Using awe in the design of an architectural company's website to elicit emotional responses from users

Master thesis

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Abstract

Background: company websites are vital in today's business world, as their design elements significantly impact success. Well-designed websites enhance user experience, establish credibility, and foster brand loyalty. Incorporating awe-inspiring visuals, especially in creative sectors like architecture or design, plays a crucial role in captivating and engaging visitors.

Aim: the current study aims to investigate the potential of awe in visualizations within the context of architectural websites, exploring its influence on users' emotional responses, as well as its impact on their subsequent company evaluation and architecture appreciation.

Method: an online questionnaire with 2 x 2 x 2 between respondent experimental design was distributed among 224 participants via convenience sampling method.

Results: the study findings indicate that the inclusion of image vastness, size, and textual cues on an architectural company's website can effectively elicit awe, thereby impacting users' emotional responses and influencing their appreciation of architecture. By inducing awe and implementing thoughtful design principles, there is potential for enhanced user engagement and perception, extending beyond the realm of architecture alone.

Relevance: the research provides guidance for incorporating awe-inducing elements and design principles on company websites, enhancing user engagement and perception. The findings offer valuable insights for optimizing digital interfaces and advancing design practices, driving innovation and improving user experiences. Future research can further refine the integration of awe-inspiring elements, continuing to enhance website design and user engagement.

Keywords: awe, architectural company's website, vastness, webdesign, user emotional responses

Contents

1. Introduction	4
2. The role of awe in architectural websites	6
2.1 The impact of awe and vastness	6
2.2 Feeling of awe in architecture	8
2.3 Image size	9
2.4 Text prompts	10
2.5 Research model	11
3. Method	13
3.1 Pretest	13
3.2 Main study	17
3.2.1 Stimuli	17
3.2.2 Participants	19
3.2.3 Procedure	20
3.2.4 Measures.	21
4. Results	24
4.1 Awe perception	24
4.2 Time perception	25
4.3 Positive emotions	27
4.4 Architecture appreciation	28
4.5 Webpage evaluation	29
4.6 Opinion about company	30
5. Discussion	32
5.1 Discussion of results	32
5.2 Limitations and future research	34
5.3 Conclusion	35
References	37
Appendix A. Images used in the pre-test	44
Appendix B. Created webpages	
Appendix C. Survey questions	50

1. Introduction

At the end of November 2022, there were about 1,14 billion websites on the Internet in the world, and according to statistics, approximately 252,000 new websites are created every new day (Huss, 2022). According to Clark (2022), at the end of 2021, there were approximately 333.34 million companies in the world. Many companies create their own websites to maintain communication with their customers in the virtual space.

Company websites play a significant role in business in the modern world. Web aesthetics (visual effects), content, navigation, and transaction design are all important design elements that have a big impact on a website's success (Lavie & Tractinsky, 2004). A well-designed website can enhance user experience, increase customer engagement, establish credibility and professionalism, and ultimately contribute to increased brand loyalty and customer conversion rates. When users visit any websites or social networking sites, they are exposed to visual stimuli such as logo, font, color, styles. Web pages with an abundance of text, images, graphics, audio, and video are more likely to be revisited because they provide a sense of pleasure and amusement to users (Arnold & Reynolds, 2003). Effective use of visual elements such as color, typography, and imagery can create an emotional connection with users and make the website more memorable (Nielsen, 1994). In addition, the appearance of the company's website can also cause various feelings and emotions among users.

Incorporating awe-inspiring visuals that evoke strong emotions is an important aspect of creating a website design with a powerful emotional impact. This approach is essential for companies seeking to differentiate themselves from competitors, engage customers, or leave a lasting impression. Particularly in creative sectors like architecture or design, where the visual component of a website plays a pivotal role, carefully considering the use of awe in the design can effectively captivate and engage visitors.

Awe is an overwhelmingly positive emotion that is often experienced when individuals encounter vastness or grandeur (Keltner & Haidt, 2003; Yaden et al., 2018). In an architectural context, awe can be experienced in response to a building or vast space that is grand, impressive, or mysterious (Joye & Verpooten, 2013). The awe-inspiring architecture is characterized by its ability to induce a strong positive emotional response and a perceptual transformation, in which the individual perceives oneself as small and insignificant when compared to the grandeur and vastness of the environment (Joye & Dewitte, 2016). This transformation in perception can engender profound effects on the individual, such as fostering a sense of humility, wonder, and awe. Therefore, incorporating elements that convey a sense of vastness, such as panoramic images or images of vast buildings, can be an effective way for architecture firms to create a memorable user experience and positive evaluation of the company's website.

This study focuses on investigating the specific component in the design of an architectural company's website - awe. The study aims to highlight the potential of awe that has gone unnoticed in previous studies, particularly in the context of visualizations. While visualizations have been a popular research topic, the emotional impact of awe, which can be induced by powerful visualizations, has not been thoroughly examined. Consequently, there exists a significant research gap in understanding how awe can be effectively utilized through visualizations to elicit strong emotional responses among users visiting the company's website.

Therefore, this study aims to explore the potential of awe in the context of visualizations and its impact on the users of the website. Thus, the research question of this paper is formulated as:

"How does the use of awe in the design of an architectural company's website affect users' emotional responses and influence their further company evaluation and architecture appreciation?"

The primary objective is to awe users by using three key elements of the webpage: the inclusion of vastness in images, the manipulation of image size and the use of text prompts based on awe. Using this method, the aim of this study is to explore the extent to which users can be imbued with a sense of awe when interacting with a website and examine how this experience may influence their opinion of the company.

2. The role of awe in architectural websites

Websites are frequently the first and sometimes the only point of contact between a user and a company. For many businesses, an engaging website is crucial to their success. According to Peracchio and Luna (2006), the majority of Internet users (80%) only spend 50 milliseconds searching and browsing on one website before moving on to the next website (Lindgaard et al., 2006). The visual component must be memorable in order to capture consumers' attention (Adaval et al., 2019). In addition, the websites of companies also influence the attitude of customers toward the product and services (Lee et al., 2010). The impact of awe in the design of a company's website can significantly contribute to capturing users' attention, shaping their attitude towards the company's offerings, and ultimately influencing their decision-making process.

2.1 The impact of awe and vastness

According to Yu et al. (2022), when an inexplicable circumstance emerges, a sense of awe is experienced along with feelings of wonder, amazement, or confusion. Keltner and Haidt (2003) posit that awe, as a self-transcendent emotion, is predominantly characterized by positive and pleasant affective experiences (Yaden et al., 2018) when an individual is confronted with an object or event of tremendous magnitude that profoundly alters their

worldview (Schindler et al., 2017). In other words, awe is a feeling that arises in reaction to an overwhelming stimulus, such as environmental factors, works of art, powerful figures, or even theories (Negami & Ellard, 2021; Shiota et al., 2007). Awe is considered to be a transcendent emotion, as it can lead to a sense of connectedness and unity with the world.

According to the current conception of awe, there are two main cognitive appraisals that are central for the experiences of awe. This is the perception of vastness and the necessity to mentally try to accommodate this vastness into existing mental schemes (Keltner & Haidt, 2003). In addition, there are two types of vastness: perceptual vastness, which occurs when a person observes an enormous object (such the Grand Canyon or the ocean), and conceptual vastness (for example, contemplation of eternity) (Schindler et al., 2017). The study will primarily concentrate on perceptual vastness as it is more closely related to the field of architecture.

It is noteworthy to underscore that the phenomenon of awe represents a salient example of self-transcendent experiences (STEs). According to Yaden et al. (2017), STEs are temporary mental states that people experience in a range of intensities, from routine (such as losing themselves in a book) to profound and possibly transforming (such as a feeling of connectedness with everything and everyone) to intermediate states, such as awe or meditation. Since awe is a STE characterized by its highly subjective and personal nature, its objective measurement has proven to be a considerable challenge for researchers in the field. However, previous experimental studies have attempted to identify and measure the main components of awe, which include perceptions of vastness, the need for cognitive adaptation, self-diminishment, altered time perception, a sense of connectedness, and physical sensations (Yaden et al., 2018; Nelson-Coffey et al., 2019).

An additional significant aspect of the emotional experience of awe is the individual's perception of temporal processes. The feeling of awe expands people's perception of time,

creating a feeling that more time is available and it flows more slowly (Rudd et al., 2012). It is the change in people's perception of time that marks the difference between awe and any other emotions (Yaden et al., 2018). The affective experience of awe has been shown to exert a distinctive influence on individuals' subjective perception of temporal availability, surpassing that of other positive or neutral emotional states. Tang's (2020) investigation demonstrated that individuals experiencing awe displayed a heightened sense of time abundance and a concomitant reduction in time pressure. Specifically, study participants in the state of awe exhibited an enhanced belief in the availability of temporal resources and reduced urgency in the allocation of time (Tang, 2020). Previous research has also shown that people are willing to give and spend more time after experiencing awe (Guan et al., 2019).

2.2 Feeling of awe in architecture

In addition to images of natural landscapes, phenomena and various types of art, architecture may also cause awe in people. Significantly, certain constructors of grandiose architectural structures have acknowledged and intentionally utilized the potential of architecture to cause immobilization (Gordillo, 2015). According to Joye and Dewitte (2016), people can experience awe when looking at images of skyscrapers, the sight of which causes freezing behavior - a sense of immobility, slow reaction speed, a sense of self-diminishment and humility. Throughout history, some builders and designers have intentionally employed the potential immobilizing effects of architecture, such as the use of imposing size and various visual illusions, as seen in grandiose religious monumental structures that can induce feelings of awe and wonder in their audience (Joye & Verpooten, 2013). The interior spaces of various architectural structures can also evoke a sense of awe due to such architectural properties as immense size, decorations and ornaments, age, furnishings, symmetry and lighting (Negami & Ellard, 2021).

Several studies have explored the relationship between awe and the built environment. For example, a study by Valtchanov and Ellard (2015) investigated the impact of architectural scale on emotional response and found that exposure to large-scale spaces induced stronger feelings of awe than exposure to small-scale spaces. Vastness in architectural design can elicit awe through scale, proportion, and spatial arrangements (Joye & Dewitte, 2016), triggering powerful psychological and physiological responses in individuals. Another study by Chirico et al. (2017) used virtual reality (VR) and functional magnetic resonance imaging to investigate the neural responses to architectural spaces with varying levels of complexity and vastness. The results showed that greater levels of vastness were associated with increased activity in brain regions involved in processing reward and emotional responses.

According to Ahmad and Razak (2014), the presence of images and the level of awe on an architectural design firm's website have a positive impact on users' attitudes towards the firm. In this research, the objective is to evoke an emotional response from study participants through the use of awe on a specially designed webpage. This will be accomplished by implementing manipulations of the vastness level of the view and other visual content on the webpage, which showcases an architectural project. Thus, the first hypothesis is formulated as:

H1: The presence of vastness, rather than its absence, in the images of the architectural project's web page positively affects the emotional response of users and influences their opinion about the company and the appreciation of architecture.

2.3 Image size

Images and their parameters hold great importance in the realm of the Internet and media technologies due to their inherently visual nature (Pauwels, 2005). Various images on the Internet have the potential to evoke a wide range of emotions, influence user behavior,

and evoke aesthetic emotions, particularly in relation to architecture, sculptures, buildings, and other visual art forms (Bell, 2018).

The size of the images on the website also matters, although there is a lack of scientific literature devoted to this. According to Back et al. (2020), large photos on hotel websites have a positive effect on users, increasing booking intent and willingness to pay more. In addition, large photos are most effective when there are no people on them, while the effect of small photos improves with the presence of a person. The study conducted by Pieters and Wedel (2004) revealed that larger images capture greater visual attention and enhance consumer engagement, indicating that image size influences both visual processing and overall engagement with products or websites. Furthermore, the utilization of detailed product visualization, along with the inclusion of supplementary visual cues facilitated by large images on the website, elicits more favorable user responses and has been shown to contribute to increased sales (Lorenzo et al., 2007). Based on these findings, the following hypothesis states:

H2: The presence of large images on the website, as opposed to small ones, enhances the effect of vastness on awe and elicits a heightened emotional response among users, influencing their evaluation of the company and fostering a greater appreciation for the architecture.

2.4 Text prompts

Architectural companies exhibit advantages in website and social media management owing to the pervasive use of visualization at every stage of building projects. The integration of descriptive text and images on websites enhances the vividness of verbal action descriptions, fosters perceptual associations, and contributes to improved textual coherence (Adaval et al., 2007).

In addition to the influence of image size, the effect of vastness on consumer responses can be further influenced by the presence of text prompts. Incorporating emotionally evocative language into text has been found to exert a significant impact on users' emotional experiences and perceptions. Research by Williams and Bargh (2008) indicates that emotionally charged words or phrases have the ability to activate corresponding emotional states in individuals. This suggests that carefully chosen text prompts can effectively shape users' emotional reactions while navigating a website.

Furthermore, according to Dolan et al. (2019), the inclusion of emotionally appealing text content enhances users' enjoyment, engagement, and perceived usability of a website. Additionally, Kramer et al. (2014) found that positive and negative emotions conveyed through text prompts can induce emotional contagion, influencing the emotional state and subsequent behavior of recipients. By appropriately incorporating emotion prompts, website designers can create a more immersive and satisfying browsing experience, fostering positive associations with the website. Based on these findings, the third hypothesis states:

H3: The presence of a text with an awe-inspiring prompt on a website, in contrast to a neutral text, enhances the effect of vastness on awe and elicits a heightened emotional response among users, influencing their evaluation of the company and fostering a greater appreciation for the architecture.

2.5 Research model

Based on the hypotheses formulated in the previous chapters, the following research model is shown in Figure 1 below to visualize the relationships that are central to this study. In the model, vastness is considered as the independent variable, while emotional responses, company evaluation, and architecture appreciation are the dependent variables. Additionally, this model includes image size and text prompt as moderators. The hypotheses included in the research model are repeated here:

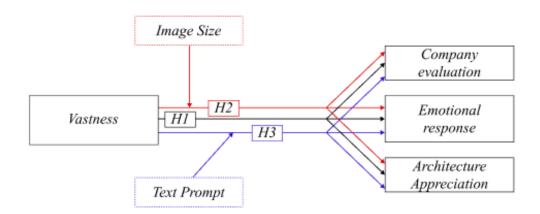
H1: The presence of vastness, rather than its absence, in the images of the architectural project's web page positively affects the emotional response of users and influences their opinion about the company and the appreciation of architecture.

H2: The presence of large images on the website, as opposed to small ones, enhances the effect of vastness on awe and elicits a heightened emotional response among users, influencing their evaluation of the company and fostering a greater appreciation for the architecture.

H3: The presence of a text with an awe-inspiring prompt on a website, in contrast to a neutral text, enhances the effect of vastness on awe and elicits a heightened emotional response among users, influencing their evaluation of the company and fostering a greater appreciation for the architecture.

Figure 1

Conceptual Research Model



3. Method

To test these hypotheses and the research question, a 2 (Vastness: low versus high) X 2 (Image Size: small versus large) X 2 (Text: neutral versus with prompt) between subjects design was employed. Ethical approval for the study was obtained from the BMS ethics committee of the University of Twente, with the assigned approval number 230066. Prior to data collection, a pretest was conducted to select images with different levels of vastness.

3.1 Pretest

The aim of this pretest was to measure the Vastness level of the pictures used in the main study. Fourteen participants evaluated various photos of the Wonderwoods project for the degree of awe, with vastness as the main component, and ranked them.

The Wonderwoods project, created together by MVSA Architects and Stefano Boeri Architetti companies (MVSA Projects, 2020), is chosen as the main architectural construction, the photos of which are used in this research. Ten photos of the Wonderwoods project were selected, some of which are presented below (see Figure 2). There are a limited number of photos at the moment, because the project is still at the initial stage of construction, and all photos show 3D models of the future building. All the photos used in the pre-test are shown in Appendix A.

Figure 2

Wonderwoods building



Items used for measuring awe were based on the Awe Experience Scale (AWE-S) by Yaden et al. (2018). The original AWE-S consists of 61 questions about aspects of experiencing awe. The main six aspects of awe that have been explored in previous experimental studies and are used in similar scales to measure awe are vastness, the need for adaptation, self-diminishment, altered perception of time, connectedness and physical sensations (Yaden et al., 2018).

Each of the pre-test photos was accompanied by 10 statements (items) based on the main six factors associated with feeling awe (see Table 1). The items are based on the AWE-S. In the context of architecture, vastness is an important factor of awe, that is why most items are focused on vastness. Participants had to evaluate all 10 items on a 7-point scale, from 1 = strongly disagree to 7 = strongly agree.

Table 1Statements for each pre-test image

	Items
1	Being in the presence of something grand.
2	Being in the presence of something greater than myself.
3	Perceiving something that was much larger than me.
4	Being in the presence of greatness.
5	Perceiving something vast.
6	This view looks like a wonder.
7	This view is breathtaking.
8	I gasped when I saw this view.
9	My eyes widened when I saw this view.
10	This view is awe-inspiring.

The purpose of this pretest was to identify two images for the main test, one of which would create the highest level of awe among the participants, and the other one - the lowest. Despite the fact that the means for different factors were compared (see Table 2), the final decision was based mostly on the Vastness measure, which showed that the view in image 8 evokes the highest level of awe. Among the two images (5 and 9) with a low level of Vastness, image 9 was selected for the main test as an image with a low level of awe. The choice was made in preference to image 9, because it depicts a view with daylight, as opposed to image 5, which could also have an impact on the participants of the main test.

 Table 2

 Mean values of views imagery for each pre-test item

•	Image ^a	All items	Vastness				•	,
			(items	inspiring	(item 6)	taking	(item 8)	(item 9)

		1-5)	(item 10)		(item 7)		
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1	5.66	6.27	5.29	5.79	5.5	4.21	4.5
2	6.59	6.19	7.57	7.79	7.29	6	6.36
3	6.03	6.3	6.07	6.64	6.07	4.86	5.14
4	7.14	7.09	7.79	6.29	7.64	6	6.86
5	5.25	4.43	6.86	5.79	6.36	4.71	5
6	6.09	6.71	5.71	6.21	5.5	4.71	5.07
7	5.38	5.57	5.93	6.07	5.43	4.43	4.36
8	6.34	6.63	6.86	6.36	5.71	5.36	6.14
9	5.03	4.67	6.36	4.64	5.36	4.36	4.79
10	6.06	6.22	6.57	7.43	6.15	4.93	5.5

Note. All items were tested on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Based on the findings from this pretest, two photographs presented in Figure 3 were selected for the main study.

Figure 3

Images with views evoking high and low levels of vastness

^a See Appendix A for corresponding images.





Image with High Vastness

Image with Low Vastness

3.2 Main study

3.2.1 *Stimuli*

The eight different versions of the architectural project web page used in the main experiment were designed and constructed using Figma Web Application. The participants of the main test saw and evaluated only one of the eight versions (see Figure 4), which was randomly shown to them. Appendix B contains full-size images of all the web pages created for this test.

Figure 4

Stimulus material

MV SA



MV SA

in @ MVSA HQ info@mvsa-i

Wonderwoods



in @ MVSA HQ info@mvsa-archits.

MV SA

Wonderwoods



MV SA

in @ MVSA HQ info@mvsa-

Wonderwoods



in @ MVSA H0 info@mvsa-archits.e

MV SA

Wonderwoods



MV SA

in @ MVSA HQ info@mvsa-archits.

Wonderwoods



in
MVSA HQ
info@mvsa-archits.com

MV

Wonderwoods



MV

in ⊚ MVSA HQ info@mvsa-archits.

Wonderwoods



in MVSA HQ info@mvsa-archits.com

All eight web pages were created with a consistent design format, where variances between them are limited to variances in image size, views on images, and text. The image size and text manipulations were deliberately utilized to enhance and influence the perception of vastness.

The pictures on the webpages were presented in two sizes: a small square measuring 372 pixels and a large square measuring 775 pixels. The web pages were accompanied by either a neutral text or a text with a prompt, with the differences primarily evident in the last sentences (see Figure 4). For instance, the neutral text provided a description such as: "Wonderwoods creates a healthy urban microclimate in the heart of Utrecht, building a balance between nature and the urban environment." In contrast, the text with a prompt included more emotionally evocative language, such as: "This is a wonder to behold and draws you in. Can you imagine passing by this piece of architectural beauty, feeling the presence of something grand?"

3.2.2 Participants

In total 224 respondents (132 female, 77 male, 15 other/ preferred not to say) participated in the experiment. There were no age restrictions in this survey, however, respondents aged 18 to 24 and 25 to 34 make up the largest age groups (39% and 40%, respectively). This predominance of these categories can also be explained by the fact that the questionnaire was distributed mostly among students and their friends. A complete overview of the age and gender is given in Table 3.

Table 3Participant Demographics

Gender

		Female	Male	Other	Prefer not to answer
Age	18-24	53	30	4	1
	25-34	54	29	5	1
	35-44	11	8	2	1
	45-54	10	7	1	0
	55-64	3	2	0	0
	65 or older	1	1	0	0
	Total	132	77	12	3

3.2.3 Procedure

The participants took part in an online survey on the Qualtrics platform, during which they were randomly shown one of eight fictional web pages with an architectural project.

Before the participants clicked on the link to the fictional web page, they were shown a text asking them to take a close look at the architectural project, view the whole web page and then return to the questionnaire with questions related to this architectural project. The link led to a web page where participants could only scroll up and down and were not able to go further by clicking on the page elements.

After viewing the web page, the participants returned to the questionnaire and answered questions, comprising dependent measures, about their impressions of the architectural project, the website and the company. At the end of the survey, the participants also answered the question about their closeness and connectivity with the sphere of architecture and design.

3.2.4 Measures

In total, 28 statements measuring various constructs were presented to the participants as questions (see Table 4). Participants had to indicate to what extent they agreed with each statement.

 Table 4

 Statements from the main test questionnaire

Constructs	Statements	Cronbach's Alpha
Awe perception	Being in the presence of something grand.	0.93
	Being in the presence of greatness.	
	Perceiving something vast.	
	Experiencing something that was much larger than me.	
	My eyes widened when I saw this view.	
Time perception	I feel like I might be able to look at this view for a long time.	0.89
	This view makes me lose track of time easily.	
	This view makes me slow down.	
	I feel like time doesn't exist when I'm gazing at this view.	
Positive emotions	This building looks like a wonder.	0.94
	This building is awe-inspiring.	
	This building attracted all my attention.	
	This project looks amazing.	
	This project looks fascinating.	
Architecture Appreciation	It would be great to live inside this building.	0.93
	It would be great to live next to this building.	
	It would be great to see this building from my window.	

	It would be great if more buildings in my city would look like this building.	
Webpage evaluation	It was interesting for me to explore this webpage.	0.93
	The webpage looks attractive.	
	The webpage is appealing.	
	I would like to spend more time on this website.	
	I would like to visit this website again.	
Opinion about company	This architectural company is very prestigious.	0.91
	This architectural company is one of the best in its field.	
	This is a high-end company.	
	I would like to see other buildings of this architectural firm.	
Connectedness	Can you say that you have some kind of connection with architecture or design (e.g., you like it or your field of activity is somehow related to it)?	

Note. This scale consists of 28 items on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) or from 1 (*strongly not connected*) to 7 (*strongly connected*).

Awe perception. Awe perception was measured with items derived from the Awe Experience Scale (AWE-S) and consisted of 5 statements (see Table 4), the attitude of the participants to which was measured on a 7-point rating scale ranging from "strongly disagree" to "strongly agree". The scale proved to be reliable with a Cronbach's Alpha of .93. Responses to these statements were summed and averaged to arrive at a general Awe perception measure.

Time perception. The measurement of Time perception was also based on items obtained from the AWE-S, and included 4 statements. All statements were measured on a 7-point Likert-scale (1 = strongly disagree, 7 = strongly agree). Responses on these constructs

were summed and averaged (Cronbach's Alpha = .89) in order to arrive at a general Time perception measure.

The time that participants spent browsing the web page was also automatically measured (variable Time spent). It is anticipated that the inclusion or exclusion of awe-inspiring images with vastness could potentially impact users' temporal perception during website browsing and influence their inclination to prolong their visit. At first, the time when users clicked on the link to view the page was tracked. After that, the time measurement stopped when the respondent moved on to the next questions of the questionnaire.

Positive emotions. Positive emotions were measured using 5 statements. Responses were recorded on a 7-point rating scale (1 = strongly disagree, 7 = strongly agree). The scale proved to be reliable with a Cronbach's Alpha of .94. Responses to these statements were summed and averaged to arrive at a general Positive emotions measure.

Architecture Appreciation. Architecture appreciation was measured using 4 statements. Participants had to indicate to what extent they agreed with each of these statements. Responses were recorded on 7-point rating scales ranging from "strongly disagree" to "strongly agree". Responses on the Architecture appreciation statements were summed and averaged ($\alpha = .93$) in order to arrive at a general 'Architecture appreciation' measure.

Webpage evaluation. Webpage evaluation measure included 5 statements, each of those were measured on a 7-point Likert-scale (1 = strongly disagree, 7 = strongly agree). Responses on these statements were summed and averaged (α = .93) in order to arrive at a general Webpage evaluation measure.

Opinion about company. Participants' opinion about architecture company was measured with a scale comprising 4 statements ($\alpha = .91$). Using 7-point rating scales,

participants had to indicate to what extent they agreed with each of these statements.

Responses to these statements were summed and averaged to arrive at a general Opinion about company measure.

Connectedness. In addition, to measure respondents' level of connection with architecture and design, a single-item Connectedness measure was added at the end of the survey. This was done to also consider that users connected to architecture and design tend to evaluate architectural websites based on functionality and usability, as found by Faliagka et al. (2015), while individuals with a design background demonstrate increased engagement and involvement with design and architecture related websites, as indicated by Koutsabasis and Istikopoulou (2013), due to their deeper understanding of architectural concepts and principles. The responses were recorded on a 7-point rating scale ranging from "strongly not connected" to "strongly connected".

4. Results

Data were analyzed using a 2 (Vastness: low versus high) × 2 (Image Size: small versus large) × 2 (Text: neutral versus with prompt) between subjects design. To analyze the data, an ANOVA was performed with vastness, image size and text as independent variables and awe perception, time perception, positive emotions, architecture appreciation, webpage evaluation and opinion about company as dependent variables. The variables time spent and connectedness were also used as the covariates.

4.1 Awe perception

The main effect of Vastness was significant (F(1, 216) = 41.89; p < .01) and influenced the Awe perception. On web pages with images of high Vastness, the average Awe perception among participants was higher (M = 4.64; SD = 1.44) compared to web pages with low Vastness (M = 3.71; SD = 1.52).

The influence of the Image size exhibited considerable statistical significance (F(1, 216) = 159.35; p < .01) and exerted an impact on the participants' experiences pertaining to the Awe perception. Participants' feelings of Awe perception were significantly higher when exposed to web pages featuring larger Images (M = 5.09, SD = 1.15) compared to those with smaller Images (M = 3.26, SD = 1.34).

The main effect of Text was also significant (F(1, 216) = 36.93; p < .01); the presence of awe prompts in the Text (M = 4.61; SD = 1.45) resulted in a greater Awe perception among the participants compared to the neutral Text (M = 3.74; SD = 1.52). No further interaction effects were obtained (see Table 5).

Table 5Univariate Analysis of Variance Awe perception Effect

Source	F	Sig
Vastness	41.891	<.001
Image size	159.353	<.001
Text	36.931	<.001
Vastness * Image size	.015	.902
Vastness * Text	.478	.490
Image size * Text	.269	.604
Vastness * Image size * Text	2.271	.133

4.2 Time perception

The effect of Vastness yielded statistical significance (F(1, 216) = 30.36; p < .01) and exerted influence on the Time perception; participants reported that their Time perception was on average higher when viewing web pages with images characterized by high Vastness

(M = 4.24; SD = 1.54), compared those displaying low Vastness (M = 3.39; SD = 1.44). This indicates that participants felt the passage of time to be slower when exposed to web pages featuring high Vastness images. Conversely, when participants viewed web pages with images characterized by low Vastness, their Time perception was lower on average, suggesting that they perceived less variation in the passage of time.

The impact of Image size exhibited notable statistical significance (F(1, 216) = 122.73; p < .01). Participants' feelings of Time perception were significantly higher when exposed to web pages featuring larger Images (M = 4.67, SD = 1.33) compared to those with smaller Images (M = 2.97, SD = 1.26). This suggests that higher Time perception is associated with a slower sense of time when viewing web pages with larger Images.

Significant findings were obtained for the main effect of Text (F(1, 216) = 32.32; p < .01); the incorporation of prompts within the Text (M = 4.25; SD = 1.51) resulted in a significantly elevated level of the Time perception experienced by participants in comparison to the neutral Text condition (M = 3.38; SD = 1.46). This suggests that participants perceived time to pass more slowly when exposed to Text containing prompts.

Table 6Univariate Analysis of Variance Time Perception Effect

Source	F	Sig
Vastness	30.359	<.001
Image size	122.725	<.001
Text	32.317	<.001
Vastness * Image size	1.645	.201
Vastness * Text	.008	.930
Image size * Text	1.101	.295

In addition, the Time perception was positively related to the time spent by the participant on the website (F(1, 215) = 5.36; p = .021). This means that participants with a high Time Perception measure also physically spent more time on the site.

Although the *p*-value for the Vastness * Image size * Text interaction is relatively close to the threshold of statistical significance (F(1, 216) = 3.48; p = .063), no additional interaction effects were observed (see Table 6).

4.3 Positive emotions

The main effect of Vastness was significant (F(1, 216) = 31.04; p < .01) and influenced the Positive emotions; participants experienced them more strongly on web pages with images of high Vastness (M = 4.96; SD = 1.41) than with low Vastness (M = 4.09; SD = 1.64).

The main effect of Image size was also significant (F(1,216) = 128.78; p < .01). The presence of large Images (M = 5.41, SD = 1.01) caused a greater level of Positive emotions among the participants compared to the small Images (M = 3.64, SD = 1.56).

The main effect of the Text was significant (F(1, 216) = 28.55; p < .01) which indicates that Text with a prompt causes more Positive emotions among users (M = 4.94; SD = 1.43) than neutral Text without prompts (M = 4.1; SD = 1.63).

Table 7Univariate Analysis of Variance Positive emotions Effect

Source	F	Sig
Vastness	31.040	<.001
Image size	128.781	<.001

Text	28.548	<.001
Vastness * Image size	.639	.425
Vastness * Text	1.201	.274
Image size * Text	.088	.767
Vastness * Image size * Text	2.933	.088

Moreover, participants who reported experiencing a greater number of Positive emotions while interacting with the website spent more time exploring the web page (F(1, 215) = 13.88; p < .01). No further interaction effects were detected (see Table 7).

4.4 Architecture appreciation

Vastness emerged as a significant factor (F(1, 216) = 21.55; p < .01) influencing the Architecture appreciation; participants reported significantly stronger occurrences of Architecture appreciation on web pages featuring images with high Vastness (M = 5.16; SD = 1.49) compared to those displaying low vastness (M = 4.31; SD = 1.79).

The impact of Image size achieved considerable statistical significance (F(1,216) = 80.42; p < .01) and exerted a discernible influence on participants' encounters associated with the Architecture appreciation. Participants displayed significantly stronger perceptions of the Architecture appreciation when exposed to web pages featuring larger Images (M = 5.56, SD = 1.05) compared to those showcasing smaller Images (M = 3.91, SD = 1.83).

The main effect of Text was significant (F(1, 216) = 19.99; p < .01) and influenced the Architecture appreciation; participants experienced it more strongly on web pages with prompts in the Text (M = 5.15; SD = 1.5) compared to the neutral Text (M = 4.32; SD = 1.79).

Table 8

Source	F	Sig
Vastness	21.547	<.001
Image size	80.423	<.001
Text	19.997	<.001
Vastness * Image size	.643	.423
Vastness * Text	.021	.884
Image size * Text	.021	.884
Vastness * Image size * Text	2.731	.100

The Time spent by users on the web page was positively related to a higher level of the Architecture appreciation (F(1, 215) = 25.54; p < .01). No additional interaction effects emerged (see Table 8).

4.5 Webpage evaluation

Vastness demonstrated a significant main effect (F(1, 216) = 26.73; p < .01) that exerted influence on the Webpage evaluation; participants rated the website much higher if there were images with high Vastness (M = 4.39; SD = 1.59), as opposed to those that contained images with low Vastness (M = 3.54; SD = 1.49).

The main effect of the Image size was also significant (F(1,216) = 109.86; p < .01). The presence of large Images (M = 4.83, SD = 1.42) created a higher Website evaluation among participants compared to small Images (M = 3.11, SD = 1.28).

The main effect of Text was found to be statistically significant (F(1, 216) = 20.4; p < .01); the inclusion of Text prompts (M = 4.34; SD = 1.54) induced a greater level of the Webpage evaluation among participants in comparison to the neutral Text condition (M = 3.59; SD = 1.57).

 Table 9

 Univariate Analysis of Variance Webpage evaluation Effect

Source	F	Sig
Vastness	26.728	<.001
Image size	109.858	<.001
Text	20.402	<.001
Vastness * Image size	.385	.536
Vastness * Text	1.513	.220
Image size * Text	.631	.428
Vastness * Image size * Text	2.920	.089

The level of Connectedness with the architecture was found to be statistically significant (F(1, 215) = 11.73; p < .01) and positively related to users' opinions and Webpage evaluation. This indicates that participants who reported a higher sense of connection with architecture and design provided more favorable scores for the overall evaluation of the webpage, in comparison to individuals with a lower connection to architecture. No additional interaction effects were identified (see Table 9).

4.6 Opinion about company

Vastness emerged as a significant main factor (F(1, 216) = 16.68; p < .01) that significantly impacted the Opinion about company; participants had a more positive evaluation of the Opinion about the company when viewing web pages showing images with a high level of Vastness (M = 4.64; SD = 1.43) compared to images with a low level of Vastness (M = 3.97; SD = 1.57).

The influence of Image size was found to be highly significant (F(1,216) = 102.98; p < .01) and exerted a noticeable impact on the participants and their Opinion about the company. Participants demonstrated a much higher Opinion about the company during

viewing web pages showing larger Images (M = 5.13, SD = 1.15), as opposed to pages with smaller Images (M = 3.47, SD = 1.43).

Significant results were obtained for the main effect of Text (F(1, 216) = 14.94; p < .01); the presence of Text prompts (M = 4.62; SD = 1.41) led to a significantly greater level of the Opinion about company experienced by participants in comparison to the neutral Text (M = 3.99; SD = 1.59).

 Table 10

 Univariate Analysis of Variance Opinion about company Effect

Source	F	Sia
Source		Sig
Vastness	16.678	<.001
Image size	102.984	<.001
Text	14.94	<.001
Vastness * Image size	.015	.902
Vastness * Text	.255	.614
Image size * Text	.054	.817
Vastness * Image size * Text	1.348	.247

A positive relationship was also found between the Time spent by the participants on the company's web page and their Opinion about the company (F(1, 215) = 11.16; p = .001). This indicates that individuals who spent more time on the website tended to hold a more favorable opinion of the company. Additionally, the Connectedness level of the participants with architecture and design was found to be statistically significant (F(1, 215) = 7.54; p = .007) and positively associated with their Opinion about the company. These findings suggest that participants who reported a higher sense of connection with architecture and design

expressed more positive opinions regarding the company. No further interaction effects were detected (see Table 10).

5. Discussion

5.1 Discussion of results

The presented results of this study indicate that such elements of an architectural company's website as the vastness of the image used, its size and textual cues possess the potential to engender a favorable influence on the elicitation of awe within users and their subsequent opinions regarding the website and the company. However, no interaction effects were found.

The use of vastness in images on a web page has significantly influenced users, their perception of awe and opinion about the website. Previous studies have also confirmed that vast views of architectural spaces evokes emotional responses in people (Chirico et al., 2017; Hagen & Ostergren, 2006), creating an experience of awe (Negami & Ellard, 2021; Joye & Dewitte, 2016; Bai et al., 2021). These findings emphasize the profound impact of vast imagery on webpages, highlighting its ability to shape user engagement and evoke emotional experiences.

Nevertheless, the size of the images used most strongly influenced the study participants. The respondents who were shown webpages with large images were more prone to the awe's effect and gave a more positive opinion about the website. This result is in line with findings obtained in previous research (Back et al., 2020; Lorenzo et al., 2007). Furthermore, this proves that even small changes on the website, such as adding a few emotional hints to the text or size of the photo will have an impact on users. Moreover, the results of this study are also consistent with the findings of previous research conducted by Williams and Bargh (2008) and Dolan et al. (2019) on emotional text content, further strengthening the coherence between these studies.

Previous studies have shown that people feel time availability due to awe (Rudd et al., 2012) and are therefore willing to spend more time (Guan et al., 2019), which was also confirmed by participants in this study who physically spent more time on the website. The time spent on the site appeared to be positively related to such constructs as time perception, positive emotions, architectural appreciation and opinion about the company. In a real-life setting, as opposed to an online survey, the outcomes of such a study could be more vivid and significant, as the experience of awe exerts a significant influence on temporal perception, leading to a subjective expansion of time for individuals (Yaden et al., 2018; Tang, 2020; Quesnel & Riecke, 2018). In conclusion, these findings support the idea that inducing awe in website visitors can lead to increased time engagement and positive perceptions, suggesting its potential benefits for businesses and user experiences.

In addition, the results of the study show that the user's connection with architecture and design also affects the user's opinion and evaluation of the website, which is also confirmed by the results of studies by Faliagka et al. (2015) and Koutsabasis and Istikopoulou (2013). This is also consistent with a study conducted by Hekkert and Van Wieringen (1996), in which they demonstrated that people with experience in a particular field, such as architecture, tend to have increased sensitivity and respond more positively to design-related stimuli due to accumulated knowledge and familiarity with examples of high-quality design. These findings highlight the broader implications of the study, suggesting that the influence of awe and architectural appreciation on user experiences can extend beyond the realm of architecture itself. It suggests that inducing awe and employing thoughtful design principles can potentially enhance user engagement and perception across various spheres, not limited to architecture alone.

5.2 Limitations and future research

The study used images of the Wonderwoods building, which is still under construction (MVSA Projects, 2020). Therefore, the study did not use real photos of the building, but 3D models of the building constructed in the program from different sides. There are a limited number of these images. Joye and Dewitte (2016) classify computer-generated models used in their study as building surrogates. The primary point of contention concerning these surrogate images revolves around their authenticity and persuasiveness (Sevenant & Antrop, 2011). Moreover, prior research on the external validity of environmental surrogates has predominantly focused on exploring individuals' preference responses to environments (Palmer & Hoffman, 2001), paying comparatively less attention to the particular emotional and behavioral facets investigated in this study, namely awe.

In addition to the fact that the photos used show different perspectives and angles of the building, they also show different lighting. Various factors, including culture, nationality, and personality traits, shape people's perception of day and night views (Huang & Wang, 2018). The presence of darkness and nighttime elements in images can evoke a dual emotional response of apprehension and intrigue (Baker, 2015), while abundant natural daylight in architectural design enhances spatial perception and fosters a sense of joy and pleasure (Hourani & Hammad, 2012). Considering these factors, the lighting conditions in photos may influence participants' selection of awe-inspiring images in the pretest.

Another limitation of this study is that camera angle may influence the perceived sense of vastness when viewing nature images. For instance, capturing nature scenes from a lower camera angle, such as a ground-level perspective, enhances the perceived depth and vastness of the landscape (Yaden et al., 2017; Peeples, 2011). Similarly, consider pictures of Earth taken from space, where the camera angle showcases the planet's vastness, evoking a

sense of awe (Allen, 2018). The specific camera angles used in the presented nature pictures may have influenced participants' perception of vastness, potentially affecting their responses.

Awe is a feeling that arises in reaction to overwhelming stimulus, such as environmental factors, works of art, powerful figures, or even theories (Negami & Ellard, 2021) and this feeling can be both positive and negative. Despite the fact that in this study awe was considered only as a predominantly positive emotion (Yaden et al., 2018), it is also important to note that there is also a negative side of the awe effect. A negative version of awe may arise in response to threatening stimuli, such as natural disasters (earthquake or tornado) or other terrifying events (terrorist attack) (Gordon et al., 2017). In the context of Nazi Germany, the deliberate utilization of space and architecture generated an almost ethereal and captivating sense of mass fascination and awe, evoking a nervous state of fascination, admiration, and fear among participants and observers (Hagen & Ostergren, 2006).

5.3 Conclusion

The implications of the findings underscore the significance of conducting awe research specifically focused on company websites, which has been a relatively unexplored area thus far. By exploring the impact of awe on user experiences in the context of company websites, researchers can uncover new insights into the role of emotional design and its potential to enhance user engagement and perception in the digital realm. Understanding how awe-inducing elements and thoughtful design principles can be effectively incorporated into website interfaces could revolutionize the way businesses and organizations approach online user experiences.

This study addresses this gap in research, demonstrating by the example of an architectural company that even with the help of basic visual elements, such as images and text, it is possible to evoke a deep sense of awe in users and effectively influence their

opinion. These results highlight the potential of using visual components to awe and increase user engagement, offering valuable information to any companies seeking to optimize the design of their websites. Furthermore, this study provides a foundation for future research to explore the optimal integration of awe-inspiring elements in digital interfaces of company websites, informing future design practices and contributing to the advancement of knowledge in this domain.

Silvia et al. (2015) suggested that, given the transforming power of awe emotional experience and its intrinsic complexity, inducing strong awe experience within controlled research laboratory conditions becomes difficult. However, the integration of modern technologies, such as artificial intelligence and virtual reality, within the context of website design is already demonstrating their potential to generate and sustain a sense of awe (Khare et al., 2023; Chirico et al., 2017). This utilization allows companies to gain a deeper understanding of e-consumers' preferences while simultaneously exerting influence over their perceptions. As these technological advancements continue to evolve, it is foreseeable that the incorporation of awe-inspiring elements on the websites of most companies will become increasingly prevalent. By harnessing the power of awe, these technological advancements have the capacity to enhance user engagement, foster a more positive opinion about the company's product, and establish stronger connections between users and organizations.

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Appendix A. Images used in the pre-test





Appendix B. Created webpages

Wonderwoods

A green island in an urban environment.



LOCATION: PROGRAMME: Utrecht offices, apartments,

hospitality, retail, COMPLETION: parking

2024

By 2050, almost 90% of Europeans will live in a city. How can we maximize our exposure to fresh air and green spaces? Wonderwoods is our answer to that question.

This is a wonder to behold and draws you in. Can you imagine passing by this piece of architectural beauty, feeling the presence of something grand?

MVSA HQ

in info@mvsa-archits.com

Wonderwoods

A green island in an urban environment.



MV SA

LOCATION:

Utrecht

PROGRAMME: offices, apartments, hospitality, retail,

COMPLETION:

2024

By 2050, almost 90% of Europeans will live in a city. Given the increasing density of our urban environments, how can we maximize our exposure to fresh air and green spaces? Wonderwoods is our answer to that question.

parking

Wonderwoods creates a healthy urban microclimate in the heart of Utrecht, building a balance between nature and the urban environment.



MVSA HQ info@mvsa-archits.com

Wonderwoods

A green island in an urban environment.





PROGRAMME: offices, apartments, hospitality, retail,

COMPLETION:

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2024

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This is a wonder to behold and draws you in. Can you imagine passing by this piece of architectural beauty, feeling the presence of something grand?

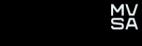
in ©

MVSA HQ

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Appendix C. Survey questions

Main test FINAL

Start of Block: Intro-

Intro Thanks for checking out the Qualtrics Surveys Question Walkthrough! This survey will help explain the question types and features offered with your free Qualtrics Survey account.

First things first, this question is a "Descriptive Text" question. In Qualtrics, each piece of a survey is considered a question, so this is a "question" that doesn't require any input from the user. It just allows you to provide instructions, clarify why you're asking questions, or add hands/ links to outside sites that give more information.

You can also do further text editing by using the <u>Rich Content Editor</u> (the blue button above this question text when you click on it to edit), including *italics* and **bolding**. You can also change the color, size, or font of your text. Additionally, you can add images, files, or even videos - anything you need to show your participant or respondent before they answer a question.

There's another type of "Descriptive Text" question, but it doesn't actually allow for written word. This question, the "Graphic" question, is pretty much just an image. You can see an example of this below! You can add a graphic you've uploaded from your library, or you can link one from another website using the image's URL.

Behold my beautiful placeholder below and then click the "Next" button to advance to the next page!

I agree to the terms and conditions (4)	
Page Break ————————————————————————————————————	

End of Block: Intro
Start of Block: Age+Gender
Age Which category below includes your age?
O 18-24 (1)
O 25-34 (2)
O 35-44 (3)
O 45-54 (4)
O 55-64 (5)
○ 65 or older (6)
Gender What gender do you identify as?
O Female (1)
○ Male (2)
Other (3)
O Prefer not to answer (4)
Q31 Click to write the question text Browser (1) Version (2) Operating System (3) Screen Resolution (4) Flash Version (5) Java Support (6)
User Agent (7) End of Block: Age+Gender

Start of Block: Link description

Description On the next page there will be a link, clicking on which will automatically open a new tab with the project from the website of the architectural company. Please take a close look at the architectural project and carefully view the whole webpage. After that, please return to the questionnaire, there will be several questions related to this project.

End of Block: Link description	
Start of Block: Time+ Link	
Page Break ————————————————————————————————————	_

Q12 Timing First Click (1) Last Click (2) Page Submit (3) Click Count (4)
$X_{\bullet} X_{\bullet} X_{\bullet}$
Links Please click on the link below. After viewing the link, please go back to this survey page and click on the circle next to the link (it should turn dark).
O Wonderwoods project 1 (1)
O Wonderwoods project 2 (2)
○ Wonderwoods project 3 (3)
○ Wonderwoods project 4 (4)
O Wonderwoods project 5 (5)
O Wonderwoods project 6 (6)
O Wonderwoods project 7 (7)
○ Wonderwoods project 8 (8)
End of Block: Time+ Link
Start of Block: Statements
Description Thank you for viewing the project page. Now there will be questions related to the page of this project. Please indicate to what extent you agree with the following statements on a scale from "Strongly Disagree" to "Strongly Agree".

	Strongly Disagree (1)	Moderately Disagree (2)	Somewhat Disagree (3)	Neutral (4)	Somewhat Agree (5)	Moderately Agree (6)	Strongly Agree (7)
Being in the presence of something grand. (1)	0	0	0	0	0	0	0
Being in the presence of greatness. (2)	0	0	0	0	0	0	0
Perceiving something vast. (3)	0	0	0	0	0	0	0
Experiencing something that was much larger than me. (4)	0	0	0	0	0	0	0
My eyes widened when I saw this view. (5)	0	0	0	0	0	0	0
Page Break							

Time Please indicate to what extent you agree with the following statements:

	Strongly Disagree (1)	Moderately Disagree (2)	Somewhat Disagree (3)	Neutral (4)	Somewhat Agree (5)	Moderately Agree (6)	Strongly Agree (7)
I feel like I might be able to look at this view for a long time. (1)	0	0	0	0	0	0	0
This view makes me lose track of time easily.	0	0	0	0	0	0	0
This view makes me slow down. (3)	0	0	0	0	0	0	0
I feel like time doesn't exist when I'm gazing at this view. (4)	0	0	0	0	0	0	0
Page Bre	ak ——						

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Positive emotions Please indicate to what extent you agree with the following statements:

		(2)	(3)	(4)	Agree (5)	Agree (6)	(7)
This building looks like a wonder. (1)	0	0	0	0	0	0	0
This building is awe- inspiring. (2)	0	0	0	0	0	0	0
This building attracted all my attention.	0	0	0	0	0	0	0
This project looks amazing. (4)	0	0	0	0	0	0	0
This project looks fascinating. (6)	0	0	0	0	0	0	0

Page Break ---

Interest Please indicate to what extent you agree with the following statements:

	Strongly Disagree (1)	Moderately Disagree (2)	Somewhat Disagree (3)	Neutral (4)	Somewhat Agree (5)	Moderately Agree (6)	Strongly Agree (7)
It would be great to live inside this building. (1)	0	0	0	0	0	0	0
It would be great to live next to this building. (2)	0	0	0	0	0	0	0
It would be great to see this building from my window. (3)	0	0	0	0	0	0	0
It would be great if more buildings in my city would look like this building. (4)	0	0	0	0	0	0	0
Page Brea	ak ——						

Webpage Please indicate to what extent you agree with the following statements:

	Strongly Disagree (1)	Moderately Disagree (2)	Somewhat Disagree (3)	Neutral (4)	Somewhat Agree (5)	Moderately Agree (6)	Strongly Agree (7)
It was interesting for me to explore this webpage. (1)	0	0	0	0	0	0	0
The webpage looks attractive. (2)	0	0	0	0	0	0	0
The webpage is appealing. (3)	0	0	0	0	0	0	0
I would like to spend more time on this website. (4)	0	0	0	0	0	0	0
I would like to visit this website again. (6)	0	0	0	0	0	0	0

Company opinion Please indicate to what extent you agree	e with the	following	statements:
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	Strongly Disagree (1)	Moderately Disagree (2)	Somewhat Disagree (3)	Neutral (4)	Somewhat Agree (5)	Moderately Agree (6)	Strongly Agree (7)
This architectural company is very prestigious.	0	0	0	0	0	0	0
This architectural company is one of the best in its field. (2)	0	0	0	0	0	0	0
This is a high-end company. (3)	0	0	0	0	0	0	0
I would like to see other buildings of this architectural firm. (4)	0	0	0	0	0	0	0

Start of Block: Connectedness

Connectedness Can you say that you have some kind of connection with architecture or design (e.g., you like it or your field of activity is somehow related to it)?

	Strongly not connected (1)	Moderately not connected (2)	Somewhat not connected (3)	Neutral (4)	Somewhat connected (5)	Moderately connected (6)	Strongly connected (7)
I am to architecture. (1)	0	0	0	0	0	0	0