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# Technology-based orientation programs to support indoor travel by persons with moderate Alzheimer's disease: Impact assessment and social validation

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ABSTRACT

The present study (a) extended the assessment of an orientation program involving auditory cues (i.e., verbal messages automatically presented from the destinations) with five patients with Alzheimer's disease, (b) compared the effects of this program with those of a program with light cues (i.e., a program in which strobe lights were used instead of the verbal messages) with the same five patients, and (c) conducted a social validation assessment of the two programs with 70 university psychology students employed as social raters. Results confirmed the effectiveness of the program with auditory cues and showed an equally strong impact of the program with light cues with all five patients. The psychology students involved in the social validation assessment provided significantly higher scores for the program involving light cues on a six-item questionnaire. Those scores suggested that this program was perceived as a practically and socially preferable choice. The implications of the findings for daily contexts dealing with patients with Alzheimer's disease are discussed.



## 1. Introduction

Orientation (way-finding) and travel problems are a common characteristic of patients with Alzheimer's disease, and the extent and impact of those problems progressively increase with the evolution of the disease (Caffò et al., 2012; Cherrier, Mendez, & Perryman, 2001; Gadler, Grassi, & Riva, 2009; Grossi, Fasanaro, Cecere, Salzano, & Trojano, 2007; McGilton, Rivera, & Dawson, 2003; Provencher, Bier, Audet, & Gagnon, 2008; Rainville, Passini, & Marchand, 2001). Once the disease reaches the low moderate and severe stages, orientation and travel problems become prominent also within the patients' most familiar environments such as their home and other indoor areas that they daily use. This situation can restrict their self-determination and performance opportunities, with extensive negative implications on activity engagement, basic personal independence, self-assurance, and social status (Benge, Balsis, Massman, Havins, & Doody, 2011; Lancioni et al., 2011;

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McGilton et al., 2003; Nolan, Mathews, & Harrison, 2001; Passini, Pigot, Rainville, & Tétreault, 2000; Rainville et al., 2001; Sadowsky & Galvin, 2012).

Behavioral strategies to tackle orientation and travel problems (i.e., to contain their negative social and adaptive implications) in the home or other residential areas can involve the use of spatial cues as well as backward chaining programs (Gadler et al., 2009; Passini et al., 2000; Sadowsky & Galvin, 2012). Spatial cues may be viewed as salient stimuli (e.g., colors and photos) that are used to help the person discriminate and recognize specific orientation/travel targets, such as room entrances (Gibson, MacLean, Borrie, & Geiger, 2004; Nolan et al., 2001; Provencher et al., 2008). Backward chaining programs are aimed at teaching orientation and travel to relevant destinations, such as the dining room or bedroom, in a stepwise fashion. The program for each destination begins by promoting independence on the last portion of the travel/route leading to it (McEnvoy & Patterson, 1986; McGilton et al., 2003; Provencher et al., 2008). Once the patient achieves this level of independence, the next step of the program focuses on extending his or her ability, that is, on enabling him or her to travel a new (intermediate) portion of the distance in addition to the last portion already learned. The third step of the program may be directed at enabling the patient to manage the entire distance that he or she has to cover for reaching the target destination (Chiu et al., 2004; Jerome, Frantino, & Sturmey, 2007; Martelli, Nicholson, & Zasler, 2008). To minimize errors, fading procedures might be used at each step. Such procedures would allow gradual reduction/elimination of any program-related prompting (Brooks et al., 1999; Caffò et al., 2012; Provencher et al., 2008).

The aforementioned behavioral strategies (i.e., use of spatial cues and of backward chaining) may (a) be more effective when the patients are in a condition of mild Alzheimer's disease and (b) lose part of their effectiveness as the number of routes/destinations increases (Chiu et al., 2004; Provencher et al., 2008). It could also be argued that the use of backward chaining is fairly costly in terms of staff investment (Brooks et al., 1999; Brunsdon, Nickels, Coltheart, & Joy, 2007). A possible alternative to these strategies might be represented by the use of technology-based orientation programs that rely on the automatic presentation of direction cues (e.g., sounds or vibrations) to guide the patient to the destination (Grierson, Zelek, Lam, Black, & Carnahan, 2011; Lancioni et al., 2011). For example, Lancioni et al. (2011) assessed a technology-based program, which involved auditory cues (i.e., verbal encouragements) automatically presented from the target destinations. At each travel occasion, the cues from the destination that the patient was to reach were activated to guide him or her to such a destination. The technology, which had previously been used with persons with multiple disabilities (Lancioni et al., 2007, 2008, 2010), proved effective with each of the three patients with Alzheimer's disease with whom it was applied. Moreover, a social validation assessment involving university psychology students as raters showed that the patients' travel performance with the technology was scored higher (more positive) than their travel performance with the help of a caregiver.

The present study had three specific aims: (a) extending the use of the technology-based program with auditory cues to five new patients with Alzheimer's disease so as to determine whether the aforementioned findings on the effectiveness of such a program could be confirmed (b) comparing the effects of this program with those of a program with light cues (i.e., a program in which strobe lights were used instead of the verbal encouragements) with the same five patients, to determine whether the latter program (potentially less disturbing for the environment) could be a viable alternative to the former; and (c) conducting a social validation assessment of the two programs with 70 university psychology students employed as social raters (Callahan, Henson, & Cowan, 2008; Kazdin, 2001; Kennedy, 2005; Lancioni, Sigafoos, O'Reilly, & Singh, 2012).

## 2. Method

### 2.1. Participants

The patients (Agnes, Nellie, Brandon, Mandy, and Heather) were 72–80 ($M = 77$) years old and were considered to function at the lower end of the moderate stage of Alzheimer's disease, with scores below 15 on the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975). Their scores on the Hamilton Depression Rating Scale (Bagby, Ryder, Schuller, & Marshall, 2004) suggested mild depression for Nellie, Mandy, and Heather and moderate depression for Agnes and Brandon. Pharmacological treatment in the form of memantine was available for Brandon, Mandy, and Heather. Nelly was provided with acetylcholinesterase inhibitors. All five patients attended a day center in which they were provided with some supervised activity involvement. They seemed to enjoy traveling across the different rooms of the day center and meeting up with different staff people (e.g., bringing or taking from them some material such as papers or daily objects). Their ability to reach the appropriate room destinations, however, was considered to be limited or negligible. An intervention program to help them improve their traveling performance was considered highly desirable by staff personnel and families. Their families had signed a formal consent for their involvement in this study, which had been approved by a scientific and ethics committee.

### 2.2. Setting and sessions

Six rooms of the day center, with which the patients were familiar, served as target destinations for their traveling during the study. Those destinations concerned, among other things, medical services, occupational therapy, and general administration. Within each session, a patient was to reach five of those destinations/rooms to deliver and/or pick up small objects and meet a staff person present there (see Lancioni et al., 2011). The patients were not required to travel to the different destinations consecutively. Rather, their traveling could occur over a period of more than 1 h. The distance to travel to reach the destinations varied between about 5 and 13 m, with a mean distance of about 9 m per destination.