

# Readability: importance of information that is easy to read for most people



Simon Collins, HIV i-Base

[www.i-Base.info](http://www.i-Base.info)

# Outline

- This talk is based on an oral presentation to the UK BHIVA conference in 2015.
- Designed to show whether literacy in patient information meets guideline targets.
- Also, that to show that patient information can be made easier to understand.
- Difficult text is a barrier to inclusion. It requires education to access to healthcare.
- This is not a new issue and it is not specific to HIV 😊

**Patient information leaflets (PILs)  
currently require graduate level  
literacy levels:  
equivalent to The Guardian or The Telegraph  
newspapers**



Simon Collins [1], Matt Williams [2], Liam Martin [1],  
Robin Jakob [1] Marta Boffito [3]

1. HIV i-Base; 2. UK-CAB; 3. Chelsea & Westminster Hospital

# Informed consent

- Informed consent (IC) as an ethical concept is a cornerstone of medical research.
- Patient Information and consent forms are part of the IC process.
  - What the study is for.
  - What is involved and expected.
  - Possible risks and benefits.
  - That taking part is voluntary.
- i-Base talks with individuals about joining studies and works with research groups.



# Readability scores

- Recommended in NHS guidelines. [1]
- How difficult is text to read?
- What percentage of people will easily understand - or be excluded.
- Usually include average word, sentence and paragraph length.
- Readability increased with shorter words, sentences (10-12 words), using the active tense, and common words.

1. NHS. Information Sheets & Consent Forms. Guidance for Researchers and Reviewers. March 2011, Annex 9. <http://www.hra.nhs.uk>

# Methods

- Evaluate the body text of patient information leaflets from 9 ongoing studies: phase I-IV.
- Text was copied from PDF files into MS Word. Minor edits to help scores. Punctuation added after headings and in bullet lists. Tables were excluded.
- Primary outcome was Reading Ease. Scores calculated online.<sup>[1]</sup> Results compiled in Excel.
- Two community-written patient leaflets were used as comparisons.

1. [www.readabilityscore.com](http://www.readabilityscore.com) and [www.read-able.com](http://www.read-able.com)

# Choice of scores

- **Flesch reading ease (Plain English) <sup>[1]</sup>**  
Target: >70 for general public; higher score is better  
Practical range 0 – 100 (but can be <0 and >100)
- **Flesch-Kincaid reading grade <sup>[1]</sup>**  
Adapted for US school grade: lower is better,  
Target: grade <8 = reading age 13-14; grade >12 = graduate  
Microsoft Word caps highest grade at 12.
- **SMOG grade score <sup>[2]</sup>**  
May have advantages for health information. Stricter criteria for higher comprehension. Used for cancer patients in US. <sup>[3]</sup>

1. Wikipediia: Flesch–Kincaid readability tests; 2. Wikipediia: SMOG index 3. Friedma DB, Health Educ Behav. (2006).

# Reading scores

**Equations are objective estimates.**

Flesch reading ease score <sup>[1]</sup>

$$206.835 - 1.015 \left( \frac{\text{total words}}{\text{total sentences}} \right) + 84.6 \left( \frac{\text{total syllables}}{\text{total words}} \right)$$

Flesch-Kincaid reading grade <sup>[1]</sup>

$$0.39 \left( \frac{\text{total words}}{\text{total sentences}} \right) + 11.8 \left( \frac{\text{total syllables}}{\text{total words}} \right) - 15.59$$

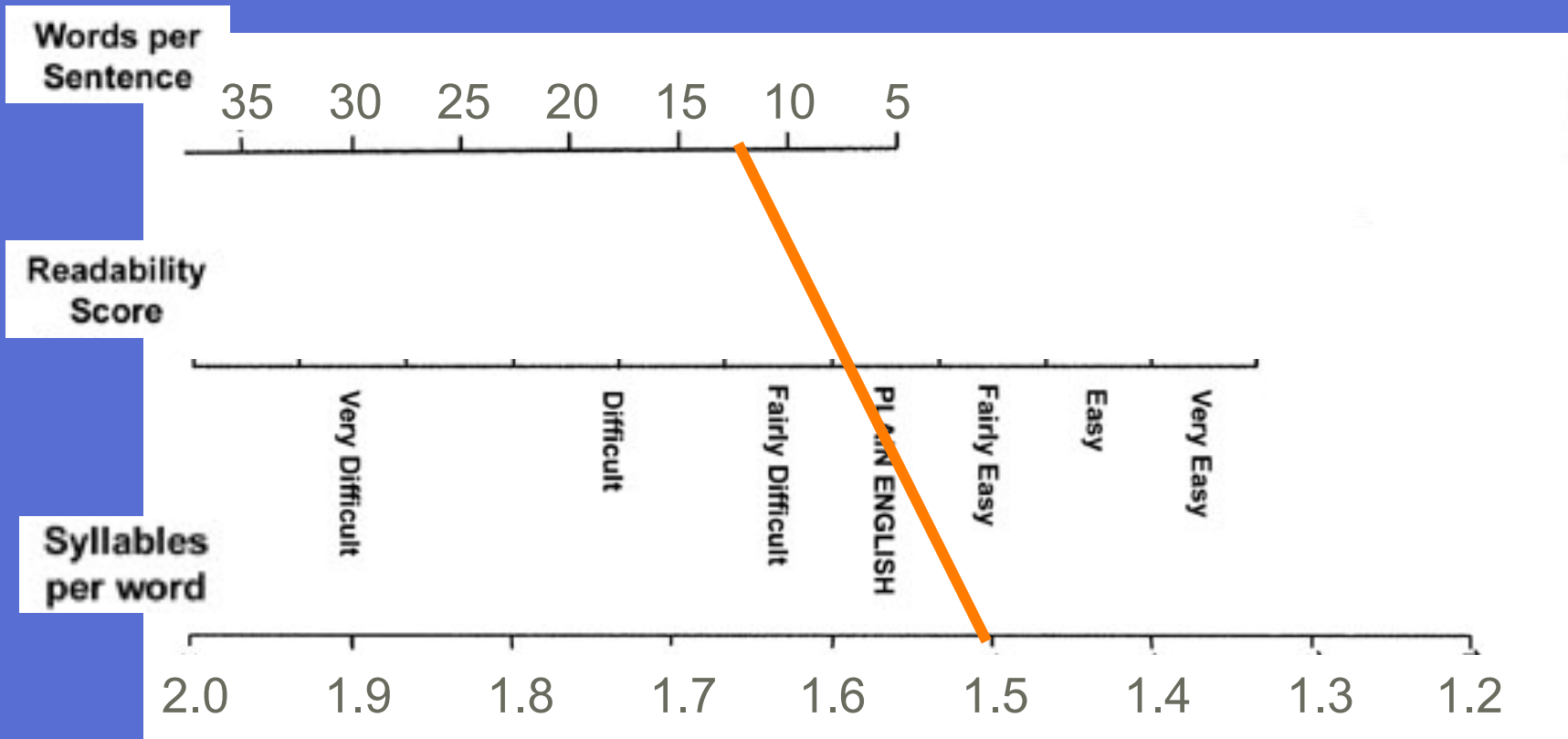
SMOG index <sup>[2]</sup>

$$\text{grade} = 1.0430 \sqrt{\text{number of polysyllables} \times \frac{30}{\text{number of sentences}}} + 3.1291$$

1. Wikipediia: Flesch–Kincaid readability tests; 2. Wikipediia: SMOG index.

# Flesch reading ease

The intersection of the line joining average words per sentence to average syllables per word show the readability score. The minimum score for Plain English is 60.



# Target literacy

Reading ease score >70: similar to tabloids. <sup>[1]</sup>

	<b>Score*</b>	<b>% of pop</b>
Easy tabloids	>70	70-80%
Standard magazine	60-70	50-60%
Broadsheet	40-60	30-50%
Academic	30-40	<30%

UK literacy <sup>[2]</sup>

Level 2 - 57% or higher - GSCE grade A-C

Level 1 - 27% - GSCE grade D-E

Below Level 1 - 16% - reading age 11

\* modified, based on recent sampling.

1. NHS. Information Sheets & Consent Forms. Guidance for Researchers and Reviewers. March 2011.

2. Department for Business, Innovation and Skills. Skills for Life Survey (2011)

<https://www.readabilityformulas.com>

# Online scores

The screenshot shows a web interface for calculating readability scores. At the top, there are three tabs: 'Test by URI', 'Test by Direct Input' (which is selected), and 'Test by Referer'. Below the tabs, the heading 'Test by Direct Input' is displayed. A prompt 'Enter text to check the readability:' is followed by a large text input area containing a paragraph of text. Below the input area, a note states 'HTML is allowed - it will be stripped from the text.' At the bottom, there is a button labeled 'Calculate Readability'.

Test by URI   Test by Direct Input   Test by Referer

## Test by Direct Input

Enter text to check the readability:

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way – in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.

HTML is allowed - it will be stripped from the text.

Calculate Readability

**Free service, unlimited text, instant results.**

## Online scores

Test by URI

Test by Direct Input

### Test by Direct Input

Enter text to check the readability:

It was the best of times, it was the worst of times, it was the age of foolishness, it was the epoch of darkness, it was the season of Light, it was the season of Darkness, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct to Hell, we were as close to the Gods as you could get, we were as far from them as possible, so far like the present period, that some of the wisest among us of this generation have received, for good or for evil, in the superlative degree of comparison only.

HTML is allowed - it will be stripped from the text.

Calculate Readability

### Text statistics

No. of sentences	1
No. of words	120
No. of complex words	10
% of complex words	8.33%
Av. words per sentence	120
Av. syllables per word	1.4

Statistics are provided in addition to calculations



# Online scores

### Readability Indices

<b>Flesch Kincaid Reading Ease</b>	-34.8	
<b>Flesch Kincaid Grade Level</b>	47.9	
<b>Gunning Fog Score</b>	51.3	
<b>SMOG Index</b>	18.2	
<b>Coleman Liau Index</b>	7.5	
<b>Automated Readability Index</b>	57.2	

# Online scores

## Readability Indices

Flesch Kincaid Reading Ease

-34.8



Flesch

Gunn

SMO

Cole

Auto

## Readability Test Results

This page has an average [grade level](#) of about 36.

Ooh, that's probably a bit too complicated.  
Have you thought about using smaller words and shorter sentences?

A Tale of Two Cities (110 words). Reading ease: -34 Reading grade: 47

# Results: document statistics

	Mean n=9	Range n=9	Community examples n=2
<b>Text statistics</b>			
Page number	13	5-23	9
Word count	4513	1875-8530	3582
Sentence count	242	125-401	280
Mean numbers of words per sentence	18.5	15.6-22.1	12.8

**Community examples matched for complexity.  
Document length is a literacy factor (START substudy)**

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# Results: readability scores

	Mean scores n=9	Range of mean scores n=9	Community examples n=2
<b>Readability scores</b>			
<b>Flesch Reading Ease</b>	<b>55.4</b>	<b>47.1-63.1</b>	<b>70.3</b>
<b>Flesch-Kincaid Reading Grade</b>	<b>10.1</b>	<b>9.0-12.0</b>	<b>6.6</b>
<b>SMOG index</b>	<b>9.2</b>	<b>7.9-10.4</b>	<b>6.9</b>

**Community examples show targets are achievable.**

# Results: readability scores

	Mean scores n=9	Range of mean scores n=9	Community examples n=2
Readability scores			
Flesch Reading Ease	55.4	47.1-63.1	70.3
Flesch-Kincaid Reading Grade	10.1	9.0-12.0	6.6
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Community examples show targets are achievable.



# Results: readability scores

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Flesch Reading Ease	55.4	47.1-63.1	70.3
Flesch-Kincaid Reading Grade	10.1	9.0-12.0	6.6
SMOG index	9.2	7.9-10.4	6.9

Community examples show targets are achievable.

# Limitations and discussion

- Small number of protocols.
- Other factors of readability were not assessed:  
i.e. text content and layout (font size, use of space and headings).
- However, text heavy layouts and results probably underestimated true readability scores.
- Patient leaflets are not used in isolation. Talking through a study is essential – but readability enables independent engagement.

# Advantages of readability

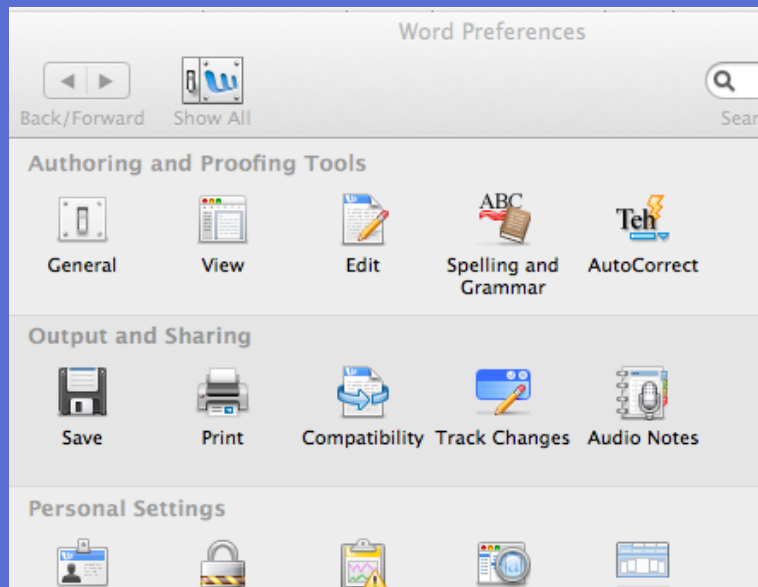
- Increase the pool of potential participants.
- Engage people in research.
- Reduce the chance that people leave the study later.
- More likely to enable real informed consent.

# Conclusion

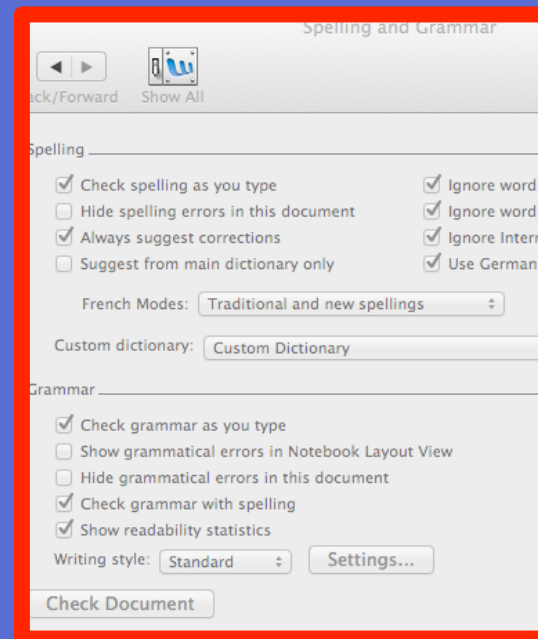
- **This small study showed that literacy levels are too high for people to be easily included in research.**
- **Given the care, detail and costs involved in HIV studies, similar attention is needed for patient information - not as an afterthought.**
- **This is neither a recent or UK-specific issue.\***
- **These skills are easy to learn and the tools are easy to use.**

\* See: Grossman SA et al. Jour Oncology (1994); Sugarman J et al. Hastings Centre Report (1999); Paasche-Orlow et al. NEJM (2003) etc.

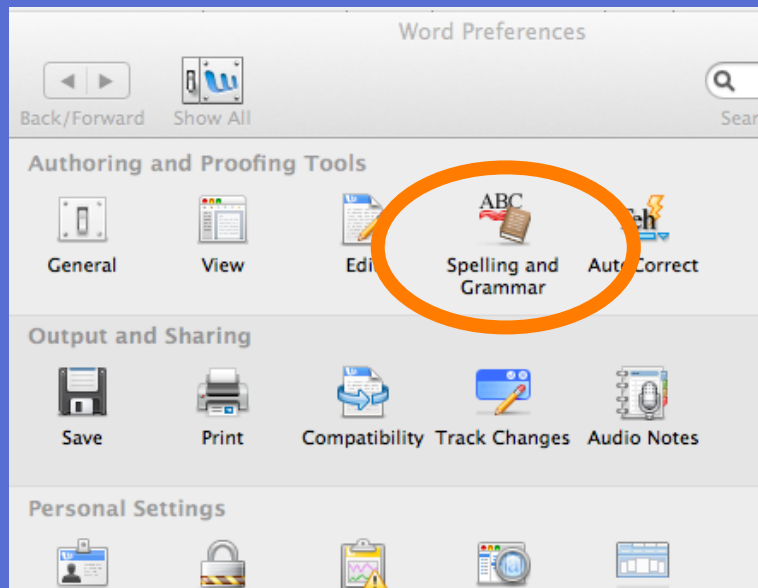
# Readability in Microsoft Word



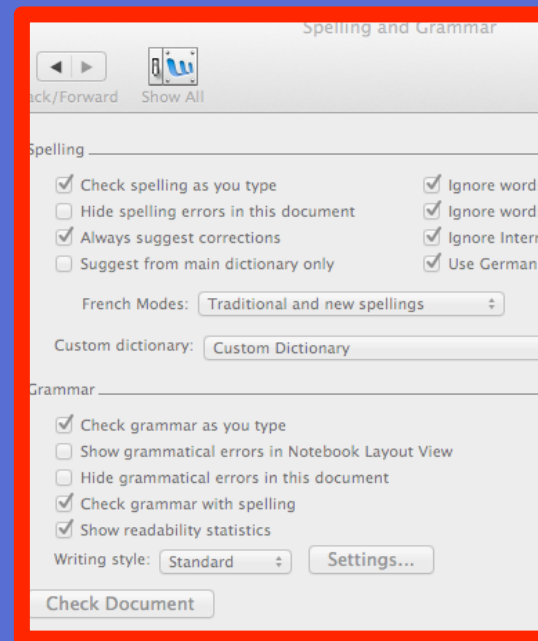
In Spelling and Grammar preferences, check the box to select:  
“Show readability statistics”



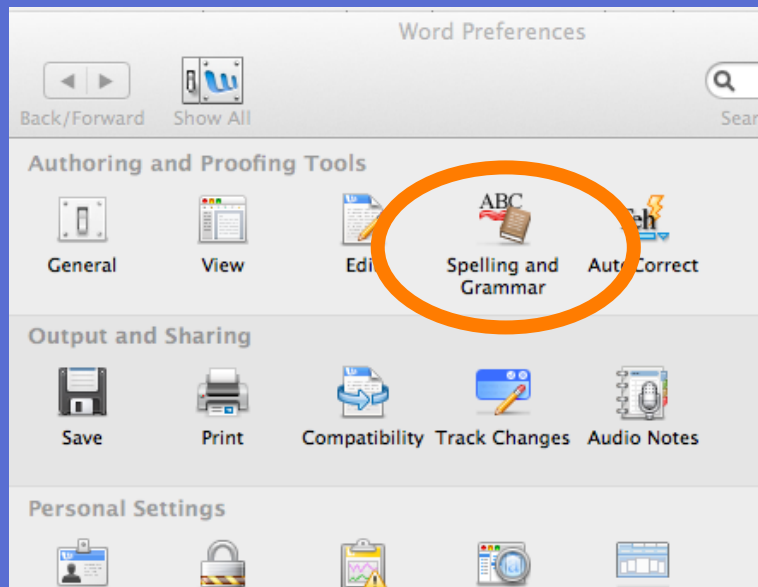
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In Spelling and Grammar preferences, check the box to select:  
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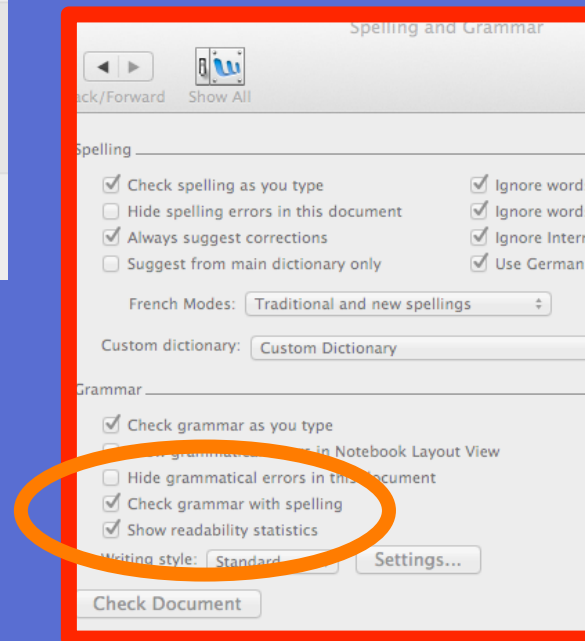


# Readability in Microsoft Word

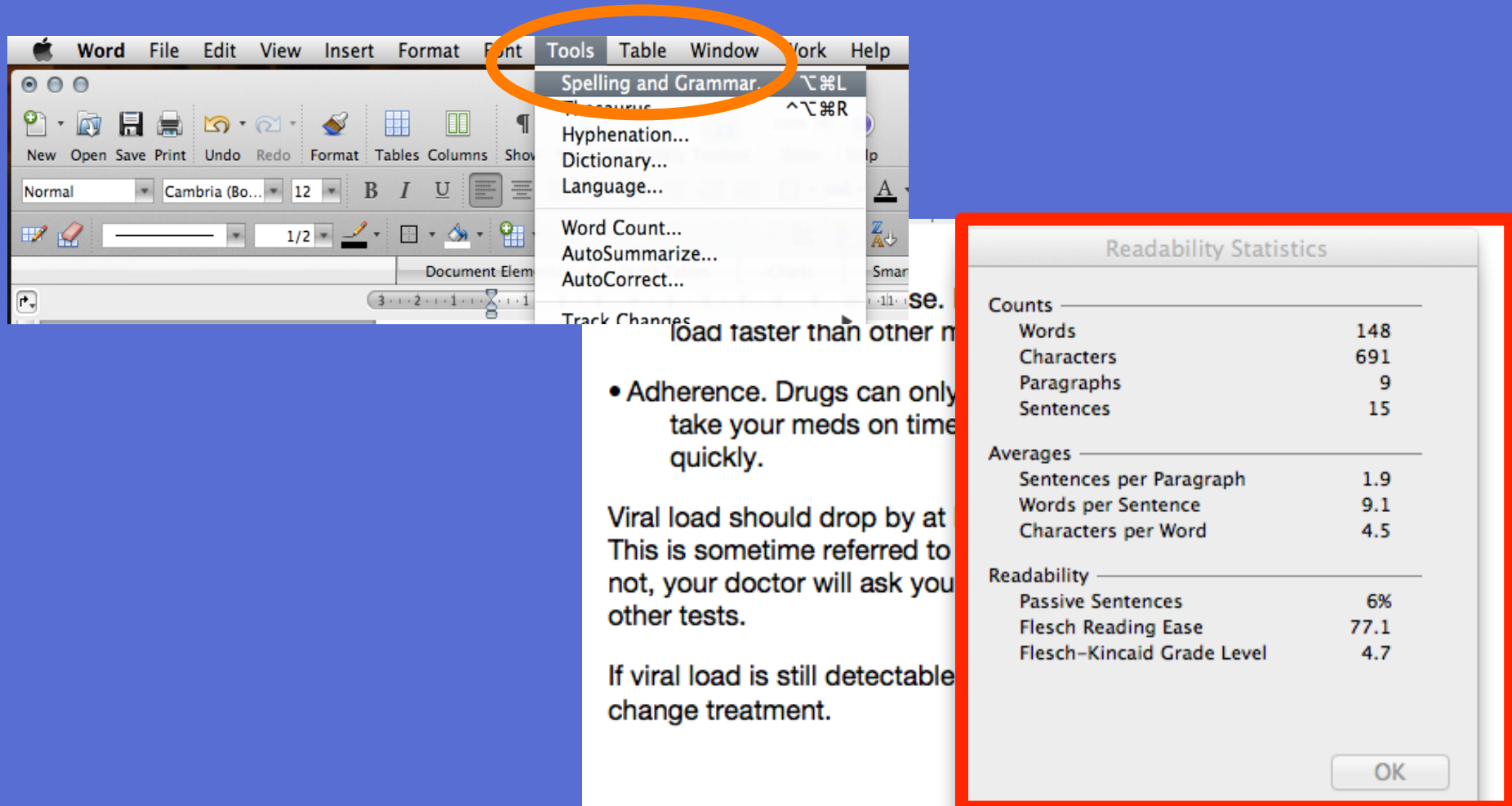


In Spelling and Grammar preferences, check boxes to select:

“Check grammar with spelling” and  
“Show readability statistics”



# Readability in MS Word



The screenshot shows the MS Word interface with the 'Tools' menu open. The 'Tools' menu is circled in orange. The 'Readability Statistics' dialog box is open, showing various readability metrics. The dialog box is outlined in red. The background text is partially obscured by the dialog box.

**Tools Menu Options:**

- Spelling and Grammar...
- Hyphenation...
- Dictionary...
- Language...
- Word Count...
- AutoSummarize...
- AutoCorrect...
- Track Changes

**Readability Statistics Dialog Box:**

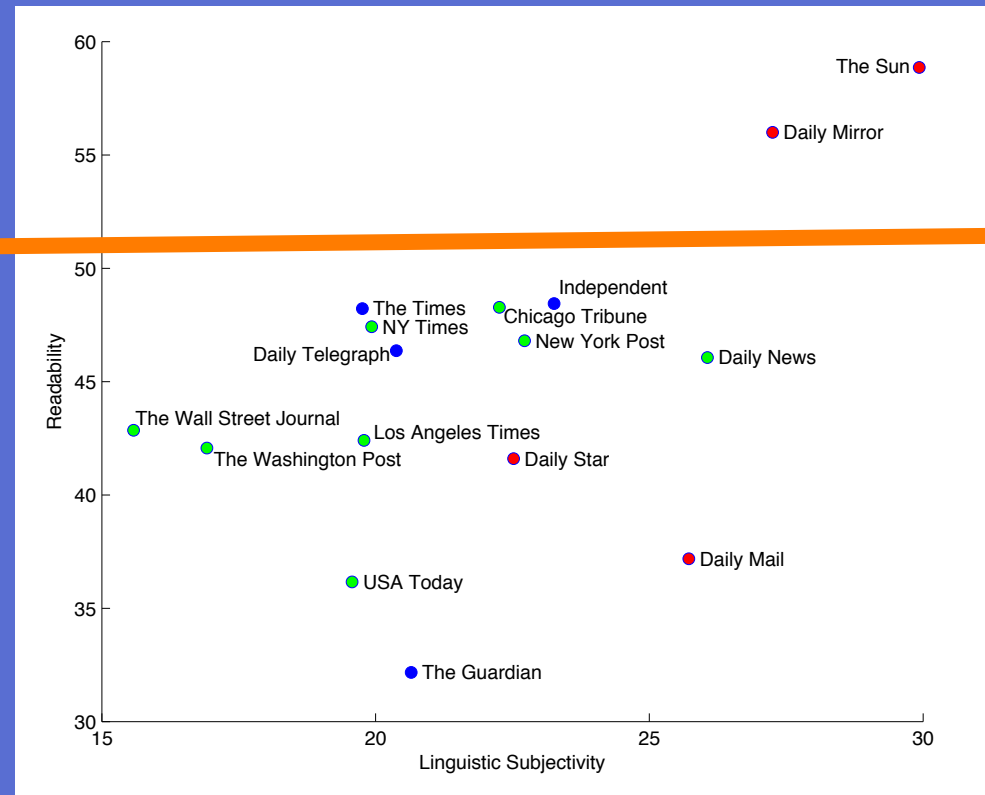
Readability Statistics	
<b>Counts</b>	
Words	148
Characters	691
Paragraphs	9
Sentences	15
<b>Averages</b>	
Sentences per Paragraph	1.9
Words per Sentence	9.1
Characters per Word	4.5
<b>Readability</b>	
Passive Sentences	6%
Flesch Reading Ease	77.1
Flesch-Kincaid Grade Level	4.7

OK



# Newspaper readability

Comparison of selection of US and UK journals based on writing style (Flesch reading ease and subjectivity).



**Tabloids:**  
Sun, Mirror.

**Broadsheets:**  
Telegraph,  
Independent,  
NY Times,  
WSJ.

Cristianini N et al. Digital Journalism 1(1)102-116 (2012) [10.1080/21670811.2012.714928](https://doi.org/10.1080/21670811.2012.714928).

# UK adult literacy & numeracy

	Literacy	Numeracy	Comment
Level 2 or higher	57%	22%	GCSE A-C
Level 1	28%	29%	GCSE D-E
Below level 1	15%	49%	“functionally illiterate”
Entry level 3	8%	25%	Reading age 9-11
Entry level 2	2%	17%	Reading age 7-9
Entry level 1 or lower	5%	7%	Reading age 5-7

**Based on representative sample of > 7000 adults (16-65 years old).  
Not all participants included in all modules.**

Department for Business, Innovation and Skills. Skills for Life Survey (2011). Tables 4.1 and 4.4  
<https://www.gov.uk/government/publications/skills-for-life-survey-2011-important-findings>

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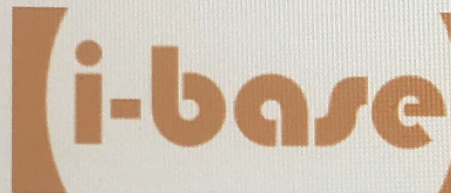
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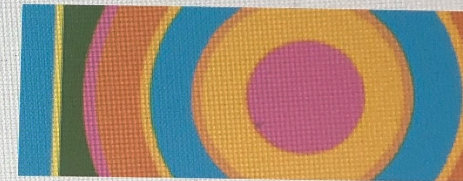


#### i-Base treatment guides use non-technical language

**This is so more people can easily understand the information. Notes for how to write for a wider readership are included below.**

*For example, the information on this web page has a Flesch-Kincaid reading ease score of 74 and reading grade of 5.2 (reading age 8 to 9). There are an average of 9.3 words per sentence. Only 2% of sentences use the passive tense.*

All guides are available in print and online as web pages and as PDF files.



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# Thank you

**HIV positive people who contacted i-Base.**

**Researchers who collaborated with patient leaflets.**

**Marta Boffito, Matt Williams, Liam Martin, Robin Jakobs**

## **Further information**

**[i-base.info/guides/about](https://i-base.info/guides/about)**

**[www.plainenglish.co.uk](http://www.plainenglish.co.uk)**

**[www.hra.nhs.uk](http://www.hra.nhs.uk)**

# Additional slides



# Green eggs and ham

Do you like green eggs and ham?

I do not like them, Sam-I-am.  
I do not like green eggs and ham!

Would you like them here or there?

I would not like them here or there.  
I would not like them anywhere.

I do so like green eggs and ham!  
Thank you! Thank you, Sam-I-am!

FK reading ease: +112; Reading grade: –0.8

# A tale of two cities

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to Heaven, we were all going direct the other way – in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.

**The opening sentence of A Tale of Two Cities has 110 words. It has a reading ease: –34 and reading grade: 47**



Fry Graph for estimating Reading Ages (grade level)

