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# BREAKING THROUGH COMPLEXITY: VISUAL AND CONCEPTUAL DIMENSIONS IN LOGO EVALUATION ACROSS EXPOSURES

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# BREAKING THROUGH COMPLEXITY:

# VISUAL AND CONCEPTUAL DIMENSIONS IN LOGO EVALUATION ACROSS EXPOSURES

*Abstract*

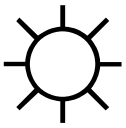
This research investigates the effects of visual and conceptual complexity on brand logo evaluations at single and multiple exposures. Building upon the theoretical distinction between visual and conceptual constructs and on a *processing fluency* account it is proposed that the effects of visual complexity and conceptual complexity on attitude toward the logo change across exposures following opposite patterns, and are driven by the mechanisms of *perceptual fluency* and *conceptual fluency*, respectively. The results of a hybrid experimental study suggest that the initially positive effect of visual complexity on attitude toward the logo becomes negative with multiple exposures, whereas the initially negative effect of conceptual complexity on attitude toward the logo becomes positive as exposures increase. The findings contribute to research on consumer reactions to the visual elements of brands, and offer guidelines to brand managers and logo designers for leveraging on visual and conceptual complexity, as well as the number of exposures, in order to raise the attractiveness of logos.

Keywords: Complexity, logo, brand, fluency

## INTRODUCTION

A logo is the set of graphic design elements associated with a brand and represents a fundamental tool of the brand communication strategy (Keller, 1998). Logos are often the most visible and prominent parts of brands and influence consumer attitude toward the brand "at first sight" (Henderson & Cote, 1998) as well as after repeated exposure (Janiszewski & Meyvis, 2001). Ultimately, logos have an impact on brand equity via their effects on brand awareness and image (Shimp, 2010).

Visual complexity, i.e. the variety of visual information featured by a logo (Berlyne, 1970), and conceptual complexity, i.e. the ability of a logo to evoke multiple meanings but not a consensually held one (Perussia, 1988), are two distinct properties of logos. Take as examples the following three logos:

a)  b)  c) 

One may easily recognize that both logos 'a' and 'b' evoke unambiguously the concept of 'sun' (low conceptual complexity) but have higher and lower degrees of visual complexity, respectively. In other words, a consensually held meaning can be evoked independent of whether the stimulus is visually elaborate or simple. At the same time, both logos 'b' and 'c' are visually simple, but while the former is immediately related to a sun, the latter is susceptible to several interpretations (a wheel, slices of a cake, a pinwheel, a sun – high conceptual complexity). In other words, comparable levels of visual complexity may yield to either a consensually held meaning or multiple meanings.

Previous studies have analyzed different dimensions of complexity in a single-exposure context (Henderson & Cote, 1998; van der Lans et al., 2009) or specific forms of complexity in a multiple-exposure context (Janiszewski & Meyvis, 2001), and have provided evidence on

the effect of complexity on logo evaluation and on how such effect may change across exposures. Despite these relevant findings, previous research offers only a partial view of how both visual and conceptual dimensions of complexity influence attitude toward the logo in a single/multiple-exposure context, and, more importantly, it has neglected the mechanisms mediating the effects of complexity on attitude. Although Janiszewski and Meyvis (2001) have proposed *processing fluency* as the mechanism driving conceptual complexity effects, they have not empirically tested the mediating role of fluency in their studies.

The above-mentioned gaps are particularly relevant when considering that logos have a ubiquitous presence in the communication campaigns of any company (Henderson & Cote, 1998), and are systematically shown to new and established customers by means of mass as well as social media. Additionally, in comparison with other visual stimuli, logos have specific features (small scale dimension, reduced use of colors to favor replicability, meaning-based associations) that call for further research using true logos to test predictions on complexity effects on logo evaluation.

This research investigates the effects of visual and conceptual complexity on brand logo evaluations at single and multiple exposures. Specifically, building upon the theoretical distinction between visual and conceptual constructs (e.g., Blaxton, 1989; Tulving & Schacter, 1990) and on a *processing fluency* account (Reber, Schwarz, & Winkielman, 2004) hypotheses on the interactions of visual and conceptual complexity with the number of exposures are formulated. Based on the present conceptual analysis, it is proposed that the effects of the two dimensions of complexity change across exposures and follow opposite patterns. In addition, it is argued that the effects of visual complexity and conceptual

complexity on attitude toward the logo are driven by the mechanisms of *perceptual fluency* and *conceptual fluency*, respectively.

The results of a hybrid experimental study suggest that the initially positive effect of visual complexity on attitude toward the logo becomes negative with multiple exposures, whereas the initially negative effect of conceptual complexity on attitude toward the logo becomes positive as exposures increase. The findings contribute to research on consumer reactions to the visual elements of brands (Keller & Lehmann, 2006; Labreque, Patrick, & Milne, 2013), and offer guidelines to brand managers and logo designers for leveraging on visual and conceptual complexity, as well as the number of exposures, in order to raise the attractiveness of logos.

## BREAKING THROUGH COMPLEXITY IN LOGO EVALUATION

Logos have both a *visual structure* and a *meaning structure* (Garner, 1974). The visual structure is represented by the informational properties of the logo, which can be defined independently of any user-organism. The meaning structure is the set of meanings associated with the logo. Accordingly, the level of complexity that characterizes a logo can refer to either its visual structure or its meaning structure.

Following theories on aesthetics and perception (Berlyne, 1970; Kosslyn, 1975; Palmer, 1999), in this research *visual complexity* (hereafter: VC) of a logo is defined as the variety of the information featured by the visual structure of the logo. According to this definition, the structure of a visually complex logo is characterized by heterogeneous visual elements that span multiple perceptual dimensions. Following theories on semiotics and stimulus codability (Butterfield & Butterfield, 1977; Lachman, Schaffer, & Hennrikus, 1974; Perussia, 1988), in this research *conceptual complexity* (hereafter: CC) is defined as the property of logos of

evoking multiple meanings. According to this definition, a conceptually complex logo is one susceptible to several interpretations and that shows high degrees of polysemy.

Because they are used in multiple media and are crucial depositaries for brand associations, logos have specific features compared to other visual marketing stimuli (Park & Rabolt, 2009; Maxian, Bradley, Wise, & Toulouse, 2013). On the one hand, they have often small dimensions and therefore a finite surface that should fit in disparate communication media (e.g., business cards, packages, ads, social networks and web sites). As such, from a graphical perspective, logos are designed to be adaptable to different communication contexts, often with low variety in colors (Labreque, Patrick, & Milne, 2013). As a consequence, logos seldom reach very high levels of heterogeneity and detail in terms of visual elements (Henderson & Cote, 1998). On the other hand, despite the small dimensions, logos have a relevant potential in terms of meanings that can be associated to their perceptual features (Bennett, 1995). Accordingly, one may expect to observe a sizeable range of variation in terms of CC across logos.

Some empirical studies (Henderson & Cote, 1998; van der Lans et al., 2009) suggest that VC and CC are distinct constructs. Specifically, they show that visual elaborateness, a factor combining VC, depth, and activeness of design, has no effect, or a significant but close to zero effect, on the ability of logos to elicit a familiar or shared meaning, a property inversely related to CC. More generally, different streams of research have demonstrated that perceptual and conceptual constructs involve distinct domains and processes of human cognition. First, performance on tasks that require the processing of meaning appears to be systematically dissociated from performance on tasks that rely more on the analysis of physical features (Blaxton, 1989). Second, research on *implicit memory* (e.g., Cabeza & Ohta, 1993; Tulving & Schacter, 1990) has shown that mechanisms related to perceptual and

semantic priming act separately and independently.

In addition, processing of visual information and of meanings associated with that information seems to require different resources in terms of effort and time. On the one hand, there is evidence that individuals are able to get the gist of a scene within less than 100 milliseconds (Oliva, 2005), and to perceive other specific visual elements within a few more eye-movements (Pieters & Wedel, 2008), since the memory representation of the perceptual aspects of a stimulus operates at a pre-semantic level and does not require conscious processing (Lee, 2002). On the other hand, the elaboration of meaning may require the retrieval of knowledge associations from memory, and the categorization and semantic interpretation of the stimulus (Hamann, 1990). Consequently, a meaning-based representation of a stimulus cannot be formed without the intervention of conscious elaboration, which requires more time and opportunities to process the stimulus (Lee, 2002). Overall, previous studies suggest that *i)* VC and CC are theoretically distinct constructs, *ii)* their elaboration follows different routes, and *iii)* they may be differently sensitive to the number of exposures.

Previous research suggests that stimulus complexity influences evaluations, and that such effect changes depending on the number of exposures to the stimulus. Berlyne (1970) found that complexity – intended as a general concept – positively influences viewers' pleasure in response to an object up to an optimal level. At first, increasing complexity boosts pleasure because of arousal and the stimulus learning potential. Further increases in complexity, however, dampen pleasure because they produce uncertainty of interpretation and reduce the ability to elaborate the stimulus. The central idea of this theory is expressed by an inverted U-shaped relationship between complexity and pleasure.

Focusing on the visual dimension of complexity, Henderson and Cote (1998) found a reverse-U shaped effect of logo elaborateness (a factor related to VC) on affect toward the

logo, whereas Henderson, Cote, Leong, and Schmitt (2003), and more recently Van der Lans et al. (2009) have conducted large-scale surveys and found that logo elaborateness has a generally positive effect on attitude toward the logo. Focusing on the conceptual dimension of logo complexity, Janiszewski and Meyvis (2001) manipulate the congruity between verbal and pictorial elements of logos in a series of experiments. Their results generally suggest that mono-meaning logos (i.e., logos in which verbal and pictorial elements both convey the same meaning) are initially preferred to multi-meaning logos (i.e., logos in which verbal and pictorial elements convey different meanings), whereas as the number of exposures increases multi-meaning logos are relatively preferred to the mono-meaning logos.

Despite these relevant contributions, existing research on logo complexity has not considered the effects of both dimensions of complexity and has not observed how these effects change within a single/multiple exposure design. Another important area that needs further clarification concerns the mechanisms driving complexity effects on logo evaluations. In fact, while some authors have suggested that *processing fluency* may drive the effect of complexity (Janiszewski & Meyvis, 2001; Reber, Schwarz, & Winkielman, 2004), little empirical evidence is available on the potential mediating role of fluency in the complexity-to-attitude relation taking into account single and repeated exposure.

*Complexity and processing fluency*

Processing fluency refers to the ease of elaboration of a stimulus, which generates pleasant metacognitive feelings in the beholder, and is affected by stimulus features (e.g., symmetry, complexity – Reber et al., 2004) and/or by repeated exposure (Zajonc, 1968). According to fluency theory (Higgins, 1998; Clore et al., 2001), people attribute the pleasantness of the fluency metacognitions to the stimulus itself. Indeed, although fluency-based affective

reactions emerge in the course of processing the stimulus, they are not a function of the stimulus cognitive elaboration, but rather metacognitions about how easy it is to elaborate the stimulus (Schwarz & Clore, 1990). As a consequence, the experience of processing fluency makes stimulus evaluations improve (Winkielman & Cacioppo, 2001; Winkielman, Schwarz, Fazendeiro, & Reber, 2003).

When considering a single exposure, processing fluency is triggered by specific stimulus characteristics (Reber et al., 2004), which facilitate the elaboration of the stimulus. For example, changes in stimulus surface affect the amount of processing fluency (Jacoby & Dallas, 1981). Also, symmetry is supposed to generate processing fluency because symmetrical patterns can be elaborated more efficiently than nonsymmetrical patterns (Reber et al., 2004). With multiple exposures, instead, processing fluency can be triggered by the interplay of stimulus characteristics and repeated exposures (Reber et al., 2004). Indeed, previous research has related the *mere exposure effect* (Zajonc, 1968; Stafford & Grimes, 2012) to processing fluency, as individuals tend to elaborate familiar stimuli, that have been seen repeatedly, more smoothly.

Two forms of processing fluency have been acknowledged: *perceptual fluency* and *conceptual fluency*. Perceptual fluency occurs when exposure to a stimulus creates a feature-based representation of that stimulus that facilitates its elaboration (Bornstein & D'Agostino, 1992; Jacoby, Kelley, & Dywan, 1989). Indeed, perceptual fluency concerns metacognitions that trigger interest and attention in the observer, thus facilitating the elaboration of the visual features of the stimulus. Conceptual fluency occurs when exposure to a stimulus creates a meaning-based representation of that stimulus that facilitates its interpretation (Shapiro, 1999; Whittlesea, 1993). In fact, conceptual fluency regards metacognitions related to stimulus semantics that ease the interpretation of meanings associated with the stimulus.

This research proposes that the two dimensions of complexity are related to the two aforementioned forms of processing fluency. On the one hand, VC, which concerns the visual structure of a stimulus, affects the smoothness with which perceptual information is attended and decoded. Accordingly, it is claimed that the effect of VC on attitude toward the logo is driven by perceptual fluency. On the other hand, CC, by influencing the number of potential meanings associated with a stimulus, affects the ease of interpreting the meaning of that stimulus. In this research, the effect of CC on attitude toward the logo is thought to be driven by conceptual fluency.

There are reasons to believe that the relation between VC and perceptual fluency and that between CC and conceptual fluency may change across exposures. Previous research has related the mere exposure effect (Zajonc, 1968) to changes in perceptual fluency due to multiple exposures to the same stimulus (Bornstein & D'Agostino, 1994), especially for those stimuli characterized by few (compared to many) perceptual dimensions (Janiszewski & Meyvis, 2001). Repeated exposure may also affect the relation between CC and conceptual fluency by providing more time and opportunities to decode and to interpret visual stimuli even when they carry multiple meanings (Hamann, 1990; Lee, 2002).

*The effect of visual complexity on attitude toward the logo across exposures*

This research proposes that the effect of VC on logo evaluations across exposures is related to the generation of perceptual fluency. Considering a single exposure context, high-VC logos, featuring heterogeneous visual elements (e.g., curves, lines, patterns), are more likely to stimulate interest and attention than low-VC logos, thus facilitating stimulus encoding. Differently, low-VC logos are characterized by homogenous perceptual elements, and may fail to attract individuals' attention. Therefore, high-VC logos are supposed to

activate positive metacognitions related to perceptual fluency, which, in turn, should determine an increase in attitude toward the logo. Accordingly, it is expected that, at a single exposure, the effect of VC on attitude toward the logo is positive. Although some authors have advocated a reverse-U shaped effect of VC on stimulus evaluations (Berlyne, 1974; Henderson & Cote, 1998), one may consider that the typical logos, having relatively small scale dimension, do not reach extreme levels of VC. Therefore, even for high-VC logos, the effect on attitude should not decline and keeps being monotonically positive. This prediction is consistent with the results of an extensive cross-national survey (van der Lans et al., 2009) that reported a robust positive effect of logo elaborateness (a factor including VC) on affect toward logos exposed once.

The effect of VC on attitude toward the logo may change with increasing exposures. Since perceptual information is elaborated quickly (Quinlan, 2003), the attention-grabbing and interest potential of VC can be exhausted with initial exposure. However, in addition to stimulus properties, repeated exposure *per se* may determine the experience of perceptual fluency. Based on the mere exposure effect (Zajonc, 1968), previous research has proposed that repeated exposure generates a pleasant sensation deriving from the encoding of an apparently familiar stimulus. Janiszewski and Meyvis (2001) argue that repetition-based fluency is more common for stimuli with structures based on a single perceptual dimension compared to stimuli that are complex along multiple perceptual dimensions. If this conjecture is correct, one should observe an increase in perceptual fluency for low-VC logos, which benefit from the mere exposure effect also because their simpler structure facilitates the retrieval of the feature-based representation in memory of the stimulus. The experience of repetition-based perceptual fluency for high-VC logos is less likely to take place, because multiple perceptual dimensions reduce uniformity and prevent familiarization with visual

elements. Therefore, with multiple exposures the effect of VC on attitude toward the logo becomes negative, with low-VC logos receiving higher evaluations than high-VC logos.

Overall, it is expected that the effect of VC on attitude toward the logo changes with increased exposures, and that such change is driven by changes in perceptual fluency. Formally:

**H1**: The number of exposures moderates the effect of VC on attitude toward the logo. Specifically, at a single exposure, the effect of VC on attitude toward the logo is positive, whereas, with multiple exposures, the effect of VC on attitude toward the logo is negative.

*The effect of conceptual complexity on attitude toward the logo across exposures*

This research proposes that the effect of CC on attitude toward the logo across exposures is driven by conceptual fluency. At a single exposure, conceptual fluency mainly depends on stimulus codability (Perussia, 1988), that is, the property of a stimulus to evoke an easily interpretable meaning (i.e., low CC). With multiple exposures, however, conceptual fluency can be influenced also by the incremental opportunities to interpret even lowly codable stimuli (i.e., high CC – Hamann, 1990).

Studies on codability (Perussia, 1988) suggest that, at a single exposure, highly codable stimuli are perceived and interpreted more easily than stimuli that are low in codability (Schulz & Lovelace, 1964; Smith & Egeth, 1966; Rodewald & Bosma, 1972; Lachman, 1973). Such prediction is consistent with a conceptual fluency account, which suggests that when the meaning of a stimulus is easy to access and to understand (i.e., low in CC – Schwarz & Clore, 1990) the stimulus tends to receive more favorable evaluations because the positively-valenced metacognitions associated with fluent processing are ascribed to stimulus

liking. Studies on codability and conceptual fluency, therefore, seem to suggest that at initial exposures high levels of CC may result in less favorable evaluations, because the meaning structure of the stimulus is not immediately codable, preventing the experience of conceptual fluency (Hamann, 1990; Lee, 2002). On the contrary, low levels of CC make the meaning structure of a logo accessible, facilitating the process of interpretation and thus benefiting from conceptual fluency-based metacognitions that improve attitude toward the logo. Accordingly, it is expected that, at a single exposure, the effect of CC on attitude toward the logo is negative.

A higher number of exposures provides more resources for the conscious elaboration of high-CC logos and increases the opportunity to elaborate the meaning of even a conceptually complex stimulus (Hamann, 1990), thus amplifying the likelihood of experiencing conceptual fluency that will, in turn, enhance stimulus liking. In contrast, the meaning of a low-CC logo is often codable even after a single exposure. Further opportunities to elaborate the stimulus provided by additional exposures are unlikely to enhance conceptual fluency, and the already clear meaning of the logo may become boring and fail to reinforce logo evaluations. As a consequence, the effect of CC on attitude toward the logo becomes positive as exposures increase. Overall, it is expected that the effect of CC on attitude toward the logo changes with multiple exposures, and that such change is driven by changes in conceptual fluency. Formally:

**H2:** The number of exposures moderates the effect of CC on attitude toward the logo. Specifically, at a single exposure, the effect of CC on attitude toward the logo is negative, whereas, with multiple exposures, the effect of CC on attitude toward the logo is positive.

## A HYBRID EXPERIMENTAL STUDY

In order to test the hypotheses, a hybrid experimental study was conducted on a large set of logos. The number of exposures was manipulated in three levels (1 *vs*. 4 *vs.* 9 exposures) adopting a procedure based on an ostensibly unrelated task that will be discussed in detail later. For each logo, scores of VC, CC, control variables, and attitude toward the logo were collected from different groups of respondents. Using different data sources allowed to prevent common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) and to ensure correct estimation of relevant effects. Measures of perceptual and conceptual fluency were also collected in order to test for the underlying mechanisms driving the hypothesized effects.

*Stimuli, participants and procedure*

A multi-stage procedure was adopted to collect the data. The first stage used a procedure similar to that described by Henderson and Cote (1998) and selected 140 black-and-white, unfamiliar logos, partly from Henderson and Cote's sample, and partly through a random extraction from the Yellow Pages of a major metropolitan directory from a region outside that of data collection. Two professional graphic designers and two marketing and advertising experts were provided with definitions of VC, as well as of other visual dimensions that potentially affect fluency included in the study as control variables (Reber et al., 2004). Specifically, the four experts rated (using 7-point scales) the 140 logos on VC, proportionality, symmetry, parallelism, redundancy, and roundness[1]. The experts were

[1] Proportionality is the extent to which a visual stimulus follows the "golden section," that is, a ratio between the horizontal and vertical dimensions of about 1.62. Symmetry is the extent to which a visual stimulus appears as reflections along one or more axis. Parallelism is the extent to which a visual stimulus contains multiple elements that appear adjacent to each other. Redundancy is the extent to which a visual stimulus contains parts that are identical to each other. Roundness is the extent to which a visual stimulus contains mainly curved lines and circular objects (Henderson & Cote, 1998).

instructed to take their time to give accurate evaluations, and to rate all of the 140 logos by focusing on one specific dimension at a time. This approach reduces bias due to fatigue and boredom, and favors comparability across logos. Reliability analyses showed an adequate level of agreement among the four experts. Cronbach alphas were computed for each dimension and allowed to create average scores of VC (α = .83), proportionality (α = .82), symmetry (α = .89), parallelism (α = .76), redundancy (α = .89), and roundness (α = .91) for each logo.

The second stage adopted the following procedure. First, a random set of 100 target logos was extracted from those used in the first stage. The remaining 40 logos were used as decoy stimuli in the manipulation of exposures. Second, to control for any potential confound related to the assignment of logos to specific exposure conditions, 300 potential conditions (100 target logos × 3 exposure conditions) were created.

Five hundred and five participants (56.2% female; $M_{age}$ = 33.48, $SD_{age}$ = 12.38) were recruited to complete the study from Amazon Mechanical Turk (AMT). Previous studies demonstrate the validity and many benefits of running virtual experiments with AMT workers (e.g., Horton, Rand, & Zeckhauser, 2011; Paolacci, Chandler, & Ipeirotis, 2010; Mason & Suri, 2012; Paolacci & Chandler, 2014). Based on AMT's prescreening feature, participation in the study was allowed only to AMT workers with an approval rate higher than 95%, aged 18 years or older, and located in the United States. Workers were paid $ .50 for their participation in the study. This compensation is comparable to or higher than other payments on AMT (e.g., Berinsky, Huber, & Lenz, 2012; Wu, 2013).

In the first part of the study, participants were randomly assigned to one target logo/exposure condition and were exposed to nine screenshots, each showing six logos (target and decoy logos), in which two decoy logos were identical. The screenshots also

contained the target logo, which appeared one, four, or nine times across the nine screenshots, depending on the exposure condition. For each screenshot, participants were asked to identify and to select the pair of identical (decoy) logos as quickly as possible. This task allowed to expose participants to the target logo the intended number of times, albeit surreptitiously. Figure 1 shows a sample screenshot of the experimental task.

**Figure 1 about here**

Subsequently, participants were asked to list up to ten meanings they associate with the target logo. A research assistant who was not aware of the research objectives counted the valid meanings aggregating redundant words ($M_{meanings}$ = 3.62, $SD_{meanings}$ = 2.76). This variable was used as a measure of CC, as logos inspiring multiple meanings are supposed to be less codable and more conceptually complex[2]. Participants then evaluated the target logo on a 7-point scale (1 = *do not like at all*, 7 = *like a lot*), answered a set of fluency measures, and typed in their gender and age. Perceptual fluency was measured by two 7-point items ("To what extent do you find this logo interesting?": 1 = *not at all*, 7 = *a lot*; and "This logo features graphical elements that attract your attention": 1 = *completely disagree*, 7 = *completely agree* – Labroo, Dhar, & Schwarz, 2008). Conceptual fluency was measured by two 7-point items ("To what extent this logo is easy to interpret?", and "To what extent this logo conveys a clear meaning?": 1 = *not at all*, 7 = *a lot*) developed by the authors based on the construct definition (Whittlesea, 1993). Finally, participants were asked to guess the real

[2] As suggested by an anonymous referee, it was important to rule out the possibility that the three exposure conditions differ on the word count measure. Results of a one-way ANOVA showed that participants in the three exposure conditions generated similar numbers of words ($F(2, 502) = .17$, $p = .84$; $WordCount_{1exp} = 3.63$; $WordCount_{4exp} = 3.53$; $WordCount_{9exp} = 3.71$).

purpose of the study. None of the participants mentioned that the target logos were shown in the first task, making the occurrence of a demand effect unlikely.

To control for the potential confounding effects of logo valence two judges assigned a score of plus one (positive meaning), zero (neutral meaning), or minus one (negative meaning) to each meaning associated with the target logos. Upon verifying that the two judges showed a good level of agreement (Cohen's kappa = .76), a valence score was computed for each target logo by summating individual meaning scores. Valence was used in the subsequent analyses as a control variable.

Summarizing, two different samples provided data on attitude toward the logo (dependent variable), VC and CC (independent variables), proportionality, symmetry, parallelism, redundancy, roundness, and valence (control variables). Additionally, the number of exposures was manipulated in three levels (1 *vs*. 4 *vs.* 9). The authors also computed average scores of perceptual fluency (α = .89) and of conceptual fluency (α = .84) to investigate the mechanisms driving the effects of VC and CC across exposures. Table 1 shows descriptive statistics and correlations.

**Table 1 about here**

*Results*

Multiple regression analyses were first conducted on the whole sample. Considering that each target logo was evaluated by multiple respondents, heteroskedasticity-consistent standard errors were computed to derive correct statistical conclusions. In all the estimated linear models, VIFs were lower than 2.33, suggesting that multicollinearity does not affect the data. Results show no effects of VC and CC when considering the whole sample and

therefore all the levels of exposures. However, the interactions of VC ($\beta_{VC\_exposure}$ = - .41, $p$ < .01) and CC ($\beta_{CC\_exposure}$ = .38, $p$ < .01) with exposures on attitude toward the logo were significant. This evidence suggests that indeed the effects of VC and CC change across exposures. Among control variables, proportionality has a positive effect and redundancy has a negative effect on attitude toward the logo, whereas the positive effect of symmetry is only marginally significant. The other control variables do not show significant effects.

Then, separate regression analyses for the three exposure conditions show that the effect of VC is positive at one exposure ($\beta_{VC\_1exp}$ = .29, $p$ < .01), non-significant at four exposures ($\beta_{VC\_4exp}$ = .06, *ns*), and negative at nine exposures ($\beta_{VC\_9exp}$ = - .32, $p$ < .01). Also, the effect of CC is negative at one exposure ($\beta_{CC\_1exp}$ = - .28, $p$ < .01), non-significant at four exposures ($\beta_{CC\_4exp}$ = .03, *ns*), and positive at nine exposures ($\beta_{VC\_9exp}$ = .23, $p$ < .01). Table 2 synthesizes results of regression analyses, which support H1 and H2[3]. The two interaction effects are graphically shown in figures 2 and 3. Considering control variables, one may notice a consistently negative effect of redundancy on attitude toward the logo across exposure, whereas the effect of proportionality seems to increase with multiple exposures.

**Table 2 about here**

**Figures 2 and 3 about here**

*Mediation analysis*

Following Zhao, Lynch, and Chen (2010), mediation tests based on bootstrap causal analysis (with 1,000 re-samples) were conducted. Since significant effects of VC and CC at

[3] To make sure that correlations among control variables (see table 1) did not affect the results, all the regression analyses were re-conducted excluding the control variables. The results remain the same, supporting the robustness of findings.

one and nine exposures were observed, mediation analysis focused on these two sub-samples. First, the effect of VC on attitude toward the logo across exposures via perceptual fluency was analyzed, and conceptual fluency was considered as a rival mediator. At one exposure, VC positively influences perceptual fluency ($b = .25$, $p < .01$). The effect of VC on conceptual fluency is positive and marginally significant ($b = .16$, $p < .10$). The effects of perceptual fluency ($b = .49$, $p < .01$) and conceptual fluency ($b = .14$, $p < .05$) on attitude toward the logo are both positive and significant, while the direct effect of VC on attitude toward the logo is not significant ($b = .04$, *ns*). The bootstrap 95% confidence interval for the indirect effect VC → perceptual fluency → attitude toward the logo does not include zero (.03, .22). The bootstrap 95% confidence interval for the indirect effect VC → conceptual fluency → attitude toward the logo shows a lower bound close to zero (.00, .07) casting doubts about the significance of such indirect effect. As a robustness check, a test of the null hypothesis of equality between the two indirect effects demonstrated that the indirect effect via perceptual fluency is significantly stronger than the indirect effect via conceptual fluency ($IE_{via\ PF} = .14$ $IE_{via\ CF} = .03$, $\chi^2_{(1)} = 4.75$, $p < .05$). Therefore, it is possible to conclude that the effect of VC on attitude toward the logo at one exposure is fully mediated by perceptual fluency and conceptual fluency, but the mediating role of perceptual fluency is certainly more prominent.

At nine exposures, VC negatively influences perceptual fluency ($b = -.20$, $p < .05$). The effect of VC on conceptual fluency is not significant ($b = -.07$, *ns*). The effects of perceptual fluency ($b = .48$, $p < .01$) and conceptual fluency ($b = .16$, $p < .01$) on attitude toward the logo are both positive and significant, while the direct effect of VC on attitude toward the logo is not significant ($b = -.07$, *ns*). The bootstrap 95% confidence interval for the indirect effect VC → perceptual fluency → attitude toward the logo does not include zero (- .19, -

.02). The bootstrap 95% confidence interval for the indirect effect VC → conceptual fluency → attitude toward the logo does include zero (- .05, .02). Therefore, it is possible to conclude that the effect of VC on attitude toward the logo at nine exposure is fully mediated only by perceptual fluency.

Then, the effect of CC on attitude toward the logo across exposures via conceptual fluency was analyzed, and perceptual fluency was considered as a rival mediator. At one exposure, CC negatively influences conceptual fluency ($b$ = - .12, $p$ < .05). The effect of CC on perceptual fluency is negative and marginally significant ($b$ = - .10, $p$ < .10). The effects of perceptual fluency ($b$ = .49, $p$ < .01) and conceptual fluency ($b$ = .13, $p$ < .05) on attitude toward the logo are both positive and significant, while the direct effect of CC on attitude toward the logo is negative and significant ($b$ = - .08, $p$ < .05). The bootstrap 95% confidence interval for the indirect effect CC → conceptual fluency → attitude toward the logo does not include zero (- .04, - .01). The bootstrap 95% confidence interval for the indirect effect CC → perceptual fluency → attitude toward the logo does include zero (- .10, .01). Therefore, the effect of CC on attitude toward the logo at one exposure is partially mediated only by conceptual fluency.

At nine exposures, CC positively influences conceptual fluency ($b$ = .17, $p$ < .01). The effect of CC on perceptual fluency is positive and marginally significant ($b$ = .08, $p$ < .10). The effects of perceptual fluency ($b$ = .49, $p$ < .01) and conceptual fluency ($b$ = .14, $p$ < .05) on attitude toward the logo are both positive and significant, while the direct effect of CC on attitude toward the logo is not significant ($b$ = .05, *ns*). The bootstrap 95% confidence interval for the indirect effect CC → conceptual fluency → attitude toward the logo does not include zero (.01, .06). The bootstrap 95% confidence interval for the indirect effect CC → perceptual fluency → attitude toward the logo does include zero (- .01, .09). Therefore, the

effect of CC on attitude toward the logo at one exposure is fully mediated only by conceptual fluency. Overall, consistent with the proposed conceptual analysis, the effect of VC on attitude toward the logo is mediated by perceptual fluency, whereas the effect of CC on attitude toward the logo is mediated by conceptual fluency.

## GENERAL DISCUSSION

In their detailed review of studies on processing fluency and aesthetic pleasure, Reber et al. (2004) suggest that complexity may *sometimes* be preferred because it facilitates the understanding of a visual stimulus (Martindale, Moore, & Borkum, 1990), and that *"simplicity per se does not necessarily imply ease of processing* (p. 376)." In order to account for this evidence, previous research on aesthetics and consumer behavior (e.g., Berlyne, 1970; Janiszewski & Meyvis, 2001) has recognized that the effect of complexity on evaluations of visual stimuli may be explained by considering both its perceptual and conceptual aspects as potential drivers of consumer reactions. This paper proposes and tests a conceptual model to examine how visual and conceptual dimensions of complexity may affect brand logo evaluations at different levels of exposures. The remainder of this section discusses implications of this research for theory and management of brand logos, as well as limitations of the study and directions for future research.

### *Implications for brand logo theory*

Following the direction of a research stream exploring the relation between perceptual and conceptual constructs, as well as the related types of processing (Lee & Labroo, 2004; Labroo et al., 2008), this paper contributes to the literature on consumer reactions to brand visual

elements by showing that the effects of VC and CC on consumer attitude depend on the number of exposures and follow opposite patterns. While previous studies have analyzed different dimensions of complexity at a single exposure or specific forms of complexity with multiple exposures, this research shows that it is important to take into account both dimensions of complexity in single/multiple exposure studies. Indeed, breaking through complexity appears crucial as the effects of the two dimensions are different across exposures, and ignoring (or not controlling for) the two-faceted nature of complexity may lead to biased conclusions. Particularly, treating complexity as a general concept may prevent to separate perceptual and meaning-based sources of complexity effects, whereas focusing on a specific dimension of complexity without controlling for the other one may lead to biased inference on the extent to which stimuli vary non-randomly over the uncontrolled dimension of complexity.

Results also show that the effect of VC on logo evaluations is driven by perceptual fluency. Differently, the effect of CC on logo evaluations is driven by conceptual fluency. As a matter of fact, this study is a first attempt to analyze how the relationship between exposure and evaluations of visual stimuli is mediated by changes in both perceptual and conceptual fluency. While previous research offers insights on the interaction between perceptual and conceptual fluency at a single exposure (Lee & Labroo, 2004), this study sheds light on how the two forms of fluency behave across exposures.

This research relates to previous studies on complexity reporting that the elaborateness of logos, an underlying dimension gathering measures of VC, depth, and activity, has a slightly inverted U-shaped relationship (Henderson & Cote, 1998), or a positive relationship (Henderson et al., 2003; van der Lans et al., 2009) with consumers' affective responses. While the effect of VC on attitude at one exposure is generally in line with these results, the

presented conceptual analysis and findings expand the framework of these studies by showing how the effect of VC on attitude changes across exposures, and how such an effect differs from that of CC.

This research also relates to the framework proposed by Janiszewski and Meyvis (2001), but follows different theoretical and methodological directions. First, Janiszewski and Meyvis (2001) define CC in terms of *congruity* between brand pictorial and brand name. Therefore, logos are defined as mono- *vs.* multiple-meanings depending on the congruity *vs.* incongruity between pictorial and name of the brand. Instead, this study isolates the analysis of pictorial from that of brand name, and defines logos as conceptually simple *vs.* complex depending on their ability to evoke a consensually held meaning *vs*. multiple meanings, irrespective of brand names. These different conceptualizations of CC may call for different predictions on their effects on consumer responses. Second, Janiszewski and Meyvis (2001) assess the effect of congruity between brand pictorial and name on *consumer preference* for multiple-meanings over mono-meaning logos at different levels of exposure. However, it is more realistic to assume that individuals form attitudes toward logos than make choices between pairs of logos. Accordingly, this research focused on attitude, rather than on choice, as the dependent variable. Interestingly, although the dependent variable and the definition of logo complexity are different, the findings are generally in line with the results of Janiszewski and Meyvis' (2001) Study 2, as mono-meaning logos are initially preferred to multi-meaning logos, while as the number of exposures increases multi-meaning logos become relatively preferred. On the one hand, this convergence of findings suggests that, as exposures increase, the positive effect of CC on evaluations of visual stimuli is robust to different operationalizations. On the other hand, the present findings are different from those of their Study 1, where initial exposures favored multi-meaning over mono-meaning logos and vice

versa for higher number of exposures. This could be due to the fact that in their Study 2, compared to Study 1, Janiszewski and Meyvis (2001) increased the intervals between exposures. Although the massed exposures used in Study 1 are less comparable with the manipulation of exposures used in the present study, the distributed exposures used in Study 2 are more consistent with the comparison between one-exposure and nine-exposure conditions in the present study.

*Implications for brand management*

From a managerial perspective, this research offers insights for logo design and brand management to maximize the favorability of consumer attitude toward brand logos. The proposed conceptual model examines three actionable variables – VC, CC, and the number of exposures. When creating a new logo or updating visual identity through changes in brand elements (Muller, Kocher, & Crettaz, 2013), brand managers and designers can control, to a large extent, the levels of VC and CC of their logos. The number of exposures to logos can be managed by companies in several contexts, such as that of paid advertising campaigns, in which companies try to reach a target number of exposures. The present findings mainly apply to these cases. In particular, managers and designers can use the results of this research to determine the ideal *1)* levels of logo VC and CC, given the intended number of exposures, and *2)* number of exposures to logos, given fixed levels of logo VC and CC.

Considering the relationship between the number of exposures and the promotional budget (Henderson & Cote, 1998), some companies need to leverage on logo complexity given a fixed level of exposure that they can afford. In the attempt to translate the experimental setting in the real world, it is possible to consider the high and low levels of the manipulation used in this study as an approximation of slightly-exposed (1/9 exposures), and largely-

exposed (9/9 exposure) logos, respectively. In turn, one can assume that slightly-exposed logos and largely-exposed logos are related to limited and larger promotional budgets, respectively. In these scenarios, companies may try to maximize their return on communication in terms of attitude favorability by leveraging on logo VC and CC. Companies that rely on small budgets for the promotion of their brand logo may need to maximize the return of their effort within a small number of exposures. Based on the present findings, it is possible to recommend that these companies design logos with high levels of VC and low levels of CC. For example Skyscanner, a web search engine for travel services, has recently changed its old logo, characterized by low-VC and high-CC, with a new logo featuring higher VC and lower CC.

Skyscanner old logo

Skyscanner new logo

This logo modification seems to be consistent with the present findings and recommendations. Although the new logo is more visually complex, it could create a more pleasing sensation in the beholder as its meaning is easily interpretable even without extensive exposure. This goal is also pursued in the specific versions of the logo used for related businesses, as shown in the following logos belonging to the same company.


Skyscanner
new logo versions

The Conservation International Foundation is a nonprofit environmental organization with headquarters in Virginia, which can rely on lower levels of exposure than other, more famous nonprofit organizations (e.g., Greenpeace, WWF). The Foundation has recently changed its logo:

Conservation International Foundation old logo

Conservation International Foundation new logo

While the old logo – which features high VC and low CC – would have performed better with limited exposure, the new logo – which shows a significant shift towards low VC and high CC – requires more exposures to produce more favorable consumer attitude. According to the findings, this strategy may jeopardize attitude toward the logo, unless the Foundation managers are not planning to expand the logo exposure through promotional investments.

Companies that rely on larger budgets can reach a higher number of exposures for their logos. For these companies, lower levels of VC and higher levels of CC are recommendable. For example, the replacement of the U.K. Conservative Party's torch (i.e., a high-VC/low-CC logo) with a new logo in 2006, characterized by lower VC and higher CC (it could be interpreted as a tree, a cloud, a doodle) seems to be an appropriate logo re-design strategy given a large promotional budget.

Caribou Coffee
old logo

Caribou Coffee
new logo

Similarly, Caribou Coffee, the second largest U.S.A. coffee and espresso retailer, seems to have chosen an appropriate logo re-design strategy if supported by a large promotional budget. The old logo was characterized by high-VC and low-CC, while the new logo has lower levels of VC and, at the same time, higher levels of CC. In the new logo, the reindeer is, in fact, much more stylized and susceptible to multiple interpretations.

UK Conservative Party
old logo

UK Conservative Party
new logo

Interestingly, low-VC and high-CC logos appear to be also more suitable from a brand extension perspective (Broniarczyk & Alba, 1994). Visually simple and conceptually complex logos tend to be more abstract and less idiosyncratic with respect to a specific

category. Perceptually simpler and conceptually complex logos may therefore meet the level of abstraction required for brands that are extended across product categories and are related to more general brand personality dimensions (Aaker, 1997) rather than to more concrete product features. Accordingly, these logos can benefit from exposures cumulated across different product categories.

Pick a Pizza logo

There are situations, however, in which companies may have difficulty in changing the complexity of their logos. For instance, short-run constraints and trademark concerns may preclude modifications to logo complexity aimed at obtaining favorable reactions in specific exposure conditions. In such cases, our results may help to define the ideal level of exposure to be sought given fixed levels of VC and CC featured by the logo. Logos featuring high levels of VC and low levels of CC benefit the most from slight exposure, whereas, logos featuring low levels of VC and high levels of CC benefit the most from higher levels of exposure. Since a certain promotional budget can be invested either on increasing the *reach* (i.e., the number of individuals exposed to the brand) or the *frequency* (i.e., the number of exposures per individual; Kotler & Keller, 2010) of a message, this research proposes that companies with high-VC and low-CC logos should aim at enlarging the scope of their promotional effort by increasing the reach. For example, consider the following high-VC/low-CC logo used by a take-away pizza chain from San Francisco:

Based on the present findings, and assuming a fixed promotional budget, the company owning this logo should rather leverage on reach by expanding the scope of the campaign and media impact, keeping exposure to lower levels.

Instead, companies with low-VC and high-CC logos should invest in increasing the number of exposures by raising the frequency rather than the reach of their messages.

Less perceptually complex, more abstract logos, such as Almirall's (a Spanish pharmaceutical company),

Almirall logo

would indeed require a higher number of exposures to obtain more favorable evaluations. Accordingly, Almirall's promotional budget should be devoted more to increase the frequency or their messages rather than the reach.

As previously mentioned, the present findings apply more readily to cases in which companies can control the number of exposures to the logo. In other contexts, companies have limited control over the number of exposures as consumers are incidentally exposed to logos featured on packages, products, guerrilla marketing, and other informal media (e.g., McQuarrie & Mick, 2003). Although the present guidelines are less applicable in these contexts, companies may still have some degree of control on the level of exposure to their logos by managing *brand logo prominence* (Han, Nunes, & Drèze, 2010). This concept refers to the extent to which brand signs are visible on products and other marketing stimuli. By increasing visibility, logo prominence enhances the likelihood that consumers are exposed to that logo. Consequently, based on the reported findings one may speculate that high-VC and

low-CC logos – which are favored by lower levels of exposure – may benefit from reduced prominence, whereas low-VC and high-CC logos – which are favored by higher levels of exposure – may benefit from increased prominence. Consistent with this idea, French fashion company Hermes uses a high-VC and low-CC logo, which is often reported onto products in small scale dimension, thus featuring low prominence and maintaining low levels of incidental or informal exposure.

Hermes
logo

Instead, Nike, which employs a low-VC/high-CC logo, tends to leverage strongly on brand prominence by marking their merchandise with loud signs, thus increasing informal exposures to their logos.

*Limitations and directions for future research*

This research has some limitations that may provide opportunities for future research. First, the proposed analysis focuses on black-and-white, picture-only stimuli, and therefore does not take into account colors, name, and brand identity. Although such focus may be a limit to the external validity of results because the experimental stimuli are less realistic, it allowed to control for the visual clutter of the images (i.e., the level of detail in color, luminance, and edges, see Rosenholtz, Li, & Nakano, 2007), granting greater internal validity. Future research may want to extend the present framework by including additional visual elements. Second, the analysis focuses on complexity but excludes from the conceptual analysis other potentially relevant perceptual dimensions (see Henderson & Cote, 1998).

However, several dimensions that previous research has related to fluency-based effects (proportionality, symmetry, parallelism, redundancy, and roundness) were measured and controlled for. Having assessed the effects of visual and conceptual complexity by controlling for these dimensions allows to interpret the results confidently. Finally, this paper presents results of a single study. Despite such limitation, the conducted hybrid experimental study employs a large sample and was designed to ensure adequate manipulations of exposures and measurement of focal independent variables (considering 300 potential conditions). Also, the collection of data from multiple sources should prevent common method bias, thus offering further confidence in the stability of results.

Although disciplines such as aesthetics and semiotics have provided relevant directions on basic aspects of the relations between signs and related meanings (e.g., Berlyne, 1970; Mick, 1986), there is still a need for further exploration of how these elements act as determinants of individuals' responses across exposures. This research contributes to the debate on these issues and proposes insights on the idea of *"simplicity in complexity"* discussed in the aesthetics literature (Dickie, 1997; Gombrich, 1984). That is, stimuli that feature complex themes presented in an accessible way may receive favorable evaluations. Managing both visual and conceptual complexity and taking into account the number of exposures to a logo may allow companies to concretely embody simplicity in complexity in a brand logo, in order to generate more favorable consumer evaluations.

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## TABLES

**Table 1 Descriptive statistics and correlations**

| | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Attitude[a] | 3.88 | 1.44 | 1.00 | | | | | | | | | | | |
| 2. VC[a] | 3.74 | 1.44 | .01 | 1.00 | | | | | | | | | | |
| 3. CC[b] | 3.62 | 2.76 | .03 | .08 | 1.00 | | | | | | | | | |
| 4. Exposure[c] | 4.67 | 3.26 | -.03 | .02 | .02 | 1.00 | | | | | | | | |
| 5. Proportionality[a] | 3.41 | 1.55 | .09* | .01 | .06 | -.02 | 1.00 | | | | | | | |
| 6. Symmetry[a] | 4.08 | 1.65 | .08 | -.26** | .00 | -.05 | .60** | 1.00 | | | | | | |
| 7. Parallelism[a] | 2.71 | 1.24 | .03 | .50** | .06 | -.01 | .12** | -.04 | 1.00 | | | | | |
| 8. Redundancy[a] | 3.01 | 1.14 | -.07 | -.06 | .00 | -.04 | .61** | .49** | .04 | 1.00 | | | | |
| 9. Roundness[a] | 3.34 | 1.12 | .01 | .12** | .03 | .00 | -.20** | -.31** | .06 | -.09 | 1.00 | | | |
| 10. Valence[d] | 5.74 | 14.52 | .07 | .22** | .08 | .01 | .15** | .15** | .06 | -.12** | .04 | 1.00 | | |
| 11. Perceptual Fluency[a] | 3.93 | 1.71 | .68** | .08 | .02 | .02 | .09* | .07 | .08 | -.07 | -.03 | .05 | 1.00 | |
| 12. Conceptual Fluency[a] | 2.95 | 1.51 | .39** | .00 | .08 | .08 | .10* | .14** | .06 | .00 | .11* | .15** | .37** | 1.00 |

* $p < .05$, ** $p < .01$; [a] 7-point scale, [b] count measure of associated meanings, [c] experimental conditions (1, 4, and 9 exposures), [d] index formed aggregating valence scores (-1, 0, +1) to associated meanings (min = - 23, max = 38)

**Table 2 Results of regression analyses**

| ***Independent Variable*** | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** | **Model 6** |
|---|---|---|---|---|---|---|
| | **Estimates** | **Estimates** | **Estimates** | **Estimates** | **Estimates** | **Estimates** |
| VC | .01 | .19 * | .01 | .29 ** | .06 | - .32 ** |
| CC | .02 | .01 | - .24 ** | - .28 ** | .03 | .23 ** |
| Exposure | - .03 | .31 ** | - .25 ** | | | |
| Proportionality | .17 * | .17 * | .17 * | - .07 | .29 * | .29 * |
| Symmetry | .11 ° | .11 ° | .11 ° | .17 | .11 | - .00 |
| Parallelism | .02 | .01 | .02 | - .09 | -.09 | .25 ** |
| Redundancy | - .23 ** | - .22 ** | .23 ** | - .21 ° | - .21 * | - .25 * |
| Roundness | .06 | .05 | .05 | .09 | .03 | - .00 |
| Valence | -.01 | - .01 | -.01 | .04 | -.02 | .02 |
| VC x Exposure | | - .41 ** | | | | |
| CC x Exposure | | | .38 ** | | | |
| $R^2$ | .04 | .06 | .07 | .17 | .08 | .19 |
| *F* | 2.48 ** | 3.13 ** | 3.72 ** | 3.94 ** | 1.81 ° | 4.45 ** |
| Sample | Whole (N = 505) | Whole (N = 505) | Whole (N = 505) | Exposure = 1 (N = 162) | Exposure = 4 (N = 178) | Exposure = 9 (N = 165) |

Dependent variable: Attitude toward the logo
Standardized estimates are reported. ° $p < .10$, * $p < .05$, ** $p < .01$

**FIGURES**

**Fig. 1 A sample screenshot of the experimental task**

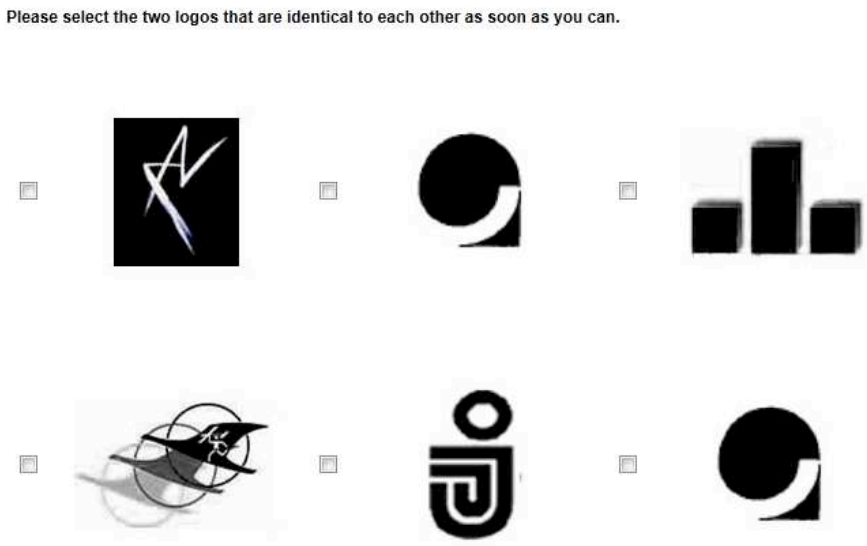

**Fig. 2 The interaction VC x Number of exposures**

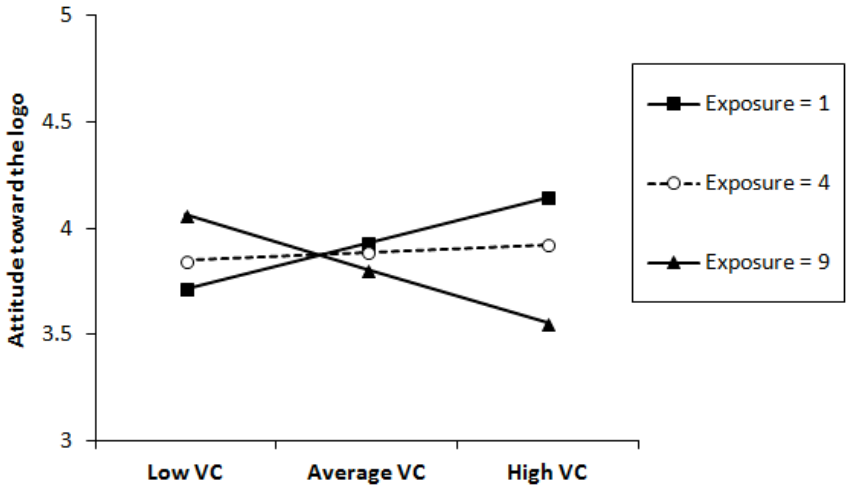


**Fig. 3 The interaction CC x Number of exposures**