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Evaluating the impact of practice conditions (randomized vs. blocked) and schedule (distributed vs. massed) on script training in aphasia

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Background:

A growing body of evidence suggests that intensity of therapy is a critical factor influencing outcomes in aphasia treatment regardless of the treatment approach. However, little information is available regarding scheduling or practice conditions that optimize treatment outcomes. Much of the literature on practice and schedule conditions has come from well-established principles of motor learning. The extent to which these principles apply to aphasia, and to tasks that include not just motor skill learning, but also complex language learning, requires investigation.

Aims:

The purpose of this study was to assess the impact of practice conditions (random vs blocked) and schedule (distributed vs massed) on script training in aphasia.

Methods & Procedures:

Thirty-six participants with aphasia (22 males; 14 females; 24 nonfluent; 12 fluent) were randomly assigned to one of four conditions that varied by practice (blocked versus random) and schedule (massed versus distributed). Overall, mean age was 58.57 (sd=16.83) years; mean time post onset was 35.8 (sd=35.9) months; mean education was 15.8 (sd=2.6) years; and mean WAB-R Aphasia Quotient was 62.96 (sd=14.20).

The treatment used was script training, administered via a computer program called *AphasiaScripts* that has demonstrated positive outcomes across several studies (Cherney et al., 2008, 2011, 2014). To ensure consistency across subjects and across arms, standard scripts were used. The complexity of the scripts was set relative to the participant's language level using methods successfully developed and previously reported (Kaye & Cherney, 2016).

All participants received 18 hours of script training on 12 different days (i.e. 3× 30-minute treatment sessions for a total of 90 minutes on each designated treatment day). Those randomized to the massed schedule arm completed the 18 hours over a 2-week period; those randomized to the distributed schedule arm completed the 18 hours over a 4-week period.

In the blocked practice arm, participants practiced one script at a time. They practiced the first script for 9 hours (6 treatment days) over one week in the massed condition, and over two weeks in the distributed condition. Then they practiced the second script for 9 hours (6 treatment days). In the random practice arm, the two scripts were intermixed with each other within each treatment session. Since each treatment session was 30 minutes long, the participant practiced one script for 15 minutes and the other script for 15 minutes.

Script production probes were taken at baseline (three measures), periodically during treatment, immediately after the end of the treatment period (two probes), and at 2 week and 4 week follow-ups. Probes were audio taped, transcribed, and scored. Reliability measures of at least 90% were considered satisfactory.

Outcomes & Results:

Outcomes of interest were change (gain) in % accurate script-related words and rate of production of script-related words on the trained scripts. Data were analyzed using linear mixed models with fixed effects (practice and schedule) and random effects (PWA). There was no interaction between practice (random/blocked) and schedule (massed/distributed). Main effects also were not significant but important trends emerged, with differential effects depending on whether the outcome was accuracy or rate. Blocked practice had an advantage over random practice for accuracy at both post-treatment and maintenance whereas random practice was advantageous for gains in rate at post-treatment but not at maintenance. Similarly, a distributed schedule had an advantage over a massed schedule for accuracy at both post-treatment and maintenance whereas the massed schedule was advantageous for gains in rate at both post-treatment and maintenance.

Conclusions:

Practice conditions and scheduling have differential effects on accuracy and rate of performance. Results will inform the delivery of script training, with further implications for the delivery of other aphasia treatments.

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