

*ASSESSMENT OF PREFERENCE FOR EDIBLE AND LEISURE
ITEMS IN INDIVIDUALS WITH DEMENTIA*

JAVIER VIRUÉS ORTEGA

UNIVERSITY OF MANITOBA AND ST. AMANT RESEARCH CENTRE, CANADA

BRIAN A. IWATA

UNIVERSITY OF FLORIDA

CELIA NOGALES-GONZÁLEZ

UNIVERSIDAD REY JUAN CARLOS, SPAIN

AND

BELÉN FRADES

NETWORK RESEARCH CENTRE FOR NEURODEGENERATIVE DISEASES, SPAIN

We conducted 2 studies on reinforcer preference in patients with dementia. Results of preference assessments yielded differential selections by 14 participants. Unlike prior studies with individuals with intellectual disabilities, all participants showed a noticeable preference for leisure items over edible items. Results of a subsequent analysis with 3 participants showed reinforcement effects when highly preferred items were delivered as consequences.

Key words: Alzheimer's disease, dementia, preference assessment

Dementia is a cluster of behavioral deficits secondary to neurological degeneration and is associated with deterioration in verbal, social, and daily living skills (Maj & Sartorius, 2002). Several studies have demonstrated the success of behavioral interventions in maintaining adaptive skills in elderly individuals; however, many were multicomponent interventions that relied on participants' ability to respond to instructions (e.g., Bourgeois, 1990; Brenske, Rudrud, Schulze, & Rapp, 2008). Direct, differential reinforcement may be required with individuals who no longer respond to instructions. In these

instances, preference assessments may be helpful in identifying effective consequences.

Research on the preferences of individuals with dementia has focused primarily on leisure activities (e.g., Feliciano, Steers, Elite-Marcandonatu, McLane, & Areán, 2009; LeBlanc, Raetz, Baker, Strobel, & Feeney, 2008; Staal, Pinkney, & Roane, 2003). Less is known about preference for edible reinforcers, which is important to examine for several reasons. First, progressive loss of skills and leisure activity common with dementia (Verghese et al., 2003) may render edible reinforcers more effective for some individuals. Second, delivery of edible items interferes only minimally with instruction during rehabilitation activities that may require extended shaping trials. Third, although preference for edible items over leisure items has been a common finding in research on intellectual disabilities (Bojak & Carr, 1999; DeLeon & Iwata, 1996; DeLeon, Iwata, &

We thank Pablo Martinez-Martin, Licinia Ullán Sánchez, and Elena Hernández, who volunteered resources and provided institutional support.

Address correspondence to Javier Virués Ortega, University of Manitoba, Psychology Department, P518 Duff Roblin Bldg., 190 Dysart Rd., Winnipeg, Manitoba R3T 2N2, Canada (e-mail: javier.virues@ad.umanitoba.ca).

doi: 10.1901/jaba.2012.45-839

Roscoe, 1997), individuals with dementia might not show such a preference. For instance, dementia patients experience significant loss of smell and taste (Shiffman, 1997), which influences flavor discrimination and could potentially affect preference. In the present study, we examined preference for leisure versus edible items with individuals with varied degrees of dementia. We subsequently determined whether highly ranked stimuli functioned as reinforcers.

METHOD

Participants and Setting

Fourteen individuals (12 women, two men; age range, 69 to 89 years) with Alzheimer's disease (AD) (seven), mild cognitive syndrome (five), mixed dementia (one), and vascular dementia (one) participated in preference assessments. Three of these individuals, all diagnosed with AD (Patricia, age 85; Andrea, age 87; Eva, age 69), participated in subsequent reinforcer assessments. Disease severity (Morris, 1993) ranged from mild to severe. Skills required for participation included the ability to follow simple instructions (e.g., "pick your favorite"), remain seated during sessions, and use a pencil or crayon. Sessions were conducted in a quiet room at a senior day center between 3:00 p.m. and 5:00 p.m. and at least 90 min before or after meals. Preference assessments lasted approximately 45 min. Reinforcer assessment sessions lasted 2 to 5 min.

Response Measurement and Interobserver Agreement

The dependent variable for preference assessments was the percentage of trials in which a stimulus was selected (i.e., vocalization or touch). A second observer recorded selections on 27% of the trials. Interobserver agreement was calculated as the number of trials with exactly the same scoring (i.e., agreement) divided by the number of trials. The percentage of trials for which agreement was assessed and the percentage agreement (in parentheses) was 100% (98%) for Eva, 39% (91%) for Patricia,

100% (100%) for Andrea, 100% (95%) for Antonio, and 38% (100%) for Teresa.

The responses targeted during the reinforcer assessment were ones that could be acquired quickly and measured easily, and that had some degree of social significance. They included tapping (Andrea and Patricia), defined as depressing a finger tapper lever with any part of the subject's hand such that the finger tapper counter increased by one unit (Andrea and Patricia); joining Mega Bloks (Eva), defined as joining two Mega Bloks pieces by at least one of the pins of each piece for at least 1 s; and playing a keyboard (Andrea), defined as physical contact between the subject's hand and a small electronic keyboard with enough force to make one or more audible sounds. We used frequency (tapping; all participants) and 30-s partial-interval recording (tapping, keyboard, and Mega Bloks engagement; Andrea only), and the data were expressed as responses per minute or percentage of 10-s intervals scored. A second observer recorded data independently during a mean of 40% of sessions across participants. Interobserver agreement for rate measures was calculated by comparing observers' records and dividing the smaller number of responses by the larger number. Mean agreement percentages were 99% (range, 96% to 100%) for Patricia, 100% for Eva, and 99% (range, 84% to 100%) for Andrea (finger taps). Interobserver agreement for interval measures (Andrea only) was calculated by dividing the number of intervals in which both observers scored a response by the total number of intervals. The mean agreement percentage was 99% (range, 84% to 100%) for tapping, 96% (range, 83% to 100%) for keyboard playing, and 97% (83% to 100%) for Mega Bloks engagement.

Preference Assessment

A paired-stimulus procedure (Fisher et al., 1992) was used to assess preference for four edible and four leisure items. Participants sampled all items prior to the assessment. On

each trial, the experimenter presented a pair of items and the instruction "pick one." The participant either vocalized or touched the item. If he or she did not respond within 10 s, the trial was repeated. If the participant again did not respond, the next trial began. The participant was given one piece of an edible item or 30 s of access to the leisure item he or she selected. All pairs of items were presented twice, with left and right positions alternated, and no evidence of position bias was observed for any participant.

Reinforcer Assessment

The effects of contingent access to the preferred items on responding were evaluated in a multiple baseline design across subjects (Patricia, Andrea, and Eva) and in a combined reversal and multiple baseline design across behaviors (Andrea). A sequence of instruction, modeling, and physical guidance was used until participants performed at least one target response independently. Participants also were exposed once to the contingency in effect prior to each session.

Baseline. At the beginning of each session, the experimenter instructed the participant to engage in any of the activities available and repeated the instruction once if the participant did not initiate any activity within 5 s. No further prompts were delivered. The target response was the only activity available for Patricia and Eva; three activities were available concurrently for Andrea (finger tapper, keyboard, Mega Bloks). Items were placed on the table within the participant's reach. When multiple items were available, location was alternated across sessions. The experimenter did not interact with the participant during the session and did not deliver any consequences for target responses.

Reinforcement. Procedures were identical to those in baseline except that, contingent on occurrences of the target response, the experimenter delivered the top-ranked items based on results of the preference assessments. Patricia's reinforcer was access to a 9- or 12-piece puzzle

until a piece was joined. Eva's reinforcer was a 5-g piece of chocolate. Because Andrea engaged in an extended analysis (see below), she was offered a choice between her most frequently selected items (i.e., coloring or puzzle). Reinforcement schedules were fixed-ratio (FR) 20 for Patricia, FR 1 for Eva, and FR 10 (tapping), FR 1 (keyboard), and FR 10 (Mega Bloks) for Andrea and were based on the number of prompted responses the participant performed during a preexperimental session. Reinforcer-access time was subtracted from the session time.

RESULTS AND DISCUSSION

Figure 1 shows the results of the preference assessments. Assessment time ranged from 30 to 60 min, and most participants completed the assessment in one session. A leisure activity was the most preferred item by all 14 participants, and leisure items were the top two items for 12 participants and the top three items for eight participants. Figure 2 shows the results of the reinforcer assessment. All participants exhibited low rates of responding during baseline, which increased during the reinforcement condition. Eva's response rate during reinforcement was much lower than that observed for Patricia and Andrea, which may have been related to task difficulty. Accordingly, her reinforcement schedule remained at FR 1, which also may have contributed to her low response rate. Figure 3 shows the results of the additional analysis conducted with Andrea to establish reinforcer effects across behaviors. Although she engaged in all responses to some degree during baseline, high and sustained levels of engagement were observed only when reinforcement conditions were introduced and only for the response being reinforced.

The consistent preference for leisure items over edible items was in marked contrast to data reported by Bojak and Carr (1999), DeLeon and Iwata (1996), and DeLeon et al. (1997), who observed that leisure items were displaced

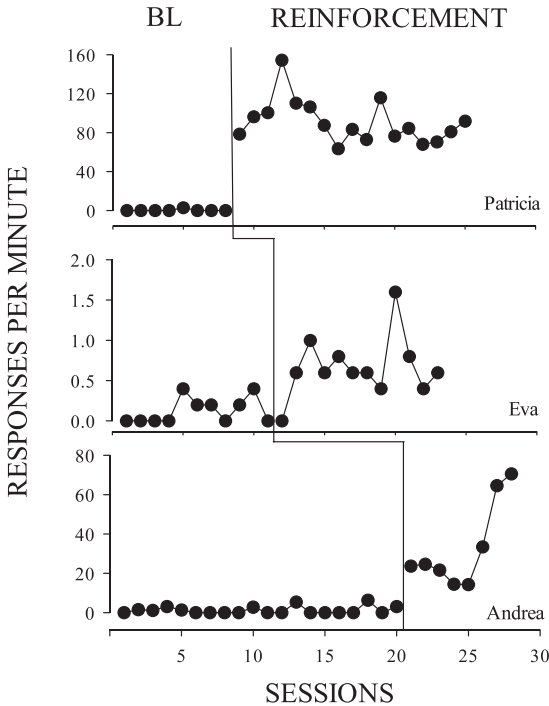


Figure 2. Responses per minute during the reinforcer assessment. BL = baseline.

worsened in individuals with cognitive impairment and dementia (Steinbach et al., 2010). Thus, decreased ability to discriminate taste differences may weaken food preferences, although whether food per se is a less effective reinforcer for patients with dementia cannot be determined from the present data.

A limitation of the study was the short duration of sessions during the reinforcement test, which was selected to accommodate participants' fatigue and short durations of attending. As a result, although reinforcement effects were observed reliably across participants, it is unknown whether sustained performance would be observed over periods of time more common to training contexts (e.g., 10 to 15 min).

Future studies might examine performance differences in individuals with dementia relative to other dimensions of reinforcement besides quality. For example, Plaud, Gillund, and

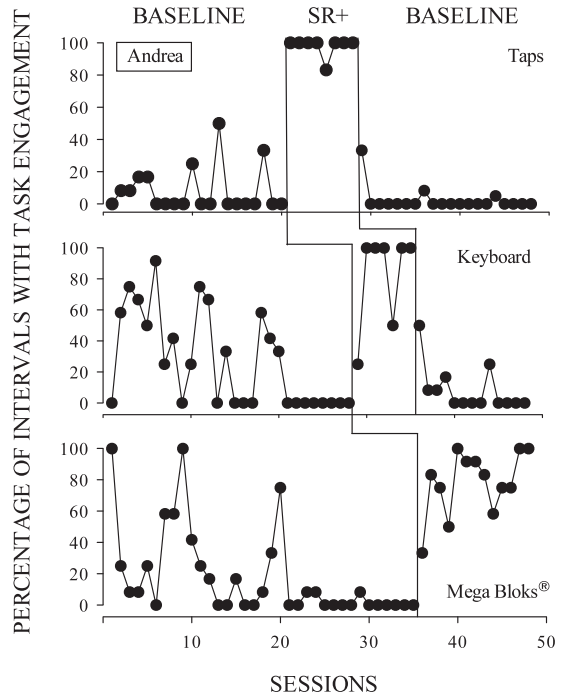


Figure 3. Percentage of intervals with active task engagement for Andrea. SR+ = reinforcement.

Ferraro (2000) examined response allocation of cognitively unimpaired older adults under varied reinforcement schedules. Discriminated schedules resulted in minimal errors in response allocation, and participants allocated responding proportionally to the density of the schedule, thus conforming to the matching equation (Herrnstein, 1970). Plaud et al. suggested that “the next step is to compare these results with clinical samples of older adults with AD and other dementias” (p. 79). Although our data were based on between-rather than within-participant schedule variations, the Pearson product-moment correlation coefficient between response rate and reinforcement rate across participants in the reinforcement test was $r = 0.94$, meaning that reinforcement rate accounted for 88% of response variation.

Engagement in leisure and occupational activities by patients with dementia often may require formal intervention and explicit rein-

forcement. Not much is known, however, about preferences among this population for different classes of reinforcers or whether patterns of selection observed during a preference assessment are predictive of reinforcement effects. Results of this study showed that the preference assessment and reinforcer test model commonly used in behavioral research in intellectual disabilities produced reliable outcomes when extended to patients with dementia.

REFERENCES

- Bojak, S. L., & Carr, J. E. (1999). On the displacement of leisure items by food during multiple-stimulus preference assessments. *Journal of Applied Behavior Analysis, 32*, 515–518. doi:10.1901/jaba.1999.32-515
- Booth, D. A. (1985). Food-conditioned eating preferences and aversions with interoceptive elements. *Annals of the New York Academy of Sciences, 443*, 22–41. doi:10.1111/j.1749-6632.1985.tb27061.x
- Bourgeois, M. S. (1990). Enhancing conversation skills in patients with Alzheimer's disease using a prosthetic memory aid. *Journal of Applied Behavior Analysis, 23*, 29–42. doi:10.1901/jaba.1990.23-29
- Brenske, S., Rudrud, E. H., Schulze, K. A., & Rapp, J. T. (2008). Increasing activity attendance and engagement in individuals with dementia using descriptive prompts. *Journal of Applied Behavior Analysis, 41*, 273–277. doi:10.1901/jaba.2008.41-273
- DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*, 519–533. doi:10.1901/jaba.1996.29-519
- DeLeon, I. G., Iwata, B. A., & Roscoe, E. M. (1997). Displacement of leisure reinforcers by food during preference assessments. *Journal of Applied Behavior Analysis, 30*, 475–484. doi:10.1901/jaba.1997.30-475
- Feliciano, L., Steers, M. E., Elite-Marcandonatou, A., McLane, M., & Aréan, P. A. (2009). Applications of preference assessment procedures in depression and agitation management in elders with dementia. *Clinical Gerontologist, 32*, 239–259. doi:10.1080/07317110902895226
- Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis, 25*, 491–498. doi:10.1901/jaba.1992.25-491
- Herrnstein, R. J. (1970). On the law of effect. *Journal of the Experimental Analysis of Behavior, 13*, 243–266. doi:10.1901/jeab.1970.13-243
- LeBlanc, L. A., Raetz, P. B., Baker, J. C., Strobel, M. J., & Feeney, B. J. (2008). Assessing preference in elders with dementia using multimedia and verbal pleasant events schedules. *Behavioral Interventions, 23*, 213–225. doi:10.1002/bin.266
- Maj, M., & Sartorius, N. (2002). *Dementia* (2nd ed.). Chichester, West Sussex, UK: Wiley.
- Morris, J. (1993). The Clinical Dementia Rating (CDR): Current version and scoring rules. *Neurology, 43*, 2412–2414. doi:10.1212/WNL.43.11.2412-a
- Plaud, J. J., Gillund, B., & Ferraro, F. R. (2000). Signal detection analysis of choice behavior and aging. *Journal of Clinical Geropsychology, 6*, 73–81.
- Shiffman, S. S. (1997). Taste and smell losses in normal aging and disease. *Journal of the American Medical Association, 278*, 1357–1362. doi:10.1001/jama.278.16.1357
- Staal, J. A., Pinkney, L., & Roane, D. M. (2003). Assessment of stimulus preferences in multisensory environment therapy for older people with dementia. *British Journal of Occupational Therapy, 66*, 542–550.
- Steinbach, S., Hundt, W., Vaitl, A., Heinrich, P., Förster, S., Bürger, K., et al. (2010). Taste in mild cognitive impairment and Alzheimer's disease. *Journal of Neurology, 257*, 238–246. doi:10.1007/s00415-009-5300-6
- Verghese, J., Lipton, R. B., Katz, M. J., Hall, C. B., Derby, C. A., Kuslansky, G., et al. (2003). Leisure activities and the risk of dementia in the elderly. *The New England Journal of Medicine, 348*, 2508–2516. doi:10.1056/NEJMoa022252

Received January 25, 2012

Final acceptance June 3, 2012

Action Editor, Linda LeBlanc