Assessing reading and writing speeds – what is 'average'?

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Session overview

- Reading speeds
  - What happened to the 'expected' reading speeds in the new format?
  - Complexity of reading process
    - Model of reading development
    - Multiple factors
  - Key research papers
    - Lewandowski, Amendum, **Brysbaert**
  - Different types of reading
  - Implications for assessment
- Writing speeds
  - What happened to the 'expected' writing speeds in the new format?
  - Is 25 wpm reasonable?
  - How do we know?
    - Model of writing development
    - Multiple factors
  - Key research papers
  - My (small scale) research
  - Implications for assessment and recommendations
    - Helen Duncan's research

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Reading speeds

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What might affect reading speed?

- The simple view of reading (Gough and Tunmer 1986)
  - D x LC = RC
  - Many factors implicit in this: see right
- Maximum, minimum and optimum comprehension
- Oral v silent reading speeds

Scarborough's Reading Rope (2001)

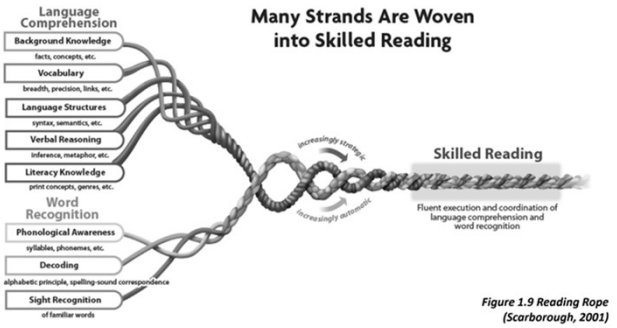

Figure 1.9 Reading Rope (Scarborough, 2001)

Scarborough, H. S. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. Neuman & D. Dickinson (Eds.), *Handbook for research in early literacy* (pp. 97–110). New York, NY: Guilford Press.

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Key research into silent reading speeds

- Early studies
  - Quantz (1898)
    - 'very slow' readers = 234 wpm (!)
    - 'very rapid' readers = 438 wpm
  - Huey (1901)
    - 321-355 wpm for 'normal' silent reading
    - Fiction passages – highly influential
  - Tinker (1955)
    - Chapman-Cook test
    - Undergraduates; easy texts
    - 309 wpm
  - Buswell (1959)
    - Early eye movement research
    - 250 wpm end of elementary school
    - 300 wpm in college students
- Rayner (1978, 1989, 1998)
  - 300 wpm based on eye movements
- Carver (1977-1997)
  - Idea of 'gears' for reading from memorising to scanning
  - 'normal' silent reading = 300 wpm (without aiming to answer questions afterwards)
- Lewandowski et al (2003)
  - systematic literature review on reading rates in HE
  - 'average' varied from **140** wpm to **400** wpm
- Nation, P. (2009)
  - Physiological limits of reading speed based on fixation, saccade and regression
  - around 300 words per minute
  - 250 wpm is 'reasonable' for comprehension

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Brysbaert (2019)

- Brysbaert (2019)

  Marc Brysbaert

  Professor of Psychology
  Department of Experimental Psychology
  University of Ghent

  How many words do we read per minute?
  A review and meta-analysis of reading rate

  'To have a more widely supported estimate of reading rate, we decided to run meta-analyses of silent and oral reading rates, **including all the studies we could find, spanning a time period from 1901 to 2019**. This ensured that our estimates are based on the largest possible database.'

- Brysbaert was interested in the validity of the commonly quoted 300 wpm for 'normal' silent reading:
- The normal or typical reading rate of 300 wpm is widely mentioned and used:
  - to calculate the typical time needed to read online newspaper articles, books, contracts, or legal cases
  - the speed computer programmers use to present information in visual displays
  - the number used to determine whether someone is a slow reader
- How well is this supported by the available data?

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Brysbaert's methodology and sampling

Inclusion criteria

- Healthy adults between 17 and 60 years
- Reading for comprehension or fun
- Normal text reading (not single word)
  - Minimum 10 participants
  - Unselected group (or control group) of healthy participants
  - Native speakers
  - Full text visible to participants (45 articles)
    - Cross-references (uncovered many more articles)
- Eventually considered 190 studies with a total of around 18500 participants

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Brysbaert's key findings

Reading speed has been overestimated.

- **average** silent reading speed for healthy adults was **238 wpm for non-fiction and 260 for fiction**.
- BUT the range was very wide:
  - non-fiction **175 - 300 wpm**
  - fiction **200 - 320 wpm**
- Speeds for *reading silently with understanding* correlated closely with *listening and understanding*
- Rates are in line with maximum listening speed and do not imply reading-specific language processing.
- Reading rates are lower for children, older adults, and EAL readers
- There is no evidence for reading gears except for reading versus text scanning

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What about oral reading speeds?

Brysbaert

- Average oral reading rate 183 wpm
- Based on 77 studies with 5965 participants
- Average oral speeds reach a ceiling in adolescence
- Correlated with RAN

Oral reading of continuous prose can provide useful qualitative information about accuracy and approaches to word decoding, punctuation and intonation, but oral reading *rates* for continuous prose may be of limited value for identifying reading difficulties in adults.

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What about comprehension?

Castles, A., Rastle K. and Nation, K. *(*2018) Ending the Reading Wars: Reading Acquisition from Novice to Expert

- comprehension is a complex skill and develops throughout our lives as our reading skills, language skills, and general knowledge increase
- a much harder skill to measure than reading fluency
- Clear from any brief comparison of comprehension tests used in diagnostic assessments:
  - word, sentence, paragraph or text level.
  - multiple choice questions or self-generated answers.
  - specific details, key ideas/themes,
  - direct or inferred meaning.

- Amendum et al (2018)
  - literature review on interaction between text complexity, fluency and comprehension in elementary pupils
  - **accuracy and reading rate decreased with higher text difficulty**
  - effect more marked in less skilled readers with fewer strategies to draw on
- Ciuffo et al (2017):
  - correlation is also inconsistent between oral v silent reading and comprehension

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Evidence for decline of silent reading rate

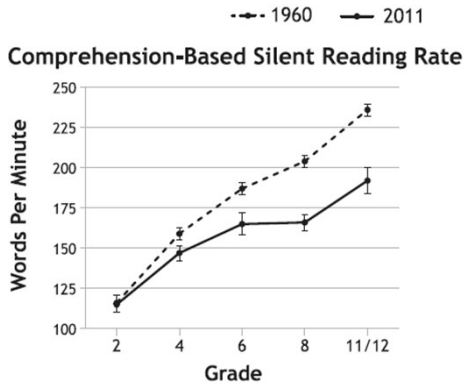

Figure 6: A comparison of Taylor's (1965) data collected in 1960 and Spichtig et al.'s (2016) data collected in 2011, both showing the increase in reading rate during primary and secondary school. Source: Spichtig et al. (2016) (in Brysbaert, 2019)

- Research in 2011 showed a decline in American school-age reading rates since 1960
- The wpm rate in second grade remained the same
- Rates rise over course of schooling
- cf change in standard scores between TOWRE 1 and TOWRE 2

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Implications for assessors

- A figure for reading rate on its own is of little utility
- There is no simple average writing or reading speed by age or stage
- ***Typical ranges*** may help pinpoint atypical performance
- Silent reading speeds may increase in adulthood, while oral rates reach a ceiling based on articulation
- A good assessment of silent reading rate ideally has one long text
- Silent reading is more naturalistic for adults but more difficult to time
- Report on:
  - type and content of the task set
  - a range of reading tasks
  - qualitative observations of fluency, prosody, strategies etc

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Writing speeds

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25 wpm – is it reasonable?

Warren (2017)

- comprehensive literature review of research into the factors influencing writing speed and fluency
- wide variations in 'average' writing speed depending on the type and length of writing tasks set (e.g. free writing, dictation, precis, 'examination' style task, sentence completion, copying).
- several studies looked explicitly at adult typical and non-typical (dyslexic) writing fluency
- findings confirm that a 25 wpm 'average' writing speed is an overestimate of typical performance under examination conditions

'writing speed varies according to the nature of the task, and it is debatable what approach is most appropriate for determining whether or not a student should be entitled to additional time in examinations,'
(Horne et al, 2011, p 54).

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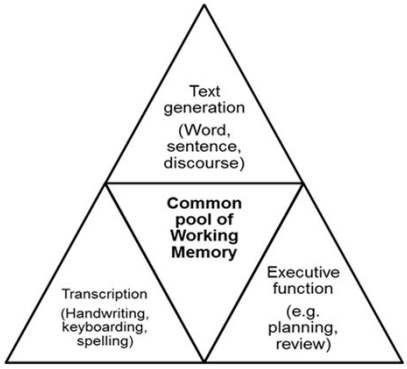
A model of writing



The simple view of writing, adapted from Barnett (2014) after Berninger and Amtmann (2003)

- More complex than the simple view of reading
- Increased load in one area reduces cognitive resources available for others
- Tasks in writing tests vary in these areas
- Do outcomes differ for different groups?

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Summary of writing speeds

Date	Study/Test	task	Sample size	wpm	age range	time limit
1992	Hedderly	sentence completion	2000	25	18	10
1996	Sawyer et al	copying	41	200 ch	Y10	5
1998	Roaf	free writing	249	15-25	16 (Y11)	10
2001	Allcock	free writing	2701	16.9	16	20
2003	Summers and Catarro	examination	66	15-18	20	120
2005	Connelly et al	examination	22	13/19	u/g	60
2006	Connelly et al	examination	60	14/17	u/g	30
2008	O'Mahony et al	free writing	1224	n/a	8 to 18	3/9
2009	DASH 17+	free writing	393	25	17-25	10
2011	Horne et al	dictation	952	24	17	n/a
2012	York AB Rev	précis	126	21.7	u/g	10
2013	Ferrier et al	free writing	364	8.9	11 (Y7)	20
2016	SASC guidelines	free writing	n/a	25	adult	15

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My small scale research – 2017 and 2020

- Regular assessors have potential access to large datasets of free writing data.
- Hypothesis:
  - The average observed free writing speed in assessments is less than 25 wpm
  - This is not dependent on SpLD identification
- Small-scale study
  - Convenience sampling
  - Secondary data analysis
- Statistical analysis of writing speed in wpm from existing anonymised diagnostic report data
- Two datasets:
  - 2011-2013 in one institution
  - 2018-2020 in a range of institutions

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Eyeball stats

2017

Id	N	Low	High	Range
Dyslexia	89	9.3	30	20.7
Dyspraxia	29	8	29	21
Dysgraphia	5	15	20	5
SpLD	13	15	24	9
No SpLD	57	12	41	29
SProc	6	12	24	12
All	202	8	41	33

Median = 19
LQ = 16
UQ = 22
19 students write at 25+wpm:
13 w dyslexia, 1 w dyspraxia, 6 w no SpLD

dyslexia mean	19.47
dyspraxia mean	17.2
no SpLD mean	19.9
SpLD mean	19.13

2020

Id	N	Low	High	Range
Dyslexia	64	11	24.4	13.4
Dyspraxia	10	13	28	15
SpLD	29	12	24	12
No SpLD	33	12	25	13
All	128	11	28	17

Median	17
LQ	14.8
UQ	24

Just **four** students write at 25+ wpm - two with dyspraxia.

dyslexia mean	17.33
dyspraxia mean	19.97
no spld mean	17.8
SpLD mean	18.14

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Answering the question

- Hypothesis:
  - The average observed free writing speed in assessments is less than 25 wpm
    - This would seem to be supported by results: 2017 mean for both dyslexic and non-SpLD groups c.19 wpm with no significant difference
    - 2020 means also below 20 wpm and generally slightly lower
  - This is not dependent on SpLD identification
    - 2017: SPSS showed that students with dyspraxia write significantly more slowly than other groups, although the correlation was not particularly strong.
    - 2020: no SPSS, but clear from eyeball data that there is no significance based on SpLD identification
      - If anything, students with DCD-dyspraxia wrote faster than other groups

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Implications for assessors

- From both the literature and the findings from these datasets it would seem that in authentic free writing tasks students rarely write at 25 wpm.
- A fair benchmark, if one is needed, may be 20 wpm +/- 5; so 15-25 wpm is considered within expectations.
- But as with reading rates, a figure for free writing speed can only tell us so much – there are many other variables.

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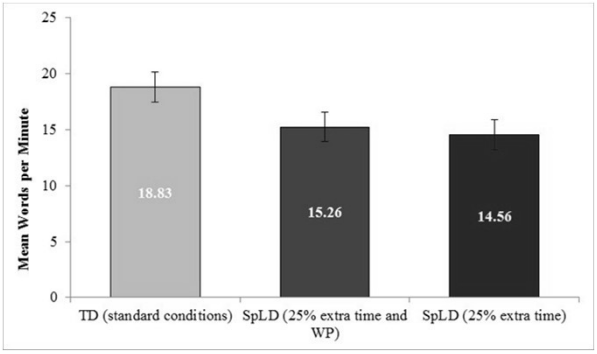
Implications for exam arrangements?

- Inappropriate to use raw reading and writing speeds for exam arrangements

BUT

- SpLD processing differences seem to justify this
  - Helen Duncan's research aimed to identify whether EAAs actually confer equity
  - Paper in 2017 (using exam data from 2014 – humanities only)
  - Presentation (using exam data from 2016 – humanities and STEM)

Figure 2: Mean wpm across all participant groups



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In conclusion…

- Assessments of reading and writing should be holistic
  - Simple rates of either reading or writing are not very informative
- Oral reading tests can tell us a lot about fluency, accuracy and prosody but are not typical of adult reading practices
- The average range of silent reading speeds is very wide
- Both reading and writing speeds are highly variable depending upon the task and desired outcomes
  - It's fine to quote the measured reading and writing speeds in reports, but **be wary of stating 'slow' unless silent reading speed is below 175 wpm and/or writing speed is below 15 wpm.**
- My research and Helen Duncan's concur that there is little statistical difference between TD and SpLD writing speeds
  - It is likely to be the known processing difficulties inherent in SpLDs that affect outcomes and justify exam arrangements, rather than speeds *per se*
- Exceptionally slow reading and writing speeds are always a cause for concern.

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