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# Preliminary Validation of the Virtual Version of the Parallel Picture Naming Test for Tele-Assessment of Naming Disorder in Persian Speaking Adult

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Original Article

## Abstract

**Introduction:** In recent years, providing virtual rehabilitation services has become an accepted clinical approach. The findings of studies using telerehabilitation indicate challenges with the validity of scores obtained through this approach to language assessment. As a result, the virtual evaluation of patients must also be conducted in accordance with valid frameworks. In this initial study, we examine the validity of the virtual version of the parallel picture naming test.

**Materials and Methods:** In this descriptive-analytical cross-sectional study, two versions of the Parallel Picture Naming Test (PPNT), each consisting of 109 black-and-white linear pictures of Persian names, were prepared for virtual presentation. Five speech therapists determined the face validity of the virtual versions. Then, the virtual test was administered to 30 healthy adults, and test-retest reliability and equivalent versions were calculated.

**Results:** The images of versions A and B of PPNT had acceptable average impact scores (4.1 to 4.4) and content validity indices (0.99 to 1) for simplicity, clarity, and comprehensibility. The ICCs obtained for version A and version B were 0.88 and 0.79, respectively, which were significant ($P < 0.001$). The difference in scores between the two versions of the virtual test was also not significant ($P = 0.450$).

**Conclusion:** The virtual format of parallel A and B naming tests has suitable face validity and reliability. Given the importance of evaluating naming skills in language and cognitive evaluations, these tests can serve as suitable virtual tools for assessing word retrieval problems remotely. More research on the patient groups is recommended.

**Keywords:** Telemedicine; Picture Naming; Language Tests; Validation; Persian

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## Introduction

Telerehabilitation is a modern method of delivering rehabilitation services that utilizes information and communication technologies to facilitate interaction between therapists and patients. This mode of communication can occur through various technologies such as telephone, internet-based videoconferencing, and sensors. Virtual reality programs, in which patients perform therapeutic tasks within a virtual environment, and the resulting data are

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transmitted to the therapist, are also considered a subset of telerehabilitation (1, 2). Studies have shown that all clinical stages—from diagnosis and assessment to intervention and follow-up of treatment progress—can be conducted through remote communication tools. This approach facilitates rehabilitation interventions for patients and their families, particularly during the acute stages of illness or when access to in-person healthcare services is limited. It also helps reduce healthcare costs (3).

Research in the field of tele-speech therapy has demonstrated that this approach can be applied to a wide range of speech and language disorders resulting from neurological conditions, including aphasia, apraxia, and dysarthria (4–6). With advancements in communication technologies, faster internet speeds, and greater ease of use, tele-speech therapy has become a practical and attractive option for clients, particularly those with physical limitations (3). Nevertheless, questions remain regarding the clinical effectiveness of tele-speech therapy compared with conventional face-to-face approaches, as well as the validity of assessment outcomes obtained through remote administration.

Word retrieval and naming are fundamental components of language essential for speech production (7, 8). Assessment of this skill is among the most common language and cognitive evaluations performed by speech-language pathologists for a variety of clients, particularly individuals with neurological impairments (8, 9). Accordingly, numerous naming tests have been developed in different languages, most of which are based on visual confrontation naming using pictorial stimuli, whereby an individual is asked to name a target picture after viewing it (10). Therefore, in remote assessment of naming ability, it is generally necessary to present visual stimuli clearly.

Several studies have investigated the assessment and treatment of naming skills through internet-based systems. For example, Hill et al. examined the effect of aphasia severity on the feasibility of language assessment via telerehabilitation. They found that aphasia severity had little impact on the accuracy of most subtests of the third edition of the Boston Diagnostic Aphasia Examination administered remotely. However, aphasia severity appeared to affect the assessment of naming and paraphasia through telerehabilitation (5). Agostini et al. compared telerehabilitation-based treatment of anomia, using pictorial stimuli delivered via Skype, with face-to-face therapy in post-stroke patients and found no significant differences between the two treatment modalities (1). In another study, Meyer et al. investigated telerehabilitation for anomia in individuals with Primary Progressive Aphasia (PPA) and reported positive treatment outcomes that met or exceeded expectations for all participants (9).

The Parallel Picture Naming Test (PPNT) is a valid and reliable instrument for assessing naming ability in Persian-speaking adults. It evaluates naming performance and lexical retrieval using word-processing models and psycholinguistic factors that affect word retrieval, such as word frequency, word length, age of acquisition, and picture-word agreement. The test consists of two parallel forms. Its clinical advantages include the arrangement of concepts from easy to difficult and the availability of clearly defined cutoff scores for both versions (10). The face-to-face administration of this test has been widely used for clinical and research purposes in Persian-speaking populations (11, 12). Therefore, examining the accuracy of its results when administered virtually may facilitate the development of additional therapeutic and research applications to improve the quality of rehabilitation services for patients with naming impairments.

Considering the above, the present study aimed to administer the PPNT virtually through an internet-based platform to Persian-speaking adults and to investigate the validity of scores obtained through this mode of administration. Cultural and regional factors, along with access to appropriate communication devices and internet speed, are among the variables influencing remote assessment and intervention (13) and may challenge both the feasibility and validity of testing procedures. The results of this study may inform the development of a protocol to improve the accuracy of language assessment outcomes in adult clients who require remote language rehabilitation services for various reasons.

## Materials and Methods

This cross-sectional descriptive-analytical study was conducted to investigate the validity of scores obtained from the virtual (internet-based) administration of the Parallel Picture Naming Test (PPNT) in adults. The study was carried out after obtaining ethical approval.

The PPNT consists of two parallel versions, A and B, each containing 109 black-and-white line drawings. In a previous study, a Content Validity Index (CVI) of 1.0 was obtained for all items in both versions, indicating that the test content is appropriate for evaluating naming ability in adults. Furthermore, the clarity of the images was confirmed (10). Given the virtual administration format targeted in the present

study and the potential for changes in the images' visual characteristics under this format, the face validity of the virtual administration method for each test version was first assessed. Accordingly, the test was presented virtually to five speech-language pathology experts, who were asked to rate the simplicity, clarity, and comprehensibility of each image using a five-point Likert scale ranging from 1 (very simple, clear, and understandable) to 5. Quantitative face validity was then calculated using the Impact Score (IS) for simplicity and the Content Validity Index (CVI) for clarity and comprehensibility of the test items.

To determine the test–retest reliability of the virtual PPNT scores, 30 neurologically healthy adults were recruited based on the following inclusion criteria: proficiency in Persian, no history of neurological disorders, absence of cognitive impairment as indicated by a score of 24 or higher on the Mini-Mental State Examination (MMSE), no visual or hearing impairments that could interfere with test administration, and access to a mobile phone with a 5.5-inch display, a stable internet connection, and the WhatsApp messaging application. Participants were required to provide informed consent and to use any necessary visual or hearing aids during testing.

After participant selection, the PPNT was administered individually to each participant in two sessions separated by a two-week interval.

The virtual administration procedure was conducted as follows: At the scheduled time, the examiner prepared the test for administration using Microsoft PowerPoint on a laptop computer. Communication between the participant and examiner was established through WhatsApp. The test instructions were explained to the participant. Subsequently, the rear camera of the examiner's mobile phone was positioned approximately 50 cm from the laptop screen to ensure adequate image clarity. Participants first named five practice pictures and then proceeded to the main test stimuli. The examiner observed participants' manner of responding throughout the testing process. Each image in the PPNT was displayed for 10 seconds. Participants' responses were recorded and documented by the examiner. A score of 1 was assigned to each correct response and 0 to each incorrect response, resulting in a maximum score of 109 for each version. Versions A and B were administered on the same day with a 30-minute interval between them.

Finally, the Intraclass Correlation Coefficient (ICC) and a paired T-test were calculated to assess test–retest reliability and parallel-forms reliability, respectively. Data analyses were performed using Microsoft Excel and SPSS version 22.

## Results

In the face validity assessment, the Impact Score analysis indicated that the images in Versions A and B achieved minimum simplicity scores of 3.2 and 3.4, respectively. The Content Validity Index for image clarity and comprehensibility was at least 0.99 for all items (Table 1).

To determine test–retest reliability and the reliability of the parallel forms, the study was conducted on 30 adults (18 women and 12 men) with a mean age of 35.82 years (SD = 6.09) and a mean educational level of 14.06 years (SD = 2.83). The ICC values between the two administrations of the test are presented in Table 2.

For the parallel forms reliability, no significant difference was observed between the scores obtained from the virtual administration of Versions A and B, as indicated by the paired-samples t-test (t = 0.76, P = 0.45).

## Discussion

Today, with advances in technology, telerehabilitation has become an accessible option for both clinicians and patients. In particular, for individuals whose disorders impose limitations (such as many neurological conditions limit mobility) or who face environmental barriers (e.g., long distances from treatment centers), telerehabilitation may serve as a practical alternative for assessment and intervention (14). Consequently, the effectiveness of remote interventions and the efficiency of outcomes from internet-based assessments have become important research questions. In 2025, Teti et al. conducted a systematic review of studies on remote assessment in individuals with aphasia over the previous two decades. They concluded that many of the assessment tools used in these studies exhibited psychometric issues (15).

**Table 1.** Face Validity of the Virtual Version of the Parallel Picture Naming Test

| PPNT | Simplicity (IS) | | | Clarity (CVI) | Comprehensibility (CVI) |
|---|---|---|---|---|---|
| | Mean | Min | Max | Mean | Mean |
| Version A (n = 109) | 4.1 | 3.2 | 5 | 1 | 0.99 |
| Version B (n = 109) | 4.4 | 3.4 | 5 | 0.99 | 0.99 |

**Table 2.** Reliability of the Virtual Version of the Parallel Picture Naming Test (n = 30)

| PPNT | Administration | Mean | SD | Min | Test–Retest | |
|---|---|---|---|---|---|---|
| | | | | | ICC | Reliability |
| Version A | 1st. | 105.63 | 1.40 | 103 | 0.88 | 0.000 |
| | 2nd. | 107.10 | 1.09 | 105 | | |
| Version B | 1st. | 104.46 | 1.10 | 101 | 0.79 | 0.000 |
| | 2nd. | 106.86 | 0.86 | 104 | | |

The present study investigated the validity of scores obtained from the virtual (internet-based) administration of the Parallel Picture Naming Test in adults (10). This test assesses naming ability, one of the most commonly evaluated skills in speech-language pathology and neuro-linguistic examinations (7). Naming ability is typically assessed using visual stimuli, and successful performance requires the individual's attention regardless of the underlying disorder. It is therefore reasonable to assume that certain components of test administration may be altered during remote assessment. This raises the question of whether test validity and performance reliability remain comparable when a standardized protocol is implemented under different administration conditions.

In naming tasks, image quality is one of the factors influencing naming accuracy (16). In virtual administration, where participants view stimuli through a mobile phone or computer screen, visual characteristics may differ from those encountered during face-to-face testing. Therefore, the first phase of the present study focused on evaluating the face validity of the virtual version of the PPNT. Previous research by Tahanzadeh et al. (2017) had already demonstrated satisfactory imageability and face validity of the in-person version of the test (10). In the current study, the face validity of the virtual version was assessed using the judgments of five speech therapists. According to previous studies, an IS greater than 1.5 indicates adequate simplicity and supports retention of the stimulus during testing (17). Since all 109 images in both PPNT-A and PPNT-B received a minimum IS of 3.2, all stimuli were retained for virtual administration.

Furthermore, the Content Validity Index (CVI) values for clarity and comprehensibility were consistent with Lawshe's criteria, based on ratings from the five experts (18). In other words, the test items maintained satisfactory face validity in the mobile-based virtual administration format. They were considered simple, clear, and visually understandable for healthy adults. The 15-item version of the Boston Naming Test (BNT) is among the most widely used naming assessments and has been administered remotely in several studies. Brearly et al. (2017), in a systematic review and meta-analysis of studies employing videoconference-based neuropsychological assessments, concluded that visually based tests such as the BNT are suitable for virtual administration. Nevertheless, they emphasized the importance of validating virtual administration procedures (19).

Test–retest reliability was assessed to determine the stability of participants' responses over time. Numerous internal and external factors may influence test performance and response accuracy (1, 3). During virtual assessments, participants may be affected by internal factors such as fluctuations in attention, cognitive performance, and mood, as well as external factors such as unstable internet connectivity. In the original validation study, test–retest reliability coefficients for Versions A and B of the PPNT under face-to-face administration ranged from 0.95 to 0.98 and were statistically significant (10). Similarly, the present study demonstrated significant reliability for both versions when administered virtually, indicating a high degree of score stability across repeated administrations. However, reliability coefficients obtained through virtual administration (0.91 and 0.82) were slightly lower than those reported for face-to-face administration (10). This difference may be attributable to reduced examiner control over environmental consistency across testing sessions and to variations in participant attention under virtual conditions. Although the present study specifically examined stability within the virtual format and compared the results with previous face-to-face findings, most previous investigations of remote language assessment have focused on comparisons between in-person and remote administration rather than repeated administration within the same modality. Those studies likewise reported no significant differences between administrations formats (1, 5, 19), findings that are consistent with the results of the current study. Additionally, in 2025, Jewell et al. calculated intra-rater reliability for picture-naming performance during selected therapy sessions and reported an agreement rate of 98.8% for virtual sessions (20).

Analysis of parallel-form reliability also revealed no significant differences between the virtual administration scores of Versions A and B of the PPNT. This finding is consistent with results reported for the face-to-face version of the test (10) and with findings

from similar psychometric studies (21). The equivalence of the two forms indicates that they provide comparable assessments and may serve as useful clinical and research tools, particularly for evaluating naming performance before and after treatment.

Overall, the findings suggest that the virtual version of the Parallel Picture Naming Test is a valid assessment tool for adults and that scores obtained through videoconference-based administration demonstrate acceptable reliability.

## Limitations

Despite the numerous advantages of virtual assessment, this mode of administration also presents certain limitations. For example, it is difficult for the examiner to control the participant's environment, and environmental distractions may negatively affect naming accuracy. In addition, the technological requirements of the assessment, including access to high-speed internet and a mobile device with an adequately sized display, may not be available to all individuals (3). These factors constituted limitations of the present study.

## Recommendations

The current study included only neurologically healthy adults. Future studies should investigate individuals with neurological disorders associated with naming impairments, such as aphasia and dementia, and should recruit larger samples. Given the demonstrated validity of the virtual version, the images used in these tests may serve as a suitable foundation for developing specialized clinical software applications. The development of a shortened version of the test is also recommended to facilitate clinical use. As an initial investigation, the present study may serve as a foundation for further validation studies examining the remote administration of various Persian-language assessment tools.

## Conclusion

The virtual versions of the Parallel Picture Naming Tests demonstrated acceptable face validity and reliability. According to the protocol proposed in this study, these tests can be administered via a variety of messaging and videoconferencing platforms. Given the importance of naming ability in language and cognitive assessment, these tests may serve as effective virtual tools for the remote evaluation of word-retrieval difficulties in Persian-speaking populations.

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## Authors' Contribution

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Scientific and executive support of the project: Behnoush Tahanzadeh, Shiva Khodrizadeh
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## Conflict of Interest

The authors did not have a conflict of interest.

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