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INNOVATIVE TRAINING TECHNIQUES FOR AUDITORY AND LANGUAGE DISORDERS

Effect of Pre-test Sensitization for Auditory Training in Hearing-Impaired Old Adults using Solomon Four Group Design

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BACKGROUND and OBJECT

Traditional pretest/posttest study designs did not take into account pre-test sensitization, which poses a threat to external validity, and thus results were often misinterpreted as rehabilitation effects.
In the current study, we had applied Solomon Four Group Design to confirm the effect of auditory training through a 4-week of Hearing Rehabilitation for Old Adults (HeRO) application program in the elderly.

METHODS and METERIALS

The number of subjects in four groups was calculated based on a normal distribution with effect size f = 0.5, alpha error 0.05, and power 0.95. If the correlation between repeated measurements was 0.5, we would need at least 7 subjects in each group, resulting in assigning 10 older adults per group. A total of 40 older adults with moderate sensorineural hearing loss participated. The average age was 74.63 (±3.79) years, and there were 16 men and 24 women. Participants were randomly assigned to four groups (A, B, C, and D).

The procedure was basically followed by screening, pre-test, post-test and follow-up. The test battery consisted of consonant discrimination/ identification, vowel discrimination/ identification test, matrix sentence test (quiet, + 6dB SNR condition), digit span memory (forward and backward), and KHHIE and COSI questionnaires. Only group A and C rehabilitated for 40 minutes, five days a week for four weeks. Group A and B performed pre-tests, while Group C and D did not. Post-test and follow-up were performed in all groups. (See the Fig.1)

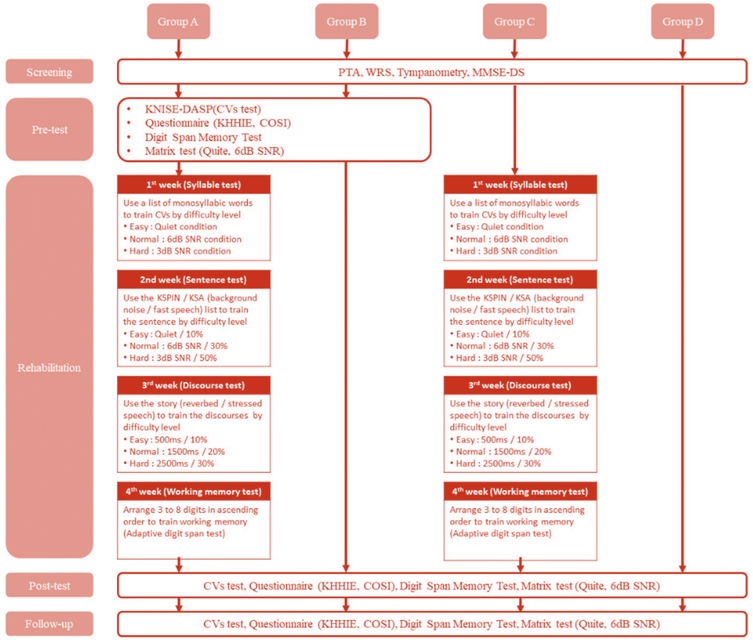

Fig.1. The rehabilitation process of the HeRO application program using the Solomon Four Group Design

RESULTS

As usual, the rehabilitation effect of the pre- and post-tests was compared between Group A and Group B. We found that consonant and vowel discrimination/identification scores and results of the sentence recognition (quiet, +6dB SNR) were significantly increased.

However, KHHIE and working memory (forward and backward digit span) did not have significant changes. On the other hand, when the Solomon Four Group Design was applied, the rehabilitation effect was statistically confirmed only in consonant discrimination/identification, sentence recognition ability (quiet, +6 dB SNR), and backward digit span, but there was no significant difference in the results of the vowel discrimination/identification test, forward digit span, and KHHIE questionnaire between before and after the training.

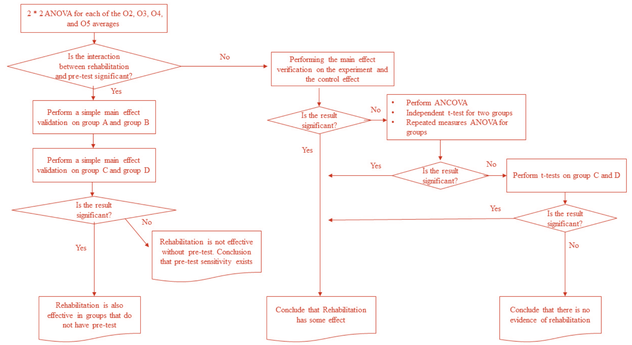

Fig.2. A flowchart of Solomon Four Group Design analysis

CONLCUSION

Pure rehabilitation effects of 4 weeks of HeRO application in older adults were confirmed on consonant discrimination, sentence recognition (quiet, +6dB SNR), and working memory (only for backward digit span). Digit forward span allows us to conclude that pre-test sensitization exists and that KHHIE has no evidence for a rehabilitation effect. In addition, the rehabilitation effect was seemed to affect vowel discrimination ability, but it was not a pure effect. In sum, we propose that future studies of auditory training should consider this possible pre-test sensitization and draw conclusions with caution.

Key Reference

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