Applying Skinner's Analysis of Verbal Behavior to Persons With Dementia

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Skinner’s 1957 analysis of verbal behavior has demonstrated a fair amount of utility to teach language to children with autism and other various disorders. However, the learning of language can be forgotten, as is the case for many elderly suffering from dementia or other degenerative diseases. It appears possible that Skinner’s operants may facilitate not only acquisition of language but also the ability to recall items or objects that may have appeared to be “forgotten.” The present study examined the utility of having a series of adults in long-term care emit tacts, echoics, or intraverbals upon presentation of various visual stimuli. Compared to a no-verbal response condition, it appears that the incorporation of Skinner's verbal operants can in fact improve recall for this population. Implications for the retraining of lost language are presented.

Alzheimer’s disease is a degenerative neurological disease resulting in decreased functioning in language and memory (American Psychiatric Association, 2000). These language and memory deficits can have a devastating impact on both the person with Alzheimer’s and the caregiver, including social isolation and communication difficulties (LeBlanc, Raetz, & Feliciano, in press). Although Alzheimer’s disease has biological etiologies, some research exists indicating that the onset of Alzheimer’s can be delayed when older adults regularly engage in activities that require them to recall information during middle and late life (e.g., Wilson et al., 2002). Upon onset of the disease, a number of nonpharmacological cognitive interventions have been developed to address language and memory deficits, including reality orientation (RO) and spaced retrieval (SR). In RO, staff remind elders about time, place, and other information on a relatively frequent basis (Mimura & Komatsu, 2007). In SR, stimuli are presented on a screen and participants are expected to recall information about the stimuli over progressively increasing intervals (Camp & Stevens, 1990; Mimura & Komatsu). Although RO has not been shown to have lasting effects (i.e., memory-related behaviors do not maintain following sessions), SR has been shown to produce increases in recall, with effects lasting up to 3 months. However, such gains are typically seen in adults with less severe dementia (e.g., mild dementia) and in conjunction with cholinergic medications (i.e., medications designed to prevent the progression of Alzheimer’s; Mimura & Komatsu).

Although much research has been conducted on cognitive-based interventions, there have been relatively few behavior analytic studies looking at memory in older adults with dementia. Of those limited studies, the majority have been antecedent-based memory aids, which vary from printed nameplates on doors to memory wallets with pictures and text related to life events (LeBlanc et al.). Although such interventions have been effective, the effects only maintain when the aids are present.
The potential misplacement of memory aids presents a serious limitation to their adoption, especially when considering people with Alzheimer's disease are prone to forget items and in nursing home settings there is a chance that other residents might pick up the aid and keep it. Therefore, there is a need for behavior analytic interventions for memory deficits that can be as effective as previous interventions but are not limited to the availability of the materials.

One potential avenue for such behavior analytic interventions is related to verbal behavior-based interventions. Although cognitive psychology has embraced the relationship between verbal behavior and memory by looking at interventions on language as a way to facilitate memory (Hoyer & Verhaeghen, 2006), behavior analytic studies on memory have avoided directly impacting verbal behavior. This lack of verbal behavior-based research related to memory deficits is similar to an overall dearth of behavior analytic research on language in geriatric populations. Although Skinner’s (1957) *Verbal Behavior* provided a behavior analytic approach to language that has been utilized in developmental disabilities and autism populations, it has gone relatively unused in aging populations (Baker, LeBlanc, & Raetz, 2008; Dixon, Small, & Rosales, 2007; Sundberg, 1991, 1993). However, researchers have argued for the potential benefits of such an approach with aging populations (Baker et al.). Before such adoption can occur, it may be necessary for behavioral gerontologists to become more familiar with Skinner’s analysis.

Skinner’s (1957) analysis of verbal behavior focused on a functional account of language. That is, instead of defining language based solely on topographical differences, Skinner proposed that an account of language should also include an analysis of the functional differences of language. To that end, Skinner proposed the verbal operant as a unit of analysis in language. Skinner’s analysis includes seven different verbal operants, each defined by the stimuli that evoke and maintain them. These include mands, tacts, echoics, intraverbals, autoclitics, textuals, and transcriptions. Briefly, a *mand* is a verbal operant controlled by a specific motivative operation (MO; e.g., deprivation, aversive stimulation; Laraway, Syncerski, Michael, & Poling, 2003) and that specifies its unique reinforcer (e.g., asking for a cookie when food deprived; Skinner). A *tact* is an operant occasioned by a nonverbal stimulus or some aspect of that stimulus and maintained by generalized social reinforcement in the form of social interaction in the presence of a dog. An *echoic* is an operant that is occasioned by a vocal stimulus with a point-to-point correspondence between the stimulus and the response, which is also maintained by a generalized social reinforcer (e.g., doctor says, “say aaah,” child says “aaah,” “Good job”). In contrast, the *intraverbal* is also maintained by generalized social reinforcers and occasioned by a verbal stimulus but there is no point-to-point correspondence between the stimulus and the response. Thus, conversational interactions (e.g., “How are you?” “Not too bad, yourself?”) and verbal chains (e.g., “one, two, buckle my shoe”) constitute this operant. The *autoclitic* is a verbal operant that defines, modifies, or describes other verbal behavior to change the impact of the speaker’s language on the listener (e.g., “I think 1066 was the year the William the conqueror invaded England”). A *textual* is a vocal response under the control of nonauditory verbal stimuli (e.g., responding “dog”, in the presence of the letters D, O, and G). Finally, *transcriptional* behavior is a response that creates stimuli that have the same controlling effects as verbal stimuli (e.g., writing the letters D, O, and G together).

Of the seven verbal operants, intraverbals are often affected in age-related language deficits (Baker et al., 2008). Sautter and LeBlanc (2006) noted that intraverbals constitute “the most diverse group of responding [that] accounts for reading comprehension, conversation and question answering, and events that are traditionally conceptualized as thought or memory (i.e., covert mediating responses)” (p. 41). Despite the potential value of research in this area, Sautter and LeBlanc lament that few studies have been conducted on intraverbals.

Although research in this area is limited, the studies that have focused on intraverbal provide a framework for research that could be done in populations with Alzheimer’s disease. For example, Sundberg, San Juan, Dawdy, and Arguelles (1990) used a verbal behavior approach to assess and train mands, tacts, and intraverbals in individuals with traumatic brain injury. The training of intraverbals consisted of a procedure in which the experimenter asked the participant a question that required an intraverbal response. For example, the experimenter would ask the participant, “What do you use to clean between your teeth?” The participant would then need to provide the correct intraverbal. Upon correct responding, praise was presented. Upon incorrect responding, the participant would be provided with an echoic prompt. Results of the study indicate that intraverbals were acquired relatively quickly (Sundberg et al., 1990). Finkel
and Williams (2001) taught intraverbal responding (i.e., question answering) in a child with autism. Using a transfer of stimulus control procedure, the authors used echoic and textual prompts to teach intraverbal responding. Specifically, they asked the child questions related to familiar people. Following the question, the researchers either said “Say [answer]” (i.e., the echoic prompt) or held up a card with the response (i.e., the textual prompt). They were able to fade the prompts and maintain intraverbal responding following the intervention. This study used an effective repertoire (e.g., an echoic repertoire) to serve as a prompt to establish intraverbal responding.

The purpose of the present study was to utilize a similar technique (i.e., the use of existing repertoires to serve as prompts to respond) to determine if such a procedure could increase recall. Three older adults with mild or moderate stage Alzheimer’s disease were presented with stimuli in either: (a) a treatment package consisting of an echoic prompt to tact the item followed by an intraverbal prompt related to the item, or (b) a control condition where stimuli were presented and the experimenter remained silent. Participants were then asked to recall as many items as they could at the end of the session and at a 1-week follow-up.

Methods

Participants and Settings

The current study was performed in a 159-bed, skilled nursing care facility located in Murphysboro, Illinois. Three female nursing home residents consented to participate in this study. Laura was 84 years old and was diagnosed with dementia. She had good vision and clear speech. Her last Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) was conducted on July 14, 2008. She received a score of 17—moderately impaired. Lisa was 87 years old and suffered from cognitive deficits. She had good vision with her glasses and clear speech. Her last MMSE was conducted on September 8, 2008. Although she had an official diagnosis of dementia from a previous doctor, she received a score of 25, indicating some impairment, but not low enough to meet the cutoff for probable dementia. Barbara was 91 years old and was diagnosed with dementia. She had good vision when wearing her glasses and clear speech. Her last MMSE was conducted on September 2, 2008. She received a score of 18—moderately impaired. All sessions were conducted in the participants’ rooms to minimize outside distractions and to control the amount of noise that took place while the participant was working on the experiment.

Materials

The experimental procedures were conducted using the software developing language Visual Basic Studio 2008 Express Edition. Additionally, a total of 40 different pictures were obtained from the Clip Art gallery in Microsoft Word 2003. Pictures were divided into four different categories with 10 pictures in each category. The four picture categories that were used were clothes, shapes, tools, and food. The participants completed the experiment on a Toshiba laptop computer with a Windows XP operating system. To make sure there were not any errors in the developed software program, a debugger was run before the participants would start each session. The debugger never reported any errors. In addition, a rolling die and a United States quarter were used by the experimenter to preselect what the participant would have to do. The rolling die was used to preselect the order in which the participant would look at the four different categories of pictures. The quarter was used to select which color background (red or blue) the pictures would be seen on.

Procedure

Each participant first looked through the 40 different pictures to ensure that he/she understood what each one was and did not have any questions or uncertainties about the object. They were instructed to ask any questions they might have. The experimenter labeled the item if needed. Prior to the participant performing the study, the experimenter preselected the order in which the participant would look at the four different categories of pictures. This was done by rolling a die. Rolling a “1” resulted in looking at clothes first, “2” resulted in looking at shapes, “3” resulted in looking at tools, and “4” resulted in looking at food. If the experimenter rolled a “5” or a “6,” she rolled again. Also, if a number was rolled more than once, the experimenter would keep rolling until all four numbers and categories were selected.

After the order of the categories was established, the experimenter flipped a quarter to determine if the participant would be instructed by the experimenter to “Say [object]” (i.e., “Say hamburger!”) or if the experimenter would sit quietly and allow the participant to look at and name the pictures out loud if she wanted to. If the coin landed heads side up, then for that category of pictures the experimenter would tell the participant what to say. If the coin landed tails side up, then for that category of pictures the experimenter would not say anything at all. For the pictures that the experimenter told the participant to “Say [picture]” (i.e., “Say pizza!”)
they were placed on a blue computer screened background and the pictures in which the experimenter said nothing were placed on red computer screened background. All four categories were shown for each condition.

Before beginning the experiment the experimenter read aloud the following instructions to each of the participants:

You are going to see forty different pictures on the screen. You will look at four different categories: clothes, shapes, tools, and food. When the pictures are on a blue background I will instruct you to say whatever the picture is. For example, if the picture is of a cat, I will say, “Say cat!” and then you will say, “Cat!”

After you say what the picture is I will provide you a question about that picture and I want you to answer my question regarding the object. However, if the pictures are on a red background I will not say anything. After you see all ten pictures in a category I will give you fifteen seconds to recall and tell me as many as the pictures you saw.

The participant was then provided with an example question they might be asked (e.g., when presented with a picture of a hammer, the experimenter asked, “What would you use a hammer for?”), given the opportunity to ask any questions, and then reminded of the contingencies in place for each colored background of the computer screen. After the participant saw all 10 pictures in a category, the researcher provided the participant with the following intraverbals for each category of pictures: “What are some clothes you just saw?” “What are some shapes you just saw?” “What are some tools you just saw?” and “What are some foods you just saw?” Each participant was given 15 seconds to recall as many pictures as she could. While the participant was saying the pictures, the experimenter was checking off the ones that she said. Answers were considered correct if the participant independently said any of the 10 pictures from the correct category within the 15-second limit. Answers were deemed incorrect if the participant said items that were not actually seen, said pictures that were not from the category they were asked to identify, or if the participant said a picture after the 15 seconds elapsed (data were not collected on the specific topography of the error, as each error is part of the larger class of failed stimulus control). This time interval was chosen arbitrarily with the rationale that longer delays would not be typically found in verbal interchanges between two people.

Exactly 1 week later the researcher and another data collector returned to interact with the participants and asked them to recall as many pictures as they saw a week ago in the four different categories—clothes, shapes, tools, and food. The participant was allowed 30 seconds to vocally emit as many pictures as they could remember. The switch from a 15-second delay during the initial session to a 30-second delay during the 1-week follow-up was chosen arbitrarily with the rationale that it may take participants additional time to recall items, as it had been a week since they were exposed to the items. During this time the researcher and another data collector wrote down the items the participant spoke.

**Dependent Variable Reliability**

A second observer independently scored all aforementioned behaviors during 100% of the sessions for each participant. Mean occurrence agreement for pictures recalled was 100% for Laura, 100% for Lisa, and 100% for Barbara. In addition, mean occurrence for recalling pictures a week later were also 100% for all participants.

**Results**

Upon the experimenter providing the following intraverbals, “What are some clothes you just saw?”, “What are some shapes you just saw?”, “What are some tools you just saw?”, and “What are some foods you just saw?” all three participants were better able to recall more pictures displayed during the echoic condition (blue screen background). The resulting data are displayed in Figure 1. Laura recalled five pictures during the echoic condition compared to four pictures without echoics. Lisa was able to recall eight pictures during the echoic condition compared to only being able to remember five pictures without echoics. Barbara was able to recall nine pictures during the echoic condition compared to being able to recall five pictures without echoics.

One week later, the participants were asked to recall as many pictures as they had previously seen in the four different categories of clothes, shapes, tools, and food; once again, all three participants were better able to recall more pictures during the echoic condition than the nonechoic condition. Laura recalled three pictures compared to one picture. Lisa was able to recall three pictures compared to zero. Barbara was also able to recall three pictures compared to zero. The bottom panel of Figure 1 displays the results of all participants following 1 week from the actual presentation of the stimuli.
The goal of the present study was to develop an intervention based on Skinner’s (1957) analysis of verbal behavior to improve item recall for older adults diagnosed with Alzheimer’s disease. The results indicate that all three participants were able to recall more of the pictures that were paired with an echoic prompt from the experimenter and a resulting echoic response from the participant in comparison to pictures that required no overt vocalization on the part of the participant. In addition, a week later all three participants were still able to recall more pictures from the echoic condition they saw the previous week. There are a number of benefits from the research, including: (a) that the results were obtained regardless of medication in older adults with both mild and moderate Alzheimer’s disease; (b) that the results maintained a week following the study when the materials were no longer present; and (c) that the results demonstrate the effectiveness of using a verbal behavior approach to addressing language and memory deficits in older adults with dementia.

The first benefit of the present study is that the results were obtained regardless of medication or severity of dementia. As noted earlier, demonstrations of the effectiveness of cognitive approaches to improve memory have been limited to combinations of therapy with medication and have demonstrated effects in persons with less severe forms of Alzheimer’s (Mimura & Komatsu, 2007). Although information was not collected on specific medications in this study, no medication changes occurred during the study. As such, the present results indicate that the effects of the treatment occurred regardless of medication. Also important is the fact that two of the participants had

![Picture Recollection During Initial Session](image1.png)

![Picture Recollection a Week Later](image2.png)

**FIGURE 1** Top panel shows the results of how many pictures each participant could recall from either the pictures that were seen on the blue background (verbal prompt to say the picture provided from the experimenter) or on the red background (pictures identified independently) during the initial session. The bottom panel shows the results of how many pictures each participant could recall a week later from either the pictures that were seen on the blue background (verbal prompt to say the picture provided from the experimenter) or on the red background (pictures identified independently).
moderate Alzheimer’s disease. Previous studies on interventions to improve recall have not only relied on medication, but have not been as effective in persons with moderate or severe dementia (Mimura & Komatsu). Another benefit of this study is that improvements were still observed at a 1-week follow-up. Previous behavior analytic research on memory in this population has required the use of memory aids (LeBlanc et al., in press). The current study demonstrates that effects can be obtained without the use of memory aids, which can be lost or damaged.

Finally, the present investigation provides a demonstration of the application of Skinner’s (1957) analysis of verbal behavior to older adults with dementia. Such results are important for two reasons. First, older adults with dementia are a population with a generally sophisticated level of verbal behavior. Traditional research in verbal behavior has focused on populations with autism or developmental disabilities, often exclusively with children (Baker et al., 2008; Dixon et al., 2007; Sautter & LeBlanc, 2006). In order to further our understanding of the applicability of Skinner’s (1957) analysis, it is important that research in verbal behavior be conducted on populations with more complex verbal repertoires. This study represents an important step in that direction. Another finding from this study is that the effects observed did not require extensive effort to fade the prompts. In fact, the prompts were used in the first session and then eliminated. Traditional research in verbal behavior has required well-designed fading procedures to transfer stimulus control of the response from the prompt to the target stimulus (e.g., Finkel & Williams, 2001). It may be that with populations with more complex verbal repertoires, fading is less necessary. Such a finding is important as the majority of current recommendations for establishing verbal operants are based on a population that has never had an extensive verbal repertoire. As such, it may be the case that further research in this area may yield recommendations that differ from those resulting from research in autism and developmental disabilities.

Despite the effectiveness of the verbal behavior treatment, a number of limitations exist. First, although the effect was demonstrated within participants on two occasions a week apart as well as across three different participants, no baseline data were ever collected on intraverbal responding. That is, the participants were never asked to simply name as many items from a category as they could to establish responding levels prior to intervention. Such information would have been useful to further rule out the possibility of chance responding accounting for performance. Another limitation is that participants were only tested once after the procedure and that testing was only 1 week later. It would be useful to determine if the results of the treatment package last longer than 1 week or if refresher sessions are necessary. A third limitation is the level of responding that was observed. Each participant was exposed to 40 items. Barbara, who recalled the most items, was only able to recall 9 of the items presented, less than 25%. It is unclear whether presenting fewer items would have facilitated recalling more items (i.e., there were too many items to recall) or if these levels of responding are the best that can be obtained, regardless of the number of items presented. A fourth limitation is the degree to which the colors associated with the different conditions affected responding. The different colors were used to aid with stimulus control of the intervention, as researchers have noted the decreased impact of stimuli in older adult populations (LeBlanc et al., in press). By doing so, it is possible that the colors might have affected responding regardless of the intervention. Future researchers might consider varying which color is assigned to each condition across participants. Finally, given that this was a treatment package, it is unclear what impact the echoic or intraverbal prompts would have had independent of each other.

Despite the limitations of the study, the treatment still resulted in older adults with Alzheimer’s disease recalling more items both immediately and a week later following the use of verbal behavior treatment package. These effects were greater than simply showing the participants the items. The methodology was simple enough that caregivers could use this to facilitate recall of relevant facts. For example, one of the most difficult aspects of the disease for family members is when the older adult is no longer able to remember the names of loved ones. The current treatment package may represent a way to help older adults with Alzheimer’s disease remember the names of relatives. Thus, the study represents not only a benefit to older adults with Alzheimer’s disease, but could be useful in helping caregivers or loved ones assist in combating the effects of the disease. The methodology could be expanded as a way to help older adults retain repertoires that have not yet been affected by the disease. Such an intervention might prove appealing for persons in all stages of Alzheimer’s disease, but particularly those in the early stage who are still aware of their memory deficits and the progressing effects of the disease. Future studies might also focus on whether these effects generalize to other settings. In addition, future studies might expand
upon the use of Skinner's (1957) analysis of verbal behavior to assist with other language deficits associated with the dementia progression. For example, conversation skills typically decline with dementia, resulting in sentences that lack content and contain an abundance of words like “thing” or “that.” Treatments focusing on tact and intraverbal repertoires might prove valuable to remediating such deficits. Also, running this treatment and other preparations with participants with more severe dementia would be useful, providing information about the benefits or limitations of this preparation.

In summary, Skinner’s analysis of verbal behavior has provided a theoretical framework for the understanding of human language for over 50 years. To date, the primary outcomes of Skinner’s approach have been conceptual and application has been concentrated on the acquisition of language skills for those individuals born with repertoire deficits. However, as the present data suggest, Skinner’s account may have utility for those persons born with intact repertoires that eventually lose skills as they begin to age. Memory is often considered to be “good” or “bad” and a skill that declines with age. While this may be true to some degree, the present data suggest that simple, efficacious strategies may be adopted from the Skinnerian approach even in those persons with dementia. As we strive to develop care programs for the elderly that are evidence-based, we should attempt interventions that can allow for retaining as much functioning as possible for as long as possible. Perhaps doing so will provide each individual elderly person with just a bit more dignity in his or her last remaining years of life.

References