

## **RERC-ACT D6 Project Context Appropriate Behavioral Cueing**

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Individuals with cognitive impairments such as those associated with traumatic brain injury (TBI) often experience behaviors that can disrupt their interpersonal, social, or vocational activities. Past research by members of our project team has indicated that such behaviors can be modified with the help of automated cues. Further, a person's response to such cues can be altered by the specific wording and other characteristics of the cue. Based on these insights, we are developing software which will have access to the user's schedule including information about the social context of their tasks (home, work, school; alone, with friends, with co-workers). A caregiver will be able to define various behavioral cues based on what is or is not appropriate in different contexts or across contexts having similar social constraints (e.g., these are settings in which it is necessary to behave formally vs. those in which it is acceptable to be casual). For example, a cue required at home may not be the same as one required at work, while a cue required at work during lunchtime may be different than a cue required at work during a meeting.

Several single case trials have been conducted using software developed by members of the project team in prior work. In one case, a client with a TBI initially spoke only when instructed to do so or in response to direct questions. An intervention was developed that provides automated cues for increased verbal interaction. First, baseline utterance levels were assessed. Then, interventions were introduced in two trial blocks. During the first block, he was given the cue "speak up." During the second trial block, he was given the cue "speak longer." Consistent with the hypotheses, during the first trial block, he significantly increased the number of utterances compared to baseline. During the second trial block, he increased the utterance length significantly compared to both baseline and trial block. Therefore, the study successfully demonstrated that different behaviors can be elicited in response to carefully chosen cues, despite the same underlying behavioral restriction.

A second client had a marked difficulty with initiation, interfering with her ability to sustain activity or switch from one activity to another. Two interventions were attempted. Under one condition, the patient was provided with calendar-based cues that she used to navigate from one setting to another. Under a second condition, the software developed for this project was used to provide her with "meta-cues" that provided guidance about generalized behavioral strategies, without presenting any information about the specific tasks that she had been asked to complete. For example, rather than being told to work on a math homework assignment, she was given cues to "remember to stay organized" or "remember not to get distracted." The data indicate that with these "meta-cues" there was a significant improvement in task accuracy, number of assigned tasks completed, and number of tasks completed consistent with rules about task order.

A third case (in progress) involves another client with decreased verbosity following a TBI. Multiple baseline trials were conducted, with a mean rate of 6 verbalizations per one hour therapy session. As with Case 1, cues will be offered in two blocks. For the first block, she has been given a cue of "remember to speak up." For the second block, she will be offered a cue of speak longer. Preliminary data indicate a marked increase in verbalizations in response to the "speak up" cue, with a mean verbalization rate of 19.5 verbalizations per one hour group.

For each of these studies, the investigators manually adjusted the phrasing of the cues while new software is being developed to automatically deliver context-appropriate behavioral cues. A caregiver will be able to "tag" the user's tasks with appropriate contextual information; and design different behavioral cues for these different contexts. The software will predict the user's social context based on recent tasks and deliver the appropriate cues at the appropriate frequency. The software will also enable a therapist observing the user to adjust cues quickly in a clinical setting, then save them for later automated cueing. This software will be evaluated in usability tests for clinicians who would be defining prompts as well as people with disabilities who will receive the prompts.