

The Multilingual Vocabulary Test:
Validity in first-language Afrikaans speaking South African adults

Rhiannon Changuion
ACSENT Laboratory
Department of Psychology
University of Cape Town



Supervisor: Kevin Thomas

Co-supervisor: Julian Siebert

Word count:

Abstract: 245

Main text: 7092

This page is left intentionally blank.

PLAGIARISM DECLARATION**PLAGIARISM**

This means that you present substantial portions or elements of another's work, ideas or data as your own, even if the original author is cited occasionally. A signed photocopy or other copy of the Declaration below must accompany every piece of work that you hand in.

DECLARATION

1. I know that Plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the American Psychological Association formatting for citation and referencing. Each significant contribution to, and quotation in, this essay/report/project from the work or works, of other people has been attributed, cited and referenced.
3. This project is my own work.
4. I have not allowed and will not allow anyone to copy my work with the intention of passing it off as his or her own work.

NAME: Rhiannon Changuion

SIGNATURE: *RChanguion*

STUDENT NUMBER: CHNRHI001

Abstract

South African clinical settings are characterised by resource limitations and a high burden of disease. To prevent increasing case backlogs and misdiagnoses of intellectual disorders, there is a need for brief and psychometrically sound cognitive screening tools. Existing standardised assessments of IQ do not accommodate multilingual individuals who draw on vocabulary from various languages to solve the tasks given to them. The recently developed Multilingual Vocabulary Test (MVT) is a novel and brief (14-item) IQ screening tool that allows the test-taker to respond to each item in any of three languages (English, Afrikaans, or isiXhosa). Initial psychometric studies indicated that the MVT showed promising internal consistency and criterion validity in a sample of university students. This study aimed to assess the validity of the MVT in a more diverse, non-university sample. To fulfil this aim, I administered the MVT to a sample of multilinguals (Afrikaans first language acquired), from a range of educational and socioeconomic backgrounds ($N = 27$). Participants completed a sociodemographic and linguistic profiling questionnaire, two criterion measures (the 12-Item SA-WASI Vocabulary subtest and the Kaufman Brief Intelligence Test-2nd Edition), and the MVT. Analyses focused on assessing the MVT's construct and criterion validity, determining its inter-item reliability, and creating an item difficulty index. Results suggested adequate psychometric properties, but that some item modification may be necessary. This study is an important step in advancing the MVT research project and establishing the instrument as a reliable and valid IQ screening measure in multilingual populations.

Keywords: diverse backgrounds, intelligence testing, linguistic fairness, multilingualism, psychometrics, South Africa

Brief and psychometrically sound cognitive screening tools are needed in resource-limited settings like South Africa. Healthcare systems in such settings are often overwhelmed by clinical demands because the small numbers of highly-trained professionals who service them do not have time to administer comprehensive assessment batteries to all patients in need or to interpret the results of those administrations. Brief screening tools that can be administered by non-professionals are therefore crucial.

Equally crucial is that these tools are sensitive to the linguistic context in which they are to be used. For instance, although most standardised cognitive tests are only available in English, or have only been normed using English-speaking standardisation samples, the use of English-language tests is not optimal in South African clinics (Robbins et al., 2013). Hence, there is a significant linguistic mismatch between available tests and the South African population. Such mismatches are rarely innocuous, often resulting in misdiagnoses or inappropriate interpretations of results (Ortiz, 2007; Shuttleworth-Edwards & Kemp, 2004). Thus, linguistic biases inherent to inappropriately standardised psychometric tests are a primary factor undermining performance of people who are demographically different from standardisation samples (Ferrett, 2011; Kester & Peña, 2002). This is the primary reason why accurate assessment of cognitive functioning is difficult in South Africa.

IQ Testing in a Multilingual South Africa

Topics surrounding the assessment of general intellectual functioning (e.g., cultural appropriateness and language biases in tests) have been debated for decades (Horn & Cattell, 2004; Pietschnig & Voracek, 2015; Raven, 1941; Spearman, 1904). Nonetheless, there is substantial consensus that the construct of general intelligence is comprised of crystallised (verbal) and fluid (non-verbal) components which, when combined, provide an estimate of overall general intellectual functioning, or the full-scale intelligence quotient (FSIQ; Cattell, 1943; Wechsler, 1981).

The most widely used family of IQ tests, the Wechsler scales assume this two-factor structure by adopting verbal and non-verbal subtests. One such example being the Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1955; 2008). The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), a four-subtest instrument (two Verbal subtests, two Performance subtests) that aims to provide a quick yet reliable IQ estimate, has been adapted and normed for local use under the moniker South African-adapted Wechsler Abbreviated Scale of Intelligence (SA-WASI; Ferrett, 2011).

Within the Wechsler framework, Verbal subtests (e.g., Vocabulary, Similarities) are the best predictors of FSIQ (Thierry, 2016). Because the Wechsler tests, like most

standardised IQ assessments, are presented in a single language (usually English), individuals with different language proficiencies, or who are multilingual and who can therefore best express their abilities across more than one language, are disadvantaged (see, e.g., Bennett & Verney, 2018). In a heavily multilingual country, such as South Africa, this disadvantage is a central concern for clinicians, researchers, and educators.

Until relatively recently, the legacy of apartheid-era policies resulted in the exclusion of African languages from the canon of psychometric tests used in South Africa (Alexander, 2013). This condition was clearly unsustainable: South Africa has 11 official languages and almost half of its population is multilingual (Statistics South Africa, 2011). High rates of multilingualism can be attributed to varying combinations of languages being used across homes, schools, and the labour market. In such a linguistically diverse and multilingual population, the use of monolingual (usually English) measures of IQ increases the risk of misdiagnoses and inappropriate interpretations of test results (Sabanathan, Wills, & Gladstone, 2015).

Though possessing a larger vocabulary, spanning across their different languages, multilinguals' vocabulary in any single language is often smaller than that of monolingual individuals in that language (Portocarrero, Burright, & Donovanick, 2007). Hence, when a multilingual individual is assessed using a monolingual measure, only certain subsets of that person's vocabulary might be accessible. This is especially true if, as is the case for many multilinguals, certain concepts and words have been acquired in, and are only used in, specific contexts (Griessel, 2005). Therefore, whereas under ordinary circumstances a multilingual individual might switch languages to complete a task successfully, in a forced monolingual test environment test-relevant information may be unavailable (Bennett & Verney, 2018). If such switching is not allowed, or if test materials are not provided in all of the individual's languages, optimal IQ assessment is not accomplished (Nell, 1999).

Existing Intelligence Measures

IQ test developers have responded in a variety of ways to these and other language-based challenges. Many have advocated using tests, or test batteries, consisting strictly of non-verbal stimuli (e.g., Raven's Advanced Progressive Matrices; Court & Raven, 1993). Their argument is that these tests, which generally estimate overall IQ based on success in completing fluid reasoning tasks, allow for fairer assessment of individuals who are not fluent in the language of, for instance, the Wechsler scales (Hamel & Schmittmann, 2006; Oller, Kim, & Choe, 2000).

The development of such tests and batteries was a clear step toward culturally and linguistically fair IQ testing. However, even though verbal and non-verbal measures of IQ are conventionally viewed as distinct entities, they may not be so. Close inspection of the processing of non-verbal stimuli suggests implicit verbal processing often occurs, even if no verbal instructions are given (Oller et al., 2000). Moreover, verbal IQ (VIQ) appears to be a more reliable estimate of FSIQ than non-verbal IQ (Axelrod, 2002; Wechsler, 1999). Hence, it is unsurprising that verbally-based IQ measures have been the focus of most research in the field.

Within the Wechsler family, the Vocabulary subtest appears to be the most reliable single-test estimate of FSIQ (Oller et al., 2000). South African researchers have therefore developed monolingual translations of this subtest to accommodate individuals not fluent in the language of standardisation (English). For example, Ferrett (2011) developed an Afrikaans version of the WASI Vocabulary subtest, using standard translation and back-translation methods. This adaptation has been used in independent research projects (e.g., Cawthra, 2016) and has been further modified for use in clinical contexts.

Such monolingual translations are helpful for monolingual individuals but (for the reasons expanded upon above) they are not ideal for multilingual individuals. A small body of literature describes attempts to develop linguistically fair psychometric tests for multilingual individuals. For example, Muñoz-Sandoval and colleagues (2005) developed the Bilingual Verbal Ability Test (BVAT), an assessment of general verbal/linguistic ability that permits responses in the test-taker's home language if the initial English prompt does not produce a response. This is an important step in the development of linguistically fair assessments but fails to truly accommodate multilingualism because languages are still hierarchically ranked, with English as the base language of inquiry. Hence, there remains a need for inherently multilingual and truly non-hierarchical assessment.

The Multilingual Vocabulary Test

The need for a truly multilingual assessment tool, tailored to the set of languages an individual draws on in everyday life, is met by the Multilingual Vocabulary Test (MVT; Siebert, 2017, 2018). This instrument, modelled on the SA-WASI Vocabulary subtest (Cawthra, 2016), attempts to address the issues of language hierarchy within neuropsychological assessment and the need for a brief IQ screener. MVT items are presented sequentially, from easiest to most difficult, on a digital interface. The test-taker is required to select the most correct meaning of a presented word from five response options. Each word, and each of the corresponding five response options, are presented in English,

Afrikaans, and isiXhosa simultaneously.¹ Hence, the test-taker can respond to each item in whichever language they prefer, with flexibility to switch languages from item to item. This is useful because multilingual individuals draw on multiple language vocabularies and knowledge bases when responding to cues.

The MVT is still at an early stage of its development. Although it appears to have promising internal consistency ($\omega = .59$) and criterion validity ($r = .46$ and $.52$ with the Kaufman Brief Intelligence Test-2nd Edition and Shipley-2 respectively), these properties have only been established using samples of university students, most of whom were at least English-fluent. The instrument has not been validated in samples of isiXhosa and Afrikaans first-language speakers from varying educational and sociodemographic backgrounds. Moreover, psychometric evaluation of the Siebert (2018) MVT administration suggests that item adjustments were needed before the 2019 administration.

Rationale and Aims

Clinicians and researchers working in resource-limited countries require time-efficient, cost-efficient, linguistically, and culturally fair standardised psychometric assessments in order to ensure that cognitive disorders within their patient populations do not go unnoticed or misdiagnosed. The issue of linguistic fairness is particularly pertinent in countries such as South Africa which have a linguistically heterogeneous population that, ideally, requires inherently multilingual IQ screeners.

Existing standardised assessments of IQ do not accommodate multilinguals who draw on vocabulary from various languages. In response, researchers have published non-verbal IQ measures, monolingual translations of existing English measures, and instruments that allow responses in a second language if an item cannot be completed in English. Each of these is, for various reasons, unsatisfactory in the context of heavily multilingual settings. Hence, the locally-developed MVT has sought to provide a linguistically fair IQ-screening measure that (a) allows responses in English, Afrikaans, and isiXhosa, (b) is brief, (c) is scored automatically, and (d) can be used by lay professionals in resource-constrained clinics and educational settings. Although the instrument has promise, some psychometric properties (e.g., generalisability outside of university samples) remain to be tested. The current study tested the psychometric properties of the MVT (specifically, its construct and criterion

¹The use of these three languages was dictated by the geographic region in which the MVT was developed as they are the most widely-spoken languages in the Western Cape province of South Africa (Statistics South Africa, 2011). The test is, however, easily adapted to accommodate different languages.

validity) in a sample of Afrikaans first-language speakers with diverse educational and socioeconomic backgrounds.

Methods

Design and Setting

The study used a cross-sectional and relational design, correlating performance on the MVT with performance on two criterion measures: the 12-Item SA-WASI Vocabulary Subtest (SA-WASI; Cawthra, 2016) and the Kaufman Brief Intelligence Test-Second Edition (KBIT-2; Kaufman & Kaufman, 2004). Further analyses characterised the MVT's item-total correlations, item difficulty characteristics, and internal consistency. Study procedures were conducted in community centres and workplaces around Cape Town in a quiet, private room.

Participants

I recruited healthy volunteers ($N = 27$; age range = 26–60) using convenience and snowball sampling from community centres and workplaces in Cape Town. Sampling was largely done at a factory in Maitland which led to the subsequent snowball sampling of other participants. Individuals were self-reported multilingual Afrikaans and English speakers. Those with current or past experience of neurological, endocrinological, psychiatric, or psychological disorders were excluded from participation due to the potential influence of these conditions on cognitive performance (Hebben & Milberg, 2009). Individuals with current prescription for chronic medication were also excluded, for similar reasons (Lezak, Howieson, Bigler, & Tranel, 2012). There were no eligibility criteria related to education, occupation, employment status, or socioeconomic status.

Measures

Each participant was administered the following paper-and-pencil instruments.

Sociodemographic questionnaire. This brief (five-min) study-specific questionnaire (see Appendix A) gathered self-reported biographic (e.g., age, sex, level of education), socioeconomic (e.g., area while growing up, school setting), and medical information. It also asked about language of educational instruction to assist in establishing the participant's linguistic profile. This questionnaire also ensured that all eligibility criteria were met.

Adapted Language Experience and Proficiency Questionnaire (LEAP-Q). A translated and back-translated version of this instrument (Siebert, 2017, 2018; see Appendix B), which allowed participants to answer in either English or Afrikaans, assisted in establishing the participant's linguistic profile. Specifically, it asked about language dominance, order of language acquisition, language preference, and years spent in each

language environment, and helped to establish if participants were multilingual Afrikaans and English. Administration time was approximately 10 minutes.

Regarding psychometric properties, the original version of the LEAP-Q (Marian, Blumenfeld, & Kaushanskaya, 2007) has high internal consistency ($\alpha = .85$). Importantly, other linguistic adaptations of the instrument appear to retain the same construct validity as the original (Bilingualism and Psycholinguistics Research Group, 2017).

9-Item Patient Health Questionnaire (PHQ-9). This instrument (Spitzer, Kroenke, & Williams, 1999; Spitzer et al., 1994; see Appendix C), which is based on the Primary Care Evaluation of Mental Disorders (Kumar, Kim, Krefetz, & Steer, 2001), assessed whether participants presented with depressive symptoms. Each item reflected one of the DSM-5 (American Psychiatric Association, 2013) diagnostic criteria for major depressive disorder (MDD). Responses were scored on a Likert-type scale with response options ranging from zero (*does not experience symptoms at all*) to three (*experiences symptoms nearly every day*). The conventional cut-off indicating a likelihood of being diagnosed with MDD is a score ≥ 20 (Kroenke, Spitzer, & Williams, 2001). Individuals with scores exceeding this threshold were excluded from the study because MDD affects cognitive functioning negatively (Rock, Roiser, Riedel, & Blackwell, 2014). Administration time was approximately five minutes.

Regarding psychometric properties, the PHQ-9 has high internal consistency ($\alpha = .81$; Titov et al., 2011) and test-retest reliability ($r = .92$; Gelaye et al., 2013). The instrument has been used successfully in South African clinical and research settings. For instance, Cholera et al. (2014) showed that, within a randomly selected subset of HIV-infected individuals at a Johannesburg clinic, there was a 75% post-test probability of being diagnosed with MDD if the respondent scored ≥ 20 .

12-Item SA-WASI Vocabulary subtest. This instrument (Cawthra, 2016; see Appendix E) assessed expressive vocabulary and verbal knowledge. It was the first of the study's two criterion measures. Administration followed the standard format of the Wechsler Vocabulary subtest (Wechsler, 1999). That is to say, it was administered orally, one-on-one, with participants required to explain the meaning of an English word read aloud to them by the researcher (Cawthra, 2016). Words were presented in a graded sequence, from least to most difficult. Each response was judged against a formal scoring rubric (see Appendix F) and received a score two (correct and comprehensive response), one (directed but incomplete response), or zero (vague or irrelevant response). Administration time was approximately 15 minutes.

Regarding psychometric properties, the developer indicated that the instrument has high internal consistency (Cronbach's $\alpha = .82$) and good construct validity, correlating at .76 and .70 with SA-WASI Verbal IQ and FSIQ scores, respectively.

Kaufman Brief Intelligence Test-Second Edition (KBIT-2). This brief (25-min) cognitive test battery measures both crystallised and fluid intelligence and is appropriate for use with individuals aged 4–90 years (Kaufman & Kaufman, 2004). It was the second criterion measure. The Verbal Knowledge subtest required the participant to choose one picture from a selection of six which best described the phrase read aloud by the researcher. The Matrices subtest required the participant to choose, from an array of six pictures, the one that best completes a 2x2, 2x3, or 3x3 matrix. Both the Verbal Knowledge and Matrices subtests are presented in a multiple-choice response format, ensuring that the KBIT-2 is a sound comparative tool for the MVT. The Riddles subtest required the participant to provide unprompted verbal responses to riddles and descriptions presented orally by the examiner. Here, no visual prompts were provided; the examiner simply read out the scenario or riddle, usually starting by saying, “What is...” and waited for the participant’s response.

Regarding psychometric properties, the KBIT-2 has high internal consistency ($\alpha = .93$) and outstanding construct validity, correlating .90 and .89 with WASI FSIQ and WAIS-III FSIQ scores, respectively (Bain & Jaspers, 2010; Kaufman & Kaufman, 2004). In South African research, this measure has been used successfully to assess the general intellectual functioning of a sample of mildly intellectually disabled, multilingual adolescents between that ages of 12 and 15 (Dada, Huguet, & Bornman, 2013).

Multilingual Vocabulary Test (MVT). I administered a 14-item version of the MVT (see Appendix G) featuring the most psychometrically sound items reported by Siebert (2018). Regarding psychometric properties of the instrument, the developer reported that internal consistency was promising ($\omega = .59$), as was criterion validity against the KBIT-2 and Shipley-2 Vocabulary subtests (.54 and .61, respectively). Administration time was approximately 10 minutes.

Qualitative interview. A brief (five-min) semi-structured interview (see Appendix H) gathered information about participants’ experience of the MVT. Questions focused mainly on the MVT as compared to the 12-Item SA-WASI Vocabulary subtest and the overall experience of the MVT.

Procedure

Each participant was tested individually by either myself (a multilingual Afrikaans and English speaker) or one of my research assistants who were all currently enrolled in an

undergraduate degree at the University of Cape Town. I was present at each testing session to ensure correct test administration and quality control. The entire test session lasted approximately 75 minutes.

Immediately after the participant arrived at the study site, the researcher administered informed consent procedures (see Appendix H). Thereafter, the participant completed the PHQ-9, sociodemographic questionnaire, and the adapted LEAP-Q, in that order. Upon completion of these measures and subsequent assurance of participant eligibility, the researcher administered the MVT, 12-Item SA WASI, and KBIT-2 in a block-randomised order. After the last of these tests was complete, the researcher presented the participant with the set of semi-structured questions. Finally, the participant was debriefed, given an opportunity to ask questions about the research, and presented with a hard-copy debriefing form (see Appendix I). I received ethical clearance from the University of Cape Town Psychology Department Research Ethics Committee – Reference number: PSY2019-038 (see Appendix J).

Data Management and Statistical Analyses

SPSS (version 25.0) and Excel were used for all statistical analyses, with α set at .05 for all decisions regarding statistical significance. In correlational analyses, values less than .40 were interpreted as low, between .40 and .70 as moderate, and above .70 as high (Lachenicht, 2013). When assumptions underlying parametric statistical tests were not met, the appropriate non-parametric test was used.

Preliminary analysis. I compiled a set of descriptive statistics in order to provide an initial summary of participant sociodemographic and linguistic characteristics as well as their overall test performance on all criterion measures. This also enabled the testing of assumptions underlying subsequent parametric statistical tests.

Psychometric analysis. First, I assessed criterion validity by conducting bivariate correlational analyses (using Pearson's r correlation coefficient) to establish the magnitude of association between performance on the MVT and that on each of the criterion measures. Second, I calculated difficulty scores for each item to establish the frequency of correct responses. Lastly, I estimated internal consistency of the MVT across both language groups using Cronbach's α .

Ethical Considerations

Consent and Confidentiality

Informed consent was obtained from the participants before completing any questionnaires or test procedures. A comprehensive informed consent document outlined the

purpose and procedure of the study, explained that participation was voluntary, and informed participants they were free to withdraw from the study at any time with no consequences. Data collected from participants was kept confidential by assigning them each a number so that their data could not be linked back to them. Hardcopy data, including the key linking individual identifying information to the anonymised study identification number, are kept in a secure, locked cabinet in the UCT Department of Psychology. Electronic data are stored on a password-protected computer. Any publications or public presentations emanating from this research will not include any identifying information about participants.

Risks and Benefits

There were no physical, psychological, or psychosocial risks of participation, and participants reported no adverse events. Those who scored highly (≥ 20) on the PHQ-9 were referred to non-governmental organisations that provide counselling services (e.g., LifeLine Western Cape and the South African Depression and Anxiety Group). Each participant was provided with light refreshments and entered into a raffle to win either a R500, R300 or R200 Checkers voucher.

Debriefing

The researcher conducted a verbal debriefing once the study procedures were concluded. Once formal debriefing was complete, the participant was given a hardcopy debriefing form, and they were given the opportunity to ask questions.

Results and Discussion

Sample Characteristics

Interpretation and discussion of this study's results is aided by a comparison with the Siebert (2018) MVT administration because, even though that study and the current one employed similar methods and procedures, their samples were considerably different. Most of Siebert's sample ($N = 494$) were undergraduate students, with a mean age of 19.53 years and mean of 12.73 years of education. Although all individuals in Siebert's sample reported being multilingual, almost 65% of them reported they had acquired English first, and more than 80% reported that their dominant language was English. Conversely, the current sample ($N = 27$) had a mean age of 41.42 and a mean of 13.72 years of education. Although all individuals in this sample reported being multilingual, almost 67% of them reported that they had acquired Afrikaans first, and more than 70% reported that their dominant language was English.

Table 1 summarises the current sample's key sociodemographic characteristics. Overall, all participants had completed at least primary school (i.e., had attained at least seven years of education). On average, however, they had completed more than 13 years of education; 24 (88.88%) had completed high school and attained a matric certificate. Regarding SES, I classified participants using South African census data (F. Mohideen, personal communication, May 27, 2019) on suburb-level income category (low, low-to-medium, medium, medium-to-high, high). Using this rubric, and taking into account the suburb each participant reported living in while growing up, most could be classed as emerging from a medium background. Regarding linguistic profile, self-reported language acquisition was mainly Afrikaans whereas self-reported current language dominance was mainly English.

As Table 1 shows, analyses detected no significant sex differences on any of the measured variables. All assumptions for the *t*-tests were upheld apart from homogeneity of variance for the years of education variable. In that case, results based on equal variances not assumed are presented. Similarly, all assumptions for the chi-squared tests were upheld, apart from that related to adequate cell-size observations for the language acquisition and language dominance variables. In those cases, I used Fisher's test.

Table 1.
Sample Sociodemographic Characteristics (N = 27)

Variable	Total (N = 27)	Male (n = 12)	Female (n = 15)	95% CI		Sex Differences		
				LL	UL	t / X ²	p	ESE
Age	41.52 (8.52)	42.42 (9.13)	40.80 (8.10)	-4.18	7.41	0.56	.576	0.19
Years of Education	13.72 (2.80)	13.96 (2.45)	13.53 (3.06)	-1.43	2.28	0.47	.642	0.16
SES by Area	2.63 (.742)	2.75 (.87)	2.53 (.63)	-0.27	0.70	0.90	.372	0.29
Education Quality	2.62 (1.02)	2.27 (1.01)	2.53 (1.04)	-0.54	-0.56	0.53	.597	0.25
Language Acquisition				-0.15	0.55	0.14	.712	.23
Afrikaans	18 (66.67)	8 (66.67)	10 (66.67)					
English	8 (29.63)	3 (25.00)	5 (33.33)					
Other	1 (3.70)	1 (8.33)	0					
Language Dominance				-0.10	0.59	2.10	.147	.28
Afrikaans	8 (29.63)	2 (16.67)	6 (40.00)					
English	19 (70.37)	10 (83.33)	9 (60.00)					
Language Instruction				-0.08	0.60	2.44	.295	.30
Afrikaans	13 (48.15)	4 (33.33)	9 (60.00)					
English	7 (25.93)	4 (33.33)	3 (20.00)					
Both	7 (25.93)	4 (33.33)	3 (20.00)					

Note. For continuous variables (*Age, Years of Education, SES by Area, Education Quality*), means are presented with standard deviations in parentheses. For categorical variables (*Language Dominance, Language Acquisition, Language Instruction*), frequencies are presented with percentages in parentheses. If percentages do not add to 100, it is due to rounding. Between-group differences were assessed using independent samples *t*-tests for continuous variables and chi-squared tests of contingency for categorical variables. CI = confidence interval; LL = lower limit; UL = upper limit; ESE = effect size estimate (in this case, Cohen's *d* for *t*-tests and Fisher's *r* for chi-squared tests of contingency). SES = socioeconomic status.

Participant Test Experience

Responses to the brief semi-structured qualitative interview conducted at the end of the testing session suggested that all participants evaluated the MVT positively even when they had a few critiques. For instance, 20 participants (74.07% of the sample) remarked that the MVT was easier than the criterion measures. For example, one participant explicitly said, *“The multiple-choice test was much easier”*. Twelve participants (44.44% of the sample) reported that having all the languages presented ‘hinted’ at the answer and allowed them to draw on their knowledge of both English and Afrikaans. For example, one participant said, *“[The] Afrikaans gave you a hint as to what it was and what the test was looking for. There were almost two clues that drove you towards picking the most correct answer.”* A significant minority of participants ($n = 7$; 25.93% of the sample) explicitly indicated a positive attitude to having multilingual tests as a premise for future researchers to build upon. For example, one participant said, *“We [South Africans] probably need tests like this more.”*

Some participants highlighted negative aspects of their MVT experience. Two indicated that they did not like the fact that there were multiple correct answers in the MVT and that they had to choose the most correct one. Two participants also indicated that the MVT was confusing at first (although they did note that they eventually grasped and understood what was required of them).

Performance on Outcome Measures

Table 2 displays the sample’s test performance on all outcome measures. All assumptions for the t -tests were upheld, and the analyses detected significant sex differences (in favour of men) for KBIT-2 PIQ and FSIQ scores. In both cases, the magnitude of these differences was associated with a large effect size. This sex difference is not surprising: Previous studies have reported that men tend to significantly outperform women on PIQ measures (see, e.g. Kaufman, Kaufman, Liu, & Johnson, 2009). Because FSIQ is simply a weighted combination of PIQ and VIQ, the significant sex difference on that outcome variable is attributable to the PIQ sex difference.

There were no other significant sex differences, but further inspection of the sample’s performance on the outcome measures highlighted that participants achieved particularly high scores on the MVT compared to the two criterion measures. These high MVT scores can be attributed to how participants experienced the MVT as well as critiques associated with multiple-choice formats. Wesche and Paribakht (1996) suggest that tests employing multiple choice questions (MCQs) can create an over-estimation of abilities because test-takers can use guessing and processes of elimination to improve their scores. Along the same lines is the

argument that MCQ items may test the knowledge of distractors rather than the target word (see e.g. Wesche & Paribakht, 1996). This proposal is supported by information gathered from the post-test semi-structured qualitative interview in which many participants reported that the multiple-choice MVT items “hinted” at the correct answer. An encouraging report, however, was that participants stated they could draw on all the languages they knew to rule out distractors and hone in on the correct response. In other words, the MCQ format of the MVT, allied with the fact that the items are presented in multiple languages, made the test easier for the participants and could explain their relatively high overall scores.

Table 2.
Performance on Outcome Measures (N = 27)

Measure	Total (N = 27)	Male (n = 12)	Female (n = 15)	95% CI		Sex Differences		ESE
				LL	UL	t	p	
12-Item SA-WASI	10.83 (4.30)	11.92 (3.75)	10.27 (5.13)	-1.61	4.91	1.02	.313	.37
MVT	19.71 (3.65)	20.50 (3.06)	19.73 (3.81)	-1.70	3.23	0.63	.533	.22
KBIT-2								
VIQ	92.77 (14.41)	97.67 (14.04)	91.40 (15.19)	-3.87	-3.88	1.25	.219	.43
PIQ	103.43 (13.28)	113.33 (10.52)	97.67 (11.12)	8.11	23.22	4.31	< .001***	1.45
FSIQ	97.74 (13.22)	105.67 (12.26)	93.87 (11.61)	3.20	20.40	2.87	.010*	.99

Note. Means are presented with standard deviations in parentheses. CI = confidence interval; LL = lower limit; UL = upper limit; ESE = effect size estimate (in this case, Cohen's *d*); MVT = Multilingual Vocabulary Test; KBIT-2 = Kaufman Brief Intelligence Test-Second Edition; VIQ = verbal intelligence quotient; PIQ = performance intelligence quotient; FSIQ = full-scale intelligence quotient. 12-Item SA-WASI and MVT scores are raw scores; KBIT-2 scores are standardised scores.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Criterion Validity Analyses

Table 3 shows the correlations between MVT and criterion measure performance. Data used in these analyses were raw scores for the 12-Item SA-WASI and MVT and age-adjusted standard scores (conversion obtained from the test manual) for the KBIT-2 variables. All assumptions underlying this analytic technique were upheld.

MVT scores were non-significantly positively correlated with scores on the 12-Item SA-WASI, KBIT-2 PIQ, and KBIT-2 FSIQ (all p s > .10). MVT performance was, however, significantly positively correlated (at moderate strength, $p = .039$) with the KBIT-2 VIQ.

Although this latter result indicates that the MVT shows promise in achieving criterion validity when evaluated against purely verbal measures of general intellectual functioning, the weak relationship between MVT performance and that on the other criterion measures seems to indicate that criterion validity is not met here. Alternatively, the low correlations could be indicative of a ceiling effect (the achievement of high scores due to too few difficult items in a test; Ho & Yu, 2015) being present in the MVT. However, the current data and state of the instrument do not allow one to discern whether there really is a ceiling effect or whether MVT performance was considerably better than that on the criterion measures. This is because it was the only instrument that allowed multilingual individuals to be fairly assessed in all the languages that they knew (i.e., if the other instruments underestimated their IQ while the MVT provided a more accurate estimate of their general intellectual functioning). Further nuances to this question are discussed in subsequent sections.

Large score discrepancies between the MVT and the two criterion measures could suggest any of the following: a) the criterion measures are not appropriate, b) the MVT itself is not an appropriate IQ measure or, c) the multilingual aspect of the MVT allowed participants to better understand the items because they could access knowledge that they had acquired in all the languages they know.

Table 3.

Correlational Analyses: Associations between MVT and criterion measure scores (N = 27)

	1	2	3	4	5
1. MVT	1.00				
2. 12-Item SA-WASI	.19	1.00			
3. KBIT-2 VIQ	.40*	.59**	1.00		
4. KBIT-2 PIQ	.16	.36	.47**	1.00	
5. KBIT-2 FSIQ	.32	.54**	.88***	.83***	1.00

Notes. Data presented are Pearson's r correlation coefficients with p values in parentheses. Statistically significant correlations are highlighted in boldface font. MVT = Multilingual Vocabulary Test; KBIT-2 = Kaufman Brief Intelligence Test-Second Edition; VIQ = verbal intelligence quotient; PIQ = performance intelligence quotient; FSIQ = full-scale intelligence quotient. 12-Item SA-WASI and MVT scores are raw scores; KBIT-2 scores are standardised scores.

* $p < .05$. ** $p < .01$. *** $p < .001$

Score Distributions: Siebert (2018) versus Current Administration of the MVT

Figure 1 shows the distribution of scores for Siebert's (2018) MVT administration. This distribution is normal but skewed to the left. Figure 2 shows the distribution of scores for the current study's administration of the MVT. This distribution is approaching a normal distribution and is also skewed to the left. The difference in distribution is likely due to the small sample size used in the current study. The left skew of the scores further supports the proposal that participants achieved relatively high scores on the MVT because of how participants reported experiencing the MVT and critiques associated with multiple-choice formats. The present skew could also be indicative of the fact that the multilingual aspect of the MVT allowed participants to better understand the items because they could access knowledge that they had acquired in all the languages they know. Classical Test Theory (CTT) states that increasing the number of items on a test tends to improve its validity and normality distributions. This is strongly linked to the 'ceiling effect' described above for the MVT.

One clear suggestion here, then, is that the MVT would benefit from adding more difficult items—this would improve both score distribution and validity.

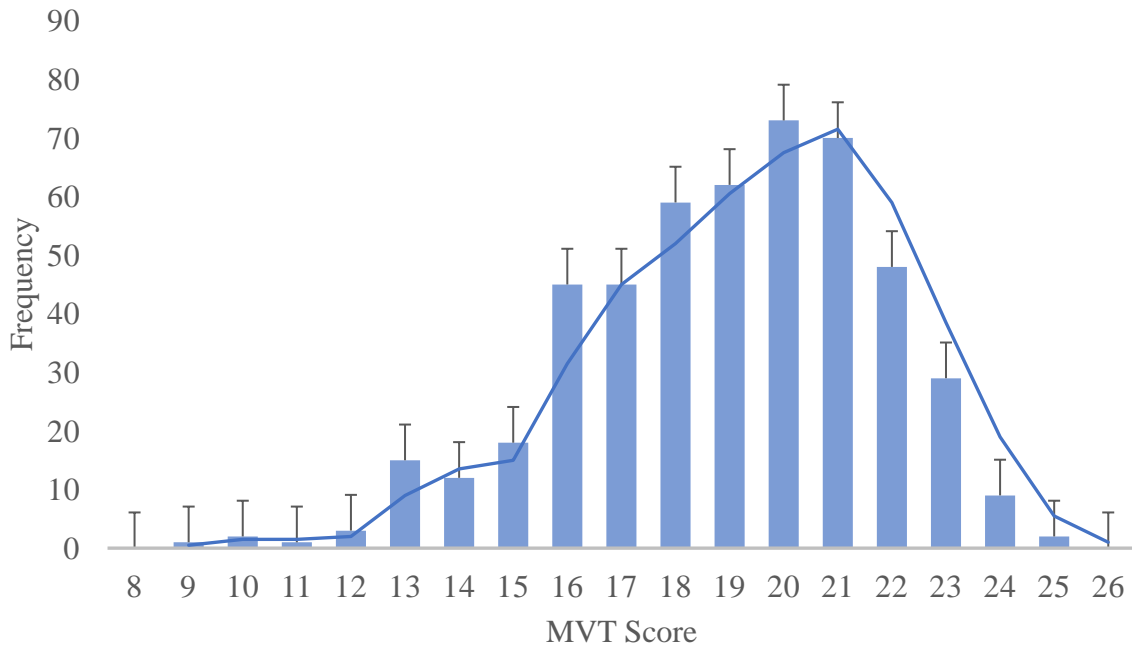


Figure 1. Distribution of MVT scores for the Siebert (2018) administration of the instrument ($N = 494$). The entire range of scores is depicted.

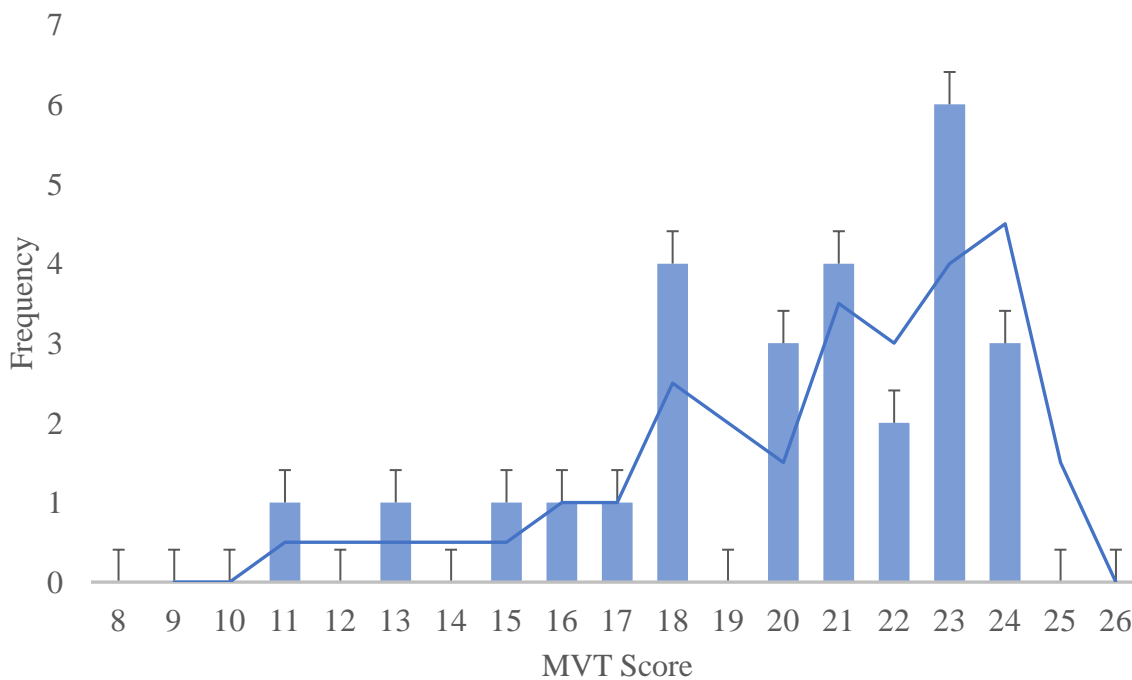


Figure 2. Distribution of MVT scores for the current administration of the instrument ($N = 27$). The entire range of scores is depicted.

Item Analysis Comparison: Siebert (2018) versus Current Administration of the MVT

Item difficulty curves. Figures 3 and 4 show the relative item-difficulty curves per item for the Siebert (2018) and current MVT administrations, respectively.

In Siebert's administration, items 13 (*picture / prent / umfanekiso*) and 14 (*atoll / atoll / isiqhiti esisangqa*) had particularly high correct response rates in relation to other items toward the end of the test. Moving these items to earlier in the test would have been better – possibly between items 7 and 8 to ensure a more accurate item difficulty curve. Furthermore, items 11 (*impetuous / oorhastig / -dyuduzayo*) and 10 (*pretentious / pretensieus / ukuzenzisa*) should have been swapped around as item 11 had a slightly higher response rate.

In the current administration, items 11 (*impetuous / oorhastig / -dyuduzayo*), 12 (*train / trein / uloliwe*), 13 (*picture / prent / umfanekiso*), and 14 (*atoll / atoll / isiqhiti esisangqa*) had a particularly high correct response rate in relation to the other items toward the end of the test. Should the items be retained, items 11 and 14 should be moved to between items 8 and 9, item 12 to between items 7 and 8, and item 13 between items 10 and 11. Interestingly, item 2 (*conversion / omskakeling / ukuguqula*) had a particularly low correct response rate in relation to the other items at the beginning of the test. This piece of data allows speculation that it would thus be better to move this item to between items 8 and 9.

In sum, item difficulty data from both Siebert's (2018) administration and the current administration suggest that the order of item administration on the MVT needs to be changed considerably. Based on a combination of both administrations, a potential new order of items could be: 1, 3, 4, 5, 6, 7, 12, 8, 11, 14, 13, 2, 9, and 10.

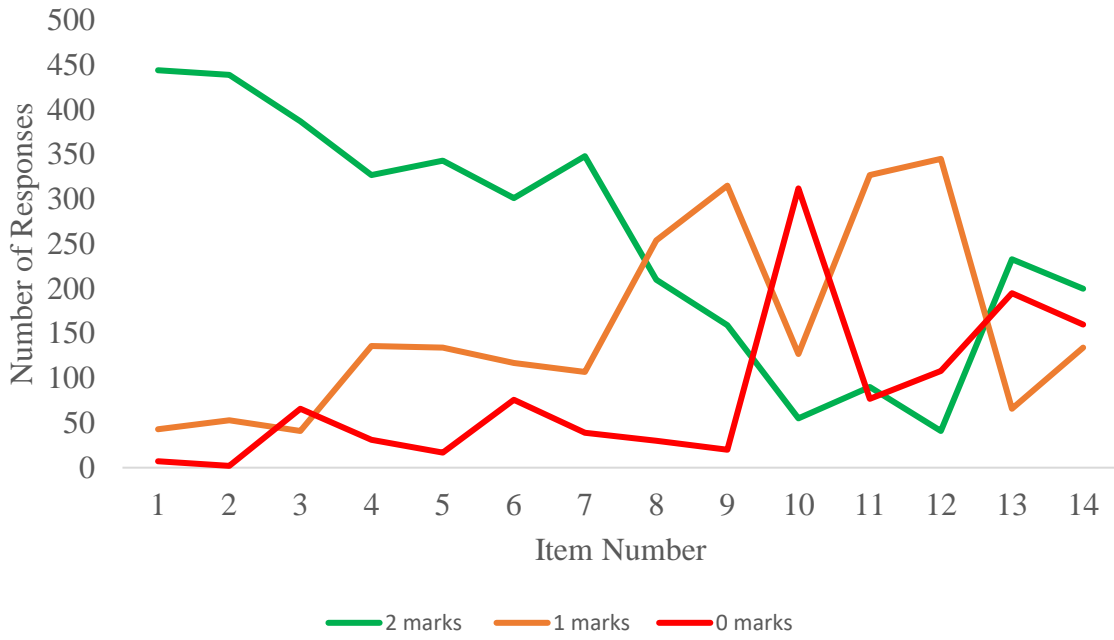


Figure 3. Relative item difficulty curves for the Siebert (2018) MVT administration ($N = 494$). Items are arranged in the current administration order.

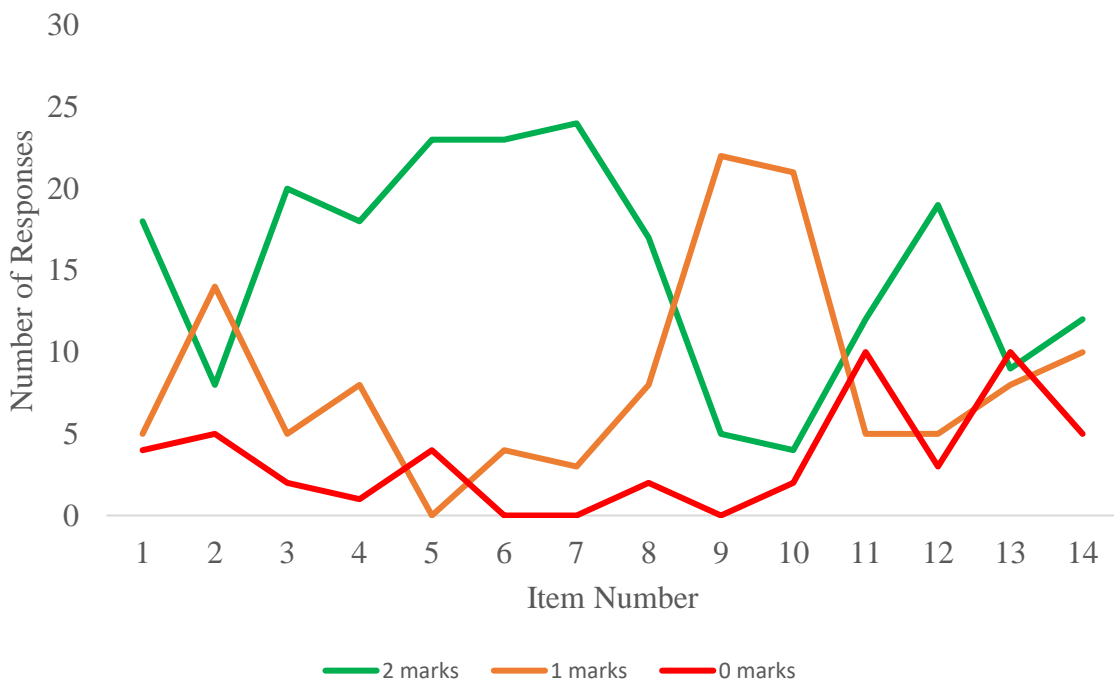


Figure 4. Relative item difficulty curves for the current MVT administration ($N = 27$). Items are arranged in the current administration order.

Item difficulty scores. Table 4 shows item-difficulty and item-total correlations for the current administration of the MVT compared to the Siebert (2018) administration. It also shows the language response proportions for the current administration. While most items showed similar difficulty scores across the two administrations, a few thought-provoking items (1, 2, 11, and 12) stand out as being worthy of discussion.

Items 1 (*suggest / voorstel / ukucebisa*) and 2 (*conversion / omskakeling / ukuguqula*). These items appeared to be more difficult for the current sample than for the Siebert (2018) sample. When inspecting these items more closely, some response options for items 1 and 2 possess subtle nuances and require critical thinking to attain the wholly correct answer (*propose / aanbeveel / ukuveza iimbono* and *change / verandering / utshintsho*, respectively). Hence, one explanation for the item-difficulty discrepancy is that although the current sample have, on average, a higher number of years of education than the Siebert (2018) sample, they were, at the time of testing, not studying toward a tertiary degree like all of the individuals in Siebert's sample were. Those who were undertaking such studies may have been using and thinking about these words critically in their studies and may therefore have been more sensitive to the nuances the words hold (Seamon, Lee, Toner, Wheeler, Goodkind, & Birch, 2002).

Item 11 (*impetuous / oorhastig / -dyuduzayo*). This item appeared to be easier for the current sample than for the Siebert (2018) sample. A clue hinting at the reason for this discrepancy may be that this item had a relatively high Afrikaans response rate in the current sample. This might have been because the English word *impetuous* is not one with which people, with Afrikaans as the first acquired language, would be familiar. On the other hand, the Afrikaans translation option (*oorhastig*) is more literal (a literal translation might be *overhasty*) and descriptive and is used more often in everyday conversations (Viljoen, 2006).

Item 12 (*train / trein / uloliwe*). This item appeared to be easier for the current sample than for the Siebert (2018) sample. One possible reason for this discrepancy is an age-cohort effect. The most correct answer for this item is *locomotive / lokomotief / inqwelo enamakhareji*, a word more likely to be used and understood by older than younger adults (Jackson, 2013). If one considers that the current sample contained many more middle-aged and older adults than did the Siebert (2018) sample, differing item difficulty scores are plausible.

Internal consistency. Table 4 also shows both overall Cronbach's alpha values and alpha values should each individual item be deleted for the current administration of the MVT compared to the Siebert (2018) administration. The 14-Item MVT used in Siebert's

previous administration shows poor internal consistency ($\alpha = .28$), suggesting that the abbreviated version of the instrument was not appropriate in the sample used. Deleting items did not appreciably improve the internal consistency. However, when longer versions of the test (i.e. the 24-Item MVT) were administered by Siebert (2018), internal consistency increased ($\alpha = .48$), suggesting that a longer test would improve the MVT's reliability.

Analyses of data from the current MVT administration suggest the instrument shows marginally better, but still poor, internal consistency ($\alpha = .54$). Item deletion evaluation suggested that items 1, 5, and 8 should be retained, whereas items 11 and 14 could be deleted, to improve internal consistency.

Overall, however, the current data together with the Siebert (2018) data suggest the MVT requires revisions in order to improve its reliability. Classical Test Theory (CTT) and Item Response Theory (IRT) express conflicting views with regard to whether one of those revisions might include increased test length. Whereas CTT suggests that the reliability of a measure can be increased if more items are included, IRT suggests this is not necessarily true (i.e., that shorter tests are acceptable if the items selected are suitable). Nonetheless, when assessing score distributions, item difficulty, and internal consistency statistics of the current and previous administration, it is clear that adding more difficult items to the instrument would be beneficial.

Table 4.

Item Analysis: Previous (N = 494) and current (N = 27) administrations of the MVT

	14-Item MVT 2019 ($\alpha = .54$)			2019 MVT Language Response		14-Item MVT 2018 ($\alpha = .28$)		
	Item	Item-total	α with item	English	Afrikaans	Item	Item-total	α with item
	Difficulty (p)	Correlation (r)	deleted			Difficulty (p)	Correlation (r)	deleted
Item 1	.67	.61	.46	22 (81.48)	5 (18.52)	.90	.27	.26
Item 2	.29	.25	.56	23 (85.19)	4 (14.81)	.89	.12	.29
Item 3	.74	.48	.50	21 (77.78)	6 (22.22)	.78	.39	.24
Item 4	.67	.39	.51	22 (81.48)	5 (18.52)	.66	.38	.23
Item 5	.85	.66	.44	26 (96.29)	1 (3.70)	.69	.24	.28
Item 6	.85	.41	.51	25 (92.59)	2 (7.41)	.61	.30	.29
Item 7	.89	.32	.52	22 (81.48)	5 (18.52)	.70	.39	.23
Item 8	.63	.62	.46	19 (70.37)	8 (29.63)	.42	.23	.29
Item 9	.19	.33	.52	21 (77.78)	6 (22.22)	.32	.33	.25
Item 10	.15	.30	.53	21 (77.78)	6 (22.22)	.11	.23	.31
Item 11	.44	.19	.60	16 (59.26)	11 (40.74)	.18	.33	.25
Item 12	.70	.45	.51	23 (85.19)	4 (14.81)	.08	.11	.32
Item 13	.33	.43	.52	22 (81.48)	5 (18.52)	.47	.47	.23
Item 14	.44	.07	.60	23 (85.19)	4 (14.81)	.40	.43	.24

Note. Data for the 2018 administration of the MVT are taken from Siebert (2018). Item difficulty scores are represented as p values (proportion of correct responses). Item-total correlation values are represented as Pearson's r coefficients. 2019 MVT Language Response data are frequencies with percentages in parentheses. If percentages do not add to 100, it is due to rounding.

Limitations and Suggestions for Future Research

The current study had some design limitations that should be addressed by future research. Strict exclusionary criteria were contributing factors to the small sample size, resulting in the study being statistically underpowered to achieve its aims. The initial G*Power analysis (Faul, Erdfelder, Buchner, & Lang, 2009) indicated that with parameters set to analysis = linear regression modelling, effect size (f^2) = .15 (medium), α = .05, power $(1 - \beta)$ = .80, and number of predictors = 5, an N of 100 was sufficient. However, linear regression modelling analyses could not be employed due to small sample size. Hence, G*Power analysis with parameters set to analysis = correlation, and an N of 27, indicated that achieved power $(1 - \beta)$ = .10. Hence, a larger sample would meaningfully aid in analyses (e.g., it would allow for regression analyses and allow for higher achieved power). The Siebert (2018) MVT was developed with English, Afrikaans, and isiXhosa participants in mind, whereas the current study only used English and Afrikaans participants. This discrepancy could have skewed the interpretations of comparisons drawn between the two studies. Future research should, thus, also assess English, Afrikaans and isiXhosa participants so that more meaningful comparisons can be drawn.

Summary and Conclusion

This study adds to a growing body of literature on neurocognitive testing in inherently multilingual populations such as South Africa. Existing standardised assessments of IQ do not accommodate multilinguals who draw on vocabulary from various languages in completing the requisite tasks. In response, researchers have published various measures that, while they are good starting points, are not completely satisfactory. The locally-developed MVT seeks to provide a truly linguistically fair and multilingual IQ-screening measure. The current study aimed to test the psychometric properties of the MVT in a sample of Afrikaans first-language speakers with diverse educational and socioeconomic backgrounds. Results showed that participants performed much better on the MVT than on the criterion measures, a pattern of performance that might be attributed to participant test experience and critiques associated with multiple-choice test formats. Criterion validity assessment showed that MVT performance was non-significantly and weakly correlated with performance on most criterion measures. However, there was a significant moderate correlation with the KBIT-2 VIQ score, indicating that the MVT shows promising criterion validity with verbally-based measures of general intellectual functioning. Assessment of item difficulty curves and internal consistency data allowed for the proposal of a revised set of items (deleting three from the original set) administered in a revised order to ensure graded difficulty. Importantly, internal consistency

is poor and the MVT could potentially benefit from being supplemented by additional, more difficult, items.

The MVT is still early in its development and so interpretations and conclusions drawn need to be done so tentatively and with caution. The psychometric properties of the MVT are showing promise but there is still long way to go to ensure the presence of inherently multilingual intelligence tests in South Africa.

Acknowledgements

I would like to sincerely thank and express my appreciation to the following people:

To my supervisor, Associate Professor Kevin Thomas: thank you for your continuous support, guidance and incredible patience for all my questions and drafts.

To my co-supervisor, Julian Siebert: thank you for getting the ball rolling on such an important and much needed measure. Your enthusiasm and love for the project (even from half-way across the world) really inspired me to go forward and ensure that further measures are taken to ensure multilingual cognitive assessment.

To my participants: thank you for your time and subsequent contribution to this paper. Without you, this project would not have been possible.

To my friends and family: thank you for your unconditional support and motivation.

And lastly, to my partner, Max Chernotsky: thank you for being there for me through the ups and downs of this entire process. My appreciation for your practical approaches to problem-solving, unwavering ‘backing’ and presence while I wrote is something that I can’t quite describe.

References

- Alexander, N. (2013). *Language policy and national unity in South Africa/Azania*. Cape Town, South Africa: The Estate of Neville Edward Alexander.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author
- Axelrod, B. N. (2002). Validity of the Wechsler Abbreviated Scale of Intelligence and other very short forms of estimating intellectual functioning. *Assessment*, 9, 17-23.
doi:10.1177/1073191102009001003
- Bain, S. K., & Jaspers, K. E. (2010). Review of Kaufman Brief Intelligence Test, Second Edition. *Journal of Psychoeducational Assessment*, 28(2), 167–174.
<http://doi.org/10.1177/0734282909348217>
- Bennett, J., & Verney, S. P. (2018). Linguistic factors associated with phonemic fluency performance in a sample of bilingual Hispanic undergraduate students. *Applied Neuropsychology: Adult*, 4(4), 1–14. doi: 10.1080/23279095.2017.1417309
- Bilingualism and Psycholinguistics Research Group. (2017). *LEAP-Questionnaire*. Retrieved May 24, 2017, from <http://www.bilingualism.northwestern.edu/leapq/>
- Cattell, R. B. (1943). The measurement of adult intelligence. *Psychological Bulletin*, 40, 153-193. doi:10.1037/h0059973
- Cawthra, T. A. (2016). *A South African-Adapted WASI Vocabulary Subtest: Construct validity and screening tool potential*. (Unpublished Honours research project). University of Cape Town, South Africa.
- Cholera, R., Gaynes, B. N., Pence, B. W., Bassett, J., Qangule, N., Macphail, C., ... Miller, W. C. (2014). Validity of the patient health questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa. *Journal of Affective Disorders*, 167, 160-166. doi: <http://dx.doi.org/10.1016/j.jad.2014.06.003>
- Court, J. H., & Raven, J. C. (1993). *Manual for Raven's Progressive Matrices and Vocabulary Scales*. Oxford, England: Oxford Psychologists Press.
- Dada, S., Huguet, A., & Bornman, J. (2013). The iconomy of picture communication symbols for children with English additional language and mild intellectual disability. *Augmentative and Alternative Communication*, 29(4), 360-373. doi: 10.3109/07434618.2013.849753
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <http://doi.org/doi:10.3758/BRM.41.4.1149>

- Ferrett, H. L. (2011). *The adaptation and norming of selected psychometric tests for 12-to-15-year-old urbanised Western Cape adolescents*. (Unpublished doctoral dissertation). University of Stellenbosch, South Africa.
- Gelaye, B., Williams, M. A., Lemma, S., Deyessa, N., Bahretibeb, Y., Shibre, T., ... Zhou, X. A. (2013). Validity of the Patient Health Questionnaire-9 for depression screening and diagnosis in East Africa. *Psychiatry Res*, *210*(2), 1-23. doi: 10.1016/j.psychres.2013.07.015
- Griessel, L. (2005). Administering psychological assessment measures. In C. D. Foxcroft & G. Roodt (Eds.), *An introduction to psychological assessment in the South African context* (pp. 83-98). Cape Town, South Africa: Oxford University Press.
- Hamel, R., & Schmittmann, V. D. (2006). The 20-minute version as a predictor of the Raven Advanced Progressive Matrices Test. *Educational and Psychological Measurement*, *66*(6), 1039-1046. doi: 10.1177/0013164406288169
- Hebben, N., & Milberg, W. (2009). *Essentials of Neuropsychological Assessment* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Ho, A. D., & Yu, C. C. (2015). Descriptive statistics for modern test score distributions: Skewness, kurtosis, discreteness, and ceiling effects. *Educational and Psychological Measurement*, *75*(3), 365-388. doi: 10.1177/0013164414548576
- Horn, J. L., & Cattell, R. B. (2004). Refinement and test of the theory of fluid and crystallised general intelligences. *Journal of Educational Psychology*, *57*(5), 253-270.
- Jackson, H. (2013). *Words and Their Meaning*. New York: Routledge.
- Kaufman, A. S., Kaufman, J. C., Liu, X., & Johnson, C. K. (2009). How do educational attainment and gender relate to fluid intelligence, crystallised intelligence, and academic skills at ages 22-90 years? *Archives of Clinical Neuropsychology*, *24*, 153-163. doi:10.1093/arclin/acp015
- Kaufman, A. S., & Kaufman, N. L. (2004). *Kaufman Brief Intelligence Test, Second Edition*. Bloomington, MN: Pearson, Inc.
- Kester, E. S., & Peña, E. D. (2002). Language ability assessment of Spanish-English bilinguals: Future directions. *Practical Assessment, Research & Evaluation*, *8*(4), 1-5. ISSN=1531-7714.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*, *16*(9), 606-613.
- Kumar, G., Kim, A. H., Krefetz, D., & Steer, R. A. (2001). Screening for major depressive disorders in adolescent psychiatric inpatients with the mood modules from the primary

- care evaluation of mental disorders and the patient health questionnaire. *Psychological Reports*, 89, 274-278.
- Lachenicht, L. (2013). Correlation. In C. G. Tredoux & K. Durrheim (Eds.), *Numbers, Hypotheses & Conclusions* (pp. 181–200). Cape Town: Juta & Company Ltd.
- Lezak, M. D., Howieson, D. B., Bigler, E. D., & Tranel, D. (2012). *Neuropsychological Assessment* (5 ed.). Oxford, England: Oxford University Press.
- Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research*, 50(4), 940–967. <http://doi.org/1092-4388/07/5004-0940>
- Muñoz-Sandoval, A. F., Cummins, J., Alvarado, C. G., & Ruef, M. L. (2005). *Bilingual verbal ability tests: Normative update*. Rolling Meadows, IL: The Riverside Publishing Company.
- Nell, V. (1999). Standardising the WAIS-III and the WMS-III for South Africa: Legislative, psychometric, and policy issues. *South African Journal of Psychology*, 29, 128-137. doi:10.1177/008124639902900305
- Oller, J. W., Kim, K., & Choe, Y. (2000). Testing verbal (language) and non-verbal abilities in language minorities: a socio-educational problem in historical perspective. *Language Testing*, 17(3), 341-360. doi: 10.1177/026553220001700304
- Ortiz, S. O. (2007). *Chapter 40: Best practice in non-discriminatory assessment*. Best practices in school psychology. The Charlesworth Group, Wakefield.
- Pietschnig, J., & Voracek, M. (2015). One century of global IQ-gains: A formal meta-analysis of the Flynn Effect. *Perspectives on Psychological Science*, 10(3), 282-306. doi: 10.1177/1745691615577701
- Portocarrero, J. S., Burrig, R. G., & Donovan, P. J. (2007). Vocabulary and verbal fluency of bilingual and monolingual college students. *Archives of Clinical Neuropsychology*, 22(3), 415–422. doi: 10.1016/j.acn.2007.01.015
- Raven, J. C. (1941). Standardisation of progressive matrices. *British Journal of Medical Psychology*, 19, 137-150. doi:10.1111/j.2044-8341.1941.tb00316.x
- Robbins, R. N., Joska, J. A., Thomas, K. G. F., Stein, D. J., Linda, T., Mellins, C. A., & Remien, R. H. (2013). Exploring the utility of the Montreal Cognitive Assessment to detect HIV-Associated Neurocognitive Disorder: The challenge and need for culturally valid screening tests in South Africa. *The Clinical Neuropsychologist*, 27(3), 437-454. doi: 10.1080/13854046.2012.759627

- Rock, P. L., Roiser, J. P., Riedel, W. J., & Blackwell, A. D. (2014). Cognitive impairment in depression: A systematic review and meta-analysis. *Psychological Medicine*, *44*, 2029–2040. doi: 10.1017/S0033291713002535
- Sabanathan, S., Wills, B., & Gladstone, M. (2015). Child development assessment tools in low-income and middle-income countries: how can we use them more appropriately? *Archives of Disease in Childhood*, *100*(5), 1–7. doi: 10.1136/2014-308114
- Seamon, J. G., Lee, I. A., Toner, S. K., Wheeler, R. H., Goodkind, M. S., & Birch, A. D. (2002). Thinking of critical words during study is unnecessary for false memory in the Deese, Roediger, and McDermott Procedure. *Psychological Science*, *13*(6), 526–531.
- Shuttleworth-Edwards, A. B., & Kemp, R. D. (2004). Cross-cultural effects on IQ test performance: A review and preliminary normative indications on WAIS-III test performance. *Journal of Clinical and Experimental Neuropsychology*, *26*(7), 903–920. doi: 10.1080/13803390490510824
- Siebert, J. M. (2017). *A linguistically fair IQ screening tool for South Africa's Multilingual Reality*. (Unpublished Honours dissertation). University of Cape Town, South Africa.
- Siebert, J. M. (2018). *Toward linguistically fair IQ screening: Multilingual Vocabulary Test*. (Unpublished Masters dissertation). University of Cape Town, South Africa.
- Spearman, C. E. (1904). General intelligence: objectively determined and measured. *American Journal of Psychology*, *15*(2), 201–292.
- Spitzer, R. L., Kroenke, K., & Williams, J. B. W. (1999). Validation and Utility of a Self-report Version of PRIME-MD: The PHQ Primary Care Study. *Jama*, *282*(18), 1737–1744.
- Spitzer, R. L., Williams, J. B. W., Kroenke, K., Linzer, M., deGruy, F. V., & Hahn, S. R. (1994). Utility of a New Procedure for Diagnosing Mental Disorders in Primary Care: The PRIME-MD 1000 Study. *Jama*, *272*(22), 1749–1756. <http://doi.org/10.1001/jama.1994.03520220043029>
- Statistics South Africa. (2011). *Census 2011: Census in brief*. Pretoria, South Africa: Statistics South Africa. Retrieved from http://www.statssa.gov.za/census/census_2011/census_products/Census_2011_Census_in_brief.pdf
- Thierry, G. (2016). Neurolinguistic relativity: How language flexes human perception and cognition. *Language Learning*, *66*(3), 690–713. doi: 10.1111/lang.12186
- Titov, N., Dear, B. F., McMillan, D., Anderson, T., Zou, J., & Sunderland, M. (2011). Psychometric comparison of the PHQ-9 and BDI-II for measuring response during

- treatment of depression. *Cognitive Behaviour Therapy*, 40(2), 126-136. doi:
10.1080/16506073.2010.550059
- Viljoen, L. (2006). Translation and transformation. *Scrutiny2*, 11(1), 32-45. doi:
10.1080/18125441.2006.9684200
- Wechsler, D. (1955). *Wechsler Adult Intelligence Scale*. New York, NY: The Psychological Corporation.
- Wechsler, D. (1981). *The Wechsler Adult Intelligence Scale Revised*. New York: The Psychological Corporation.
- Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence*. San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (2008). *Wechsler Adult Intelligence Scale* (4th ed.). London, England: Pearson Assessment.
- Wesche, M., & Paribakht, T. S. (1996). Assessing Second Language Vocabulary Knowledge Depth Versus Breadth. *Canadian Modern Language Review*, 53(1), 13-40.

Appendix A
Sociodemographic Questionnaire

Sociodemographic Questionnaire

ACSENT Laboratory

University of Cape Town

Participant ID:

1. Demographics

1.1 Age:

1.2 Sex:

2. Education

2.1 Are you currently studying? (please tick) Yes No

2.1.1 If yes, what year are you in?

2.1.2 If yes, what degree are you enrolled for?

2.1.3 What are your majors?

2.1.4 What language are you studying in?

2.2 What is your highest qualification?

2.3 How many years of education have you completed?

2.4 These questions pertain to your primary school:

2.4.1 Was it in a rural or urban setting? Rural Urban

2.4.2 What was the name of the school?

2.4.3 Was it a public or a private school?

2.4.4 What was the language of instruction?

2.5 These questions pertain to your high school:

2.5.1 Was it in a rural or urban setting? Rural Urban

2.5.2 What was the name of the school?

2.5.3 Was it a public or a private school?

2.5.4 What was the language of instruction?

3. General Information

3.1 What area did you live in while growing up?

3.2 Have you ever been or are you currently diagnosed with a psychological, psychiatric, traumatic brain injury, neurological or learning disorder? If yes, please specify:

3.3 Are you currently taking any psychiatric/chronic medications? If yes, please specify:

Appendix B

Adapted Language Experience And Profile Questionnaire (LEAP-Q)

Adapted Language Experience And Profile Questionnaire (LEAP-Q)

Part A

Participant ID:

1. Please list all the languages you know **in order of dominance**:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

2. Please list all the languages you know **in order of acquisition** (your native language first):

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

3. Please list what percentage of the time you are **currently** and **on average** exposed to each language (*Your percentages should add up to 100%*):

Language:

Percentage:

Part B (to be filled in for each language)

Participant ID:

Language:

1. Age when you... ...this language.

began acquiring became fluent in began reading in became fluent reading in

3. On a scale from 0 to 10, please select your level of **proficiency** in speaking, understanding, and reading this language (*circle the appropriate number*):

	<u>None</u>			<u>Adequate</u>				<u>Perfect</u>			
Speaking:	0	1	2	3	4	5	6	7	8	9	10
Understanding:	0	1	2	3	4	5	6	7	8	9	10
Reading:	0	1	2	3	4	5	6	7	8	9	10

5. Please rate to what extent you are currently exposed to this language in the following contexts:

	<u>Never</u>												<u>Always</u>
Interacting with friends:	0	1	2	3	4	5	6	7	8	9	10		
Interacting with family:	0	1	2	3	4	5	6	7	8	9	10		
Watching TV:	0	1	2	3	4	5	6	7	8	9	10		
Listening to radio/music:	0	1	2	3	4	5	6	7	8	9	10		
Reading:	0	1	2	3	4	5	6	7	8	9	10		
Language-lab/self-instruction:	0	1	2	3	4	5	6	7	8	9	10		

Based on: Marian, Blumenfeld, & Kaushanskaya (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research*, 50(4), 940-967.

Appendix C

Patient Health Questionnaire-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? Read each item carefully, and tick the appropriate response box.

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things.				
Feeling down, depressed or hopeless.				
Trouble falling or staying asleep or sleeping too much.				
Feeling tired or having little energy.				
Poor appetite or overeating.				
Feeling bad about yourself – or that you are a failure or have let yourself or family down.				
Trouble concentrating on things such as reading the newspaper or watching television.				
Moving or speaking so slowly that other people could have noticed. Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual.				
Thought that you would be better off dead or of hurting yourself in some way.				

Appendix D
12-Item SA-WASI Vocabulary Subtest

South African-Adapted Wechsler Abbreviated Scale of Intelligence			
12-Item Vocabulary Subtest			
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Participant ID:</div> <div style="border: 1px solid black; padding: 5px;"> Instructions: Start at item 1 and administer all items. Stop testing after discontinuance point (5 consecutive scores of 0). Score items up to discontinuance point. </div>			
	Item	Response	Score
1	Bird		/2
2	Calendar		/2
3	Complicated		/2
4	Haste		/2
5	Entertain		/2
6	Impulse		/2
7	Cart		/2
8	Ruminate		/2
9	Intermittent		/2
10	Formidable		/2
11	Impertinent		/2
12	Tirade		/2
Total:			/24

Appendix E
Scoring Sheet for 12-Item SA-WASI

South African-Adapted Wechsler Abbreviated Scale of Intelligence		
12-Item Vocabulary Subtest		
<u>Scoring Manual</u>		
<i>Score items up to discontinuance point (i.e. 5 consecutive scores of zero).</i>		
Item	Response	Score
1. Bird	It could be a pet Q It lives in a tree Q It's pretty	0
	It flies Mammal that flies (sings, has wings) It has wings (feathers, a beak) Q It sings (in the spring) It makes nests Chicken Hawk Parakeet Cardinal etc.	1
	A feathered creature that flies An animal (that can fly) A winged animal that has feathers on its body Fowl	2
2. Calendar	Can carry one with you Wall calendar Made of paper It tells you what time it is Q	0
	Schedule Appointment book It helps you plan (your time or schedule) It shows which days are holidays It has the days (months, years) Q	1
	It tells you what day and month it is Something that tells you the date An orderly list of the days of the week and months of the year	2
3. Complicated	Can't get it right / solve it Can't explain it Don't understand it Not understandable Problematic Struggle to do	0
	Not straight-forward Hard / not easy Complex Tricky Not clear Confusing / made up of different parts Mixed-up / not well defined	1
	Something that is made up of intricate parts or aspects that are difficult to understand or analyse Not easily comprehended or understood Not simple (Very) involved Not as easy as it seems Not easily worked out/resolved Difficult to analyse or explain Not easy to find an answer Not easy to explain Hard to explain (Very) difficult Intricate	2
4. Haste	Wasting time Haste makes waste	0

	Carelessness Do something without care (thinking) Quickly Fast Quick	1
	Hurry Rashness Rush Swiftness Quickness Rash action Done quickly Speed Rapidity of motion Moving rapidly In a hurry Do something fast	2
5. Entertain	To have fun Q Take care of	0
	To perform To keep someone (you) busy Q Putting on a show A comedian, TV, or radio can entertain you Activity to provide amusement Enjoyment A person who amuses others To make people laugh (happy) Q Play a musical instrument (Sing, Dance, Tell jokes) Q	1
	Amuse Contemplate Consider To provide diversion To show a good time To keep occupied (hold the attention of) <input type="checkbox"/> To perform (sing, dance) for others' enjoyment To make others laugh with your actions To think about (consider) something To host a party (social event) To extend hospitality toward	2
6. Impulse	Wanting to do something Q You did it automatically Q Sudden Q I did it on impulse	0
	Spontaneity Q Urge; Drive; Momentum Q Spur of the moment Q To act (do something) on a whim (on the spur of the moment, without thinking) Q A quick moment of decision-making Q Impetuous; Spontaneous Q An instinctive (involuntary, immediate) response or reaction; Reaction Response	1
	Impetus An urge for sudden action Sudden urge An inner drive that makes you do something on the spur of the moment (without thinking) A feeling which compels you to do something Stimulus transmitted in a muscle or nerve fibre	2
7. Cart	A horse pulls it Q For transportation Q You push (pull) it Q	0
	Something you drive around in when you play golf Something you put (carry) things in (when shopping) You load things in it and use it to carry things around Something	1

	you push that holds things Haul Carry A box with wheels Grocery basket Way of transporting goods A container that holds stuff Q	
	Small-wheeled vehicle used to store or carry things Something that has wheels and carries things Wheeled vehicle drawn by a horse (pony, dog) Wagon Buggy Wheelbarrow	2
8. Ruminare	To talk about something Q To remember something I ruminare about my taxes Q	0
	Something to do with thinking Q To lament about past events To think about Q To worry excessively (about things that aren't there) Q To dwell on something Q An animal that eats grass (that has more than one stomach) Digest Q	1
	Reflect Ponder Cogitate Muse Contemplate To chew (the cud) To thoroughly consider To go over in the mind repeatedly Mull (think) over	2
9. Intermittent	It occurs on a regular sequence Intermittent showers A pause A break Q Something comes between other things Q In between In the middle Q Scattered Q	0
	Put time between Q Unpredictable occurrence of some action Q Like your windshield wipers are going at different times	1
	Periodic Occasional Spasmodic Sporadic Every now and then Coming and going at intervals To happen in an irregular pattern Something that starts then stops Not continuous With interruptions Without synchronicity On- again, off-again, not steady Erratic Inconstant Irregular	2
10. Formidable	Worthy opponent Q ; Worthy; Great Q ; A formidable intellect	0
	Difficult; Hard; Tough; Scary Q Overwhelming; Challenging Q ; Competitive; Strong Q Strenuous; Laborious; Toilsome Q Powerful Q Something to be respected; Opponent with superior abilities to yourself Q	1

	Daunting Awesome Awful Appalling Dreadful Horrible Horrifying Terrible Intimidating Threatening Ominous Difficult to defeat or overcome Presents a difficult, challenging or overwhelming obstacle Imposing Gives the impression of having great strength and authority	2
11. Impertinent	Foolish Pretentious Q Cocky Smart	0
	Obnoxious; Disobedient Q Unessential; Insignificant; Unimportant Q Intrusive; Meddlesome Q Not necessary Q Not pertaining to the current subject Someone that gets on people's nerves Annoying Q Not a very nice person Q Sarcastic and smart-alecky Not to the point Q Fresh	1
	Irrelevant Impudent Brazen Saucy Sassy Pert Insolent Rude Disrespectful Flippant Lack of etiquette Out of line and disrespectful Something that is not appropriate	2
12. Tirade	A tantrum A temper tantrum A fit of anger Lose one's temper Outburst Q A fit of inner feeling Rampage A commotion Associated with violence and anger, letting go of human or natural control Upheaval Raising Cain To be forceful and angry Bossy person Q	0
	Verbal fuss Yelling To yell A scolding Argument Flood of words A speech A long speech	1
	A long emotional speech marked by anger or censure Ranting and raving Laying into somebody verbally Verbal tantrum Verbal browbeating Volume of rapid language, generally some quality, such as punishment, about it An angry speech A harangue Hostile flow of words Cussing somebody out, having a go at them	2

Appendix F
14-Item Multilingual Vocabulary Test (MVT)

Item	English	Afrikaans	isiXhosa	Score
1	suggest	voorstel	ukucebisa	
	<input type="radio"/> say	<input type="radio"/> se	<input type="radio"/> ukuthi	0
	<input type="radio"/> scream	<input type="radio"/> skree	<input type="radio"/> ukukhwaza	0
	<input type="radio"/> propose	<input type="radio"/> aanbeveel	<input type="radio"/> ukuveza iimbono	2
	<input type="radio"/> argue	<input type="radio"/> argumenteer	<input type="radio"/> ukuxoxa	1
	<input type="radio"/> imply	<input type="radio"/> impliseer	<input type="radio"/> ukunceda umntu	1
2	conversion	omskakeling	ukuguqula	
	<input type="radio"/> conviction	<input type="radio"/> oortuiging	<input type="radio"/> isigwebo	0
	<input type="radio"/> calculation	<input type="radio"/> berekening	<input type="radio"/> ukubala	0
	<input type="radio"/> change	<input type="radio"/> verandering	<input type="radio"/> utshintsho	2
	<input type="radio"/> transformation	<input type="radio"/> transformasie	<input type="radio"/> inguqu	1
	<input type="radio"/> modification	<input type="radio"/> modifikasie	<input type="radio"/> ukulungisa	1
3	excellence	uitnemendheid	ukugqwesa	
	<input type="radio"/> brilliance	<input type="radio"/> briljant	<input type="radio"/> ukuphuma phambili	2
	<input type="radio"/> performance	<input type="radio"/> werkverrigting	<input type="radio"/> ukulunga	0
	<input type="radio"/> sufficiency	<input type="radio"/> genoegsaamheid	<input type="radio"/> ukwenza	1
	<input type="radio"/> difference	<input type="radio"/> verskil	<input type="radio"/> ngokufanelekileyo	0
	<input type="radio"/> greatness	<input type="radio"/> grootheid	<input type="radio"/> ukuphumelela	1
4	horse	perd	ihashe	
	<input type="radio"/> riding animal	<input type="radio"/> rybare dier	<input type="radio"/> isilwanyana esikhwelwayo	2
	<input type="radio"/> farm animal	<input type="radio"/> plaas dier	<input type="radio"/> isilwanyana sasekhaya	1
	<input type="radio"/> hooded animal	<input type="radio"/> gehoeftedier	<input type="radio"/> isilwanyana esikhabayo	1
	<input type="radio"/> big animal	<input type="radio"/> groot dier	<input type="radio"/> isilwanyana esikhulu	0
	<input type="radio"/> strong animal	<input type="radio"/> sterk dier	<input type="radio"/> isilwanyana esomeleleyo	0
5	value	waarde	ixabiso	
	<input type="radio"/> importance	<input type="radio"/> belangrikheid	<input type="radio"/> ukubaluleka	0
	<input type="radio"/> merit	<input type="radio"/> meriete	<input type="radio"/> umvuzo	1
	<input type="radio"/> worth	<input type="radio"/> weer	<input type="radio"/> ukuxabiseka	2
	<input type="radio"/> usefulness	<input type="radio"/> bruikbaarheid	<input type="radio"/> lulutho	1
	<input type="radio"/> skill	<input type="radio"/> vaardigheid	<input type="radio"/> isakhono	0
6	dinner	dinee	idinala	

	<ul style="list-style-type: none"> ○ meal ○ night ○ food ○ lunch ○ supper 	<ul style="list-style-type: none"> ○ maaltyd ○ nag ○ kis ○ middagete ○ aandete 	<ul style="list-style-type: none"> ○ isidlo ○ ubusuku ○ ukutya ○ isidlo sasemini ○ isidlo samalanga 	<ul style="list-style-type: none"> 1 0 0 1 2
7	recurrent	terugkerend	phindaphindayo	
	<ul style="list-style-type: none"> ○ respected ○ frequent ○ repetitive ○ regular ○ recent 	<ul style="list-style-type: none"> ○ gerespekteerd ○ frekwent ○ herhalend ○ gereeld ○ onlangs 	<ul style="list-style-type: none"> ○ ukukhumbula ○ ukwenzeka kwakhona ○ ukwenzeka izidlandlo ezininzi ○ ukumana ukhumbula ○ iinkumbulo 	<ul style="list-style-type: none"> 0 1 2 1 0
8	announce	aankondig	ukwanzisa	
	<ul style="list-style-type: none"> ○ make known ○ communicate ○ state ○ proclaim ○ talk 	<ul style="list-style-type: none"> ○ bekend maak ○ kommunikeer ○ verklaar ○ verkondig ○ praat 	<ul style="list-style-type: none"> ○ ukwazisa ○ ukunxibelelana ○ ukusasaza iindaba ○ ukudumisa umbra ○ ukuthetha 	<ul style="list-style-type: none"> 1 0 1 2 0
9	ambulance	ambulans	i-ambulensi	
	<ul style="list-style-type: none"> ○ fire truck ○ emergency vehicle ○ police vehicle ○ paramedics ○ rescue vehicle 	<ul style="list-style-type: none"> ○ brandweerwa ○ noodvoertuig ○ polisiewa ○ paramedici ○ reddingsvoertuig 	<ul style="list-style-type: none"> ○ isithuthi somlilo ○ isithuthi soxakeko ○ isithuthi samapolisa ○ abancedi bezigulana ○ isithithi sokuhlangula 	<ul style="list-style-type: none"> 0 1 0 1 2
10	pretentious	pretensieus	ukuzenzisa	
	<ul style="list-style-type: none"> ○ exaggerating ○ flamboyant ○ ostentatious ○ flatulent ○ theatric 	<ul style="list-style-type: none"> ○ oordryf ○ flambojante ○ blufferig ○ winderig ○ theatric 	<ul style="list-style-type: none"> ○ ukubaxa ○ eqaqambileyo ○ ubuqhawe ○ ukuqumbela ○ ukuzigwagwisa 	<ul style="list-style-type: none"> 0 1 2 1 0
11	impetuous	oorhastig	-dyuduzayo	
	<ul style="list-style-type: none"> ○ imprudent ○ uncontrolled ○ disciplined ○ considered 	<ul style="list-style-type: none"> ○ onverstandig ○ onbeheersd ○ gedissiplineerd ○ oorweeg 	<ul style="list-style-type: none"> ○ ukwenza ngaphandle kokucinga ○ ukwenza into ngokungakhathali 	<ul style="list-style-type: none"> 1 1 0 0

	<ul style="list-style-type: none"> ○ impulsive 	<ul style="list-style-type: none"> ○ implusief 	<ul style="list-style-type: none"> ○ ukukhathala ○ ukonqena ○ ukwenza into ngokungxama 	2
12	train	trein	uloliwe	
	<ul style="list-style-type: none"> ○ transport ○ locomotive ○ railway ○ vehicle ○ carriage 	<ul style="list-style-type: none"> ○ vervoer ○ lokomotief ○ spoorlyn ○ motor ○ wa 	<ul style="list-style-type: none"> ○ isithuthi ○ inqwelo enamakhareji ○ isiporo ○ inqwelo ○ igutsi 	0
				2
				1
				0
13	picture	prent	umfanekiso	
	<ul style="list-style-type: none"> ○ show ○ artwork ○ caption ○ still ○ painting 	<ul style="list-style-type: none"> ○ skou ○ kunswerk ○ opskrif ○ stillewe ○ skildery 	<ul style="list-style-type: none"> ○ umabonwakude ○ umzobo ○ isihlokwana ○ umboniso ○ ifoto 	0
				1
				0
				1
14	atoll	atol	isiqhiti esisangqa	
	<ul style="list-style-type: none"> ○ land ○ island ○ sandbank ○ archipelago ○ coastline 	<ul style="list-style-type: none"> ○ land ○ eiland ○ sandbank ○ argipel ○ kuslyn 	<ul style="list-style-type: none"> ○ umhlaba ○ isiqhiti ○ iinduli zesanti ○ iqela leziqhiti ○ unxweme 	0
				2
				1
				1
			0	

Appendix G
Qualitative Feedback Questions

Qualitative Feedback

Participant ID: _____

Examiner: _____ Date: _____

Instructions:

- Ask the participant the following questions (read them out as written below).
- Begin by saying: ***Before we end, I would like to ask you some quick questions about your experience of taking the test on the tablet.***
- Clarify which test you are referring to (the 14-Item MVT, i.e. the one where they had to select the meaning of a word from the choices on the screen).
- Ask the questions one after the other and write down their responses in as much detail as possible. The idea of this is to find out how they

1. Please tell me about your experience of taking the test on the tablet. What was it like?

2. Please tell me how it compared to the other tasks you did, particularly to the one where you had to tell me the meaning of words and I wrote them down.

3. How did you like the test on the tablet? What did you like about it and what didn't you like about it?

4. What did you think about the fact that there were multiple languages in the test and what languages did you use?

Appendix H

Consent Form

Consent to Participate in a Research Study

University of Cape Town ACSENT Laboratory

I invite you to take part in a study that is testing the usefulness of a new intelligence test using more than one language. This study forms part of my degree in the Department of Psychology at the University of Cape Town. Please read through this page and ask me any questions you might have.

Purpose of this study

I would like to test to see if the newly developed intelligence test, the Multilingual Vocabulary Test (MVT), works for people who speak more than one language. I will do this by comparing how well people do on this test compared to other tests that are in only one language. This is important because I would like to make sure that people who speak more than one language can be tested using all the languages they know.

What will you do?

Should you agree to take part, I will ask you to fill out two brief questionnaires about your life and the languages that you speak. Then, I, or one of my assistants, will test how well you speak English and Afrikaans. After that, I will ask you to do three short intelligence tests where you will describe words, fill out multiple choice questions and complete pictures. The entire study should take just over an hour and 20 minutes.

Inclusion / exclusion criteria?

You are able to participate if you are bilingual (can speak Afrikaans AND English), are between 30 and 60 years old, have no current or past experience of neurological, endocrinological, psychiatric or psychological disorders, are not taking any chronic medication and have not had a traumatic brain injury.

Risks and benefits to you?

There are no dangers or risks to participating in this study. Some light refreshments will be offered, and you will be working toward a fairer way of testing intelligence of people who speak multiple languages. You will also be entered into a lucky raffle to possible win either a R500, R300 or R200 Shoprite or Checkers voucher.

Your rights

You are not forced to take part in this study and should do it because you want to take part. If you would like to stop before we finish the study, you can do so at any time. You do not have to tell me why you want to stop, and you will not be penalised for it. I will keep your answers safe, and nobody will find out what answers you gave, not even I will be able to know. I will only use your answers to see how well the new test works.

Informed Consent

I, _____, have read and understood what is written above, and by signing here, I agree to take part in this study.

Participant's signature: _____ Date: _____

Researcher's signature: _____ Date: _____

If you have any further questions or concerns, please feel free to contact me, Rhiannon Changuion, at CHNRHI001@myuct.ac.za, or my supervisor, A/Prof Kevin Thomas, at kevin.thomas@uct.ac.za. If you feel that I have not treated you well or you have any concerns about the study, you can reach out to Ms Rosalind Adams: 021 650 3417 or rosalind.adams@uct.ac.za

Appendix I
Debriefing Form

Debriefing Form

University of Cape Town ACSENT Laboratory
**Assessing the Validity of the Multilingual Vocabulary Test in First-Language
Afrikaans and isiXhosa South African Populations**

Dear participant

Thank you very much for participating in this study! The aim of this project is to see if the newly developed IQ screening test, the Multilingual Vocabulary Test (MVT), is suitable for people who speak more than one language in South Africa.

To do this, I need to compare the performance on the new test with other intelligence tests. The information you provided by completing the various tests will be used to assess how well the new test predicts intelligence and to show what other factors may have influenced how well you did. E.g. your level of education, your socioeconomic status and language history.

Please be reminded that your responses will be treated anonymously and confidentially. This means that nobody, can find out your responses because you will be assigned a random number and your name will not be included in the data files or papers we write about the research.

If you feel as though you have been negatively affected by this study, please contact any of the following places:

LifeLine- Tell: 021 461 111 or WhatsApp: 063 709 2620

South African Depression and Anxiety Group (SADAG)- Tell: 011 234 4837

Please feel free to ask any questions you have now, or email them to me, Rhiannon

Changuion, at CHNRHI001@myuct.ac.za. If you feel I have not treated you fairly or you have any concerns about the study, please contact the UCT Department of Psychology: Ms Rosalind Adams, rosalind.adams@uct.ac.za or 021 650 3417

Appendix J
Ethical Approval Letter

UNIVERSITY OF CAPE TOWN



Department of Psychology

University of Cape Town Rondebosch 7701 South Africa
Telephone (021) 650 3417
Fax No. (021) 650 4104

15 July 2019

Rhiannon Changuion
Department of Psychology
University of Cape Town
Rondebosch 7701

Dear Rhiannon

I am pleased to inform you that ethical clearance has been given by an Ethics Review Committee of the Faculty of Humanities for your study, *Assessing the Validity of the Multilingual Vocabulary Test in First-Language Afrikaans and isiXhosa South African Adults*. The reference number is PSY2019 -038.

I wish you all the best for your study.

Yours sincerely

A handwritten signature in black ink, appearing to read 'L Wild'.

Lauren Wild (PhD)
Associate Professor
Chair: Ethics Review Committee

University of Cape Town
ΨPSYCHOLOGY DEPARTMENT
Upper Campus
Rondebosch