

Equivalence of Online Remote Versus Traditional In-Person Administration of the **Identi-Fi: A Test of Visual Organization and Recognition**

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INTRODUCTION

As psychologists rely more on technology while navigating the digital world, we must adapt existing psychological assessment tools and create new ones for in-person and online remote administration. PAR is committed to doing everything we can to continue to help you serve your clients and recognize the increasing need for digital assessment options. We offer a library of online rating scales through our PARiConnect platform, which have become very prevalent in the field. Within PARiConnect, our Digital Library houses e-manuals for our products. More recently and due to increasing demand, we have also been providing digital materials that offer flexibility in administration format (e.g., on-screen vs. paper-and-pencil). Through our continued development of e-stimulus books, we have addressed concerns about the cleanliness of paper stimulus books and helped reduce the amount of physical materials needed for administration (i.e., e-stimulus books on a single device vs. multiple paper stimulus books). We've developed e-stimulus materials for both in-person administration and remote administration ([see our administration guidelines for more information](#)).

Individual testing, a major part of neuropsychological assessment, is often time-intensive; it can be challenging to schedule in-person sessions given pandemic-related restrictions. Online remote testing is a convenient and safe way to assess individuals. Because there are now multiple cognitive measures available for online remote assessment, there's a need for additional performance-based tests that can be administered remotely. To that end, PAR developed a process for conducting remote administration of the Identi-Fi: A Test of Visual Organization and Recognition (Reynolds & McCaffrey, 2020). Our current study evaluates the equivalence between online remote administration and traditional in-person administration of the Identi-Fi. The goal is to evaluate the scatter of scores captured by both administration formats (with matched participants based on demographics) in order to determine if the formats are interchangeable and congruent.

The Identi-Fi is an individually administered test of visual organization and recognition. Identi-Fi is composed of two subtests—Visual Recognition (VR) and Visual Matching (VM)—the results of which combine to yield the Identi-Fi Visual Organization Index (VOI). Administration of the two tasks takes approximately 10 minutes.

The Identi-Fi was designed to provide continuity of measurement across a wide age span, so it was standardized with individuals ages 5 to 79 years and conformed with the Trails-X (Hartman & Reynolds, 2019). [Table 1.1](#) describes each subtest and index.

Two types of standard scores are provided: *T* scores ($M = 50$, $SD = 10$) are provided for performance on each subtest, and the VOI is an age-corrected standard score ($M = 100$, $SD = 15$) derived using continuous norming ([Angoff & Robertson, 1987](#); [Evers et al., 2010](#); Gorsuch, 1983; Reynolds, 2014a, 2014b; Roid, 2003; [Zachary & Gorsuch, 1985](#)).

As a measure of visual organization, the Identi-Fi is appropriate for an array of purposes and can be used when assessment of an examinee's visual organizational and visual processing skills is deemed useful or desirable. This may occur in many contexts, including the assessment of individuals with traumatic brain injury (TBI) and other forms of central nervous system (CNS) compromise or evaluation of reading disorders when the clinician suspects the presence of visual perceptual or processing skill deficits that may adversely impact orthographic processing. It's also useful for monitoring recovery following a brain injury or other CNS compromise, whenever right hemisphere dysfunction or deficiencies are hypothesized, and when visual attention is an issue.

Tasks that do not have a large *g*-factor, such as those included in the Identi-Fi, are necessary in the evaluation of various complex functional systems in the brain. Though not as highly correlated with academic success as measures that gauge IQ or other broad cognitive skills such as memory, visual organization skills are narrower, more specific, and clearly associated with compromise in brain functions ([Johansson et al., 2009](#)).

Because developmental issues associated with fine motor control are estimated to exist in referral populations at four times the rate of those in nonreferral populations ([Kaplan et al., 1998](#); [Piek et al., 2008](#)), Identi-Fi is especially useful across referral populations in the assessment of related spatial skills involved in visual organization without the confounding of fine motor issues. Hence, Identi-Fi offers a more accurate measure of visual organization than similar tasks that require fast and accurate fine motor control, such as the rapid assembly of physical puzzle pieces.

Many factors involved with the administration of any assessment can affect the examinee's performance, such as motivation, room conditions, and distractions. We took into account several factors before considering converting traditional, in-person, paper-and-pencil test administration materials and format to a remote administration format. For example, the interactions between the examiner and examinee through a videoconferencing platform, technology challenges, and the alteration from a physical stimulus book to a digital format may influence the examinee's

Table 1.1.
Identi-Fi Subtests and Index

Visual Recognition (VR)	Examinees are presented with a picture of a cut-up illustration of a common object, animal, or body part and must identify the picture solely from the visual presentation, absent physical manipulation of the pieces displayed. Results are presented as <i>T</i> scores ($M = 50, SD = 10$).
Visual Matching (VM)	Examinees are presented with the same cut-up illustrations from the Visual Recognition subtest, in the same order, and must match the cut-up pieces to the illustration that has been completely assembled. Results are presented as <i>T</i> scores ($M = 50, SD = 10$).
Visual Organization Index (VOI)	Provides a summary estimate of visual organization skills as represented in cumulative performance on the two tasks of visual organization included in the Identi-Fi, Visual Recognition and Visual Matching. Results are presented as standard scores ($M = 100, SD = 15$).

responses. Therefore, we felt it necessary to examine whether Identi-Fi results are equivalent in these two administration formats. This study provides psychometric evidence that these two testing methods (i.e., in-person paper-and-pencil vs. online remote) are generally equivalent.

FIDELITY REQUIREMENTS

The Identi-Fi online remote administration data were collected under specific conditions, which are listed in this paper. Results of this study are only generalizable to testing situations that adhere to the fidelity requirements described. Other types of online remote administration of the Identi-Fi have not been evaluated for their potential equivalence to traditional in-person administration. Therefore, practitioners should administer the Identi-Fi remotely only under standardized conditions.

PHYSICAL CONDITIONS

Remote administration of the Identi-Fi took place in a quiet room with no distractions where the examinee was seated in front of a laptop, desktop computer, or tablet with a viewable screen measuring at least 9 inches diagonally through which the examinee verbally and visually communicated with the examiner, who was located in a separate quiet room with no distractions. A high-definition camera was set up so that the examinee's face and desk/work space were visible to the examiner and the examinee could see the examiner's face and digital materials via the digital platform on the screen. The examinee, examiner, and proctor (when used) had a headset with a microphone. When using a desktop or laptop computer, the examinee had a mouse to indicate response choices on the screen, if desired. The proctor, who remained in the room (only with examinees younger than 10 years) seated behind the examinee, redirected the examinee as indicated by the examiner. The examiner followed all standardized administration instructions.

DIGITAL PLATFORM AND DIGITAL STIMULUS

The Identi-Fi stimulus book was converted to an e-stimulus book for use on a digital videoconferencing platform. Careful consideration was given to the fidelity of the images and text on all subtests. In order to maintain accurate presentation of the stimuli, we required both displays (i.e., examiner's and examinee's) to have at least 800 × 600 pixels of resolution quality and a minimum 9-inch diagonal view. The audio was transmitted through the platform (versus other means like a conference phone) to ensure clarity and quality. The examinee used a headset.

We required a video integration system that allowed the examiner to administer the assessment tool and annotate while

sharing the e-stimulus book. For this study, examiners and examinees used Zoom, WebEx, or GoToMeeting. Each platform required the examiner to log in and "admit" the examinee into the test administration session. Test security was maintained as each examiner opened the e-stimulus book and then shared the screen for examinees to view the items. After they were given instructions on how to use the e-stimulus books with the platform, examiners completed a technology check with PAR staff as needed before administering assessments.

EXAMINER TRAINING

In order to participate in this study, all examiners were required to have previous training and skill in psychological assessment and the psychometric concepts of reliability and validity. Although Identi-Fi administration is straightforward, examiners who administer and interpret the results should have formal training in assessment. This training should result in a thorough understanding of test statistics; general procedures governing test administration, scoring, and interpretation; and specific information about the evaluation of cognitive functioning of children, adolescents, adults, and older adults. All examiners for this study were psychologists with previous knowledge and experience administering the Identi-Fi or similar assessments in the traditional in-person format. Some examiners also had previous experience completing online remote assessments. All examiners received training in how to set up the assessment session. Examiners were required to verify that participants had a proper stable internet connection to be included in the study.

Examiners not familiar with remote assessments underwent additional, specific training provided by PAR staff. This consisted of a video to familiarize the examiner with remote assessment, instructions on how to use the e-stimulus book, and individual practice and feedback sessions as needed. Prior to the administration of the online remote Identi-Fi, examiners refamiliarized themselves with all facets of the instrument, including test instructions, scoring guidelines and procedures, and appropriate querying.

PROCTOR TRAINING

Children younger than 10 years had a proctor available (e.g., parent, caregiver, teacher) to assist with computer setup and assure they remained on task. The proctors were recruited and trained by the examiners. Proctors reviewed an introductory document about the project, and examiners coached them on when they were allowed to speak to examinees. For example, proctors were prohibited from providing the child with direct or indirect feedback. Proctors sat behind the child so they would not interfere with the testing session.

EQUIVALENCE STUDY DESIGN

To reduce confounding factors, this study used a demographically corrected normative comparison. Examinees who completed the remote Identi-Fi subtests were demographically matched (age group, gender, and race/ethnicity) with examinees from the Identi-Fi standardization sample, who had taken the traditional Identi-Fi. The two separate samples (in-person and remote) were equal in number and, because of the matching, should be comparable on potentially confounding variables and general cognitive ability.

For the purposes of this study, both significance tests (p values of t -tests) and effect sizes (Cohen's d and omega squared [ω^2]) were calculated to determine if there were significant effects for administration procedure. Cohen's d , which measures the mean differences between two groups, was selected because t -tests were used and the two groups had similar standard deviations and were the same size (Kotrlík et al., 2011). Omega squared, another way to measure effect size, was also selected as it uses unbiased measures of the variance components and is appropriate for small sample sizes (Olejnik & Algina, 2003). The standards of $p \geq .05$, Cohen's $d \leq 0.30$ (Cohen, 1988), and $\omega^2 \leq .03$ (Button et al., 2013; Cohen, 1992; Wright, 2018) were selected as cutoff criteria for a significant effect of the administration type.

IDENTI-FI EQUIVALENCE STUDY

PARTICIPANTS

PAR used known examiners to recruit a sample of 106 examinees ages 5 to 78 years for online remote administration of the Identi-Fi. Payment was provided to all examiners.

Parental consent was granted for all participants younger than 18 years. All participants were fluent in English. Participants were excluded from the study if they presented with hearing or visual impairments that would preclude online assessment or had a diagnosis of a specific learning disability, attention-deficit/hyperactivity disorder (ADHD), or another condition that may impact academic performance.

Each examinee was matched with an examinee of the same age group, gender, and race/ethnicity from the standardization sample, resulting in 212 total examinees. Demographic characteristics of the sample are presented in [Table 1.2](#). Overall, males and females were equally represented. In terms of race and ethnicity, the current sample is relatively comparable to 2020 U.S. Census proportions (U.S. Census Bureau & U.S. Bureau of Labor Statistics, 2020), with Blacks being comparable, Whites being underrepresented (versus census data of 64%), and Hispanic and other races/ethnicities being overrepresented

(versus census data of 14% and 7%, respectively). Other races/ethnicities included American Indians, Alaska Natives, Asian Americans, Pacific Islanders, and any other group not classified as White, Black, or Hispanic.

PROCEDURE

Remote administration. Data for remote administration were collected between October 2020 and January 2021 using 18 examiners who tested examinees in 11 states: Alabama, California, Florida, Georgia, Idaho, Kansas, Maryland, New York, Oregon, South Dakota, and Texas.

All Identi-Fi remote test administrations occurred between two different rooms in different homes or buildings or between two rooms in the same home or building. The Identi-Fi was administered according to the procedures specified by PAR.

We provided examiners with instructions on how to complete each remote administration and mailed print copies of the Identi-Fi Professional Manual to them for additional administration and scoring guidance. Examiners completed a participant enrollment form, which asked for the examiner's site and examinee's demographic information. Examiners were then paid to verify proper internet connection with the examinee; during this setup session, they obtained consent and background information from the examinee. The setup and testing sessions occurred via Zoom, GoToMeeting, or WebEx.

During the testing session, the examiner followed the remote administration instructions (Reynolds et al., 2021) and used the Identi-Fi e-stimulus book. For example, on the Visual Recognition (VR) and Visual Matching (VM) subtests, the examiner used the screen share feature to present and administer all items in the e-stimulus book. On the VR subtest, the examinee provided a verbal response. On the VM subtest, the examinee had the option to respond nonverbally through the use of a drawing tool.

For each subtest, examiners used paper record forms to read the administration instructions and record responses, along with confirming and recording the participant's demographic information.

When the testing session was complete, examiners scored the protocol by totaling the raw scores for each scale and using the normative look-up tables in the Identi-Fi Professional Manual to find and record the age-adjusted T scores and VOI score. At this time, examiners also verified the examinee's demographic information and asked whether there were any issues with the session. Because the Identi-Fi is a published assessment, results were made available to participants or parents of participants

Table 1.2.
**Demographic Characteristics of the Identi-Fi Traditional
 and Remote Administration Samples**

Demographic characteristic	Administration format	
	Traditional in-person	Online remote
Number of participants	106	106
Gender		
Male	53	53
Female	53	53
Age (years)		
Range	5–76	5–78
<i>M</i>	29.27	29.27
<i>SD</i>	22.91	22.96
Race/ethnicity (%)		
White	53%	53%
Black	17%	17%
Hispanic	19%	19%
Other ^a	11%	11%

Note. *N* = 212 (traditional in-person format *n* = 106; online remote format *n* = 106). Participants matched 100% on gender, age group, and race/ethnicity.

^a Includes American Indians, Alaska Natives, Asian Americans, Pacific Islanders, and any other group not classified as White, Black, or Hispanic.

on request. Examiners mailed the completed protocols and examinee enrollment forms to PAR, where staff reviewed each protocol and, if necessary, resolved administration and scoring errors. Examiners were paid for each completed case.

Examinees and examiners were required to confirm they completed the assessment in a quiet room using a headset with a microphone on a desktop computer, laptop, or full-sized tablet. In addition, examiners were required to indicate they followed standardized administration instructions and to note the device they used to administer the test, the videoconferencing platform they used, and any technical difficulties. Finally, examinees who were older than 10 years confirmed they were in the room by themselves.

Matched sample. Identi-Fi remote administration sample cases were matched on age group, gender, and race/ethnicity with controls randomly selected from Identi-Fi in-person standardization sample. For more information about the Identi-Fi standardization sample and procedures, refer to the Identi-Fi Professional Manual (Reynolds and McCaffrey, 2020).

RESULTS

The means and standard deviations of all Identi-Fi subtest T scores ($M = 50$, $SD = 10$) and index scores ($M = 100$, $SD = 15$) for samples using each administration format as well as the total sample are presented in [Table 1.3](#).

Independent-samples t -tests were conducted to determine if there were differences in scores between the traditional in-person and online remote formats. [Table 1.4](#) shows the comparisons between administration formats, both with hypothesis testing (t and p values) and effect sizes (Cohen's d and omega squared). Results of independent-samples t -tests found no statistically significant differences between subtest T scores and index scores between the two groups.

DISCUSSION

In this study, we aimed to examine the equivalence between traditional in-person administration and online remote administration of the Identi-Fi. For the VR and VM subtests (which compose the VOI), there were no significant effects for administration procedure. As a result, the administration procedures for these subtests can be used interchangeably across all ages, and the same norms can be used. The present study suggests that all subtests on the Identi-Fi, when given in the online remote format *using the specified procedure evaluated in this study*, are generally equivalent, and examiners can use the norms of the traditional test. These results are consistent with the meta-analysis completed by [Brearly et al. \(2017\)](#), which indicated that videoconference administration of neuropsychological tests did not result in any significant changes in test scores when compared to in-person assessment.

Finally, these findings demonstrate direct evidence of equivalence between traditional in-person assessment and online remote assessment of the Identi-Fi. The results are also consistent with current literature suggesting indirect evidence of equivalence. Through the cognitive processing demands analysis lens, indirect evidence of online remote assessment and traditional in-person assessment is evidence drawn from research on other tasks or subtests with the same or similar input (i.e., stimulus used) and output (i.e., how the examinee responds) demands (Wright & Raiford, 2021). In our current study, the input demands (i.e., brief spoken directions and picture stimuli) and output demands (i.e., spoken response and item-level time limit) on VR are similar to some subtests on other psychological assessment instruments that have been evaluated for equivalence (see [Dekhtyar et al., 2020](#); Feifer & Champ Morera, 2021; [Sutherland et al., 2017](#); and [Wright, 2018](#)). Similarly, the input demands (i.e., brief spoken directions and picture stimuli) and output demands (i.e., item-level time limit, multiple choice, and pointing) on VM are similar to some subtests on other psychological assessment instruments that have been studied for equivalence (see [Dekhtyar et al., 2020](#); Feifer & Champ Morera, 2021; [Hodge et al., 2019](#); [Wright, 2018](#); and [Wright, 2020](#)).



Table 1.3.
Descriptive Statistics for Identi-Fi
Test Scores by Administration Format

Subtest/index score	Traditional in-person administration		Online remote administration		Total sample	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Visual Recognition (VR)	50.51	7.28	49.20	9.06	49.85	8.22
Visual Matching (VM)	49.25	7.84	47.45	9.12	48.35	8.53
Visual Organization Index (VOI)	99.74	10.32	97.18	12.54	98.46	11.53
N	106		106		212	

Note. Standard scores are provided. Subtest scores are *T* scores (*M* = 50, *SD* = 10). The VOI is an index score (*M* = 100, *SD* = 15).

Table 1.4.
Significance and Effect Size of Administration
Format on Identi-Fi Subtest and Index Scores

Subtest/index score	<i>t</i>	<i>p</i>	Effect size	
			Cohen's <i>d</i>	ω^2
Visual Recognition (VR)	-1.162	.247	0.160	.002
Visual Matching (VM)	-1.543	.124	0.211	.006
Visual Organization Index (VOI)	-1.621	.107	0.223	.008

Note. A positive effect size indicates higher scores with traditional in-person administration (*N* = 212).

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