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Additional Information

EMOTIONAL DESIGN APPLICATION TO EVALUATE USER IMPRESSIONS OF LIBRARY INFORMATION DESKS

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Abstract

To evaluate the quality of service it is critical to know the concepts on which such evaluations are made from the user point of view. Differential semantics was applied in an emotional design framework to identify these concepts, or dimensions, and an equation was devised to discover the influence they have in the acceptance of a service by users. Some 53 users evaluated the tangible elements of 28 library information desks. Five latent concepts emerged from the analysis: *modern*, *welcoming*, *professional*, *simple*, and *accessible*. The most influential concepts influencing willingness to interact at library information desks were, in descending order, modernity, professionalism, welcoming environment, and accessibility. Finally, a comparative semantic profile was developed to explore the perception differences between the most and the least desirable information desks. Understanding the concepts that users consider when evaluating information desks and the influence of those concepts on user behavior can help designers improve overall service quality impressions.

1. Introduction

Customer satisfaction is a critical component that needs to be measured for any service organization. Library user satisfaction depends in part on the quality of service provided and is an important measure of the service quality provided by a library. Obviously, users are more likely to be satisfied when their service requirements are fulfilled. However, traditional performance measures of library services, such as richness of collection, variations in material, and number of users are insufficient (Dahan, Taib, Zainudin, & Ismail, 2016). As consumers are becoming increasingly demanding, performance measurements relating to goal-oriented activities need to be

conducted through an analysis of affective and hedonic demands (Ladhari, Souiden, & Dufour, 2017).

To fulfil customer requirements, it is necessary to understand customer expectations and perceptions. It is well known that a perceived high level of service quality leads to a satisfactory relationship with customers and fosters greater customer-company identification, which eventually leads to loyalty and recommendations (Su, Swanson, & Chen, 2016). As Nelson et al. demonstrate (2004), user perceptions of quality could have an economic impact of between 17 to 27 percent on earnings, net revenue, and return on assets. It is worth stating that the quality of a service is not something offered by the service provider, but is something subjectively perceived by the user.

Many authors (Gaur, Herjanto, & Makkar, 2014; Ng & Russell-Bennet, 2015) have recognized the influence of perceptions and emotions triggered by products and services on customer behavior. Customer behavioral intentions are known to be determined by cognitive and emotional evaluations (Gracia, Bahher, & Grau, 2011). Customer behavior is formed through a combination of cognitive and emotional factors which influence service quality evaluations (Kim, Park, Lee, & Choi, 2016).

The number of dimensions to be considered when evaluating service quality depends on the sector, scope, and purpose of the study. However, three dimensions have been traditionally considered for libraries: service affect (empathy, responsiveness, assurance, reliability); library as place (utilitarian space, symbol, refuge); and information control (content or scope, convenience, timeliness, and ease of navigation) (Natesan & Aerts, 2016). Considering this framework, this study contributes to improving service quality in libraries by turning attention to the library as a place dimension, investigating the latent concepts that library users keep in mind when

evaluating the tangible elements of information desks, and the concepts that have an impact on the final approach or avoidance behavior.

2. Problem statement

There are several methods and tools for measuring the quality of services that analyze multiple service dimensions (these include SERVQUAL, SERVPRF, and LibQUAL). Most of these methods analyze the perception triggered by the tangible elements of a service in a user-centered design approach. However, these methods entail several inconveniences:

- Service quality evaluations consider few cognitive and emotional attributes, or are done in a one dimensional way, and assume that multiple factors representing cognitive and emotional responses can be reduced to a single dimension (satisfaction) (Kim & Park, 2016).

- When setting the perceptive and emotional attributes to be evaluated, only expert criteria are taken into account. Thus, evaluations are made on a discretionary basis without knowing which images and concepts are conveyed to service users. Existing methods question user perceptions of tangible elements of a service without first identifying which aspects users consider when evaluating them.

To solve these problems, the differential semantic (DS) method (Osgood, Suci, & Tannenbaum, 1957) was used to set the underlying concepts and emotions in a multi-dimensional approach, filling the gap between the messages that are supposed to be conveyed to users and the messages that users really want to perceive. This allows designers to discover which affective attributes and concepts users latently consider when perceiving library information desks. In addition, the influence of these concepts on the final decision by users to talk with library staff can be established. The results

may help service designers transmit the messages and concepts that users want and so improve perceived service quality.

3. Literature review

3.1. Service quality assessment

The term quality could be defined as superiority or excellence. Thus, perceived quality could be defined as the consumer's judgement about the superiority or excellence of a product or service. Steenkamp (1989) defines service quality as "an overall judgment that is based on the perception of the object (or product) on the quality attributes" (p. 100). The relevance of such quality attributes varies between different types of products and services. Thus, experts try to group quality attributes into more abstract and broad dimensions to deal with quality in a more general way. For instance, Garvin (1988) determined quality using eight dimensions (performance, features, reliability, conformability, durability, serviceability, aesthetics, and perceived quality); and Brucks (1985) used six dimensions (ease of use, functionality, performance, durability, serviceability, and prestige). Experts on service marketing agree that customers mostly base their judgments about quality on two dimensions: the technical and the functional (Grönroos, 1984). The former refers to what a customer actually receives from the service (the outcome), and the latter refers to the way a service is delivered to a customer or the customer's perception of the interaction during the service (process). More recently, researchers have evaluated both dimensions (Chen & Cheng, 2012; Tam, 2012), but the majority of works focus on the functional dimension (Giovanis, Zondiros, & Tomaras, 2014). Addressing the functional dimension, Parasuraman. Zeithaml, and Berry (1985) looked at four different consumer service industries and found five dimensions of perceived quality: reliability, empathy, assurance, responsiveness, and tangibles. As a result of this discovery, the authors

developed SERVQUAL as a tool to measure the gap in the five dimensions between user expectations and user perceptions of the service provided (Parasuraman, Zeithaml, & Berry, 1988).

Many researchers who use SERVQUAL customize the original 22-item Likert scale survey according to their own objectives and service typologies, leading to derived standards such as DINESERV (Stevens, Knutson, & Patton, 1995) for restaurants, SERVQHOS (Mira, Tomas, Virtudes-Perez, Nebot, & Rodriguez-Marin, 2009) for hospitals, E-S-QUAL (Gefen, 2002) for electronic service, and LibQUAL (Natesan & Aerts, 2016) for libraries.

It is worth stating that in most SERVQUAL adaptations the original dimension for evaluating the tangible elements of service has been simplified or completely removed. However, it is clear that the tangible elements present in service environments have an influence on in-store behavior, decision processes, approach or avoidance behavior, and user emotions and satisfaction (Babin, Chebat, & Michon, 2004; Heung and Gu, 2012; Ladhari, Souiden, & Ladhari, 2011; Michon, Chebat, & Turley, 2005). Therefore, in many services, as in the case of libraries, taking into account this tangible dimension can be critical for improving the quality of service delivered.

3.2. Emotional engineering and service design

Emotional engineering tries to relate the attributes of products or services to the emotions they trigger in users (Nagamachi, 1995). It is important to note that there are two fundamental types of emotions: basic and secondary. Basic emotions consist of a fixed set of discrete categories generic to all human beings (Ortony & Turner, 1990). Examples of basic emotions include happiness, sadness, anger, fear, disgust, and surprise. Secondary emotions, which may come from more complex processes of thinking than basic emotions, are domain-specific and individual-dependent emotions

derived from primary emotions (Gaunt, Leyens, & Demoulin, 2002). Secondary emotions enable emotional design to be approached in a multi-dimensional way by means of semantic spaces. Semantic space determination using the DS method has been successfully consolidated in the Kansei engineering (KE) methodology (Nagamachi, 1995). KE has been mainly used for the emotional design of products, but in recent years it has been increasingly applied to services (Chen, Hsu, Chang, & Chou, 2015; Hsiao, Chen, & Liao, 2017). However, the relationship between services and emotions has been analyzed more intensively in terms of basic emotions (positive and negative) in hedonic services (such as tourism, leisure, entertainment, and luxury services) in which users seek fun, satisfaction, distraction, or pleasure.

The influence of a service environment on the basic emotions of shoppers has become a significant stream of research since Kotler (1973) coined the term *atmospherics* to describe the discipline of designing commercial spaces to produce specific emotional effects in consumers. By contrast, the role of emotions has been the object of fewer studies in utilitarian services (healthcare, banking, and dental services), where user consumption is more functional, instrumental, and goal-oriented. However, the work of Ladhari et al. (2017) and Rychalski and Hudson (2017) confirms the significant role played by emotions in utilitarian service settings.

Library services have usually been analyzed from a utilitarian perspective, as library services are intended to be used in the traditional instrumental sense of information service (Buckland, 1986). Despite some exceptions (see Julien, McKechnie, & Hart, 2005), library and information science (LIS) still pays little attention to the influence of emotions on the delivery of its services (Lopatovska & Arapakis, 2011). However, emotions are critical in social interactions and in every decision-making process, and influence the customer service experience and customer behavior in both

hedonic and utilitarian settings (Babin, Darden, & Griffin, 1994; Chan, To, & Chu, 2015).

This research defines the emotional space of the library information desk to establish the user-perceived quality of its tangible elements and their influence on the eventual approach or avoidance user behavior.

4. Methods

The work was carried out in three phases:

1. Identification of the information desk semantic space (IDSS).

2. Investigation of the influence of the IDSS dimensions on willingness to interact at information desks.

3. Comparison of perception differences between the most and least desirable information desks using semantic profile representation.

4.1. Identification of the IDSS

Identifying the cognitive and affective dimensions that constitute the IDSS would let designers discern the main dimensions that users consider when performing an aesthetic, semantic, symbolic, and emotional appraisal of the spatial arrangement in a library.

4.1.1. Word selections

The identification of the IDSS was performed according to guidelines laid out by Alcántara, Artacho, Gonzalez, and Garcia (2005) when applying DS. The first step in obtaining the semantic concepts was to gather all the adjectives and expressions used by people to express their perceptions of information desks, thereby obtaining the initial semantic universe (ISU). To do this, 23 users (aged between 12 and 65, and balanced in gender) were interviewed, and interior design publications and the main information desk manufacturer websites were consulted. The survey was conducted in Valencia,

Spain, in Mars 2012. Only Spanish words were compiled as language, culture and background of the users are influential in determining their perceptive response to products and services. Interviewees were asked to consider information desks in any environment or entity where they found them (banks, shopping malls, airports, libraries, etc.) and to provide adjectives to express whatever they saw or felt when evaluating such spaces.

Three experts in product semantics reduced the collected words and expressions to a smaller set, the reduced semantic universe (RSU), to avoid loss of reliability due to subject exhaustion during the evaluation phase. It is common for semantic evaluation to use between 40 to 100 words (Tanoue, Ishizaka, & Nagamachi, 1997). The goal for this research was established as 30 and 50 words, as aesthetic impression, semantic interpretation and symbolic association of information desks seem no complex enough to demand more words in order to be evaluated. The selection criteria required keeping the most common adjectives and expressions, while discarding synonyms and antonyms, as well as adjectives related to materials, specialized terms, and expressions indicating purpose or aim (Jindo, Hirasago, & Nagamachi, 1995). Only adjectives evaluating the information desk as a place were considered.

4.1.2. Images of information desks evaluated with RSU

To establish the perception triggered by a sample of information desks, pictures of real information desks were used as stimuli. Some 84 images were obtained from various sources, including pictures taken in public libraries in the city of Valencia, and pictures from design and architecture websites showing information desks from various environments and entities. Finally, 28 pictures were selected showing various information desk arrangements. The pictures show library information desks as well as reception desks from other places to expand and enrich the sample stimuli and concept

conveyance. All of the pictures were taken from the same angle, were well-lit, and did not show people queuing.

4.1.3. Survey procedure

Perception analysis was conducted in four group sessions lasting approximately 45 minutes. Fifty-three users (26 men and 27 women aged between 20 and 65), who were randomly chosen from the databases of libraries in the city of Valencia, took part in the study. It is worth noting that some inclusion criteria for subject sampling were considered: the final sample should be balanced in genre and have similar percentage of users representing four age ranges (14-25, 26-40, 41-60 and >60). The users were given the standard instructions for DS questionnaires (Osgood et al., 1957) and were allowed up to two minutes per image to make evaluations. The subjects sat in a room where pictures of the information desks were projected onto a large screen. The individuals evaluated the information desks in an arbitrary order. The terms selected were arranged in the form of 33 statements (e.g., "This information desk is *functional*") and people indicated whether or not they agreed with the statements on a five point-Likert scale: 2 (*completely agree*), 1(*agree*), 0 (*indifferent*), −1 (*disagree*), −2 (*completely disagree*). The questionnaire also included a question about their willingness to interact with staff at the information desk ("Would you like to interact at this information desk?"), with "Yes" or "No" as the possible answers. Users were given one of 53 different versions of the self-report questionnaire to prevent an ordering effect of statements. The participants were allowed to rest if needed in order to avoid having exhaustion influence the results. The stage resulted in 1484 self-questionnaires (28 information desks multiplied by 53 subjects).

Data were then submitted to a principal component analysis (PCA) with varimax rotation to group the adjectives by dimensions. The PCA solution was selected based on

certain criteria: the Kaiser-Meyer-Olkin test (KMO) was greater than 0.8; the components obtained were easy to interpret; the components accounted for a high global variance (> 60%); the components yielded eigenvalues greater than 1 after rotation; and the communality of each variable presented valued above 0.6 (Artacho-Ramirez, Diego-Mas, & Alcaide-Marzal, 2008).

The score of each variable for each axis was obtained by regression. To check the reliability and consistency of the axes, Cronbach's alpha coefficient was calculated.

4.2. Influence of the semantic concepts on willingness to interact at the information desks

The dimensions of the IDSS identified in Section 4.1 were assessed by analyzing their influence on user answers about their intention to interact with staff at information desks. Binary logistic regression analysis was conducted, with user willingness to interact as a dependent variable and factor scores of IDSS dimensions as independent variables. The forward Wald procedure, as well as the Hosmer-Lemeshow test, and the R^2 of Nagelkerke, were used to assess goodness-of-fit and percentage of variance. Finally, the equation for the probability of having an intention to be assisted was obtained. Ten percent of cases were randomly selected for a validation test of the predictability of the model produced by the analysis.

4.3. Semantic profile representation to compare concept conveyance between the most and the least desirable information desks

Using the equation obtained in section 4.2 and the mean perception achieved by every information desk with IDSS dimensions, the probability of the willingness to interact at each information desk was calculated. The perception differences between the most and the least desirable information desks were then analyzed using the compared semantic profile (CSP). CSP is a graphical representation of the mean subject

perception of the two information desks for each IDSS dimension, together with percentiles 5 and 95 of the subject perception means of the sample used to identify the IDSS. In addition, CSP presents the results of an ANOVA for each concept using the information desk as a factor. Differences were considered statistically significant for $p < 0.05$. CSP shows the least significant difference (LSD) test intervals of confidence for the mean of each alternative for each axis to reveal significant differences. Statistically significant differences exist when intervals do not overlap.

5. Findings

5.1. Identification of the IDSS

Some 109 adjectives compiled from various sources were collected for the ISU, (AppendixA). They were reduced to 33 to constitute the RSU (Table 1).

Table 1. RSU for information desks (original Spanish words in bold).

Accessible	**Accesible**	Elegant	**Elegante**	Showy	**Llamativo**
Advanced	**Vanguardista**	Exclusive	**Exclusivo**	Simple	**Sencillo**
Attractive	**Atractivo**	Functional	**Funcional**	Sober	**Sobrio**
Boring	**Soso**	Good quality	**De calidad**	Technological	**Tecnológico**
Clean	**Limpio**	Modern	**Moderno**	Tidy	**Ordenado**
Clear	**Diáfano**	Obsolete	**Anticuado**	Updated	**Actualizado**
Close	**Cercano**	Original	**Original**	Visible	**Visible**
Cold	**Frío**	Overloaded	**Recargado**	Welcoming	**Acogedor**
Colorful	**Colorido**	Pleasant	**Agradable**	Well signposted	**Bien señalizado**
Comfortable	**Cómodo**	Pleasing	**Vistoso**	Well-appointed	**Bien equipado**
Dynamic	**Dinámico**	Professional	**Profesional**	With personality	**Con personalidad**

After PCA analysis, five principal components were selected that accounted for more than 61.5% of total variance. The KMO value was 0.958. Table 2 shows each semantic dimension, the main variables that integrate them with the correlation coefficient between each variable and the dimension in brackets, the percentage of the total variance explained for each, and Cronbach's alpha coefficient.

Table 2. Semantic dimensions; variance explained for each dimension and Cronbach's alpha coefficient.

	Variables (correlation)	% Of Variance Explained	Cronbach's alpha
D1	Advanced (0.882), Original (0.872), Modern (0.848), Exclusive (0.820), Showy (0.799), Attractive (0.794), Obsolete (-0.785), Updated (0.779), Technological (0.767)	36.711	0.765
D2	Welcoming (0.764), Pleasant (0.718), Close (0.616), Cold (-0.590)	8.088	0.741
D3	Well-signposted (0.774), Well-appointed (0.657), Professional (0.592), Comfortable (0.591), Visible (0.463)	6.748	0.815
D4	Simple (0.582), Sober (0.578), Overloaded (-0.446), Tidy (0.418)	5.019	0.863
D5	Clear (0.545), Functional (0.458), Accessible (0.423)	4.534	0.758

Each semantic dimension that integrates the structure is explained below.

- D1, *modern*, refers to the perception of modernity, originality, attractiveness, and uniqueness, and is negatively correlated with an obsolete impression.

- D2, *welcoming*, refers to how welcoming and friendly the information desk is perceived.

- D3, *professional*, refers to the transmission of professionalism, considering how well the information desks are equipped and signposted.

- D4, *simple*, refers to the sober, simple, and neat image that an information desk gives.

- D5, *accessible*, is the functional axis referring to the accessibility and openness offered by the information desk space.

5.2. Influence of the semantic concepts on willingness to interact at information desks

Binary logistic regression analysis produced a model in which, excluding *simple*, all dimensions were statistically significant. Table 3 shows the coefficients, B,

as well as the odds ratio, Exp(B), for the significant dimensions. The odds ratio is the constant effect of one dimension on the likelihood that a willingness to interact will occur (holding other independent dimensions constant). Nagelkerke's R^2 is 0.58 and the Hosmer-Lemeshow test is not statistically significant (showing a good fit of the model).

Table 3 Logistic regression coefficients (B) and odds ratio (Exp(B)).

Concept	B	Exp(B)
Modern	1.25	3.502
Welcoming	1.10	3.007
Professional	1.17	3.229
Accessible	0.41	1.509

Results can be seen in equation 1:

Prob. of willingness to interact $= 1/(1+e^{(-0.98-1.25 \times modern-1.10 \times welcoming-1.17 \times professional-0.41 \times accessible)})$

The classification test showed an average predictability of 83.1% in the analysis and 75.6% for the validation cases.

5.3. Semantic profile representation comparing the dimensional differences between the most and the least desirable information desks

The results of the perception comparison between information desks 10 and 14 (see Figure 1) are depicted in Figure 2. There were significant differences in the perception of the two information desks in all but one dimension: accessible.
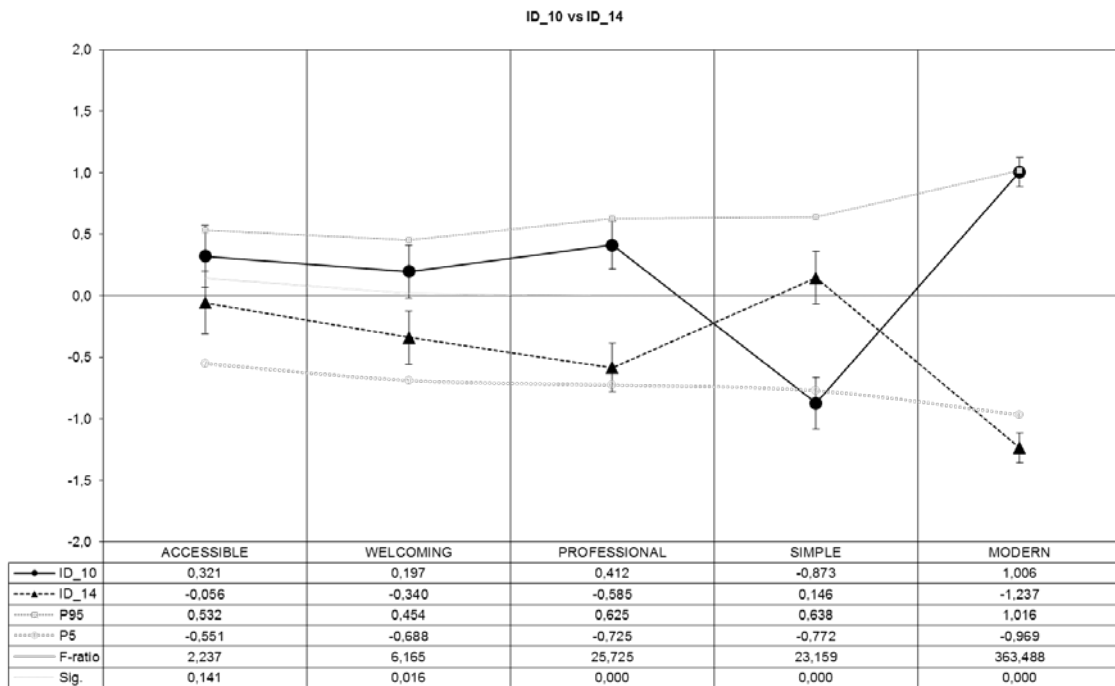
Fig. 1. ID 10 (left) and ID 14 (right).

	ACCESSIBLE	WELCOMING	PROFESSIONAL	SIMPLE	MODERN
ID_10	0,321	0,197	0,412	-0,873	1,006
ID_14	-0,056	-0,340	-0,585	0,146	-1,237
P95	0,532	0,454	0,625	0,638	1,016
P5	-0,551	-0,688	-0,725	-0,772	-0,969
F-ratio	2,237	6,165	25,725	23,159	363,488
Sig.	0,141	0,016	0,000	0,000	0,000

Fig. 2. Compared semantic profile between the Information desk 10 and 14.

6. Discussion

The results present DS as a useful method in discovering the key affective dimensions that users keep in mind when they evaluate library information desks. Many researchers (Zeithaml, 1988) have underlined the importance of improving perceived quality of service attributes by going beyond the views of managers (who are mainly focused on objective quality dimensions, such as specifications and performance) and

considering user views and perceptions. Moreover, an analysis of affective user responses in multiple dimensions without reducing the responses to a single factor (i.e., overall satisfaction) leads to a better understanding of user intentions and reactions (Kim & Park, 2016).

It is important to stress that the obtained dimensions measure the cognitive answers (aesthetic, semantic, and symbolic evaluation) and the affective answer in terms of secondary emotions (Gaunt et al., 2002). This makes these dimensions appropriate for measuring quality, as they embrace this abstract and multi-dimensional concept by analyzing both functional benefits and emotional payoffs of products and services (Young & Feigin, 1975). The dimensions are also in line with Lutz's (1986) conception of quality in two pillars: affective quality, related to the overall evaluation after an experience, and cognitive quality, related to the assessment of service tangible attributes as the simplest level of abstraction.

Most studies of service quality measurement dismiss tangible elements, and when considered, only a few of the general dimensions established by researchers are used. Cleanliness, comfort, and security are generally among the most common tangible elements considered in service settings (Morton, Caulfield, & Anable, 2016; Pantouvakis & Renzi, 2016; Tosun, Bora Dedeoglu, & Fyall, 2015). Other attributes frequently used are, for example, "easy to find" and "up-to-date equipment" (Bezerra and Gomes, 2016; Choi, Cho, Lee, Lee, & Kim, 2004). In a recent study of user perceptions of academic library service quality, the LibQUAL model was applied limiting tangible elements to cleanliness and comfort, along with clearness of directional signs (Dahan et al., 2016). However, a more in-depth analysis seems necessary to deal with tangible service attributes, as they convey messages that can elicit emotional responses from users and determine final acceptance.

This study indicates that five specific dimensions can describe the cognitive and emotional appraisal by users of information desks in libraries. These dimensions go further than the general attributes commonly measured. *Modern* is a concept broader than simply considering up-to-date equipment, as it includes spatial arrangement and décor evaluations. *Welcoming* goes beyond basic demands of comfort or cleanliness, and is related to positive sensations and emotions that the information desk can elicit in users at first glance. *Professional* is a symbolic concept that helps give a desirable image of the library. *Simple* and *accessible* could be related to the Gibson semantic concept of affordances (Gibson 1977), in which a product or arrangement communicates to users the functions it performs and how they should be interacted with. Moreover, the accessible dimension evaluates space layout while considering the possibilities of interacting with people with the widest range of abilities. The validity of the five dimension IDSS was supported by the accomplishment of requirements as set out in section 4.1.3. In addition, in the analysis of internal consistency for each factor using Cronbach's alpha coefficient, all the dimensions obtained reliability values above 0.7 (the lowest threshold considered as acceptable that assures the dimensions used are reliable and satisfactory [Nunnally, 1978]).

These five dimensions were examined to explore their influence in the final user approach or user avoidance behavior. The results of binary logistic regression were used to produce an equation to estimate the probability of obtaining "Yes" as an answer to the question "Would you like to interact at this information desk?" The factors that positively influenced the willingness to interact were (in descending order) *modern*, *professional*, *welcoming*, and *accessible*. The factor *simple* did not have any significant influence on user behavior, probably because most of the information desks in the selected sample were simple and tidy when they were photographed. Library managers

can use this equation to assess and improve attractiveness for interactions. Once managers know the value obtained by their libraries in each dimension (ranging from -2 to 2), and the resulting probability of user willingness to interact (using equation 1), they can strategically establish which dimensions should be changed to improve the probability of satisfactory interactions.

The most and the least desirable information desks were identified using equation 1. The comparative semantic profile graphically reveals the perception results. Despite not showing statistically significant differences for *accessible*, desk 10 reached highly positive values in all significant dimensions (near to P95 values for all dimensions). In contrast, desk 14 was perceived negatively in all significant dimensions, being the least modern desk in the sample, with a value under P5. Interestingly, desk 14 reached higher values for *simple* than desk 10, but as mentioned above, *simple* had no significant influence on the regression model for user willingness to interact.

6.1. Limitations

The methods and techniques used in this study have enabled an analysis of the cognitive and emotional appraisal of library information desks by users, as well as the intentions of users. However, these methods suffer from some limitations. The application of DS requires time and some statistical expertise, and provides results that must be reviewed over time, especially if tangible elements can be influenced by changing fashions. Another issue to consider is that DS provides information about how the service setting is perceived, but tells us nothing about why it is perceived in that way. Further research should be undertaken to investigate the influence on the emotions triggered in users by the chosen tangible elements and the way they are arranged. Moreover, only the spatial layout and facilities aesthetic of information desks were considered. However, ambient factors (such as scent, lighting, temperature, music, etc.)

and employee factors and rules of behavior are also linked with user emotions and behavior (Heung & Gu, 2012). Further research—including the analysis of all these factors together—seems necessary to gain insight into the influence of service atmosphere on user emotions and behaviors.

7. Conclusion

Differential semantics has proven to be a useful method in evaluating the tangible elements of services in a multi-dimensional approach and from the user point of view. The results enable designers to discover the key cognitive and emotional dimensions used to evaluate the perceived quality of service environments. The equation presented in this research enables library managers to know which dimensional perceptions need to be modified to improve user image impression and willingness to interact. This more nuanced approach to evaluating an aspect of library services suggests that there is much to be gained by taking into account the emotional component of service quality perception.

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Appendix A. *Initial semantic universe of information desks (original Spanish words in bold).*

Accessible	**Accesible**	Funny	**Divertido**	Resistant	**Resistente**
Adaptable	**Adaptable**	Futuristic	**Futurista**	Safe	**Seguro**
Adapted	**Adaptado**	Glazed	**Acristalado**	Serious	**Serio**
Advanced	**Vanguardista**	Good quality	**De calidad**	Showy	**Llamativo**
Attractive	**Atractivo**	Happy	**Alegre**	Simple	**Sencillo**
Austere	**Austero**	Harmonic	**Armónico**	Sober	**Sobrio**
Balanced	**Equilibrado**	In organic form	**De forma orgánica**	Sophisticated	**Sofisticado**
Bold	**Rompedor**	In simple ways	**De formas simples**	Spectacular	**Aparatoso**
Boring	**Soso**	Innovative	**Innovador**	Strong	**Robusto**
Bright	**Luminoso**	Integrated	**Integrado**	Technical	**Técnico**
Bright colors	**De colores vivos**	Interactive	**Interactivo**	Technological	**Tecnológico**
Careless	**Desenfadado**	Interesting	**De interés**	Tidy	**Ordenado**
Clean	**Limpio**	Large	**Amplio**	Timeless	**Atemporal**
Clear	**Diáfano**	Luxurious	**Lujoso**	Updated	**Actualizado**
Close	**Cercano**	Minimalist	**Minimalista**	User-friendly	**De uso intuitivo**
Closed	**Cerrado**	Modern	**Moderno**	Ventilated	**Ventilado**
Cold	**Frío**	Modular	**Modular**	Versatile	**Versátil**
Colorful	**Colorido**	Narrow	**Estrecho**	Visible	**Visible**
Comfortable	**Cómodo**	Natural	**Natural**	Welcoming	**Acogedor**
Common	**Vulgar**	Neat	**Aseado**	Well decorated	**Bien decorado**
Compact	**Compacto**	Neutral colors	**De colores neutros**	Well distributed	**Bien distribuido**
Complex	**Complejo**	Nice	**Coqueto**	Well finished	**Bien acabado**
Conventional	**Convencional**	Obsolete	**Anticuado**	Well lit	**Bien iluminado**
Cool	**Guay**	Of careful aesthetics	**De estetica cuidada**	Well located	**Bien ubicado**
Cosmopolitan	**Cosmopolita**	Of nice touch	**De tacto agradable**	Well organized	**Bien organizado**
Cute	**Mono**	Of noble materials	**De materiales nobles**	Well signposted	**Bien señalizado**
Different	**Diferente**	Open	**Abierto**	Well-appointed	**Bien equipado**
Discreet	**Discreto**	Ordinary	**Ordinario**	Width	**Ancho**
Durable	**Duradero**	Original	**Original**	With cold colors	**De colores fríos**
Dynamic	**Dinámico**	Out of style	**Desfasado**	With curved shapes	**De formas curvas**
Elegant	**Elegante**	Overloaded	**Recargado**	With personality	**Con personalidad**
Ergonomic	**Ergonómico**	Pleasant	**Agradable**	With straight shapes	**De formas rectas**
Exclusive	**Exclusivo**	Pleasing	**Vistoso**	With style	**Con estilo**
Feminine	**Femenino**	Practical	**Práctico**	With warm colors	**De colores cálidos**
Formal	**Formal**	Professional	**Profesional**	Youthful	**Juvenil**
Fresh	**Fresco**	Rational	**Racional**		
Functional	**Funcional**	Refined	**Pulido**		