Empirical Investigation of Web Design Attributes Affecting Brand Perception

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ABSTRACT
The web has become a mainstream communication tool used by companies, institutions, celebrities, and politicians to establish, reinforce, or repurpose their brand, almost bypassing more conventional branding media. In this scenario, understanding the effects of the different design qualities of a website on users' attitude towards the brand is of major importance. This paper contributes to the exploration of this issue by presenting a wide empirical study that investigates the degree to which users’ perception of a brand is affected by different design aspects of a website, namely usability, aesthetics, and communicability. The results of this multidimensional analysis have implications on HCI research and practice, as they provide empirically founded guidelines to prioritize design choices in relationship to branding goals.

Author Keywords
Brand, Web, User Experience, Design, Value, Usability, Aesthetics, Communicability, User Attitude

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
The promotion of a brand through the web — a process known as e-branding — is reaching in importance, if not overcoming, traditional paradigms of branding that support more passive, “one-way” forms of communication (e.g., conventional advertising) and are less engaging for users [9, 23, 30, 47, 48]. In this arena, it becomes important for many stakeholders - managers, designers, and marketers – not only to align the design of a web communication artefact to the corporate branding strategy but also to identify the “value” resulting from a web user experience in forming or sustaining a positive “brand image”. The work presented in this paper contributes to the understanding of this issue, focusing on the role of web design in e-branding.

The practice of marketing and industrial design generally acknowledges that the user experience (UX) with any well design reification of a brand – being it a product, a service, a communication or advertisement artefact - translates to a positive attitude towards the brand itself [47]. An implication of this general principle is that the quality of the UX with a website affects the gamut of feelings, beliefs, or judgments that users associate to the brand. Recent HCI studies pinpoint that people’s opinion on a web user experience is modulated by a number of factors of different nature: subjective (related to the individual predisposition of the user [26]), objective (related to the design characteristics of the website), and contextual (how the experience is situated in place and unfolds in time). The objective (i.e., design-oriented) features that are usually considered to affect the perceived quality of the UX include both pragmatic attributes, which focus on the fulfillment of user’s “operational” goals, and hedonic qualities, which affect the psychological well-being of the individuals [28]. The former are typically associated to the general concept of usability. The latter are related to a broad range of design attributes, such as aesthetics, attractiveness, engagement, joy, and fun [4, 18, 25, 28, 37].

The purpose of our research is to investigate the aggregated and individual effects of different objective, design oriented characteristics of a web UX on brand perception. We focus on a pragmatic design attribute – usability, and a hedonic attribute – aesthetics. In addition, we consider a third attribute of the design of websites – communicability – which, to our knowledge, has never been taken into account in existing studies in the design/e-branding domain. Specializing a concept of traditional semiotic theories [16, 39], we define communicability as the capability of the sole information content of a website, abstracting from the “channel” that wraps it up (interface and the interaction capabilities), to convey meaning. The “meaning” we are interested in is the set of messages that the brand underlying the web application intends to convey to its target.
The study involved overall 140 participants and was designed as a set of seven experiments. Each experiment considered a different website for which we evaluated the above design attributes and measured the effects of web exposure on users’ brand perception, which was operationalized using value-based metrics. We then analyzed the resulting data in order to identify the existence of significant correlations between each design attribute and the modification in brand perception, comparing the different findings.

To our knowledge, this is the first work that systematically investigates the effects of web design for e-branding purposes from such a multidimensional perspective, and provides some empirical evidence of the individual role played by different design qualities in the complex trajectory from a web user experience to the creation or modification of the brand image. At the same time, our findings raise a number of questions that highlight the complexity of this domain and the need for future research.

THE EMPIRICAL STUDY

Research Goal
The research goal of our empirical study is to discover and isolate the individual effects of three web design attributes - usability, aesthetics, and communicability - on brand perception, identifying whether and at which degree these attributes are good indicators of the effectiveness of a website to convey the brand image, and discovering if there is any dominant factor in this process. We operationalize and measure these three independent variables in seven different websites with the purpose of discovering their correlation with the change of brand perception (before vs. after using the site) as dependent variable.

Study Variables
Brand Perception
The modern concept of brand is extremely wide and deserves multiple interpretations that go beyond the simple, original notion of brand as a “sign” — word expression or symbol — which identifies the goods or services of a vendor and differentiates them from those of the competitors. A more recent approach to brand definition is more abstract, and encompasses the perceived qualities of both the good (i.e., the products or the service) and the “entity” that stand behind the good: a company, an institution, an organization, a person or, at a wider level, a community or a country. [17] proposes that the brand represents a promise of recognizable values that are unique to an entity and its goods, and they can keep to all their stakeholders - customers, trades, stockholders, employees, fans, or supporters. These are not necessarily functional, utilitarian qualities, but can be anything that gives rise to positive, emotional, or affective effects.

Embracing this approach, and in line with value-based design thinking in HCI [22] [10] [11], we model the concept of brand in terms of Brand Values [5, 6, 8]. A brand value can be a moral, ethical, social, or cultural belief, benefit, or lifestyle which an entity is committed to thorough its overall behavior, its products and services, and is worthwhile for a given target group, either at individual or collective level. A brand value represents therefore those traits of an entity’s personality that the entity holds as salient to leverage on and to communicate via its products, interactive artifacts, services, or marketing actions.

Syntactically, a brand value takes the form of a single statement or attribute, defining a trait of the brand, as in the following example of brand values for one of the applications considered in our study (Table 1).

<table>
<thead>
<tr>
<th>BV1</th>
<th>BV2</th>
<th>BV3</th>
<th>BV4</th>
<th>BV5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magic/Fairytail</td>
<td>Spectacular</td>
<td>Exciting</td>
<td>Amusing</td>
<td>Adrenalinc</td>
</tr>
</tbody>
</table>

Table 1. A subset of Brand Values (BVs) of Gardaland (the largest entertainment park in Italy - www.gardaland.com)

Consistently with this line of reasoning, we define Brand Perception in terms of Brand Values Perception, i.e., the users’ subjective opinion that an entity, its products and services, actually fulfill the promise of the values declared by their brand. Given a brand, we measure Brand Perception as the strength of the association, in the users’ mind, between the brand values and the entity, products, or services associated to the brand.

Performance-based and Heuristics-based Usability
In our study we are interested in the most “classical”, functional view of web usability, which considers the operational ease of use and the degree of effective and efficient support to users’ information and operational goals.

Among all the possible metrics that can be used to assess usability of a website, we adopt two complementary measures: standard performance-based usability — the degree to which users can successfully perform a set of tasks — and heuristics-based usability. The latter denotes the results of heuristics inspection of usability as performed by a team of expert evaluators examining the interface and judging its compliance with recognized usability principles. Rather than adopting Nielsen’s heuristics, we needed to consider finer grained and more structured set of usability principles that could specifically address the pragmatic qualities of the web design suggested by many existing web and hypermedia design models [41]. To this end, we adopted the set of “domain independent” heuristics1 provided by MILE+ method for web usability inspection [7]. MILE+ distinguishes between:

- Content heuristics (8): they address pragmatic qualities of content like accuracy, consistency, linguistic
correctness, readability of the information communicated to the users by a website;

- **Navigation heuristics** (36): they consider the consistency and effectiveness of information architecture and link structures;

- **Presentation heuristics** (31): they address the consistency and effectiveness of the presentation of the different interaction elements and of the overall page lay-out;

- **Technology heuristics** (7): they focus on technology-driven features of the application, e.g., system messages or page loading time, or effects caused by implementation defects.

Usability assessment carried on using MILE+ allows us to measure web usability (although subjectively as any inspection method) along multiple perspectives, which in turn enables us to explore the effects of pragmatic design qualities on brand perception of web users in a much finer grained way. MILE+ offers all the known advantages of heuristic evaluation and has been empirically proved [7] to be easy to learn and more effective (in terms of quantity of discovered usability defects vs. time employed in the inspection) than conventional Nielsen’s method, since it provides a systematic guidance to perform the inspection process.

**Aesthetics**
The model of perceived aesthetics used in our study follows the one proposed by Lavie and Tracktinsky [33], which differentiates between classical aesthetics and expressive aesthetics. Classical aesthetics refers to “traditional” aesthetic notions emphasizing orderly, balanced, and clear design. It includes attributes such as pleasant, clear, clean, symmetrical, and aesthetic. Expressive aesthetics is modeled by qualities that capture the design’s creativity and originality. Relevant items in this dimension are creative, fascinating, original, sophisticated design, and use of special effects.

**Communicability**
As mentioned in the Introduction section, communicability denotes the “communication power” of the sole information content of a web system. More precisely, it expresses the degree to which text, image, video, sound, or animation units in a website manifest the brand values of the entity underlying the application and are capable to convey them to the users.

Our concept of communicability does not imply that we consider explicit brand messages only, as determined, for examples, by the entity’s mission statements, brand mottos, tag line, or logo. As Eco teaches us [16], the meaning of content signs is not necessarily determined by whether they explicitly refer to actual “objects” – brand values in our case. Indeed, the meaning of a message that is formed in a person’s mind is a result of a complex interpretation process that involves multiple subjective and contextual factors and elaborates both explicit and implicit (indirect, evocative, symbolic, or allusive) references to such “objects”. As a consequence, it is difficult to identify objective measures of communicability. It is more feasible to consider the perceived communicability of a website, as the results from users’ subjective rating of the evidence of brand values messages in contents elements only.

**Scoping Our Research**
To restrict the boundaries of our investigation and better scope our research, we focused our study on a “category” of e-branding artifacts: brand-oriented content-intensive websites. These are characterized by the goals that inform their design: reinforcing, establishing or repurposing a brand, and satisfying substantial information and knowledge needs of users. In other words, brand-oriented content-intensive websites are designed both to trigger positive feelings and attitudes towards a given brand and to support the effective use of a large quantity of articulated content.

It is important to characterize the investigated websites in terms of both the above design goals (brand and information purposes) because these criteria are appropriate for the design qualities we set out to investigate in relationship to brand perception. We consider, in fact, hedonic factors like aesthetics, attributes that are more pragmatic (usability), and features related to content (communicability and content accuracy, consistency, linguistic correctness, readability). “Brand-oriented only” websites tend to privilege the hedonic aspects of the UX and the creation of emotional engagement with a brand. As such, they would offer less significant case studies than websites that are also content-intensive, because we aim at comparing how design attributes of diverse nature affect brand perception and also at understanding the branding role of web UX also along its functional, utilitarian, and more rational dimension.

**Instruments**
The study was organized in two sub-studies, the first one addressing the evaluation of usability, aesthetics, and brand values perception, and the second one addressing communicability. Each sub-study involved different subjects and, in part, required different instruments, as discussed below.

**“Original” Websites**
We selected seven brands – all related to consolidated companies or institutions in different business sectors and the corresponding websites (see Table 2), meeting the criteria of being brand-oriented and content-intensive, as discussed above.

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2 The term “content-oriented” website is commonly used in web engineering, in most cases as synonymous of “data intensive”, to indicate websites that provide large amount of information items.
For each website, we performed a detailed analysis to determine how the entity behind the application wants to be perceived by its target audience and to elicit the entity’s brand values. We followed the process guidelines provided by the value-driven requirements method illustrated in [5, 8], which structures brand values elicitation into a combination of business analysis, techno-organizational analysis, and user analysis. In short, we carried out brand value extraction from explicitly declared brand sources (institutional mission statements, press releases, and other public domain information such as investor relations material), interviews (via phone or face-to-face) to both institutional stakeholders (e.g., marketing managers or CEO’s) and brand “customers”, and direct, contextual experience of the product or services (e.g., visits to the entertainment parks or brand shops). The qualitative and quantitative data collected with these instruments were distilled in a list of (ten, on average) brand values for each website, which were further validated with institutional stakeholders.

During this preliminary phase, we also identified an articulated profile of the main target users for each website, including their information and operational needs and the motivations for using the application. We distilled this knowledge into the definition of a set of activity scenarios that helped us screen the participants involved in the study and define the tasks to be assigned to the users during the exposure to each website. A set of tasks, specific for each application, operationalized high-priority goals for the intended users (e.g., “planning a family visit” on a museum website). The nature and sequence of the tasks were designed to frame a plausible and realistic experience with the website as it would arise in a spontaneous situation of use.

Content-Only Web “Sites”
Measuring communicability requires distinguishing the effects of users’ exposure to implicit and explicit messages contained in the pure content units from the semiotic effects of the interactive experience of contents as mediated by the interface.

For each website, we therefore created a “content-only version”, where we removed all lay-out and interaction or navigation features. Since it would have been too expensive to re-implement each entire application in this form, we used the following approach. For each activity scenario of a given website, we defined, an appropriate “path” on the website, i.e., a sequence of pages that a “typical” user would traverse to complete the tasks in the scenario. The path was identified on the basis of the results of the first study of usability and aesthetics, identifying the most frequent steps followed by the users to execute the assigned scenarios. For each sequence of original pages we created a sequence of content-only html or flash pages that we then submitted to the participants involved in the communicability assessment study. A content-only page provides all text, sound, video, animation, and image units extracted from its corresponding page in the real website but it does not include any interaction and navigation capability, and have minimal lay-out (e.g., no background or special fonts - see Figure 1).

Participants and Settings
A total of 140 users were involved in the overall study, which was carried on from February to September 2009. For each website, two subject groups were recruited and randomly assigned to either the study on usability, aesthetics, and brand perception, or to the study on communicability. For each website, we assigned ten participants to the first study and ten different participants to the second study.

One hundred and twenty students of two master classes in HCI at Politecnico di Milano carried out the recruitment of participants (involving relatives and friends) as part of the course homework. All subjects were screened from a larger set, using a pre-test questionnaire that elicited demographic data and consistency of their profile with the brand target of each website. It is important to notice that we considered only persons who never used the website under study, to prevent pre-conceptions and biases derived from previous uses of the application. The sample was composed of males (56%) and females (44%) of different ages (65% aged 18-35, 20% aged 35-50), balancing the age distribution according to the profile of the targets of the different brands. Reward for participation was the gift of an interactive CD (either a multimedia guide of a local museum or an interactive game, both developed by the research lab of one of the authors).

Observers and Usability Inspectors (13 overall) were members of our research lab in Milan, all with a significant experience on UX evaluation both in academic and industrial contexts. To preserve ecological validity, the first study (assessment usability, aesthetics, and brand perception) was performed in the natural usage environment of the participants (at home, work office, or university). The second, more controlled study, given the technical skills required to prepare and administer the communicability test, was carried out at the laboratory of one of the authors.

<table>
<thead>
<tr>
<th>Website</th>
<th>url</th>
<th>Business Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Apple</td>
<td><a href="http://www.apple.com/it">www.apple.com/it</a></td>
<td>High-Tech</td>
</tr>
<tr>
<td>#2 Bang &amp; Olufsen</td>
<td><a href="http://www.bang-olufsen.it">www.bang-olufsen.it</a></td>
<td>High-Tech</td>
</tr>
<tr>
<td>#3 Fender</td>
<td><a href="http://www.fender.it">www.fender.it</a></td>
<td>Musical Instruments</td>
</tr>
<tr>
<td>#4 Gardaland</td>
<td><a href="http://www.gardaland.it">www.gardaland.it</a></td>
<td>Entertainment Park</td>
</tr>
<tr>
<td>#5 Mirabilandia</td>
<td><a href="http://www.mirabilandia.it">www.mirabilandia.it</a></td>
<td>Entertainment Park</td>
</tr>
<tr>
<td>#6 Egyptian</td>
<td><a href="http://www.museoegizio.it">www.museoegizio.it</a></td>
<td>Cultural Heritage</td>
</tr>
<tr>
<td>Museum Turin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#7 Nintendo</td>
<td><a href="http://www.nintendo.it">www.nintendo.it</a></td>
<td>Digital Entertainment</td>
</tr>
</tbody>
</table>

Table 2. The websites considered in our study.
Procedure

Measurements of Brand Perception and Performance
To assess Brand Values Perception, we used a questionnaire. Some questions aimed at identifying whether and at which degree users would associate an “entity”, or its products or services, to a set of brand values, inviting users to indicate, for each brand value, the strength of this association on a 5-points Likert scale (0 = Not at all; 4 = Strongly). Other questions asked participants to express their level of agreement with a brand’s fulfillment of brand values statements, measured using a 5-points Likert scale (0 = Strongly Disagree; 4 = Strongly Agree).

One important aspect of our procedure is the need to isolate the effects on brand perception resulting from the exposure to the website during the experiment from those resulting from previous experience with other brand reifications, e.g., traditional marketing actions, word of mouth, use of brand products or services or the website itself. To this end, we measured users’ brand perception before and after the use of the website, and considered the actual increment or decrement of these measures only. As mentioned in the previous section, study participants had never used the website before. This removed the potentially confounding factor that a previous exposure to e-branding actions could have introduced in our study.

The brand perception questionnaire was administrated to the users before using the website. Then each subject was asked to use the website by following 3 assigned activity scenarios. The average overall duration of a session of use was approximately 40 minutes. During users’ execution of the assigned scenarios, observers collected data on performance, in terms of level of task success (task completion rate) and time-on-task. At the end of all scenarios, the questionnaire used prior to the website exposure was administrated to the users, to collect their actual perception of the brand values after the experience with the website.

Inspecting Heuristic Usability
Each website was assigned to a team of 3 inspectors, who individually performed a systematic heuristics evaluation using the MILE+ method and its reporting instruments (structured data entry forms). Each inspector rated each applicable MILE+ heuristic with a 5 points Likert scale denoting compliance level (0 = Very Low; 4 = Very High) and reported design problems according to shared guidelines. Then, as in conventional inspection methods [40, 46] the 3 inspectors came together to discuss the problems found and their severity, motivate their judgments, consolidate the results and finally converge their scores to an agreed level.

Evaluating Aesthetics
Each website was evaluated by the users on each of the 10 adjectives (defined by the model in [33]) that denote classic and expressive aesthetics using a 5-points scale (0 = Strongly Disagree; 4 = Strongly Agree). We administered a questionnaire after the exposure to a website and after compiling the brand perception post-usage questionnaire.

Evaluating Communicability
Each subject in the “content-only” group was exposed to a scenario-based experience of the content-only version of the assigned website. We removed any form of interactivity from the user experience by giving the facilitator the responsibility of opening, for each scenario, the corresponding “content-only” pages, one after another, in the proper sequence, at a pace defined by each user.
Dynamic elements (sound, video, animation) were also activated by the facilitator on user’s request.

A questionnaire was submitted to the participants after the overall content-only experience to assess communicability. Questions were articulated around brand messages, asking users whether and to what degree, in their opinion, each brand value “emerged” from the experienced content, on a 5 points Likert scale (0=Not communicated at all; 4=Strongly Communicated).

RESULTS
We analyzed the data with standard effect and correlation analysis methods to investigate the relationships between the independent variables (performance-based usability, heuristics-based usability, aesthetics, and communicability) and the dependent variable (brand values perception). The main results are discussed in the rest of this section.

Checking for Variability and Sample Quality

Usability Performance
The level of usability performance on the seven websites is significantly different (one-way ANOVA, F(7,69) = 9.95, p < .01). On average, Turin Egyptian Museum has the highest score (mean = 88.65, SD = 5.36), while Gardaland the lowest (mean = 68.57, SD = 7.62). These results indicate that the sample of websites selected account for substantial variability in terms of usability performance, and this contributes to strengthen the overall reliability of the data.

Classic and Expressive Aesthetics
The scales used to measure classic and expressive aesthetics are both reliable (Cronbach’s Alpha > .7). The websites are significantly different among each other both on classic (F(7, 69) = 5.29, p < .01) and expressive aesthetics (F(7, 69) = 5.19, p < .01). Apple has the highest score on classic aesthetics (mean = 4.06, SD = .31), while Gardaland the lowest (mean = 2.88, SD = .78). For expressive aesthetics, Mirabilandia has the highest score (mean = 3.62, SD = .65), while Fender the lowest (mean = 2.38, SD = .86).

Content Communicability
Like the other two factors, the values of content communicability of these websites are also significantly different (F(7, 69) = 6.87, p < .01). The content of Nintendo website has the highest communicability (mean = .44, SD = .34), however, the Fender website has the lowest and even a negative communicability (mean = -.31, SD = .41).

Brand Values Perception
Overall, users’ perceptions of the brand values for each website are significantly different (F(7, 69) = 4.68, p < .01). The brand values for Nintendo website are best perceived by the users (mean = .64, SD = .46), whereas the brand values for Gardaland website are the worst perceived (mean = -.03, SD = .30).

Correlations
To check whether the four predictors are measuring different characteristics of the considered applications, we looked for the presence of high correlations among the predictors. A high correlation may increase or mitigate the effect of a single predictor, which would make the situation much more complex to interpret. The VIF (Variance Inflation Factor), which detects strong linear relationships between predictors, shows that there are no strong correlations (1.196). The highest correlation is between classic aesthetics and expressive aesthetics, but it is not high in absolute terms (r=.478). Therefore, we can confidently conclude that the four predictors actually measured meaningfully different constructs of the user experience with the website.

Overall, these preliminary results indicate that the selected websites are a “good” sample to represent content-intensive and brand-intensive web applications. They are normally distributed in terms of communication impact (Mean=.27, SD=.39), and they significantly differ in each of the four predictors.

Multi-Dimensional Effect on Brand Perception

Factors Affecting Brand Perception Change
We run a multiple regression to discover relationships between performance-based usability, aesthetics, and content communicability as predictors, and brand perception change as the outcome variable (Figure 2).

Based on the results of the multiple regression analysis (see Table 3), we used the standardized regression coefficient ($\beta$) as an indicator of the effect of a predictor on the communication impact. We were then able to quantitatively model how brand values perception is affected by usability performance, aesthetics, and content communicability. The model shows how much a given predictor affects the outcome variable (brand values perception), if the effects of the remaining predictors are held constant.

<table>
<thead>
<tr>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-.740</td>
<td>.388</td>
<td></td>
</tr>
<tr>
<td>.004</td>
<td>.004</td>
<td>.097</td>
</tr>
<tr>
<td>.206</td>
<td>.069</td>
<td>.342*</td>
</tr>
<tr>
<td>-.024</td>
<td>.057</td>
<td>-.047</td>
</tr>
<tr>
<td>.423</td>
<td>.106</td>
<td>.416*</td>
</tr>
</tbody>
</table>

Table 3. Multiple Regression for Brand Values Perception: $R^2 = .364$ (p < .001). * p < .01

The communicability of the site is the predictor that most significantly accounts for the variability of the brand values perception ($\beta = .416$). In other words, the brand values perceived by the users when exposed to the multimedia content of the site only (in isolation from the interactive and graphic elements of the design) account for most of the overall brand perception in the fully interactive experience.
Classic aesthetics ($\beta = .342$) is the second most important factor that significantly affects brand values perception. Expressive aesthetics shows a negative, but not significant effect ($\beta = -.47$).

We also checked for a potential interaction effect between content communicability and classic aesthetics. In fact, we have seen that better communicability yields better brand values perception, but the effects of communicability could have been influenced by classic aesthetics (present in the stimuli of the communicability study). However, we verified that this effect is not significant ($p > .05$).

Interestingly, usability performance does not significantly affect brand values perception ($\beta = 0.97$). This suggests that, in our considered case studies, users could still strongly and positively perceive the brand values even when task performance is low but other design dimensions are well designed.

Factors Correlating with Brand Perception Change
The assessed values of heuristics-based usability as a whole significantly correlate with the level of brand values perception ($r = .817$). This suggests that the level of usability of the design characteristics as inspected by the evaluators follows closely the variation in users’ brand perception. Still, when looking at the specific design dimensions considered during inspection, presentation design has the only significant correlation with brand perception ($r = .775$). The measures of the other pragmatic factors – usability of content, navigation, and technology aspects - do not have significant correlations.

In summary, we point out three key findings:

1. Communicability is the most important predictor of brand perception impact, followed by classic aesthetics.

2. As to the intrinsic characteristics of the application evaluated by inspectors’ ratings, presentation design has the strongest positive correlation with brand perception, while the other pragmatic factors seem to have a marginal effect.

3. Overall, communicability, classic and expressive aesthetics, and usability account for little more than one third (36.4%) of the variation in brand values perception ($R^2 = .364$).

DISCUSSION

Limitations of our study
Our research has its shortcomings which may have affected its validity, most notably the relatively limited sample size used for each website. Still, the fact that we have replicated the study in seven web applications using the same methodological framework partially compensates this drawback and strengthens the external validity of our results.

The fact that the considered design attributes can only explain 36.4% of the variation in brand values perception ($R^2 = .364$) is an indicator that there are a number of variables — of subjective and objective nature — we could not fully control for in our study, but have an impact on brand perception. Hedonic and pragmatic design factors other than usability, aesthetics, and communicability may play a strong role in forming or modifying the image of a brand in the user mind and are worth being investigated. Furthermore, the heterogeneity of the business sectors considered may have introduced a confounding variable. The selection criterion for the websites in our study was only to be brand-oriented and content-intensive, as this class of applications has design goals that are particularly relevant for the design attributes considered. As we wanted to study both hedonic and pragmatic factors in relationship to brand perception we needed to focus on websites whose design is informed by both branding goals and functional goals (such as information goals). Still, abstracting from the business sector brought in a broad variability of branding strategies and approaches. This in turn may have introduced a strong variability in the initial brand perception of the study participants who had familiarity with the brand; it may have acted as a strong mediating effect on the user’s judgment during the experiment [12] in spite of our attempt to control for this aspect (by isolating what impacted on user’s brand perception at the beginning through pre-use brand perception evaluation).

On the other hand, focusing on brands in a specific business sector could reduce this variability factor but might introduce further complexity. Using the business sector as the only selection criterion for our case studies would have meant not to discriminate between brand-oriented only websites and websites that are also content-intensive, thus removing a confounding variable but adding another one.

In spite of these limitations, we think that the results of our study have some interesting implications that are worth discussing and can be influential on the practice and research in user experience design and evaluation.

Implications

Content as Key Driver for the Brand Experience
Our findings clearly indicate that the brand values communicated by the content are the ones that mostly determine the overall brand perception. This goes much beyond the simplistic slogan that “content is king” and points to the fact that properly designed content is the most critical vehicle to effectively convey brand values and create a positive brand image in users’ mind. Note that content here does not indicate just “information”, but the organic, value-driven shaping of the messages (conveyed by various media) that the website intends to get across to its target users. We can summarize the key implication of our research as follows: Value-driven content is the primary concern when designing a website for branding purposes.
Designing value-charged content plays an often underestimated role in UX design. A deep exploration of design concerns pertaining content requirements, conception, articulation, deployment and evaluation, and a seamless integration of this understanding into existing HCI methods and tools opens important perspectives for the future development of the field.

**The Role of Aesthetics**

The significant effect of classic aesthetics on brand perception demonstrates that implicit brand messages are effectively conveyed through design attributes that are very much related to the most conventional concept of “beauty”, such as clean, clear, pleasant, and symmetrical. This finding is somehow consistent with the high correlation found between presentation heuristics score and brand perception. In fact, the heuristics used by experts during the inspection of the presentation-related aspects of the website are conceptually akin to characteristics of classic aesthetics, since they mainly focus on the consistency of the visual characteristics of page elements and on their lay-out balance and regularity. In contrast, the attributes of expressive aesthetics, which concern more the emotional sphere, do not seem to significantly modify brand perception. This is quite surprising, since it seems to contradict, at least in part, the principles of emotional design [37] which suggests that emotions have a crucial role in the human ability of sense making. A possible explanation of this result is that users are more familiar with classic aesthetics attributes, which are more related to our conventional concept of beauty, and therefore can identify more immediately, transparently, and rationally the associations with intended brand values [46]. Rating expressive characteristics, instead, require users to reach a deeper level of cognitive reflection, interpretation, and judgment, which in turn makes the association to brand values more indirect and distant.

It is also important to notice that the fact that classical aesthetic qualities of the design are related to the overall brand values perception across the sites analyzed, does not yet reveal which specific brand values are more influenced by this aesthetics dimension. Thus we cannot conclude that our results are influenced by the nature of the brand values of the websites considered in our study. A finer grained analysis of the relationship of each aesthetic dimension with specific values may reveal that the perception of values that have a more emotional, affective nature is indeed affected by expressive aesthetics. This analysis was outside the scope of our study, but the exploration of this and similar issues points to interesting future research directions. Based on the results of our study, we can suggest that after quality of value-charged content, designing for classic aesthetics is the most effective way to positively affect the brand image.

**The Role of Usability**

It is important to note the tension between two emerging results. On the one hand, usability performance does not significantly affect brand value perception. This means, for example, that even strong (positive or negative) variations in user performance do not change significantly the user’s opinion on a brand. On the other hand, the overall usability of content, navigation and presentation design (as measured through usability heuristics expert rating) has a significant correlation with brand values perception. This suggests that the brand values communication effect originated by these pragmatic qualities is generally stronger than threats to the brand coming from breakdowns in user performance.

**RELATED WORK AND CONCLUSIONS**

Recent studies pinpoint the complex role that different intertwined dimensions of the web user experience play in users’ judgment of a website and their attitudes towards it. Still, few of them specifically investigate these aspects in relationship to e-branding and brand perception. [12] illustrates that a subjective factor like brand attitude does influence the users’ evaluation of aesthetics, pleasure, and usability of websites, while [29] highlights the influence of brand awareness on the user evaluation of search engine results. [45] highlights the correlation between users’ perception of interface aesthetics and their judgment on system’s usability. [27] introduces a framework for users’ design quality judgments based on Active Decision Making Theory. [3] manipulates usability and aesthetics of an interactive system to assess the relative impact of these factors in users’ perceived “value” of the application. [32] considers a number of key visual design factors and identifies their quantitative relationships with 13 classes of emotions that people usually feel when viewing diverse homepages. In the field of persuasive computing [19], a number of studies have examined the design factors that affect consumer’s trust in e-commerce websites [21, 24, 44], influence people’s perception of the website credibility [20] and ultimately have an impact on consumers’ product preference. [14] considers in particular the relationship between beauty and usability and the general impact of beauty on product choice and use.

A number of authors claim that brand image - intended as the set of “brand associations held in consumer memory” [31] – is influenced by hedonic aspects of an interactive product [37] as well its pragmatic characteristics (e.g., usability [43]). [6] provides some empirical evidence to the correlation between usability and brand perception, and also offers a reusable, methodological support to replicate the reported study and to investigate additional design characteristics of a website in relationship to brand. [6] provides a useful operationalization of the notion of brand perception, which we have also used in the study reported in this paper, adopting a value-oriented perspective to model brand perception, and is centered around the concept of “value”. This notion is widely investigated in (online) marketing, also in relationship to measures of the perception of brand personality and the economic benefits derived from an improved brand image [1, 2, 13, 34, 35, 36, 38, 40, 42]. We instead embrace a notion of value that is...
closer to what has been investigated in HCI design frameworks, such as Values-Sensitive Design [22] and Value-Centered Design [10]. More specifically, we take inspiration from Worth Centered Design (WCD) [11].

This paper substantially extends the results of [6] for a number of reasons. [6] only considered how web usability as a whole affects brand image, without discriminating the role played by the different design dimensions that modulate usability, as we do in this paper. The work reported here also expands the analysis to a spectrum of brand affecting design dimensions beyond usability that include [classic and expressive] aesthetics and communicability. This is the first work that empirically investigates the effects of web design for e-branding purposes from such a multidimensional perspective, and provides evidence of the role played by the different design characteristics in the creation or modification of the “brand image”. Among the considered design factors, communicability is novel. A branch of HCI named Semiotic Engineering uses this term with a different meaning, as “the degree to which an interactive system communicates efficiently and effectively to users the underlying design intent and interactive principles” [15]. Instead, we embrace the concept of communicability from a different perspective, more related to traditional semiotic theories existing before the advent of interactive multimedia [16, 39]. Based on these approaches, we consider communicability as the fundamental semiotic property of the sole content elements of a website to more or less transparently communicate meaning. In particular, we evaluate the degree to which “pure” multimedia content, isolated from all the interactive elements through which it is delivered, conveys the intended brand image, and define an original procedure to measure it.

Our work provides contributions both from a research and practical perspective. In terms of contributions to the body of knowledge on user experience research and e-branding, we have: (a) analytically modeled and isolated some hedonic and pragmatic factors of web user experience design influencing brand perception, in a class of web application that are both brand-oriented and content-intensive; (b) for this category of websites, empirically demonstrated and discussed the relative importance and role of communicability, aesthetics, performance-based usability and heuristics-based usability to influence the user’s brand values perception of a website.

Besides, our work can have implications for the practice of UX design and e-branding. A question that seems to be crucial in the industrial world is “How do you prioritize interaction design when boundaries are set by time, money and resources?” (as raised at the Industrial Day UX session at Interact 2009) Our work sheds a preliminary light on this issue, as it provides implications for the consideration and prioritization of the design dimensions to inform effective user experience designs. Specifically, we have provided some empirical evidence that a semantic property of media content – communicability, followed by classic aesthetics, are the most important factors to consider to effectively generating brand values perception. Still, we have assessed that the considered design factors can only explain little more than one third of the variation in brand values perception, at least in our case studies, that focused on a specific class of applications. If confirmed by further studies, involving a larger size sample of testers and a wider number of websites, these results mean that, beyond usability, classic aesthetics, and communicability, there are other, subjective and objective factors in the web User Experience that may account for the remaining variation of brand values perception. Further research is needed to discover them and indentify their role for e-branding. Finally, other genres of branded websites are challenging domains for investigating the applicability of similar user studies. We think for example of brand-oriented applications that are mainly intended to provide services, and therefore stress the functional qualities of the interface and the interaction, or those that focus almost exclusively on branding goals and thus heavily rely on special advertising-like multimedia effects. These classes of branded web systems may require similar approaches as ours, but different constructs and investigation methods, more relevant to the nature of the brand communication strategy at stake.

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