

Digital Masterpieces:

A User Evaluation of MNHA's website and virtual tour

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PURPOSE AND GOALS

The MNHA Museum in Luxembourg has recently updated its online collection to create a better online experience, especially during the current Covid-19 time.



(Vialard, n.d.)

The goal is to further improve the emotional and informational experience of the MNHA website.



Through a comparative user test, the user experience and usability will be evaluated.



The museum will be compared to the National Gallery of Art in Washington, which uses the same engine for the virtual tour: 'Matterport'.



From the results, a set of recommendations will be gathered for the MNHA and communicated through this report.

TARGET POPULATION AND STRATEGY



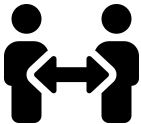
The participants are regular museum visitors. They visit a museum at least once a year



The age of the participant will lie between 18 and 65 years old. The upper age limit of 65 years is chosen to refrain from possible issues in understanding the website and tour on base lack of technological skills.



The education level lies preferably between Secondary Vocational Education (MBO) and University graduates.



Participants will be approached through our personal circles, but will not be interviewed by the acquaintance that approached them.

RESEARCH QUESTIONS

For this research the focus lies on the informational and emotional experience. Therefore the following research questions were proposed to investigate both and the relation between them:

Which available methods of information-gathering in the online gallery and virtual tour have a positive effect on participants' informative experience?

Which interface elements of the museum website can be identified that hinder or improve the navigation, efficiency and accessibility of the website and virtual tour?

What are identifiable effects of the above aspects on a strong negative or positive emotional experience of the website, gallery and virtual tour?

INTRODUCTION TO STUDY (as read to participant)

During this test, which may take up to 60 minutes, you will be asked to perform a set of tasks on two different 'virtual tour' museum websites, which will be followed up by an interview about your experiences. The tasks are created to measure the experience of using the website and how easy it is to navigate. The intent of the study is not to test you as a participant, but for you to test the website.

We ask that you use a desktop or laptop to navigate the website (not a tablet or phone) and also request that you use a computer mouse over a trackpad or touch screen. Make sure that you can easily read your screen, and minimize the distractions surrounding you by turning off notifications on your devices and closing tabs and applications that are not necessary for the test.

The study will be performed online due to the Covid-19 quarantine, so we ask that you share your screen (or at least the relevant tab) during the study. We also ask that we are able to hear you at any time during the test and your microphone is never muted, and that you vocalize your thoughts as much as possible while using the websites.

Throughout the test you may use any part of the museum website for any task. Use the website as you deem appropriate/useful for executing the task, but don't use external sources (like search engines or other websites)



USER TESTING TASKS

The purpose of the user testing tasks is to make it easy to compare the user actions of both museum websites. To ensure that the experience of both websites is not influenced by personal taste in art, similar collection and exhibitions are chosen and are therefore specifically asked in these tasks. The sequence of both museum websites will be alternated to avoid biases in the results due to pre-knowledge of the participants.

Musée National d'Histoire Naturelle

Imagine yourself wanting to go to a museum, but not being able to do so because the museum is closed. You still want to have a museum 'experience' and want to look through artwork and learn more about it. Therefore you go to **Musée National d'Histoire Naturelle** and go through the collection and virtual exhibitions. Go to www.mnha.lu/en

Starting on the home page, find the "Art in Luxembourg" virtual tour and walk around the virtual tour for about 5-10 minutes informing yourself as much as you want on at least one painting of your choice.

Go back to the MNHA page and find the "highlights" of the MNHA collection and inform yourself as much as you want on at least one artwork that you find interesting.

USER TESTING TASKS

National Gallery of Art USA

Imagine yourself wanting to go to a museum, but not being able to do so because the museum is closed. You still want to have a museum 'experience' and want to look through artwork and learn more about it. Therefore you go to the **National Gallery of Art USA** and go through the virtual exhibitions. Go to <https://www.nga.gov/>

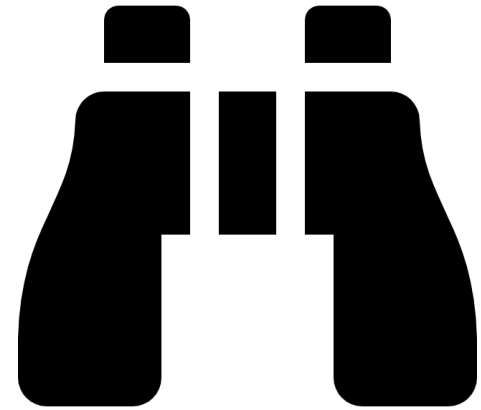
Starting on the home page, find the "True to Nature" virtual tour and walk around the virtual tour for about 5-10 minutes informing yourself as much as you want on at least one painting of your choice.

Find the "highlights" of the NGA collection and inform yourself as much as you want on at least one artwork that you find interesting.

OBSERVATION GUIDE AND PROTOCOL

Participants are asked to think out loud while completing the tasks. The observer may ask questions to clarify the choices made by the participant. Unless the participant is unable to complete the task, the observer will not help them or give them information on how to navigate the website or virtual tour.

The observation guide can be found in the additional file: Observation guide. The time it takes participants to find the virtual tour or highlights can be noted in the observation guide. Additionally, the observer can indicate which methods of acquiring information the participants used by ticking boxes. There is also a section for other comments or notes, here the observation can write down what navigation paths the participant tried.



SEMI STRUCTURED INTERVIEW GUIDE

The following set of questions was used as guidelines for the post-test interview

1. Are you satisfied with the amount of information on various art pieces and the curation of the rooms?
 - a. Was there information missing (or that you didn't find) that you would like to have available?
 - b. Was there a place where you feel there should have been information that wasn't there (but maybe you found it somewhere else)?
2. Was it easy to find the virtual tours on the websites?
3. Was it easy to navigate the virtual exhibition tours? Was it easier on one of the websites than the other?
4. Would you use the virtual museum for exploring museum collections in the future?
 - a. In which situations would you use it specifically?
 - b. In which situations would you prefer to use something else?
5. How does the emotional experience of the virtual tour compare to a real museum visit?
6. When comparing the two websites, can you describe some similarities? (Which did you prefer in that aspect?)
7. And some differences? (Which did you prefer in that aspect?)
8. Are there aspects of the experience you found especially frustrating or that got in the way of your enjoyment?
9. Are there aspects of the experience you found especially exciting or that improved your experience greatly?

POST TEST MEASURES

The questionnaire opens with questions relating to participant information (age, education) as well as what type of museum visitor they consider themselves to be, selecting from the five options proposed by John Falk (2016).

After this, a **User Experience Questionnaire** is used at the end of each test in relation to the overall experience of that website. An official reduced list of 8 items is used for each website because it covers the main aspects we want to observe (comparing and identifying Hedonic and Pragmatic qualities).

We also ask users which of Christopher Morse's '20 focused triggers of museum visits' (Additional Files) are experienced during the use of the virtual tour and use these to understand which experience triggers are present in the virtual tour and which are absent.

Finally, results from an external MNHA evaluation using a longer UEQ are also used.

EQUIPMENT & LOGISTICS



During the user evaluation, Microsoft Teams will be used to call and record the meeting. A phone recording is made in case of malfunctions with Teams.



All the recordings will be stored and shared amongst the researchers through SURFdrive.

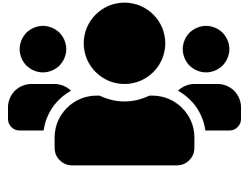


During the user evaluation, the user will be guided to <https://www.mnha.lu/en> and <https://www.nga.gov/> on Google Chrome.

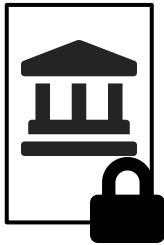


As a post-test measure, the User Experience Questionnaire will be used through Google Forms

ETHICAL CONSIDERATIONS

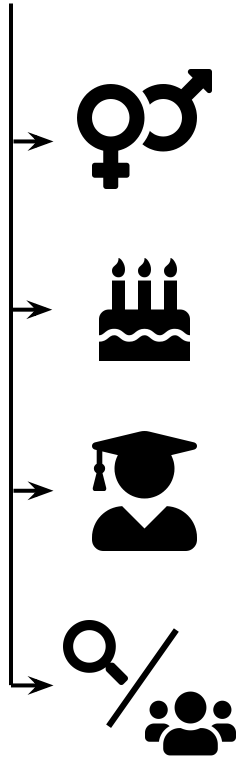


During this study, participation is voluntary. Participants have the right to withdraw at any stage and will be fully informed and asked for consent prior to the study (see Consent form in Additional Files). The privacy of the participants will be secured by giving them identifiers instead of their names.



Data will be stored in the secure database 'SURFdrive' and will be deleted two months after the user test has been completed. Persons who have access to the data for review are: the researchers, the educators of the course "DDB140 User Evaluation Methods" and the client "MNHA".

PARTICIPANTS



5 of the participants were female, 3 male.

The age varied between 22 and 60. three were in their 20s, five in their 50/60s

Their education level was either HBO (applied sciences) or WO (university)

All claimed to be an explorer however the interview revealed that some are more inclined towards facilitator (see post test measures)

DATA ANALYSIS METHODS



MoteOo (n.d.-c)

The observation guide is analyzed by illustrating how participants navigated the websites, what successful and unsuccessful attempts they made and an overview is made of how participants acquire information.



MoteOo (n.d.-a)

The questionnaire and external survey are analyzed by plotting individual and comparative graphs through Excel. Moreover, the data analysis tools of UEQ were used (Schrepp, 2018).



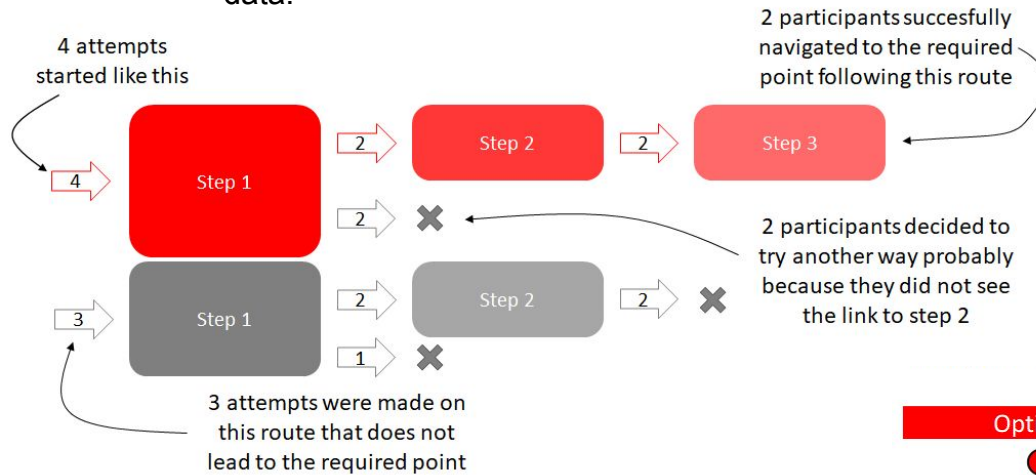
MoteOo (n.d.-b)

The post-test interview is analyzed using a code tree. Each comment related to an aspect is labeled as either positive (+) or negative (-) feedback. We tally comment amount and calculate an overall 'score' representing the specific aspect's reception



OBSERVATION EXPLANATION NAVIGATION DATA

The following slides show how the participants navigated the websites when asked to find the virtual tours or highlights. The possible routes that lead to the required points can be found in the Additional Files: Navigation paths. This slides explains how to interpret the data.

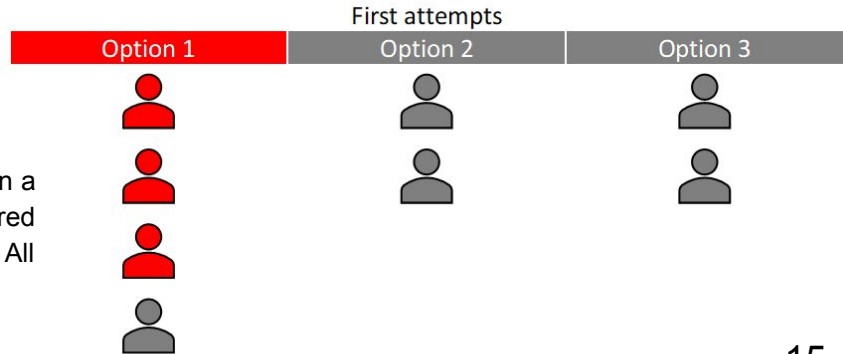


← Navigation paths

The coloured blocks show the successful attempted routes, all grey blocks show unsuccessful attempts. All grey blocks are eventually followed by an X, this is when the participants decided to try another way. The number in the arrows show the amount of attempts, for example if an arrow has a 6, this means that this specific route was tried 6 times by the participants combined.

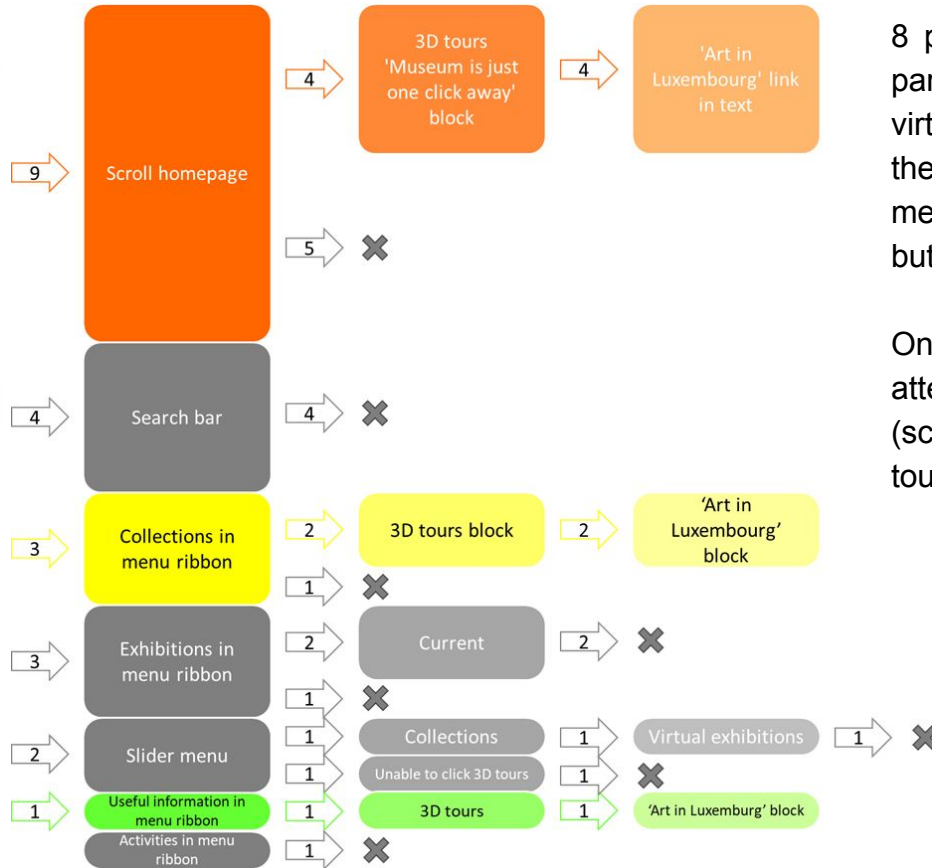
First attempts →

The coloured blocks indicate whether the first attempt was on a route that could have led to the required point. The coloured person icons indicate if a the first attempt was successful. All grey icons represent unsuccessful attempts.



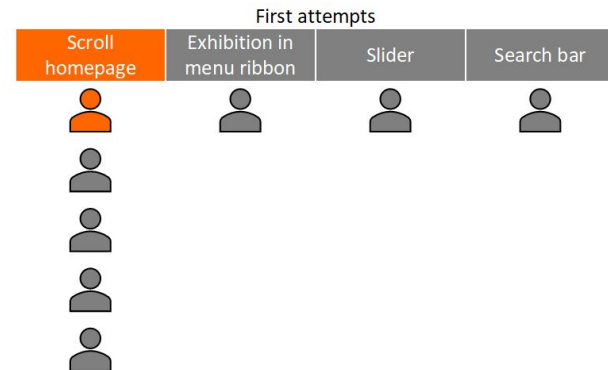


OBSERVATION MNHA VIRTUAL TOUR



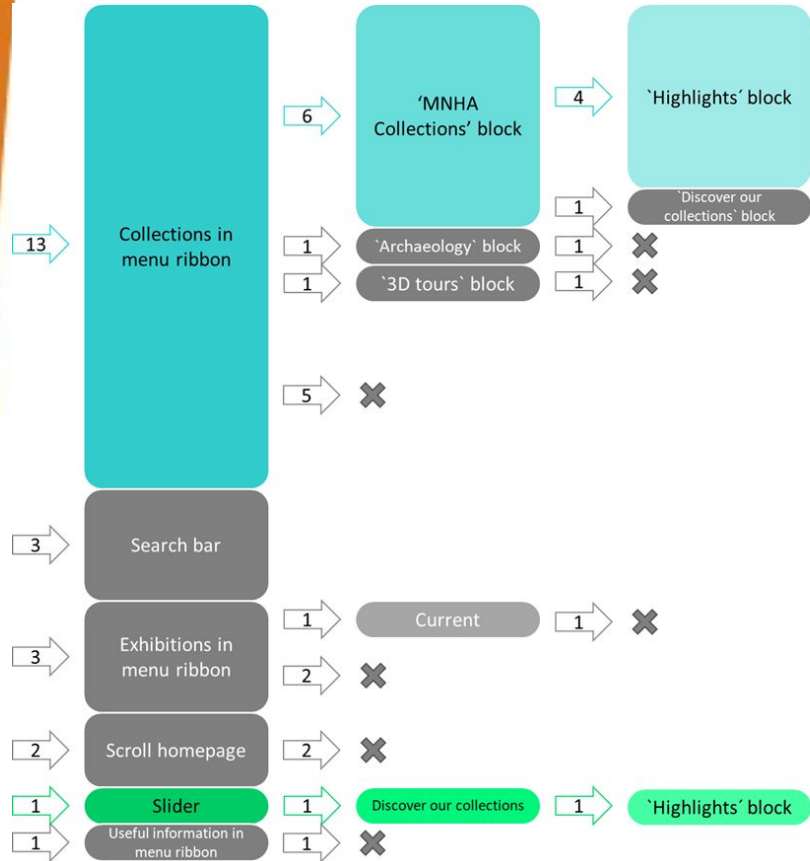
8 participants needed a total of 23 attempts, 7 out of 8 participants eventually found the 'Art in Luxembourg' virtual tour; 4 participants did so via the 3D tours block on the home page, 2 participants via 'Collections' button in the menu ribbon and 1 participant via the 'Useful information' button in the menu ribbon.

Only one participant found the Virtual tour on the first attempt. Four other participants tried the same method (scrolling through the homepage) but did not see the '3D tours' block.





OBSERVATION MNHA HIGHLIGHTS



8 participants needed a total of 23 attempts, 6 out of 8 participants eventually found the 'Highlights'; 5 participants did so via 'Collections' button in the menu ribbon and 1 participant via 'Discover our collections' in the slider on the homepage.

Only one participant found the highlights on the first attempt. Most of the participants first went to 'Collection' in the menu ribbon first.

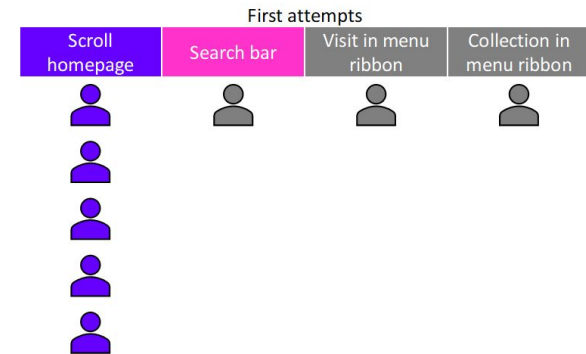
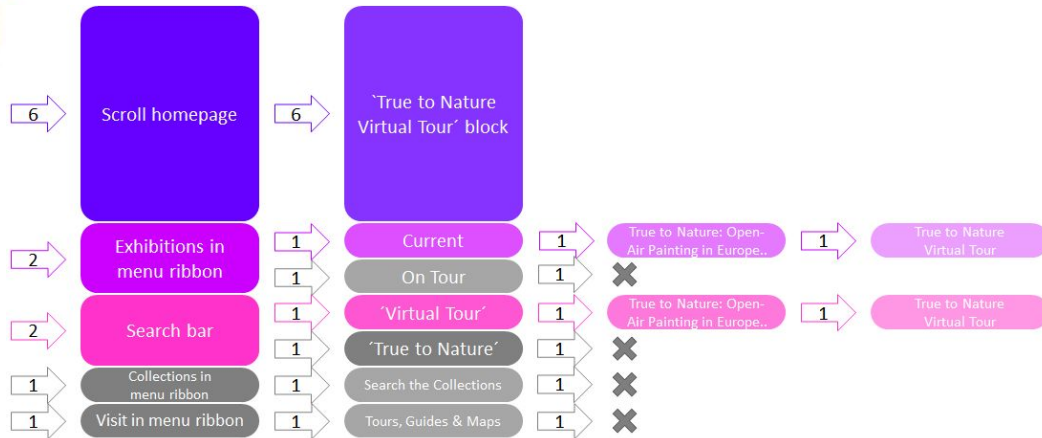
First attempts			
Collection in menu ribbon	Scroll homepage	Slider	Exhibition in menu ribbon
1 person icon	1 person icon	1 person icon (green)	1 person icon
1 person icon	1 person icon		
1 person icon			
1 person icon			



OBSERVATION NGA VIRTUAL TOUR

8 participants needed a total of 12 attempts, 8 out of 8 participants eventually found the 'True to Nature' virtual tour; 6 participants did so via the 'True to Nature Virtual Tour' block on the homepage, 1 participant via the 'Exhibitions' button in the menu ribbon and 1 participant by typing in 'Virtual Tour' in the search bar.

5 out of 8 participants found the True to Nature Virtual Tour in their first attempt. The other participants first tried using the search bar or looked at 'Visit' or 'Collection' in the menu ribbon.

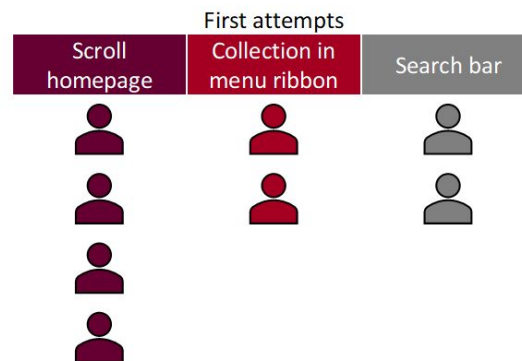
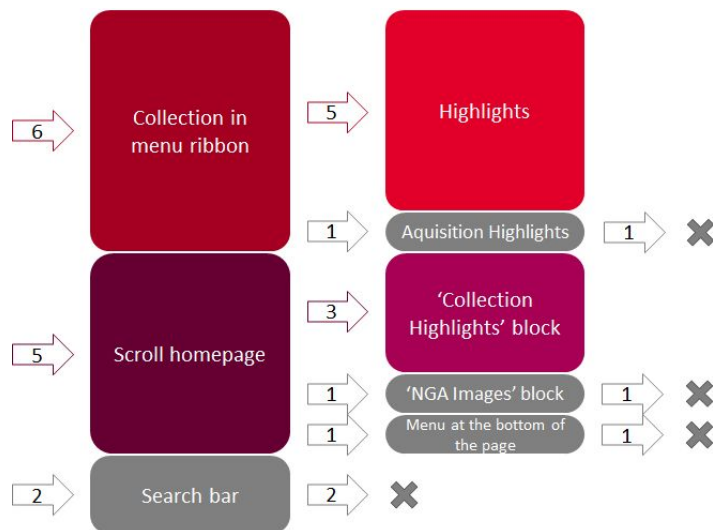




OBSERVATION NGA HIGHLIGHTS

8 participants needed a total of 13 attempts, 8 out of 8 participants eventually found the 'Highlights'; 5 participants did so via the 'Collection' button in the menu ribbon and 3 participants via the 'Collection Highlights' block on the homepage.

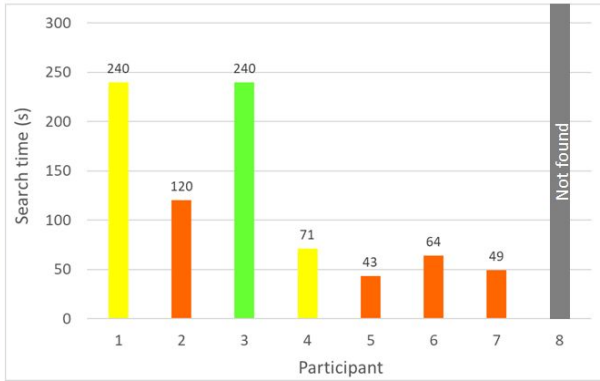
6 out of 8 participants found the highlights in their first attempt, the other two participants first tried finding the highlights with the search bar.



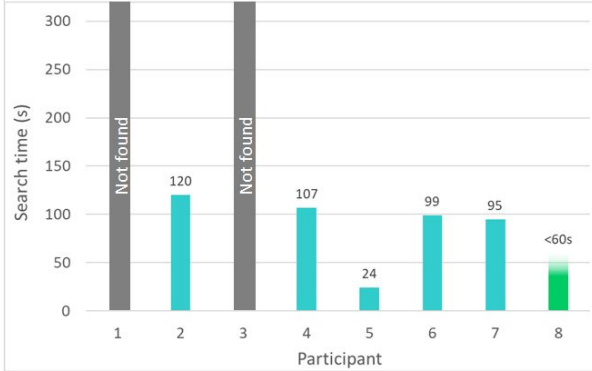


OBSERVATION SEARCH TIMES

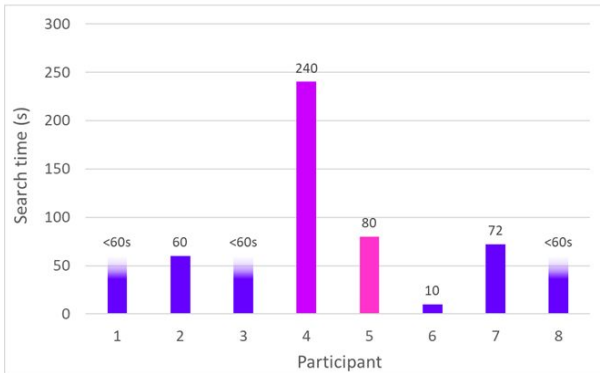
MNHA Virtual Tour



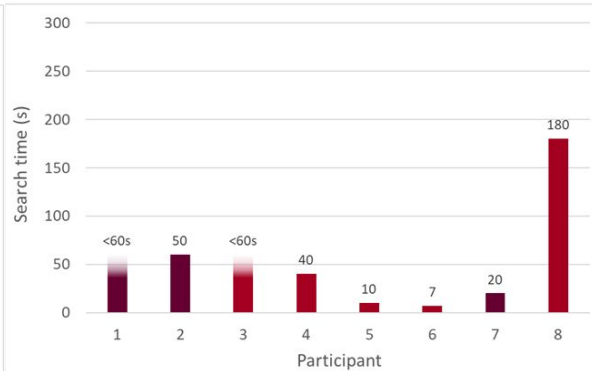
MNHA Highlights



NGA Virtual Tour



NGA Highlights



The bar graph shows how much time each participant needed to navigate to the required point. The colours of the bars match the routes they took.

A grey bar means the participant was not able to navigate to the required point.

A fading bar means the observer was not able to precisely measure the search time and wrote down an estimation (less than a minute).

These graphs show that on average, participants spend more time searching on the MNHA website than on the NGA website.









OBSERVATION OVERVIEW NAVIGATION RESULTS

		Number of participants that successfully navigated	Number of participants that succeeded on their first search attempt	#total amount of attempts	Average search time (s)
MNHA	Virtual Tour	7	1	23	118
	Highlights	6	1	23	84
NGA	Virtual Tour	8	5	12	80
	Highlights	8	6	13	54

The table above gives an overview of the navigation data gathered during the observation. It shows a clear difference between the two websites. On the NGA websites all participants were able to find both the Virtual Tour and the Highlights, and 5 and 6 participants respectively, did so on their first search attempt. For both the Virtual Tour and the Highlights of the MNHA only one participant was able to navigate successfully on their first attempt, 1 and 2 participants respectively, were not able to navigate successfully at all. Participants roughly needed double the amount of attempts to navigate to the requested point on the MNHA website as they did on the NGA site. Additionally, the average search time was higher on the MNHA website.



OBSERVATION ACQUIRING INFORMATION

MNHA		
Methods	successful	Unsuccessful
Pop-up window		
Physical signs and text		
Clicking on painting		
"Learn more"		

NGA		
Methods	successful	Unsuccessful
Pop-up window		
Physical signs and text		
Link to museum guide		
"Learn more"		
Zooming in		
Museum map		
Explanation on how to use computer mouse		

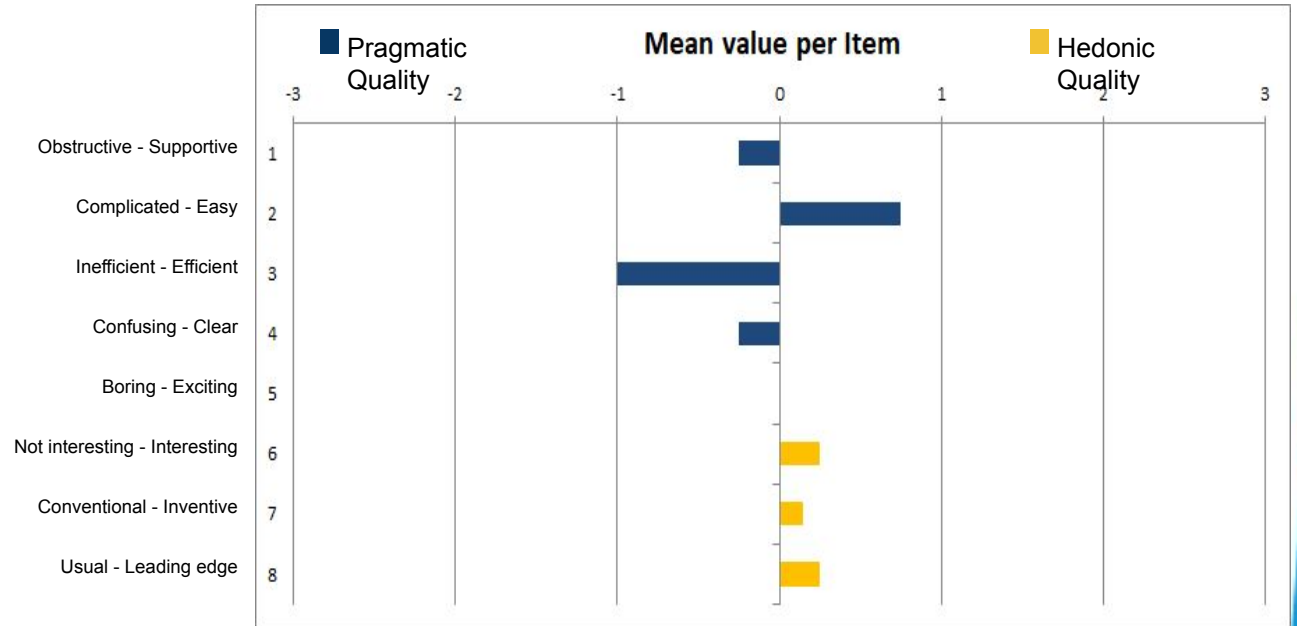
This table shows what methods of acquiring information were used in the virtual tour. Both websites have pop-ups linked to the paintings, that display more information when the user clicks it. This method was most used by participants.

Participants also tried reading the physical signs in the room but were mostly unable to do so.



QUESTIONNAIRE RESULTS MNHA

This graph illustrates the mean value per item of the MNHA short-UEQ. The blue bars indicate the first 4 questions relating to Pragmatic Quality. The yellow bars indicate the last 3 questions which relate to the Hedonic Quality. The fifth question is blank because it was missing in the questionnaire due to human error. As can be seen, the Hedonic Quality scores relative higher compared to the Pragmatic Quality, which scores especially low on the efficiency

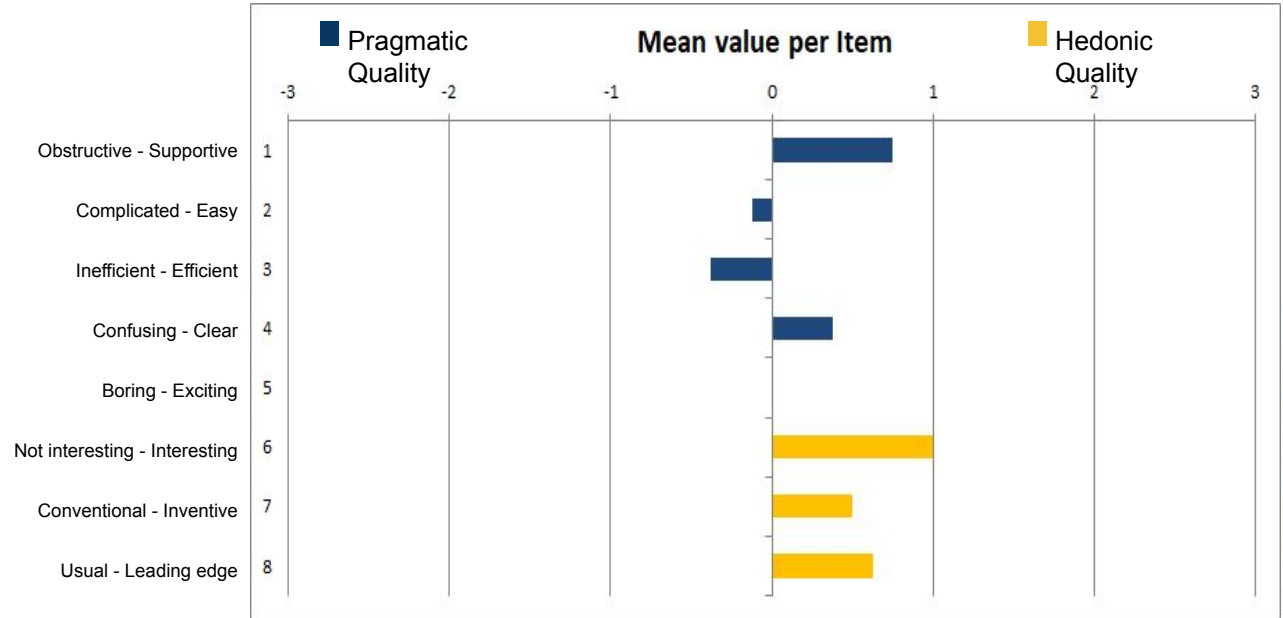


(Schrepp, 2018)



RESULTS NGA

This graph illustrates the mean value per item of the NGA short-UEQ. The blue bars indicate the first 4 questions which show the Pragmatic Quality. The yellow bars indicate the last 3 questions which show the Hedonic Quality. The fifth question is blank because it was missing in the questionnaire due to human error. As can be seen, the Hedonic Quality scores relatively high compared to the Pragmatic Quality.

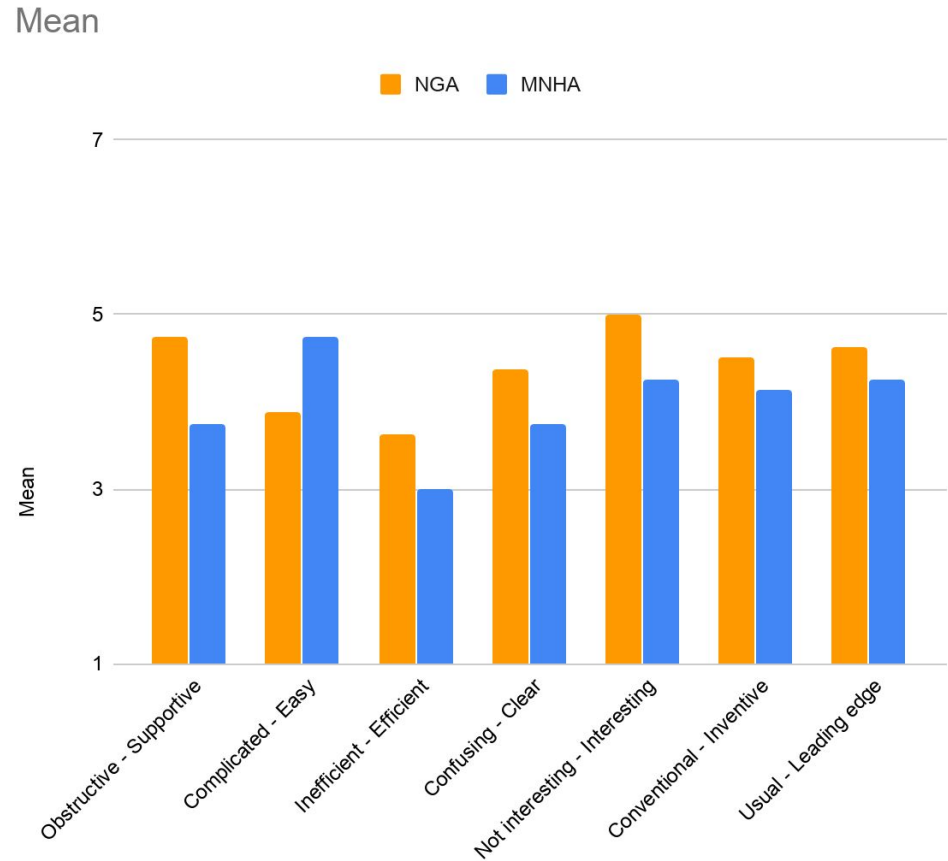


(Schrepp, 2018)



RESULTS COMPARISON

This graph indicates the difference of the mean of every item for both NGA and MNHA. The NGA scores higher in every item, except the Complicate - Easy item.



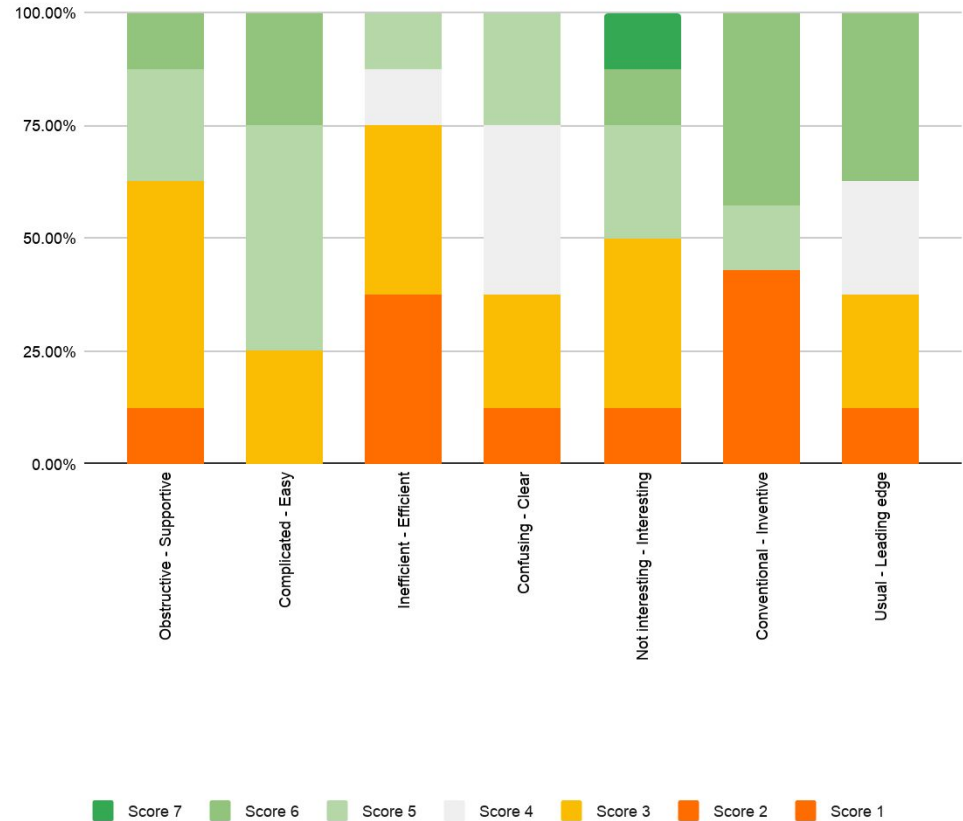


RESULTS MNHA

This graph illustrates the distributions of the answers to the questions related to the MNHA website.

No 1's were given

Distribution scores UEQ MNHA

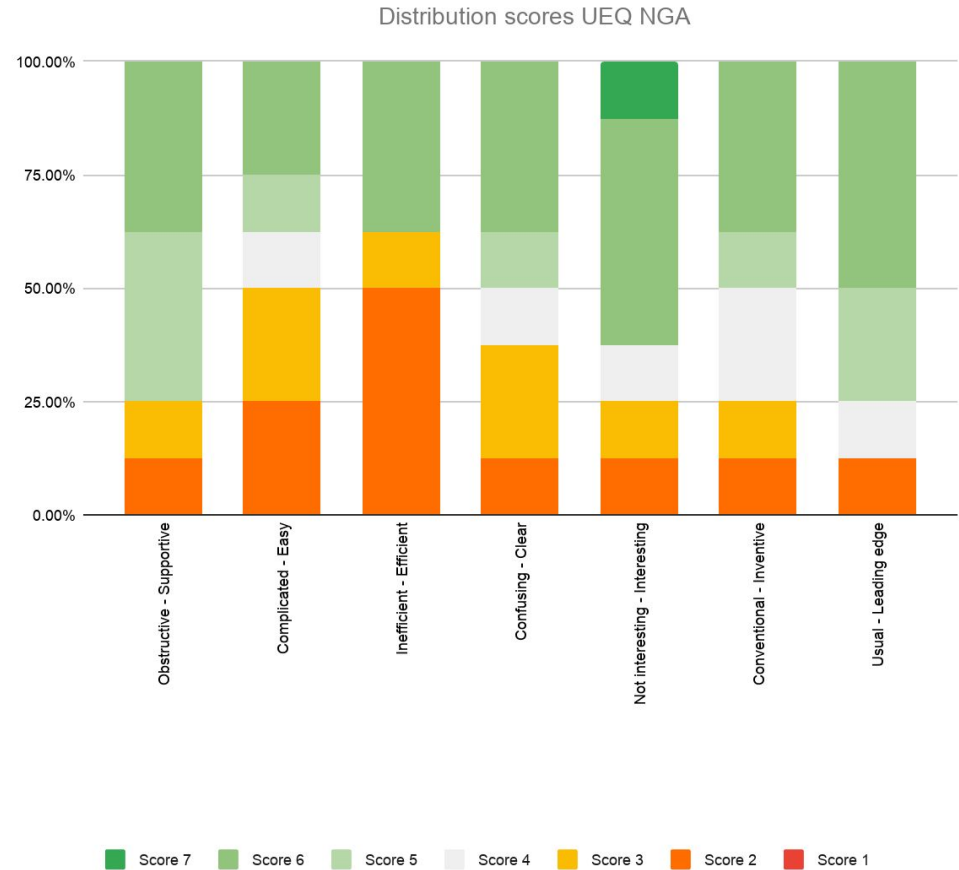




RESULTS NGA

This graph illustrates the distributions of the answers to the questions related to the NGA website.

No 1's were given

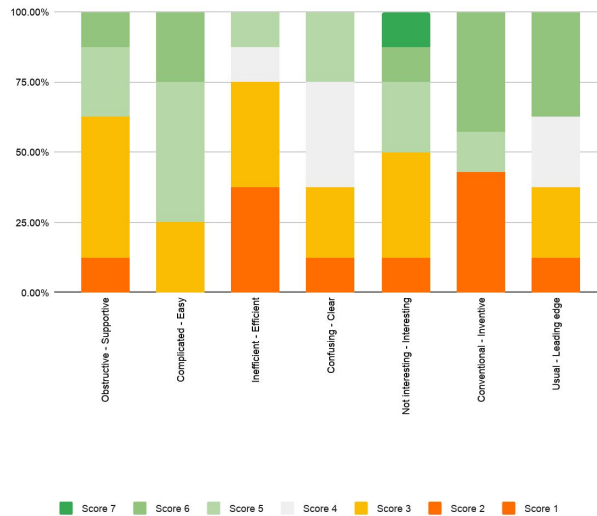




RESULTS COMPARISON

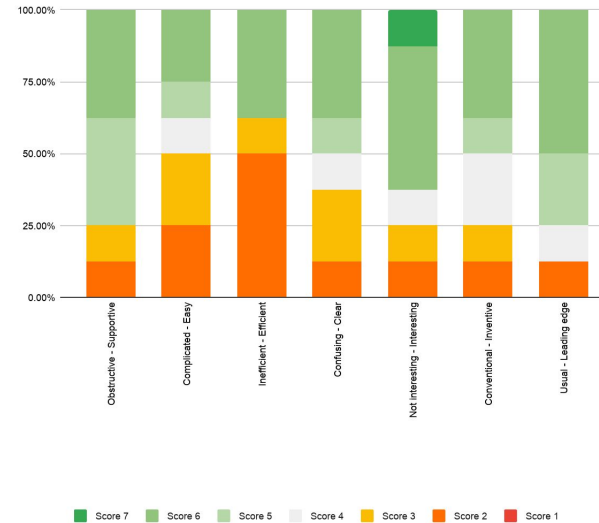
MNHA

Distribution scores UEQ MNHA



NGA

Distribution scores UEQ NGA

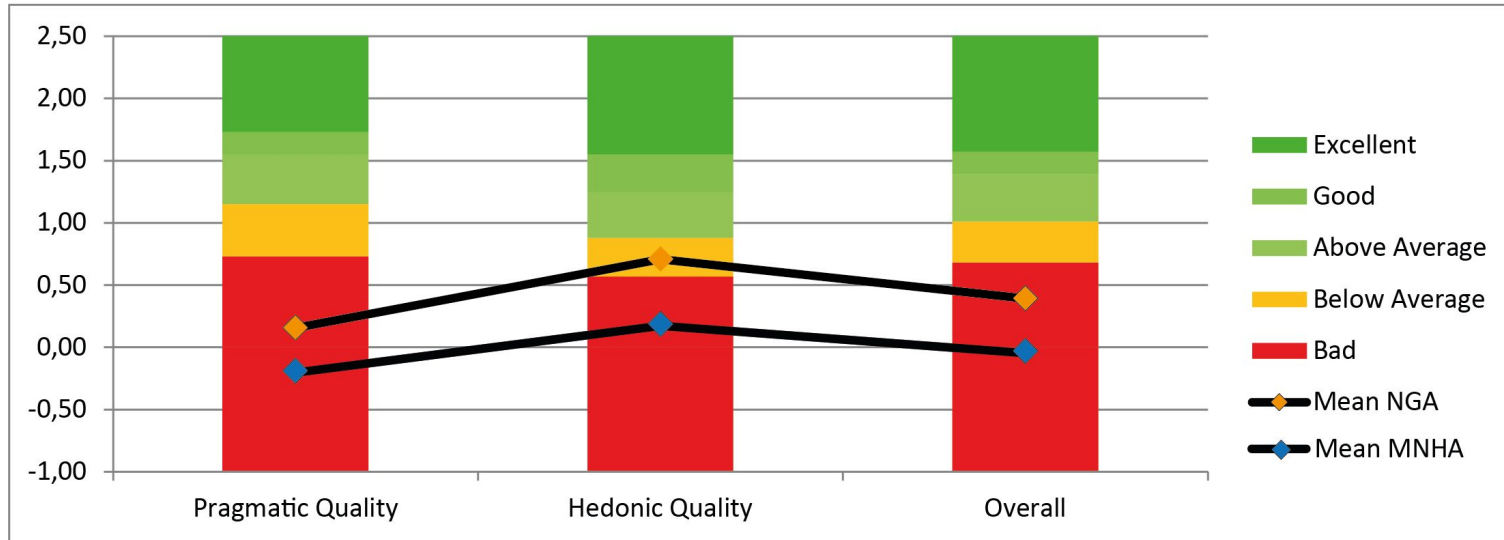


Here you can see both graphs next to each other. As can be seen, NGA scores relatively a distribution of higher scores (green colors). MNHA scores overall higher in orange (score 3) which is just below a 'neutral' score.

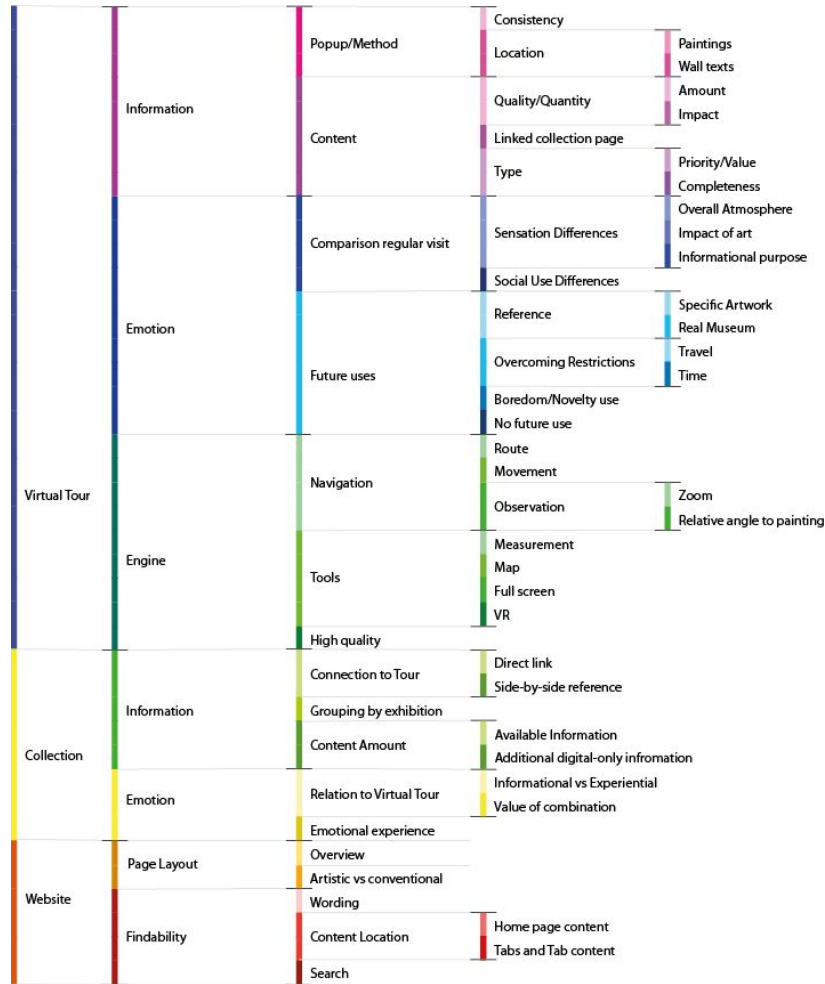


RESULTS COMPARISON

(Schrepp, 2018)



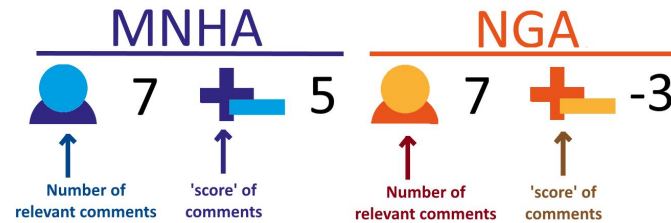
This comparison allows to see the relative quality of the MNHA website compared to the NGA website. The NGA scores relatively higher than MNHA. This data analysis is retrieved through a short-UEQ tool (Schrepp, 2018). Currently the benchmark of Excellent-Bad is based on the full UEQ. Interpret this data with care! Because of this, it is hard to understand if the websites score low because of an incorrect benchmark or because the websites have an actual low rating.



CODING TREE INTERVIEW

The interviews were all transcribed and open coded. After clustering the codes the coding tree visible on the left was created. In the upcoming 5 pages branches of the tree will be enlarged and explained. It was chosen to also create specific branches with only a few answers from participants since these give interesting suggestions for improvement.

At the end of each branch the following data is given in the upcoming slides:



The silhouette icon indicates how many participants said something. The +- icon gives the score. In this for example 6 participants said something positive and 1 said something negative resulting in a +5 score. The blue icons represent the MNHA and the orange icons represent the NGA.



Tour - Information

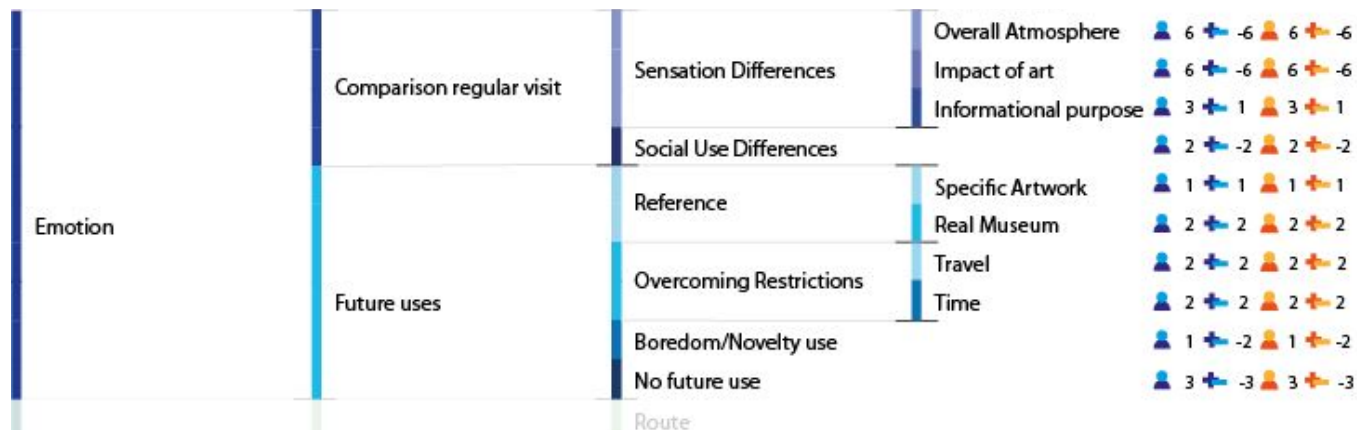
Large differences can be observed between MNHA and NGA when it comes to the information availability in the tour. The information consistency was experienced much more positively for the NGA, especially considering the inconsistent and low availability of popups in the MNHA website.

“I struggled to find information in the MNHA tour. For the NGA you can grab the information as you walk past like you’d do in a real museum. This wasn’t the case for the MNHA tour.” (P2)

All other participants provided similar comments.

The information available near the wall text was a relatively common theme. For the NGA two participants noted that the information would rather be read on the wall itself (P4, P6). The unreadability of wall information in the MNHA virtual tour was also noted (P2, P6). The MNHA’s link to the collection page was experienced positively (P5, P6), and the absence of it in the NGA museum was noted by both.

Finally, a minority of participants commented that the information available was either too little (MNHA) or too long (NGA), and that most of these also judged the available information either as incomplete (P1, P5) and/or as unimportant (P1, P2, P4).



Tour - Emotion

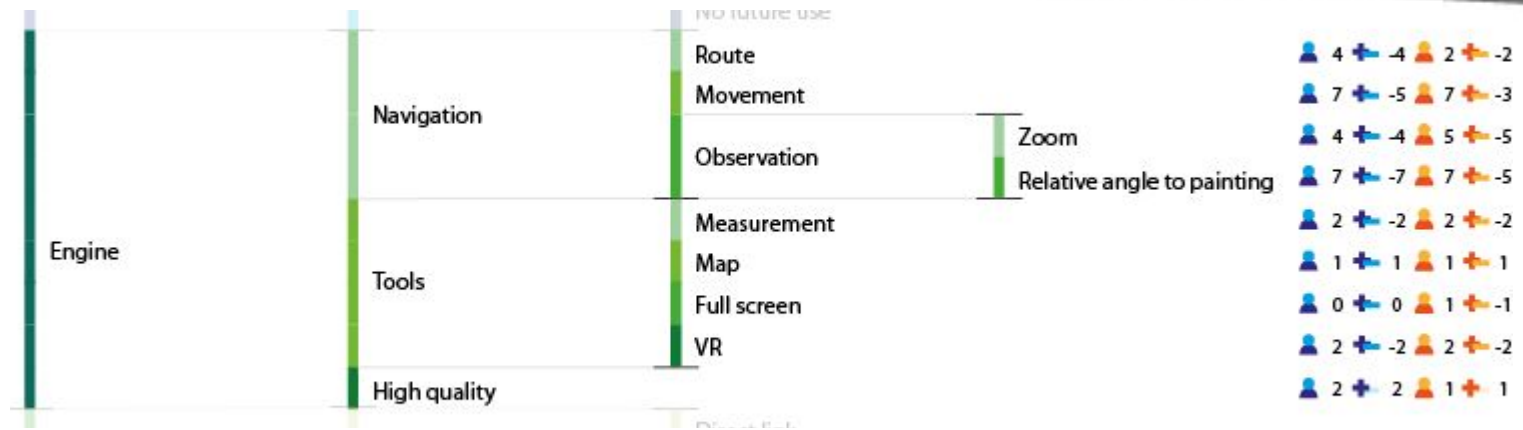
When the participants were questioned about the comparison between the virtual tour and a regular visit, they were quite anonymous: All mentioned a lack of atmosphere, impact of art or social ability or a combination between them. What does come forth however that the tour enables for a more informational purpose, since you are able to show more information than you would at the museum (P7).

“Well... It doesn't replace a museum visit... The immenseness of a painting such as the 'Nachtwacht' will get lost here” (P6)

Three participants indicated feeling no desire for future use of the tour (P1, P2 and P7) due to the sensation and social differences previously mentioned. Using the virtual museum when looking up a specific artwork (P2) or as reference for the real museum prior to a visit (P4, P6, P8) was also mentioned.

“I liked that you get a good impression of the real museum. If that's the purpose then I think it's successful.” (P8)

Participant 4 admitted novelty and boredom as a motivator. The two remaining participants (P3, P5) mentioned using the virtual tour when the real museum is restricted by time or travel. These are also the two participants that noted the least significant sensational and social differences.



Virtual Tour - Engine

The engine itself was perceived well with high quality images and smooth rendering (P3/P6) however some elements obstructed with the experience. The main problem that nearly all participants perceived was the positioning to be able to observe a painting. The painting would either be too small, too far away or seen from a weird angle and therefore difficult to observe, which caused annoyance:

“It’s not about the building it’s about the art” (P2)

In the attempts to get closer to the artwork they sometimes get warped to a complete other place in the environment which made it difficult for participants to keep track of where they were:

“I wanted to go to see a painting that when I was clicking them they were sending met to the other room” (P4)

The navigation tools were easy to use once they were found. An addition that might help here is to add a route of where you have been already (P8). The measurement tool was clear in how it works but not why you would use this. Lastly an addition of virtual reality would improve the experience (P1).



Collection

The digital collection by itself didn't seem to give an emotional experience and was mostly purely informational compared to the virtual tour:

“Looking through the collection is like a book. It doesn't feel like an art exhibition” (P2)

“I like that you can see the artwork in the 3D tour to see its surrounding exhibition” (P7)

This exhibition context within the collection itself is missing. The connection between the collection and the virtual tour is however valued. Through seeing the artwork in its exhibition space with other artwork around it gives it a side-by-side reference for aspects as size for example (P7) but also gives it more context (P3).

The amount of information given is enough for a base story (P5) but sometimes additional information is requested (P1). P6 has the unusual interest in for example what techniques are used and the background story of the materials. He/She figures that the digital website here is an ideal platform to meet such a request through additional (external) links.



Website

Six participants experience the tabs and tab content very differently between the musea (All except P2 and P7), and largely in favor of the NGA. Participants (P3, P4, P5) specifically noted how the 'highlights' of the MNHA were not findable in the collections tab despite expecting them there. During the tasks some got completely stuck here, unaware of this page having a link to the MNHA collection website.

This might relate to other issues such as wording, where for the MNHA website some participants noted that it was hard to know what some of the page titles or links referred to due to unfamiliarity with the content (P2) or similar wording being used differently in other websites (P3).

"I don't know if a 3D tour and a Virtual Tour are the same thing. They might be different terms for the same thing, but I'm not familiar with it so I don't make that connection." (P2)

The overview of the home page of the MNHA was experienced relatively negatively as well by some. Participant 4 noted that the tabs were not at the top of the page like you would expect, and participant 3 noted that the size of the banner on the MNHA page made her much less inclined to scroll down. Finally, the search function was experienced negatively on both websites by participants that used it, with participant 3 commenting that being able to use the search to find what you want to find is a 'must'

	MNHA participant mean	NGA participant mean
Average information "score" given	-0.875	-0.125
Average emotion score given	-1.5	-1.5
Average navigation/engine score given	-4.75	-1.5



Accumulated Interview Scores

Comparing participants' overall scores for the informational, emotional and navigation experiences based on the tally of negative and positive comments, we can assign an overall broad representative score. While the details of this score are not usable due to the scores not being weighted, they can still be used to give an overview of the different sections.

As we can see, the NGA scores higher on the information score and significantly higher on the navigation score, but the score for emotional experience does not differ. This somewhat mimics what we see in the participants' responses to the interview, where the emotional experience does not necessarily seem to be influenced by the availability and quality of information.

EXTERNAL SURVEY DATA PREPARATION

Data from ID2, ID35, ID19 and ID42 are removed.

The data from ID2 because nothing was entered. The data from ID35 and ID19 because nothing was entered in the User Experience Questionnaire, which is important data. Without this, the demographic of the two users is not interesting since the purpose of the questionnaire is to find out how the website is experienced. The data from ID42 because quite some responses were missing and it took a very short time filling in the answers. From this, the conclusion can be drawn that the results from this participant are not reliable.

Some participants have a few missing values, those missing values will not be taken into account (but the other values will be taken into account).

ID31 took “too long” in answering the questions. However, the data is filled in and does not look random in comparison with the other answers. Because of this, the time does not make the results unreliable and therefore we choose to keep this data.

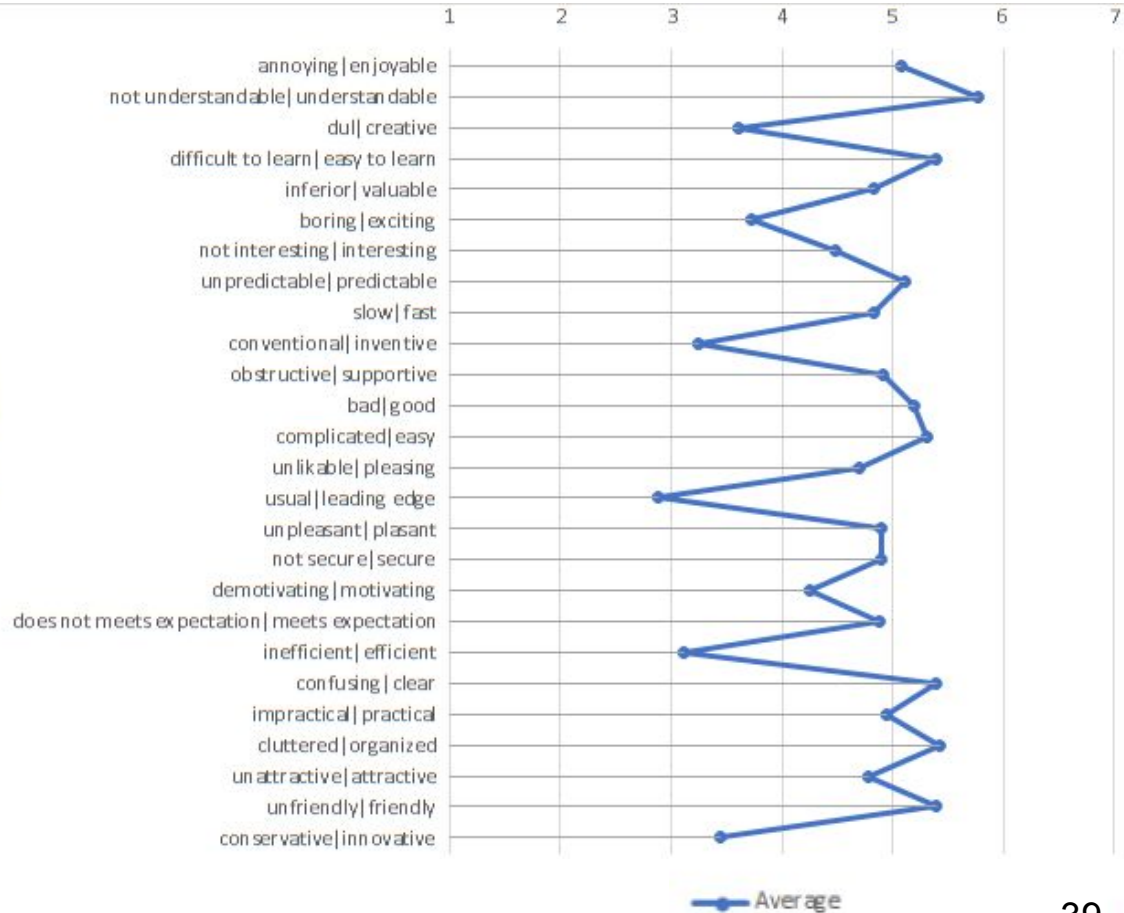
Overall, the participants' nationality is 'Dutch'. ID8, ID9, ID10, ID26 and ID43 have other nationalities. If the purpose of the questionnaire would have been to get an understanding of the experience of Dutch people, we would have removed the data from the other nationalities. However, in our understanding, the purpose is to have an overall view on how the website is experienced, thus nationality is not essential. That is why we choose to keep the data from other nationalities.

EXTERNAL SURVEY DATA ANALYSIS

The participants aged between 18 and 26 years old. There are 18 men and 18 women. The average age is 22 (rounded up). The participants varied between never visiting a museum to 6-10 times per year, but the majority (22) went between 2-5 times. There were examples for every given visitor identity, but the facilitator visitor was represented the most (25 out of 36 participants).

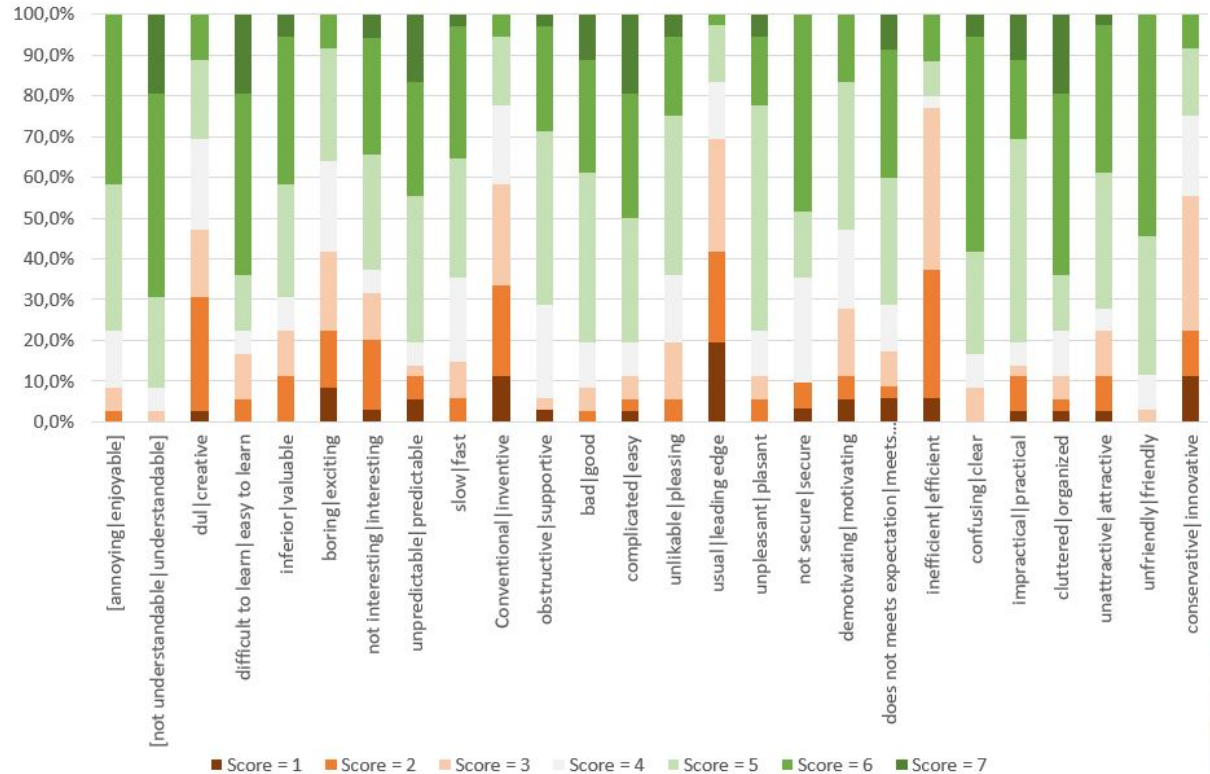
EXTERNAL SURVEY DATA ANALYSIS- UEQ Mean Scores MNHA

The first graph shows a simple overview of the mean values for each data point. If we consider a 4 a neutral score then through this we can determine which aspects are generally considered positively, and which negatively. The scales for each question have been adjusted so that generally negative values are low scores and positive values are high scores.



EXTERNAL SURVEY DATA ANALYSIS- Distribution of results

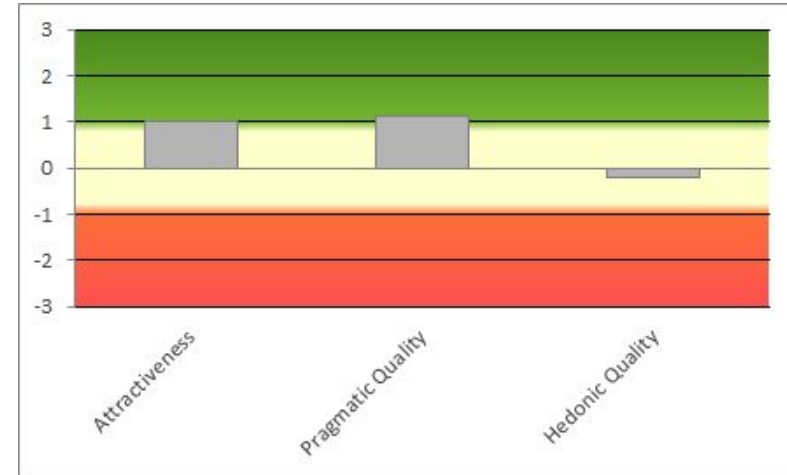
The second graph shows outliers and implies the deviation of the data. If a reader/analyst would want to know how many people consider an aspect insufficient (e.g. below 4) this visualization can be used. For example, the museum might consider the fact that more than 20% of visitors consider the website relatively unattractive (score < 4), even if the mean shows an average score higher than 4 (neutral) for this question.



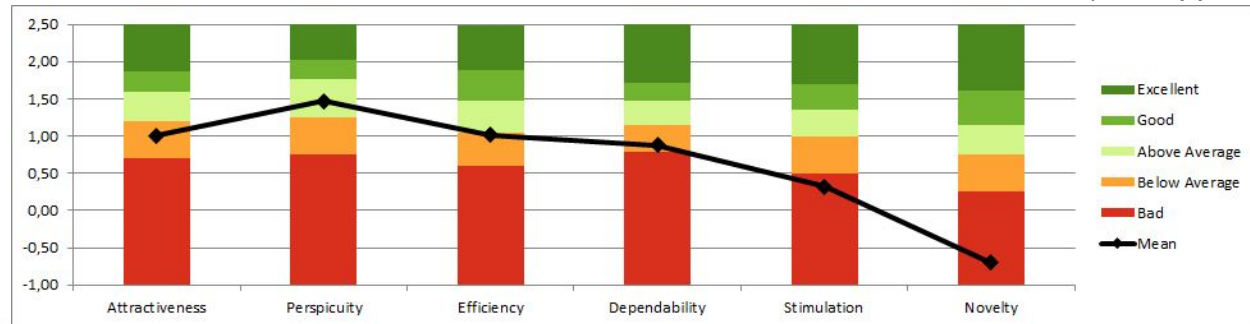
EXTERNAL SURVEY DATA ANALYSIS- Quality Evaluation

The upper graph shows the mean values concerning attractiveness, pragmatic quality and hedonic quality. Hedonic quality is quite low compared to the attractiveness and pragmatic quality

The scales in the graph below (excellent - good) are in relation to existing values from a benchmark data set. "This data set contains data from 20190 persons from 452 studies concerning different products (business software, web pages, web shops, social networks)." (Schrepp, 2018). The novelty scores significantly low.



(Schrepp, 2018)



EXTERNAL SURVEY DATA ANALYSIS- Quality Evaluation

- Bad scores are: 'usual', 'boring', 'conservative', 'conventional', 'dull' and 'inefficient'.
- Even though the site is seen as fast, easy to learn and clear, it is also seen as inefficient. From the results we cannot see why this is, but is interesting to take away from the test.
- Overall the website and its tools are easy to learn and understandable. These types of constructs are given the highest scores. It does imply some additional information and experience, but these are only barely positive with scores hovering between 4 and 5.
- Even aspects that the majority likes/approves still have lower scores mixed in. Designers might want to consider the fact that over 25% of people find the website relatively demotivating, or that over 20% of people consider the website relatively inferior. While not majorities, this could still be a significant portion of the audience and might be areas to improve on.

DISCUSSION OF RESULTS - Informational experience

RQ: Which available methods of information-gathering in an online gallery and virtual tour have a positive effect on participants' informative experience?



Attempts during the task where participants were asked to inform themselves in the virtual tour showed that the use of pop-ups was the one most consistently performed correctly. Reading text on walls that was not supported by popup bubbles was often attempted for the MNHA tour, but rarely successful.

This suggests the most important informational tools in a virtual tour should be the pop-ups and the physical text.



The NGA virtual tour had higher pragmatic scores than the MNHA, except for the complicated-easy scale. Connecting this to the observations made we can assume that the consistent application of popups and readability of the physical text are important factors in positively influencing these pragmatic differences. The complicated-easy scale difference can likely be attributed to the fact that absence of information and tools does technically decrease the complexity, though this may not necessarily be a good thing as we can see from the other results.



When we look at the results from the interviews, we recognize elements from the other methods. Participants comment on the large difference in availability of the popup windows in the virtual tour. The desire to read wall text is also commonly mentioned, as reflected in the regular attempts to read them.

Additional feedback on the amount of content in the pop-up bubbles became apparent here, but few participants commented on this, and their comments varied. We cannot confidently determine a conclusion from this feedback.

DISCUSSION OF RESULTS - Navigation, Efficiency and Accessibility

RQ: Which interface elements of a museum website can be identified that hinder or improve the navigation, efficiency and accessibility of the website and virtual tour?



Attempts to find the virtual tour and exhibition proved to be difficult for the users seeing the average time, the amount of attempts and the success rate. There are too many paths and confusing elements that lead to the incorrect page.



The results from the questionnaire show that the efficiency is significant low. Moreover, the pragmatic quality scores relatively low. However, the results also show how it is scored as 'easy'. Connecting this to the observations it could be concluded that the website may seem easy in words of simple graphic design but does not lead to easy access, navigation or efficiency. .



The results from the interview show how the main problem is the navigation in the sense that it does not do what you tend to do. However, the navigation tools were easy to use once they were found. Important notes of the participants were how a specific collection was not findable in the place they expected. There are too many similar words and links that indicate different pages or actually the same page, that is a big issue in accessibility of the website and tour. Connecting this to the questionnaire it is understandable why the pragmatic quality scored low by the participants.

DISCUSSION OF RESULTS - Effect on emotional experience

RQ: What are identifiable effects of informational and interface aspects on a strong negative or positive emotional experience of the website, gallery and virtual tour?



Even though the observation didn't have an emotional aspect by itself the results do explain the UEQ and interview. As said on the last page, the MNHA site has many different and indirect paths. This causes the site to be inefficient and unclear. No direct effect can be told from the observation however.



From the UEQ it is seen that both the hedonic as pragmatic scale are higher for the NGA. What however is seen here is that the hedonic score is higher when the pragmatic scale is higher, suggesting a possible correlation. Given is that this could be influenced by a large number of biases. When you look at the individual items it is seen that the MNHA has mostly negative scores on inefficient, next to obstructive and confusing, while it got a positive score on easy. The inefficient score suggests a high influence on the hedonic quality, while easy has a lesser influence.



Within the interviews the scores were accumulated and averaged for both of the museums. What became clear is that both museums got the same score for emotion related topics: -1,5. The score for informational and navigating topics however varied largely. The MNHA got respectively -0,875 and -4,75 where the NGA got -0,125 and -1,5. The NGA site was better perceived regarding informational and navigation topics, however the emotional experience remained the same at -1,5. Based on the interview it can therefore be said that the informational experience does not influence the emotional experience, as differences in indicated informational quality did not result in differences in emotional quality.

LIMITATIONS OF THE STUDY



Due to human error, the UEQ had seven items instead of eight. Question five (Boring - Exciting) did not take part in the questionnaire. This could have affected our understanding of the users experience.



Due to technical reasons, the footage of two participants was not recorded properly (one partially missing audio, one missing video), notes were taken instead. This might have affected the data of the observations and interviews of the two participants.



The short UEQ was chosen for the questionnaire in combination with the themes. This was decided to not exhaust the participants and to have therefore accurate answers. Unfortunately, the themes were confusing for the participants and are therefore not taken into consideration for the results. It might have frustrated the participants as well. Should we have known this, we **would have chosen the normal UEQ to have a more accurate representation of the experience.**

SUGGESTIONS FOR IMPROVEMENTS MNHA - VIRTUAL TOUR

The suggested use of the virtual tour that came from participants was mostly informational, as all participants indicated that the emotional experience was incomparable to that of a physical museum. Therefore we propose a redesign of the virtual tour experience targeted at making the virtual tour an **interactive informational experience** rather than a digital replacement of the emotional experience.

Popup Consistency: To accommodate the participants' desire for more consistently available information, we highly urge the MNHA to apply a similar approach as the NGA and have each painting annotated with a pop-up window.

Wall Text: Text on the walls should be accessible. This can be done through a popup window, but having a clear image of the wall text and being able to see them in the virtual space has preference.

Tool Functionality: The functionality of the tools should be elaborated. We suggest ,if possible, updating the engine to include instructions on the base functionalities (how to walk, how to zoom, how to open popups) on startup.

Positioning: Due to the lack of positioning options, some paintings can not be observer properly, which impacts the emotional experience as well as the information experience. Giving the user more freedom of movement should solve this.

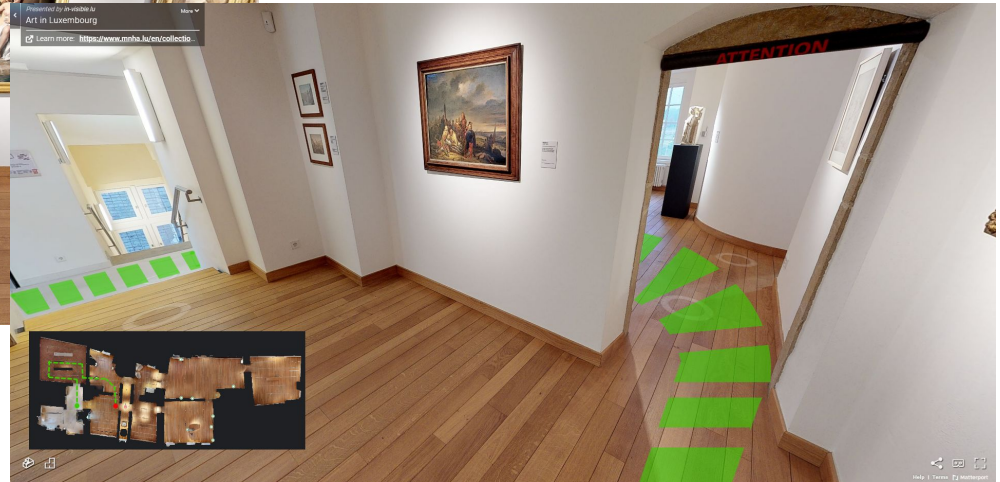
Routing: The layout of the museum can be hard to navigate. Especially in the virtual space where vision lacks depth and movement controls are limited, it is more important for the user to understand where they need to move to, or where they have already been. Therefore, we suggest the inclusion of an established route, or a trail that allows the user to see where they have been. Two mockup images of this are shown on the following page.

SUGGESTIONS FOR IMPROVEMENTS - VIRTUAL TOUR ROUTE SUGGESTION

The images below show a suggested method for displaying a pre-assigned route (left) or for displaying the movement history of the user (right) to help navigate the user around the space



Where am I going?



Where have I already been?

SUGGESTIONS FOR IMPROVEMENTS MNHA - COLLECTION

The **relation between the digital collections and the virtual tour** is one of the most valued aspects of the MNHA website. In order to increase the informational experience of the tour as well as the informational emotional experience of the collection we suggest highlighting this connection even further, as participants feel it is the most meaningful and significant way to use both the virtual tour and the collection.

Sorting collection by exhibitions: In order to further relate the collection to the exhibitions, we suggest linking collection pages specific to exhibitions from the virtual tour, collections page, and other locations of the website that sort by exhibition.

Consistent connection to the virtual tour: In the current collections website, only some of the works have a link to their location in the virtual tour, most of them being in the highlights section. As participants indicated the great value of this connection, we feel it should be applied more consistently to as many works in the collections tab as possible.

SUGGESTIONS FOR IMPROVEMENTS MNHA - WEBSITE HOMEPAGE

Several aspects of the website homepage are experienced as unclear, unintuitive or confusing by participants. We suggest the MNHA should **optimize for navigation and overview** more. In a museum website the amount of information to display on the website is quite large, so making sure that users don't end up in the wrong place is valued.

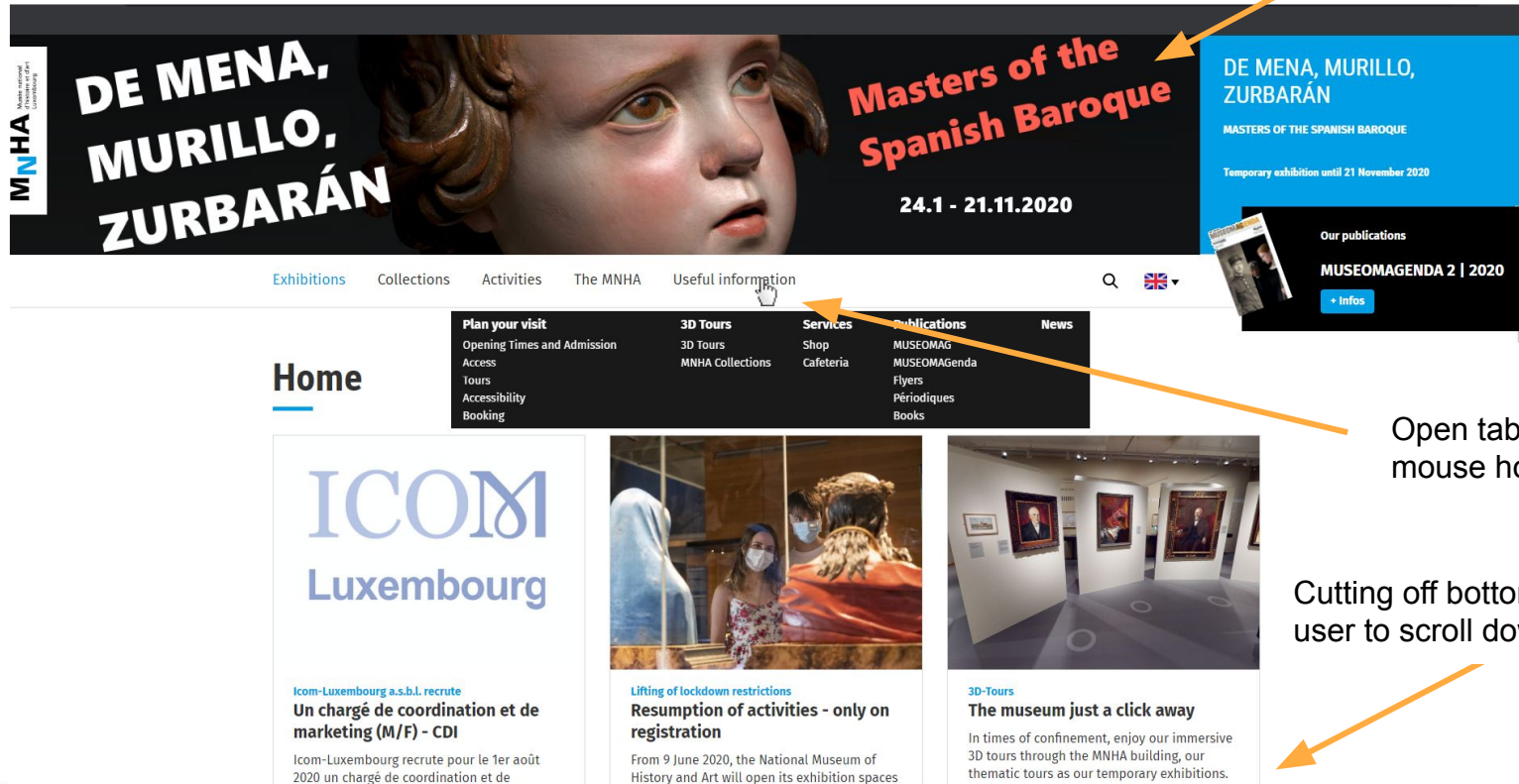
Homepage - Banner Size: The banner on the MNHA homepage takes up a significant amount of space, leaving the header tab at the bottom of the first screen and indicating no desire for the user to scroll down. By reducing the banner size, more of the information on the page is immediately visible, the header tabs are near the top of the page, and the participant becomes more inclined to scroll down. An example of this can be found on the next page.

Homepage - header tab content: Most header tabs currently use a 'click to unfold' method, with only the collections tab linking the user directly to a new page on clicking. This seems inconsistent, and might make it harder for participants to find the tab content. We suggest including a 'unfold on hover' function, so that the user does not need to 'commit' to a click to get an indication of what a tab refers to. An example of this can be found on the next page.

Homepage - Search Function: Many participants were not able to find what they were looking for when using the search function. The correct option was often either not showing up, or was not at (or near) the top of the search result. Participants feel the search function should be a reliable method to find pages in the website, and thus we suggest optimizing the search function for navigation of the website.

SUGGESTIONS FOR IMPROVEMENTS - HOMEPAGE REDESIGN SUGGESTION

Banner size reduction creates space



Open tabs on mouse hover

Cutting off bottom signals user to scroll down

SUGGESTIONS FOR IMPROVEMENTS - WEBSITE COLLECTIONS PAGE

The collections tab was commonly experienced as confusing. The difference between a 'collection' and an 'exhibition' was not always apparent, and having a separate website for the MNHA collections was often not expected or intuitive. We suggest **connecting the MNHA collections website more** as well as **showcasing highlights more** and **connect exhibitions to their collection**.

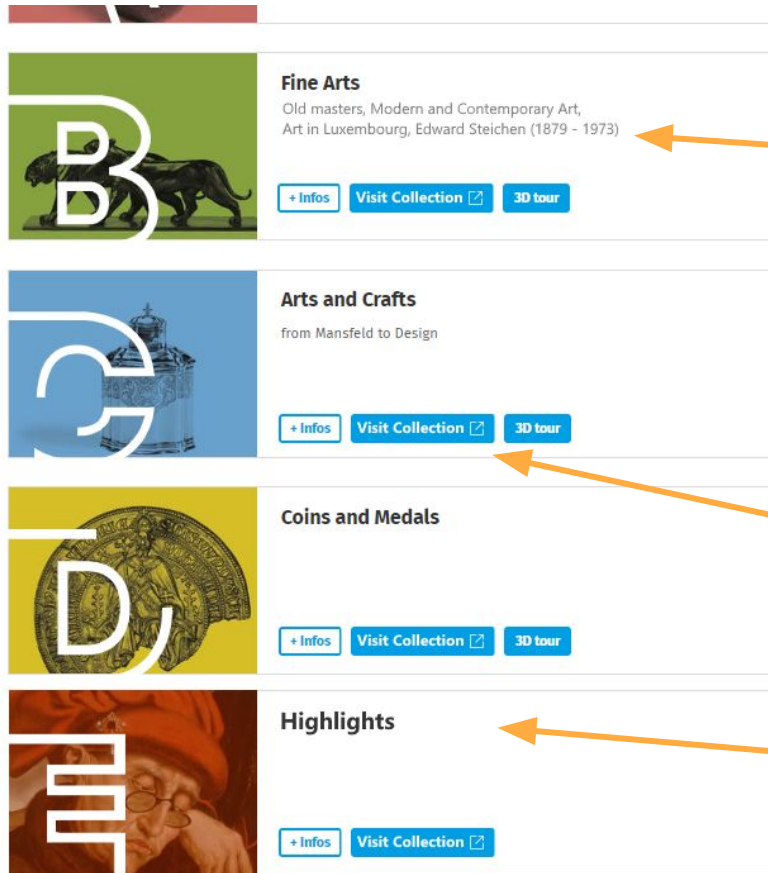
Showcase highlights page: A lot of participants valued the inclusion of highlights, but many expected to find it under the 'collections' page or tab. Therefore we suggest directly linking to the highlights from the collections tab.

Link specific collections: The collections tab on the MNHA website shows the various collections, but for each of them only links to either the virtual tour or the information tab. We suggest adding a button below each collection that links to the 'MNHA collections' page of that collection.

Connection between exhibitions and collections: The difference between collections and exhibitions seems unclear to participants. In the collection page, it is not obvious that exhibitions are a subset of the collections. It is also not apparent which exhibitions belong to which collection. We suggest updating the description of each collection with the names of the exhibitions that it includes,

An example of how all three of these action points can be incorporated in the collections page is shown on the next page.

SUGGESTIONS FOR IMPROVEMENTS - COLLECTIONS PAGE REDESIGN SUGGESTION



Show which exhibitions are in a given collection

Add links to MNHA collections page of specific collection

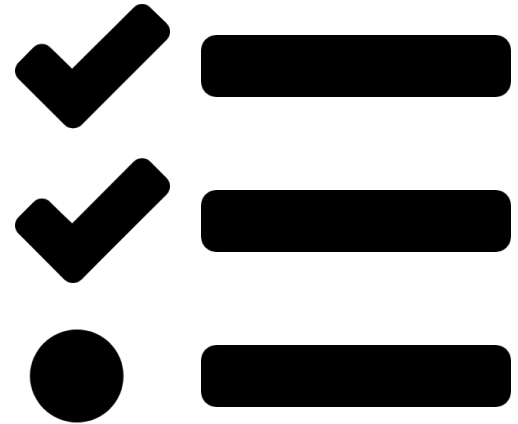
Include 'highlights of collection' under collections tab.

CONCLUSION

The informational elements of MNHA's tour were experienced as lacking. Adjustments are recommended to ensure information is consistently available and easily accessible. Recommendations for tour navigation are also made, as participants tend to get lost.

The navigation of the website is lacking, especially for the collection page, which we recommend to make more findable and link to the virtual tour more.

The emotional experience seems lacking in both aspects of the website. Participants indicate absence of atmosphere and little impact of artwork. MNHA's lacking quality of informational and navigation aspects has no clear identifiable influence on specifically the emotional experience.



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