children in the group condition.

Experimental Blinding

Caregivers were informed that their child was receiving treatment for grammar, but they were not told about the specific morphemes targeted until the end of the study. Because they never observed treatment sessions, caregivers remained blind to the focus and methods of treatment. Preschool staff were likewise aware that children were receiving grammatical intervention. However, they were not aware of the specific morphemes targeted for each child. Those collecting data on probe reliability were blind to assignment of target and control morphemes.

Data Analyses

Prior to testing the impact of context in which the treatment was delivered (group vs. individual treatment), we wished to establish that the treatment itself was effective. A Wilcoxon's T was calculated to compare the first three probe sessions with the last three sessions in order to measure change over time. This nonparametric test was used because low pretreatment use compared with variable levels of end treatment use resulted in homogeneity of variance, preventing use of a parametric test. Treatment efficacy should result in statistically significant change in target morpheme use in response to obligatory probes from pretreatment baseline to the end of treatment. However, untreated morphemes should not show significant change in either treatment condition.

To test for differences between the group and individual treatment conditions, we measured performance on both generalization probes (primary measure) and spontaneous use of the target morpheme (secondary measure). For the primary measure, we wanted a single dependent variable that reflected treatment change from baseline performance that could be tested for group differences. Therefore, we calculated a treatment effect size (d) on a participant-by-participant basis as the metric of the primary treatment effect. The effect size d was calculated in the same manner as explained by Plante et al. (2014). The mean correct morpheme use during the first three pretreatment probes (baseline) was subtracted from the mean correct morpheme use during the final three generalization probes. This number was then divided by the standard deviation of the final three generalization probes. For spontaneous use, the total number of correct spontaneous child uses during treatment or probe sessions were summed for comparison between treatment conditions. Both outcome measures were evaluated with a between-groups t test. We also correlated probe performance at the end of treatment with that at follow-up to determine the degree of retention over time.

Results

Descriptive statistics for pretreatment and end treatment performance are reported in Table 3, and the results are displayed graphically in Figure 2.

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Table 3. Performance data for children in the individual and group treatment conditions.

		Target form						Control form				Ambient form			
ID	Tx partner	Pre-Tx (%)	End-Tx (%)	Tx effect size (*d*)	(%)	Total spontaneous use	Unique spontaneous use	Pre-Tx (%)	End-Tx (%)	Effect size (*d*)	(%)	Pre-Tx (%)	End-Tx (%)	Effect size (*d*)	(%)
Individual treatment															
I-1		0	100	17.33	10	77	53	0	0	0.00	90				
I-2		0	100	17.33	100	40	26	7	43	1.20	20				
I-3		3	97	16.17	100	21	20	0	0	0.00	10				
I-4		3	93	15.59	60	9	7	0	100	17.33	80				
I-5		3	37	2.89	0	5	4	3	0	−0.58	0				
I-6		3	33	2.60	30	4	4	13	3	−1.73	30				
I-7		0	13	2.31	20	3	3	10	20	0.58	20				
I-8		20	30	1.00	30	61	38	7	3	−0.58	0				
I-9		7	40	0.92	20	30	23	7	13	0.29	10				
I-10		7	27	0.87	40	7	7	3	0	−0.58	30				
M		4.6	57	7.7	41	22.1	19.0	5.0	18.2	1.6	29.0				
(*SD*)		(5.9)	(35.6)	(7.7)	(35.1)	(26.5)	(17.2)	(4.5)	(31.8)	(5.6)	(31.4)				
Group treatment															
G-1	G-3	0	97	16.74	90	37	28	0	0	0.00	0	7	7	0.00	40
G-2	G-4	10	100	15.60	70	10	10	3	0	−0.58	100	3	33	0.49	0
G-3	G-1	7	87	13.86	80	18	13	3	0	−0.58	60	7	30	1.17	0
G-4	G-2	10	47	6.35	60	5	5	3	0	−0.58	20	20	23	0.08	30
G-5	G-8	10	33	4.04	0	5	5	0	3	0.58	0	7	0	−1.15	0
G-6	G-7	10	20	1.00	50	2	2	17	3	−2.31	10	10	7	−0.29	60
G-7	G-6	0	13	0.87	0	9	5	0	0	0	0	3	17	2.31	50
G-8	G-5	0	10	0.19	10	3	3	0	0	0	0	7	23	2.89	20
G-9	G-10	0	0	0.00	0	4	4	3	30	1.01	0	3	7	0.29	20
G-10	G-9	7	0	−1.16	30	3	3	7	0	−1.16	40	7	3	−0.58	40
M		5.4	40.7	5.7	39.0	9.6	7.8	3.6	3.6	−0.4	23	7.4	15.0	0.5	26.0
(*SD*)		(4.8)	(40.0)	(7.0)	(35.4)	(10.8)	(7.9)	(5.2)	(9.4)	(0.9)	(34.0)	(5.0)	(11.7)	(1.3)	(21.7)

Note. Effect size (*d*) is calculated by subtracting mean correct morpheme use during the first three pretreatment probes from mean correct morpheme use during the final three probes. This difference was divided by the standard deviation of the final three generalization probes (i.e., (End-Tx – Pre-Tx) / End-Tx *SD*). Total spontaneous use refers to each unmodeled and unelicited use of the target morpheme by the child. Unique spontaneous use refers to the number of spontaneous uses that use the target morpheme in a unique linguistic context (i.e., all uses of a target morpheme with the same verb are counted once). Tx = treatment; Pre-Tx = correct morpheme use before treatment, during three pretreatment probe sessions (cf. baseline); End-Tx = correct morpheme use after treatment, during the final three generalization probe sessions.

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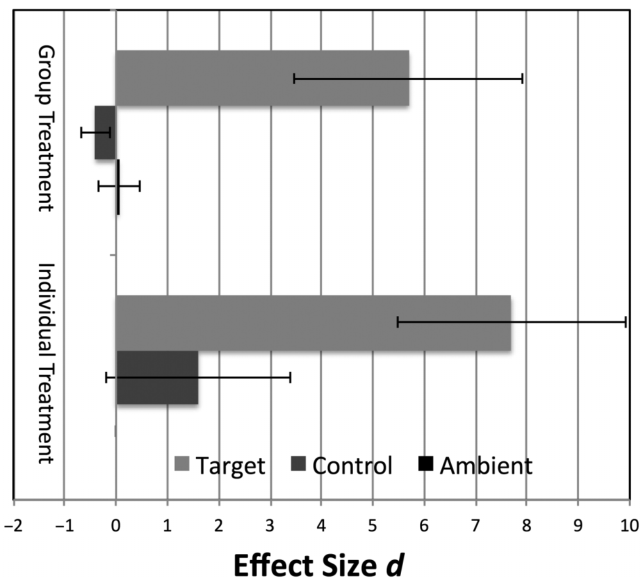
Figure 2. Treatment effects under the group and individual treatment conditions. Bars represent the effect size d for change relative to baseline performance.



Treatment Efficacy

In support of the general efficacy of the treatment, children used their target morphemes significantly more frequently at the end of treatment than before treatment, Wilcoxon's $T_z = 3.786$, $p = .000$, $d = 1.16$. This applied to both the individual condition, Wilcoxon's $T_z = 2.807$, $p = .005$. $d = 1.47$, and the group condition, Wilcoxon's $T_z = 2.549$, $p = .011$, $d = 0.88$. The effect sizes reported here are considered large for psychological research (see Cohen, 1992). There are currently no standards for effect sizes for speech or language treatment research (Gierut, Morrisette, & Dickinson, 2015), except that stronger effects are preferred over weaker ones. The control morphemes did not increase significantly from pretreatment probes to end treatment probes, Wilcoxon's $T_z = 0.259$, $p = .796$, $d = 0.28$. This was also true for the two groups when separated: individual condition, Wilcoxon's $T_z = 0.916$, $p = .360$, $d = 0.42$, and group condition, Wilcoxon's $T_z = 0.775$, $p = .439$, $d = 0.00$.

Treatment Condition Effects

Group Versus Individual Treatment Effects

The primary aim of the current study was to determine whether there was a significant difference in learning between the individual and group treatment conditions. This was tested by comparing the treatment *d,* calculated for individual subjects across groups. The comparisons revealed no significant differences between the treatment conditions, $t(18) = 0.591$, $p = .562$, $d = 0.264$. The small effect size suggests that a difference between the two groups would be unlikely even with a much larger sample size (see Cohen, 1992). Therefore, the difference detected is unlikely to be of much clinical relevance.

A two-tailed independent-samples *t* test indicated that there was no significant difference in the total number of spontaneous target morpheme use between the individual and group conditions, $t(18) = 1.384$, $p = .183$, $d = 0.619$, nor in the total number of unique spontaneous morpheme use between the individual ($M = 19.0$) and group conditions ($M = 7.8$), $t(18) = 1.870$, $p = .078$, $d = 0.836$. The nonsignificant nature of these effects, despite their reasonable size, reflects the variability among children within the groups. However, because the effect sizes are moderate to large, a group difference favoring individual treatment might be found with a larger sample size.

The Effect of Ambient Exposure

We also investigated the effect of exposure to the ambient morphemes in the group condition (i.e., whether a child would benefit from hearing the recasts for the morpheme targeted to his treatment partner). The results show that the children who received treatment as a member of a group did not use their ambient morphemes significantly more frequently during the final three probe sessions than during the three pretreatment probe sessions, Wilcoxon's $T_z = 1.494$, $p = .135$, $d = 0.65$. However, the moderate-to-large effect size reveals a tendency for a few participants to learn the partner's ambient morpheme (see Supplemental Material S1 for individual child performance).

Treatment Responders Versus Nonresponders

Most children (eight children in the individual condition and six children in the group condition) showed at least minimal treatment response to the recast treatment, regardless of their treatment group. As a result, the low number of nonresponders violates the conditions necessary for a formal test of statistical differences (a chi-square test), but the relatively even numbers suggest minimal practical difference.

Long-Term Retention

All children returned for a follow-up measure approximately 8 weeks after the final treatment day (range: 7–10 weeks). The percentage correct morpheme use of target, control, and ambient morphemes in response to obligatory probes is described in Table 3. A two-tailed independent-samples *t* test indicated that the two conditions (individual and group) did not differ in performance on follow-up (retention) on target morpheme, $t(18) = 0.127$, $p = .900$, $d = 0.057$, nor for the control morpheme, $t(18) = 0.410$, $p = .687$, $d = 0.183$. Figure 3 displays the relation between mean end treatment morpheme use and use at follow-up testing for target and ambient morphemes for both conditions (group and individual). Regardless of treatment condition, there was a strong positive correlation between end treatment performance on the target morpheme and long-term retention on the target morpheme, calculated with Spearman's rho ($rho = .600$, $p = .005$). This was true for children in the group condition analyzed alone

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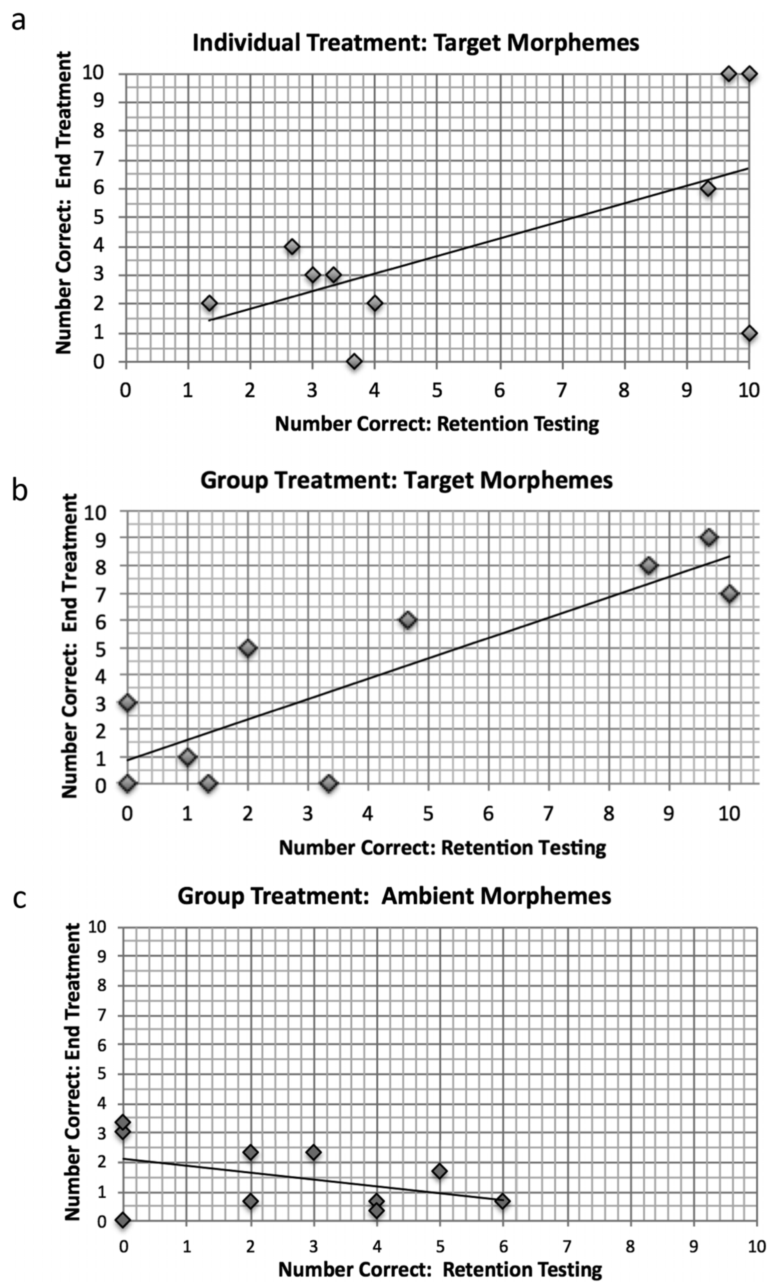
Figure 3. The relationship between mean end treatment use (*y*-axis) and long-term follow-up performance obtained 7–10 weeks posttreatment (*x*-axis): (a) individual treatment condition; (b) group treatment condition, target morphemes; (c) group treatment condition, ambient morphemes.



(*rho* = .751, *p* = .012), but not for children in the individual condition (*rho* = .255, *p* = .478). However, this latter result was largely due to one child who showed strong end treatment performance but little retention (*rho* = .87, without this child).

Discussion

Consistent with other recast studies (Cleave, Becker, Curran, Van Horne, & Fey, 2015), enhanced conversational recast treatment produced significant change on the target morpheme for children with DLD. The improvement on the target morpheme and not on the control or ambient morpheme supports the effectiveness of direct treatment for expressive morphological errors in children with DLD. Generalization occurred on the morphological forms directly treated for each child. With one exception, change did not extend to the control morphemes. For the exception (Child I-4), the target and control forms were linguistically

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related, which may have inadvertently caused carryover from the target to control forms. However, such carryover did not occur for other morphemes that arguably could be seen as linguistically related. The absence of improvement on these additional morphemes demonstrates the need for direct treatment of morphological errors in children with DLD (cf. Plante & Gómez, 2018).

There was no significant difference in the relative effectiveness of treatment when delivered to children individually versus in small groups. This was true for all outcome metrics used. In some of the groups, there was a trend that if one child in the group was successful, then the other was too (see Table 2 for a listing of child pairs). There was an exception to this trend (G-5 vs. G-8). This may reflect the reality that some children were easier to treat within a group than others due to their compatibility and/or tolerance of the group condition.

The findings suggest that treatment efficacy does not necessarily suffer when delivered to children in groups of two compared to children in one-on-one settings. Accordingly, some treatment efficiency can be gained for recast treatment by treating children in groups as opposed to the individual settings that have been studied to date (e.g., Camarata et al., 1994; Leonard et al., 2004, 2006; Meyers-Denman & Plante, 2016; Plante et al., 2014, 2018), given that the treatment sessions were of equal length in both conditions. The findings also parallel those in a large-scale study (Boyle et al., 2009), in which group and individual treatment sessions did not differ in effectiveness, despite difference in treatment methods across conditions. Like this study, that study also used evidence-based treatments, which assured that the base treatment was effective prior to testing it in group versus individual settings.

This study further explored whether children treated in small groups benefitted from recasts provided to the other child in the group. For each group, the target morpheme for one child was also a morpheme that had not been acquired by the other (the ambient morpheme). Each child treated in a group heard recasts for these two different morphemes. In contrast to the significant change on the target morpheme, little change occurred for the ambient morphemes. There was no significant change from the pretreatment use of the ambient morpheme at a group level, and very little change was seen at the individual level. This occurred despite the fact that the dose number and form (24 unique examples per session) were equivalent for both the target and ambient morphemes. There was some indication that performance on ambient morphemes at follow-up was somewhat better than at end treatment, perhaps suggesting longer term growth. However, this also occurred in some cases for the untreated control morphemes. Therefore, these results likely reflect developmental changes that occurred independently of morpheme-specific input each child received during treatment.

The two forms of input (target and ambient) in group treatment differed in two critical aspects. First, an essential component of conversational recasting is the uninterrupted child utterance–adult utterance sequence (Hassink & Leonard, 2010). In this study, the platform utterance for target morpheme was always produced by the child. In contrast, platform utterances for the ambient morphemes were produced by the treatment partner. It may be that expressive attempts by the child during recasting increases the effectiveness of the treatment relative to exposure only to clinician models. Merely hearing the child utterance–adult utterance sequence may not elicit the hypothesized critical cognitive comparison between the platform and recast utterances on the part of the child who simply hears these. If so, clinician models, in the absence of a platform utterance, would not bring about meaningful change in the correct use of the ambient morpheme. If children paired in groups had been assigned the same target morpheme, recasts directed to the treatment partner might have conferred additional benefit beyond recasting alone. However, it may be that the opportunity to attempt use of the morpheme is critical.

Second, another potentially important difference between delivery of the target and ambient morpheme doses is attention. For enhanced conversational recast treatment, input for the target morpheme is directed toward the child and the clinician attempts to elicit that child's attention at the time of the recast. In our group condition, input for the ambient morpheme was directed toward the second child without any attentional demands on the first. Likewise, the child not receiving the recast was not within the clinician's particular focus of attention nor was this child's attention demanded during ambient morpheme recasts. Although this arrangement offers the opportunity for observational learning (Colozzi et al., 2008), the children with DLD did not benefit particularly from ambient exposure to morphemes even though this exposure occurred with the same density and variability as the effective treatment doses for the target morpheme. This suggests the importance of directing the child's attention to the clinician at the time the recast is delivered. This attentional component is one of the factors that differentiates enhanced conversational recasting from other forms of recasting (Meyers-Denman & Plante, 2016). The explicit bids for attention can reduce the "naturalness" of enhanced conversational recasting relative to every day interactions because the flow of the activity is often interrupted briefly by the clinician's attempts to gain the child's attention during the recast. However, the present data indicate that recasting in the general presence of a child is not equivalent to recasting directly to a child who is attending to the recast. The former situation carries no guarantee that the dose delivered in the presence of a child was actually received by that child.

Another potential concern with treatment of children in groups was that the incorrect productions of one child could actually interfere with his or her treatment partner's learning of ambient morphemes. Although clinicians produced correct models of each child's target and ambient morpheme, children also heard many incorrect attempts of the target and ambient morphemes from their treatment partner. This was particularly true during the initial treatment period when accurate use was quite low. Early in treatment, the ratio of incorrect child attempts to correct

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clinician input was as high as 1:1 or 50% incorrect examples, exceeding the 33% that extinguished learning in the Gómez and Lakusta (2004) study. There were three children who showed high performance on their target morpheme midway through the treatment period. These children were using their target morpheme correctly at high rates during the latter part of treatment. However, their treatment partner's end treatment performance on the corresponding ambient morphemes was still poor. This shows that the treatment partner's accuracy was not the only explanation for why ambient morphemes were so poorly learned. In addition, early exposure to ungrammatical examples by the treatment partner may take time to overcome, leaving the child little time to recover from hearing high rates of incorrect examples early in treatment.

It remains unknown whether the ambient exposure to morphemes would make their subsequent treatment more efficient. Experimental work by Leonard and Deevy (2011) showed that children were more likely to produce grammatical forms that dominated in the input. Therefore, it is possible that this prior stimulation for a second form would produce faster learning once the morpheme was subject to treatment. However, counterevidence for this idea comes from an earlier enhanced conversational recast study in which a brief presentation of high-density examples (auditory bombardment) prior to recasting did not boost learning relative to bombardment that followed recasting (Plante et al., 2018). In addition, children appear to learn the conversational recast format over the course of treatment. This includes understanding the role of the clinician's prompts for eliciting an utterance from the child and the need to attend to clinician recasts. This alone may also speed subsequent learning.

It is important to note that the input represented by ambient morpheme presentations differed in important ways from target morphemes in this and our previous studies (Meyers-Denman & Plante, 2016; Plante et al., 2014, 2018). The ambient morphemes were not the most frequent morpheme heard during the session. They occurred as often as target morphemes. This may make the ambient morphemes inherently less salient to the child than they otherwise would be if they were the sole frequently occurring morpheme (Plante & Gómez, 2018). Salience would be further reduced if the child's attention was elsewhere at the time of occurrence.

Conclusion

This early efficacy study compared individual and small group (n = 2) administration of enhanced conversational recast treatment. Unlike previous studies of individual and group treatment, this study compared these two delivery contexts while holding constant the treatment parameters across the two conditions. When delivered consistently, this treatment is effective in both one-on-one settings and small group settings. A major finding of this study was that treatment doses, in this case each clinician recast, were only effective under conditions that included child attempts at morpheme production, recasts that were directed to a specific child, and clinician's demands for that child's active attention at the time of the recast. Although we cannot discern whether expressive practice or active attention was more important in this study, this can be thought of broadly as the difference between recasting to the child versus recasting around the child. This idea is particularly important in group settings, where additional children present multiple opportunities for distraction. It would also apply to recasting in one-on-one sessions while a child's attention is directed toward an activity rather than to the clinician's input.

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