

Changing typographic elements of eBooks without disturbing the reader's experience; the basis for a richer story

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Abstract

The book has become digital but it is still a static book. To make the book more interesting, an extra layer could be added. A layer with more 'information' that intensifies the story at the right moment. To lay a base for these developments, it is necessary to know if elements can be changed without disturbing the reader's experience.

By creating a program for an eReader (in our case the iPad), we tested how the reader responds to changes on the page while reading. With the use of recorded reading times and a questionnaire, we analysed if the changes influenced the immersion of the reader and therefore the reader's experience.

Although a substantial number of people indicated the changes as not positive, from the reading time measurements and immersion questionnaire we concluded that it is possible to change elements without disturbing the immersion.

Introduction

Before we come to the main content of this paper, a context is set in which this research originated. The overall vision is to take a story like you encounter in a book and adding an extra layer of information. This should be extra information that intensifies the story. Hereby the story is enriched beneficial to the reader's experience. Several enrichments are presented for text like stories alternated by games and magazines which contain a lot of movie-clips to accompany the columns. We will have a different approach when it comes to books.

The extra 'information' can consist of anything from colour, typographic elements to music and images. You could think of a darker background when a personage in the story is sneaking into a abandoned house. Or maybe

the font changes to a graceful curly type when someone in the story writes a letter. By doing this digitally, you can precisely control what is displayed and when it is displayed. When the reader starts reading a page it starts looking normal and when events in the story occur, elements change almost magically.

Mainly because this extra layer is subjective, it should be *designed* specific for each story. Therefore I see it ultimately as a new design discipline similar to typographic design. Before this is even an issue, research is needed to determine how this layer can be added and what is a suitable way to apply it in the case of books.

We could imagine this addition is especially useful to use in educating kids or attract teens to read. However, we deliberately do not fixate on a specific target group because in this stage we do not want to exclude others.

We did keep possible readers in mind and their opinion about this idea. First of all, it depends heavily on the way the layer is designed. The classical reader is possibly not attracted by this idea. They prefer the old fashion physical book with its texture, smell, etcetera. But the idea may attract other readers as they see it as a book with more entertaining value. It can be seen as a new kind of book.

Several developments contributed to the origin of this research. Text in general changed and gained in forms and functions. Separate from the development of text, the book also made some transitions. We discuss both developments in the following chapters.

Development in text

The written word isn't static anymore. It is even fully dynamic. This dynamic characteristic became possible with help of developments in technology. We gained more control over text and have an extensive range of tools and

editors with which we can create and change text easily. We can vary type size, colour, font, weight, word space, line space within one step, a click. These properties give you the opportunity to embed more information through the appearance of the text. Information that otherwise would have been lost when a told story has been written down. When it comes to the spoken word, it has been estimated that up to 70 percent of meaning is communicated with paralinguistic features as intonation, pitch and volume (Birdwhistell, 1970). So when communicating a message with text, all extra subjective information transmitted to the reader is welcome. American graphic designer David Carson once said that: "the message that the type sends [...] is as important as what it is saying. When those work together, you've got really strong communication". This concurs with other designers such as Bellantoni and Woolman (2000). They state that the printed word has two levels of meaning, the 'word image', i.e. the idea represented by the word itself, constructed from a string of characters, and the 'typographic image', the 'holistic visual impression', i.e. the meaning that is represented by the graphical shape of the characters and strings.

Although these statements are positive signals because they would mean that there is more information involved in type that can be exploited, we have to take into account that the statements come from graphic designers. For them, a letter or word doesn't differ much from a shape or a pattern.

From a more scientific point of view, van Leeuwen (2005) stated that details such as serifs or sanserifs, angularity (angle of the character) or long/short descenders (like the stem of the letter 'p') can act as metaphor for the intended meaning e.g. the 'e' in the written expression of the beer-brand 'Heineken' is tilted causing a more friendly expression. McCarthy and Mothersbaugh (2002) discovered that some script types evoked a feeling of elegance and sophistication as you can imagine when words are displayed in a type face with curly characters. A different but potentially useful result came from Jun (2000) who found that for example, serif, light weight and medium size of type implies a woman's voice whereas sanserif, bold and big size of type represent a man's strong voice.

These studies give the impression that as well from the graphic design as the scientific point

of view, there are more opportunities to embed extra information in type besides the words and their linguistic meaning.

Because of better understanding of text and its communicative possibilities, it is logical that new purposes for text arose. Use of text became no longer only functional but also aesthetic. Conveying the message always is the main goal but occurred in different new forms and shapes. As already mentioned, graphic design was an (obvious) expression in the development of text but another interesting discipline that followed was *kinetic typography* or moving text. This discipline is a branch from animation. Words are animated in such a way that they represent the meaning of those words. Often this happens synchronous with the pronouncing of those words. Jun states that because of the addition of the time dimension (animation), kinetic typography extends its communicative and expressive possibilities compared to traditional typographic language. Several studies (R. Brain Stone, 2009; S. Malik, 2009) claimed that kinetic typography even has the ability to evoke emotion. Work by Wong and Ishizaki (1995) has shown that by treating text as an animated performer, we can increase the richness of communication in text based communication. Text becomes a sort of animated character that is almost mimicking the emotion it tries to convey. Malik (2009) also sees this, calling it text tending to act as a sort of embodied emotion, where the movements are easily associated with the physical reactions and responses that correspond to emotional communication. For example, text that is communicating fear would be trembling.

Although adding extra information in such an explicit way can be useful, we prefer concentrating on the more basic properties of text (e.g. size, weight, font, spacing) which are often used in typography. Explicitness is in some cases a good quality but we question if it is desirable in every usage of text.

Development in books

The same transition text made, happened on the hardware side. Books and paper also went from static to dynamic due to developments in technology. They became digital (electronic text like PDF's) making it easier to transport, share and acquire text easily. New possibilities

arose and writer-ship changed; non-linearity in story lines benefited from the transition to digital text and other forms of narratives set in such as hypertext and interactive text where the reader can navigate to parts of the story. The reader gained control and subsequently more influence. In recent use (S. Daniel, 2007), text is alternated by mini games or just a simple choice which influences the story-line and ending. What does this add to the experience besides leaving the reader curious about other endings?

The increase in interaction is a nice and fun way of demonstrating the capabilities of both technology and books but again, we question whether it is desirable when reading a story; it explicitly interrupts the reader and demands attention.

The explicit and interruptive nature of the interactive variations to stories resembles the direction that developments of text was heading with kinetic typography. Both are amusing expressions but aren't they too 'loud' when it comes to reading stories in books?

Samuel Taylor Coleridge (1817) described the process of reading as a "willing suspension of disbelief for the moment" and this brings us to the associated concept of 'immersion'.

Immersion is the degree to which the reader is absorbed by a story. Probably everybody has experienced the feeling that he/she forgets everything around him/her when reading a good book. Sometimes you do not even notice you turn the page. That is a typical example of when you are immersed in the story. The notion of the book disappears, as Reuneker (2008) states.

Several other studies (e.g. M. McLuhan, 1964; M. Ryan, 1999, 2001; A. Reuneker, 2008; P. Remmerswaal, 2008) researched the effect of interactivity on immersion with different theories and contrasting conclusions.

Ryan (1999) discusses the immersion when interaction takes place. Her theory is that unless all the senses are stimulated to such a degree that the user cannot distinguish the virtual from the real, interaction decreases immersion. Interaction will make us more aware of the medium. On the other hand McLuhan argued that "involvement with the contents of a medium with a lower definition quality (less rich image quality or missing sensory information like sound), causing the interactor to have to fill in the details of the content, forces the interactor not only to

devote his or her senses to the medium, but also one's thought processes and hence immersion is higher".

However we must keep in mind that our intended focus lies on the immersion that applies for a book. Therefore it is useful to take in consideration an important aspect of the discipline of typography expressed by Beatrice Warde (1959) as type being as transparent as a crystal goblet, invisible to the reader.

However, what readers see and not see is not as straight forward as you would think. Van Zoest et al. (2007) gave an explanation why some participants from her experiment took more time spotting a specific target. This could be because of the mismatch between incoming information and the perceptual hypothesis formed by the participant. This concurs with a statement made by Chun and Wolfe (2001); "What you see is determined by what you attend to".

Applying this to our hypothesis, it could well be possible to change typographic elements on a page of a book without drawing the full attention of the reader.

Developments meet

This is the point where the development of text and book are tied together in the shape of the eReader. The eReader is the hardware device where you can read an eBook on. On the one hand the eReader offers the possibility to change the visual image of text and on the other hand it makes interaction between the book and the reader possible.

We have learned that the concept of immersion has to be maintained because of its crucial value for the reading experience. Therefore we set the requirement that the extra layer should not be explicit and thus less interruptive.

Subsequently, we have come to the essence of the vision from the beginning of this paper: before we can even begin to look at the effect an extra layer of subjective information has on the reader's experience, we first must know if it is even possible to change elements of the book while reading. Therefore our hypothesis is:

It is possible to change typographic elements of eBooks without disturbing the reader's experience.

Method

The aim of the current experiment was to show whether the reader's experience is disturbed when elements on the page change.

We have set up an experiment to investigate this matter. For this experiment we have programmed an iPad. The screen of this device is easy on the eyes and thus very suitable to read from. Even if the Apple *iPad* tablet computer has some restrictions like poor offline possibilities, overall this eReader is well suited to run a self-written program because it is also used as a basic personal computer.

We created a reader-application that contained one story. The story was the winner of a short-

story, thriller, writing contest. It counted nine pages, was written in Dutch and was selected because it had potential to evoke some degree of immersion in a short amount of pages and time.

The application allowed us to change certain elements on individual pages. You can roughly say that all changeable elements on a page can be divided in the categories page surface, spacing and character-form. In our program we have chosen one from each different category;

- increase in word spacing
- change in background colour
- increase in font size

One of the criteria for selecting these elements was that the changes had to be subtle. The element must have the ability to change very slowly to not cause a disrupting change on the entire page. For instance, line height would change the layout too much. Similarly, increasing letter spacing would make the words unreadable because the grouping of words disappears gradually.

The word spacing increased with 233% from 6 pixels to 20 pixels. The background colour changed from white to brown (RGB colour-code #a49e7f). The font size increased with 14% from 18 pixels to 20.5 pixels which was the maximum increase without words falling off the page. See figure 1.

As mentioned before, the changes had to happen very gradually. To be able to choose which technique gave the best result, we tested various options. Changing the actual character-form was the toughest to do. Javascript, Flash animation, plain images, SVGGraphics and CSS gave a very choppy result. The smoothness of the animation is crucial because lacking this would definitely affect the participants negatively. They would immediately notice the change and probably indicate this as annoying and distracting. To achieve this smoothness the animation was made in Adobe After Effects and exported as a movie with m4v extension. This gave very satisfying results. This approach wasn't needed when changing the other element; colour. This was achieved by 'tweening' the rgb-value.

Disturbance was measured by determining the level of immersion because we earlier have set the preservation of the immersion as



Figure 1. Top: change in background colour, Middle: change in word spacing, Bottom: change in font size

requirement. There are several ways to measure immersion. The main difference in methods is the moment of gathering the data. Possible moments are during or after the task (reading). During the task applies to SAGAT (Endsley, 1988) which originally was used to test how immersed pilots are, working in a cockpit. Using SAGAT, immersion is derived from situation awareness. The amount of information in the environment that is perceived by a person while doing a task indicates how immersed that person was. Using SAGAT in its intended form to test reader's immersion when reading a story was out of the question because it would interrupt the performed task with a question. Interrupting the reader while the story is for instance, building tension, ruins the meaning of the results.

We instead gather data after the task through a questionnaire that was based on a questionnaire used in a study that researched the immersion in video games (Charlene Jennet, 2008). A total of 19 Likert scales, from 1 to 5, formed the total score of immersion with a high score indicating that the participant was very immersed in the story. See appendix I for the complete list of questions.

In our experiment we divided participants in two groups: one control group (C_0) and one experimental group (C_1). In C_0 , consisting of 15 participants, no elements were changed during reading.

When participants in C_1 , also 15, read the story, elements on some pages changed. This group was split into two subgroups (C_{1A} and C_{1B}), see table 1.

Condition	N	Males	Females
C_0	15	6	9
C_{1A}	8	3	5
C_{1B}	7	4	3

Table 1. Distribution of participants

In each subgroup the changes occurred on different pages to account for order effects. For instance if the change in font size would be very noticeable and located in the first pages, every participant would notice this. This would make every participant more alert to any subsequent changes.

No change occurred on the first 2 pages to afford the immersion to build up. Between each changed page there was one normal page minimising the influence of one changed element affecting the next.

See figure 2 for an overview of subgroups and respectively the occurrence of changes.

Participants were first asked to fill in a few demographic questions and how much they read and if they are used to read books of an eReader.

The participants are told this research is about reading behaviour with eBooks. Then they had to read the short story of 9 pages. They were assigned to one of the three versions (C_0 , C_{1A} , C_{1B}). Before the participants could read the story, they had to read an instruction page and try out the turning of the pages by sliding them.

Next, was a page containing the title and author. When the participant turned that page, the story began and the timer started.

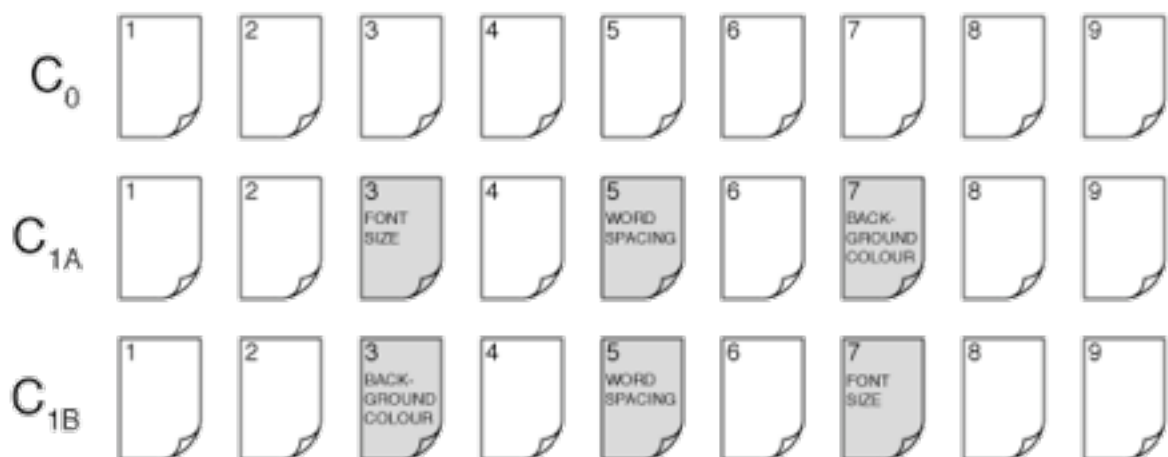


Figure 2. Order of changes within the different (sub)groups

While the participant is reading the story, each time a page is turned, the time it took to read the previous page was registered. This was not visible for the participant. The registered times could give an indication to see if the changes had any influence on reading times and thus disturbed the reader. This could be seen as an objective measure indicating disturbance.

After the story, participants were presented the immersion questionnaire. In extension to that questionnaire, participants had to answer some questions about the noticed changes and if this affected his or her experience. Also 3 questions had to be answered about the content of the story to check if the participant had read the story carefully enough.

All participants were recruited in a public library. At first, 32 participants did the experiment. Two participants were cast out of the selection because they did not read the story careful enough. The distribution of the 30 remaining participants was 50% male and 50% female. Age varied from 18 to 78 years old with the average of 34 years. The experience the participants had with reading books was varying between 0 and 20 hours per week with an average of 6.5 hours per week thus a diverse group.

The changing of an element started 3 seconds after the participant turned the page. This should have preserved the immersive quality because it is assumable that the participant's attention is still a bit interrupted just after turning a page. This refers back to earlier mentioned studies about the effect of interactivity on immersion. The participant could be more alert at the point of turning the page.

Results

The results consist out of three parts: the measurements of reading time, the data from the immersion questionnaire and the data from the questions whether the participant noticed anything unusual.

Reading times were measured in milliseconds. As we could not compare the 'raw' reading times of all the participants (some people just read faster than others). We compared the reading times from the pages that changed

with the time clocked for the same participant on a static page. This means we get the reading time of the changed page relative to the participant's own reading speed.

To select the static page to compare with, we looked for a page where no change occurred yet (in the experimental group) when the participant is at page 2. The reading time recorded from page 2 therefore isn't influenced by anything 'unusual'.

To confirm page 2 is suitable to derive a relative reading time from, we conducted a one-way repeated measures ANOVA using data from the control group to compare the readings times from every page. Results are presented in the table 2.

Page 2 didn't show a significant difference with either page 3, 5 or 7 (the pages that can change).

page n°	mean reading time (ms)	SD
1*	96493	27206
2	80175	21843
3	86349	20460
4	88028	20676
5	77900	18013
6	81332	21755
7	72071	19908
8	86390	24444
9*	67263	16327

table 2: Mean reading time and standard deviation per page for the control condition. The asterisk(*) indicates a significant difference in reading time with page 2.

To get a value representing the relation between page 2 and a changed page (c), we divided the time needed to read the changed page by the time needed to read page 2 for every participant individually. For page 3 this would be:

$$\Delta p_{(3,2)} = \frac{T_3}{T_2}$$

This way we get the reading time of the changed page relative to the individual reader's own reading speed. Besides this, we

also want to be able to add the results of the two subgroups together so we can compare them with the control group as one experimental group instead of two subgroups. The difficulty is that on page 3 in C_{1A}, the font size changes and on that same page in C_{1B} the background gets brown. So for the font size, we want to add page 3 of C_{1A} and page 7 of C_{1B} into one group and compare them with C₀. The problem is that page 3 can be easier to read than page 7. This could be because of more lines of text, amount of longer or more complex words, etcetera.

We therefore determine the average relation between a changed page and page 2 for C₀ only. For page 3 this would be:

$$\bar{p}_{C_0} = \frac{\sum_{i=1}^{n(C_0)} \Delta p_i^{3,2}}{n^{C_0}}$$

The outcome represents the ‘normal’ difference between the 2 pages. Normal in this case means, when the story didn’t contain changing pages (condition C₀).

For the font size, we want that the relation between page 3 and 2 from C_{1A} to mean the same as the relation between page 7 and 2 from C_{1B} so we can join them into one group. To do this, one more step required. We take these relations from C_{1A} and C_{1B} and divide them by the average relation of the same pages from C₀ (derived from previous calculation) for every participant individually. That way, we know how much the relation between a changed page and page 2 differ from the average relation between the same

pages in the group C₀. The calculation is:

$$\Delta p^{FONTsize} = \frac{\Delta p^{3,2}}{p_3}$$

Now we can do the same for page 7, where in C_{1B} the font size changed. When fitting all the steps into one calculation:

$$\Delta p^{FONTsize} = \frac{\frac{T_7}{T_2}}{\sum_{i=1}^{n(C_0)} \Delta p_i^{7,2}}$$

The outcomes of the two last calculations are now comparable and concerning the font size, the subgroups C_{1A} and C_{1B} form together C₁. The same process has been executed for changes in word spacing and background colour.

Next, an independent-samples t-test was conducted for every changing element to compare the differences calculated above for C₀ and C₁. There was no significant difference in reading times for font size between C₀ (M = 1.00, SD = 0.10) and C₁ (M = 0.94, SD = 0.15). $t(28) = 1.25$, $p = 0.22$ (two-tailed). There was no significant difference in reading times for word spacing between C₀ (M = 1, SD = 0.10) and C₁ (M = 1.00, SD = 0.18). $t(22.07) = 0.03$, $p = 0.98$ (two-tailed). There was no significant difference in reading times for background colour between C₀ (M = 1.00, SD = 0.10) and C₁ (M = 1.07, SD = 0.24). $t(18.37) = -1.06$, $p = 0.30$ (two-tailed).

Out of 15 participants from the experimental group, 9 (60%) noticed at least one of the changes. Only one participant noticed all three changes in the whole story and 7 (47%) from the experimental group noticed the change in font size. The change in word spacing was noticed by 2 participants (13%) and the change of the background colour was noticed by 6 (40%) of the participants.

Of the 9 participants who noticed one or more changes, 4 (44%) found it difficult to read because of these changes. It was found

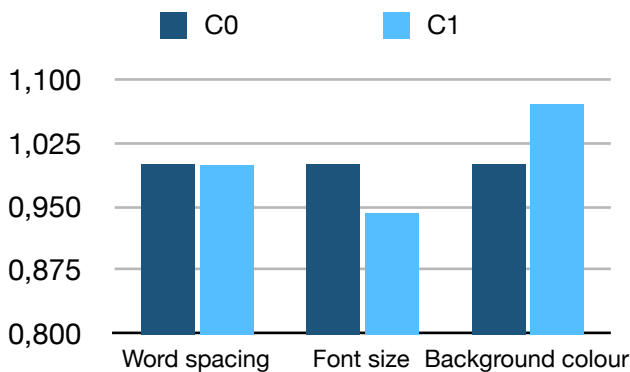


Figure 3. Mean results from reading time measurements

annoying by also 4 (44%) participants and 5 (56%) were distracted by the changes.

In multiple cases, the experimental participant did not formulated the change precisely. For example, a lot of participants wrote the change in word spacing as *shifting of the text*. In these cases, I classified it as positive thus as if they indeed noticed the change in word spacing.

The final result is from the questions about immersion. The scores from all Likert scales were added up after reversing the scores for negatively worded items with a maximum score of 95. An independent-samples t-test was conducted to compare the total immersion scores between C₀ (M = 62.27, SD = 11.29) and C₁ (M = 62.20, SD = 12.95). $t(28) = 0.02$, $p = 0.99$ (two-tailed). The difference was far from significant.

We also looked at the questions from the immersion questionnaire independently and only one question showed a significant difference between C₀ and C₁.

Conclusion

In this research we investigated whether it is possible to change typographic elements of eBooks during a reading task without disturbing the reader's experience.

First of all, when looking at the analysis of reading times, there was no difference between the control group and the experimental group. This means that the changes that occurred in the experimental group did not affect the time participants required to read those pages. Particularly word spacing had very little influence on the reading times.

Because we have transformed the reading times to a value expressing it relative to the participants own reading speed, and corrected for differences in page length and complexity, the outcome of this analysis tells us more than when all the measurements of a certain page were averaged and compared. By this method, we filtered out the influence of individual different reading speeds and that of differences in page length and complexity.

Of the experimental (non-control) participants, 40% did not notice any one of the changes. The changes happened so slowly, that many people who have seen the experiment besides the participants had also difficulties noticing

them. On forehand, the reason to make the changes progress so slow was because we thought this would be needed to not disrupt the reader. Now it is clear that the changes can probably occur faster.

Although the changes did not affect the reading times, the majority of participants did see some changes. Of the experimental participants, 60% saw one or more changes, a substantial part of the group. Only this group of 60% had to indicate if they found it annoying, difficult to read and if it distracted them. The answers from these questions did support our hypothesis to a lesser extent. The attitude towards the noticed changes appeared to be quite negative. A reason for these results could be that the changes in this experiment were not chosen to contribute anything to the content of the story. When the changes do work together with the story to create a more rich experience, it could well be that readers would appreciate it. However, 40% out of 60% is not that much anymore when compared to the whole experimental group. This possibly stresses the importance of making the changes less visible.

A more important source of data is the immersion questionnaire. It could potentially tell us if the important concept of immersion is affected. The analysis showed a p-value of 0.99. That means the difference between the control and experimental group is far, far from significant and therefore it seems that the immersion is successfully preserved.

Although participants indicate negative feelings about the experience when they did noticed the changes, our hypothesis that "*It is possible to change typographic elements of eBooks without disturbing the reader's experience*", is supported by the data gathered in this experiment. It supports research towards the initial vision. That is what this research is about, a base to build upon. It now seems well possible to change the page while the participant is reading. Maybe the next step is to make use of this information and now try to enrich a story by letting the changes coincide both in time and content with events in the story.

For instance by changing to a darker background when a personage in the story is sneaks around an abandoned house. Or by changing the font to a graceful curly type when a story's character writes a letter.

Discussion

During the programming we encountered several technical obstacles when trying to implement the visual changes. As stated earlier, we have tried many methods but they gave a choppy result. It is of extreme importance that the changing or animating of an element goes smoothly, or the reader will notice it straight away, get more distracted and thus less immersed and will probably assess the whole experience as annoying.

Besides that, every element that is changed has a different effect on the reading experience. Therefore it is required to test each element on separate pages instead of multiple changes on one page.

Some side notes are in place when discussing the visual changes made in this experiment. When changing elements on the page, the way the turned page and the next page look, also need some attention. In this research we did not change the font size and word spacing back gradually but at once. So when the page was turned, the next page looked different. The reason for 40% of participants to not notice any changes could possibly be that the reader experiences a short disruption in attention when turning the page and the attention span is resumed when the process of turning the page is over. Hereby, the difference in the appearance of the next page is maybe unnoticed.

With background colour, it is different. The colour of the underlying page changes with the current page. When the current page is turned, the colour is changed back to white relatively fast in 10 seconds. Some participants saw the changing to white instead of changing to brown.

When changing the font size the whole page is influenced. Indirectly the margins change also. Changing the word spacing has a similar effect, namely that the whole line is affected and shifts. Be aware of these effects.

In this research a story of nine pages was used. Choosing a story proved to be more important than we thought. We got some complains that participants disliked the story. Also a longer story would evoke probably more immersion. For testing purposes this is very difficult but for implementation as a real

addition on a digital book it turns out to be beneficial.

At the start of the development of the experiment, we intended to let the changes occur at the point where the reader 'is' on the page. We did some pilot tests with three people to test if we could determine their position on the page by calculating their reading speed after two pages. On a later page we disrupted the reader and predicted their position on the page, accurate by the line. Every time it worked successfully. When we conducted some pilots with static text, it appeared that some people read a page in 40 seconds. Due to these fast reading speeds, the element changes on the whole current page instead of near eye fixation. That way the animation has enough time to change very slow. We also could have varied the changes in duration per person but this would make the data inconsistent. It could be possible that all participants with a high reading speed noticed the changes. Therefore we chose to discard the change based on reading speed and just let the change begin 3 seconds after the page has turned.

Returning to the overarching context of adding extra information to stories in books, this study provides positive signals. Our hypothesis is supported by our research and studies with more detailed topics may follow.

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Appendix 1: Immersion questionnaire

Your experience of the story,

Answer the questions by circling the relevant number. In particular, remember that these questions are asking you about how you felt after reading the story.

To what extent did the story hold your attention?

Not at all 1 2 3 4 5 A lot

To what extent did you feel you were focused on the story?

Not at all 1 2 3 4 5 A lot

How much effort did you put into reading the story?

Very little 1 2 3 4 5 A lot

Did you feel that you were trying your best?

Not at all 1 2 3 4 5 Very much so

To what extent did you lose track of time?

Not at all 1 2 3 4 5 A lot

To what extent did you feel consciously aware of being in the real world whilst reading?

Not at all 1 2 3 4 5 Very much so

To what extent did you forget about your everyday concerns?

Not at all 1 2 3 4 5 A lot

To what extent were you aware of yourself in your surroundings?

Not at all 1 2 3 4 5 Very aware

To what extent did you notice events taking place around you?

Not at all 1 2 3 4 5 A lot

Did you feel the urge at any point to stop playing and see what was happening around you?

Not at all 1 2 3 4 5 Very much so

To what extent did you feel that you were interacting with the book?

Not at all 1 2 3 4 5 Very much so

To what extent did you feel as though you were separated from your real-world environment?

Not at all 1 2 3 4 5 Very much so

To what extent did you feel that the story was something you were experiencing, rather than something you were just doing?

Not at all 1 2 3 4 5 Very much so

To what extent was your sense of being in the story environment stronger than your sense of being in the real world?

Not at all 1 2 3 4 5 Very much so

At any point did you find yourself become so involved that you were unaware you were even using an e-reader?

Not at all 1 2 3 4 5 Very much so

To what extent did you feel emotionally attached to the story?

Not at all 1 2 3 4 5 Very much so

To what extent were you interested in seeing how the story would progress?

Not at all 1 2 3 4 5 A lot

To what extent did you find the story exciting to read?

Not at all 1 2 3 4 5 Very much so

To what extent did you find the story fun to read?

Not at all 1 2 3 4 5 Very much so