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► To cite this version:

Imène Belboula, Claire-Lise Ackermann. Consumer response to service brand physical elements: Using a semantic priming task to explore implicit understanding of service brand meaning. *Journal of retailing and consumer services*, 2021, 61, pp.102019. 10.1016/j.jretconser.2019.102019 . hal-03329978

HAL Id: hal-03329978

<https://rennes-sb.hal.science/hal-03329978v1>

Submitted on 13 Jun 2023

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**Consumer response to service brand physical elements: Using a Semantic Priming Task
to explore implicit understanding of service brand meaning**

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Abstract

Consumers' responses to design features involve both conscious and non-conscious information processing. The current research therefore argues that a combination of explicit and implicit measures should be used to assess consumer understanding of service brand meaning conveyed by a service brand's physical elements. However, most methods traditionally used to evaluate design meaning are explicit methods, based on conscious cognitive processes. The current research addresses this gap by documenting how understanding of service brand meaning conveyed by a service brand's physical elements can be tapped by an implicit measure. More specifically, it aims to investigate the extent to which a greater ability to decode meaning conveyed by design features results in differences in implicit understanding of service brand meaning. This research uses a Semantic Priming Task to assess associative strength between brand meaning and a service brand's physical elements. Results ($N=157$) show that command of the design language, captured by design acumen and involvement in the product category, results in greater ability to implicitly understand brand meaning conveyed by a service brand's physical elements, and moderates the implicit-explicit relationship. Results suggest that combining implicit and explicit measures may help practitioners in charge of creating brand's physical elements, especially when associations between design types and brand impressions are not constant across product categories.

Keywords: service brand physical elements, logo design, semantic transformation, semantic priming task

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1. Introduction

A brand is “a name, term, sign, symbol, or design, or combination of them which is intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of competitors” (Kotler and Armstrong, 2010, Glossary, p. 1). Consistent with an associative network memory model, these different brand’s physical elements are critical to branding because they serve as an anchor in memory for a variety of associations that constitute brand knowledge (D.A. Aaker, 2009; Keller, 1993; Rauschnabel et al., 2019). Most importantly to this research, a brand’s physical elements also convey brand meaning (C.M Henderson et al., 2019; Karjalainen and Snelders, 2010).

Brand meaning is conveyed by design features as the result from a semantic transformation process: designers transform qualitative brand descriptions into design features that transmit the meaning of the brand (Karjalainen and Snelders, 2010). However, design features may fail to deliver brand meaning as designers and marketers desire if (a) designers fail to embed proper meaning into the design features and/or (b) consumers fail to correctly decode the meaning embedded in these design features (Karjalainen, 2007). This is why marketing management involves monitoring consumers’ understanding of the brand meaning that design features are intended to convey.

In the realm of services, such measures are particularly important because service characteristics of intangibility increase the level of uncertainty consumers feel when choosing between competing services (Lovelock and Gummesson, 2004). Strong brands reduce uncertainty because they increase customers’ trust in the intangible purchase (Berry, 2000). A strong brand is characterized by strong brand equity (i.e., the differential effect of brand

knowledge on customer response to the marketing of the brand) (Keller, 1993). An effective way to increase brand equity in services is to make the intangible more tangible by using as many physical elements (e.g., logo, staff uniform, store atmosphere) as possible (Berry, 2000). Therefore, building a strong service brand involves (a) designing physical elements that aim to deliver brand meaning and (b) verifying whether the service brand's physical elements are able to deliver such meaning.

Although past research has suggested that consumers' responses to design features involve both conscious and non-conscious information processing (Veryzer, 1999), most methods traditionally used to evaluate design meaning are direct methods, based on self-reporting (Belboula et al., 2018; Mugge and Schoormans, 2012; Pleyers, in press; Radford and Bloch, 2011). Like all explicit measures, these direct measures require respondents to deliberately engage in a reflection process. However, recent research has suggested the existence of dual evaluative processes by which two cognitive systems interact to produce evaluations: one system is automatic, associative, fast, and non-conscious; and the other is controlled, deliberative, slow, and conscious (Van Bavel et al., 2012). Thus, using explicit measures to investigate whether service brands' physical elements successfully communicate brand meaning is problematic because they only involve controlled reflection processes and disregard substantial non-conscious and automatic processes.

Estimating how design features automatically activates meaning requires using implicit measures (Belboula et al., 2018; Pleyers, in press). Implicit measures are indirect measures that do not inform the subject of what is being assessed and that tap associations in memory in an automatic manner (Ackermann and Mathieu, 2015). Consumers make many consumption choices with minimal information processing, and these decisions are often the consequences of automatic and almost non-conscious influences (Bargh, 2002). Because human behavior is largely influenced by automatic and non-conscious processes, it is important to measure

implicit understanding of brand meaning conveyed by a service brand's physical elements. Indeed, implicit associations, once established in the minds of consumers, cannot be easily modified (Gregg et al., 2006; Ratliff et al., 2012). Therefore, designers and managers must identify them and later adjust their stylistic decisions to achieve the intended impressions.

Thus, when investigating whether service brands' physical elements successfully communicate brand meaning, it is important to use not only explicit but also implicit measures because the later may provide an indicator of the brand impressions that automatically come to mind when individuals are exposed to a service brand's physical elements. However, individuals may differ in the ability to decode meaning conveyed by design features: some individuals, because of an innate predisposition to understand design features or because of greater knowledge of the design codes used in a given product category, may be better able than others to understand brand meaning conveyed by a service brand's physical elements. Thus, it is important not only to measure implicit understanding of brand meaning conveyed by a service brand's physical elements but also to understand which individual characteristics may result in more clear-cut implicit brand impressions. In this regard, the objective of this research is to investigate the extent to which a greater ability to decode meaning conveyed by design features results in differences in implicit understanding of service brand meaning.

This paper has the following structure. Research from the service branding and implicit cognition literatures is first discussed. Theoretical and empirical support from the two streams of research is integrated to develop hypotheses. Results from an empirical study using a combination of explicit and implicit measures are then reported. Finally, implications of the results, limitations and avenues for future research are discussed.

2. Literature review and hypothesis development

2.1. Brand building in services: the importance of physical elements

In the context of packaged goods, brands are said to be subsequent to the product; that is, brands abstract themselves from the first products that made them known (Borja de Mozota, 2007). This is why product design is linked to the early stages of the history of any brand. In this context, the *product* is the *primary brand*, and consumers can use the product to understand the meaning of the brand (Berry, 2000).

This may be less the case with services because of service characteristic of intangibility. Tangibility refers to the “degree to which a product can be visualized and provides a clear and concrete image before purchase” (McDougall and Snetsinger, 1990, p. 31). Unlike physical goods, services cannot be seen, tasted, or felt before purchase; thus, their intangibility increases the perception of monetary, social, or safety risks (Lovelock and Gummesson, 2004). This is why branding plays a special role in service companies. Strong brands enable customers to better visualize and understand intangible products, and this thus increases customers’ trust of the invisible purchase (Berry, 2000). Strong brands help reduce consumer’s perceived risk because they increase trust in buying services that are difficult to evaluate in advance (Löhndorf and Diamantopoulos, 2014). Strong brands are the surrogates when the company offers no physical goods to touch, try on, or scrutinize; in the context of services, the *company* is said to be the *primary brand* (Berry, 2000).

The remaining issue is knowing how to brand services. Most services require physical goods, implying that there are few pure services (Shostack, 1977). Services usually include tangibles (e.g., appearance of physical facilities in which the service is delivered, equipment, staff uniforms, software user interfaces, etc.) that customers perceive and to which aesthetic design can be applied (Candi and Saemundsson, 2011). Thus, by developing physical facilities, staff uniforms, leaflets, visual identity systems, etc., designers contribute to making the

intangible tangible and thus build strong service brands. In other words, managers can better connect customers to their brand by designing a service environment that creates brand impressions that appeal to their customer base (Nyffenegger et al., 2015). Results from a recent study on retail design highlight that designers themselves recognize the importance of being able to put personal style preferences aside and to start from the brand values to translate these into the overall concept and design (Quartier et al., in press). From this perspective, the designer's role is not only to develop aesthetically attractive service brand physical elements but also to use the principles of design semantics to develop physical elements that convey brand meaning. Thus, they make service brands more understandable for consumers, and, in turn, reduce perceptions of uncertainty about the service provider.

Design semantics refers to how meaning is mediated by the physical features that designers choose so that the physical features will be recognized and interpreted by consumers (P.W. Henderson and Cote, 1998; Karjalainen and Snelders, 2010; Krippendorff and Butter, 1984). According to the design semantics approach, design is a language that designers can use to convey meaning (Verganti, 2008), and this occurs through a semantic transformation process by which the designer transforms qualitative attributes into design features (Karjalainen, 2007; Karjalainen and Snelders, 2010). The ability of design features to convey brand meaning has been demonstrated for goods (see Karjalainen and Snelders, 2010; Orth and Malkewitz, 2008) and brand visual identity elements, such as logos (P.W. Henderson and Cote, 1998; Klink, 2003; Klink and Athaide, 2014). Design features have been found to inform consumers of products' functional attributes (Belboula et al., 2018; Pantin-Sohier, 2009), price expectations (Orth et al., 2010; Van Rompay et al., 2009), perceived quality (Orth et al., 2010), and, most important to this study, brand impressions (Orth and Malkewitz, 2008).

However, there are some risks involved in the semantic transformation process. Through this process, designers choose design characteristics (e.g., form, size, color, etc.) to

convey meaning. It is at this stage that a first distortion, a failure to encode proper brand meaning, may occur (Karjalainen, 2007). The second distortion may occur when consumers are exposed to design features and have the opportunity to perceive them, *i.e.*, to attribute an interpretation to the formal attributes chosen by designers to convey meaning. The second distortion occurs if consumers fail to attribute meaning to design features in the way the designer expected or desired (Karjalainen, 2007). Because there is a risk consumers may not interpret design features in the expected way and because consumers' correct understanding of brand meaning in the realm of services is so important (Berry, 2000), it is critical that brand managers make sure service brands' physical elements enable consumers to develop an understanding of the brand meaning that is consistent with the brand identity.

2.2. Implicit understanding of a service brand's physical elements

Designers can deliver brand meaning that consumers can understand only if they embed design features that easily evoke consensually held meaning within a culture or subculture (P.W. Henderson and Cote, 1998). Belboula et al. (2019) suggested that physical elements have a clear meaning (*i.e.*, can be easily perceived and interpreted) if consumers have associations between specific design features (*e.g.*, font, form, color) and qualitative attributes stored in memory. For example, when exposed to the logo of an unknown beverage brand, consumers are better able to perceive the beverage as being dark, heavy, and strong (in terms of taste) if the logo is large, rounded, and dark, rather than if it is small, angular, and light (Klink, 2003). According to Belboula et al. (2019), this is because consumers have learned to associate these particular design features with those specific attributes in the beer category. Belboula et al. (2019) built on the Human Associative Memory (HAM) model (Anderson, 1983) to suggest that consumers have developed a network of memory associations between design features and attributes as the result of a learning process.

The Human Associative Memory model describes human memory as a network of interconnected memory nodes. These memory nodes are basic elements that constitute a piece of information stored in a person's mind; they are traces of previous learning episodes and activate each other in relevant contexts (Anderson, 1983). A key characteristic of the HAM model is spreading activation (Anderson and Pirolli, 1984), which refers to the flow of node activation originating from the activation of a specific node. The activation of a specific memory node primes the activation of the network of nodes to which it is connected, and this priming effect occurs without the individual being aware of it. Building on the HAM model, Belboula et al. (2019) suggested the perception of a design feature automatically activates the conceptual attributes to which it is associated in memory. This activation occurs implicitly, i.e., in an unintentional manner and outside of conscious awareness. As stressed by Veryzer (1999), "just as people may implicitly learn the rules of an artificial grammar and then apply them without conscious awareness, rules governing the processing ... of product designs may be non-consciously acquired and applied" (pp. 503–504).

In the context of this research, it is therefore suggested that consumers have developed a network of memory associations between design features and service brand attributes as the result of past learning experiences. Exposure to a service brand's physical elements implicitly triggers brand meaning because it activates memory associations in a manner that is unintentional and non-conscious.

2.3. Explicit versus implicit measures: an iterative reprocessing model perspective

Market researchers should be aware that implicit mind is something consumers are not aware of although it influences their decision-making, and this includes evaluation of service brand physical elements (Penn, 2016). For this reason, specific protocols should be used to assess brand meaning automatically activated from a service brand's physical elements. However, previous research on the impact of aesthetic design has mostly relied on consumers'

self-reported, explicit measures (Pleyers, in press). Explicit measures used to explore the effectiveness of physical elements to convey brand meaning include both qualitative techniques (e.g., first meaning that comes to mind [P.W. Henderson and Cote, 1998]) and quantitative techniques (e.g., semantic differential scales [Klink, 2003; Klink and Athaide, 2014]). Like all explicit measures, these qualitative and quantitative methods are direct measures that share the typical features of self-reported measures: awareness of evaluating the design elements, intention to evaluate, control over the evaluation, and deliberation in making the evaluation (Smith and Nosek, 2011). Thus, they emphasize cognitive processes that are accessible (automatic processes are not accessible) and are therefore vulnerable to verbalization biases, such as positivity bias, socially desirable responding, or contextual cueing (Cunningham and Zelazo, 2007; Fazio and Olson, 2003; Gregg et al., 2013; Pleyers, in press; Wörfel, in press). In other words, explicit measures cannot tap whether a semantic attribute has been automatically activated in memory by exposure to a service brand's physical elements.

Conversely, implicit measures typically require participants to classify stimuli into categories, and the strength of memory associations is assessed by categorization speed. Thus, the control loop (Cunningham and Zelazo, 2007) that "prompts respondents to over-validate their responses" (Rivière et al., 2013, p. 377) in an explicit questionnaire is blocked, and implicit measures thereby gain access to automatic associations in memory. Thus, implicit measures may provide a more proximal estimate of how a service brand's physical elements automatically activate brand meaning than explicit measures do.

Building on Cunningham and Zelazo (2007), it may be argued that implicit and explicit measures assess the two endpoints of an iterative reflection process (Belboula et al., 2019; Rivière et al., 2013). Cunningham and Zelazo's (2007) iterative reprocessing (IR) model proposes that evaluations are constructed through an iterative reprocessing of stimuli. Associations existing in memory with a given stimulus are automatically activated when

exposed to that stimulus and provide the basis of an initial evaluation, which is then reprocessed iteratively during a reflective process that produces more nuanced evaluations. Nonetheless, the automatic process underlying the initial evaluation remains active during the different iterations and influences the subsequent, more reflective evaluations. In other words, automatic processes are not superseded by reflective processes, but rather they interact to generate evaluations that result not only from existing memory associations but also from other processes that consumers use to process information (Rivière et al., 2013).

In the context of this research, this implies that the meaning associated in memory with some specific service brand design features is automatically activated when consumers are exposed to them. An explicit method, be it qualitative or quantitative, that requires consumers to reflect on the attributes they associate with the service brands' physical elements will trigger a reflective process similar to that described by Cunningham and Zelazo (2007). Thus, an explicit measure will reflect the outcome of the consumer's reflection process prompted by the need to verbalize an answer; however, an implicit measure offers an assessment of the ability of the service brand's physical elements to automatically activate meaning.

To summarize, the design semantics approach views design as a language that designers use to convey meaning (Verganti, 2008). By repeated exposure to a service brand's physical elements, consumers have implicitly learned the rules of this specific language and then, without conscious awareness, apply them to decode brand meaning (Veryzer 1999). Thus, following Belboula et al. (2019) and Rivière et al. (2013), this research builds on Cunningham and Zelazo (2007) to argue that (a) traditional explicit measures cannot tap brand meaning that is automatically activated by exposure to a service brand's physical elements, (b) associative strength between brand meaning and service brand physical elements can be measured by implicit measures, and (c) verbalization biases may cause

associations between brand meaning and a service brand's physical elements measured with an implicit measure to differ from those measured with explicit measures.

2.4. The effect of design acumen and involvement in the service category

In addition, individuals may differ in their abilities to interpret brand meaning conveyed by a service brand's physical elements. Ability refers to constraints of competence that may limit the extent to which consumers may interpret, in the desired way, design features embedded in a service brand's physical elements. Design acumen and product involvement are identified as individual differences that may either impede or facilitate understanding of brand meaning conveyed by physical elements as design acumen and involvement in the product category may affect consumers' ability to recognize and assign meaning to the design features chosen by designers to convey brand meaning.

Design acumen is a personal characteristic explaining that some consumers are more responsive to design than others (Bloch, 1995). It is an innate characteristic by which some individuals make quicker sensory connections than others and thus show more sophisticated preferences regarding design (Csikszentmihalyi and Robinson, 1990). Such individuals are better able to understand and evaluate design features (Bloch et al., 2003; Orth et al., 2010; Truong et al., 2014). In other words, if design is a language, such individuals should have a higher command of this specific language and should be better able to apply the rules governing the processing of design features. This increased ability is expected to be observed for any type of service because the ability of individuals with high design acumen to decode design meaning is due to a high responsivity to design, and is not category specific.

In addition, it may be suggested that the ability to decode design meaning can also be category specific. More precisely, this ability is expected to increase with increased involvement in the category of service under consideration. In a consumer behavior context, involvement is an inherent interest a consumer has in a product (de Ruyter and Bloemer, 1998).

Involvement in a category of goods or services is an enduring state of motivation, arousal, or interest that results in a high level of category-specific knowledge (Richins et al., 1992; Rothschild, 1984). Highly involved consumers are therefore expected to be more knowledgeable about the meaning of some design codes specifically used in a given category of services to convey specific meaning. These consumers have indeed been repeatedly exposed to a service brand's physical elements within a specific category of services because of their inherent interest; therefore, they have implicitly learned the design language used in this category of services. Thus, they are expected to be more capable than consumers with lower involvement to apply the rules governing the processing of design features in this category of services.

In considering design as a language, fluency in this specific language is likely to be higher among individuals with high design acumen and involvement in the service category than among individuals with low design acumen and involvement in the service category. These two individual characteristics are expected to affect implicit understanding of the brand meaning conveyed by a service brand's physical elements in two different ways.

First, individuals with greater design acumen and greater involvement in the service category may show greater ability to implicitly understand a service brand's physical elements than individuals with lower design acumen and lower involvement in the service category because they are better able to apply the rules governing the processing of design features. Specifically, because implicit measures assess associative strength by measuring how quickly individuals make categorization decisions, it may be suggested that response times in an implicit measure assessing understanding of brand meaning conveyed by design features may be shorter for individuals with a high command of the design language than for individuals with a low command of the design language. Thus, it is hypothesized that

Hypothesis 1-a: Individuals with high design acumen show greater ability to implicitly understand a service brand's physical elements than individuals with low design acumen.

Hypothesis 1-b: Individuals with high involvement in the service category show greater ability to implicitly understand a service brand's physical elements than individuals with low involvement in the service category.

Second, high command of the design language may also result in weaker associations between implicit and explicit understanding of brand meaning conveyed by a service brand's physical elements. Even though implicit and explicit measures rely on two different cognitive systems, the two systems interact together, suggesting that answers to implicit and explicit measures are distinct but related constructs. Many models in cognitive psychology suggest that implicit and explicit constructs are related (e.g., iterative reprocessing model, Cunningham and Zelazo, 2007; associate-propositional evaluation model, Gawronski and Bodenhausen, 2006). These models posit that (a) exposure to a stimulus automatically activates associations existing in memory with the focal stimulus, and (b) these associations are then processed in a more deliberate manner to arrive at an explicit evaluation. In other words, these models suggest that implicit constructs inform explicit constructs.

Building on the initial argument that implicit and explicit measures assess the two endpoints of an iterative reflection process, it is therefore argued that exposure to a service brand's physical elements first automatically activates associations (i.e., implicit understanding). These associations are then iteratively processed to arrive at an understanding of brand meaning that is accessible to self-report (i.e., explicit understanding). Thus, explicit understanding is based on implicit understanding.

Another feature of automatically activated associations is that they become active at a preconscious level, thus making individuals unaware of their source (Bargh, 2002). This is why they can come into awareness without an accompanying representation of the rationale behind

them, and may therefore be experienced as intuitions (Zimmerman et al., 2010). It may be suggested that individuals with a high command of the design language are less likely to follow their intuitions when reporting their understanding of brand meaning conveyed by a service brand's physical elements than individuals with low command of the design language. Individuals with a high command of the design language may indeed be considered as experts. Expertise is characterized by knowledge that is abundant and elaborate (Wood et al., 1995). Compared to novices, experts in a domain have a high level of detailed information stored in memory about objects belonging to that domain, that they activate when asked to evaluate an object in their domain of expertise (Czellar and Luna, 2010). Novices, in contrast, may be more prone to use first impressions and intuitions (Alba and Hutchinson, 1987). In line with Cunningham and Zelazo's (2007) iterative reprocessing (IR) model, it follows from the above that iterative reprocessing of first impressions and intuitions may be more elaborate for experts than for novices. Thus, the relative weight of first impressions and intuitions (tapped by implicit measures) in the final evaluation (tapped by explicit measures) may be smaller for experts than for novices, leading to potentially weaker implicit-explicit relations. In the context of this research, it may therefore be suggested that individuals with a high command of the design language are more likely to enter into a control loop by which they will tend to over validate their responses to explicit questions. When asked to report their views regarding a service brand's physical elements, individuals with high design acumen/involvement in the service category may indeed activate detailed knowledge available in memory and base their explicit evaluation on an elaborated scrutinization of the different aspects of the service brand's physical elements. Conversely, individuals with low design acumen/involvement in the service category may base their reported evaluation on their first impressions and intuitions. In summary, the knowledge aspect of expertise results in a prediction of a negative moderating effect of design

acumen and involvement in the service category on the implicit-explicit relation. Thus, it is hypothesized that:

Hypothesis 2-a: Implicit understanding of brand meaning conveyed by a service brand's physical elements is more likely to inform explicit understanding of brand meaning conveyed by a service brand's physical elements for individuals with low design acumen than for individuals with high design acumen.

Hypothesis 2-b: Implicit understanding of brand meaning conveyed by a service brand's physical elements is more likely to inform explicit understanding of brand meaning conveyed by a service brand's physical elements for individuals with low involvement in the service category than for individuals with high involvement in the service category.

3. Method

3.1. Stimuli

The specific service brand physical element used to test the hypotheses was hotel brand logos. Among the different brand physical elements, a logo plays a critical role because it appears in the environment in which the service is delivered in multiple ways (e.g., Starbucks logo appears on the store's façade, cups, napkins, uniforms, etc.) and also in online and off-line advertisements and on letterheads, business cards, and even corporate giveaways that often carry nothing more than the brand logo (Klink, 2003).

A specific service industry was chosen because associations between a brand's physical elements and brand meaning can be category specific (Orth and Malkewitz, 2008). Thus, using logos from different types of services may have confounded the results. The hotel industry was chosen specifically because this is a service category that is well known by the general public, therefore increasing respondents' level of familiarity with the brand's physical elements used in this industry. In addition, consumers may show some level of interest in this industry, but they are unlikely to demonstrate a high level of involvement or expertise. Therefore, the focus

on design was stressed, and the research is of greater interest to practitioners and researchers (Radford and Bloch, 2011).

Orth and Malkewitz's (2008) holistic design types approach was used to select four hotel brand logos expected to generate different types of brand impressions. Orth and Malkewitz (2008) developed a model explaining how, within a product category, specific types of holistic designs evoke particular brand impressions: eight design factors (i.e., natural, harmony, elaborate, size, symmetry, compressed, flourish, and weight) can be used to define different holistic package/product design types (e.g., massive, contrasting, etc.); In addition, each holistic design type conveys specific brand personality traits (sincere, exciting, sophisticated, competent, and rugged). Their model has been tested in the categories of wine and perfume, and they suggested that the different types of holistic designs they identified can be used to describe a wide range of brand physical elements. Some design factors they used (i.e., natural, elaborate, and harmony) have been used in past research to differentiate brand logos (P.W. Henderson and Cote, 1998; P.W. Henderson et al., 2003).

18 fictitious hotel logos were selected from a designer blog (abduzeedo.com). First, fictitious hotel logos were used because consumers rely more on design elements to infer brand characteristics for unfamiliar brands than they do for familiar brands (Orth and Malkewitz, 2008). Second, logos combining words and images were selected because the word logo refers to a variety of graphic and typeface elements (P.W. Henderson and Cote, 1998), and most companies in the hotel industry use a combination of graphic and typeface elements. However, specific attention was paid to selecting logos whose text was not semantically/associatively related to any of the investigated brand personality traits. The assumption within the holistic approach to design adopted in this research is indeed that different product design constitutive elements are combined into more complex cognitive design components that are aggregated during perception and convey meaning (Hoegg and Alba, 2008; Veryzer, 1999). In other words,

when consumers are exposed to a logo, they perceive a combination of pictorial and verbal elements. Thus, understanding of a logo includes combined understanding of its pictorial and verbal elements. It should be noted here that this is the approach used by Orth and Malkewitz (2008) in their research on the relationship between holistic design types and brand impressions. However, when investigating logos combining graphic and typeface elements, it cannot be totally excluded that the effects observed may be due to the words presented and not to the logo as a whole. For example, a logo for an hotel called “Prince Hotel” would not be appropriate as “charming” is one of the items related to the sophistication dimension of brand personality, and there is an association between “Prince” and “Charming” as in the a fairy tale character “Prince Charming”.

Orth and Malkewitz’s (2008) design elements (e.g., color scheme is natural/not natural, typography is plain/ornate) were adapted to the stimuli chosen for this research (i.e., hotel logos) and used to identify the most massive, contrasting, natural, and delicate hotel logos among the 18 hotel logos initially selected. The assumption that none of the texts in the pre-selected logos was semantically/associatively related to any of the investigated brand personality traits was checked by running a free elicitation task with respondents ($N=30$) not involved in the main study. Appendix A displays the four different hotel logos that were finally selected

3.2. Procedure

157 French native-speaking undergraduate students (59.76% female and 40.24% male) enrolled in a marketing course completed the research experiment as part of a course requirement. Participants were first greeted individually by the experimenter and were then informed about the overall procedure of the experiment. They first completed the implicit test, presented to them as a comprehension test. Implicit measures are indirect measures; this implies that respondents should not be informed of the purpose of the measurement

(Greenwald and Banaji, 1995). Then, they answered direct questions aimed at measuring the brand impressions the hotel logos evoked. The questionnaire ended with moderating variables and demographic measures. They were then thanked for their time and participation.

3.2.1. Implicit measures

A semantic priming task was developed to assess the strength of the associations between hotel logos and brand meaning. A semantic priming task is a lexical-decision task associated with a semantic priming paradigm: participants are first primed with a stimulus and then exposed to a target, word or pseudo-word, about which they have to make a lexical decision (Meyer and Schvaneveldt, 1971). A priming effect is observed if the time needed to categorize the target stimuli is shorter when primes and target stimuli are semantically related than when they are not. Semantic priming tasks are commonly used in research on memory as a means to explore automatic relations among concepts. In business research, they have been used to explore semantic networks (Rivière et al., 2013) or consumers' emotional engagement with brands (Calvert et al., 2014). In particular, Belboula et al. (2019) used a semantic priming task to evaluate perceived product positioning conveyed by product design.

The semantic priming task is highly suitable to measure the extent to which exposure to a logo conveys brand meaning (i.e., exposure activates semantic nodes in memory) because it indicates the extent to which exposure to a prime (i.e., the logo) facilitates categorizing brand attributes as words or pseudo-words. How easily a brand attribute will be recognized as a word depends on how strongly it is semantically associated in memory with some of the design features of the logo. Figure 1 illustrates the underlying mechanism, as follows: (a) exposure to the logo of the brand (i.e., the prime) automatically primes the activation in memory of the conceptual nodes to which some specific design features of the logo are semantically associated; (b) the activation level of these conceptual nodes is temporarily increased; (c) the activation of these conceptual nodes facilitates the brand attributes' categorization as words

(i.e., the target) that are associated with them; and (d) the degree of facilitation induced by the initial exposure to the brand logo is the measure of the associative strength between the logo design and the brand attributes.

Figure 1 to be inserted about here

E-Prime software was used to develop and administer the semantic priming task. Participants were told that various letter strings would be presented in the center of the screen. For each of these letter strings, they would be required to indicate as quickly as possible whether it represented a word or pseudo-word by pressing the appropriate key on a computer keyboard. A semantic priming task consists of test sequences that aim to measure the strength of the association between a focal prime stimulus and focal targets, and distractive sequences that aim to prevent participants from understanding the real purpose of the test. Each sequence started with the presentation of a prime, followed by the presentation of a target about which the participants have to make a lexical decision. All the stimuli appeared in the center of the computer screen on a neutral, white background. The stimuli were the previously selected four hotel logos, 15 words, and 15 pseudo-words. The four logos served as the primes. The pictures were of the same size and quality. The targets were 15 words (i.e., 15 brand personality items [Orth and Malkewitz, 2008]), and 15 pseudo-words. The 15 brand personality items used by Orth and Malkewitz (2008) stemmed from J.L. Aaker's (1997) brand personality inventory (BPI) and corresponded to the five BPI initial dimensions (i.e., sincerity, excitement, sophistication, competence, and ruggedness). The 30 targets (i.e., letter strings corresponding to words or pseudo-words) and the four primes (i.e., service brand logos) were combined to form 120 couples (prime-targets), which combined in 60 distractive sequences (using target pseudo-words) and 60 test sequences (using target words). Each respondent reviewed 120 sequences; the presentation orders of distractive and test sequences were randomized for each participant.

Each sequence (1) started with the presentation of a fixation point in the center of the screen for a duration of 500 milliseconds. This was (2) immediately followed by a 200-millisecond presentation of a service brand logo, (3) followed by a 100-millisecond presentation of a mask composed of a row of five hash-masks (#####), and then by (4) the presentation of a target letters-string that represented a word or pseudo-word. Participants had to answer as quickly as possible by pressing the “1” key if the string of letters was a real word or the “2” key if not. The target disappeared as soon as the participant had answered. The intersequence interval was set to 1,500 milliseconds. Response time (RT) was measured from the target onset until the participant’s response. The interval between the presentation of the prime and the presentation of the target (i.e., the stimulus onset asynchrony [SOA]) was set at 300 milliseconds to guarantee significant priming effects (e.g., Fazio et al., 1986).

Only RTs observed in the test sequences (a logo followed by a real word corresponding to one of the 15 brand personality items) were retained for data analysis. It was checked that no RTs were shorter than 250 milliseconds or longer than 1,500 milliseconds, which led us to exclude 2% of the trials from data analysis (Hermans et al., 2001), and that all the retained responses were correct (i.e., words categorized as real words). In addition, although the priming effect tested in a semantic priming task is automatic in nature, it cannot be totally excluded that participants use specific strategies in word recognition when completing a semantic priming task (e.g. den Heyer et al., 1985; Neely, 1991). As the targets have been repeated four times each, it is possible that participants have engaged in strategic processing once they became aware of the repetition of targets (Scarborough et al., 1977). Therefore, it was checked for potential repetition effects by (1) comparing first- and second-target presentation RTs for each participant and for each target, and (2) examining whether RTs to pseudo-words changed over the course of the task and whether different primes affected pseudo-words responses differently (RTs could get faster if a repetition effect is observed or slower because repetition of pseudo-

words can also increase their familiarity, thus making them more difficult to reject as pseudo-words, but no differences among primes should be observed); no differences were observed.

For each logo and for each dimension of the BPI, RTs were averaged to provide a measure of *implicit* impressions of sincerity (ImpBP_{Sincerity}), excitement (ImpBP_{Excitement}), sophistication (ImpBP_{Sophistication}), competence (ImpBP_{Competence}), and ruggedness (ImpBP_{Ruggedness}). Details regarding the scores for ImpBP are provided in Appendix B.

3.2.2. *Explicit measures*

Details regarding explicit measures are provided in Appendix B.

Explicit brand meaning was measured with the 15 brand personality items anchored on seven-point Likert scales. Brand personality explicit data were analyzed through factor analyses to capture brand personality dimensions (J.L. Aaker, 1997). For each hotel logo, the analyses produced five factors that corresponded to the five BPI initial dimensions of sincerity, excitement, sophistication, competence, and ruggedness. For each logo and for each dimension of the BPI, scores were obtained by averaging the answers to the different scale items to provide a measure of *explicit* impressions of sincerity (ExpBP_{Sincerity}), excitement (ExpBP_{Excitement}), sophistication (ExpBP_{Sophistication}), competence (ExpBP_{Competence}), and ruggedness (ExpBP_{Ruggedness}).

Design acumen was measured with the four items from Bloch et al.'s (2003) centrality of visual product aesthetics scale anchored on seven-point Likert scales. A principle-components factor analysis was conducted, with one factor explaining 63.59% of the variance; this provides evidence for convergent validity. The four items were averaged in one measure of design acumen (DA, M=3.51; SD=0.89).

Involvement in hospitality industry was measured with the ten items of Zaichkowsky's (1994) personal involvement inventory anchored on seven-point scales. A principle-components factor analysis was conducted, with one factor explaining 73.45% of the variance;

this provides evidence for convergent validity. The ten items were averaged in one measure of personal involvement in the hospitality industry (PI, $M=4.18$; $SD=1.03$).

4. Results

This section first presents the results of the implicit and explicit measures and then continues with the test of the hypotheses.

The semantic priming effect receives support if, for a given brand personality item, a significantly shorter RT occurs in a sequence starting with one logo when compared with sequences starting with the other logos. RT captures the logo-brand personality item associative strength: a shorter RT indicates a stronger association between the prime (i.e., the logo) and the target (i.e., the brand personality item). A logo is suggested to convey implicit brand meaning if a significantly shorter RT occurs in the logo test sequence (i.e., when the respondent indicates that a brand personality item is a real word after seeing the logo) compared with the other sequences (test sequences with other logos). Thus, significant differences in measures of implicit brand personality impressions ($ImpBP_{Sincerity}$, $ImpBP_{Excitement}$, $ImpBP_{Sophistication}$, $ImpBP_{Competence}$, and $ImpBP_{Ruggedness}$) indicate significant differences in associative strength between the logo and the brand personality dimension. The likelihood that a logo is conveying a given brand personality dimension increases as the implicit measure of brand personality impressions decreases.

An ANOVA was applied to explicit and implicit brand personality impressions with hotel logos as the within-subjects variable (see Table 1). The ANOVA first revealed, the four prime logos generated significantly different implicit ($F(3,628)=234.788$, $p<0.05$) and explicit ($F(3,628)=2.56$, $p<0.05$) impressions of sincerity. In addition, results from a mean comparison Tukey Test showed that natural and delicate logos generated the strongest impressions of sincerity at both the implicit and explicit levels. This is consistent with Orth and Malkewitz's (2008) results that had shown that natural designs resulted in high impressions of sincerity in

the two product categories they had investigated (i.e., wine and perfume). However, the results suggest that impressions of sincerity are equally conveyed by natural, delicate, and contrasting logos at the explicit level, whereas at the implicit level, out of the four logos, the contrasting logo generated the weakest impressions of sincerity.

Second, the ANOVA showed that the four prime logos generated significantly different implicit ($F(3,628)=153.423$, $p<0.05$) and explicit ($F(3,628)=6.11$, $p<0.05$) impressions of excitement. In addition, results from a mean comparison Tukey Test revealed that the natural logo generated the weakest impressions of excitement at both the implicit and explicit levels. This is consistent with Orth and Malkewitz's (2008) results that had shown that natural designs also resulted in low impressions of excitement in the wine category and average impressions of excitement in the perfume category. However, the implicit results suggest impressions of excitement are best conveyed by the delicate logo; the explicit results suggest there are no differences between contrasting, delicate, and massive logos in terms of impressions of excitement. These results are interesting because they suggest some inconsistency that was previously highlighted by Orth and Malkewitz (2008): whereas massive design was associated with high impressions of excitement in the wine category, it was associated with low impressions of excitement in the perfume category.

Third, the ANOVA revealed that the four prime logos generated significantly different implicit ($F(3,628)=224.142$, $p<0.05$) and explicit ($F(3,628)=1.89$, $p<0.05$) impressions of competence. In addition, results from a mean comparison Tukey Test showed the delicate logo generated the strongest impressions of competence at the explicit level, thus supporting Orth and Malkewitz's (2008) results in both categories of wine and perfume whereas it generated the weakest impressions of competence at the implicit level. This is a clear illustration of implicit/explicit dissociation.

Fourth, the ANOVA showed the four prime logos generated significantly different implicit ($F(3,628)=157.023$, $p<0.05$) and explicit ($F(3,628)=15.07$, $p<0.05$) impressions of sophistication. In addition, results from a mean comparison Tukey Test revealed impressions of sophistication are best conveyed by the contrasting logo and worst conveyed by the natural logo at both the implicit and explicit levels. These results were unexpected because Orth and Malkewitz (2008) had shown quite the opposite: contrasting design results in low/average impressions of sophistication in the category of wine/perfume, and natural design results in high impressions of sophistication in the category of wine and perfume.

Finally, the ANOVA showed the four prime logos generated significantly different implicit ($F(3,628)=189.149$, $p<0.05$) and explicit ($F(3,628)=1.69$, $p<0.05$) impressions of ruggedness. In addition, results from a mean comparison Tukey Test revealed the massive logo generated the strongest impressions of ruggedness, and the delicate logo generated the weakest impressions of ruggedness at both the implicit and explicit levels. Orth and Malkewitz (2008) had found the same pattern of results for perfume, but not for wine, where the contrasting design generated high impressions of ruggedness. Very interestingly, the results suggest the contrasting logo also generated impressions of ruggedness at both the implicit and explicit levels, but not as much as the massive logo.

Table 1 to be inserted about here

Thus, results provide evidence for the assumptions that (a) associative strength between brand meaning and a service brand's physical elements can be measured by implicit measures and that (b) associations between brand meaning and a service brand's physical elements measured with an implicit measure may differ from those measured with explicit measures, as depicted in Figure 2.

Figure 2 to be inserted about here

To test Hypotheses 1-a and 1-b, regression analyses were conducted to examine the relationship between design acumen (DA) and involvement in the hospitality industry (PI) as the independent variables and implicit brand personality impression as the dependent variable (ImpBP) for each logo and for each dimension of the BPI. Because a semantic priming task assesses associative strength by measuring how quickly individuals make categorization decisions, it was suggested that response times would be shorter for individuals with a high DA and PI than for individuals with a low DA and PI. The results (Table 2) indicate that RTs¹ significantly decrease with increased DA and PI for all dimensions and logos, except for the natural logo where DA and PI have no effect. Thus, Hypothesis 1-a - *Individuals with high design acumen show greater ability to implicitly understand a service brand's physical elements than individuals with low design acumen* - and Hypothesis 1-b - *Individuals with high involvement in the service category show greater ability to implicitly understand a service brand's physical elements than individuals with low involvement in the service category* - are partially supported.

Table 2 to be inserted about here

To test Hypotheses 2-a and 2-b, the bootstrapping approach introduced by Preacher and Hayes (2008) was used to assess moderation effects. To this end, Hayes's (2013) PROCESS macro (Model 3) was used. The analyses are based on 5,000 bootstrap replications with a confidence interval corresponding to a p value of 0.05. Regression analyses were conducted in which ImpBP was entered at the independent variable, ExpBP was entered as the dependent variable, and DA/PI were entered as the moderating continuous variables. The type of logo (1=Massive; 2=Contrasted; 3=Natural; 4=Delicate) was entered as a moderator of the moderating effect to check that the hypothesized moderating effect was not varying according

¹ RTs (response times) have been negatively valenced so that β are positive when the expected effect is observed.

to the type of logo. As expected, results showed the type of logo had no effect on the hypothesized moderating effect (coeff=0.019, $p = ns$) and interaction effects between DA and each dimension of ImpBP (Sincerity: coeff=0.3122; 95% IC [0.0201;0.1230] / Excitement: coeff=0.1321; 95% IC [0.0180;0.2443] / Sophistication: coeff=0.2626; 95% IC [0.1587;0.3683] / Competence: coeff=0.1122; 95% IC [0.0196;0.0536] / Ruggedness: coeff=0.1709; 95% IC [0.0152;0.1771]) and between PI and each dimension of ImpBP (Sincerity: coeff=0.1651; 95% IC [0.0737;0.4039] / Excitement: coeff=0.1850; 95% IC [0.1290;0.3630] / Sophistication: coeff=0.0964; 95% IC [0.0036;0.1901] / Competence: coeff=0.1117; 95% IC [0.0690;0.1750] / Ruggedness: coeff=0.1323; 95% IC [0.0608;0.2048]) were observed. The results showed that implicit brand personality impressions tend to inform more explicit brand personality impressions when DA and PI are low compared to when DA and PI are high (See Table 3). Thus, Hypothesis 2-a - *Implicit understanding of brand meaning conveyed by a service brand's physical elements is more likely to inform explicit understanding of brand meaning conveyed by a service brand's physical elements for individuals with low design acumen than for individuals with high design acumen* - and Hypothesis 2-b - *Implicit understanding of brand meaning conveyed by a service brand's physical elements is more likely to inform explicit understanding of brand meaning conveyed by a service brand's physical elements for individuals with low involvement in the service category than for individuals with high involvement in the service category* - are supported.

Table 3 to be inserted about here

5. General discussion: Contributions, implications, and future research

To convey brand meaning, designers make stylistic choices in terms of materials, morphology, type elements, chromatic elements, and graphic elements (Belboula et al., 2018). In light of this, the question is: do design features embedded in service brands' physical elements generate desired responses? This research argues that implicit measures can tap brand

meaning that is automatically activated by exposure to a service brand's physical elements. By using a semantic priming task to assess associative strength between brand meaning and a service brand's physical elements, this research aimed to investigate the extent to which a greater ability to decode meaning conveyed by design features results in differences in implicit understanding of service brand meaning. In particular, it was suggested that greater ability to decode design meaning, captured by design acumen and involvement in the product category, would result in (a) greater ability to implicitly understand brand meaning conveyed by a service brand's physical elements, and (b) greater divergences between brand impressions that are automatically activated by a service brand's physical elements and those that are deliberately reported.

5.1 Methodological and theoretical contributions

The current research makes several important contributions at the interface of different literature streams, namely implicit cognition, services and design semantics.

With regards to the implicit cognition literature, this research further establishes the validity of the semantic priming task in marketing studies by showing its relevance in the context of service brand design and makes a key contribution by identifying design acumen and involvement in the product category as moderators of the cognitive processes that underlie the automatic understanding of brand meaning conveyed by physical elements. The aim of this research was not to establish the superiority of one type of measure, implicit or explicit, over the other; it was to show they offer complementary results because they tap understanding of service brand meaning conveyed by physical elements at different points of a reflective process. Differences between explicit and implicit measures suggest the reflection process leads respondents to review their automatic interpretation of a service brand's physical elements, and command of the design language, captured by design acumen and involvement in the product category, is identified as a moderator of the effect of the reflection process. Because of their

high command of the design language, implicit understanding of brand meaning conveyed by a service brand's physical elements is quicker for individuals high in design acumen or highly involved in the product category. However, because of these individuals' expertise, they tend to more greatly review their automatic interpretation of a service brand's physical elements, causing implicit and explicit brand impressions to be less related.

This research also contributes to the service literature by highlighting the critical role a service brand's physical elements, and more precisely logos, play in conveying brand meaning. Tangibles have already been identified as one key dimension of service quality (Zeithaml et al., 1990). Past research has highlighted the importance of designing service environments that, from a utilitarian perspective, make the service experience easier and more convenient (Troiville et al., 2019), and, from a symbolic point of view, provide emotional rewards to consumers (Lunardo and Mouangue, 2019). The concept of servicescape recognizes that service experiences are also shaped by a built environment incorporating ambiance and design (Bitner, 1992; Madsen and Petermans, in press). In particular, it has been shown that different design strategies can be used to modify a servicescape's mystery, complexity and legibility (Orth et al., 2019). Aesthetic design has been recognized as an element of new technology-based service development that contributes positively to competitive advantage and profitability, especially in contexts of high-level commoditization (Candi and Saemundsson, 2011). However, although the importance of aesthetic design for services is widely recognized, most research on design semantics has been characterized by a prevailing emphasis on the manufacture of goods, and less attention had been paid to how a service brand's physical elements, and more specifically logos, build brand meaning. For instance, logo redesign can play a critical role in brand rejuvenation by showing consumers that the brand is current (Müller et al., 2013). But effective service brand logos should not only be recognizable and familiar and evoke a positive affect but also elicit brand meaning (Klink, 2003). The service characteristic of intangibility makes

the role of logos even more essential in conveying brand meaning because they appear not only in the environment in which the service is delivered but also on communication materials, which can range from advertising items to annual reports (Klink, 2003).

Finally, this research contributes to the design semantics literature by further establishing the ability of holistic design types to evoke specific brand impressions (Orth and Malkewitz, 2008). Important to this research is the fact that associations between physical features and brand meaning stored in memory are a result of past learning episodes. In other words, consumers have learned to associate specific design features with specific brand impressions because of the consistent use of these design features to convey that specific meaning (Belboula et al., 2019). Although there are individual and cultural differences in the experience of design features, some associations seem to be relatively constant (Creusen and Schoormans, 2005). For instance, round forms are associated with softness and femininity, while angular forms are associated with dynamism and masculinity (Schmitt and Simonson, 1997). Conversely, some associations may be more category specific (i.e., designers may use bright colors and a large size to position a car as aggressive) or culturally bounded (i.e., white is associated with purity in most of Europe and America and is therefore the color worn by brides, whereas it is the color of mourning in Japan) (Creusen and Schoormans, 2005). This research also further establishes that natural designs create strong brand impressions of sincerity and weak brand impressions of excitement and that delicate designs create strong brand impressions of sincerity, as well. Orth and Malkewitz (2008) had already identified these associations for packages in the categories of wine and perfume, and this research extends these initial results from packages to logos, from goods to services, and from an explicit approach to an implicit one. P.W. Henderson and Cote (1998) defined highly codable stimuli as those that evoke consensually held meaning and are perceived, interpreted, and retained better than stimuli that are low in codability. Thus, natural and delicate designs can be considered highly

codable types of design because (a) they evoke brand impressions in a consistent way, as suggested by similarities between this research results and Orth and Malkewitz's (2008) results, and (b) they evoke similar implicit and explicit brand impressions, thus suggesting that their meaning is easy to interpret. From this perspective, the absence of support for H1 for the natural design could be interpreted as a signal of its high codability: natural designs evoke high sincerity and low excitement so consensually across product categories that differences in the command of the design language have no effect on an individual's ability to decode its meaning. This research also confirms Orth and Malkewitz's (2008) finding that some associations may be category specific. For instance, they had shown that contrasting design results in low impressions of sophistication in the wine category and only average impressions of sophistication in the perfume category. In the hospitality industry, this research suggests that contrasting designs create strong impressions of sophistication at both the implicit and explicit levels.

5.2. Managerial implications

Consumers are being exposed every day to an un-precedent number of service brand physical elements (e.g. in the streets, when navigating the internet, when watching TV, etc.) to which they are likely to pay limited attention, except if there is opportunity and motivation to do so (Fazio and Towles-Schwen, 1999; Pleyers, in press). In such situations, service brand physical elements are of crucial importance as they can be a powerful way to convey brand meaning in an automatic manner. There are no pure intangible services, and services usually include tangible objects to which aesthetic design can be applied (Candi and Saemundsson, 2011). Thus, service brand physical elements should be seen as opportunities to automatically impact consumers in a way that is favorable to the brand.

Supporting the key role of design, this research has clear implications for designers and marketers in the service industry. Aesthetic choices, such as proportion, shape, size, and color,

are indeed the levers available to designers (Noble and Kumar, 2010; Pleyers, G. in press). Orth and Malkewitz's (2008) model is managerially relevant because it is based on design elements and factors that are important to and used by designers (e.g., size, symmetry, etc.) and highlight which type of holistic design designers should consider for achieving specific brand impressions, while maximizing their creativity. In other words, this type of model decreases the likelihood of the first distortion within the semantic transformation process to occur. This research further establishes that brand meaning is created by managerial choices by showing that stylistic choices in terms of holistic types of design favor the formation of brand impressions in an automatic manner by activating associations stored in memory. Thus, it strongly suggests that marketers and designers in the service industry should pay close attention to how brand physical elements, and more specifically logos, convey brand meaning in order to best impact consumers' responses.

More specifically, when using a semantic priming task to assess brand meaning conveyed by a service brand's physical elements, it should be acknowledged that implementing a semantic priming task, although relatively easy, remains more time consuming than developing and administering an explicit questionnaire (Belboula et al., 2019). However, combining implicit and explicit measures may help practitioners make decisions during the service brand's physical elements' development process because investigating understanding of brand meaning implicitly and explicitly may identify brand impressions that are explicitly, but not implicitly, associated to the service brand's physical elements and *vice versa*. Qualitative techniques could be used to further investigate the nature of this apparent conflict. This is all the more important for associations between design types and brand personality impressions that are not constant across categories, especially in the realm of service brands because service characteristics of intangibility increase the level of uncertainty faced by consumers when evaluating and choosing between different service alternatives.

5.3. Limitations and future research

The first limitation to be acknowledged is the study was undertaken in the context of one particular type of service, for one type of service brand's physical element, for one type of brand impression (i.e., brand personality), and in one specific cultural context. A justification was provided for using hotel logos and brand personality impressions to test the hypotheses. However, these methodological choices reduce the external validity of the findings, and further replication studies would be useful in other service categories, with other service brand physical elements and other types of brand impressions, and in other cultural contexts. Where brand impressions are concerned, future research could specifically look at intangible attributes such as prestige, high quality, or price because past research has already investigated how they can be conveyed by design features (Orth and Malkewitz, 2008).

Furthermore, this research only recruited students for the sample. The cognitive process at stake in a semantic priming task is a process that is only slightly influenced by social variables such as occupation, income, or marital status (Wu and Lin, 2006). Thus, using a student sample should not critically reduce the external validity of the results. However, sampling is a matter of concern in any research related to branding, and it stands to reason that marketers who would like to use a semantic priming task to assess brand meaning conveyed by design features should recruit a sample of respondents who would be representative of the targeted population.

Second, although the hypotheses have been tested for four different logos, they have been tested only in the context of this research. Yet, previous research has shown that aesthetic reactions can be affected by the presentation context, as in when brand attractiveness moderates the effect of an unattractive design (Page and Herr, 2002). The hypotheses should therefore be tested in other contexts, such as related to advertising communication or to differences in brand familiarity to determine whether contextual elements influence the extent to which exposure to

a service brand's physical elements automatically activates brand impressions in the direction desired by designers and marketers.

Third, explicit measures have been used to assess the moderating variables, namely design acumen and involvement in the service category. Given the problems noted earlier with self-reported measures, it cannot be excluded that respondents' answers may have been biased. In particular, some participants may have distorted their answers to the design acumen items to provide a more favorable impression of their ability to understand design. Thus, future research may aim to replicate this research findings by using an indirect measure of design acumen and personal involvement.

Fourth, by using the five holistic design types defined by Orth and Malkewitz (2008), this research has adopted a holistic view of product design by which different design elements (e.g., color, line, etc.) are combined into more complex cognitive design components (e.g., a natural design) that are aggregated during perception and convey meaning (Hoegg and Alba, 2008; Veryzer, 1999). Another approach is to use analytical tools such as conjoint analysis (Mathieu and Le Ray, 2006), which disaggregates physical objects into a set of components like materials, morphology, graphism, color, etc., whose arrangement can be modified to optimize customer satisfaction (Noble, 2011). Therefore, future research could investigate the extent to which manipulating a specific design component automatically activates different brand impressions.

Finally, logos that include verbal and pictorial elements have been used to test the hypotheses. This decision was made to increase external validity because real-world logos are seldom purely visual (e.g., Twitter or Carrefour) or purely verbal (e.g., Google or eBay), especially in the hotel industry. However, consumers may differ in how quickly they access meaning from verbal elements or from pictorial elements, and these individual variables may influence how quickly meaning conveyed by a logo is processed, which is critical in a semantic

priming task. Thus, future research may aim to identify the impact of alternative presentation formats (i.e., words *versus* pictures) on individual responses in a semantic priming task.

6. Conclusion

This research shows that explicit and implicit measures tap brand meaning conveyed by a service brand's physical elements at different points of a reflective process and that command of the design language has an effect on how automatic and reflective processes interact together to arrive at an understanding of brand meaning conveyed by a service brand's physical elements. It sheds light on an implicit tool, the semantic priming task, from which future research into implicit cognition and consumer behavior may grow.

Indeed, there are few marketing studies that have used implicit measures other than the Implicit Association Test (IAT) (Greenwald et al., 1998; Richetin et al., in press). However, in an IAT, the emphasis is on controllability, but it is on spontaneous activation of associated concepts in a priming task (Fazio and Olson, 2003). IAT responses are considered automatic because they are expressed without control; semantic priming task responses are considered automatic because they are spontaneously activated by the prime. This distinction is important because the associations in an IAT are assessed at the category level, but in a semantic priming task, they are assessed at the exemplar level (Fazio and Olson, 2003). In addition, in an IAT, only two concepts can be paired whereas several concepts can be investigated in a semantic priming task. This has clear practical implications. Using an IAT may be appropriate in many managerial situations when it is needed to compare two categories (Ackermann and Mathieu, 2015). However, finding an "opposite" concept may be a matter of pure methodological constraint when the researcher wishes to investigate a unique concept. From that perspective, the semantic priming task is a promising tool for market research because it enables measuring the strength of associations primed by individual exemplars.

Implementing a semantic priming task, although relatively easy, requires a specific expertise in the protocol development. First, and as previously noted, researchers should be very cautious in the choice of the primes. A combination of graphic and pictorial elements has been used in this research. A justification for the use of this type of prime has already been provided, and attention was paid to select logos using words that are not semantically/associatively related to the target words used in the semantic priming task. However, the risk that the effects observed may be due to the words presented and not to the logo may be much higher in other contexts, such as when a brand name conveys its positioning (e.g. in the hotel industry, the brand name Ibis Budget conveys the meaning that the hotel is inexpensive; in the car rental industry, Budget conveys the meaning that the service is cheap). In such a case, if a semantic priming task was to be used to verify the ability of a brand logo to convey brand positioning, a control should be implemented. Experimentally, this could be done by using exactly the same text on each logo. Second, there are other accounts of semantic priming than activation ones, such as compound cues or feature overlap (for a review on semantic priming, see McNamara, 2005). For example, the amount of priming may depend not only on the associative strength between a prime and a target in memory but also on the familiarity of the prime and target as a *compound* (McKoon and Ratcliff, 1992). The compound is formed by the simultaneous presence of the prime and target in short-term memory as a test item. In the experiment reported in this research, this may have occurred if a logo of a familiar brand associated with a well-known and recognized brand attribute had been chosen. In the same way of thinking, it has been argued that semantic priming may be driven by both associative strength and feature overlap between the two components of prime-target pairs (Hutchinson, 2003). To increase the likelihood that the priming effect is more driven by associative strength than by activation of features that overlap with those of the target, researchers should pay attention to selecting primes and targets that are not perceptually similar

or categorically related (in this research, primes are logos and targets are brand personality related words; therefore, they are perceptually and categorically different).

To conclude, and as suggested by Rivière et al. (2013), if done with appropriate care, use of the semantic priming task “could lead to insightful results that are both scientifically valid [as supported by extensive psychological research] and complementary to the findings of explicit tests” (p. 388).

Appendix A. Selected hotel logos

<p data-bbox="509 275 620 309">Massive</p>  <p data-bbox="375 696 775 723">PLEASANT HOTELS</p>	<p data-bbox="1114 275 1265 309">Contrasting</p>  <p data-bbox="1045 566 1337 645">AUGUSTO Hotel - Villa</p>
<p data-bbox="512 884 617 918">Delicate</p>  <p data-bbox="344 1115 799 1182">HOSTAL BLAU PERATALLADA</p>	<p data-bbox="1139 884 1240 918">Natural</p>  <p data-bbox="1018 1144 1347 1223">HOTEL VILLAMARIA AU LAC</p>

Appendix B. Measurement items: Means with standard deviation (in parentheses) of the various quantitative indices

Evaluation of Logos	Massive	Contrasting	Delicate	Natural
<i>Implicit Brand Personality (ImpBP)</i>				
Sincerity dimension (<i>Down-to-earth, Honest, Wholesome, Cheerful</i>)	701 (172.623)	867 (27.889)	575 (179.285)	543 (143.711)
Excitement dimension (<i>Daring, Spirited, Imaginative, Up-to-date</i>)	539 (25.693)	512 (87.305)	495 (149.282)	856 (196.549)
Competence dimension (<i>Reliable, Intelligent, Successful</i>)	549 (151.952)	512 (159.489)	705 (125.693)	567 (157.992)
Sophistication dimension (<i>Upper class, Charming</i>)	763 (141.614)	601 (173.469)	781 (125.693)	824 (16.627)
Ruggedness dimension (<i>Outdoorsy, Tough</i>)	627 (130.637)	738 (17.887)	941 (235.853)	788 (162.227)
<i>Explicit Brand Personality (ExpBP)</i>				
Sincerity dimension (<i>Down-to-earth, Honest, Wholesome, Cheerful</i>)	1.94 (1.07) $\alpha=0.80$	3.23 (1.19) $\alpha=0.85$	3.02 (1.03) $\alpha=0.82$	4.26 (0.88) $\alpha=0.86$
Excitement dimension (<i>Daring, Spirited, Imaginative, Up-to-date</i>)	2.04 (0.91) $\alpha=0.81$	3.16 (0.97) $\alpha=0.86$	3.13 (1.02) $\alpha=0.80$	1.37 (1.12) $\alpha=0.78$
Competence dimension (<i>Reliable, Intelligent, Successful</i>)	2.94 (1.01) $\alpha=0.89$	3.68 (1.02) $\alpha=0.84$	1.78 (0.99) $\alpha=0.73$	2.02 (1.02) $\alpha=0.80$
Sophistication dimension (<i>Upper class, Charming</i>)	2.92 (1.04) $\alpha=0.83$	3.94 (1.01) $\alpha=0.84$	4.02 (1.03) $\alpha=0.89$	1.76 (0.85) $\alpha=0.78$
Ruggedness dimension (<i>Outdoorsy, Tough</i>)	3.96 (1.01) $\alpha=0.85$	2.87 (1.03) $\alpha=0.83$	1.42 (0.89) $\alpha=0.78$	3.15 (1.05) $\alpha=0.84$
Individual Differences				
<u>Design Acumen</u>				
<i>Being able to see subtle differences in product designs is one skill that I have developed over time.</i>				
<i>I see things in a product's design that other people tend to pass over.</i>			3.51 (0.89)	
<i>I have the ability to imagine how a product will fit in with designs of other things I already own.</i>			$\alpha=0.79$	
<i>I have a pretty good idea of what makes one product look better than its competitors.</i>				
<u>Personal Involvement</u>				
<i>Important/Unimportant - Boring/Interesting - Relevant/Irrelevant - Exciting/Unexciting - Means Nothing/Means a lot to me - Appealing/Unappealing - Fascinating/Mundane - Worthless/Valuable - Involving/Uninvolving - Not Needed/Needed</i>			4.18 (1.03), $\alpha=0.81$	

Acknowledgments

The authors would like to thank Dr. Sheila Matson-Barkat for her insightful comments.

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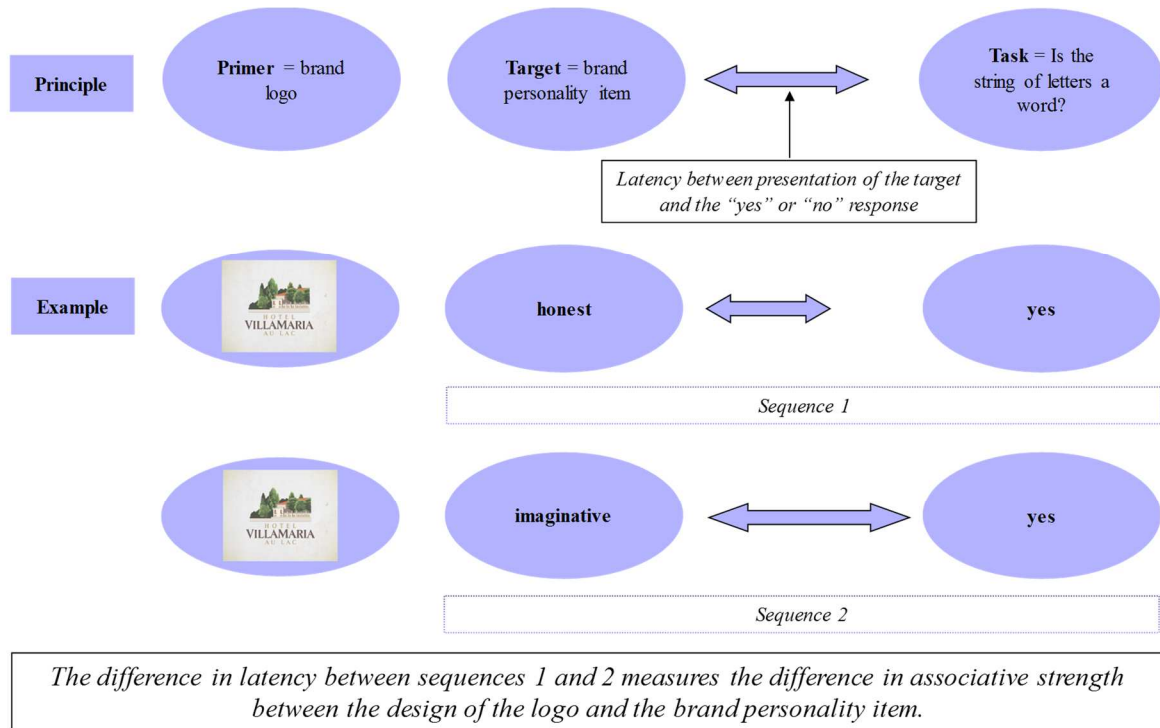
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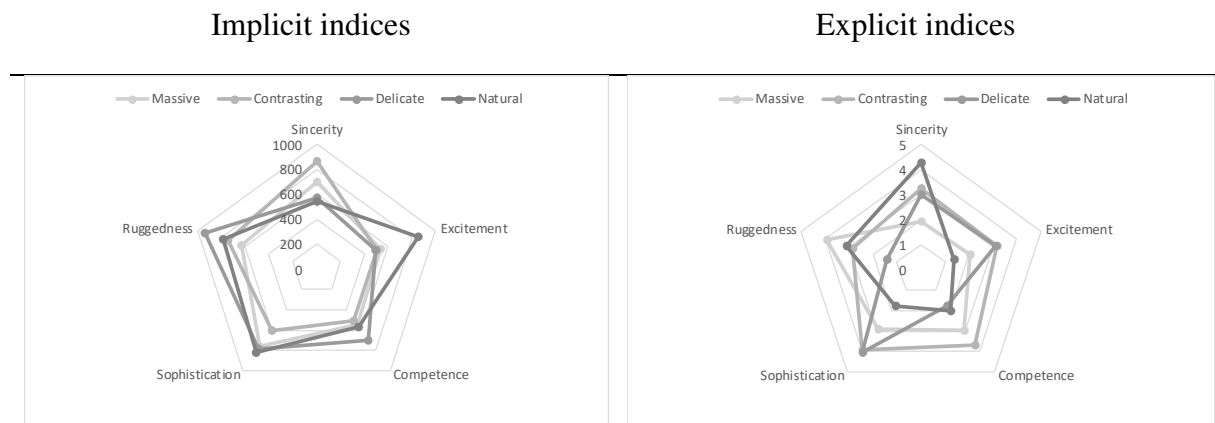
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Figure 1. Response times as a way to measure the strength of association between hotel logos and brand personality impressions



Source: Adapted from Ackermann and Mathieu (2015)

Figure 2. Implicit and explicit brand personality impressions indices



Axes in the radar chart represents the means of implicit and explicit brand personality impressions indices. Lines connect the mean values for each logo.

Implicit indices: lower values indicate stronger brand personality impressions

Explicit indices: lower values indicate weaker brand personality impressions

Table 1. Means of implicit and explicit brand personality impressions indices for each logo using ANOVA with post hoc Tukey's test

Brand personality impressions		Mean				ANOVA		
		Massive logo	Contrasting logo	Delicate logo	Natural logo	F	<i>p</i>	Mean comparison post hoc Tukey's test
Sincerity	<i>Implicit</i>	701	867	574	543	234.788	<0.001	Delicate ns Natural > Massive > Contrasting
	<i>Explicit</i>	1.94	3.23	4.02	4.26	2.56	<0.001	Natural ns Delicate ns Contrasting > Massive
Excitement	<i>Implicit</i>	539	512	495	856	153.423	<0.001	Delicate > Contrasting ns Massive > Natural
	<i>Explicit</i>	2.04	3.16	3.13	1.37	6.11	<0.001	Contrasting ns Delicate ns Massive > Natural
Competence	<i>Implicit</i>	549	512	705	567	224.142	<0.001	Contrasting ns Massive ns Natural > Delicate
	<i>Explicit</i>	2.94	3.68	3.78	2.02	1.89	<0.001	Delicate ns Contrasting > Massive ns Natural
Sophistication	<i>Implicit</i>	763	601	781	824	157.023	<0.001	Contrasting > Massive ns Delicate > Natural
	<i>Explicit</i>	2.92	3.94	2.02	1.76	15.07	<0.001	Contrasting > Massive > Delicate ns Natural
Ruggedness	<i>Implicit</i>	627	738	941	788	189.149	<0.001	Massive > Contrasting ns Natural > Delicate
	<i>Explicit</i>	3.96	2.87	1.42	3.15	1.69	<0.001	Massive > Contrasting > Natural ns Delicate

Implicit measures: RT in millisecond

ns indicates that no significant differences are observed in the post hoc Tukey's test; > indicates that there are significant differences in the post hoc Tukey's test and that the logo is significantly more associated with the brand personality dimension than the other logo(s); shorter response times indicate stronger associations between the logo and the brand personality dimension.

Table 2. Effect of design acumen and involvement in the hospitality industry on implicit brand personality impressions

<i>dv</i>	Sincerity	Excitement	Competence	Sophistication	Ruggedness
Massive logo					
DA	$\beta = 0.41$ $t = 21.54^*$	$\beta = 0.17$ $t = 8.77^{**}$	$\beta = 0.28$ $t = 12.27^*$	$\beta = 0.13$ $t = 5.28^*$	$\beta = 0.16$ $t = 8.43^*$
PI	$\beta = 0.11$ $t = 4.10^{**}$	$\beta = 0.35$ $t = 6.82^{**}$	$\beta = 0.21$ $t = 3.49^{**}$	$\beta = 0.59$ $t = 2.86^{**}$	$\beta = 0.31$ $t = 16.82^*$
Contrasting logo					
DA	$\beta = 0.40$ $t = 12.22^*$	$\beta = 0.69$ $t = 13.22^*$	$\beta = 0.67$ $t = 8.75^*$	$\beta = 0.38$ $t = 5.63^{**}$	$\beta = 0.58$ $t = 11.13^*$
PI	$\beta = 0.27$ $t = 6.12^{**}$	$\beta = 0.41$ $t = 10.16^*$	$\beta = 0.26$ $t = 6.27^*$	$\beta = 0.18$ $t = 4.73^{**}$	$\beta = 0.23$ $t = 5.98^{**}$
Delicate logo					
DA	$\beta = 0.10$ $t = 2.40^{**}$	$\beta = 0.13$ $t = 3.17^{**}$	$\beta = 0.21$ $t = 5.08^{**}$	$\beta = 0.17$ $t = 3.67^{**}$	$\beta = 0.23$ $t = 4.88^{**}$
PI	$\beta = 0.29$ $t = 11.52^*$	$\beta = 0.58$ $t = 11.21^*$	$\beta = 0.57$ $t = 7.75^{**}$	$\beta = 0.17$ $t = 5.10^{**}$	$\beta = 0.16$ $t = 5.24^{**}$
Natural logo					
DA	$\beta = -0.13$ $t = -1.69$	$\beta = 0.003$ $t = 1.10$	$\beta = 0.002$ $t = 0.04$	$\beta = 0.001$ $t = .601$	$\beta = 0.04$ $t = 1.10$
PI	$\beta = 0.10$ $t = 4.59$	$\beta = -0.002$ $t = -.63$	$\beta = 0.13$ $t = 3.64$	$\beta = -0.001$ $t = -.06$	$\beta = 0.11$ $t = 4.13$

* $p < 0.05$

** $p < 0.001$

RT have been negatively valenced so that β are positive when the expected effect is observed.

Table 3. Moderating effect of design acumen and involvement in the hospitality industry on the implicit/explicit relationship

	Effect	[CI low;CI high]
Moderating effect of design acumen		
Effect of ImpBP _{Sincerity} on ExpBP _{Sincerity}		
Low DA (=2.62)	0.2980	[0.0326;0.4164]
High DA (=4.4)	0.1140	[0.0512;0.1771]
Effect of ImpBP _{Excitement} on ExpBP _{Excitement}		
Low DA (=2.62)	0.4445	[0.2923;0.4032]
High DA (=4.4)	0.1316	[0;0305;0.1326]
Effect of ImpBP _{Sophistication} on ExpBP _{Sophistication}		
Low DA (=2.62)	0.9867	[0.7834;1.0123]
High DA (=4.4)	0.2135	[0.0304;0.8976]
Effect of ImpBP _{Competence} on ExpBP _{Competence}		
Low DA (=2.62)	0.3148	[0.1105;0.6453]
High DA (=4.4)	0.1033	[0.1627;0.3756]
Effect of ImpBP _{Ruggedness} on ExpBP _{Ruggedness}		
Low DA (=2.62)	0.1618	[0.8766;1.3022]
High DA (=4.4)	0.1136	[0.6574;1.1041]
Moderating effect of involvement in the hospitality industry		
Effect of ImpBP _{Sincerity} on ExpBP _{Sincerity}		
Low PI (=3.15)	0.1467	[0.2736;0.4102]
High PI (=5.21)	0.1132	[0.5266;0.9102]
Effect of ImpBP _{Excitement} on ExpBP _{Excitement}		
Low PI (=3.15)	0.1579	[0.8714;1.4123]
High PI (=5.21)	0.1027	[0.7778;1.0987]
Effect of ImpBP _{Sophistication} on ExpBP _{Sophistication}		
Low PI (=3.15)	0.1177	[0.5418;0.9101]
High PI (=5.21)	0.1037	[0.4623;0.8654]
Effect of ImpBP _{Competence} on ExpBP _{Competence}		
Low PI (=3.15)	0.1619	[0.7664;1.4011]
High PI (=5.21)	0.1147	[0.6583;1.1011]
Effect of ImpBP _{Ruggedness} on ExpBP _{Ruggedness}		
Low PI (=3.15)	0.0316	[0.3218;0.4464]
High PI (=5.21)	0.0219	[0.3587;0.4739]

Low DA/PI=1 standard deviation below the mean
 High DA/PI=1 standard deviation above the mean