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# Effects of reading strategies on reading behaviour and comprehension: implications for teaching study skills

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## *Presentation abstract*

We summarised the findings of our ESRC funded project 'Revealing the implications of reading strategy for reading behaviour and comprehension'. The research employed eye-tracking methods, such as measuring when and where the eyes move to reveal what is processed during reading and skimming. Experiments that include manipulations of text characteristics help reveal how reading strategies affect comprehension of text. Our findings have important implications for teaching reading strategy study skills. We are excited to engage those working in learning development to explore the implications of our findings for study skills teaching and to inform our programme of research.
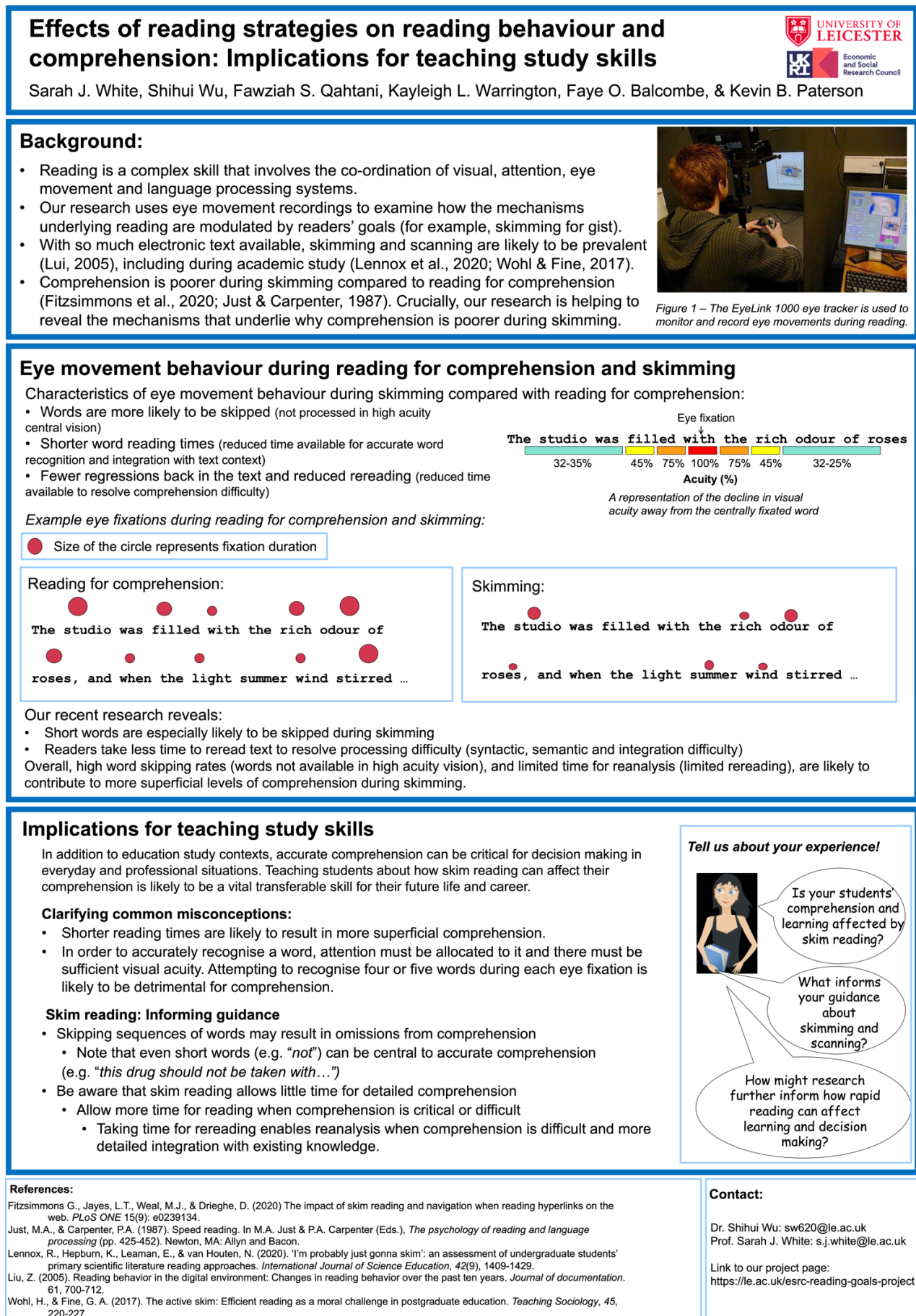
## Discussion prompts:

1. Guidance/approaches to teaching reading skills (especially related to skimming and scanning).

2. Discuss whether the findings from our project fit with the guidance/approaches being used to teach reading skills.

3. Effects of reading strategies on learning and decision making: identifying further research questions with potential for application within (and collaboration with) the field of learning development.

## Poster key points:

- Our research uses eye movement recordings to examine how the mechanisms underlying reading are modulated by readers' goals (reading for comprehension vs. skimming for gist).

- Eye movement behaviour is different during skimming as compared to careful reading: words (especially short words) are more likely to be skipped, there are shorter word reading times and there is less re-reading of previous text.

- Comprehension is poorer during skimming compared with more careful reading for comprehension. This could be due to: words being omitted from comprehension (when sequences of words are skipped); limited reanalysis of text to resolve incomplete comprehension; limited time for integration of concepts within the text; limited time for integration of the text with prior knowledge.

- Our research can help to clarify common misconceptions about rapid reading and inform guidance for reading skills. Specifically, readers need to be aware that skimming can result in only superficial comprehension, and that it is important to allocate more time for reading (including re-reading) when comprehension is critical.

**Figure 1. Conference poster.**

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## Background:

- Reading is a complex skill that involves the co-ordination of visual, attention, eye movement and language processing systems.
- Our research uses eye movement recordings to examine how the mechanisms underlying reading are modulated by readers' goals (for example, skimming for gist).
- With so much electronic text available, skimming and scanning are likely to be prevalent (Lui, 2005), including during academic study (Lennox et al., 2020; Wohl & Fine, 2017).
- Comprehension is poorer during skimming compared to reading for comprehension (Fitzsimmons et al., 2020; Just & Carpenter, 1987). Crucially, our research is helping to reveal the mechanisms that underlie why comprehension is poorer during skimming.

*Figure 1 – The EyeLink 1000 eye tracker is used to monitor and record eye movements during reading.*

## Eye movement behaviour during reading for comprehension and skimming

Characteristics of eye movement behaviour during skimming compared with reading for comprehension:

- Words are more likely to be skipped (not processed in high acuity central vision)
- Shorter word reading times (reduced time available for accurate word recognition and integration with text context)
- Fewer regressions back in the text and reduced rereading (reduced time available to resolve comprehension difficulty)

Eye fixation
↓
The studio was filled with the rich odour of roses
32-35%   45% 75% 100% 75% 45%   32-25%
**Acuity (%)**
*A representation of the decline in visual acuity away from the centrally fixated word*

*Example eye fixations during reading for comprehension and skimming:*

● Size of the circle represents fixation duration

Reading for comprehension:

The studio was filled with the rich odour of

roses, and when the light summer wind stirred …

Skimming:

The studio was filled with the rich odour of

roses, and when the light summer wind stirred …

Our recent research reveals:
- Short words are especially likely to be skipped during skimming
- Readers take less time to reread text to resolve processing difficulty (syntactic, semantic and integration difficulty)

Overall, high word skipping rates (words not available in high acuity vision), and limited time for reanalysis (limited rereading), are likely to contribute to more superficial levels of comprehension during skimming.

## Implications for teaching study skills

In addition to education study contexts, accurate comprehension can be critical for decision making in everyday and professional situations. Teaching students about how skim reading can affect their comprehension is likely to be a vital transferable skill for their future life and career.

**Clarifying common misconceptions:**
- Shorter reading times are likely to result in more superficial comprehension.
- In order to accurately recognise a word, attention must be allocated to it and there must be sufficient visual acuity. Attempting to recognise four or five words during each eye fixation is likely to be detrimental for comprehension.

**Skim reading: Informing guidance**
- Skipping sequences of words may result in omissions from comprehension
  - Note that even short words (e.g. "*not*") can be central to accurate comprehension (e.g. "*this drug should not be taken with…*")
- Be aware that skim reading allows little time for detailed comprehension
  - Allow more time for reading when comprehension is critical or difficult
    - Taking time for rereading enables reanalysis when comprehension is difficult and more detailed integration with existing knowledge.

*Tell us about your experience!*

Is your students' comprehension and learning affected by skim reading?

What informs your guidance about skimming and scanning?

How might research further inform how rapid reading can affect learning and decision making?

**References:**

Fitzsimmons G., Jayes, L.T., Weal, M.J., & Drieghe, D. (2020) The impact of skim reading and navigation when reading hyperlinks on the web. *PLoS ONE* 15(9): e0239134.

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Link to our project page:
https://le.ac.uk/esrc-reading-goals-project

## *Community response*

These community reflections were contributed by three members of the community. These reflections have been presented as original, unedited content from the community.

This was a really interesting keynote. Reading is something I don't think is given enough attention – we focus mainly on critical reading but actually have very little information and few resources for students to understand how they physically read and especially around skimming, scanning or reading quickly. We like to think students are reading entire books critically and carefully, but in reality, that is not happening and is not possible. We need to ensure students understand when skimming or scanning is appropriate but also the dangers and problems. Developing a toolkit for scanning/skimming would be really great to share with students as it is a definite gap currently. I will be taking these ideas forward and looking at my reading workshops to edit and integrate this learning.

I agree with the comments above about reading being an often under-explored area of academic practice. This keynote, and the research it was based on, provided a timely and important corrective to some of the 'advice' on reading – especially when it comes to reading more efficiently. As several participants noted, the pseudo-scientific claims contained within much popular guidance (promising to enhance reading speed and accelerate comprehension) is popular precisely because it does speak to perceived needs among students. Learning developers are often well-placed to mediate the tensions between these needs and the false promises and unhelpful advice so widely available. For these reasons, it is really encouraging to see how keen Prof. White and colleagues are to work with the ALDinHE community to ensure the insights from the research project can be put to practical, educational use. If this is to be effective, I suggest it needs to be situated within a broader conversation with students concerning the varied purposes for academic reading, what these purposes mean for how different types of text should be approached, the assumed role of the HE student as a 'critical' reader etc.

I enjoyed engaging with this keynote speaker, and I agree that this is an under-researched topic. I particularly like how the above commentator terms the 'pseudo-scientific claims' associated with popularised reading guidance – and this is certainly a problem. However, I sometimes think the issue here is one of context. I have no doubt that 'speed reading' and other reading approaches may have their place. At the same time, I do not think this place

is higher education. I think you can speed read some business minutes before a meeting with some success, but that would not work with a journal article ahead of a seminar. In our approach to reading, we must be mindful that there are multiple contexts in which any given strategy may be used. It is also fair to recognise that students might not appreciate this – and speed reading is an attractive concept. I have been able to use this attraction in my practice by offering speed reading workshops, but using them as an opportunity to critically appraise the practice. In doing so, students can build an appreciation of what it is and where it can be used – hopefully, also acknowledging this will not work for academic reading.

## *Authors' reflections*

Conference participants reported that their students skim read and that some use rapid reading apps. Conference participants reported that they try to challenge these behaviours sensitively, helping students to appreciate the value of reading in more depth. However, although there are established resources available for teaching critical and active reading, conference participants reported that there are minimal resources available for teaching students about skimming and scanning. In addition, not all participants were aware that speed reading is a misnomer (there is a speed-accuracy trade-off (Rayner et al., 2016)). Therefore, it is important to help learning developers understand the effects of rapid reading on comprehension, and to equip them with knowledge of the science that can help debunk common misconceptions.

Conference participants suggested creating a 'toolkit' for learning developers that would support teaching about how skimming affects comprehension. One conference participant noted that it is hard to teach reading skills because it is difficult for advisors to observe the approaches that students are taking, and it is difficult for students to observe good practice (students rarely see academics reading). An online toolkit could include videos of eye tracking recordings to demonstrate different reading behaviours, and to provide starting points for discussion about how reading strategies affect comprehension.

More information about our research (including a video for young adults) is available on our project webpage: https://le.ac.uk/esrc-reading-goals-project.

## *Acknowledgements*

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Rayner, K., Schotter, E. R., Masson, M. E. J., Potter, M. C. and Treiman, R. (2016) 'So much to read, so little time: how do we read, and can speed reading help?', *Psychological Science in the Public Interest*, 17, pp.4-34. https://doi.org/10.1177/1529100615623267

## *Further reading*

Fitzsimmons G., Jayes, L. T., Weal, M. J. and Drieghe, D. (2020) 'The impact of skim reading and navigation when reading hyperlinks on the web', *PLoS ONE*, 15(9), e0239134. https://doi.org/10.1371/journal.pone.0239134.

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