Parallax Design

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Management summary

This report shows the effect of parallax scrolling on the user experience and how it can best be used for maximum results. The information and results are based on desk and literature research, interviews with experts, website analysis and an observation study.

Parallax is a way of presenting a website that uses multiple layers that move with different speeds to create a 3D effect. The main result of this study is that parallax scrolling has no significant effect on the user experience. This is inline with previous research done by Frederick in 2013. Parallax websites look more attractive and are fun to use, but can be overwhelming if designed poorly.

This type of design can be used by any type of company. Web designers and other companies who are promoting a service are able to use parallax as their main page. Experts say that parallax is best used as a micro-page to promote one product.

The main downside of parallax is that it has a negative effect on the loading time of the page and SEO results. The latter problem can be solved by using different URLs for different sections of the page.

Most important factor in the success of a Parallax website is the design of the page. Websites should be kept simple. Colours in the same family, minimum amount of text and slower moving backgrounds are advised to prevent people from getting overwhelmed by the website. Important information -like contact details and social media links- need to be visible above the page fold. The same is true for the menu used for navigation. These considerations will have a positive effect on the user experience.

For now, parallax has its limitations but it keeps getting better. More designers are using it and while the technique improves. Parallax scrolling can bring a website to life.

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Acknowledgements

Here is my graduation assignment. During the study I have undertaken in the past four years, I have learnt how and when communication should be used. Some of what I have learned, I used for this report.

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Anne Verhaagen
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Introduction

1.1 Motivation

The internet is a fast changing communication medium. Most companies use the internet to promote their brand, products or services. Standing out and having a positive influence on a websites visitors is important. The latest trend in website design is parallax scrolling. Using a 3D effect, companies are trying to impress the visitors. Instead of clicking through a website, the visitor needs to scroll in order to find the information they are looking for.

Parallax scrolling is relatively new. It is not clear what kind effect this type of design has on the user experience. Available research and information is contradictory. Some experts are very positive towards parallax scrolling, where others prefer not to work this type of design. The same goes for the users' opinion. Some love parallax scrolling and others do not.

The contradicting information leaves companies in the dark whether they should use parallax scrolling or not. American researcher and web designer Dede Frederick has done research in 2013 to see what effect parallax scrolling has on the user experience. His results will be compared with the results of this study to give companies clear and substantiated advice: who should use parallax scrolling, and how.

1.2 Main question and sub questions

1.2.1 Main question

To give a founded advice, the following question (main question) needs to be answered: **What effect does parallax scrolling have on the user experience?**

1.2.2 Sub questions

The main question will be answered by the following sub questions:
1) What is parallax design?
2) What types of companies currently use parallax design?
3) What elements have an influence on the user experience?
4) How do these elements work on a normal or parallax website?
5) How do users experience the usability of a parallax website?

A detailed overview of the research methods can be found in the chapter 'Research method' on page 8.

1.3 Demarcation of the study

This report will only focus on the effect that parallax scrolling has on the user experience. To clarify the elements that have an effect on the user experience, the user experience will be measured based on the VADU-model. This will be explained on page 14.

1.4 Brief description of the study

The main goal of this study is to see what effect parallax scrolling has on user experience, and advises companies in how to use and benefit from parallax scrolling. The given advice is based on desk and literature research, website analysis, observational study and interviews with experts.

1.5 Structure and reading guide

The introduction clarifies the motivation of this study and explains the main and sub questions and the goal of this report. In the chapter 'Research method' the methods that were used for this study are explained. The following chapter 'Theory' shows the results of desk and literature research. After this, the research methodology is explained in chapter 'Research methodology'. Followed by the results of the interviews, website analysis and observation study. This report will end with the conclusions to the sub questions and final recommendations.

Research methods

This chapter will give an insight on the different research methods that were used to answer the sub questions. This will be explained per method and will clarify why this was chosen. The research methodology for desk and literature research will be shown in paragraph 2.1. The research methodology for the interviews with experts, website analyses and observation study will be explained in the chapter 'Research methodology' on page 23. Below is a brief description of the methods. Table 1 will show what research method was used to answer the different sub questions.

2.1 Desk and literature research

2.1.1 Reason for method

Acquired information that is already available has been retrieved by desk and literature research. The preliminary research was necessary to create a better understanding of the current situation and factors that would have an influence on this study.

2.1.2 Use of literature

Parallax scrolling is relatively new. This also implies that there is lack of information and scientific research/studies on the topic that can be used for this report. The main resources were articles written by experts, previous studies on user experience and the opinion of bloggers.

The following topics have been studied through desk and literature research:
- Definition of parallax scrolling
- Effect of elements on the user experience, based on VADU-model.
    - Value (SEO and text)
    - Usability (Location of items and loading time)
    - Adaptability (Mobile friendly and cost)
    - Desirability (Interactivity and visual design)

2.1.3 Limitations
- Lack of information on parallax scrolling
- Contradicting information
- Lack of research on parallax design and its effects

2.2 Interviews with experts

Six experts, on various topics, have been interviewed for different reasons. The interviews have been conducted through email or personal conversation. All the live interviews have been recorded. The main goals of the interviews where:

- How to gain information on user experience regarding parallax design.
- Type of companies that use parallax scrolling.
- Positive effect of parallax
- Negative effect of parallax
- How to use parallax

The full methodology is described on page 23, the results can be found on page 30.

2.3 Website analysis

20 websites have been analysed to get insight on what types of companies are using parallax design and how the websites are design. How does parallax design effect the user experience? The topics that have been analysed are based on the VADU-model. A detailed methodology can be found on page 25; the results are listed on page 31

2.4 Observation study

This observation study is necessary to get insights into how people respond to a parallax website versus a non-parallax website. 32 to participants (16 men and 16 women) performed three small tasks and filled in a post survey. The main topics of this study where: use of the website, finding information and appeal. All the topics are based on the VADU-model. The full methodology is described on page 26, the results can be found on page 32.

Table 1 | Sub question and chosen method

Sub question	Research method
What is parallax design?	Desk research
What types of companies currently use parallax design?	Website analysis, interviews
What elements have an influence on the user experience?	Desk research, interviews
How do these elements work on a normal or parallax website?	Desk research, interviews, website analysis
How do users experience the usability of a parallax website?	Observation study

Theory

3.1 Definition of parallax design

This section will answer sub question 1: *What is parallax design?* by explaining what parallax design is, showing the benefits and disadvantages and explain how it can be used. Paragraph 31.2 will focus on the history and will give the definition of parallax design and how it works on the technical side. Paragraph 3.1.4 and 3.1.5 show the benefits and disadvantages when using parallax design. Finally, this chapter will end with a description of the various types of parallax design that can be used and where parallax can be best used. The information given in this chapter is based on desk and literature research.

3.1.1 Introduction

User experience is becoming more important and companies are realising that they can benefit from a pleasurable, easy, simple and efficient website. Bad user experience is often due to lack of a good design and content (Williams, 2012). Parallax design is a web design trend that started mid 2010 early 2011 and is still growing. Companies use parallax design to make their website more appealing to their visitors. By engaging visuals and functionality, parallax design is changing the user experience (Brown, 2013) and it can lead to more sales, referrals and profit (Williams, 2012). But what is parallax design?

3.1.2 History

The word 'parallax' is used in the world of astronomy and is defined as the apparent displacement or the difference in apparent directions of something when viewed from two different vantage points (Janssen, 2013). In the world of graphics the term 'parallax' was used for 2D side scrolling videogames. This visual effect uses different backgrounds images that move at different speeds to create an illusion of depth and immersion during the videogame. The background usually moves slower than the foreground to make it seem further away (Brown, 2013). Today parallax is used to make a page come alive, put some fun and personality into a website and create interaction with the visitor (Williams, 2012). The first parallax website was designed by Ian Coyle who designed the parallax website for NIKE (Dawson, 2014). Ever since that website, parallax is getting more known and more companies are interested in using this type of design.
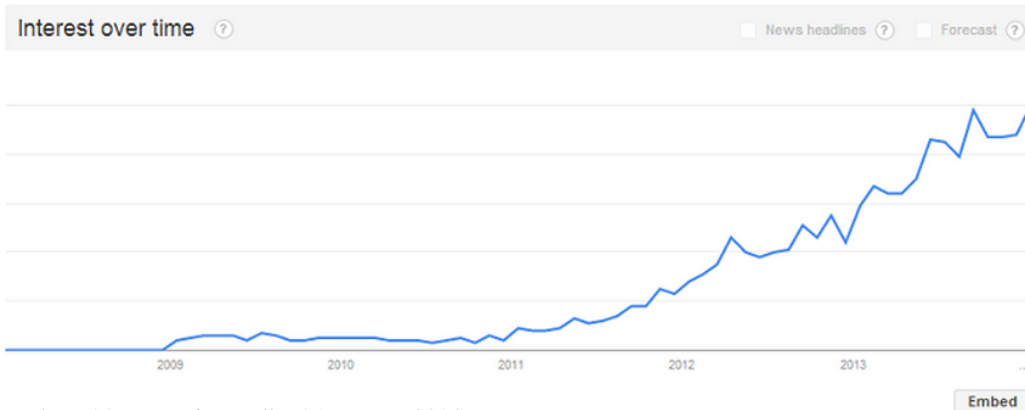
Photo 1 | Interest in parallax | (Dawson, 2014)

3.1.3 Parallax versus a non-parallax website

What is it that makes a parallax website different from a non-parallax website? A non-parallax website exists out of several pages, where parallax often has just one page. On a non-parallax website you need to click to go to the next page, with parallax a scrolling technique is used to move around on the page (Dawson, 2014).

Photo 2 | Parallax layers |

Moving layers is what defines parallax and is what makes it different from a non-parallax website. Photo two shows the different layers of a website, which create a 3D effect. To create the parallax effect, layer four can move at 80% of the speed, layer three at 50%, layer two at 55% and layer one at 20% of the speed. Amount of speeds are just an example.

3.1.4 Benefits

More companies are starting to work with parallax designed websites. Below are possible benefits that parallax design can bring a company, depending on the design and purpose. The following benefits are opinions of experts found in current available literature.

- Parallax design is able to bring the user experience to a new interactive level of online viewing and creates a wow-effect with the visitors by using depth and animation on the website. (Brown, 2013)
- A parallax website will trigger the curiosity with its visitors, and if they have a positive experience they are more likely to stay on the page longer to play around. This will lead to CTA (call to action) (Gurp, 2013)
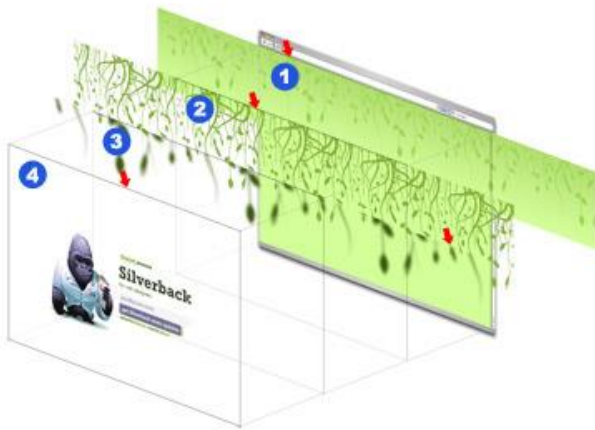
- It is an opportunity to promote a product in a 3D or interactive way. Visitors will be able to explore the product in a unique way (Idler, 2012).
- Because of the one design, visitors will not be able to go to another page. This reduces the bounce rate. Having a low bounce rate will have a positive effect on the websites ranking. (Benny, 2013)

3.1.5 Disadvantages

Companies want and try to create interaction with their customers. Parallax websites are known to create interaction. So why is not every company working with a parallax website yet? The disadvantages listed below are opinion of experts found in current available literature and can be a reason for a company not to use parallax scrolling.

- It takes time to design and make a parallax website, and time is money. Having a parallax website is expensive. Not everyone is trained to build that type of website, which forces companies to work with specialists. (Gurp, 2013)
- Most parallax websites consist of only one long page. This can be detrimental to the website. Working with SEO is nearly impossible due to the lack of webpages and web titles. (Brown, 2013)
- Parallax websites tend to have a lot of images, data and other information. This has a negative effect on the loading time of the website which can cause frustration with the visitor. (Brown, 2013)
- Parallax websites can be impressive and technical. The downside is that it can be difficult to find specific information. When the usability of a website is low, visitors will leave the page and are unlikely to return. (Gurp, 2013)
- Parallax websites work well on computers, but they are not so easily transformed for the use on other devices like a smartphone or tablet. It is possible to make an independent version for the other devices, but this will result in higher costs. (Kokkinou, 2013)

3.1.6 Types of parallax

Having the right web design is crucial for a company. People see many different websites and parallax design as a way to stand out. (RB Online marketing, 2014) Parallax scrolling can be used for product display, call to action, storytelling and engagement (Idler, 2013). There are five different themes that can be used for a parallax website. (Brocka, 2012) Most parallax websites are a combination of the different types to create the perfect effect.

Vertical parallax scrolling

Vertical parallax design is based on a WordPress theme. (Raju, 2011) Instead of clicking through a website, the visitor needs to scroll the page up or down. This type of design can be used to tell a story, showcase a product and induce a call to action. (Cousins, 2013)

Horizontal parallax scrolling

Horizontal parallax is the same type of design as a vertical parallax, but moving horizontal instead of vertical. Vertical parallax is used more often. Horizontal parallax is used to tell a story, showcase a product and call to action. (Cousins, 2013)

Animation/frames

Animation is uses to create movement on the webpage without scrolling or clicking. This is a background feature and can be used in combination with all designs. (Brocka, 2012)

3D room

3D room is a type of design to create the effect that the background is moving. The front layer does not move and the background has limited movement. It is the same effect as standing in front of a painting and has the feeling that the eyes follow you. This type of design is used as an extra effect on a parallax website. (Brocka, 2012)

Worlds

Worlds are used for storytelling and promotions. It is a type of design where the visitor decides what the next part of the story is. Companies can create a different and unique world to create interaction with the visitor. (Isaksson, 2013)

3.1.6 Conclusion

Parallax websites use a design based on multiple backgrounds that move with different speeds to create a 3D effect. This type of design can create a wow-effect with the visitors. This can result in longer page visits and CTA. The downside is that the lack of URL's will have a negative effect on SEO and the loading time can be longer do to the heavy content.

3.2 Influence on the user experience

The following section will answer the third sub question: *What elements have an influence on the user experience?* And the fourth sub question: *How do these elements work on a normal or parallax site?*

There are many factors that have an influence on the user experience. This section will focus on the elements used in the VADU-model designed by Frank Guo in 2012. The model uses the four most fundamental elements to help define the objectives and measurement of user experience. Unlike Peter Morville's Honeycomb, the VADU elements are focused on the user experience. The different elements do not have to be equal. It depends on the type of brand and product which element is more important (Guo, 2012). If all elements are in balance, the website is more likely to have a positive user experience.
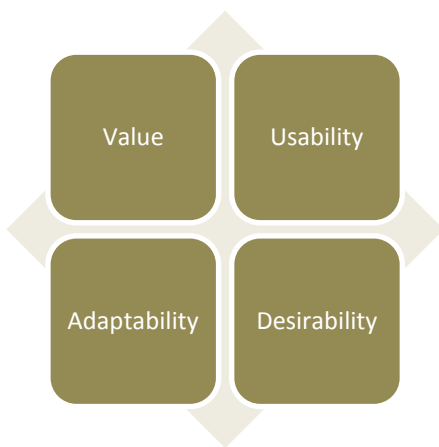

Figure 1 | VADU-model, (Guo, 2012)

The following paragraphs will explain the benefits and disadvantages for the various elements, which have an influence on user experience, for a parallax and non-parallax website. The four main elements that have an influence on the user experience are value, usability, adaptability and desirability. These elements have sub elements for a better understanding. All the information given in this chapter is based on previous research.

3.2.1 Value

Most people visit websites for various reasons. One of them is to look for information. The type of information that they are looking for varies per website and company. Offering the right information and making sure that the website visitor finds the information, is crucial. People will see dozens of website before finding the information they are looking for. A website is judged in less than a second (Pengnate, 2013) and during an average page view, users read 28% of the text (Nielsen, 2010). The right information makes a website valuable. The sub elements SEO and text have an influence on the user experience.

SEO

SEO stands for Search Engine Optimization. It is a technique used by marketers to optimize their ranking in search engines like Google. The websites are displayed in a SERP (search engine result page). Users want to find the information quickly and tend to focus on the top hits. 17% of users only look at the first hit, 42% look at the second and third hit. 12% scroll all the way to the bottom of the first page and only 2% look on the second page (Nielsen, 2010). The search engines scan names of websites, webpages, titles and content. The more pages and links a website has, the better this is for the SEO. Images cannot be scanned by search engines and are useless for SEO. The file name can be used for SEO.

A non-parallax website uses several pages. This has a positive effect on the SEO. The search engines are able to scan multiple pages for links and keywords. Another benefit of having multiple pages is clicking. Clicking can be used to track visits with analytics (Anthony, 2012). Parallax websites usually consist of one page. This will have an influence on the SEO. There is just one page to link to and photos are not used for SEO ranking. The problem of one page can be tackled by using different URL's on the one page (Rauch, 2013).

Text

The search engines scan the text for keywords; visitors scan the text to look for certain information. The amount of text and its position is important. Luuk Noordhoff, an Internet marketer, recommends not using more than a 100 words on the homepage. This is enough to explain what the website is about, will be easy to read and can be scanned by search engines. Long text will drive people away, they are scared off and don't want to read so much. Using longer texts, a minimum of a 150 words, on the other pages is recommended by Noordhoff. Pages with more text have a higher ranking in the search engines (Noordhoff, 2013)

Research, by Jakob Nielsen shows that people scan a website in an F form and read the headlines and just a couple of words per paragraph. When a paragraph looks interesting, people will read the whole paragraph. Visitors pay more attention to the text then they do to photos (Nielsen, 2013).

A non-parallax website uses a menu to organize all the information. This makes it easier for visitors to search for specific information. It is important that the headlines and the text are clear and that the page is well structured. A parallax sites needs to organize the website completely differently. There is just one page to organize the text on.

3.2.2 Usability

Usability is the effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments (Marja, 2013). Website usability consists out of several things. Element location and loading time have an influence on the user experience.

Location of items

People want to find the information they need as soon as possible without getting lost on a website. Having a clear website will make the search easier. People know where to find certain information, because the location is similar on most websites. Navigation is often on the top or left-hand side. Contact details, like email and social media, are found on the bottom and the logo is located at the upper left. Most of the content is centred. This is appealing to visitor because it is easy (Kyrnin, 2013).

It is important to have the most meaningful information above the page fold. Research, by Jakob Nielsen, shows that website visitors spend 80% of their time above the page fold. Having a long webpage can be a problem. Users prefer a website that 'gets to the point' and let them do things quickly. Scrolling is extra work. The same study shows that scrolling has a positive effect on the time spent on a website. With scrolling, people do not have to click to a next page. Clicking through can be a reason to leave the page (Nielsen,2010).

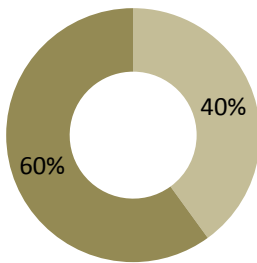Graphic 1 |Attention focused on the top (Nielsen, Scrolling and Attention, 2010)
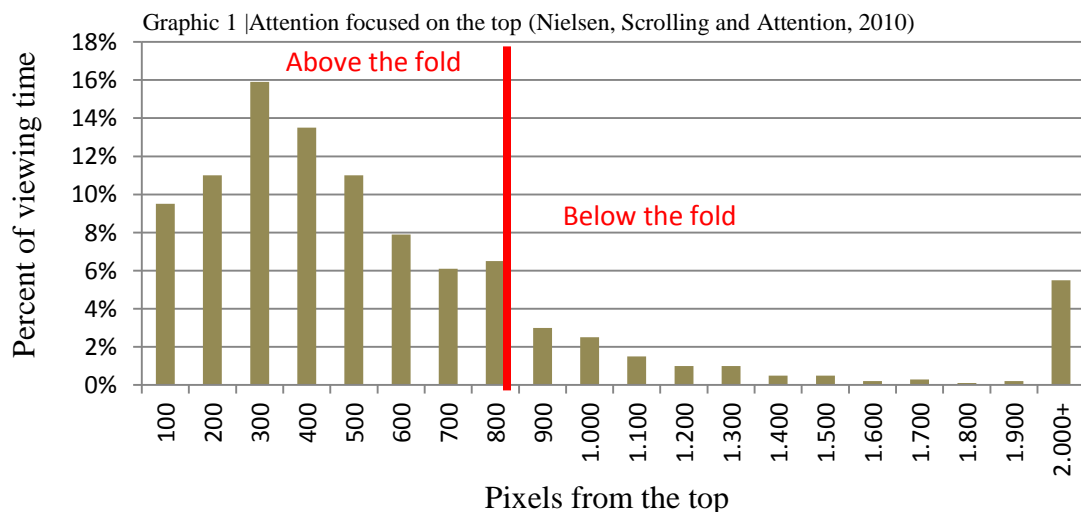
On a normal site people hardly have to scroll. All the information on the main page is above the fold and the menu can be used to look for the information. Other page may need scrolling to read all the given information. Parallax uses more scrolling than clicking.

Loading time

Internet, websites and its users have changed in the past years. Speed of internet is one of the things that has improved. In 2000 you needed to wait for 8 seconds before a page was loaded. In 2009 this was less than three seconds. People expect a website to load quickly. If it does not, they are more likely to leave the page and not return. A quarter of the visitors will leave the page if the loading time is between one and five seconds. 30% will go to a different website (Vossen, 2012).

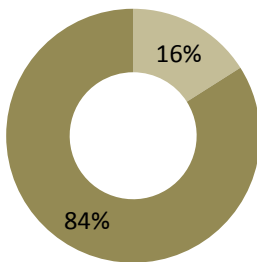40% abandon a website that takes more than three seconds to load

Graphic 2 | Abandon website | (Jensen, 2011)

A one second delay (or three seconds of waiting) decreases cusomer satisfaction by about 16%

Graphic 3 | Satisfaction | (Jensen, 2011)

In an article by The New York Times, Google states that they use the loading time to rank the pages. The ultimate loading time is 250 milliseconds. It depends on the content if visitors are willing to wait longer. If they want to look at a video or use an interactive graphic, they know that the website needs some time to load. Even then, four out of five people will click away before the video is fully loaded (Lohr, 2012).

Website elements that have the biggest effect on the loading time are graphics and photos, followed by multimedia like animations, audio and video. Text will have no real effect (Kelly, 2007).

The loading time for a non-parallax website varies. The average website size is 1059kb and has 5.4 pages. The main loading time is 3 seconds for a computer and 4.5 seconds for a mobile (Gaille, 2013). Parallax websites are built with Javascript/jQuery and are based on graphics, photos and multimedia with minimum text. The size of this type of website can exceed to 2300kb (Candrlic, 2014). This will have a negative effect on the loading time. On an average high-speed connection, it takes approximately 5 seconds to load 2 or 3 Mb (Mellas, 2013). This means that a parallax site can take 6 seconds to load.

3.2.3 Adaptability

Worldwide, there are over 1.75 billion smartphone users. That is 39% of all mobile users. Expectations are that this number will grow to 49% by 2017. 79% of all the internet use is via smartphone or tablet. Around 2017 this will be 91% (Srivastava, 2014). It is important that a website can be used on computers, laptops and on smartphones and tablets. 77% of the time, people will grab their phone to go online even if their computer is nearby. A smartphone is faster and easier (DEGA Online, 2013)

Mobile friendly

People have different expectations when they look for information on the phone. The information they look for is simple. What is the closing time of the store, when does the train leave, what is my balance on my account. A mobile friendly site is similar to the main website but designed to fit the small screen and the wishes that come with that, less text and easy to navigate (DEGA Online, 2013).

There are two ways to make a website mobile friendly: responsive and adaptive. Responsive is a website that adjusts to the different sizes, the website will adapt to the right size. Adaptive sites have similar but different back ends for different devices (Schenck, 2013). This report will focus on adaptive sites. This is (for now) the only way for parallax sites to be viewed on a smartphone (This was written in April 2014. It could be that in a couple of months parallax could be used as a responsive site).

Cost

The price depends on what the client wants and needs. They made it clear that a parallax website is more expensive than a normal one for various reasons. A web designer needs to be specialized in building and working with parallax. Designing agencies that don't have a specialist will need to hire one.

Parallax is limited in the ability to adapt to other devices like a smartphone or tablet. Therefore other designs need to be made, which are an extra cost for the company. The technique is changing quickly, maybe in a couple of months it will be easier for parallax to work on other devices. For now, the content is just too heavy (Rauch, 2013)

So what effect does the user experience have on cost? User experience problems tend to be cumulative. Enough small problems can have the same effect as a few large ones. Crafting a good user experience requires finding and eliminating major usability issues, but less severe problems deserve attention too (Fisher, 2009). This attention will cost money.

3.2.4 Desirability

Desirability should be how we can drive a user to take action through design. Using visuals, content and form elements, we can make a page more desirable to use. This can be done through design and interactivity (Ryan, 2012). If a website is desirable visitors will stay on the website longer and are more likely to come back. Attributes that are desirable to visitors are design, personalization, interactivity, informativeness, navigation, privacy and security, entertainment and accessibility (Australian Business, 2013).

Interactivity

Some studies show that the higher the degree of interactivity, the higher the websites attractiveness and that the level of interactivity can be important when trying to change the 'lookers' into 'buyers' (Australian Business, 2013). People like to communicate and share information. So many websites these days are interactive, visitors expect that they can share their info on any website. Whether it is via a comment, email or video. (Wagner, 2013). Interactive websites are a way for a company to bond with its client and build a long-term relationship.

Personalization is tailoring the presentation of a website's content to match a specific user's preference. This can be done in two ways. The visitor can change the setting of a page or the behaviour of the visitor can be tracked (Business Dictionary, 2013). Scrolling is one way to make parallax an interactive website. The benefits of scrolling are: (Anthony, 2012)

- No clicking involved
- Users see everything in order
- No page load
- Keeps users engaged
- Scrolling is faster than clicking
- Scrolling is better for usability

Different types of design can be used to keep the visitor engaged. Personalization will not be possible for parallax because of the technical limitations. Non-parallax websites use personalization and multimedia to make the website more interactive (Anthony, 2012).

Visual design

''*That's been one of my mantras – focus and simplicity. Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple. It is worth it in the end because once you get there, you can move mountains.*'' – Steve Jobs

It is important that the website is simple. If there is a lot going on, people will get distracted from the main goal. Having a simple website, it makes it easier for the visitors to find the information (The Design EN, 2013). A 2012 study by Google, showed that the websites with a simple visual design were rated as the most beautiful and people are more likely to come back (Alexandre N. Tuch, 2012).

Navigation is of the utmost importance when it comes to websites (Klust, 2013). The point of navigation is to help the visitor find the information they are looking for, in the easiest way. Navigation is what gets the visitor deeper into the site experience (Cook, 2014). There are two menu types. The first one is the vertical or horizontal menu found on the top or left side of the website. Some websites use the second menu type, the 'hamburger' menu. With this type of design the menu is hidden. Visitors need to click on an icon or link to reveal the menu. This is often used on mobile phones (Cook, 2014). A hamburger menu makes the site less cluttered, but can have a negative result on the user experience (Ryan J. , 2014). This is an extra activity/click and can be a barrier (Garratt, 2013).

Your retina converts visual information into electrical impulses. The more visual information, the more the brain needs to work. The human brain can focus on seven things at the same time. Showing more than that is pushing the brain to its limits (Lapowsky, 2013). This is why a website needs to be simple, otherwise it will be overwhelming and too much for the brain to handle. Optimizing the visual information processing, simplifying information's journey from eye to brain, is about communicating as much as you can in as few elements as possible (Walker, 2013).

Non-parallax websites can have many different elements and still look simple. It all depends on the design. There are more than enough websites who have too much going on. Parallax can look simple too, but it is more difficult. The scrolling element can make it look overwhelming. This does not mean that all parallax websites are overwhelming. If it is done right, like Sony did, it can look simple.
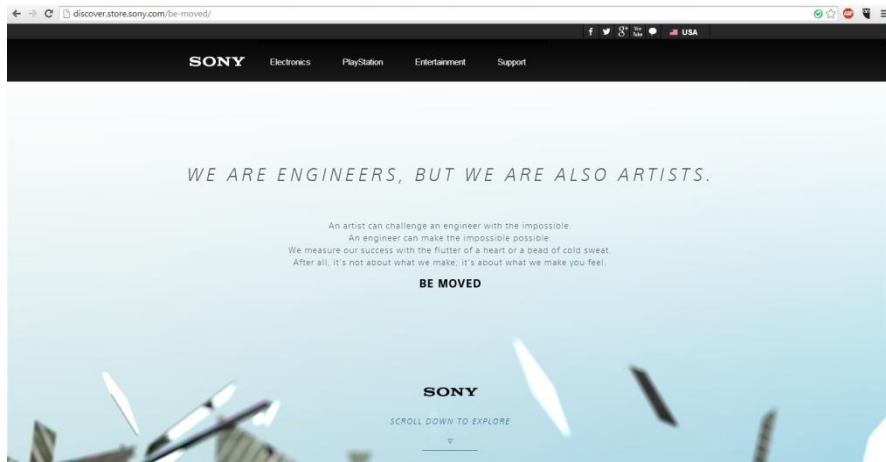
Picture 1 | www.discover.store.sony.com/be-moved/

The parallax website of Sony has a main menu and limited text. The background colour is easy for the eyes. The lack of elements and moving objects makes the website look simple and not overwhelming.
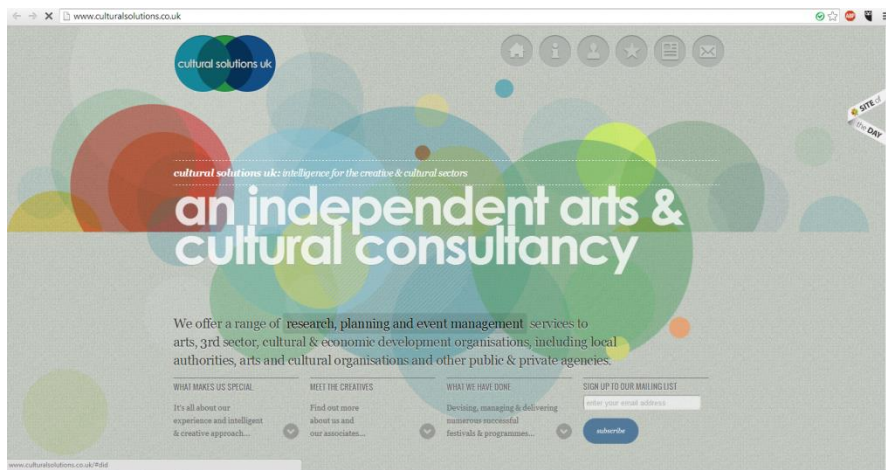
Picture 2 | www.culturalsolutions.co.uk

The parallax website of Cultural Solution has more text and uses different letter types and colors. There are two different menus and the circles in the middle follow the movement of the mouse. There is a lot going on at the same time, which can make this website overwhelming.

3.2.5 Conclusion

There are many elements that have an effect on parallax scrolling. Based on the VADU-model, the most important elements are text, location of items, loading time and visual design. The amount of text and location is important because this is what visitors are expecting and looking for. Having the right amount of text and having the important information located above the fold, will have a positive effect on the user experience. Keeping the design simple will prevent visitors being overwhelmed. Using images and other elements is important, but will have a negative effect on the loading time due to the heavy content.

3.3 Future of parallax

Parallax is a new technique and is developing. Who knows what will be possible in the future. It will become easier to make the websites and more research will be done. People will hear more about parallax scrolling than they do now (Mark, 2014).

Not everyone thinks that parallax is just a trend that will fade away. Several designers gave their opinion on Webydo, an online community for professional designers. They state that parallax scrolling is user friendly and visually appealing. Parallax can be a solution for communication problems. It just needs to be used in the right way. Despite all the hype, many designers and bloggers remain sceptical and argue that parallax only detracts from the content (Webydo, 2013).

Parallax may have several limitations, but it keeps getting better. More and more designers feel comfortable innovating with this technique. Parallax isn't a passing trend. It's an intriguing advance that's here to stay (Barlev, 2014)

Research methodology

4.1   Interviews with experts

4.1.1 Motivation for interviews

It is difficult to find information on parallax scrolling. The interviews will give an experts view on several topics. If the results of the interviews are consistent with the information collected though desk research, this will lead to a clear and solid advice. The main three different reasons for the interviews are:

- To get insights in how to conduct an observation study.
- What are the result from Frederick's research, what where his limitations?
- What are the thoughts and personal experiences, web designers who have worked with parallax scrolling?

4.1.2 Experts for advice

Laurens Vreekamp
Vreekamp is a lecturer at the University of Utrecht, teaching interaction design and user experience design and cofounder for the company 'Immrs' to bring different news media together and has worked as a web designer for several companies. He has been asked to give advice in how to conduct an observation study. Results of his interview can be found on page 25 of the appendix.

Dede Frederick
Frederick is a graduate research assistant at Purdue University. He has a master's degree and is a doctor of philosophy in Technology (User experience in web design). He has conducted research regarding the effects of parallax scrolling on the user experience in 2013. He has been asked to give feedback on his study and the results. The results of his study and interview have been used for the observation study and can be found on page 26 of the appendix.

4.1.3 Experts on parallax

The objective of these expert interviews was to gain insights on the benefits and limitations of parallax, what type of companies are using parallax at the moment, how can parallax be used to get the most out of it, what are the prices and more. The results of the interviews can be found on page 30.

Marcel Harfouche
Harfouche is a digital consultant for EXA, which is the biggest digital solution agency in Australia. He is specialized in advising companies to generate leads and ranks on Google. He has over 11 years of experience in the field and has worked with parallax before.

Jean-Louis Carmagnole

Carmagnole is an account and project manager in web services for lineation Resolution Marketing and has a bachelor degree in media, communications and marketing. He has over seven years of experience in digital media and marketing.

Kunal Dua

Dua is a commercial manager and work as a strategy and portfolio-planning manager before. He currently works for P&G and has worked for Unilever before. He has worked with web designers in the past and knows how to optimize a website.

4.1.4 Type of interview

The interviews had a semi-structured setting. The reason for this is that the topics and some questions could be prepared before the interviews. Even with the questions there would be room during the interviews to continue on the answers that was giving (Cohen, 2006). All the interviews have been recorded.

4.1.5 Interview analysis

In preparation for the three interviews, several questions were used to guide the interview. Due to different answers and the changing course of the semi-structured interviews, the questions vary per interview. The key was to get the main questions answered. Due to time limitations, one interview got cut short and not all questions were answered.

Topics that returned in all interviews are mentioned and compared in the results. Other information that was important for a professional insight, but was not talked about in all interviews, is mentioned as well.

4.1.6 Limitations

- It was difficult to find parallax experts who wanted to be interviewed.
- The three people who were interviewed had limited time.
- No one was willing to share any information on numbers and results regarding a normal versus parallax website.
- Expertise of the interviewees varied.
- The questions varied per interview, which can have an influence on the results.
- One interview was via email; this means there was no chance for in-depth questions.
- The personal nature of semi structured interviews makes findings difficult to generalize. Different questions are answered.

4.2 Parallax website analysis

4.2.1 Motivation website analysis

There are companies that now use parallax websites but there is no information or research available on parallax websites, the type of companies that work with parallax websites and why and how they use the design. The website analysis will give insights on the use of parallax websites. Some of the other questions that need to be answered are: What types of companies currently use parallax scrolling? What is the purpose of the website? What does the website look like?

4.2.2 Analyse setup

The 20 different websites were analysed. The website where selected by Gisele Muller (www.webdesignledger.com) and Alex Black (www.creativebloq.com). Muller is a web writer and cofounder of 'Refilmagem' and 'Mentaway'. The first website compares and analyses movies. The second one is a travel app. For her blogs she regularly compares websites, website elements and subjects based on design, technology and websites. Black is a writer for 'Print Express' which specializes in printing in the UK. He enjoys studying graphic and web design.

Both made a blog on their top parallax scrolling. 14 websites of the analyzed websites where named on both websites. The other six where randomly chosen.

Seven different elements were compared in this analysis. Type of company, website goal and type of parallax were compared as general information. The use of multiple URL's, Amount of text, location of information and use of menus are based on the VADU-model. These elements have been compared with desk research and have an influence on the user experience. The results of the website analysis can be found on page 31

4.2.3 Limitations

- There are hundreds of parallax websites. Only 20 have been compared. Therefore the results of this analysis cannot be generalized.
- Some of the results are based on the personal opinion of the researcher.
- The goals and companies behind the websites vary. This can have an influence on the design.

4.3 Observation study

4.3.1 Motivation observation study

There are different ways to do research on user experience. Frederick has done research on the user experience of parallax websites through an observation study. He built two websites for the same company. One was a 'normal' website; the other was a parallax website. He let 86 random people visit the websites and preform a task. After completing the task they needed to fill in a survey. Frederick wanted to compare five variables: usability, satisfaction, enjoyment, fun and visual appeal. The Mann-Whitney test was performed to compare the participants' responses with the five variables. His goal was to establish whether or not parallax scrolling can influence these variables and subsequently the user experience. (Fredericks, 2013)

Vreekamp, an expert in user experience research, advised to do an observations study to get the best and honest results. During an observation study results are based on the reaction of the participant. This is information that is needed for this study. Results vary from body language, spoken reaction and a post survey. An observation study is the perfect way to see how the participants respond to the variables. The participants will be studied in their natural way to create the best results. According to Claire Eau, these are key point of an observation study (Eau, 2013). They confirm Vreekamp's advice.

4.3.2 Previous research by Frederick

Research by Fredericks, shows that for his respondents, there is no significant difference between user experience of a non-parallax website and a parallax design; except for the variable 'fun'. According to his results, the parallax website was significantly more fun and looked more professional. Frederick's conclusion was: parallax scrolling did not significantly improve overall user experience; however it did enhance certain aspects of the user experience. (Fredericks, 2013)

This research has two purposes. The first purpose is to gauge whether scrolling has an effect on the user experience. The second one is to compare the results to the results of Frederick's rapport.

4.3.3 Population

The participants for this were randomly chosen. The sixteen men and sixteen women were all between 20-30 years and living at Greenwich Village Accommodation in Sydney Australia. Recruiting was conducted through the intercept method. They were randomly divided in two groups, 8 men and 8 women per group.

This is not consistent with previous research conducted the field by Lindgraad, Fernandes, Dudek & Brownet (Lindgaard, 2006), Sauer & Sinderegger (Sauer, 2011) and Fredericks (Fredericks, 2013). They had a minimum of 60 participants. The reason for fewer participants is time limitations. To get clear, good and honest results, these observations must not be rushed. 32 observations is the maximum amount that was possible in the given timeframe.

4.3.4 Observation setup

The goal of this observation study is to ascertain how the participants respond to and react to using a normal or parallax website. Is there a difference in what they find attractive, what website is more fun to use and what is the overall user experience?

Ultimately a comparison will be drawn with Frederick's study. The following variables will be used: The independent variable is the scrolling technique and the dependent variables are: usability, look (visual appeal), and feel (fun). These variables were chosen because they have showed to contribute to the overall user experience (Hassenzahl, 2006)

To prevent that the participants will be influenced by one website, two different websites were used. Eight men and eight women will look at one website, where the other eight men and eight women will look at the other website.

The websites that were used for this experiment were:
Normal: http://www.honda.co.uk/cars/cr-v/
Parallax: http://crv.honda.com.au/default.aspx?origin=corporate-homepage

Photo 1 | website normal

Photo 2 | website parallax

4.3.5 Justification of the variables

These are the three variables that are being researched and compared.
Feel: interaction, reaction and enjoyment of the website, is it fun.
Look: level of appeal.
Usability: functionality and is the necessary content easy to find.

These are three out of five variable used by Frederick. To compare them, they were also used for the current research. The reason for comparing just three of the five variables is that the three chosen variables are elements mentioned in the VADU-Model. The variables have different dimensions. This research is focused on a limited amount of dimensions.

4.3.6 Procedure

The websites used for this research are two Honda websites promoting the CR-V 2014 car. As mentioned before, the sites are not identical but have similar features. One laptop, a HP Pavilion dv7, with internet access was placed at a desk near the reception of Greenwich Village Accommodations.

Residents were randomly approached and asked if they wanted to be part of this observation study. The first eight men and women were placed in group 1, the other eight men and women were placed in group 2. Group 1 was asked to look at the parallax website, where group 2 was asked to look at the normal page.

Before the experiment started, the researcher explained that the participant needed to conduct 3 tasks. In order to get the next task the participant needed to notify the researcher, who timed how long it took to carry out a task.

The participants were asked to think out loud. This way it was possible for the research to register a positive or negative effect. Positive effects were observed based on smiling, cheering, straight sitting position, lack of sighing and other body and verbal expressions. A negative effect was observed based on sighing, frowning, slouched sitting position and other body and verbal expressions.

Website visitors judge a website in less than a second (Arthur, 2006). This is why participants were not given thirty seconds to browse, unlike with Frederick's test. This test is meant to simulate a real life situation.

Task 1)   Find the Facebook link and tell how many followers Honda has.
Task 2)   Give a price for the car. This can be the total price or the price per month.
Task 3)   Find a phone number to contact Honda

After the tasks were completed, the participants asked to fill in a survey. The survey will give an insight in the participant's thoughts and experience. The Likert scale was used to for the answers for this survey. This experiment took approximately five to ten minutes per participant. The survey and its full results can be found on page 3 till page 14 of the appendix.

4.3.5 Likert

The Likert scale is often used to measure attitudes. The advantage of a Likert scale is that the participants need to think about their answer and cannot just say yes or no (McLeod, 2008).

4.3.7 Limitations

This study has several limitations:
- This study is conducted at Greenwich Village Accommodation and was limited by its residents, which may not have been a true representative of the population. Therefore the outcome of this study cannot be generalized.
- The residents are from all over the world. Their level of understanding of English varies. It is possible that some did not understand or interpret the question correctly but pretended to know the answers by just filling something in.
- The observation was completed in an open area. Participants may have been distracted during the experiment.
- The observation was conducted at different times. It is possible that the conditions may not have been equal for everyone.
- This observation is based on two Honda websites. Their website design may not be equal to other websites. Therefore their experience on different websites may give different results.
- The participants may lie on the Likert scale to put themselves or the studies in a better light; this is very common on self-administered questionnaires.
- The size of the population is not representative for a larger group.

Results

5.1 Interviews

Below are the results and information obtained during the interviews with the following experts: Dede Frederick, Marcel Harfouche, Jean-Louis Carmagnole and Kunal Dua. The full interviews can be found in the appendix on page 25 of the appendix.

5.1.1 Type of companies using parallax

Just like any other website, parallax can be used by any type of company. It all depends on the problem of the company and what they want to accomplish with the website. Harfouche says that it should be considered on a case-by-case basis if parallax is the right solution. Carmagnole and Harfouche both think that parallax would work best for a niche product. Carmagnole recommends using a micro page for the best effect. All companies can benefit from parallax, as long as it is used in the right way.

5.1.2 Positive effects

Frederick's research shows that parallax scrolling has a positive effect when used in a fun hedonic context. According to Carmagnole, parallax is more engaging, more exciting and more interesting rather than being just a scrolling page. The use of different backgrounds looks good when it used in the right way. The design of parallax gives you a different feeling, as confirmed by Harfouche. He says that parallax scrolling allows for a much more interactive and highly engaging user experience and is easy to use.

5.1.3 Negative effects

The general opinion of the experts, on parallax scrolling, is not very positive. Harfouche states that there is more focus on the design and therefore less time can be spent on other important factors. Parallax takes a lot of time to design and program. The design has an effect on the adaptability to other devices, says Carmagnole. Parallax is limited in the ability to adapt to other devices like a smartphone or tablet. "I think content is the most important thing on a website. And a content heavy website doesn't work on a parallax site. Parallax will distract the visitor. And it is easy for them to get lost in the text or scrolling effect. There will be too much going on, it will be overwhelming". This is the biggest minus point according to Dua. Scrolling is not the first intention that people have. It will be more difficult for them to find the right information. All the photos and 3D effect will take away the focus on what is important.

5.1.4 Recommending parallax

"I don't like to just use the scrolling technique and I think the 3D technique is just another way to impress me. I don't fall for it", says Dua. There is too much going on. I look with professional eyes. I can understand that people, who are not trained to look at certain aspects of a site, will love it. But I prefer not to use it. Harfouche would only recommend parallax if it will solve the problem that the company has. This is what Carmagnole would do as well, but he wants companies to really think about it. If they want to use parallax for all different browser and devices, they have two options. Make it fit for all browsers and devices or adapt to a couple of them. Both are expensive and difficult in their own way. Overall they would recommend parallax if it will benefit the client.

5.2 Website analyses

Here are the results from the website analysis. The full analysis can be found in the appendix on page 25. The 20 websites belong to 20 different companies.

5.2.1 Type of companies

The website analysis shows that all types of companies use parallax. Clothing brands, Electronic Company, a company that sell calendars or watches, sportswear, phone protector, conference organizer and a site to apply for a job. There were two charity sites and two sites for clothing brands. What is interesting is that 8 out of 20 websites (40%), that were chosen by the researcher, were websites for companies specialized in web design.

5.2.2 Type of parallax

As mentioned before, there are five different types of parallax: scrolling horizontal or vertical, animation, 3D room and worlds. Vertical scrolling is the most popular technique. 19 out of the 20 websites analyzed, used this type of parallax. Two of the sites mixed it with another type (horizontal scrolling and 3D room). There was one site that was a 3D room.

5.2.3 Website goal

Companies have different goals for their website. More than three quarters of the companies were selling or promoting their product or service; others were informing people, raising money or requite new employees. Just 6 out of 20 websites were micro pages. The other 14 companies were promoting or selling one product or service.

5.2.4 Number of URL's

Most of the websites have several URLs, but have multiple pages as well. There are two websites who use multiple URLs and have just one page. 7 out of 20 of the websites use one URL.

5.2.5 Design

The website with limited text that did not use a lot of colour was easier to look at. There were several sites with a background that moved without scrolling, which was distracting. There was one website that gave a feeling of 'walking' through the website. The website used natural colours and looked good. The downside was that thanks to the interesting background, all the information on the website where missed.

Too much text with 3D can be overwhelming. The websites with limited text and effects where easier and better to look at. Some websites had big amounts of text or a big text font; this made the website look messy and made reading difficult.

5.2.6 Location of information

This analysis is focusing on social media and contact details. Half of the websites have this information above the fold. Seven of them have the information on the bottom as well. Sometimes not all the information is mentioned. Just social media links or a phone number. There is one website that has no contact details on the website at all. 9 of the 20 websites placed their contact detail on the bottom and not on the top.

5.2.7 Menu

5 of the websites had no navigation. Some were smaller websites with minimum information, but there was one website that does need a menu. It is difficult to find the information on multiple pages without navigation. Most of the websites (12) had the menu just above the fold. There were three website that had the menu on top and as footer. Three other websites used the 'hamburger' menu.

5.3 Results from observation study

Below are the observation study results. Full results can be found in the appendix on page 4.

The Likert scale that was used: Strongly disagree is 1, strongly agree is 6.

Strongly disagree   Strongly Agree

0   0   0   0   0   0
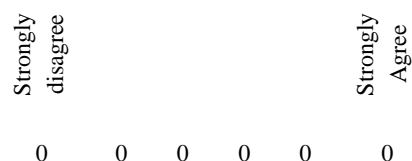
5.3.1 The participants

The ages of the 32 participants varies between 20 and 31. They are from the following countries: German, India, Australia, New Zealand, Russia, France, Spain, The Netherlands, America, Colombia, England and Brazil.

The participant from Russia does not use his phone to login on the internet. The other 31 participants do use their mobile phone for internet.

Graphic 4 | Average age participants
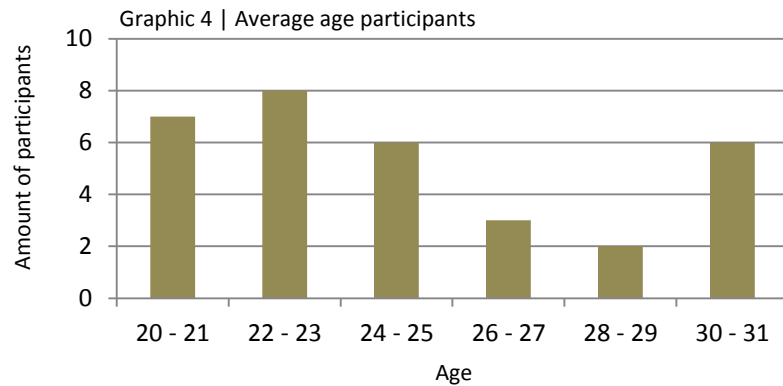
5.3.2 Appealing website

14 out of 16 participants strongly agreed that the parallax site looks appealing. Half of the participants, looking at the non-parallax website, thought that the website looked appealing. The non-parallax website was graded a 3.8 by the women where the parallax website got a 5.2. The men gave the non-parallax site an average score of 4.2 and a 5 for the parallax website.

Conclusion is that the parallax website was found appealing by the participants. In table 2 you will find the Linkers scores given by the participants.

Table 2 | Likert scale result | Appealing website

Non parallax female	4	3	5	4	5	4	1	5
Non parallax men	2	3	5	5	5	5	4	5
Parallax female	5	6	6	4	5	5	5	6
Parallax men	5	6	5	5	3	6	6	5
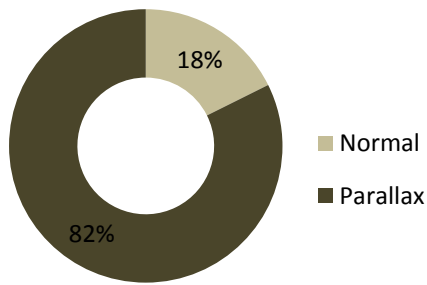
Graphic 5 | Fun to use | Overall

Graphic 6 | Overwhelming website | Women

5.3.3 Fun

13 of the 16 participants thought that the parallax website was fun to use. According to six participants that looked at the non-parallax website, the website is 'okay' to use, but not that much fun.

There is no major different between the men and women. The male participants were slightly more enthusiastic about the parallax website than the women. There was one men that did not agree with the statement that the parallax website was fun to use. Two women did not like the parallax website at all. Conclusion is that for this group of participants, parallax websites are more fun to use than a non-parallax website.

5.3.4 Overwhelming

Overall the parallax website was thought to be more overwhelming. 11 participants agreed on this. Some stated that they were not able to focus on the text.

Three out of eight women, who looked at the non-parallax website, thought that the website was overwhelming. They got confused by the different menus. "There are three or four menus, how do I know where to look" is one of the comments that was made while looking at the non-parallax website.

Overall, the parallax website is considered to be more overwhelming, by men and women, than the non-parallax website.

36%

64%

Normal

Parallax

Graphic 7 | Interesting website | Man

	Total	Man	Vrouw
Parallax	1:49	1:49	1:50
Normal	1:35	1:38	1:32

Table 3 | Finding information | Overall Time

5.3.5 Interesting website

12 out of 16 people agree that the parallax website looks interesting. Nine out of 16 participants thought that the non-parallax website looks interesting.

The non-parallax website got an average score of 3.6 and the parallax website got a score of 4.6. There are more men who think that the non-parallax website looks interesting. Women prefer the parallax website.

There were some participants who said that the parallax website looks interesting at first, but once you start using it, it become less interesting and starts to be overwhelming. The non-parallax website was considered to be 'boring'.

Overall conclusion is that the parallax website is more interesting than the non-parallax website.

5.3.6 Loading time

Almost all participants gave a neutral answer. The reason for this is that the internet connection at GVA is very slow and they are used to waiting for a page to load. The participants thought that it was not fair to judge the website on this, because the result would be different at a different location. Therefore there will be no conclusion drawn on this variable.

5.3.7 Finding information

Overall, there is no significant differencing on how easy the participants thought it was to find the information. There is a big difference in the result between men and women.

The men preferred to look for information on the parallax website. Even though, it took them longer to find the information. The women preferred the non-parallax website over the parallax one. Looking at the times, the information was found quickly on the normal website.

Surprisingly, almost half of the participants, using the parallax website, did not look at the top menu on the website, but scrolled straight to the bottom. With the non-parallax website the Facebook link was below the fold. There was one person who scrolled down and was able to find the link.

Looking at the body language, it was clear that it frustrated people that they were not able to find the Facebook link within seconds. They moved closer to the screen and started to sigh. While doing this, some participants made comments like "Why is it (Facebook) not on top?" and "Do they have a Facebook page?". These comments were made for both pages. Participants were expecting the link on the top.

Overall there was no significant difference in the time it took to find the information.

5.3.8 Website structure
Even though the non-parallax website had several menus to choose from, it was considered easy to use. The participants understood the structure of the website.

The men had more problems understanding the structure of the parallax website. They did not take the time to look and check out the website before trying to find the information. This is something that most women did do. It took two women some time to figure out that they had to scroll; "oow, we need to scroll, that's weird" was a comment that was made by one of the women.

Looking at the Likert scale, the men were okay with the parallax structure with an average score of 3.4. A score of 4.2, shows that the structure of the non-parallax website was preferred by the men.

5.3.9 Simple in use
Overall, there is no difference in the use of the website. The only difference is the preference of the men and women. Men say that the non-parallax website is easier to use with an average score of 3.7 and women think scrolling on the parallax website is easier with a score of 3.8. The main reason for the women to prefer the parallax website, was that they got distracted by the several menus on the non-parallax website.

Table 4 | Likert scale result | Website structure

Non parallax female	4	1	4	3	5	4	2	5
Non parallax men	3	5	4	5	5	4	4	4
Parallax female	3	2	4	3	5	3	5	4
Parallax men	4	2	4	4	3	3	5	2

50% | 50% | ■ Normal ■ Parallax
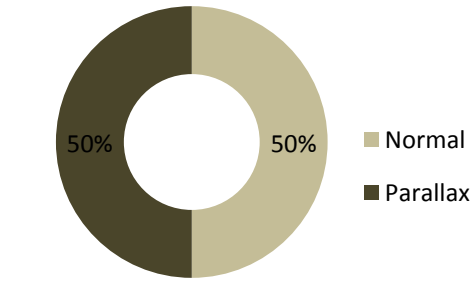
Graphic 8 | Use of the website | Overall

There is a connection between the structure and the use of the website. If the participants thought the structure of the website was simple and easy to understand, they would give a higher number on the Likert scale, agreeing with the simple use of the website.

5.3.10 Coming back

The male and female participants gave similar answers. Two thirds of the participants would return to the website. It did not matter if this was the normal or parallax website. When they were asked why they would return they could not give a good reason why. Some comments that were made where: 'Why not' and 'I got all the information, that's the main point, right'. Reasons for not coming back where: "I find the website ugly" and "I don't like the product". There is no conclusion to be drawn. If different websites were used, the results for this question might be different.

5.3.11 Results by observing

This paragraph will describe some of the observations that were made during the study. Full description of the observation can be found in the appendix on page 16

Parallax website

Two women said that the website looks nice but was difficult to use. "Contact details need to be on top" and "Scrolling takes too long and is not easy to use" were the comments that they made. There were three women who started sighing. They got annoyed by the fact that they had to scroll up and down to find the information. One participant said that she would have left the page in seconds if it was not for the research.

The reaction given by the men was different. "Looks nice" and "Interesting" were some of the comments that were made by the men. They said that the website looks good and interesting. One participant scrolled down slowly to see everything. He said that the effect looked amazing but he was not focused on the text. It took him longer than the other men to find all the information.

Most information was found by chance. This showed in their response. One moment they were focused on the screen and then they made a little jump saying: "ow, found it!". They were not expecting to find the information.

Men had more trouble finding the information. Five did not like the scrolling. "It takes too long to scroll". Clicking was found easier. Two mentioned that the website looked too busy.

Overall conclusion: website looks nice but the participants did not find it easy to work with. There is too much going on.

Non-parallax
Six out of eight women were confused by the different menus. It was not clear where they needed to look. Interestingly, most women did not start clicking or scrolling, but started reading the text. This helped them find the information quite quickly.

The main complaint by the participants was the amount of pages. After clicking through some of them, the men started to sigh and curse. The men thought that the menus were clear and helpful. It was easy to navigate. Surprisingly, five women shared this thought.

"The text is very clear, but you need to click a lot to find the information" was one of the comments that was made. The website had various pages. two women were annoyed by the amount of clicking that they needed to do. One person said that she appreciated that she did not have to scroll down to see all the information. She did not realise that important information was just below the fold. One participant expected to find the Facebook link and contact details on the main page without clicking. This was not the case. He got irritated when he needed to start clicking to find the information. "Is it not normal to have this on the main page, every website has that. Why do they need to be different".

The main conclusion, a non-parallax website is easy to use, if there were fewer pages.

Main conclusion
The main conclusion of this observation study is that the website needs to be easy. The participants appreciated it when the structure and design of the website was simple. This made it easy to work with. Various menus, multiple pages and moving elements were seen as overwhelming.

Conclusion

Parallax scrolling is a technique where background images move at different speeds to create an illusion of depth and immersion. Parallax is used to make a page come alive, put some fun and personality into a website and create interaction with the visitor.

Benefits of parallax scrolling:
- Parallax design is able to bring the user experience to a new interactive level of online viewing and creates a wow-effect with the visitors by using depth and animation on the website.
- A parallax website will trigger the curiosity with its visitors, and if they have a positive experience they are more likely to stay on the page longer to play around. This will lead to a CTA.
- It is an opportunity to promote a product in a 3D or interactive way. Visitors will be able to explore the product in a unique way.
- Because of the one design, visitors will not be able to go to another page. This reduces the bounce rate. Having a low bounce rate will have a positive effect on the websites ranking.

Disadvantages of parallax scrolling
- It takes time to design and make a parallax website, and time is money. Having a parallax website is expensive. Not everyone is trained to build that type of website, which forces companies to work with specialists.
- Most parallax websites exist of just one long page. This can be detrimental to the website. Working with SEO is nearly impossible due to the lack of webpages and web titles.
- Parallax websites tend to have a lot of images, data and other information. This has a negative effect on the loading time of the website which can cause frustration with the visitor.
- Parallax websites can be impressive and technical. The downside is that it can be difficult to find specific information. When the usability of a website is low, visitors will leave the page and are likely to not return.
- Parallax websites work well on computers, but they are not so easily transformed for the use on other devices like a smartphone or tablet. It is possible to make an independent version for the other devices, but this will resolve in higher costs.

Sub question 2: What types of companies currently use parallax design?

All types of companies can use parallax scrolling as long it is used in the right way. It is important to make sure that parallax scrolling will solve the company's problem and reaches its goals.

The experts say that parallax scrolling can best be used as a micro-page to promote a niche product. Having too many products will only confuse the visitor. A micro-page can link to the main page for extra information.

Web designers are more likely to use this type of website to promote their service. It is a way to show their creativity. Promoting a product or service is the most common reason to use parallax. Other reasons can be to raise money for charity or inform people about a certain topic. The most used type of parallax is scrolling. People are used to this technique because it is used on mobile devices.

Sub question 3: What elements have an influence on the user experience?

There are many different elements that have an influence on the user experience. This study has focused on the elements from the VADU model. All the elements can have a positive or negative effect on the user experience. It depends on how the elements are used on the website. The main elements of the VADU model are: value, usability, adaptability and desirability. They have different sub elements.

The sub elements with the most effect on the user experience are:

Text   Too much text can be distracting and demotivating. This is a reason for visitors to leave the webpage. It is important that the text is useful, clear and easy to understand.

Mobile friendly More people use their mobile phone to go online. Parallax websites do not work on mobile phones or tablets yet. This is something that is likely to change in the near future.

Location of items 80% of the visitor's time is spent above the fold. It is important to have all the important information located there.

Visual design   Simple designs are rated more beautiful and easy in use. Having an impressive looking website with various elements can be overwhelming.

Loading time   The ideal loading time of a website is 250 milliseconds. An average page takes three seconds to load. Parallax website can take up to 6 seconds, due to the heavy content.

Sub question 4: How do these elements work on a normal or parallax site?

Text: People tend to scan the text on a website. It is important to have the important information on the main page and have clear menu titles for guidance. A non-parallax website is able to handle more text. Too much text on a parallax site in combination with the 3D effects can be overwhelming. Making sure that the text is readable is a must.

Location of items: 80% of the people look for information above the fold. This is why it is important to have the main information, like contact details and social media links, located above the fold. Besides having this information on the top, most websites show the information on the bottom as well. Visitors often scroll down to the bottom because they know, through experience, that the main information can be located there. This works for both a normal and parallax site. Another way to help the visitors find content is the use of a menu. People get annoyed when they cannot find the information quickly and are more likely to leave the page.

Loading time: People do not have a lot of time and need a website to load quickly. Visitors will leave the page if the loading time is too long. The ideal loading time is 250 milliseconds. Most non parallax websites have an average loading time of three second. Parallax takes longer to load do to the heavy content. Parallax sites can exceed a size up to 2300kb. It takes 5 second to load 2-3 Mb. This means that a parallax site needs 5 to 6 seconds to load. This is an average and does not apply for all parallax sites.

Mobile friendly: Mobile phones are getting more popular. It is important that a website is able to adapt to that size. A non-parallax website is able to do this. The technique that is being used does not work for parallax yet due to the heavy content. Technique is changing quickly. It is possible that parallax will be able to adapt in a couple of months.

Visual design: Focus and simplicity will work for both types if websites. For parallax it is more important. The 3D effects alone can be overwhelming. Combining this with colours and text can be too much and have a negative effect. The websites that have a simple design are rated more beautiful and people are more likely to come back.

Sub question 5: How do users experience the usability of a parallax website?

Parallax websites look more appealing than a non-parallax website. The 3D effect and use of different effects create a wow-effect with the user. The website is interesting to look at and to play with. Men are more influenced by this then woman. Having an interesting website will keep the visitor on the website.

The downside is that the visitor can be distracted by the effects and will not look for information or read the text of the website. When they do start reading the text, or search for information, the website can be overwhelming. The text can be unclear and the effect will be too much for the brain to focus on. This will have a negative effect on the user experience.

Keeping the website simple and having an easy structure will prevent people from feeling overwhelmed. It will have a positive effect on the user experience. People prefer a website that is easy to use. Not everyone finds scrolling easy. They prefer clicking because this is something they are familiar with. Men prefer the structure of a non-parallax website; women prefer using a parallax website as long as there is a menu to navigate.

In this study the participants used the main menu a lot to find information. Important information, like contact details and social media links need to be visible on top of the website. People became frustrated when they were expecting something to be on a certain location, but were not able to find it there.

Main limitation of a parallax website is the loading time. If the loading time takes too long, people will leave the website. Another reason for leaving a parallax website is when it is overwhelming. With all the different moving elements and scrolling effect, a parallax website can easily be overwhelming. A different limitation is the fact that parallax website do not work on mobile devices yet. This might change in the future.

Recommendations

Please note: This study is focused on parallax scrolling. There are other forms of parallax. Their influences on the user experience can be different.

This study shows that not everyone is enthusiastic about parallax scrolling. The experts that were interviewed would not like to recommend using a parallax website, unless it would be the perfect solution for a company. Does this mean parallax does not have a future? Parallax scrolling will work if it is used in the right way.

- Make sure that parallax is able to solve the 'problem' and that you have the right budget. Parallax is more expensive and you need to be willing to pay the price for the full effect.
- Parallax can be used for different companies, but in different ways.
  If you are selling or promoting a service, like web design or raising money for a charity, it is possible to use parallax for the entire website. If you are selling multiple products, like Nike or Honda, you should use parallax as a micro page to promote one product.
- Use a menu to navigate your visitors. The best way to use a menu is to place one on the top and one on the bottom. The one on the top should always be visible, no matter where people are on the page.
- Important information, like contact details and social media links, needs to be located above the fold. For full advantage, it is advised to place them on the bottom as well.
- Use a different URL for different sections of the page. This will have a positive effect for SEO.
- Make sure that the background is not too busy. Do not use too many moving features or colours. Use the same tone of colours and one different colour, which stands out, to highlight the important information. Use a couple of bigger photos instead of multiple small ones. Do not let the background move too quickly.
- Do not use too much text. It is important that the text hold the key information and is easy to read. If you want to place a text on a photo background, use a box with a solid colour background. This makes sure that the text can be read.
- Ask your designer to build a website without making it too 'heavy'. Heavy content, like photos and multimedia, can have a negative influence on the loading time.

- Test the page before it goes online. Make sure it lives up to your expectation and that is has a positive effect on the user experience. If not, make some changes.
- Do not spend money for a mobile version. The technique is not there yet, but keep an eye on the development. Technique is changing fast and maybe it is possible in a few months.
- Pre-test the website through an observation study. Make sure the website works for your target group

Recommendations for future research

Research to other parallax types
This report has focused on what effects parallax scrolling has on user experience. It is not yet clear what effects the other parallax types will have on user experience.

Companies that use parallax
There needs to be more research on the type of companies that use parallax websites and why. How do they use parallax? Is it solving their problem?

Parallax results
There was no information available on the results of parallax websites versus a non-parallax website. Did sales go up? Do visitors stay on the website longer? These are just some questions that need to be answered.

Parallax scrolling
This report has similar results as Frederick's report. Yet, yet there needs to be more research done. As people start using parallax more often, the effect of parallax scrolling may change.

Mobile use
Parallax websites do not work on mobile devices yet. This will be possible in the future. What effect will parallax scrolling have when it is used on a mobile device? Will it be different than on a normal size website?

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