Comparison of Conversational-Recasting and Imitative Procedures for Training Grammatical Structures in Children With Specific Language Impairment

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The recent literature on language intervention has become increasingly focused upon developing treatments that more closely parallel normal language acquisition. However, there have been relatively few reports that directly compare imitative procedures to conversational-interactive interventions. The purpose of the present study was to compare the relative effectiveness of imitative intervention and conversational recast language intervention applied to a wide range of grammatical morpheme and complex sentence targets in 21 children with specific language impairment. The results indicated that although both kinds of treatments were effective in triggering acquisition of most targets, consistently fewer presentations to first spontaneous use were required in the conversational procedure. In addition, the transition from elicited production to generalized spontaneous production was more rapid under conversation-interactive treatment. Finally, although imitation treatment was more effective in generating elicited production, a significantly greater number of spontaneous productions occurred under the conversational training procedures. The theoretical and applied ramifications of these findings are discussed.

KEY WORDS: language disorders, language intervention, naturalistic language training, specific language impairment, language generalization

There have been a number of reports in the recent literature on language intervention advocating a shift from treatments that rely upon imitative prompting and direct reinforcement outside of a naturalistic conversational context to treatments that include procedures that more closely parallel the structures and features the child is likely to encounter outside the clinic setting (e.g., see the review in Fey, 1986; Leonard, 1981; Nelson, 1989; Oswang, Bain, Rosendahl, Oblak, & Smith, 1986; Siegel & Spradlin, 1985; Warren & Kaiser, 1986). However, a number of theoreticians continue to argue that direct imitation is required for target acquisition. For example, Connell (1986, 1987) and Connell and Stone (1992) present theoretical arguments and some experimental results suggesting that imitation procedures are superior to modeling procedures. In a direct comparison of imitation procedures to modelling procedures, Connell (1987) states: "In summary, imitation teaching was shown to be particularly effective with language impaired children and relatively less effective with children learning language normally. From these results, it seems appropriate to suggest that clinicians use imitation as the first step of language teaching programs that teach language rules" (p. 111). Similarly, Connell and Stone (1992) report: "...the children with SLI [specific language impairment] showed very little use of the
morphemes following the modeling instruction and significantly more use following the imitation instruction” (p. 851).

Although Connell (1986, 1987) and Connell and Stone (1992) provide evidence of a relative advantage for the addition of imitative prompts with a model as compared to models delivered without prompts within the training and generalization contexts described therein, it is not clear whether similar results would occur if the imitation-based procedures were compared to procedures that more directly parallel the naturalistic learning context. This is a particularly important open question because for comprehension of new rules (with invented forms), the modeling-without-imitation proved equally effective to imitative training in Connell and Stone and because Ellis-Weismer and Murray-Branch (1989) found similarly symmetrical outcomes for natural language grammatical morpheme production under modeling versus modeling plus elicited production training. Studies and analyses of normal language acquisition (e.g., Cross, 1978; Nelson, 1989) have provided promising clues to the kinds of maternal interaction patterns that are most likely to lead to language learning during mother-child interaction. For example, conversational recasts, wherein the mother follows a child’s production with an utterance that maintains the semantic platform of the child’s sentence with a production that includes some contrasts in semantic, syntactic, and/or morphological structures, have been shown to directly facilitate acquisition of language structures when presented to normally developing children (e.g., Baker & Nelson, 1984; Nelson, 1977; Scherer & Olswang, 1984). Conversational recasts may be particularly well-suited to intervention procedures because they can be monitored directly and because they can be tailored to provide clinician models of specific target structures while reacting to, and following the child’s own productions. Additionally, as noted above, conversational recasts occur relatively frequently in the normal language acquisition setting. One could question this procedure as potentially effective intervention on the grounds that children with specific language impairment are having difficulty acquiring language and are presumably already receiving recasts in their ambient communication environment. However, recent studies of maternal input to children with specific language impairment indicate that mothers provide fewer conversational recasts to these children than to normally developing children at similar language levels (Conti-Ramsden, 1990; McTear & Conti-Ramsden, 1992; Nelson, Welsh, Camarata, Butkovsky, & Camarata, in press).

To be sure, there have been a number of reports comparing imitation procedures to more interactive procedures (Cole & Dale, 1986; Friedman & Friedman, 1980; Lee, Koenigs-knecht, & Mulhern, 1975). However, a number of the procedures described as interactive or naturalistic often incorporate some conversational features while also including an imitative procedural component. For example, the procedures described in Lee et al. include a combination of direct imitation and interactive components. Similarly, in Friedman and Friedman (1980), the conversational-interactive components were part of a hybrid including imitative components, and this hybrid was compared with a strictly imitative procedure. Thus, across studies, there may be varied degrees of similarity between the “naturalistic” and imitative procedures and it is therefore not surprising that comparisons of the two approaches have often yielded no statistically significant differences or inconsistent findings (e.g., Cole & Dale, 1986; Friedman & Friedman, 1980).

Although Connell (1987) and Connell and Stone (1992) concluded that children with language impairment do not learn in the same manner as children without language impairments, Camarata and Nelson (1992) reported that children with specific language impairments learned a number of morphological and syntactic targets under conversational recast procedures developed and tested on children acquiring language normally (cf. Baker & Nelson, 1984; Nelson, 1989). Moreover, Camarata and Nelson found that learning was more rapid for the conversational recasting than for imitative training even though the conversational recast training included no imitative prompts whatsoever. However, this study included only 4 subjects and relatively few language goals. Fey, Cleave, Long, and Hughes (1993) also provide evidence that parents and clinicians trained to use multicomponent procedures incorporating target-specific recasting and other conversational elements can have significant impact on the children’s progress on global measures of language growth, but this research does not address the relative contribution of imitative and recasting procedures to progress in acquiring specific morphosyntactic targets. The current investigation was designed to replicate and expand on the Camarata and Nelson study by directly comparing imitative procedures to conversational recast training, but in a relatively large sample of children with specific language impairment and over a relatively large variety of morphological and syntactic structures. The purpose of the study was to compare conversational recast training to direct imitation in terms of the relative effectiveness of these procedures in generating spontaneous production of language goals. Unlike previous comparisons, the conversation-oriented procedures did not include direct imitation of language targets.

Method

Subjects

The subjects included 21 children, 1 female and 20 males. These children were identified as specifically language impaired by meeting all of the following criteria (adapted from Stark & Tallal, 1981): (a) expressive language skills were a minimum of one and one-half standard deviations below the mean on one or more expressive subtests of the Test of Language Development 2-Primary (TOLD2-P; Newcomer & Hammill, 1988) and below expected levels on spontaneous language samples gathered with the mother; (b) passing an audiometric screening prior to the onset of testing and training (25dBA @ 500, 1,000, 2,000, & 4,000 Hz) (Goodman, 1965); (c) performance within the normal range on the Leiter International Performance Scale (Arthur, 1952); (d) no reported history of frank neurological trauma or impairment; and (e) no reported history of psychological disorders or...
emotional disturbance. In addition, in order to determine each child's receptive language skills, comprehension was assessed using the revised Test for the Auditory Comprehension of Language (TACL-R) (Carrow-Woelk, 1985) or the Listening Quotient from the TOLD2-P. However, comprehension level was not used to exclude participants. A majority of the participants were within the normal range of performance on the comprehension assessment, indicating primarily expressive deficits in the participants. Subject information is presented in Table 1.

**Target Selection**

Samples of mother-child conversation in free play were taken once at the child's home and once in the clinic setting prior to onset of treatment. Two additional such samples in the child's home were obtained at the midpoint of treatment and after completion of treatment. Transcriptions of these samples following the procedures of Miller (1981) were used as the basis for calculating MLU for the children and for determining the children's use of syntactic structures before and after intervention in their conversations with their mothers. Each language sample included a minimum of 100 spontaneous productions gathered from each subject. Targets for training had to be absent from the preintervention sample, and for grammatical morphemes, must have been attempted a minimum of three times but produced incorrectly in these samples to be included. Also, any forms that were absent from the spontaneous samples were probed using elicitation procedures to ensure that they were indeed absent from the child's system. These probes were similar to the dynamic assessment procedures presented by Olswang, Bain, and Johnson (1992): grammatical morphemes were probed using a cloze procedure whereas complex sentences were probed using a combination of elicitation questions and indirect modelling (see Table 1 in Olswang et al., 1992, p. 203). All developmentally appropriate targets (i.e., below those expected at the child's age level) were probed, and missed, a minimum of five times with this procedure in order to be included in the training procedures. Actual targets included grammatical morphemes and complex sentence structures that met the above criteria. In addition, in order to provide control of developmental level, the targets included in training for any individual child were not more than one of Brown's stages (Miller, 1981) apart from one another. To further enhance experimental control, the targets that met the above criteria were randomly assigned to either of the training conditions. Actual targets for each subject are presented in Table 2.

**TABLE 1. Subject characteristics.**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Sex</th>
<th>AGE (Y:M)</th>
<th>MLU</th>
<th>Expected MLU</th>
<th>Deviation score</th>
<th>Receptive language</th>
<th>TOLD2-P expressive</th>
<th>Leiter IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>6:0</td>
<td>3.75</td>
<td>6.87</td>
<td>(-2.12)</td>
<td>-0.05</td>
<td>7 (78)</td>
<td>93</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>5:5</td>
<td>4.16</td>
<td>6.15</td>
<td>(-1.54)</td>
<td>-0.10</td>
<td>3 (48)</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>4:4</td>
<td>3.41</td>
<td>4.81</td>
<td>(-1.37)</td>
<td>0.00</td>
<td>6 (70)</td>
<td>110</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>6:7</td>
<td>5.73</td>
<td>7.59</td>
<td>(-1.18)</td>
<td>0.50</td>
<td>6 (70)</td>
<td>116</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>4:1</td>
<td>3.75</td>
<td>4.50</td>
<td>(-.78)</td>
<td>0.74</td>
<td>4 (55)</td>
<td>96</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>5:0</td>
<td>4.68</td>
<td>5.63</td>
<td>(-.80)</td>
<td>0.68</td>
<td>6 (70)</td>
<td>120</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>6:10</td>
<td>4.93</td>
<td>7.90</td>
<td>(-1.20)</td>
<td>0.92</td>
<td>7 (78)</td>
<td>92</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>5:1</td>
<td>6.25</td>
<td>7.68</td>
<td>(+.43)</td>
<td>1.48</td>
<td>6 (70)</td>
<td>103</td>
</tr>
<tr>
<td>9</td>
<td>M</td>
<td>6:6</td>
<td>5.75</td>
<td>7.48</td>
<td>(-1.12)</td>
<td>-0.85</td>
<td>7 (78)</td>
<td>95</td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>5:0</td>
<td>4.18</td>
<td>5.83</td>
<td>(-1.22)</td>
<td>1.00</td>
<td>7 (78)</td>
<td>125</td>
</tr>
<tr>
<td>11</td>
<td>M</td>
<td>4:0</td>
<td>2.27</td>
<td>4.40</td>
<td>(-2.26)</td>
<td>-0.25</td>
<td>3 (48)</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>M</td>
<td>4:6</td>
<td>3.49</td>
<td>5.02</td>
<td>(-1.44)</td>
<td>0.31</td>
<td>5 (63)</td>
<td>110</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>5:7</td>
<td>5.67</td>
<td>6.35</td>
<td>(-.63)</td>
<td>0.08</td>
<td>6 (70)</td>
<td>116</td>
</tr>
<tr>
<td>14</td>
<td>M</td>
<td>5:10</td>
<td>3.34</td>
<td>6.66</td>
<td>(-2.40)</td>
<td>0.25</td>
<td>2 (40)</td>
<td>100</td>
</tr>
<tr>
<td>15</td>
<td>M</td>
<td>6:5</td>
<td>3.25</td>
<td>7.38</td>
<td>(-2.69)</td>
<td>-2.05</td>
<td>4 (55)</td>
<td>119</td>
</tr>
<tr>
<td>16</td>
<td>M</td>
<td>4:7</td>
<td>2.78</td>
<td>5.12</td>
<td>(-2.17)</td>
<td>0.41</td>
<td>3 (48)</td>
<td>96</td>
</tr>
<tr>
<td>17</td>
<td>M</td>
<td>4:9</td>
<td>4.10</td>
<td>4.40</td>
<td>(-.33)</td>
<td>1.00</td>
<td>6 (70)</td>
<td>120</td>
</tr>
<tr>
<td>18</td>
<td>M</td>
<td>4:9</td>
<td>3.13</td>
<td>3.32</td>
<td>(-1.96)</td>
<td>0.31</td>
<td>3 (48)</td>
<td>100</td>
</tr>
<tr>
<td>19</td>
<td>M</td>
<td>6:7</td>
<td>4.78</td>
<td>7.39</td>
<td>(-1.73)</td>
<td>-1.18</td>
<td>5 (63)</td>
<td>91</td>
</tr>
<tr>
<td>20</td>
<td>M</td>
<td>4:2</td>
<td>2.86</td>
<td>4.60</td>
<td>(-1.78)</td>
<td>-0.33</td>
<td>4 (55)</td>
<td>87</td>
</tr>
<tr>
<td>21</td>
<td>M</td>
<td>4:0</td>
<td>4.87</td>
<td>4.40</td>
<td>(+.50)</td>
<td>0.40</td>
<td>6 (70)</td>
<td>107</td>
</tr>
</tbody>
</table>

1 The Expected MLU and deviation scores were derived using the prediction equations for MLU and for SD in Miller (1981) or from Leadholm and Miller (1992) for those children older than 60 months. Deviation was computed using the equation:

\[
\text{MLU - Expected MLU} / \text{Standard Deviation}
\]

2 The receptive score is from the TACL-R or the TOLD2-P Listening Quotient and is presented in z scores, with a mean of 0 and a standard deviation of 1 in the normal population.

3 The expressive score represents the lower of the sentence imitation or the grammatical completion subtest of the TOLD2-P. The number in parentheses is the equivalent quotient for the standard score. For this quotient, M = 100, SD = 15 for the normal population.

4 Although this MLU fell within the expected range, this was primarily due to a relatively high number of phrases appearing in the sample that were joined using the conjunction "and." The standardized testing and the structural analyses were consistent with a diagnosis of specific language impairment.
### TABLE 2. Targets assigned to each subject.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Conversation treatment</th>
<th>Imitation treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Let's/Let us complex S</td>
<td>Possessive</td>
</tr>
<tr>
<td>2</td>
<td>Relative clause</td>
<td>Conjunction</td>
</tr>
<tr>
<td>3</td>
<td>Gerund</td>
<td>Auxiliary are</td>
</tr>
<tr>
<td>4</td>
<td>Passive</td>
<td>Relative clause</td>
</tr>
<tr>
<td>5</td>
<td>Propositional complement</td>
<td>Modal</td>
</tr>
<tr>
<td>6</td>
<td>Infinitive</td>
<td>Infinitive with different subjects</td>
</tr>
<tr>
<td>7</td>
<td>Modal</td>
<td>Passive</td>
</tr>
<tr>
<td>8</td>
<td>Relative clause</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>9</td>
<td>Wh questions</td>
<td>Passive</td>
</tr>
<tr>
<td>10</td>
<td>Modal</td>
<td>Passive</td>
</tr>
<tr>
<td>11</td>
<td>Auxiliary</td>
<td>Third person singular</td>
</tr>
<tr>
<td>12</td>
<td>Auxiliary</td>
<td>Auxiliary</td>
</tr>
<tr>
<td>13</td>
<td>Stage IV negation</td>
<td>Past copula</td>
</tr>
<tr>
<td>14</td>
<td>Auxiliary</td>
<td>Relative clause</td>
</tr>
<tr>
<td>15</td>
<td>Stage IV wh questions</td>
<td>Past auxiliary</td>
</tr>
<tr>
<td>16</td>
<td>Stage IV negation</td>
<td>Copula</td>
</tr>
<tr>
<td>17</td>
<td>Third person singular</td>
<td>Wh-infinitive</td>
</tr>
<tr>
<td>18</td>
<td>Relative clause</td>
<td>Passive</td>
</tr>
<tr>
<td>19</td>
<td>Third person singular</td>
<td>Infinitive with different subjects</td>
</tr>
<tr>
<td>20</td>
<td>Wh-noninfinitive</td>
<td>Wh infinitive</td>
</tr>
<tr>
<td>21</td>
<td>Irregular third person</td>
<td></td>
</tr>
</tbody>
</table>

### Training Procedures

The training procedures included imitation-based and conversation-based conditions. The details of these procedures, including setting, activities, and reliability, are provided below.

**Imitative training.** The imitative procedures were similar to those used in a program such as the Monterey Language Program (Gray & Ryan, 1973), and by Connell and Stone (1992) within their model plus prompt procedure. In the present imitative condition, the child was required to imitate the target following a clinician model and prompt. The model and prompt were paired with an appropriate picture or object stimulus and verbal and/or token reinforcers were delivered following correct responses. After the child reached criterion for this level (90% correct for the target: 18/20 responses), the clinician model was faded. After the child reached the 90% criterion without the model or the prompt (that is, with only the stimulus items), a transfer phase was initiated wherein the clinician would engage the child in structured activities and deliver appropriate models, imitative prompts, and reinforcers while providing varied new stimulus items in a more interactive context. These prompts and reinforcers were faded after the child again reached the 90% criterion.

**Conversational training.** The conversational activities were derived from the theoretical perspectives of Nelson (1977, 1989) and directly replicated the procedures presented in Camarata and Nelson (1992). In this condition, the clinician structured the setting (see below) in a manner designed indirectly to elicit child attempts of the target. For example, when the present progressive was targeted, the setting would include toys such as cars, movable figures, trains, baby carriages, and other objects that are likely to be used for ongoing play activities. These play activities included naturalistic interaction between the child and clinician and could include open-ended statements by the clinician to encourage the child to vocalize (e.g., “Tell me about these toys,” “Tell me what happened,” etc., see Miller, 1982, pp. 9-12). However, no imitative prompts or overt reinforcers were delivered within this condition. Following a child production that omitted the target, the clinician delivered a “growth recast” (Nelson, 1989) that included the target incorporated in a reply that recast basic semantic information from the child’s utterance.

As an example, assume that the target for a child is the auxiliary form, that the setting has included items such as those described above for the present progressive, and that the child has said “Car going.” In response, the clinician would deliver a growth recast: “Yes, the car is going.” If the child said “cars going,” the clinician would respond: “Yes, the cars are going.” Complex sentences treated under this condition were presented using similar procedures. The training context was constructed to elicit attempts or to support production by the child. For example, the context for relative clause training included several items that were similar in many dimensions, but different with regard to minor details (e.g., Fisher-Price figures that were similar in terms of gender, but different with regard to attire, such as wearing hats, color of clothes, wearing scarves, etc.). While playing with these figures, the child would often comment on the activities of the figures, which the clinician would use as a platform for the recast. For example, if the child was playing with two figures (one with a hat, one without) and commented, “the woman is going into the house,” the clinician recast would include the relative clause form, “the woman who’s wearing a hat is going into the house.”

For the grammatical morphemes and for the complex sentences, the recast retains the semantic base of the child’s core utterance while providing a model of the target form. Within this kind of presentation it is likely that the child is attending to the context (because the child initiates the interaction and provides the sentence that serves as the
base for the adult recasts). The recast thus provides a direct contrast to the child's own sentence structure that is likely to be processable because it is also directly contiguous to and similar to the child's production. Given that all targets studied were absent before intervention, all the recasts for each child met the definition for "growth" recasts by providing structural challenges to the child's preintervention language system.

**Settings and Transcriptions.**

Two 50-minute language treatment sessions were completed each week for 12 weeks in a 2.5 x 3.0 m. clinic room. This room contained a small table and chairs and decorations appropriate for children. All sessions were recorded on color videotape. Each session was divided equally between the imitative treatment and the conversational recasting treatment with order counterbalanced across sessions. As above, a recast was defined as a clinician response to a child's production that provided the target structure while maintaining the central semantic information of the child's sentence.

The children's use of any intervention targets and clinicians' presentations of target forms was coded from the videotapes of the sessions. Clinician presentations under both treatments were defined as any clinician production of the target structures. Additional clinician behaviors coded were: requesting imitation, prompting production, delivering recasts, and providing verbal or token reinforcers.

Child productions of the intervention targets were defined as any correct uses of the targets. These productions were subclassified as either elicited or spontaneous. Elicited productions included not only directly prompted or requested correct imitations but also any target use that appeared during that portion of the session when that specific form was targeted. For example, if the clinician were targeting relative clauses, any production of a relative clause (e.g., "the truck targeted. For example, if the clinician were targeting relative during that portion of the session when that specific form was subclassified as either elicited or spontaneous.

Child's correct target use outside the specific treatment time for that target and thus without influence of a combination of target elicitors (adult productions, target-relevant materials, and in the imitative procedure, prompts and reinforcers). Further, to be classified as a spontaneous production, the target had to be used with stems/words different from those in training and could not immediately follow any incidental production of the target by the child's mother or by a clinician. Thus, the criterion set for spontaneous use in this investigation requires child target production with stronger generalization and less supportive familiar context and materials than spontaneous use as defined in most studies of language treatment for children with specific language impairment, or other children with language delays (cf. discussion by Kaiser, Yoder, & Keetz, 1992).

Direct comparisons of independently prepared transcripts for 10 of the language sampling sessions indicated that interobserver agreement for target selection (i.e., identifying a target as absent) was 92%. Comparisons of independently transcribed analyses of 30 treatment sessions were also completed. Interobserver agreement for child target production (including all morphological and syntactic targets included in the treatment sessions) was 89%, whereas agreement for identifying clinician presentations (including prompts, presentations, and recasts) was 98%.

**Results**

The 21 subjects used spontaneously a total of 33 of the targets, including 17 under imitation treatment and 16 under conversation treatment. Because 2 of the subjects acquired neither target, these 33 targets were distributed over 19 subjects. Fourteen of the subjects acquired targets under both conditions whereas 3 acquired only the imitation target and 2 acquired only the conversation target.

Treatments were compared with regard to the number of clinician target presentations that occurred prior to the first elicited production and the first spontaneous use of the target (as in Camarata & Nelson, 1992). In conversation-based treatment, subjects required a mean of 31.1 presentations (SD = 36.7) to achieve elicited production and a mean of 63.6 presentations (SD = 79.0) to produce targets spontaneously. For imitation treatment, elicited productions were observed following a mean of 2.2 clinician presentations (SD = 2.1), whereas spontaneous production was observed following a mean of 150.7 clinician presentations (SD = 84.3). These means were compared using a two-way Analysis of Variance (Winer, 1971). The main effect for treatment type (conversation vs. imitation) was not significant \( F(1,31) = 3.63; p > .05 \), whereas the main effect for condition (elicited vs. spontaneous) was significant \( F(1,31) = 40.38; p < .001 \). Additionally, the analysis revealed a significant interaction effect for treatment by condition \( F(1,31) = 15.94; p < .001 \). The significant interaction effect indicates that fewer clinician presentations were required to generate spontaneous productions under the conversation-based treatment than the imitative-based treatment, but that elicited productions were generated much more rapidly under the imitation treatment than under conversation. This result is presented in Figure 1.

In addition, a two-way ANOVA was completed in order to compare the number of treatment sessions that elapsed prior to spontaneous use and prior to elicited use under each treatment condition. In conversation-based treatment, subjects required a mean of 2.6 sessions (SD = 2.2) to achieve elicited production and a mean of 3.1 sessions (SD = 2.5) to produce targets spontaneously. For imitation treatment, elicited productions were observed following a mean of 1.0 sessions (SD = 0.0) (all subjects displayed elicited production within the first session), whereas spontaneous production was observed following a mean of 5.4 sessions (SD = 2.8). The results of the ANOVA indicated that significantly fewer sessions \( F(1,38) = 4.84; p < .05 \) were required for spontaneous production within conversation-based treatment than for imitation treatment. Conversely, fewer sessions \( F(1,38) = 10.43; p < .05 \) were required to generate elicited production within imitation as compared to conversation recast procedures.
There also were differences in the treatments with regard to the total number of spontaneous productions and the total number of elicited productions. A two-way analysis of variance yielded a main effect for treatment \(F(1,31) = 52.2, p < .001\) and for condition \(F(1,31) = 75.2, p < .001\) and a significant treatment by condition interaction \(F(1,31) = 63.3, p < .001\). The significant main effects indicate that there was a significantly greater number of overall productions and a greater number of elicited productions under imitation treatment. The significant interaction effect indicates that a greater number of spontaneous productions were observed under the conversational treatment \((M = 16.4, SD = 23.8)\) as compared to the imitative treatment \((M = 5.5, SD = 8.0)\), but a significantly higher number of elicited productions under the imitative treatment \((M = 230.9, SD = 126.9)\) as compared to the conversational treatment \((M = 19.6, SD = 24.3)\). These results are presented in Figure 2.

**Discussion**

The results indicated that fewer clinician presentations were required for spontaneous use of the targets under conversational-recasting treatment. Additionally, the children's total spontaneous productions were higher using this treatment. However, when examining elicited production, imitative treatment led to a greater number of child productions with fewer clinician presentations. These results are consistent in two key respects with the theoretical philosophies underlying the treatments. First, imitation-based approaches are designed to generate a larger number of productions under considerable control by the clinician in the hope that such production will then ultimately lead to spontaneous use (see the discussion in Fey, 1986). Second, the conversational recast training evaluated herein does not directly aim for elicited productions of targets; rather, the focus of training is to provide contextually and conversationally relevant clinician models in the expectation that such presentations in the form of growth recasts will rapidly generate successful analysis and spontaneous production of new language structures by the child (cf. Camarata & Nelson, 1992, and the review in Nelson, 1989).

The findings herein support this latter model because the children with specific language impairment acquired the conversational recast targets with fewer clinician presentations and much fewer elicited productions and used these targets more frequently in spontaneous production. An explanation for this effect, as seen in the present investigation and the earlier reports by Camarata and Nelson (1992) and Nelson, Camarata et al. (1994) is warranted. One factor that may account, at least in part, for this effect is that embedding targets in ongoing conversation bypasses the inherent problem of generalization from nonconversational contexts and reinforcers to actual conversation (cf. Fey, 1986; Leonard, 1981; Siegel & Spradlin, 1985). In addition, the conversational approach applied herein specifically incorporates additional relevant factors that are designed to increase the likelihood that the child will learn the targets: selection of targets known to be a challenge to the individual's language growth at the time of intervention, incorporation of the child's central semantic information from an immediately preceding utterance into a growth recast, and a total absence of requests for imitation or direct prompts that may be disruptive to the conversational context. This combination of factors may enable children to directly contrast their existing imma-

![Figure 1. Mean number of clinician presentations required for elicited and spontaneous target production under each treatment.](image-url)
ture form with the immediately presented correct (adult) form and allow for a comparison that can ultimately be stored in long-term memory. And, because this contrast is made precisely in those contexts wherein the child is likely to use the target structures in the future (i.e., natural conversation), similar events arising in the future (calling for similar child productions) are then more likely to result in correct target use as the situation also provides contextual support for recalling the correct form that has been stored in long-term memory. Theoretical discussions addressing such multiple factors in the child's encoding and retrieval of new language structures have included the rare event cognitive comparison model (Nelson, 1989) and the cognitive "competition" model (Bates & MacWhinney, 1989).

Relative to the children's higher levels of generalized spontaneous production within the conversational-recasting condition, the difficulty in generating generalized production under direct imitation arises from at least two perspectives. First, from a cognitive-linguistic perspective, the kind of learning resulting from imitation may be rather narrow in scope because productions are evoked under tightly controlled conditions. Connell (1987) argues persuasively that language intervention should be motivated by training that illustrates linguistic regularities and induces child acquisition that extends beyond the specific training exemplars for grammatical forms. The current results suggest that although imitation training procedures may result in a surface level ofrote learning, this learning is impoverished in terms of the broader linguistic knowledge required for more generalized spontaneous production of natural language targets (see the comments in Connell, 1987 regarding the need for deep linguistic knowledge). Second, from a traditional behavioral perspective, it may be that the results are attributable to the mismatch in the learning task and the actual production task within spontaneous conversation. In the imitative training contexts, the child is actually learning to produce the targets with a high degree of efficiency (as the high numbers of elicited productions would suggest), but the training context that evokes this production does not parallel conversation context sufficiently for generalization to occur. Within the conversational-recasting condition, the context for comparing the child's current immature linguistic representations to the new targets and inducing the child to transfer relevant information from such comparisons to long-term memory is more important than simply generating large numbers of target productions.

The importance of target selection and training context is also illustrated when comparing the results herein with recent comparisons of language interventions (e.g., Connell, 1986; Connell & Stone, 1992; Fey et al., 1993). The results herein are congruent with those of Fey et al. as they reported an increase in language skills was associated with parent training designed to increase recasting skills. Although Fey et al. used more global measures of language rather than tracking individual language targets as was completed herein, both studies suggest that recasting can be effective in generating language growth. Conversely, at first glance, it would appear that our findings are in contrast with research on SLI children by Connell and Stone (1992), who reported a consistent advantage for production of an experimenter-constructed (rather than natural language) grammatical morpheme when an imitative prompt was delivered as compared to experimental modelling without a prompt. Because the current study also compared imitative prompting to clinician models.
(recasts) without prompts, but with the opposite outcome, further discussion and comparison to the Connell and Stone report is warranted beyond the fundamental contrast between invented targets and natural language targets and beyond the difference in grammatical targets (i.e., both studies included grammatical morphemes, but the current study also included complex sentence structures as targets).

In addition to the aforementioned differences, the Connell and Stone (1992) experiment differed from the current one in several additional respects that may account for the divergent target production outcomes. First, a crucial component in the conversational recast training from a theoretical standpoint is the delivery of the clinician model immediately after the child has attempted the target within an appropriate communication context. In the Connell and Stone procedure, the targets were modelled using a computer training paradigm without including either an appropriate conversational context (the context was a graphic display of a ghost engaging in the activity depicting the grammatical morpheme) or an opportunity for modelling immediately following the child’s incorrect attempt of the target. Thus, in Connell and Stone, the focus was on comparing identical modelling procedures that varied only with regard to whether a prompt was delivered following the model. In the present study, the contrasting interventions differed not only with regard to whether a prompt was delivered (imitative training included prompts, conversational treatment did not), but also differed in terms of the feedback, reinforcers, and context of the training, dimensions that were not systematically varied in the Connell and Stone study.

Finally, in the current study, we found that delivery of imitative prompts often produced an "elicitation learning set" wherein the children would subsequently imitate the targets, without additional direct imitative prompting, when similar training materials were presented. Precisely this kind of effect may also account for the Connell and Stone (1992) results. The dependent measures of target production in that study were gathered using procedures that were similar to the training task, and thus likely to generate productions that would have been defined as elicited rather than spontaneous within the current study. Recall that elicited production was very rapidly achieved under imitation training within the present study: All subjects correctly produced the targets during the first session. Further support for this interpretation is seen in the Connell and Stone finding of an order effect within their results, indicating that the subjects were much more likely to produce the targets in the unprompted modelling condition if the prompted imitation condition was presented previously. This parallels our observation that imitative training resulted in high levels of subsequent elicited production even after imitative prompts were faded. Thus, Connell and Stone were possibly measuring a form of elicited production that was quite similar to the elicited production in the current study so that the results of the two studies may in fact be convergent rather than divergent: Both studies appear to demonstrate that imitative training (with prompting) promotes high levels of elicited production.

In previous studies comparing imitation- and conversation-based treatments, a number of authors have reported a “treatment by developmental level” interaction effect, wherein subjects at one developmental (language) level perform better within one treatment condition whereas children at a different level perform better within a contrasting condition. For example, Friedman and Friedman (1980) found that higher functioning children learned more efficiently under a hybrid training approach that included imitative and interactive components, whereas lower functioning children learned more efficiently under imitation training similar to that in the current study. In this case “hybrid condition” was defined as including imitation and conversation procedures within training (see the discussion in Fey, 1986, chapter 10). Yoder, Kaiser, and Alpert (1991) also reported a treatment by level interaction effect, but with the opposite outcome: Children at higher developmental levels performed better within the imitation training whereas the lower functioning children performed better within milieu training, which includes conversation/interactive components in addition to imitative procedures. Thus, milieu training (Kaiser et al. 1992) is similar to the hybrid treatment employed by Friedman and Friedman: It includes imitative prompts for specific targets while the clinician engages the child in play activities. Although the current study was not designed to evaluate the question of developmental level by treatment interaction effects, the children herein were at relatively high developmental levels (Brown Stages III & IV; Miller, 1981) and performed significantly better within the conversation-based training, a finding in apparent conflict with the report of Yoder et al. and in apparent agreement with the report of Friedman and Friedman. Several factors may account for this. First, Yoder et al. included children with developmental delays whereas Friedman and Friedman and the current study included children with specific language impairment. Thus, many of the differences among the studies may simply be attributable to differences among the subject groups. Also, although there is some overlap, the targets herein generally were more advanced than the targets trained in the higher functioning group in the Yoder et al. study, so that differences in the studies may also be due to differences in the target levels. Finally, the treatment procedures for the imitative conditions and for the more interactive treatments were not identical across studies. However, the results suggest a need to examine the relative effectiveness of specific treatment procedures across developmental levels.

The results of the current study are promising in that the targets were acquired quite rapidly and generalized quickly to spontaneous production under conversational training. Although direct comparisons with studies appearing in the literature are difficult because many of these studies employ gain scores on standardized tests rather than individual target acquisition (e.g., Cole & Dale, 1986), this speed of acquisition herein is more rapid than is typically reported in the literature (cf. Ellis Weismer & Murray-Branch, 1989). In addition, promise of effective conversational treatment for other SLI children is indicated by the achievement in this study of generalized spontaneous use of grammatical morphemes and complex sentence structures absent in pre-intervention sampling with a relatively short lag between elicited production and generalization to spontaneous samples.
As noted briefly above, one possible source of difficulty in going from imitative training contexts to varied everyday conversational context for spontaneous production of trained targets is that immediate production demands during training may interfere with multiple aspects of the processing needed for encoding and integrating a new structure into the child's linguistic system. Despite the arguments (e.g., Connell & Stone, 1992) that SLI children may be unable to learn new language targets in treatments that exclude an imitative component, the results herein and in similar studies (e.g., Cole & Dale, 1986; Fey et al. 1993) indicate that a variety of treatments without imitation can be effective in supporting induction of new structures. Similarly, comprehension success by the SLI children given modeling without imitation lead Connell and Stone (1992) to conclude that differences in children with specific language impairment (as compared to nonimpaired control subjects) in responding to modeling versus modeling-plus-imitation treatments in earlier reports “is not due to general differences in rule-induction, as was assumed in earlier work. Instead, the effect relates specifically to production of the new morpheme” (p. 851). This latter conclusion fits well with the results of the present study in suggesting that there are multiple contextual factors that can support successful production of trained language structures even though a child’s linguistic representations have not advanced sufficiently to support production spontaneously in unprompted, everyday conversations concerning materials and topics that are very different from those used in training. The present study and two closely related studies (Camarata & Nelson, 1992; Nelson et al. 1994) are consistent with the additional hypothesis that a heavy emphasis on prompted, imitative production during training may limit the opportunities for extended target processing that contribute to efficient establishment of well-consolidated long-term representations of newly induced language structures. At the same time, some SLI children might learn with high efficiency if some episodes in treatment carried the conversational advantages for processing and integrating targets whereas other episodes include prompting and imitation to increase target salience and give practice in elicited production. This kind of “hybrid” effect is claimed by Fey et al. (1993), with the qualification that only future research can determine what components of training contribute to which aspects of target learning and generalization.

There are several limitations in this study that should be considered when interpreting the results and when completing future studies. First, analyses were completed on all targets that had been acquired by the subjects by the end of the treatment series, but no detailed information was yielded for the targets that were not produced spontaneously following treatment. Additionally, the paradigm employed herein included application of both treatments (on different targets) within each session. Although the results indicate differences in treatment efficacy even within this constraint, future studies could be completed to isolate the treatments by applying each condition within alternating sessions or with even longer separations between treatment types. Finally, 3 subjects acquired targets only under imitation training whereas 3 learned only under conversation training. Although the design of the study may account for this finding (e.g., possible limitations in sampling opportunities across goals and/or inherent differences in goal difficulty assigned randomly within these particular subjects) this raises the interesting possibility of individual differences in learning styles within the language-impaired population. Ferguson (1989) has discussed the importance of evaluating individual differences during normal language acquisition, and further evaluation of such individual differences is needed for children with language impairments as well (see Cole, Dale, & Mills, 1991; Fey, 1986; Nelson, 1989).

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