

INTELLIGENT SYSTEMS DESIGN: SUPERVISING COGNITIVE TELE-REHABILITATION WITH A VIRTUAL THERAPIST

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INTRODUCTION.

Tele-rehabilitation essentially removed the presence of the therapist in the electronic exercises. To further advance the state-of-the-art in tele-rehabilitation, this work investigates the development of a virtual therapist to intelligently guide the patient through the digital rehabilitation exercises using verbal and visual cues.

MATERIALS AND METHODS.

The virtual therapist was developed based on fuzzy logic reasoning and its usability was evaluated by five therapists. Their working experience ranges from 2 to 14 years, with a mean of 5.8 years and a standard deviation of 5.5 years. Two female patients were selected by the therapists for the evaluation. Both Patient "A" (78 years old) and Patient "B" (81 years old) had left hemisphere strokes a year ago. They had similar level of moderate cognitive impairments indicated by similar scores of 4 in the Abbreviated Mental Test (AMT). In addition, both were right hand dominant and can discern vibrations from the data-gloves when interacting with virtual objects. The electronic exercises involved tasks performed in the virtual kitchen. These tasks included locating and selecting the proper utensils, operations of equipment such as the tap and stove, and cooking procedures.

RESULTS.

Table 1: Ratings of the virtual therapist

	Patient "A"			Patient "B"		
	Process support	Cue timing & suitability	Overall therapeutic performance	Process support	Cue timing & suitability	Overall therapeutic performance
Average therapist score	68%	75.2%	68%	76%	78.4%	80%

CONCLUSIONS.

Intelligent virtual rehabilitation is feasible. The basis for the development of the virtual therapist has been established but the system needs refinement, improvement and more clinical trials.

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