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Thesis Consent Form
Alzheimer’s Disease and the Utilisation of Procedural Learning.

Kathryn A. Russell

Thesis Consent Form

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Abstract

This thesis investigated the utilisation of procedural learning to improve self-care tasks and activities of daily living (ADLs) in mild-to-moderate Alzheimer's disease (AD). Procedural learning is relatively preserved in AD, presumably due to relatively little degeneration of critical neural circuits. Current interventions for AD (medical and non-medical) have limited effects on these skills, and attempts to enhance memory with explicit learning methods have been largely ineffective.

Two studies assessed the effectiveness of procedural training for ADLs in AD. Study one involved both a group and single subject design (multiple baseline across tasks) with 12 pre-selected tasks. Eight AD participants were trained on six tasks (counterbalanced across subjects) for 10 days, six tasks remained untrained. The group showed significant improvement at post-test in performance time and number of errors for trained tasks, whereas untrained tasks showed no significant change. At post-test no significant difference was found between the AD and control groups on trained tasks. Seven of the 8 participants showed a significant decrease in overall performance time (binomial analyses) and errors (visual analyses) for trained tasks. Significant training effects were maintained at 12-week follow-up. There was variability in training effectiveness between individuals and tasks.

Study two assessed the effectiveness of individually-tailored training programmes, in which tasks were selected for each individual according to task impairment and relevance. A single subject design, multiple baseline across tasks, was repeated across 6 participants. Change in task performance (time or errors) coincided with the onset of training. At post-test all participants showed some training benefits in either performance time or number of errors: 4 showed training effects on 77 to 100% of their tasks and 1 participant showed training effects in 60% of tasks. The final participant showed training effects in 75% of tasks, although a truncated follow-up period limited analyses. Training benefits endured throughout follow-up for 3 participants (2 to 4 months), and for at least 5 months for the 2 participants who had longer follow-up periods (some tasks endured up to 10 (KW) and 13 months (PB)).

Procedural learning methods can assist individuals with mild-to-moderate AD maintain self-care skills and ADLs. Additionally, this method could be adapted to provide a model of effective communication for caregivers, for example, breaking tasks into components and presenting requests one at a time.
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Preface

Thesis Rationale

This thesis will investigate the premise that individuals with AD may be able to improve their self-care and activity of daily living skills with the use of procedural retraining. This premise is based on findings that individuals with AD may be capable of a particular type of new learning. The findings of a considerable body of experimental research indicate that procedural learning (a type of implicit learning) is relatively well maintained in the mild-to-moderate stages of AD (e.g., Deweer, Ergis, Fossati, et al., 1994; Dick, Kean & Sannds, 1988; Eslinger & Damasio, 1986; Gabrieli, Keane, Stanger, Kjelgaard, Corkin & Growdon, 1994; Heindel, Salmon, Shults, Walicke & Butters, 1989). This retained learning ability provides a potential means by which some aspects of impaired functional skills in individuals with AD might be relearnt.

Research focusing on this idea has been carried out by the Dementia Research and Care Unit and Geriatric Research Group (Zanetti et al., 1997) from Bascia, Italy. Their research involved an exploratory investigation of the effectiveness of procedural learning on relearning functional skills. The research was designed and analysed using a simple group design. The study involved three weeks procedural training of 10 self-care tasks (10 tasks remained untrained). The results showed a decrease in the time taken by participants with AD to perform the trained tasks over a period of three weeks. However, they did not describe the accuracy of the participants on the tasks nor quantify the actual individual improvements in time taken. They did not investigate the duration of the effects of training in this study, although recently they repeated training with a new group of participants (and a control group) and published a 4 month single point follow-up. The results of this second study suggested the training effects were maintained by the active group for 4 months, whilst the control group showed no change (Zanetti et al., 2001).

The research in this thesis involves a more sophisticated design, which is not only capable of replicating the general findings of Zanetti and colleagues (Zanetti et al., 1997, Zanetti et al. 2001), but is also able to identify specific individuals who show gains from training. It also investigates, in greater detail, the duration of
improvements in performance of daily living skills. The research is based on strong experimental evidence of relatively spared procedural learning in the AD population. This study provides a test of the application of this spared ability to daily tasks and may potentially enhance our understanding of specific subsystems of memory and learning.

AD is one of the most pervasive and devastating disorders of older age which, as will be examined in chapter one, leads to an extensive loss of memory and of the ability to function independently. As of yet there are no effective treatments for AD. If it were possible to retrain and maintain specific self-care and daily-living skills, this would both improve the quality of life for individuals with AD and also improve the quality of life for caregivers. If the application of procedural learning techniques is effective, this could form the basis for the development of training programs for people with AD. These training programmes could be carried out by nurses, occupational therapists, trained AD caregivers and potentially even family members.

Aims of Thesis

The general aims of this thesis are:

1. To investigate whether self-care tasks can be either re-taught or improved in individuals with mild-to-moderate AD using procedural learning methods.

2. To determine the duration of any gains from procedural training. This will assist in judging the effectiveness of training, and indicate appropriate timing for when refresher training would be required.

3. To investigate the effectiveness of an individually tailored needs-based procedural training programme targeting self-care skills, which could improve the quality of life for people with AD.

4. During the course of the research a fourth aim was developed: To review the research on AD communication and distress, and discuss suggestions for assisting these areas of difficulty based on the findings of this thesis.
Outline of Thesis

Chapter 1 will provide a general overview of AD, including an outline of symptoms and current treatment trends, thereby providing the context for the intervention investigated in this thesis. Chapter 2 contains a review of the literature on procedural learning, including theories of procedural learning and how it is relatively preserved in AD. Chapter 3 is a research paper reporting the first study, which investigates the potential to utilise procedural learning to retrain a set of 12 self-care tasks in 8 individuals with AD, using a mixed group and single subject design. Chapter 4 describes study two, which investigates the potential to utilise procedural learning to retrain self-care and activity of daily living tasks based on the individual needs of 6 participants using a multiple baseline across tasks design. Chapter 5 is a discussion paper, which summarises literature and addresses issues of concern for people with AD and their caregivers in relation to the causes of distress in AD, and the role of communication. This chapter also draws upon findings from study one and two to suggest that the procedural learning method contains elements which model effective communication with AD individuals. The final chapter provides a general discussion of the findings of this thesis.
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