Using the Natural Language Paradigm (NLP) to increase vocalizations of older adults with cognitive impairments

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Abstract

The Natural Language Paradigm (NLP) has proven effective in increasing spontaneous verbalizations for children with autism. This study investigated the use of NLP with older adults with cognitive impairments served at a leisure-based adult day program for seniors. Three individuals with limited spontaneous use of functional language participated in a multiple baseline design across participants. Data were collected on appropriate and inappropriate vocalizations with appropriate vocalizations coded as prompted or unprompted during baseline and treatment sessions. All participants experienced increases in appropriate speech during NLP with variable response patterns. Additionally, the two participants with substantial inappropriate vocalizations showed decreases in inappropriate speech. Implications for intervention in day programs are discussed.

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The Natural Language Paradigm (NLP) is a leisure-based behavioral intervention developed by Koegel, O'Dell, and Koegel (1987) to increase the language of non-verbal children with autism. The procedure incorporates many strategies for promoting generalization described by Stokes and Baer (1977) including teaching in natural contexts, incorporating naturally occurring stimuli (e.g., leisure items, people) and using multiple exemplars during training. An explicit goal of NLP is enhancing learner motivation (i.e., willingness to participate in instruction,
responsiveness to social and environmental stimuli, positive affect) (Koegel, Koegel, Harrower, & Carter, 1999). Motivation is enhanced by using a loose shaping criterion to increase the probability of reinforcement during early language attempts and by incorporating choice and learner-initiated activities (Charlop-Christy, LeBlanc, & Carpenter, 1999; Koegel et al., 1999; Koegel, Koegel, & Surratt, 1992).

Several studies have found NLP effective for teaching language to children with autism (Camarata, 1996; Koegel, Camarata, Koegel, Ben-Tall, & Smith 1998; Koegel, Koegel, & Carter, 1998; Koegel et al., 1987; Laski, Charlop, & Schreibman, 1988) even with children for whom traditional vocal imitation training proved ineffective. Laski et al. (1988) trained parents to implement NLP with their children with autism with resulting increases in generalized speech. Parents found the intervention enjoyable and thought their children enjoyed it as well. Importantly, parents did not need to implement the procedures perfectly for them to be effective.

NLP may prove appealing for other populations with language impairments because of the use of preferred stimuli delivered contingent upon vocalizations and the ease of implementation in natural contexts (Charlop-Christy et al., 1999). To date, no researcher has investigated the use of NLP with older adults with cognitive impairments, though cognitive decline is often accompanied by decreases in language (Dijkstra, Bourgeois, Allen, & Burgio, 2004). Though few studies in behavioral gerontology have directly targeted conversational skills, an exception is Bourgeois (1993) who found that photographic memory aid books resulted in increased on-topic statements for individuals with dementia. Additional interventions in this area are needed. NLP may prove particularly appropriate for leisure-based day programs for older adults because the intervention is designed to incorporate preferred leisure activities. This study evaluated the effects of NLP on the speech of three adults with cognitive impairments and limited functional language.

1. **Method**

1.1. **Setting and participants**

The study was conducted at a leisure-based day program for older adults with cognitive and physical impairments (i.e., mental retardation, dementia, stroke, traumatic brain injury) designed to provide leisure activities, medical services and respite for primary care providers. The program had an average staffing of three to four participants to one staff member. Group activities were scheduled daily and various individual activities were available daily but unscheduled. As in most elder care facilities, staff typically initiated a social interaction by attempting casual conversation in the form of a social question or a statement about the weather or recent events. These initiations proved useful with most clients at the program, but were ineffective with certain individuals. Staff nominated three individuals who consistently exhibited little or no appropriate language during interaction attempts. Each had a prior diagnosis of mental retardation and had experienced a substantial adaptive and cognitive decline in later middle age consistent with early onset dementia prior to admission to the current program.

Lucy was a 54-year-old female with Down Syndrome and severe to profound mental retardation. She demonstrated negligible verbal communication, limited gestures and was described by her caseworkers and family member as having never really talked since birth. She made infrequent echoic responses, but in the years before she began attending the adult day care program, she became progressively more withdrawn and spoke less, consistent with behavioral indicators of dementia in adults with Down Syndrome (Orange & Zanon, 2006). Pam was a
57-year-old female with profound mental retardation and a seizure disorder. She had some echolalia and communicated using very few requests and labels. Part of her documented decline was decreased language production. Patsy was a 56-year-old female with moderate mental retardation, bipolar disorder and dementia. She had some echolalia and high levels of bizarre and inappropriate speech. Part of her documented decline was decreased language production and decreased coherence in spoken language. Standardized testing with the Mini Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975), a common screen for cognitive status, was attempted with the highest functioning individual (Patsy). She was unresponsive to all questions (e.g., responded by screaming or by making an irrelevant statement, such as “bathroom”) and scored 0 on the MMSE.

All experimental activities were conducted in a 10’ × 15’ room away from the main activities area one to two times per day, two to four times per week. Baseline and NLP sessions were approximately 10 min in duration. Experimental control was evaluated using a multiple baseline design across participants.

1.2. Procedures

1.2.1. Preference assessments

The Pleasant Events Schedule—Alzheimer’s Dementia (PES-AD; Teri & Logsdon, 1991), and the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996) were combined to create an interview that was administered with primary caregivers and facility staff. Based on the interviews, 11 items (Lucy) and 5 items (Pam and Patsy) were included in a paired stimulus preference assessment (Fisher et al., 1992). Each item was presented in a pair with every other item in random order until all possible combinations had been presented. A selection (i.e., saying item name, pointing) resulted in access to the item for 30 s. Preference was calculated by dividing the number of times an item was selected by the number of times that item was presented and multiplying by 100. The top six items were used for Lucy and all five items were used for Pam and Patsy because they had non-zero selection percentages and were the only potential items identified.

1.2.2. Baseline

Baseline sessions were designed based on direct observation of the program staff’s typical attempts to interact with clients at the facility. This baseline condition allowed for a comparison of the procedures that staff had reported to be ineffective with subsequent implementation of NLP. To control for the number of NLP trials, baseline consisted of sessions with 10 casual questions (e.g., “what are you up to today?”) or statements (e.g., “it sure is sunny today”) presented in random order at 1-min intervals. Researchers responded to all vocalizations, regardless of appropriateness, with polite, friendly statements, such as “that’s interesting,” as program staff typically did. Leisure items that were freely available at the day program were present (e.g., magazines, pictures), but the selection was not based on a preference assessment and none of the items identified in the preference assessment were present.

1.2.3. NLP

The NLP procedure was implemented as in previous studies with children with autism. Each session consisted of 10 trials conducted according to the procedures outlined by Koegel et al. (1987) and Charlop-Christy et al. (1999). Each trial was relatively brief and designed to minimize demands while including the natural elements of a social interaction. A trial began when the
researcher held up two preferred items and said, “pick one.” When the participant selected, the researcher withheld the item and modeled an appropriate interaction with that item (e.g., rolling dice). If the participant did not speak or made an inappropriate vocalization, the researcher modeled an appropriate verbal response (e.g., “dice”) up to two times. If no appropriate response occurred at that point, the trial was over and the next trial was initiated. If the participant made an appropriate vocalization at any time during the trial (e.g., labeling the item, approximate vocalization “di” or “ice”), the item was provided for 15 s with praise and continued descriptive comments about the item and the participant’s actions (e.g., “You rolled a four”). The researcher then retrieved the item and presented that item with another preferred item for selection, beginning the next trial.

1.3. Data collection and IOA

Data were collected on appropriate and inappropriate speech during each trial. Appropriate speech was defined as non-redundant, contextually appropriate verbalizations at an appropriate conversational volume. Appropriate speech was subsequently coded as prompted or unprompted based on whether it occurred before (i.e., unprompted) or after a verbal prompt (i.e., prompted). Inappropriate speech was defined as vocalizations above (e.g., yelling, screaming) or below (e.g., quiet whispering) normal conversational volume, repeating more than twice or grunting. Observers did not code vocalizations, such as laughing, singing and vocalizations, such as “uh huh”. Primary data were collected live but IOA and procedural integrity were scored from videotape.

A second trained observer independently scored 34% of sessions for Lucy, 39% of sessions for Pam and 28% of sessions for Patsy. For appropriate speech, agreement was defined as both coders scoring appropriate speech identically as occurring or not occurring before the verbal model or after the verbal model for each trial. Thus, coders had to agree both on status of a vocalization as appropriate speech and as either prompted or unprompted for the trial to count as an agreement. For inappropriate speech, an agreement was defined as both coders scoring inappropriate speech identically as occurring or not occurring during a trial. Overall agreement was calculated by dividing agreements by agreements plus disagreements and multiplying by 100. Agreement for Lucy was 100% for appropriate speech and 93% for inappropriate speech (80–100%). Agreement for Pam was 99% for appropriate speech (90–100%) and 84% (70–90%) for inappropriate speech. Agreement for Patsy was 97% for appropriate speech (90–100%) and 93% for inappropriate speech (80–100%).

Procedural integrity was coded by having a trained observer view NLP sessions to determine if a trial included the prescribed components of NLP. Accurate trials had to include all of the following as needed according to the protocol: preference assessment with two objects, withheld selected object, action model, verbal model and contingent access to the object with praise. Sixteen percent of treatment sessions across all participants were scored and average procedural integrity was 100%.

2. Results and discussion

The overall effects of NLP on appropriate and inappropriate speech are depicted in Fig. 1. The results for Lucy (top panel) indicate low levels of both appropriate speech ($M = 3\%$ of trials) and inappropriate speech ($M = 8\%$) in baseline while NLP resulted in an increase in appropriate speech ($M = 75\%$) and no change in inappropriate speech ($M = 5\%$). By the end of the NLP
phase, her typical appropriate responses included the names of preferred objects (e.g., scarf) and some adjectives referring to features of the items (e.g., blue, soft). The results for Pam (middle panel) indicate low levels of appropriate speech ($M = 13\%$) and moderate levels of inappropriate speech ($M = 52\%$) during baseline while NLP resulted in increased appropriate speech ($M = 63\%$) and decreased inappropriate responses ($M = 16\%$). By the end of the NLP phase, her typical appropriate responses included two to five word phrases that included object names and adjectives (e.g., “I want the pretty beads,” “pretty hair,” “I want the hairclips”). The results for Patsy (bottom panel) indicate low levels of appropriate speech ($M = 16\%$) and moderately high levels of inappropriate speech ($M = 67\%$) during baseline with an increase of appropriate speech ($M = 69\%$) and a small decrease in inappropriate speech ($M = 45\%$) during NLP. By the end of the NLP phase, her typical appropriate responses included one to two word phrases with the name of an object, adjectives and general descriptors (e.g., drum, roll it, shake it, purple).

Table 1 presents the information on appropriate speech, which was coded either as prompted or unprompted throughout the NLP phase. The first two columns present the percentage of all trials that resulted in either prompted or unprompted appropriate speech. These two columns do
Table 1
Percentage of responses that were unprompted or prompted during NLP intervention

<table>
<thead>
<tr>
<th>Participant</th>
<th>All trials</th>
<th>Appropriate responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unprompted</td>
<td>Prompted</td>
</tr>
<tr>
<td>Lucy</td>
<td>11</td>
<td>63</td>
</tr>
<tr>
<td>Pam</td>
<td>39</td>
<td>24</td>
</tr>
<tr>
<td>Patsy</td>
<td>38</td>
<td>33</td>
</tr>
</tbody>
</table>

not add up to 100% because some trials resulted in no appropriate speech. The third column presents the percentage of trials with appropriate speech that were coded as unprompted. The percentage for prompted trials is not included for brevity but is always the reciprocal with a total of 100%. Lucy primarily exhibited prompted language (63% of all trials) with a slight increase in unprompted trials beginning at session 10. Pam exhibited variable levels of unprompted (39% of all trials) and prompted speech (24% of all trials) with a shift toward unprompted trials during the last three sessions. Patsy exhibited highly variable but roughly equal percentages of unprompted (38% of all trials) and prompted (33% of all trials) speech. For Pam and Patsy, the majority of appropriate responses occurring through NLP were unprompted (59% and 54%, respectively), while only 16% of appropriate responses were unprompted for Lucy.

These results indicate that NLP, though developed for children with autism (Koegel et al., 1987; Laski et al., 1988), can result in increased vocalizations for older adults with cognitive impairments. All participants experienced an increase in appropriate vocalizations with increases in unprompted language for two of three participants. Unfortunately, time constraints prohibited continuation of the experimental evaluation until the majority of appropriate responses were unprompted for all participants. However, anecdotal reports indicate that the two participants still served at the day program (Lucy and Patsy) are much more vocal than before participation with hundreds of vocalizations per day. Recent frequency data documents four to six words per day that have never been heard before for Lucy, with friendly greetings and social interactions occurring regularly. Recent data samples indicate up to 40 novel vocalizations per day for Patsy and infrequent use of highly repetitive and bizarre vocalizations that were common prior to intervention. The two participants with substantial inappropriate vocalizations experienced small to moderate decreases during intervention, though NLP does not specifically target inappropriate speech. Staff reported being very satisfied with the intervention and very surprised at the effects, particularly with Lucy who was previously thought to be mute. Lucy’s family member indicated her satisfaction with Lucy’s improvements and that she finds Lucy more animated, happier and engaged appropriately in more activities with noticeable increases in unprompted language since NLP was implemented.

Recently, LeBlanc, Esch, Sidener, and Firth (2006) discussed procedures, such as NLP from a Skinnerian perspective and suggested that the initial vocalizations produced during NLP may share some functional aspects of a “mand” or request because they produce direct access to preferred items (Skinner, 1957). Over time social reinforcers delivered during NLP and inclusion of descriptors (e.g., red, big) as targets may result in language Skinner referred to as “tacts” (i.e., descriptive language maintained by social reinforcers). The resulting language of these participants was varied in both form (i.e., nouns, verbs, adjectives) and in function (i.e., tacts, mands, direct echo). Some responses were clearly requests for these preferred items (e.g., I want the beads) followed by engagement with the items and relatively little ongoing conversation. Other responses appeared to be tacts because the participant put the items aside shortly after
receiving it but continued social interactions with the therapist with positive affect. In these instances, the object appeared to function as a discriminative stimulus for initiating interactions, but did not seem to be the primary reinforcer for their vocalizations. Each of these types of responses can be highly beneficial in adult day settings where both preferred activities and social interactions may be available to individuals who vocalize and initiate interactions.

These effects, though promising, are only an initial effort to extend the benefits of naturalistic language interventions to older populations. Additional research should attempt to replicate these effects with other participants. In this study, we were unable to continue structured NLP sessions separate from standard day programming. Therefore, NLP was incorporated into everyday interactions for the two participants who remained at the day care program. In the future, researchers might evaluate whether NLP can be delivered effectively in less structured formats from the beginning of intervention or whether structured implementation with subsequent prompt fading and programming for generalization is necessary to achieve good effects. Finally, though the anecdotal evidence from staff and family members suggest socially valid outcomes for these participants, future studies could examine the acceptability of the intervention and the validity of the outcomes using structured assessment tools.

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References


