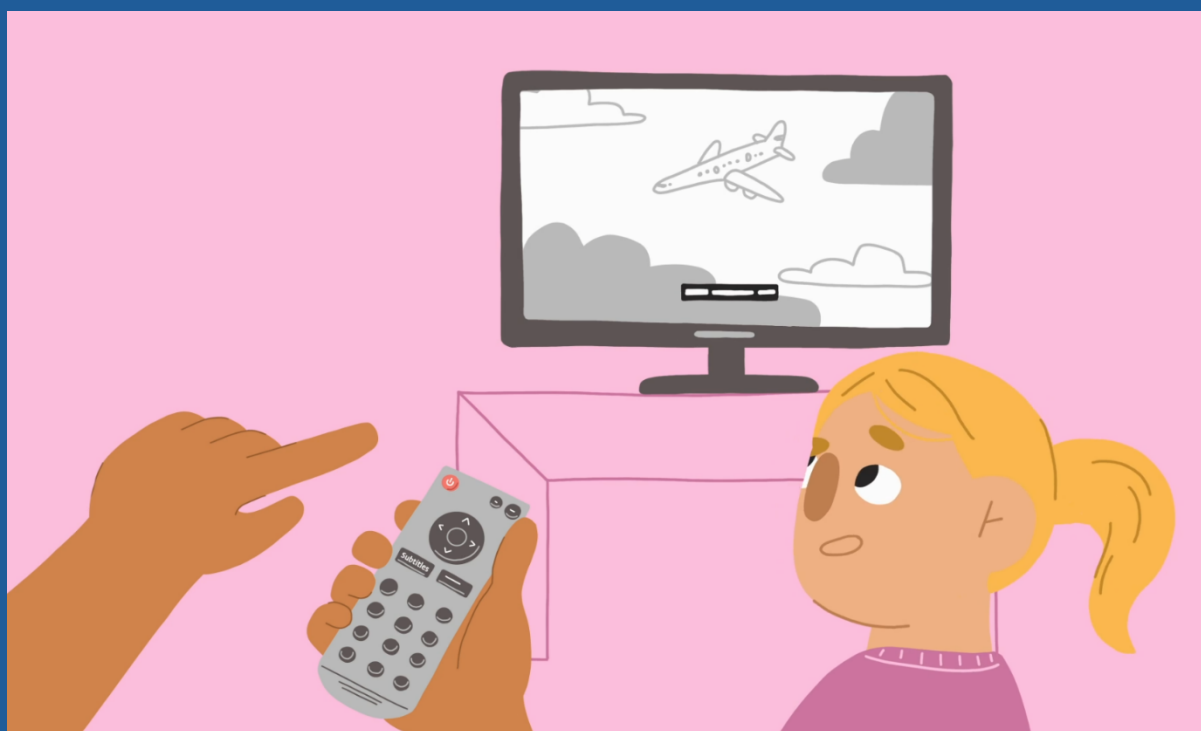


Do Same-Language Subtitles Help Children Learn to Read?

Professor Kathleen Rastle, Dr Anastasiya Lopukhina, &
Dr Walter van Heuven



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EXECUTIVE SUMMARY

In 2021, a campaign claiming that television subtitles were a 'magic button' to improve children's reading was launched in the United Kingdom. The campaign quickly went viral, with celebrities, charities, and even the British Prime Minister promoting it. There was a call for media organisations to turn on same-language subtitles by default so that all children could benefit. Similar campaigns were launched in India and the USA.

The campaign repeatedly referred to the strong underpinning evidence, but a closer examination showed that the evidence behind the claims was weak. There is good evidence that subtitles enhance comprehension in hard-of-hearing populations, and that they facilitate additional language learning. However, there is little evidence that they help children learn to read. There are no studies establishing that children even look at subtitles, and the few intervention studies that have addressed this question are characterised by serious design flaws that limit interpretability. We therefore conducted a set of highly-rigorous experimental studies to assess the claim that same-language subtitles improve children's reading.

Our first study tested whether primary school children (Years 1-6) even look at subtitles. We used eye-tracking to determine where on screen children look when watching movies with and without subtitles. Our critical finding was that the intensity of fixations to subtitles is associated with children's reading fluency. Pupils at the end of Year 1 (all of whom had passed the Year 1 phonics screen) barely look at subtitles, while engagement with subtitles increases through Years 2 and 3, before levelling off in the later years of primary school. These data suggest that children need to have achieved a reasonable degree of reading fluency – an oral reading rate of around 1 word per second – before they engage substantively with subtitles. This requirement substantially limits the potential of subtitles as a learning tool in the first few years of reading instruction. Our second study tested whether six weeks of home-based exposure to subtitles improves the reading fluency of pupils in Years 2-3. Despite an intervention 'dose' averaging 66 hours of subtitles exposure, we found no indication that subtitles improve children's reading fluency, whether measured by standard assessments or by eye-tracking. In contrast, we found clear evidence that

typical classroom experience yields significant gains in reading fluency across a six-week period.

We conclude that there is no evidence that same-language subtitles improve children's reading. It's possible that subtitles improve some other aspect of literacy – for example, vocabulary acquisition in older pupils who can already read well – but even that narrower claim would require evidence. These data are important because they allow policymakers and practitioners to focus on the evidence of what works for reading acquisition. Indeed, we have a research base stretching back over 30 years around how children learn to read, and how they can be supported to read. There are no magic bullets for literacy – the challenge is to implement best evidence at scale and with high fidelity so that all children become successful readers.

BACKGROUND AND AIMS

Learning to read is the most important milestone of a child's education. Yet, national assessments suggest that around one quarter of pupils do not meet expectations in reading by the end of primary school [1]. International comparison studies likewise suggest that around 14% of England's primary school pupils read at or below a "low benchmark" [2]. Much of the focus on England's reading outcomes has been on the importance of systematic phonics instruction. However, while phonics instruction is vital in learning to read, children also need vast practice to build reading fluency [3]. This presents a challenge because not all children engage in independent reading. Surveys by the National Literacy Trust indicate that only around one-third of children enjoy reading, and around 20% engage in daily reading outside of class [4]. Nearly 10% of disadvantaged children don't own a book [5], and the pandemic widened gaps in access [6].

This project investigated an innovative solution to these challenges proposed by a campaign called [Turn on the Subtitles](#). The campaign argues that turning on same-language subtitles can double a child's chances of becoming a good reader. Same-language subtitles are captions in the same language as the television programme or film (for example, English captions for an English television programme). The notion that

such a simple intervention could yield such staggering returns has motivated substantial interest, and the campaign has been backed by [schools](#), exam boards ([AQA](#)), literacy organisations ([World Literacy Foundation](#)), media organisations ([Sky](#)), and even former British Prime Minister Boris Johnson ([Hansard](#)). The campaign has also received substantial press coverage ([Forbes](#), [Slate](#), [BBC](#), [The Times](#), [The Guardian](#); see Figure 1), and support from public figures such as Stephen Fry and Jack Black. These celebrity endorsements have attracted millions of views through social media (see Jack Black's [TikTok](#) with over 5 million views).



Figure 1. Examples of media promoting the use of subtitles to improve children's reading

The campaign has appealed to media organisations to switch on same-language subtitles for children's programmes by default. It's been [called](#) "*the world's largest literacy project*" and [compared to](#) "*sneaking vegetables into dinner, the children don't notice, but you know you're doing them the world of good*". Similar initiatives such as [CaptionsON](#) (USA) and [Planet Read](#) (India) have started internationally, increasing the reach of the intervention to hundreds of millions.

The campaigns persistently refer to the strong scientific backing behind their claims. However, few studies have directly tested whether same-language subtitles help children become better readers. Most of the existing research on how readers engage with subtitles has focused on adult readers [7], second-language learners [8,9], and hard-of-hearing populations [10; see 11 for review]. This research is often cited to support subtitles campaigns, but is not relevant, because participants in these studies could already read fluently. By contrast, research on children learning to read in their first language remains very limited and has serious flaws. These flaws include design limitations such as low

statistical power [12, 13], the lack of control groups to measure the effect of subtitles interventions against [14], and mixed findings across different dependent measures or participant groups [12,13]. It might be tempting to conclude from these latter studies that subtitles improve reading for some groups but not others (for example, for boys but not girls [13]), but these studies did not have sufficient statistical power to make these comparisons.

One large-scale study that's been featured widely across the global media measured the reading skills of children and adults in India, and found that they were superior in individuals who reported frequent viewing of a television programme featuring subtitled Bollywood songs [15]. This study is usually described as if it were a randomised controlled trial, in which individuals were randomised into groups that watched or did not watch the programme. However, there was no randomisation of individuals into groups in this study, and there was no baseline data on individuals' reading skills. Instead, the grouping variable was based on retrospective self-report: that is, individuals self-declared whether they watched the programme frequently in the previous year. There are many reasons why individuals who watched the programme might differ from those who didn't; for example, perhaps those that reported watching the programme had easy access to a television. Thus, the inference that any difference in reading skills was *caused* by subtitles exposure is unsafe.

The campaign groups have not articulated how same-language subtitles are meant to improve reading. Learning to read is typically described as requiring an initial period of systematic phonics instruction, and subsequently, repeated retrieval of spelling-to-sound mappings via reading words aloud [3]. The retrieval of these mappings can be effortful for children, and some theories propose that learning is actually driven by these '*desirable difficulties*' [16]. The notion that reading might improve through exposure to subtitles departs quite substantially from this conceptualisation. Improvement in this case would be based on *incidental learning*, in which the simultaneous experience of the visual and spoken forms of a word drive learning. In addition to its real-world importance, discovering whether this type of passive exposure contributes to reading acquisition in primary school children would be an important theoretical contribution.

This project therefore sought to determine whether exposure to same-language subtitles improves children's reading. Our first aim was to determine how subtitles influence children's viewing behaviour and understanding of a television programme; and to determine whether these outcomes vary as a function of individual reading proficiency across pupils in Years 1-6. Our second aim was to determine whether six-weeks of exposure to same-language subtitles has a causal impact on reading fluency beyond the effect of school-based reading instruction. We planned two well-powered experiments using state-of-the-art eye-tracking to quantify engagement with subtitles. Our ambition was that the research would yield definitive evidence relevant to evaluating the proposal for default subtitling of children's programming.

GENERAL METHODS

Eye-tracking. In this study, we used eye-tracking to explore how children interact with subtitled television. Eye-tracking is a technology that measures a person's eye movements to understand where they direct their attention and how they process information. We used the EyeLink Portable Duo system, a high-speed eye-tracker with high spatial resolution (see Figure 2). Following a calibration process for each participant, the camera locks onto a participant's pupil and tracks its position relative to the screen by taking 1000 measurements per second (1000 Hz).

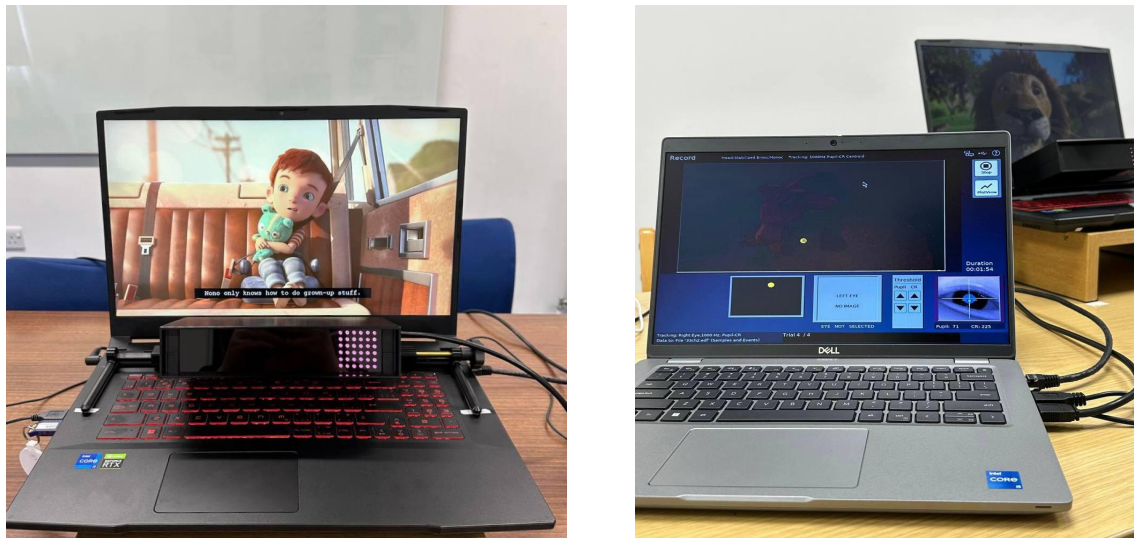


Figure 2. Eye-tracking set-up (EyeLink Portable Duo system) used in this project. The left panel shows the participant's view, with the laptop for stimulus presentation and the eye-tracking camera. The right panel shows the experimenter's view, with the laptop used to control the camera.

Eye-movement data that we collected were split into fixations and saccades on the basis of the standard algorithm from the Data Viewer package (SR Research Ltd). Fixations are stops when visual information is taken in and processed, and saccades are the quick jumps that shift gaze from one point to another. From these two basic measures, we derived several others. Specifically, we examined whether fixations occurred (or an item was skipped), as well as the number and duration of fixations in the subtitle region and on individual words in subtitles. We also analysed saccades moving between the subtitle region and the main scene (crossovers).

Open Science. Before data collection began, both experiments in the project were pre-registered. Pre-registration is a practice in which investigators articulate hypotheses, experimental design and procedures, and analysis pipelines in advance of data collection [17]. This practice guards against cherry-picking of results (i.e. presenting only those results that are consistent with one's hypothesis). This is especially important where there are multiple dependent variables that could be analysed. Pre-registration does not prevent researchers from analysing data in ways that they did not anticipate but unregistered analyses are marked explicitly as 'exploratory' and therefore carry less weight. Likewise, any deviations from the pre-registration are explicitly noted. We pre-registered our studies

because this practice substantially increases their rigour (note that no previous studies in this domain have been pre-registered). We also made available anonymised data and analysis scripts for each experiment to enhance reproducibility. Links to all of these materials on the Open Science Framework are provided in each Methods section.

PART I: WHERE DO CHILDREN LOOK WHEN WATCHING SUBTITLED MEDIA?

Background. Children need to look at subtitles in order to learn from them. Research has shown that literate adults read subtitles when they are present [7], but research has not asked this question about children learning to read. Our first study therefore sought to determine whether primary school children engage with subtitles, and whether this is related to their reading proficiency. We also asked whether subtitles affect children's comprehension of video content as previous research suggested that they may be distracting and harm understanding for young children [12]. To answer these questions, we carried out a pre-registered, well-powered experiment in which English-speaking children in Years 1-6 and adults watched short videos with and without subtitles. Our expectation was that some degree of reading proficiency would be needed before children engaged with subtitles, although we did not have a hypothesis as to what that threshold might be.

Method. The method and analysis pipeline were pre-registered on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/NVXFM>). The study included 180 children (30 per school year group from Year 1 to Year 6; age range 5-11 years) and 30 adults. Participants spoke English as their main language at home, and had normal or corrected-to-normal vision and hearing. None of the children had documented special educational needs, and the adults reported no history of language or literacy difficulties. Children were tested during the summer term (April-July). 17% of the sample were classified as disadvantaged according to the pupil premium metric used in England. Nearly all of the children in the sample (174 out of 180) had passed the national phonics screening check, which assesses decoding skills at the end of Year 1, and all children in our Year 1 sample had passed the screening check in the weeks prior to testing.

We used four short clips taken from animated films for children. Each clip was between 4 and 5 minutes long, contained 64-116 subtitles, and included 283-547 words. The clips were chosen to provide varied but age-appropriate language, to be engaging across the primary age range, and to be unfamiliar to participants. One clip (*Taking Flight*, an independent short by Moonbot Studios) tells a story of a boy playing with his grandfather. The other three came from mainstream films rated as suitable for children: *The Rescuers Down Under*, *The Wild*, and *The Road to El Dorado*. We created subtitles to be in line with the BBC Subtitle Guidelines and added these to the clips.

To ensure the linguistic content of the clips was appropriate for the youngest participants, we compared words from the clips with language from 20 episodes of popular CBBC shows (*Danger Mouse*, *The Deep*, *Horrible Histories*, *The Dumping Ground*). We also compared the clips with two benchmarks for younger readers: four “Level 1” Little Wandle fluency books (used after the Year 1 phonics check) and three fiction books from the participating schools’ curriculum (*Giraffes Can’t Dance*, *Esio Trot*, *The Rainbow Fish*). These comparisons showed that the words used in our video clips were similar to the vocabulary found in television programmes and books suitable for children across the primary school years.

Participants responded orally after each clip to four cued-recall questions [12]. We asked the children to (1) describe one of the main characters; (2) describe a critical element of the story; (3) give the main idea of the story; and (4) answer a question about an incidental element of the story. Each question was scored 0-5, giving a total of up to 20 points per video.

In the child participants only, we assessed reading fluency and receptive vocabulary. Reading fluency was measured using the Test of Word Reading Efficiency – Second Edition (TOWRE). We asked pupils to read aloud as many words and nonwords as possible within 45 seconds. Scores for word and nonword reading were combined to provide a single measure of reading fluency. Receptive vocabulary was measured using the British Picture Vocabulary Scales III (BPVS).

Our analyses examined children’s eye-movement behaviour in relation to school year and reading proficiency, and then compared Year 6 children with adults. First, we analysed *global viewing behaviour* by dividing the screen into the subtitle region and the main scene

(see Figure 3), and analysing fixation behaviour. Second, to test whether eye movements reflected linguistic processing, we investigated whether effects of word length and frequency were present on *word-level behaviour*. Third, we assessed comprehension by analysing responses to four questions about each video.



Figure 3. Illustration of the main scene and the subtitle regions in the eye-tracking experiment.

Key findings. To enhance accessibility, we present a summary of findings in this report. Detailed statistical support for our conclusions is available in [18]. Data and analysis code are available on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/UK8BT>).

Global analysis. Our critical finding was that children’s engagement with subtitles depended on their reading fluency. This result is illustrated in Figure 4 which shows ‘heatmaps’ quantifying the intensity of fixations in particular regions of the screen when subtitles were present. Children at the end of Year 1 hardly looked at the subtitles, while engagement with subtitles increased steadily until Year 3, at which time the increases levelled off. By Year 6, the intensity of fixations in the subtitle region was very similar to adults.

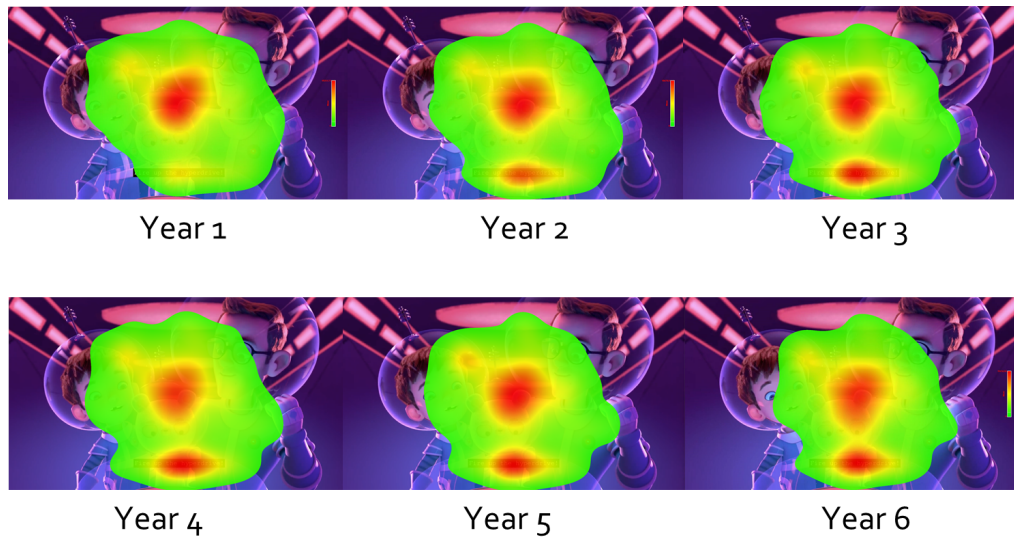


Figure 4. Heatmaps showing the intensity of fixations in different regions of the screen for each school year group when subtitles were present.

The impressions from this figure are also evident in the quantitative analysis (Figure 5). Reading proficiency (as measured by TOWRE) was strongly associated with vocabulary and year group, although generally reading proficiency was a superior predictor of fixation behaviour. Children with greater reading proficiency made more fixations on subtitles, spent longer time on them, made more crossovers between subtitles and the main scene, and also were less likely to skip subtitles. These effects were apparent only for videos with subtitles.

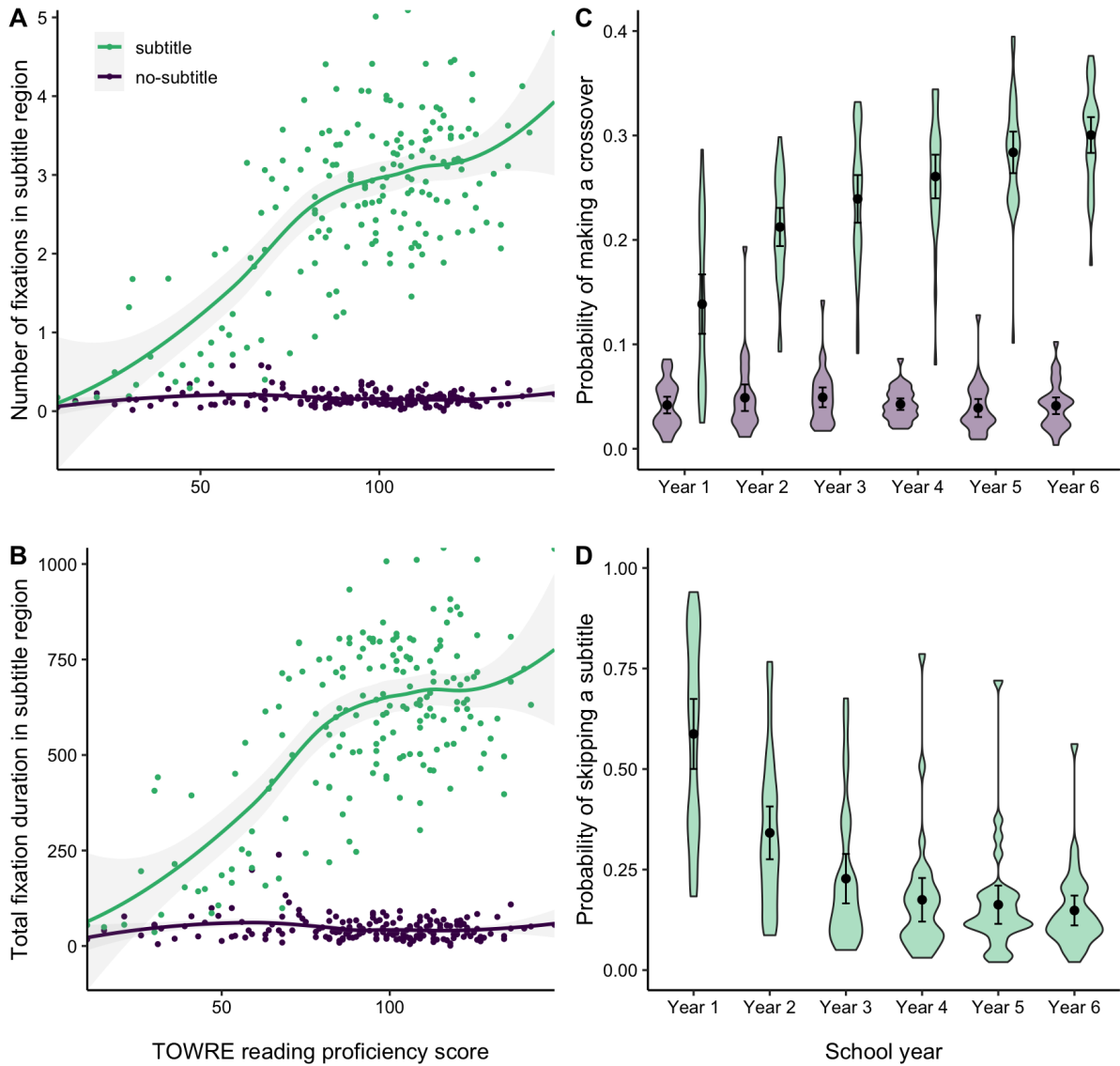


Figure 5. Eye movements in the global analysis. Panel (a): the interaction between condition (with subtitles – green line or without subtitles – purple line) and TOWRE on the total number of fixations in the subtitle region. Panel (b): the interaction between condition and TOWRE on total fixation duration in the subtitle region. Panel (c): probability of making a saccade between the subtitle and the main scene regions and vice versa (a crossover) across six year groups. Error bars represent 95% confidence intervals. Panel (d): probability of skipping a subtitle across six year groups. Error bars represent 95% confidence intervals.

Word-level analysis. We found clear signs of linguistic processing when children looked at the individual words in subtitles. Specifically, longer words and less frequent words attracted longer fixations than shorter words and more frequent words, just as is found in typical text reading. These results mean that when children looked at subtitles, they were reading them.

Comprehension. We found that children's understanding of the videos improved steadily across the year groups, from 57% correct in Year 1 to more than 86% correct in Year 6. Our adult sample showed even higher comprehension at 93% accuracy. However, the provision of subtitles did not impair or improve comprehension. There was some indication that more fluent readers were able to use subtitles to improve understanding, but this effect was weak. Finally, we found no evidence that children who spent more time looking at subtitles had better comprehension once age was taken into account.

Conclusions. Overall, the analyses suggest that children need to have acquired some degree of reading fluency – on the order of 1 word per second – before they engage substantively with subtitles. Children typically acquire this level of reading fluency in school years 2-3, following a few years of reading instruction. Children in our youngest group (at the end of Year 1) ignored around 60% of whole subtitles, and skipped two-thirds of the words in the remaining subtitles. Though these children had all passed the Year 1 phonics screen, it's unlikely that they had sufficient reading fluency to be able to engage with the challenge that reading dynamic text involves. These data suggest that the potential impact of same-language subtitles is quite limited in the case of the youngest children learning to read. Children are unlikely to learn from subtitles if they do not look at them. However, once children have acquired a reasonable degree of reading fluency, following two or three years of reading instruction, then subtitles could be a useful tool to gain reading experience, and thus build reading skill. The second part of this project investigated this possibility.

PART II: DO SAME-LANGUAGE SUBTITLES IMPROVE READING FLUENCY?

Background. Only a small number of studies have tested the causal claim that same-language subtitles improve children's reading, and these studies have serious design flaws. We therefore conducted a pre-registered, randomised controlled trial to test whether six weeks of exposure to same-language subtitles improves children's reading fluency. We selected reading fluency as a target both because of its strong relationship with reading comprehension [19] and because influential science journalism ([here](#) and [here](#)) has pushed the view that subtitles build reading fluency. Our hypothesis based on the claims of

campaign groups was that the use of subtitles would improve children's reading fluency over and above the effect of typical schooling.

Method. The method and analysis pipeline were pre-registered on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/F8KAR>). The study involved 127 English-speaking children in Years 2 and 3 of primary school. These age groups were chosen because our first study showed that they have sufficient reading ability to engage with subtitles and because reading fluency develops rapidly during these school years [19]. Five additional children completed the pretest but later withdrew from the study.

Children were randomly assigned to two groups: 64 watched television with subtitles (experimental group) and 63 watched without subtitles (control group). The groups were similar in age, gender, reading fluency, vocabulary, reading attitudes and experiences at the start of the study. They all spoke English as their main language at home and had limited prior experience with subtitles. Families confirmed at the outset that their children typically watch at least 5 hours of television or streaming services per week.

The study had three phases: a pretest session, an in-home intervention, and a posttest session (Figure 6). The main tasks in the *pretest* and *posttest* were focused on measuring reading fluency. This was operationalised in two ways: first, through standardised tests of reading fluency including the TOWRE and the YARC (York Assessment of Reading for Comprehension), and second, through children's engagement with subtitles while watching two short videos, as measured using eye-tracking. The eye-tracking measures were included because in our first study, we found that children with higher reading fluency showed greater engagement with subtitles. We thought that the eye-tracking measures might capture more subtle improvements in reading fluency than standard assessments. Children in the pretest were also given tests of vocabulary, reading habits and attitudes, and print exposure, but the latter two tasks were dropped where children were fatigued, or where these tasks would make the session go over one hour. The *in-home intervention* (average 41 days; range 35-44 days) involved children in the experimental group watching television or streaming services with subtitles on, and children in the control group watching without subtitles. Families were given a list of recommended programmes on CBBC and Netflix, all with high-quality subtitles and age-appropriate content. Children

were asked to watch at least five episodes from this list each week in addition to (or instead of) their usual television viewing routine.

To monitor how much television children were watching and to keep families engaged with the intervention, parents reported on their child's television viewing during the study. Each weekday they answered three brief questions by text message: whether their child had watched television, for how long, and whether subtitles were on or off. On Sundays, they completed a short survey summarising the week's television viewing, listing any of the recommended programmes watched, and answering questions about these programmes (completed by parents on behalf of children). On average, children in the experimental group watched 66 hours of television with subtitles (range 18–177 hours), while those in the control group watched 64 hours without subtitles (range 21–197 hours). Thus, the average intervention 'dose' in our study was between 22 and 132 times greater than that in the two prior controlled studies with same-language subtitles [12, 13].

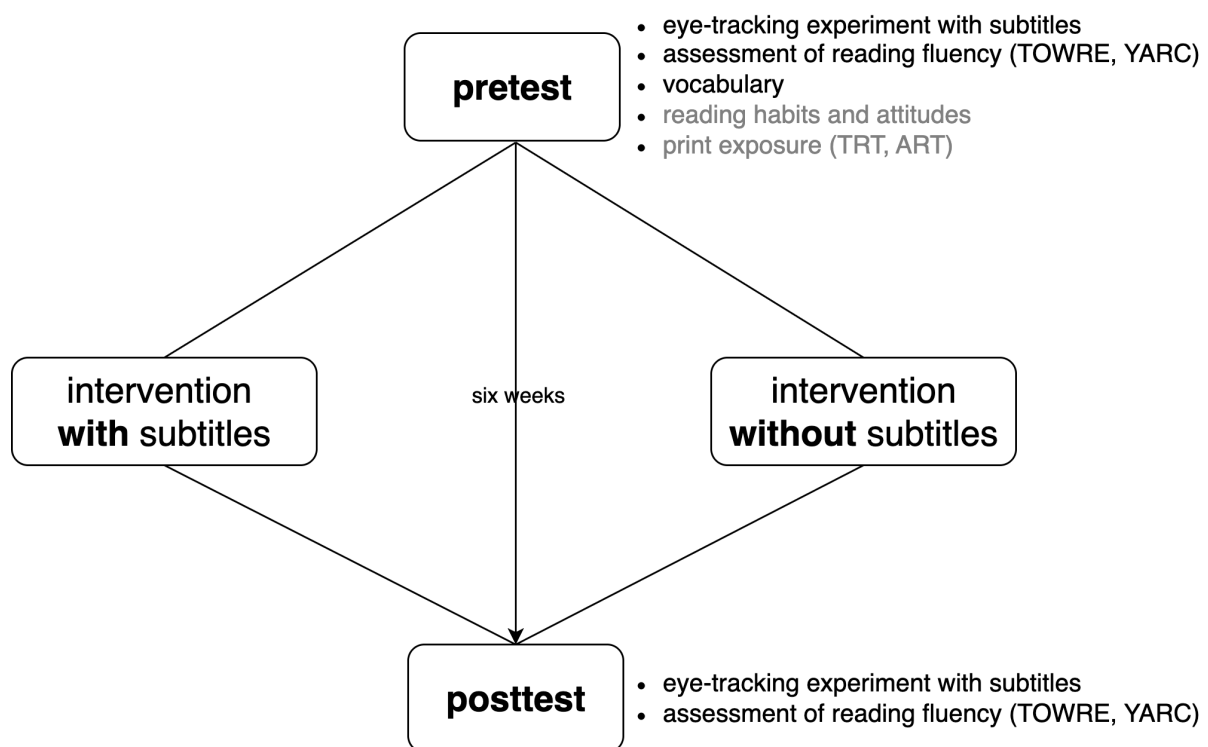


Figure 6. Overview of the experimental procedure, including the order of tasks in the pretest and posttest sessions. Tasks not completed by all participants are shown in grey.

Our analyses asked whether children's reading fluency improved between pretest and posttest, and whether this improvement was greater for children in the subtitles group.

Standard assessments of reading fluency included the TOWRE (total words and nonwords read correctly) and YARC (time taken to read a passage aloud). Eye movements were analysed both globally and at the level of individual words. For the global analysis, the screen was divided into two regions: the subtitle area and the main scene above it (see Part I, Figure 3). We focused on five pre-registered measures: (1) fixations in the subtitle region, (2) fixation durations in the subtitle region, (3) crossovers between the video and subtitle regions, (4) skipped subtitles, (5) skipped words.

Key findings. To enhance accessibility, we present a summary of findings in this report. Detailed statistical support for our conclusions is available in [20]. Data and analysis code are available on the Open Science Framework (<https://doi.org/10.17605/OSF.IO/XP5AC>).

We found that children's reading fluency improved significantly between pretest and posttest. This effect held for both standard tests of reading fluency (TOWRE and YARC) and for two of the eye-movement measures (see Figure 7). Specifically, there were more crossovers between the subtitle region and the main scene, and fewer subtitles were skipped at posttest than at pretest. However, there was no evidence that the subtitle intervention yielded any additional gains on any of these measures of reading fluency.

It is possible that effects of subtitles are more apparent in those children who had a larger 'dose' of the intervention. Thus, we conducted exploratory analyses that were not pre-registered to ascertain whether children who spent more time watching television with subtitles showed greater benefits. These analyses found no evidence that the number of 'subtitle hours' influenced either engagement with subtitles or reading fluency on standard assessments.

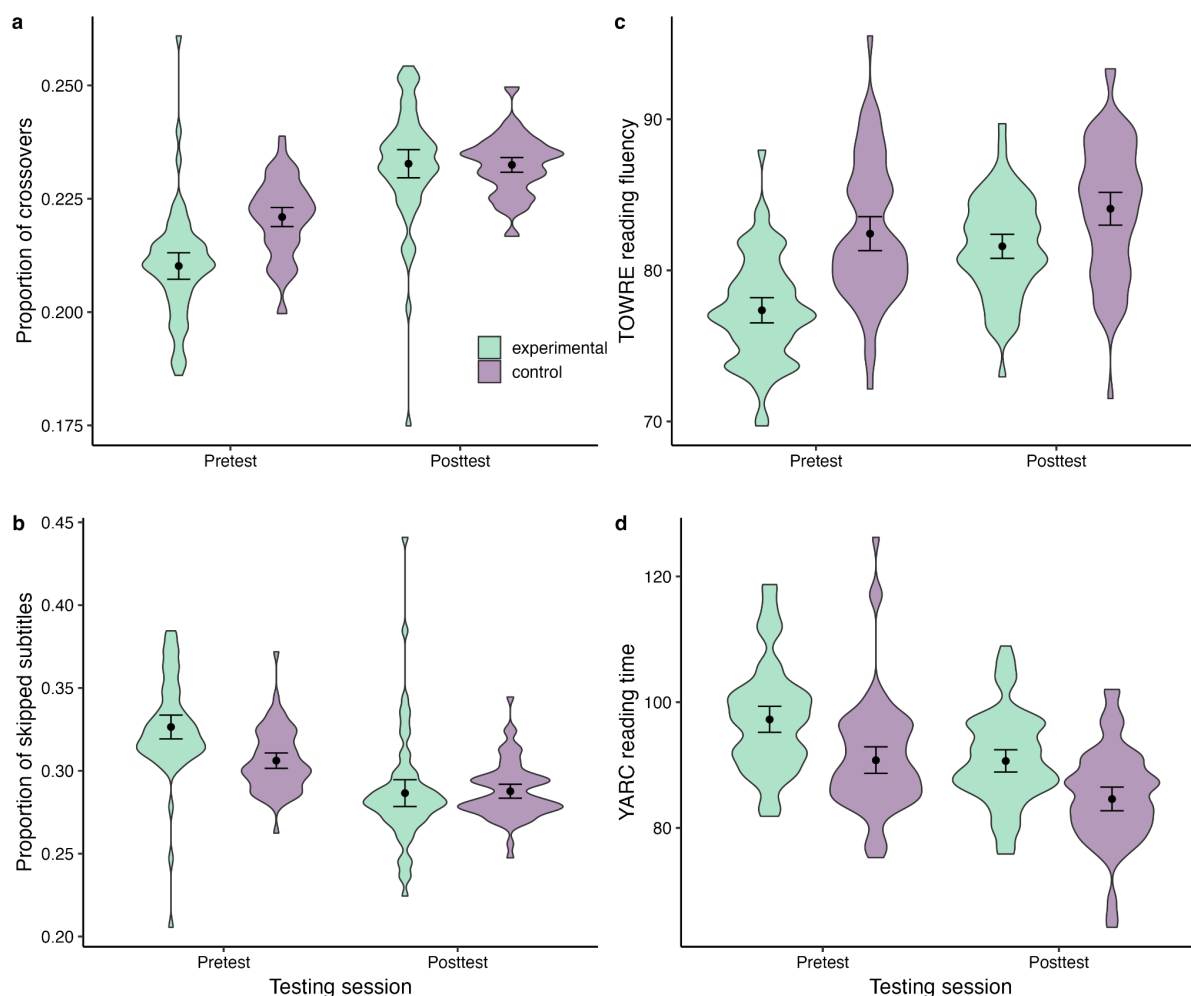


Figure 7. Eye-movement and reading fluency measures at pretest and posttest. Panels present only those measures for which significant effects were found. Panel (a): the effect of testing session by group on the proportion of crossovers (saccades between subtitle and main scene regions, and vice versa). Panel (b): the effect of testing session by group on the proportion of skipped subtitles. Panel (c): the effect of testing session by group on the number of words and nonwords read aloud in TOWRE. Panel (d): the effect of testing session by group on YARC reading time in seconds. Error bars represent 95% confidence intervals.

Conclusions. We found no evidence that six weeks of exposure to subtitles (averaging 11 hours per week) produced any gains in reading fluency. Though subtitles did not improve reading fluency, we did observe significant improvements in reading fluency for all children between pretest and posttest. This improvement was evident in both of the standard measures (TOWRE and YARC) and in two of the eye-movement measures. These improvements in reading fluency were expected given that the children were all in schools delivering high-quality reading instruction as specified in the national curriculum.

CONCLUSIONS

Everyone agrees that getting more children reading – and reading more often – is a worthy goal. Thus, the enthusiasm around the 'Turn on the Subtitles' campaign was understandable. However, the evidence behind the campaign was weak and our research casts further doubt on the claims. Our research is important because it allows policymakers and practitioners to focus their energies on interventions that work. There is a robust body of evidence around how children learn to read and how they can best be taught [3], and the challenge is to realise that body of evidence in the classroom at scale and with high fidelity.

Our first study showed that children don't tend to look at subtitles until they are able to read relatively fluently (at around 1 word per second). This level of fluency is typically acquired in Years 2-3 after a few years of reading instruction [19]. This result contrasts with media presentations of the campaign: for example, *"if a child can't read yet, their eyes will still be drawn to them [the subtitles]"* ([Slate](#)). Our Year 1 children were all strong decoders (as evidenced by their performance on the national phonics screen), but we speculate that they were not able to read quickly enough to deal with time-limited subtitles displays. It's also important to keep in mind that processing subtitles requires sophisticated oculomotor control, cross-modal processing, and divided attention. It may be that greater experience of reading is required to develop these cognitive capacities. Overall, the results of our first study suggest that reading skill supports children to engage with subtitles rather than the reverse.

Our second study showed that six weeks of exposure to subtitles yields no improvements to reading fluency beyond gains associated with typical classroom experience. These participants watched 66 hours of subtitled television on average – a 'dose' equivalent to over 4000 pages of text according to the CaptionsOn [Reading Calculator](#). Previous intervention studies promoted by campaign groups have found mixed evidence for an impact of subtitles on reading fluency [12,13]; however, our study had almost double the sample size of those studies, and had an intervention dose between 22 and 134 times as large (those studies presented between 30 minutes and 3 hours of subtitles). Our study was also pre-registered which further lifts its quality as a source of evidence. Overall, we do not

believe that there is credible evidence for an influence of same-language subtitles on reading fluency.

Theoretically, our findings are interesting because they suggest that incidental exposure to printed words does not drive meaningful learning, at least not at the timescales being investigated, and not in comparison to the substantial gains in reading proficiency driven by classroom experience. Our findings contrast with promotional material attached to the 'Turn on the Subtitles' campaign – for example, Jack Black's [claim](#) that "*They'll learn to read without even realising it*" and with more 'scientific' treatments such as the World Literacy Foundation's [claim](#) that "*SLS [same-language subtitling] taps into the power of multisensory learning, simultaneously engaging visual and auditory senses*". It's important to recognise that, even for children or adults who look at subtitles, there is no evidence that they look at particular words at the same time as they hear them. Precisely how children and adults engage with subtitles – where they look and the extent to which this is synchronised with the complementary spoken stimulus – is an interesting area for future research.

Our research did not show any impact of subtitles on reading fluency but it's possible that subtitles target some other aspect of reading. For example, it's possible that having the printed form of a word available enhances vocabulary learning from television for older pupils. However, any influence of subtitles on vocabulary learning would arise only for those children who are already able to read the subtitles. Likewise, even if there were a role for subtitles in vocabulary learning, it's important to remember that the language used on television is much less sophisticated than that used in children's books. In fact, a recent corpus study showed that around 40% of the distinct words used in children's books do not appear in BBC television programmes aimed at children of the same age, and around 20% of the distinct words in children's books do not appear on television at all [21]. Thus, the [claims](#) of campaign groups – that children who watch television with subtitles would encounter as many words "*as in all the Harry Potter books, all of The Lord of the Rings, all of The Chronicles of Narnia, and everything Roald Dahl wrote, combined*" (claims repeated on e.g. [BBC](#) and [Slate](#)) – may be correct in terms of quantity but not in terms of the quality of language encountered.

One new development in this space has been the launch of specialised captions that are claimed to improve literacy. The 'Turn on the Subtitles' campaign is now licensing

[Caterpillar Captions](#) as “*Literacy Grade Captions™*” that use an “*academically approved font*” that is “*designed to improve literacy*”. We’re not aware of any evidence to back up these claims. However, there is a long history of specialised fonts being developed for dyslexic readers, and independent research investigating the effectiveness of these fonts has shown that they confer no benefit [22,23]. Until independent, peer-reviewed tests of the effectiveness of specialised captions emerges, claims such as those made in relation to Caterpillar Captions should be treated with caution.

The potential impact of subtitles on learning depends on children and families using them. We found in our first study that nearly all of our adult participants reported using subtitles regularly when they watch television or streaming content. Adults perceive that subtitles help them to understand the content (even though there was no objective impact of subtitles on adults’ comprehension in our first study), and they see subtitles as a means of facilitating multi-tasking. However, children were less positive about their experience with subtitles. We probed children’s experiences following the extended intervention in Study 2. Fifty-nine percent of children enjoyed their experience with subtitles. Comments included “*They are good because when you watch the TV you can read them and concentrate more*” and “*[My child] has enjoyed having the subtitles on and occasionally reading out aloud what is on the screen.*” Eighteen percent of children didn’t like having subtitles on: for example “*I don’t like the subtitles because they distract me*” and “*They block some of the show.*” The remaining children had mixed views: for example, “*[My child] generally liked them as she could see how the different words were spelt. However the subtitles blocked some of the picture which was a little bit annoying.*” One interesting question that could be explored in the future is whether children’s reading ability influences their enjoyment of subtitles.

More broadly, the ‘Turn on the Subtitles’ campaign went viral in an instant, picking up media attention, celebrity endorsements, and political backing at the highest level. However, the evidence behind the campaign was vastly overstated and our research has shown that the claims have no scientific basis. Edu-myths are prominent in the literacy space partly because introspection is powerful; for example, a literate adult might recognize that their own attention is drawn to subtitles, and might mistakenly infer that this will also occur for a child learning to read. The literacy space is also highly susceptible to commercial conflicts of interest (as low literacy provides such a large market globally), and

we note that this is now a feature of the ‘Turn on the Subtitles’ campaign through the licensing of their own [Caterpillar Captions](#). Some might argue that there is no research to suggest that same-language subtitles cause harm, so it doesn’t matter if unsubstantiated claims are being used to drive commercial interests. However, these types of unevidenced interventions take energy away from implementing practices proven over decades to work [3].

Indeed, there is a very large evidence base regarding how children learn to read and how they can best be taught [3]. This evidence base demonstrates that becoming a skilled, confident reader requires high-quality phonics instruction followed by years of structured practice to develop fluency and the ability to interrogate meaning. In England, there has for many years been an effective cross-party consensus around developing evidence-based *policies* in the literacy space, and the articulation of evidence-based *practices* is further supported through organisations such as the [Education Endowment Foundation](#), structured networks such as the [English Hubs](#) and the [Research Schools Network](#), and grass-roots initiatives such as [ResearchED](#). It’s vital that investment into children’s reading continues to follow the evidence rather than unproven fads.

In conclusion, reading has been described as “*an optional accessory that must be painstakingly bolted on*” [24] to children’s capacity for spoken language. The evidence tells us that it’s built through years of instruction, dedication, and practice [3]. This project has shown that there is no magic bullet – or [magic button](#) – for learning to read.

PROJECT OUTPUTS

Project Website

<https://www.rastlelab.com/subtitles>

Creative Outputs

We worked with Nifty Fox to develop a go-second animation depicting the findings from Study 1. The development of this output was funded by the ESRC Social Science Impact Accelerator at Royal Holloway, University of London. This animation had wide engagement

on social media (see it [here](#)), and captured the interest of policy colleagues (see 'Professional Engagement' below).

Journal Articles

Lopukhina, A., van Heuven, W., Crowley, R., & Rastle, K. (2025). Where do children look when watching videos with same-language subtitles? *Psychological Science*, 36(4), 223-236. <https://doi.org/10.1177/09567976251325789>.

Lopukhina, A., Cooper, H., Hsieh, C-Y., van Heuven, W., & Rastle, K. (in submission). No evidence that same-language subtitles improve children's reading fluency. Manuscript submitted to *British Journal of Psychology*. Preprint https://osf.io/preprints/psyarxiv/eh4pb_v1.

Blogs and Other Accessible Articles

Lopukhina, A. & Rastle, K. (2025). Blog: Mythbusting claims that same-language subtitles improve children's reading. <https://www.rastlelab.com/post/mythbusting-claims-that-same-language-subtitles-improve-childrens-reading>

Lopukhina, A., van Heuven, W. & Rastle, K. (2025). Blog: Where do children look when watching videos with same-language subtitles? <https://www.rastlelab.com/post/where-do-children-look-when-watching-videos-with-same-language-subtitles>

Lopukhina, A. (2025). How do you teach children to read, and can subtitles help? *LondonCult*. In Russian. <https://londoncult.co.uk/kak-nauchit-detej-chitat-i-pomogut-li-etomu-subtitry/>

Rastle, K., Lopukhina, A., & van Heuven, W. (2023). Can same language subtitles help children learn to read? *Children's Media Yearbook*.

Selected Talks and Presentations (academic)

Lopukhina, A. *Can same-language subtitles help children become better readers?* Talk given at the British Psychological Society – Developmental Section Annual Conference, Egham, UK, September 10-11, 2025

- Lopukhina, A. *Where do children look when watching videos with same-language subtitles?* Talk given at the Symposium "Eye Movements in Reading Acquisition" at ESCoP 2025, Sheffield, UK, September 3, 2025
- Lopukhina, A. *Can same-language subtitles help children become better readers?* Talk given at the joint meeting of the Experimental Psychology Society and the Canadian Society for Brain, Behaviour and Cognitive Science, Dundee, UK, July 8, 2025
- Lopukhina, A. *Can same-language subtitles help children learn to read?* Talk at the PsychFest, RHUL, UK, June 18, 2025
- Lopukhina, A. *Can same-language subtitles help children learn to read?* Talk given at the Blythe research group meeting at Northumbria University, online, June 9, 2025
- Lopukhina, A. *Can same-language subtitles help children learn to read?* Talk given at the CO-AIR: Current Opinion on Audiovisual Integration and Reading webinar, May 22, 2025
- Lopukhina, A. *Can same-language subtitles help children learn to read?* Talk at the Department of Psychology (Psychology Salon), RHUL, UK, May 21, 2025
- Rastle, K. *How Experimental Psychology can help the world learn to read.* Talk given at the seminar series of the University of Ghent, Ghent, Belgium, November 2024
- Lopukhina, A. *Where do children look when watching videos with same-language subtitles?* Talk given at the European Conference on Eye Movements, Maynooth, Ireland, August 28, 2024
- Lopukhina, A. *Where do children look when watching videos with same-language subtitles?* Talk given at the Child Language Symposium, Newcastle, UK, July 11, 2024
- Lopukhina, A. *Where do children look when watching videos with same-language subtitles?* Talk given at the Experimental Psychology Society meeting, London, January, 4 2024
- Rastle, K. *Why we need a global science of reading.* Research seminar at the University of the UAE, Al Ain, November, 2023
- Lopukhina, A. *Do same language subtitles help children learn to read?* Talk at the Department of Psychology (Research Tea), RHUL, UK, November 13, 2023

Lopukhina, A. *Do language properties (and reading experience) influence saccadic targeting of words during reading?* Talk given at the Rank Prize Symposium, Grasmere, UK, October 11, 2023

Rastle, K. *Learning to read*. Talk given at the seminar series of the BCBL, San Sebastian, Spain, September 2023

Lopukhina, A. *Where do children and adults look when watching videos with same-language subtitles?* Talk given at the British Psychological Society – Cognitive and Developmental Sections conference, Bristol, UK, September 12, 2023

Lopukhina, A. *Where do primary-school children and adults look when watching videos with same-language subtitles?* Talk given at the FRiLL meeting, Coventry, UK, July 4, 2023

Selected Talks and Presentations (professional)

Rastle, K & Lopukhina, A. *Do subtitles help children learn to read?* Talk at ResearchED for teachers, London, UK, September 6, 2025

Rastle, K. *Can same-language subtitles help children learn to read?* Presentation for colleagues in the Department for Education and the Department for Culture, Media and Sport, July 11, 2025

Rastle, K. *Becoming a reader*. Talk given at the Little Wandle Champions Conference, London, UK, June 30, 2025 [\[slides\]](#)



Lopukhina, A. *Do same-language subtitles help children become better readers?* Talk given at the Working together: Research and practice meeting, Egham, UK, June 27, 2025

Presentation at Queen Anne's First School for teachers and children about Study 2, June 13, 2025

Rastle, K. *Becoming a reader*. Keynote at the Reading for Pleasure conference, Dubai, May 10, 2025

Rastle, K. *The journey to skilled reading*. Webinar for the National Foundation for Education Research (NFER), November 14, 2024

Lopukhina, A. *Can same-language subtitles help children become better readers?* Talk given at the Working together: Research and practice meeting, Egham, UK, June 21, 2024

Rastle, K. *Learning to read*. Presentation for the Wandle Academy Trust, Joint Professionals Day, London, UK, October 30, 2023

Presentation at Bitterne Park School and Sinclair School for teachers, children and parents about Study 1, October 13, 2023



Lopukhina, A. *Where do children and adults look when watching videos with same-language subtitles?* Talk given at the Working together: Research and practice meeting, Egham, UK, July 7, 2023

Professional Engagement

Discussion with colleagues from the Department for Culture, Media, and Sport on the implications of our findings for DCMS policy. Included Alex Miller (Senior Policy Advisor), Rory Constable (Deputy Director), and Sian Hawkrigg (Policy Advisor), July, 2025

Discussion of findings with Henry Warren (CEO, Turn on the Subtitles) and Leib Lurie (CEO, Captions On) regarding our findings, Oxford, April 8, 2025

Discussion with Emily Hanford, US Education Journalist, regarding our findings, Washington DC, March 19, 2025

Discussion with Michael Crawford (Global Education Lead, World Bank) and colleagues regarding our findings, Washington DC, March 18, 2025

Discussion with Mike Fischer (Founder, Fischer Family Trust) and colleagues regarding our findings, online, March 14, 2025

Discussion of findings with Gita Sisupalan, Head of English, Department for Education,
London, February 28, 2025

Discussion with parents and children at the Science Festival, Egham, UK, June 15, 2024

Discussion of project with Gita Sisupalan, Head of English, Department for Education,
London, January 22, 2024

Discussion with parents and children at the Summer Scientist Week, Nottingham, UK, July
31, 2023

Discussion of project with Henry Warren (CEO, Turn on the Subtitles) regarding the planned
project, online, July 4, 2022

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Children and families. We are hugely grateful to the children and families who participated in these studies. In particular, the intervention in Study 2 was relatively intense, requiring families to report daily on their child's television viewing for six weeks. We appreciate families' dedication to the study, as this allowed us to conduct a rigorous test of the hypothesis that same-language subtitles improve children's reading fluency.

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to connect with additional schools for Study 2. It would not have been possible to run these high-powered studies without these individuals and the schools they represent.

Advisory board. Our advisory board offered a diverse range of expertise from experience with schools and the wider literacy ecosystem to experience with intervention design to experience with children’s media. These different forms of expertise were extremely valuable both during the conduct of studies and in the dissemination of results. Special mention goes to Janet Vousden and Christina Clark who gave us a great deal of support in designing the intervention and helping us to maximise recruitment through more effective communications. We also want to recognise the contribution of Eleanor Ireland who represented the Nuffield Foundation on the advisory board. Eleanor supported our thinking throughout the project, starting with advice on how to shape our full application following the outline stage of the process, and she encouraged us to think creatively about how to reach different audiences in a way that other funders have not. We learned a great deal from all members of the advisory board.

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REFERENCES

1. Department for Education (2024). Key stage 2 attainment.
<https://explore-education-statistics.service.gov.uk/find-statistics/key-stage-2-attainment/2023-24>
2. McGrane, J. et al. (2017). PIRLS: National Report for England.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664562/PIRLS_2016_National_Report_for_England- BRANDED.pdf

3. Castles A., Rastle K., Nation K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 19(1), 5–51.
4. Clark, C. & Picton, I., & Cole, A. (2025). Children and young people's reading in 2025. https://nlt.hacdn.org/media/documents/Children_and_young_peoples_reading_in_2025_bqtGfls.pdf
5. National Literacy Trust (2019). Annual Literacy Survey. <https://literacytrust.org.uk/research-services/research-reports/gift-reading-childrens-book-ownership-2019/>
6. Education Endowment Foundation (2021). Best evidence of impact of COVID-19 on pupil attainment. <https://educationendowmentfoundation.org.uk/guidance-for-teachers/covid-19-resources/best-evidence-on-impact-of-covid-19-on-pupil-attainment>
7. d'Ydewalle G., Praet C., Verfaillie K., Rensbergen J. V. (1991). Watching subtitled television: Automatic reading behavior. *Communication Research*, 18(5), 650–666.
8. Montero Perez M., Van Den Noortgate W., Desmet P. (2013). Captioned video for L2 listening and vocabulary learning: A meta-analysis. *System*, 41(3), 720–739.
9. Vanderplank R. (2016). *Captioned media in foreign language learning and teaching: Subtitles for the deaf and hard-of-hearing as tools for language learning*. Springer.
10. Yoon J. O., Kim M. (2011). The effects of captions on deaf students' content comprehension, cognitive load, and motivation in online learning. *American Annals of the Deaf*, 156(3), 283–289.
11. Gernsbacher M. A. (2015). Video captions benefit everyone. *Policy Insights from the Behavioral and Brain Sciences*, 2(1), 195–202.
12. Linebarger D. L. (2001). Learning to read from television: The effects of using captions and narration. *Journal of Educational Psychology*, 93(2), 288–298.
13. Linebarger D., Piotrowski J. T., Greenwood C. R. (2010). On-screen print: The role of captions as a supplemental literacy tool. *Journal of Research in Reading*, 33(2), 148–167.

14. Davey, R., & Parkhill, F. (2014). Reading while viewing: the impact of movie subtitles as a strategy to raise achievement in comprehension and vocabulary. *Pacific-Asian Education*, 26(2), 21-36.
15. Kothari B. & Bandyopadhyay, T. (2014). Same language subtitling of Bollywood film songs on TV: Effects on literacy. *Information Technologies & International Development*, 10(4), 31-47.
16. Bjork, E. L., & Bjork, R. A. (2014). Making things hard on yourself, but in a good way: Creating desirable difficulties to enhance learning. In M. A. Gernsbacher and J. Pomerantz (Eds.), *Psychology and the real world: Essays illustrating fundamental contributions to society (2nd edition)*. (pp. 59-68). New York: Worth.
17. Nosek, B.A., Ebersole, C.R., DeHaven, A.C., & Mellor, D.T. (2018). The preregistration revolution. *Proc. Natl. Acad. Sci. U.S.A.* 115, 2600-2606.
18. Lopukhina, A., van Heuven, W., Crowley, R., & Rastle, K. (2025). Where do children look when watching videos with same-language subtitles? *Psychological Science*, 36(4), 223-236.
19. Hilton, E., Fischer, M., Charman, P., Thomson, D., Plaister, N., & Rastle, K. (2024). Reading fluency in England.
<https://ffteducationdatalab.org.uk/wp-content/uploads/2024/11/FFT-FFF-Reading-Fluency-Report-final-Nov-24.pdf>
20. Lopukhina, A., Cooper, H., Hsieh, C-Y., van Heuven, W.J.B., & Rastle, K. (2025). No evidence that same-language subtitles improve reading fluency. Preprint available on https://osf.io/preprints/psyarxiv/eh4pb_v1.
21. Korochkina, M., Marelli, M., Brysbaert, M., & Rastle, K. (2024). The Children and Young People's Books Lexicon (CYP-LEX): A large-scale lexical database of books read by children and young people in the United Kingdom. *Quarterly Journal of Experimental Psychology*, 77(12), 2418-2438.
22. Kuster, S.M., van Weerdenburg, M., Gompel, M. *et al.* (2018). Dyslexie font does not benefit reading in children with or without dyslexia. *Ann. of Dyslexia* 68, 25-42.

23. Wery, J.J., Diliberto, J.A. (2017). The effect of a specialized dyslexia font, OpenDyslexic, on reading rate and accuracy. *Ann. of Dyslexia* 67, 114–127.
24. Pinker, S. (1997). Foreword. In: D. McGuinness, *Why our children can't read – And what we can do about it: A scientific revolution in reading*. New York: Simon & Schuster.