# Comparing the performance of older low-progress readers on the York Assessment of Reading for Comprehension with performance on the Neale Analysis of Reading Ability and other measures of reading and related skills

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**Abstract**

The aim of this study was to compare the York Assessment of Reading for Comprehension (YARC) with the Neale Analysis of Reading Ability (NARA) and other measures of reading and related skills with a sample of older low-progress readers and to provide additional information regarding the validity of the YARC in Australia. The data from an opportunity sample of 78 older low-progress readers from two literacy tutorial centres, assessed on a battery of tests of reading and related skills, prior to intervention, were analysed. Correlations of the YARC with other measures were generally high and the YARC also appeared to yield similar mean reading age estimates as the NARA and other measures.

**Comparing the performance of older low-progress readers on the York Assessment of Reading for Comprehension with performance on the Neale Analysis of Reading Ability and other measures of reading and related skills**

Teachers and others working with low-progress readers frequently need to assess the reading performance of their students. For many years, in Australian schools, one of the main assessment instruments of choice has been the Neale Analysis of Reading Ability (NARA; Neale, 1958, 1988, 1999). Originally published in 1958, the test has passed through three editions, the latest having been published in 1999. While still attracted to the test, many users have, nonetheless, recognised that the latest norms (collected in 1997) may no longer be accurately representative of the current performance levels of Australian school students. Moreover, the text passages on which the assessments are based are now somewhat dated and, perhaps, less accessible to today's children.

The York Assessment of Reading for Comprehension (YARC; Snowling et al., 2012) was ostensibly developed to meet the continuing need for a test like the NARA and it is, indeed, very similar to the NARA. In both tests, children are required to read increasingly difficult passages of text, their performance being monitored in terms of reading accuracy, reading rate, and (by responding to questions based on the passages) reading comprehension.

In spite of the similarities, the YARC does differ slightly from the NARA. For example, the range of difficulty of the passages is lower for the YARC, ranging from five and a half years old to twelve years and eight months old, whereas the NARA ranges from six to thirteen years old. (Note that there is a separate, secondary version of the test, however, for older students; Stothard, Hulme, Clarke, Barmby, & Snowling, 2012) The YARC may be able to assess the reading skills of younger students due to the fact that the first passage is read jointly by the student and the test administrator. Other differences between the two tests are that the YARC manual stipulates that, "[s]tudents are allowed to look back to the passage when answering the questions" and "can be reminded once … that they are allowed to look back at the passage" (Snowling et al., 2012, p. 30), whereas the NARA manual requires the opposite, recommending that students should be encouraged to "answer from memory" (Neale, 1999, p. 15). Also, although both tests involve a starting point based on student grade or word reading ability, they then differ in that the test administrator must administer a higher

or lower passage based on accuracy and comprehension for the YARC but only accuracy for the NARA. The test authors of the YARC also thought to include a guide to scoring answers to comprehension questions, which was not provided in the NARA. This potentially makes the scoring more consistent between test administrators. One of the most interesting differences between the tests is that the YARC provides norming data based on student age, rather than years of schooling, which is the norming criterion for the Neale. The main advantage the YARC has over the NARA is that it has more recent norms, an online facility for converting the scores into a range of reading indices and producing a report, and an Australian edition with current Australian norms.

There is, however, relatively little information about the test published in the research literature. Apart from the standardisation study published in the test manual (Snowling et al., 2012), there is a book review available which provides a description of each of the assessments (Martin, 2011). There are also a few studies that utilise the YARC Early Reading and Passage Reading Secondary tests as measures of various elements of reading skill (Hulme, Nash, Gooch, Lervag, & Snowling, 2015; Snowling, Duff, Petrou, & Schiffeldrin, 2011; Stothard, Snowling, & Hulme, 2011; Wright, Mitchell, O'Donoghue, Cowhey, & Kearney, 2015). In particular, there appears to be no published study comparing performance on the YARC with the NARA or other reading tests, apart from a recent study by Colenbrander, Nickels, and Kohnen (2016). These authors compared the two tests (YARC and NARA) to determine differences in comprehension diagnosis. They assessed a sample of 95 children, referred as having average decoding abilities, on both measures. They concluded that "NARA comprehension scores were more dependent on decoding skills than YARC scores … Consequently, 15–34% of children received different diagnoses across tests" (p. 1).

As a contribution towards filling this gap in the literature and to provide guidance to practitioners, the performance of an opportunity sample of *older low-progress readers*tested on the YARC, the NARA and various other measures, given prior to their receipt of a reading intervention, was analysed and compared across tests. Our aim was different from that of Colenbrander et al. and was specifically to determine whether the YARC might prove to be a suitable substitute for the NARA, how well it correlated with other reading measures and whether it produced similar results in terms of reading level.

## Method

### Participants

Participants in the study comprised an incidental, opportunity sample of 81 low-progress readers attending two tutorial centres based in two schools in Sydney, NSW. Students had been referred to the tutorial centre by their schools on the basis of their poor performance (falling in the bottom 20% of students nationally) on the reading component of the National Assessment Program – Literacy and Numeracy (NAPLAN; Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013, "Reading"). Tests of normality identified five outliers. Following further investigation of the average data, it was decided to exclude these outliers from analyses. Thus, 76 students were included in analyses. There were missing data for nine students (11.8%) for the NARA rate measure and for six students for the YARC rate measure. The sample comprised 41 boys and 35 girls from grades Y4 (9), Y5 (23) and Y6 (44). The mean age of the sample at the time of initial testing (i.e. prior to any intervention) was 10:7 (SD = 10.06) and their mean standardised score on the Peabody Picture Vocabulary Test (PPVT-IV; Dunn & Dunn, 2007) was 80.15 (SD = 10.41). In terms of estimated verbal ability, they were clearly below average.

Note that the measures specifically employed were primarily designed to measure the effectiveness of an intensive intervention provided to the students.

### Measures

All participants were given a battery of tests assessing reading and related skills. Tests were administered by trained research assistants and were independently double scored. The research assistants were trained by the second author in the correct administration and scoring of the tests in a workshop in which they also practiced giving the tests to each other. Any discrepancies (very few) between results of double scoring were discussed and resolved by the second author, who led the team of research assistants.

The tests given were as follows:

**York Assessment of Reading for Comprehension (YARC), Passage Reading Primary – Australian edition (Snowling et al., 2012)**

This assessment measures reading accuracy, reading rate and reading comprehension. The test comprises six passages which students are asked to read aloud and one beginner passage which the student and administrator read together. A single word recognition measure is used to determine the starting passage and two passages where the student reads with adequate accuracy and comprehension are administered. Following the reading of each passage, the administrator asks a set of comprehension questions, which are scored according to a guide. Reading accuracy, rate and comprehension ability scores are calculated based on the two passages which the student read with adequate accuracy and comprehension. The test manual reported parallel forms reliability as moderate for accuracy ($r$ = .57–.81), adequate for rate ($r$ = .78–.89) and ranging from lower than desirable to adequate for comprehension ($r$ = .38–.86).

Moderate concurrent validity was reported with the Australian NAPLAN for accuracy (.75), rate (.72) and comprehension (.61).

Data for the rate measure were only available for 70 students in the current sample.

**Neale Analysis of Reading Ability – third edition (Neale, 1999)**

This test measures reading accuracy, reading rate and reading comprehension. Students read up to six passages of text, which are timed, and errors are recorded and corrected. Following the completion of a passage, the test administrator asks a set of comprehension questions relating to the passage. The reading accuracy errors are used to calculate a reading accuracy score and correct answers to comprehension questions are used to calculate a comprehension score. A reading rate score is calculated using reading errors and the recorded time for each passage. The test manual reported adequate internal consistency ($r$ = .71–.96) and good criterion-related validity for accuracy and comprehension with the Schonell graded word reading test ($r$ = .88–.96). Data for the rate measure were only available for 67 students in the current sample.

**Burt Word Reading Test (Gilmore, Croft, & Reid, 1981)**

This test is a measure of single word recognition skills. Students are presented individually with a card consisting of 110 words listed by increasing difficulty. They are instructed to read as many words as possible and are stopped when ten consecutive errors are reached. Students are then given the opportunity to look over the remaining words to see if they recognise any further words.

The maximum reading age possible on the Burt is about 13 years. The Burt Word Reading Test has high test-retest reliability (>.95) and high internal consistency (>.96; Gilmore et al., 1981). Significant and positive correlations (.90–.98) between the Burt Word Reading Test and the Schonell Graded Word Reading Test and the Oral Word Reading Test indicate that the test has high criterion validity (Gilmore et al., 1981). Wheldall and Beaman (2000) warn, however, that in some cases the Burt Word Reading Test has a tendency to overestimate reading age by 4–5 months.

**Wheldall Assessment of Reading Passages (WARP; Wheldall & Madelaine, 2013)**

The Wheldall Assessment of Reading Passages (WARP) is a curriculum-based measure of oral reading fluency. A set of three "basal" passages were used at both pre- and post-testing. Students are required to read three 200-word text passages each for one minute. The number of words read correctly per minute is averaged over the three passages to yield a single measure of the number of words read correctly in one minute. The reading passages have been shown to have high internal consistency, inter-correlations exceeding .95 (Wheldall & Beaman, 2000). The passages have also been shown to be highly correlated with the Neale Analysis of Reading Ability accuracy measure (.87) and the Burt Word Reading Test (.85) indicating good criterion related validity (Wheldall & Madelaine, 2006).

**Martin and Pratt Nonword Reading Test (Martin & Pratt, 2001)**

The Martin and Pratt Nonword Reading Test is a measure of phonological recoding ability for students between the ages of 6 and 16 years (Martin & Pratt, 2001). A presentation book with nine pages of six pseudowords per page, of increasing difficulty, is presented to the child to be read aloud. The test is discontinued after eight consecutive errors (phonetically incorrect pronunciations). The test has a high test-retest reliability coefficient of .96 for Form A and .95 for Form B, high alternative-forms reliability coefficients of .92–.96 and a high internal consistency reliability coefficient of .96 (Martin & Pratt, 2001). Positive correlations between the Martin and Pratt and the WRMT-R Word Attack (.89) and Coltheart and Leahy Nonword reading (.93) tests and the Neale Analysis of Reading Accuracy measure (.78–.88) show good criterion-related validity (Martin & Pratt, 2001).

**South Australian Spelling Test – second edition (Westwood, 2005)**

This test provides a spelling age estimate ranging from 6 to 15 years based on the number of correct items. The test authors reported good test– retest reliability ($r$ = .96) for most year groups. Similarly, alternate forms reliability was also demonstrated to be adequate ($r$ = .89–.94).

**Peabody Picture Vocabulary Test – fourth edition (Dunn & Dunn, 2007)**

This test is a measure of receptive vocabulary and is commonly employed as a rough proxy for overall verbal ability. The test comprises pages of four pictures each. The test administrator provides a verbal stimulus word and students are required to respond by selecting the picture that they think best represents the spoken word. The test is suitable for people aged 2–90 years old. The test manual provides evidence of high internal consistency ($r$ = .89–.98) across age groups, grades and forms of the test, adequate alternate forms reliability (adjusted for range restriction, $r$ = .87–.93) across age groups, and high test– retest reliability (adjusted for range restriction, $r$ = .92–.96) across age groups. Correlation coefficients of the associations between the test and the Expressive Vocabulary Test ($r$ = .80–.84), the Comprehensive Assessment of Spoken Language ($r$ = .37–.77) and the Clinical Evaluation of Language Fundamentals ($r$ = .67–.79) provide evidence of the criterion-related validity of the test.

All tests were given in the same order in a single sitting.

**Analysis**

During preliminary analyses of assumptions, it became apparent that the use of standard scores to compare the measures would not be possible. The NARA manual provides standardised scores based on the student's years of schooling, whereas the YARC provides standard scores based on the student's age. Standard scores could be calculated for the NARA measures based on the age related means and standard deviations of the standardisation sample, thereby allowing comparison of like with like. However, the YARC standard score distribution was truncated at the upper (>130) and lower (<70) ends and the manual does not contain the necessary data to calculate exact standard scores. As the current sample comprised older low-progress readers, a significant proportion (between 34 and 62%) had standard scores below the minimum of 70 on the YARC measures. This made any analysis using these scores impossible. Therefore, correlations were calculated among all measures of reading and related skills using raw scores (ability scores for the YARC).

Means and standard deviations were derived for each measure and estimates of average reading age were made using the mean raw score for each measure. Missing data were excluded from analyses on a pairwise basis. Tests of normality revealed five outliers across the measures; three univariate and two multivariate. Analyses were conducted with outliers removed.

**Results**

Means and standard deviations for all measures (raw scores and ability scores) are shown in Table 1. Intercorrelations between all measures are shown in Table 2. We first present results related to measures of reading accuracy, followed by measures of reading rate and reading comprehension.

The YARC measures of reading accuracy, reading rate and single word reading correlated highly with each other (.87+) (but less well with YARC Comprehension, .298–.381). YARC accuracy and single word reading also correlated highly with the other measures of reading accuracy: NARA accuracy (.913 and .906) and (especially) the Burt (.950 and .913) indicating high concurrent validity. Similarly, the YARC rate measure correlated very highly with the WARP (.930), again indicating good concurrent validity. As a comparison, the NARA rate measure correlated poorly with WARP (.491) indicating that YARC rate may be a superior measure of the skill. (As may be seen from the correlation matrix in Table 2, the three YARC measures also correlated well with the Martin and Pratt and the South Australian Spelling Test.)

The YARC measure of reading comprehension, however, correlated most strongly, but not as highly, with NARA comprehension (.619) and the PPVT (.639), as we might expect. It is not possible to say whether the YARC measures reading comprehension better than the NARA or not, on the basis of these data. However, the NARA also correlates with PPVT at a similar level (see Table 2).

The norms for the YARC were used to estimate mean reading ages from mean raw score (see Table 3). The estimated reading ages for the four YARC tests were similar as follows: single word reading 7:5; accuracy 7:5; rate 7:0; and reading comprehension 7:5. For the NARA, the estimated reading ages were 8:0 for reading accuracy, 9:4 for reading rate and 6:11 for reading comprehension. For the Burt and the Martin and Pratt, the estimated reading ages were 8:6 and 7:8, respectively.

The norms for the YARC and NARA were also used to convert raw scores to percentile ranks and frequencies of each percentile rank were examined (see Table 4). As the sample comprised low-

progress readers, we have compared the number of students estimated to be at or below the 25th percentile by each of the measures of accuracy, comprehension and rate. The majority of students (79% or greater) performed at or below the 25th percentile on each of the accuracy measures (NARA, YARC and Single Word Reading Test).

The percentage of students at or below the 25th percentile differed a little among the measures: 78% for NARA accuracy as compared with 93 and 96% for the YARC accuracy and Single Word Reading measures. Comparatively, 56% of students were estimated as performing below the 25th percentile by the Martin and Pratt. In contrast, the rate measures differed from each other markedly; estimating that 40% of students versus 92% of students were at or below the 25th percentile for the NARA and YARC rate measures respectively. The comprehension measures also differed in their estimate of student performance. All students performed at or below the 25th percentile according to NARA comprehension, whereas 89% of students performed at or below the 25th percentile according to the YARC comprehension measure.

**Discussion**

The two YARC single word reading and reading accuracy tests appear to be valid measures of reading accuracy. The two YARC measures of reading accuracy, NARA reading accuracy and the Burt Word Reading tests all intercorrelated to a high degree, demonstrating good concurrent validity. Moreover these measures also correlated well with Martin and Pratt, the South Australian Spelling Test and the measures of reading fluency, the YARC rate measure and the WARP.

The YARC measure of reading comprehension correlated with both reading accuracy and general comprehension, as we would expect. To this extent, this indicates that the YARC measure of reading comprehension aligns with the Simple View of Reading (Gough & Tunmer, 1986), which states that reading comprehension is the product of decoding ability and listening comprehension. In fact, the test was conceptually based on this model (Snowling et al., 2012).

The YARC reading rate and comprehension measures provided generally lower estimates of student performance than NARA, with a higher proportion of students estimated at or below the 25th percentile rank on both measures (see Table 4). The reading age estimates provided for these measures are also quite different. The YARC rate average reading age estimate was much lower than

NARA rate (7:0 compared with 9:4), whereas YARC reading comprehension measure yields a higher estimate of reading age than the NARA (7:5 compared with 6:11). The YARC accuracy measure on the other hand provides estimated reading age (7:5) and percentile ranks which are more in line with the other measures of reading accuracy. (Note that the Burt test, while still correlating highly with the other measures of reading accuracy, tends to overestimate reading age compared to the other reading measures, probably because its norms are now quite old in comparison.)

The measures of rate differ the most of the YARC and NARA measures, providing reading age estimates almost two and a half years apart. However, the YARC rate measure correlates considerably more highly with the measure of reading fluency, and so may be considered to be the more valid measure.

The YARC yields a higher estimate of reading age for reading comprehension than the NARA but this is similar to the estimate of vocabulary skills provided by the PPVT. We are inclined to consider that the YARC estimate may be more accurate than the NARA because it is more in line with the other measures and also because the norms provided are more recent. The lower estimate provided by the NARA might also be the result of a possible confounding effect of recall ability. While the instructions for the YARC reading comprehension measure are that students should be encouraged to look back over the passage just read, to help them to answer the comprehension questions, this is not the case in the NARA manual. The NARA manual states that students should be encouraged to answer from memory. Given that this measure is supposed to test reading comprehension rather than immediate recall, it seems preferable that students should be encouraged to review the passage just read when answering the test questions. To this extent, the YARC instructions are to be preferred but it should be noted that students might identify the correct information without fully understanding it. This problem is partly mitigated by the inclusion of open-ended inferential questions. This difference in the recall factor might also explain why the correlation between the two measures of reading comprehension were not as high as might be expected.

It is, however, important to consider these findings in the context of several limitations. First, and as already noted, the reported reliabilities for YARC reading comprehension range from .38 to

.86. Poor reliability of the measure will inevitably influence the inferences that can be made on the basis of these data and may also partly explain the lower than expected correlations.

Second, the fact that the current sample was relatively small, and a convenience sample (not randomly selected) impacts on the generalisability of the findings. The current sample was selected on the basis of the students being low-progress readers (as previously defined). As the tests provide for a range of student abilities in reading skills, it is not possible to determine how similar the YARC and NARA measures are for students performing at the upper end of the ability range.

In conclusion, the analyses based on this sample suggest that the YARC may be an acceptable alternative to the NARA for use with Australian low-progress readers. All of the YARC measures correlate appropriately with the other measures of reading and related skills as would be predicted and the derived reading age estimates are also consonant with what would be expected. Given also that more recent norms are available for the YARC, it is recommended for use by practitioners working with low-progress readers.

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Table 1. Means and standard deviations for all measures (raw scores).

| Measure | N | Mean | Standard Deviation | Range | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| Age | 76 | 126.01 | 10.06 | 102-141 | -0.653 | -0.286 |
| Burt | 76 | 49.30 | 15.59 | 25-85 | 0.545 | -0.696 |
| South Australian Spelling | 76 | 30.88 | 7.39 | 10-43 | -0.685 | -0.115 |
| NARA Accuracy | 76 | 39.53 | 16.31 | 15-82 | 0.897 | 0.214 |
| NARA Comprehension | 76 | 8.75 | 3.43 | 2-17 | 0.270 | -0.208 |
| NARA Rate | 67 | 66.37 | 16.64 | 28-111 | 0.059 | 0.065 |
| YARC Single Word Reading Test | 76 | 29.43 | 9.63 | 11-53 | 0.350 | -0.606 |
| YARC Accuracy | 76 | 43.49 | 5.52 | 32-57 | 0.435 | -0.372 |
| YARC Comprehension | 76 | 50.92 | 6.73 | 36-65 | -0.038 | -0.500 |
| YARC Rate | 70 | 45.69 | 13.28 | 11-71 | -0.262 | -0.429 |
| Martin and Pratt | 76 | 20.43 | 11.33 | 1-42 | 0.239 | -1.037 |
| WARP | 76 | 85.28 | 30.16 | 21-148 | 0.120 | -0.748 |
| PPVT | 76 | 123.70 | 19.19 | 71-177 | 0.021 | 0.285 |

Table 2. Intercorrelations of all measures of reading and related skills (raw scores).

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. YARC Single Word Reading Test | - | | | | | | | | | | | |
| 2. YARC Accuracy | .884** | - | | | | | | | | | | |
| 3. YARC Comprehension | .322** | .298** | - | | | | | | | | | |
| 4. YARC Rate | .897** | .868** | .381** | - | | | | | | | | |
| 5. NARA Accuracy | .913** | .906** | .331** | .849** | - | | | | | | | |
| 6. NARA Comprehension | .450** | .444** | .619** | .460** | .488** | - | | | | | | |
| 7. NARA Rate | .339** | .320** | .056 | .560** | .245* | .135 | - | | | | | |
| 8. Burt | .950** | .913** | .286* | .846** | .927** | .451** | .241* | - | | | | |
| 9. South Australian Spelling | .782** | .718** | .336** | .762** | .712** | .403** | .277* | .771** | - | | | |
| 10. Martin and Pratt | .778** | .755** | .259* | .620** | .762** | .364** | .107 | .829** | .696** | - | | |
| 11. WARP | .836** | .851** | .330** | .930** | .830** | .408** | .491** | .824** | .744** | .633** | - | |
| 12. PPVT | .282* | .229* | .639** | .282* | .275* | .634** | .103 | .290* | .172 | .173 | .181 | - |

* Correlation is statistically significant at the $p<0.05$ level (2-tailed)

** Correlation is statistically significant at the $p<0.01$ level (2-tailed)

Table 3. Estimated mean reading (spelling and vocabulary) ages based on mean raw scores of the sample (N=76).

| Measure | Mean Raw Score | Age Equivalent in Months | Age Equivalent in Years and Months |
|---|---|---|---|
| Chronological age | | 126 | 10:6 |
| NARA Accuracy | 39.53 | 96 | 8:0 |
| NARA Rate | 66.37 | 112 | 9:4 |
| NARA Comprehension | 8.75 | 83 | 6:11 |
| YARC Single Word Reading Test | 29.43 | 89 | 7:5 |
| YARC Accuracy | 43.49 | 89 | 7:5 |
| YARC Rate | 45.69 | 84 | 7:0 |
| YARC Comprehension | 50.92 | 89 | 7:5 |
| Burt | 49.30 | 102 | 8:6 |
| South Australian Spelling Test | 30.88 | 100 | 8:4 |
| Martin and Pratt | 20.43 | 92 | 7:8 |
| PPVT | 123.70 | 92 | 7:8 |

Table 4. Estimated percentage of students performing at or below the 25th percentile rank.

| Measure | Percentage of students at or below 25th percentile rank |
|---|---|
| NARA Accuracy | 78.95 |
| YARC Accuracy | 93.42 |
| YARC Single Word Reading Test | 96.05 |
| Martin and Pratt | 56.52 |
| NARA Rate | 40.30 |
| YARC Rate | 92.86 |
| NARA Comprehension | 100 |
| YARC Comprehension | 89.47 |
| PPVT | 85.33 |