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## LETTER TO EDITOR

# Overcoming COVID-19 Challenges: A Remote Adaptation of the Production Effect Task

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Cognitive and neuropsychological assessment typically involves an evaluation of several cognitive domains, such as attention and memory. Focusing on the latter, various tasks are used to test memory functioning. In recent years, the production effect (PE) paradigm has been used to assess long-term verbal memory in different populations (e.g., adults with acquired dysarthria; Icht, Bergerzon-Biton, & Mama, 2019). The PE refers to an enhanced memory for items read aloud (vocally produced) relative to items silently read at study.

In this Journal, Mama and Icht (2019) have recently compared the PE between a sample of adults with ADHD (before and after self-administration of Methylphenidate, MPH) and a control group. Participants learned a list of visually presented words, half by reading aloud and half by reading silently, followed by a free recall test. The results indicated PEs for all groups, with better memory performance for the controls than for the ADHD group. In the ADHD group, recall rates and the PE were higher with than without MPH. These results have both clinical and theoretical implications.

The coronavirus disease 2019 (COVID-19) crisis and the related social isolation measures (“lockdown”) as a response to its spread have reduced the availability of health care services and research. To continue providing necessary services while protecting patients and participants, health systems and other organizations have been encouraged to develop new and better ways to deliver remote services (Wijesooriya, Mishra, Brand, & Rubin, 2020). This calls for the adaptation of assessment tools and protocols to telehealth (Phillips et al., 2020).

In response to COVID-19 challenges, we conducted a remote adaptation of the PE paradigm. Designing the remote version, we carefully considered several factors (see, Ben-David et al., 2020), as detailed in Table 1.

Sixty healthy participants (mean age: 23.8 years;  $SD = 1.5$  years) were recruited during September 2020. Inclusion criteria are listed in Table 1. Their performance on the remote PE task was compared to a group of 21 participants (mean age: 25 years;  $SD = 2.7$  years) that performed the traditional lab (face-to-face) task, during the months of January–February 2018 (for the full procedure, see Mama & Icht, 2019). Following the study phase, a filler task was conducted, and a free recall test was performed. The results are presented in Table 1, bottom. Statistical analysis (a mixed measures ANOVA, with experimental setting as a between-subject factor, and learning condition as a within-subject factor) revealed a main effect for learning condition, with better recall for aloud than silent words,  $F(1,79) = 20.27$ ,  $p < .0001$ ,  $\eta_p^2 = .20$ . No main effect was found for experimental setting,  $F(1,79) = 1.33$ ,  $p = .25$ ,  $\eta_p^2 = .02$ , nor an interaction between these factors,  $F(1,79) = .92$ ,  $p = .34$ ,  $\eta_p^2 = .12$ .

These results confirm that the remote PE task can be successfully applied to maintain research efforts during the pandemic, extending our understanding on long-term verbal memory abilities of other populations. Further adaptation of experimental and clinical tools is called for to facilitate telehealth-based services.

## CONFLICT OF INTEREST

The authors report that they have no conflicts of interests and no financial disclosures.

## ETHICS APPROVAL

This study was approved by the Institutional Ethics Committee, Ariel University.

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**Table 1.** Traditional (face-to-face) vs. remote production effect task: methods and procedures

	Lab (face-to-face) PE task	Remote PE task
Experimental setting	Quiet room in the lab. An experimenter is present throughout the session. Participants are seated facing the center of a computer screen, at a fixed distance (about 60 cm).	Quiet room at home. An experimenter initiates an interactive video conference (a Zoom meeting) with shared screens and is visible along the experiment. Participants are asked to sit facing the center of a computer screen, at a comfortable distance.
Screening subjects for potential inclusion and obtaining informed consent	Personal data questionnaires administered by face-to-face interview. Inclusion criteria: no reported cognitive, learning, auditory, or visual difficulties.	Personal data self-report computer administered (on-line) questionnaires. Inclusion criteria: no reported cognitive, learning, auditory, or visual difficulties.
Instructions	Given orally by the experimenter prior to the experiment.	Given orally in a preliminary phone conversation and re-presented orally and visually prior to the experiment.
Apparatus	A laptop computer screen (a 15-inch color monitor). Stimuli presented under the control of DirectRT program.	Personal equipment (participants are asked to use personal computer). Stimuli presented using PowerPoint presentations (4 different versions).
Study phase and stimuli	Participants are presented with a list of 40 words and are required to read them aloud (20 words) or silently (20 different words). Each word is accompanied with an icon (microphone, eye) indicating the appropriate learning condition (reading aloud or silently, respectively). Interval between words: 4 sec.	Participants are presented with a list of 30 words and are required to read them aloud (15 words) or silently (15 different words). List length is shorter in the remote version, to maintain cooperation. Each word is accompanied with an icon (microphone, eye) indicating the appropriate learning condition (reading aloud or silently, respectively). Interval between words: 4 sec.
Memory test – Free recall	A written test; a sheet of paper and a pencil are provided by the experimenter.	An online oral test; participants verbally recall the words, and the experimenter documents them.
Total duration (the whole experimental session)	Approximately 30 min.	Approximately 25 min.
Results – Proportion of correctly recalled words, means ( <i>SDs</i> )	Reading aloud: .35 (.11) Reading silently: .27 (.13)	Reading aloud: .34 (.12) Reading silently: .22 (.14)

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