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Website Interactivity and Repeated Exposure, what Influences User Experience?

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Abstract: This paper reports a study of the influence of website design and repeated exposure to websites on user judgment. Thirty respondents participated in this study; each respondent viewed three websites on three occasions, with a two-week gap between each visit. The three websites differed at their interactivity level; a basic site with limited interactivity, an interactive website with customization features, and a highly interactive website with a virtual agent. Several criteria were assessed through questionnaires. Interviews were conducted to support questionnaire results. Finally, the relative importance of the quality criteria and websites overall preferences were investigated. Results showed that respondents were more positive about the websites with higher interactivity, and the preference for the more interactive site increased over time.

Keywords: User experience, website interactivity, repeated exposure
Categories: H.5.2

1 Introduction

Practical and academic studies have developed frameworks for addressing user experience by applying two research approaches: the qualitative approach that understands the meaning of experience in context [McCarthy, 05], and the quantitative approach which has developed metrics to measure user experience [Hassenzahl, 03], [Jordan, 00], [Norman, 04]. Several factors such as aesthetics [Lavie, 04], user characteristics (culture) [Arhippainen, 03], emotions [Norman, 04], [Picard, 97] and user expectations [Mäkelä, 01] have been researched to study user experience. However, the influence of website interactivity has received little attention. The conventional usability literature has concentrated on first-time user experiences with interactive systems [Courage, 09]; in addition, most of the existing user experience evaluation methods focus on a single behavioural experience and momentary evaluations [Vermeeren, 10]. Although time is considered to be an important factor influencing user experience [Courage, 09], [Karapanos, 09], very few studies have been conducted to show how user experience evolves over time [Karapanos, 09]. This paper investigates the effect of website interactivity and repeated exposure on user experience; it also investigates the relative importance of various criteria in influencing overall judgments of websites. The next section is a

review of related research, and then the study methods are described. The results of each exposure are presented: quantitative data, relative importance of criteria, overall preferences for websites, and analysis of the qualitative interview data. The paper concludes with a summary of the results and a discussion.

2 Related Research

Interactivity has been shown to be a critical factor in product evaluation and can be linked to pragmatic and hedonic criteria that influence users' overall preferences [Diefenbach, 11]. [Cyr, 09] showed that perceived website interactivity can be related to e-commerce website criteria such as efficiency, enjoyment, trust and loyalty; in addition, [O'Brien, 10] considered users' interactive experience as one of the e-shopping motivations, but the relation between interactive features and users' preferences remains vague since the interactive features were not experimentally manipulated. However, [Teo, 03] found a significant effect of higher interactivity on user satisfaction, value and overall attitude in an e-commerce shopping application by experimentally manipulating interactivity with several features such as chat and feedback forms. [Sutcliffe, 05] showed that interactive metaphors positively affect users' judgment of website design, satisfaction and engagement; in addition, they found that interaction may have a positive effect on users' perception of content. Time has also been shown to be an important factor influencing user experience. However, most user experience evaluation methods were based on a single experience; only 36% were based on long-term experiences [Vermeeren, 10]. In a longitudinal study over eight weeks of monitoring middle-school teachers whilst they created websites, [Mendosa, 05] discovered that the reasons for users' dissatisfaction varied noticeably over time. In addition, [Karapanos, 08] found that goodness determinants changed over time, showing that pragmatic attributes strongly affected the evaluation of goodness in the first experience of using a pointing device; identification was shown to have a strong effect after four weeks of using the product. Several models have been proposed to elicit the relative importance of usability and non-instrumental qualities on users' overall judgments. [Hassenzahl, 03], for example, claimed that both qualities contribute approximately equally; [Tractinsky, 00] suggested that they may be correlated; and [Jordan, 00] showed that they are hierarchical.

3 Study Design

3.1 Participants

The study consisted of thirty respondents; twelve were males and eighteen females, twenty-seven were postgraduate students and three were employees. Twelve respondents were aged 18-25, sixteen aged 26-35, one aged 36-45 and one was older. Participants, from a variety of countries, were recruited through advertising the study on the University of Manchester portal. There were five respondents from China, three from each of UK, Egypt and Nigeria, two from Bahrain, Greece and Iran, and

one from Bulgaria, Canada, India, Jordan, Lebanon, Palestine, Romania, Russia, Thailand and Vietnam.

3.2 Procedure

Participants were recruited through advertising the study on the University of Manchester portal. Respondents were asked to participate in this study for three times with a two-week gap between each visit.

Participants were asked to fill a pre-test questionnaire consisting of demographic information (age, gender, nationality, occupation and a brand awareness question) they then had to perform a task on each of three websites; the task was identical in each of the three visits. The site order was identical for the same individual but it was counter-balanced across individuals.

After performing the task; respondents were asked to evaluate each website using a post-test questionnaire consisting of six scales: expressive aesthetics, usability, pleasurable interaction, service quality [Lavie, 04], content scale adapted from Bernier Instructional Design [De Angeli, 06] and overall judgment. They were asked to rank these scale criteria according to their view of importance (aesthetics, usability, pleasurable interaction, service quality, content and brand) in influencing their overall judgment of a website; a forced choice format was used, i.e. respondents were not allowed to assign the same rank to more than one criterion. 1 represented most important and 6 least important. They were then asked to rank the websites according to their overall preference and persuasiveness. Finally participants were interviewed to elicit their opinions on each website.

3.3 Websites

The three websites used in the study were commercial websites from different domains and were hosted in the UK: IKEA, NIKE and ALDI (see Figures 1-3).

IKEA is an interactive website that sells ready-to-assemble home products and furniture such as beds, kitchens and home accessories. Respondents were directed to view certain pages of the website, and were then asked to interact with the virtual agent. NIKE is an interactive website that sells sportswear products such as training suits, shoes and sports equipment; it provides the option of customizing sports products according to customers' preferences. Respondents were directed to view certain pages of the website, and were then asked to customize their trainer according to their own preference. ALDI is a standard website with minimal interactive features used for grocery shopping; it is famous for its low-priced products and bargains. Respondents were directed to view certain pages of the website, and were then asked to add products to the shopping list.

These websites were selected for their different levels of interactivity: the ALDI website has very limited interactive features, NIKE is an interactive website with customization features and IKEA is a very interactive website that contains variety of interactive features and a virtual agent. Although all are examples of e-commerce, the three websites represent different domains because, after extensive online search, no sites from the same domain with different interactivity levels were found. Interactivity should be exciting and more arousing, so it was expected that users would prefer more interactive websites and that their preference for interactive websites would become

stronger over the three visits, i.e. it was expected that IKEA would be the most preferred, followed by NIKE and then ALDI; in addition, it was expected that the IKEA evaluation will become even more positive over time.

The following hypotheses were therefore tested in this study:

H1: website interactivity will have a strong influence on respondents' preferences.

H1.a respondents will prefer the website with more interactive features.

H1.b respondents will least prefer the websites with less/no interactive features.

H2 preference for interactive sites will become stronger over the repeated visits.

The three website brands were all familiar to respondents. They were asked to indicate their awareness of each brand on a scale from 1 to 7. Repeated measures ANOVAs were conducted to analyze the differences in respondents' brand awareness of IKEA, NIKE and ALDI. Results showed that there was no significant difference of brand awareness between the three websites therefore, it was expected that brand would not influence respondents' judgments.

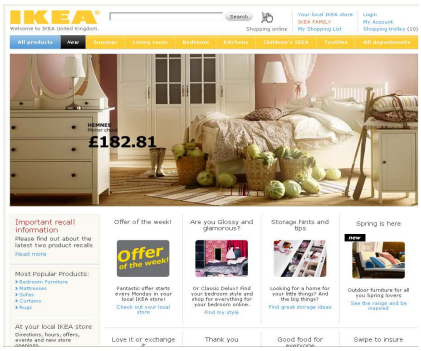

Figure 1: IKEA homepage

Figure 2: NIKE homepage

Figure 3: ALDI homepage

4 Results

Cronbach alphas were calculated to explore the internal consistency of the questionnaire scales. Cronbach alpha values ranged from 0.86 to 0.98 for all scales; the aggregate averages for all scales were used in subsequent statistical tests.

4.1 Questionnaire Results

4.1.1 Visit 1

Repeated measures ANOVAs were conducted to analyze the inter-site differences between IKEA, ALDI and NIKE on the first visit. UX indexes (aggregate averages on all the questions of each scale) were entered as dependent variables. The analysis returned significant results on aesthetics F (2, 58) = 13.95, $p < 0.001$, ηp2 = 0.33, pleasurable interaction F (2, 58) = 8.14, $p < 0.01$, ηp2 = 0.22, content F (2, 58) = 3.32, $p < 0.05$, ηp2 = 0.10 and overall judgment F (2, 58) = 8.71, $p < 0.001$, ηp2 = 0.23. Inspection of the mean values indicated that the significant results were due to the poor evaluation of the ALDI website. Post hoc results showed that the significant differences were between IKEA – ALDI, and NIKE – ALDI, apart from content where the difference was between NIKE and ALDI. No significant differences were found in usability and service quality between the three websites; see Tables 1 and 2.

Criterion	IKEA		ALDI		NIKE	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Aesthetics	5.23	1.31	3.69	1.60	5.50	1.36
Usability	5.76	1.125	5.38	1.44	5.56	1.39
Pleasure	5.37	1.31	4.22	1.61	5.48	1.22
Service quality	5.41	1.134	5.22	1.17	5.52	1.11
Content	5.52	1.048	5.16	1.22	5.78	0.97
Excitement	5.08	1.32	4.19	1.20	5.27	1.13
Overall judgment	5.77	1.11	4.64	1.49	5.61	1.04

Table 1: Descriptive statistics: first visit

NIKE*ALDI

IKEA*ALDI and NIKE*ALDI

	IKEA	ALDI	NIKE
Aesthetics	2	3	1
Usability	1	3	2
Pleasure	2	3	1
Service quality	2	3	1
Content	2	3	1
Excitement	2	3	1
Overall judgment	1	3	2

Table 2: Rank order of means and inter-site differences: first visit
Colour codes indicate significant differences between the sites in post hoc tests

4.1.2 Visit 2

Repeated measures ANOVAs analysis returned significant results on aesthetics $F(2, 58) = 16.42$, $p < 0.001$, $\eta p2 = 0.36$, pleasurable interaction $F(2, 58) = 9.45$, $p < 0.001$, $\eta p2 = 0.25$, service quality $F(2, 58) = 3.41$, $p < 0.05$, $\eta p2 = 0.11$, content $F(2, 58) = 3.25$, $p < 0.05$, $\eta p2 = 0.10$ and overall judgment $F(2, 58) = 8.30$, $p < 0.01$, $\eta p2 = 0.22$. Inspection of the mean values indicated that the significant results were due to the poor evaluation of the ALDI website. Post hoc results showed that the significant difference was between IKEA – ALDI, and NIKE – ALDI, apart from service quality and content where the difference was between only NIKE and ALDI. No significant difference was found in usability between the three websites; see Tables 3 and4.

Criterion	**IKEA**		**ALDI**		**NIKE**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Aesthetics	5.55	1.38	3.77	1.54	5.36	1.32
Usability	5.55	1.36	5.37	1.21	5.19	1.20
Pleasure	5.31	1.38	4.28	1.41	5.56	1.13
Service quality	5.61	1.11	5.20	0.99	5.69	0.85
Content	5.63	1.01	5.27	1.00	5.77	0.80
Excitement	5.21	1.33	4.26	1.12	5.27	0.88
Overall judgment	5.80	1.30	4.67	1.34	5.61	0.94

Table 3: Descriptive statistics: second visit

IKEA*ALDI and NIKE*ALDI
NIKE*ALDI

	IKEA	ALDI	NIKE
Aesthetics	1	3	2
Usability	1	2	3
Pleasure	2	3	1
Service quality	2	3	1
Content	2	3	1
Excitement	2	3	1
Overall judgment	1	3	2

Table 4: Rank order of means and inter-site differences: second visit
Colour codes indicate significant differences between the sites in post hoc tests

4.1.3 Visit 3

Repeated measures ANOVAs analysis returned significant results on aesthetics F (1.75, 50.64) = 31.75, $p < 0.001$, ηp2 = 0.52, pleasurable interaction F (2, 58) = 9.53, $p < 0.001$, ηp2 = 0.25, service quality F (2, 58) = 4.62, $p < 0.05$, ηp2 = 0.14, content F (2, 58) = 4.01, $p < 0.05$, ηp2 = 0.12 and overall judgment F (2, 58) = 9.3, $p < 0.001$, ηp2 = 0.24. Inspection of the mean values indicated that the significant results were due to the poor evaluation of the ALDI website. Post hoc results showed that the significant difference was between IKEA – ALDI, and NIKE – ALDI for aesthetics and pleasurable interaction, while the significant difference in service quality, content and overall judgment was only between IKEA and ALDI, with more positive evaluations given to IKEA. No significant difference was found in the usability between the three websites; see Tables 5 and6.

After repeated exposures IKEA scored higher than NIKE on all measures, whereas on the initial exposure NIKE was ranked first on 4 out of 6 measures.

Repeated measures ANOVAs were conducted to investigate the effect of repeated visits on user judgment within each site. UX indexes (aggregate averages on all the questions of each scale) were entered as dependent variables. The analysis returned significant results on two scales for the IKEA website only. Aesthetics was F (1.77, 51.28) = 5.3, $p < .05$, ηp2 = 0.16) and content F (1.71, 49.57) = 4.56, $p < .05$, ηp2 = 0.14) where IKEA's aesthetics and content were evaluated more positively over time, while no significant effect was shown for repeated visits to NIKE and ALDI websites.

Criterion	IKEA		ALDI		NIKE	
	Mean	SD	Mean	SD	Mean	SD
Aesthetics	5.77	1.27	3.63	1.35	5.67	1.30
Usability	5.77	1.27	5.61	1.05	5.33	1.37
Pleasure	5.69	1.20	4.20	1.49	5.30	1.61
Service quality	5.68	1.15	5.06	1.35	5.47	1.32
Content	5.89	.92	5.31	1.22	5.78	1.02
Excitement	5.42	1.17	4.16	1.13	5.09	1.33
Overall judgment	5.97	.96	4.67	1.66	5.51	1.35

Table 5: Descriptive statistics: third visit

IKEA*ALDI and NIKE*ALDI
IKEA *ALDI

	IKEA	ALDI	NIKE
Aesthetics	1	3	2
Usability	1	2	3
Pleasure	1	3	2
Service quality	1	3	2
Content	1	3	2
Excitement	1	3	2
Overall judgment	1	3	2

Table 6: Rank order of means and inter-site differences: third visit
Colour codes indicate significant differences between the sites in post hoc tests

4.2 Criteria Ranking

Respondents ranked the criteria by their importance in influencing their overall website judgment in a forced-choice format. Ranking results were calculated by summing the rank order totals and calculating the mean and SD for each criterion, with the lowest total and mean value indicating the most important influence (rank 1).

4.2.1 Visit 1

Respondents showed a consistent picture in their criteria ranking of the three websites on their first visit, where usability and content were the most important while service quality, aesthetics and pleasure were generally considered as less important; see Table 7.

IKEA				ALDI				NIKE			
criterion	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**
Usability	82	2.73	1.01	Usability	74	2.47	1.43	Usability	87	2.90	1.65
Content	91	3.03	1.35	Content	82	2.73	1.36	Content	91	3.03	1.61
Aesthetics	107	3.57	2.03	ServQual	109	3.63	1.27	Brand	103	3.43	2.11
Brand	109	3.63	1.99	Brand	112	3.73	2.03	Pleasure	106	3.53	1.48
Pleasure	111	3.70	1.80	Pleasure	124	4.13	1.53	Aesthetics	118	3.93	1.68
ServQual	130	4.33	1.52	Aesthetics	129	4.30	1.80	ServQual	125	4.17	1.44

Table 7: Criteria rank totals and mean values, post-task: first visit
Lower scores denote higher overall importance

4.2.2 Visit 2

On the second visit; respondents showed a picture in their criteria ranking of the three websites consistent with the first visit, where usability and content were the most important while service quality, aesthetics were generally considered as less important. Pleasure occupied relatively higher positions on the second visit compared with the first visit; see Table 8.

IKEA				ALDI				NIKE			
criterion	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**
Usability	81	2.70	1.44	Usability	72	2.40	1.40	Usability	85	2.83	1.49
Content	90	3.00	1.34	Content	73	2.43	1.30	Content	97	3.23	1.30
Pleasure	98	3.27	1.72	Pleasure	118	3.93	1.34	Brand	99	3.30	2.02
Aesthetics	104	3.47	1.94	ServQual	118	3.93	1.57	Pleasure	106	3.53	1.55
Brand	118	3.93	1.93	Aesthetics	120	4.00	1.80	Aesthetics	109	3.63	1.99
ServQual	139	4.63	1.13	Brand	129	4.30	1.78	ServQual	134	4.47	1.48

Table 8: Criteria rank totals and mean values, post-task: second visit
Lower scores denote higher overall importance

4.2.3 Visit 3

On their third visit, respondents were also consistent, considering usability and content as the most important criteria, except for NIKE where brand occupied the first rank. Service quality and aesthetics were still considered as less important; see Table 9.

IKEA				ALDI				NIKE			
criterion	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**	**criterion**	**total rating**	**mean**	**SD**
Content	89	2.97	1.27	Usability	62	2.07	1.17	Brand	92	3.07	2.18
Usability	97	3.23	1.70	Content	78	2.60	1.45	Usability	92	3.07	1.44
Aesthetics	97	3.23	1.83	Pleasure	114	3.80	1.58	Content	98	3.27	1.17
Brand	107	3.57	2.03	ServQual	117	3.90	1.52	Pleasure	99	3.30	1.51
Pleasure	111	3.70	1.56	Aesthetics	126	4.20	1.40	Aesthetics	109	3.63	1.83
ServQual	129	4.30	1.60	Brand	133	4.43	1.79	ServQual	140	4.67	1.54

Table 9: Criteria rank totals and mean values, post-task: third visit
Lower scores denote higher overall importance

4.3 Preference and Persuasiveness

Respondents were asked to rank the websites according to their overall preference and persuasiveness; a forced-choice format was used, 1 representing the most preferred website and 3 the least preferred. The average scores of each website was calculated.

On the first visit, IKEA was ranked first for overall preference, followed by NIKE and then ALDI; NIKE was ranked first followed by IKEA and ALDI in terms of persuasiveness (see Table 10).

Website	Preference	Persuasiveness
IKEA	1.63	1.76
NIKE	1.96	1.73
ALDI	2.4	2.5

Table 10: Website preferences mean scores; first visit
Lower scores denote higher overall preference

On the second visit, IKEA was ranked first for overall preference, followed by NIKE and then ALDI; in addition, IKEA was ranked first followed by NIKE and ALDI in terms of persuasiveness (see Table 11).

Website	Preference	Persuasiveness
IKEA	1.60	1.56
NIKE	1.83	1.93
ALDI	2.56	2.5

Table 11: Website preferences mean scores: second visit
Lower scores denote higher overall preference

On the third visit, IKEA was ranked first for overall preference, followed by NIKE and then ALDI; in addition, IKEA was ranked first followed by NIKE and

ALDI in terms of persuasiveness (see Table 12). Respondents had a consistent preference over the three visits, with IKEA ranked first followed by NIKE and ALDI. In addition, respondents were consistent in their evaluation of persuasiveness: in the second and third visits IKEA was positioned at the top followed by NIKE then ALDI. See Table 12.

Website	Preference	Persuasiveness
IKEA	1.53	1.46
NIKE	2.06	2.1
ALDI	2.4	2.43

Table 12: Website preferences mean scores: third visit
Lower scores denote higher overall preference

4.4 Interview Results

Interviews were analyzed by coding and aggregating features relating to design and qualities related to the questionnaire scales. The coding scheme involved main and sub-categories; the main categories were aesthetics, website design, usability, pleasurable interaction, website quality, content, website identity, overall impression and website features. The categories were derived from participant responses.

4.4.1 First visit

Website design, features and aesthetics were most frequently mentioned by respondents for IKEA's first visit. Respondents were fairly positive about the IKEA website. The most positive categories were content, with 100% positive comments: P-28 "I think it is very informative about its products"; overall judgment 96% positive comments: P-16 "Everything is fine about it, there is nothing I don't like"; and design 83% positive comments: P-25 "The website design was quite good". The categories which received fewer positive comments were website features with 58% positive comments, and usability with 64% positive comments. 90% of the total usability negative comments were related to difficulty in finding the virtual agent: P-5 "It is just difficult for me to find Ask Anna". Based on criteria net valency (Number of positive comments – Number of negatives, discarding neutral scores) IKEA was rated best on the first visit by respondents' overall preferences; see Table 13.

Website design, aesthetics and overall judgment were the most frequent features mentioned by respondents for NIKE's first visit; see Table 13. The best categories were overall judgment, with 97% positive comments: P-25 "It is really amazing. It is really fascinating"; design with 81% positive comments: P-17 "I like the design"; and website features with 73% positive comments: P-4 "It is amazing how many things you can basically modify in a shoe and how flexible those guys can be about configuring a shoe and the way they attach you somehow to this product". The worst category for NIKE was service quality; 100% of comments relating to response time were negative: P-27 "It takes time to load from one page to the other".

Aesthetics, design and usability were the most frequent features mentioned by respondents for ALDI's first visit; see Table 13. The best categories were overall

judgment, with 83% positive comments: P-5 "I like it"; and content with 76% positive comments P-27: "What I like is the special buys thing which gives information about the reduced price stuff". The worst categories were website design, with 60% negative comments: P-11 "I do not like the design"; and usability with 47% negative comments: P-15 "I do not think it is very user friendly and it makes me feel impatient". Based on criteria net valency (NV) ALDI was rated the worst on the first visit, supporting respondents' overall preferences; see Table 13.

	IKEA		NIKE		ALDI	
Criterion	**%**	**NV**	**%**	**NV**	**%**	**NV**
Aesthetics	18	9	19	7	25	4
Design	23	24	22	23	24	-7
Usability	9	4	14	7	18	2
Service Quality	1	-1	1	-5	1	-1
Content	9	15	9	5	16	13
Brand	1	2	1	1	1	-1
Overall	16	24	18	29	12	15
Website features	22	6	14	11	2	2
Enjoyment	1	1	2	3	1	1
Total	100	84	100	81	100	28

Table 13: Percentage of feature-related comments and net valency (NV): first visit

4.4.2 Second visit

Website features, design and aesthetics were the most frequent categories mentioned by respondents for IKEA and NIKE on the second visit; see Table 14. 100% of respondents' overall impression towards IKEA were positive; website design was also rated positively (85%): P-4 "I found out this website is really interactive; I have just tried the lighting thing switching between different light levels in the bathroom, the bedroom, and living room. It gives you a real hint or view of how the things would look". 82% of total content comments were positive: P-23 "It is elaborative enough and some information being explained and shown. So the information is clear". Based on criteria NV scores, IKEA was rated best on the second visit, which supported respondents' overall preferences; see Table 14.

Respondents were positive about NIKE content (81%): P-28 "I think it is very interesting in terms of its content"; and website design (80%): P-17 "The website design is a really nice". Respondents were negative about NIKE's speed, and 89% of total speed comments were negative: P-8 "The website took so much time to load when you clicked on anything; it is quite slow".

Aesthetics, design and content were mentioned most frequently for ALDI on the second visit. Respondents were positive about overall judgment (75%): P-20 "I think it is the best; there is nothing I don't like"; and content (74%). The worst categories were aesthetics, where 49% of comments were negative: P-23 "The colours are a bit dull"; and website design with 49% negative comments: P-27 "I would prefer it to be interactive. It doesn't add a lot". Based on criteria NV, ALDI was rated worst on the second visit, supporting the respondents' overall preferences, see Table 14.

	IKEA		NIKE		ALDI	
Criterion	**%**	**NV**	**%**	**NV**	**%**	**NV**
Aesthetics	23	22	29	10	31	1
Design	26	34	21	22	28	1
Usability	13	9	15	3	15	7
Service Quality	0.5	2	5	-7	0	0
Content	9	11	7	8	20	15
Brand	0.5	1	1	1	0	0
Overall	4	8	2	4	2.5	2
Website features	24	7	20	20	2.5	0
Enjoyment	0	0	0	0	1	1
Total	100	94	100	61	100	27

Table 14: Percentage of feature-related comments and net valency: second visit

4.4.3 Third visit

Website features, design, aesthetics and usability were most frequently mentioned by respondents for IKEA on the third visit; see Table 15. Respondents were fairly positive about the IKEA website, which is consistent with the first two visits.

Respondents liked the IKEA brand, and 100% of total brand comments were positive: P-15 "IKEA is a very reliable brand so it brings to you the good quality and good price"; design (90% of comments were positive): P-7 "It is well designed"; and aesthetics (81%): P-29 "The colour scheme is very easy to look at". Based on criteria NV, IKEA was rated best on the third visit, which supported respondents' overall preferences; see Table 15.

Design, usability and aesthetics were the most frequent features mentioned by respondents for NIKE on the third visit; see Table 15. 100% of total features comments were positive: P-19 "What I most like about the NIKE website is that we can customize everything up to the shoelace, and we can even have initials, names, any kind of words written on it, and it is a very personalized gift"; and brand, with 100% of comments being positive: P-21 "The brand itself makes me more interested in the design". The worst category was service quality, where 82% of total comments related to website response time were negative: P-16 "It was very slow".

Usability, design and content were most frequently mentioned by respondents for ALDI on the third visit, see Table 15. They were least positive about ALDI, which is consistent with the first two visits. The best categories were content with 64% of

comments being positive: P-24 “I quite like the content”; and usability (64%): P-9 “It is very easy to use”. The worst categories were aesthetics, with 61% of being negative: P-23 “I still think their colour is a bit too dull”; and overall judgment (55% negative): P-16 “Nothing very special about it”; see Table 15.

	IKEA		NIKE		ALDI	
Criterion	**%**	**NV**	**%**	**NV**	**%**	**NV**
Aesthetics	15	14	15	7	12	-4
Design	20	24	21	20	22	2
Usability	15	12	18	4	30	12
Serv. Qual	0	0	13	-11	1	2
Content	10	9	11	11	19	8
Brand	3	5	4	5	2	1
Overall	10	13	5	6	8	-1
Website features	26	13	12	16	5	4
Enjoyment	1	2	1	1	1	-1
Total	100	92	100	59	100	23

Table 15: Percentage of feature-related comments and net valency: third visit

Respondents who chose IKEA as their overall preference were explicitly asked about the reasons for this choice. They fell into four categories: 53% of respondents for whom IKEA was their first choice said that the reason was the interactive features: P-21 “It is Interactive”; 27% said content: P-24 “I like the content of it”; 10% brand: P-3 “It is a brand I will keep using; it has never disappointed me in any way”; and 10% usability: P-27 “It is easy to navigate”.

Respondents who chose NIKE as their overall preference gave reasons which fell into three categories: 67% of respondents for whom NIKE was their first choice identified the interactive features: P-11 “It is very interactive and I can modify the products”; 22% content: P-13 “The information is quite useful”; and 11% the brand: P-26 “It’s the brand”.

Respondents’ comments regarding interactive features for both IKEA and NIKE were further analyzed to investigate the influence of a particular interactive feature on their judgment. Comments on IKEA fell into two categories: the virtual agent; and other features (e.g. interactive zoom, lighting change). Comments on NIKE’s interactive features similarly fell into two categories: customization; and other features (e.g. interactive zoom and product view). The respondents were more positive towards IKEA’s other interactive features than to the agent; while they were more positive to NIKE’s customization feature than to its other features; see Table 16. Respondents also noted that the variety of IKEA’s interactive features exceeded those of NIKE.

IKEA		NIKE	
Agent	Other	Customization	Other
57%	83%	85%	62%

Table 16: Positive response to interactive features: IKEA & NIKE

IKEA was the most preferred website in the three visits, with the top criterion being the interactive design. IKEA's preference weighted score increased over the visits, while NIKE and ALDI's scores decreased by the third visit. Respondents preferred ALDI least, as its interactive design compared unfavourably to IKEA and NIKE's.

5 Discussion

The results demonstrated that website interactivity has a strong effect on users' overall preferences. Respondents were more positive towards the websites with more interactivity (i.e. IKEA and NIKE over ALDI), which agrees with [Sutcliffe,05] who showed that interactive metaphors positively affect users' judgment and users' engagement. This confirms the hypothesis that respondents will prefer more interactive websites over less/non-interactive ones.

Qualitative results and respondents' overall preferences agreed with quantitative results on inter-site differences, where ALDI was less favoured than IKEA and NIKE.

Respondents' overall preferences were fairly consistent: IKEA was their first preferred website, followed by NIKE and then ALDI; repeated exposure widened the gap in preference scores between IKEA and NIKE. Since there were no differences in perception of the brands before the experiment, we argue that the increasing preference for IKEA was influenced by its interactive features. However, another reason for NIKE's second place was probably response time, as respondents thought that the website was increasingly slower over the visits. This demonstrates the trade-off between usability and interactivity, which we argue contributes strongly to user experience; although usability is neutral if it is good enough, it may negatively influence overall preference if problems occur [De Angeli, 06], [Sutcliffe, 05].

Quantitative results showed that there was a significant difference between the three visits in evaluating IKEA's content and aesthetics; these criteria were evaluated more positively over time. Qualitative results also showed that the gap between IKEA and NIKE widened over the visits, because of the variety of the interactive features available in IKEA compared to NIKE. This supports [Karapanos, 08] and [Mendosa, 05] who showed that time has an influence on users' evaluations.

Content had an important influence on users' overall judgment, but although respondents tended to comment positively on ALDI's content they considered it as their least preferred website, possibly because of its low interactivity level. This agrees with [Diefenbach, 11], who showed that interactivity is a critical factor in product evaluation that can influence users' overall preferences. Content and usability were consistently considered as the most important criteria, agreeing with [Hartmann, 07].

Our results support the findings [Cyr, 09] and [Teo, 03] that interactive features are an important influence on user preference in websites. This has also been demonstrated in an experimental comparison of interactivity levels in games applications by [Jennett, 08], who showed that presence and flow were important factors in user experience.

This study was conducted on live websites, which has the disadvantage that many variables were not controlled, although it does have the advantage of ecological validity since real designs were being tested. Our participants may have been less interested in one of the websites or their brand awareness may have biased their judgment; however, the pre-test questionnaires did not show any pre-existing bias. In our future studies we will compare interactivity in an experimental setting to assess which classes of features have more positive influences on user experience; in addition, a wider time gap between each visit may be considered in our future research.

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