How subjective processing fluency predicts attitudes toward visual advertisements and purchase intention

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Abstract

Purpose – This paper aims to investigate the role of attention, processing motivation and processing depth in the relationship between self-reported subjective processing fluency and relevant advertisement variables such as ad attitude, brand attitude and purchase intentions.

Design/methodology/approach – Two empirical studies were conducted using self-report questionnaires.

Findings – In Study 1 ($N = 176$), the measure of self-reported subjective processing fluency was pretested. As expected, it was found to be sensitive to visual and semantic features of advertisements and to predict attitudes toward an advertisement. In Study 2 ($N = 204$), mediation analyses showed that self-reported subjective processing fluency was a predictor of attitude toward the advertisement (through attention and processing depth), attitude toward the brand (through processing depth) and purchase intentions (through processing depth).

Research limitations/implications – The results emphasize the role of cognitive processing in explaining the effect of processing fluency on attitudes in marketing research.

Practical implications – Practitioners could use this theoretical framework and take into account the fluency with which consumers process information to improve the way they advertise their products.

Originality/value – The results suggest that self-reported subjective processing fluency can be relevant to predicting consumers' attitudes because it increases attention and processing depth of the advertisement.

Keywords Attitude, Attention, Advertisement, Processing depth, Processing fluency

Paper type Research paper

An executive summary for managers and executive readers can be found at the end of this issue.

According to the theory of hedonic marking of processing fluency (Reber *et al.*, 2006, 2004; Winkielman *et al.*, 2003), affective responses to perceptual or conceptual stimuli are influenced by the ease (or "fluency") with which they are processed. More specifically, when a stimulus is processed fluently, a hedonically marked fluency signal causes a positive affective reaction. Conversely, a stimulus that is difficult to process elicits a negative affective reaction.

The theory of hedonic marking of processing fluency has been applied in a wide range of domains, including aesthetic preferences (Reber *et al.*, 2004; Reber, 2002), judgments of the truthfulness of sentences (Reber and Schwarz, 1999), evaluations of words (Whittlesea, 1993) and the prediction of short-term stock fluctuations (Alter and Oppenheimer, 2006). This theory has also found numerous successful applications in advertising research in brand evaluation (Lee and Labroo, 2004), incidental advertisement exposure effects (Shapiro, 1999), advertising repetition effects (Nordhielm, 2002) and preference for brand logo complexity (Janiszewski and Meyvis, 2001).

A key component of the theory of hedonic marking of processing fluency is the distinction between conceptual and perceptual fluency. Conceptual fluency refers to "the ease of mental operations concerned with stimulus meaning and its relation to semantic knowledge structures", whereas perceptual fluency refers to "the ease of identifying the physical identity of the stimulus" (Reber *et al.*, 2004, p. 366). Perceptual fluency is influenced by visual characteristics of the

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stimulus, such as symmetry (Reber *et al.*, 2004) or figure-ground contrast (Winkielman *et al.*, 2003). On the other hand, conceptual fluency is influenced by semantic characteristics of the stimulus, such as semantic congruence with the context (Winkielman *et al.*, 2003). The literature on conceptual fluency is especially relevant in advertising research. For example, Shapiro (1999) found that adding semantically related product information increases the processing fluency of the advertisement, making it more likely that a purchase will be considered. Lee and Labroo (2004) similarly showed that priming individuals with an advertisement for mayonnaise created a favorable response to a semantically related product, ketchup.

In this paper, we focus on "subjective processing fluency", or the consciously experienced part of processing fluency (Winkielman *et al.*, 2003). The literature suggests that individuals are able to consciously monitor their own processing fluency through internal metacognitive feedback mechanisms (Mazzoni and Nelson, 1998; Winkielman *et al.*, 2003; Wurtz *et al.*, 2008). Because previous research has shown that people are able to monitor their own processing fluency and report it sufficiently and accurately (Lee and Aaker, 2004), subjective processing fluency is a good proxy to measure objective processing fluency.

In the field of advertisement research, this metacognitive ability to consciously monitor and report on processing fluency has been found to be useful in predicting attitudes toward advertisements. These predictions can then be useful in designing advertisements, as previous results suggest that attitudes toward advertisements affect attitudes toward the brand and purchase intentions (MacKenzie *et al.*, 1986; Mitchell and Olson, 1981; Shimp, 1981).

Several studies have also shown the influence of subjective processing fluency on attitudes toward the product or the brand. For example, Chae and Hoegg (2013) showed that presenting time-sensitive advertisements in a way that is consistent with how subjects perceive time increases subjective processing fluency and affects attitudes toward the product. In another study, Lee and Aaker (2004) showed that compatibility between message framing and consumer goals enhances processing fluency, which, in turn, has an effect on attitude toward a brand. Finally, Labroo *et al.* (2008) found that exposure to semantic primes related to a product's features can enhance perceptual fluency, which then affects whether a consumer likes the product. In sum, the literature shows that processing fluency is a relevant construct in advertisement research because it predicts consumer attitude toward the advertisement and the brand as well as purchase intentions.

On the other hand, less is known about the cognitive mechanisms underlying processing fluency. According to Winkielman *et al.* (2003), the hedonic marking of processing fluency can be explained, in that high fluency is generally a sign of positive environmental characteristics (familiar, harmless, predictable or prototypical stimuli) or successful cognitive activity (easy progress toward successful stimuli processing). A complementary explanation is effort justification (Norton *et al.*, 2011): fluently processed stimuli have been shown to increase the amount of attention and effort that people devote to related behaviors (Song and Schwarz, 2008). The literature on effort justification shows that devoting effort to a task elicits positive attitudes toward the task as well as anything related to the task (Norton *et al.*, 2011). Therefore, we hypothesize that the more fluently advertisements are processed, the more cognitive effort they elicit (attention, processing motivation and processing depth), which, in turn, elicits positive attitudes toward the advertisement and the brand and increases purchase intentions as a result of effort justification.

In short, the aim of the paper is to investigate whether attention, processing motivation and processing depth mediate the relationship between processing fluency and attitude toward the advertisement, attitude toward the brand and purchase intentions.

Overview of the experiments

Our investigation involved two studies. The first was a pretest of an *ad hoc* scale to measure subjective processing fluency. We hypothesized that the objective visual and semantic clarity of an advertisement would predict self-reported conceptual and perceptual processing fluency, which, in turn, would predict the attitude toward the advertisement. This hypothesis is based on the assumption that individuals are at least partly conscious of (and therefore able to self-report) the perceptual and conceptual fluency with which they process advertisements (Mazzoni and Nelson, 1998; Winkielman *et al.*, 2003; Wurtz *et al.*, 2008). Because there is as yet no psychometrically validated measure of self-reported subjective processing fluency, we had to build an *ad hoc* subjective processing fluency scale. This scale is divided into two subscales: a perceptual subscale (five items) and a conceptual subscale (five items). To verify that the scale was psychometrically sound, we tested its internal consistency and theoretically bi-dimensional factor structure.

In the second study, we aimed to investigate the role of attention, processing motivation and processing depth in the relationship between subjective processing fluency and attitude toward an advertisement, attitude toward a brand and purchase intentions. Based on the literature on processing fluency and effort justification (Song and Schwarz, 2008; Norton *et al.*, 2011), we hypothesized that advertisements that are easy to process would increase the amount of cognitive effort (attention, processing motivation and processing depth) invested in the advertisement, which would, in turn, increase positive attitudes toward the advertisement and the brand and thus increase purchase intentions.

Study 1

In Study 1, we investigated the basic psychometric properties of an *ad hoc* measure of subjective processing fluency. We hypothesized that self-reported perceptual and conceptual processing fluency would predict the subject's attitude toward the advertisement. An advertisement that was easily processed conceptually or perceptually was expected to elicit a positive attitude. We also hypothesized that visually altered advertisements would be rated as more difficult to process perceptually, whereas semantically altered advertisements would be rated as more difficult to process conceptually.

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Finally, we hypothesized that self-reported subjective processing fluency would mediate the relationship between the objective clarity of the advertisement and the attitude toward it. More specifically, we hypothesized that perceptual processing fluency would be a significant mediator of the relationship between the visual clarity of the advertisement and the attitude toward it. We also expected that conceptual processing fluency would be a significant mediator of the relationship between the semantic clarity of the advertisement and the attitude toward it.

Method

Participants

The participants were French second-year university students from Paris, rewarded for their participation with course credit points. The sample was composed of 153 women and 23 men. The mean age of the participants was 21.29 years (SD = 4.79). The administration was supervised by research psychologists, and confidentiality was guaranteed.

Materials

Advertisements

We selected three magazine advertisements that we then modified, visually or semantically, for the experiment. The advertisements were in French and promoted three different products: a beverage, driving lessons and a car. To be selected, the advertisements had to include a picture and a written message. It is important to note that we investigated possible differences in effects between each advertisement and found that, although each elicited different levels of processing fluency and attitudes, the effects remained consistent.

To alter the visual clarity of the advertisements and to make them more difficult to process perceptually, we performed a minor color quantization with a graphics-editing program. To alter the semantic clarity of the advertisements to make them more difficult to process conceptually, we removed parts of the written message so that they were more difficult to understand (but still comprehensible). For example, the car advertisement originally showed a photograph of a monkey, taken from below, meant to highlight the fact that the car had a panoramic sunroof. The advertising copy made this feature explicit, and a small picture of the car displaying the panoramic sunroof was also shown in the bottom left-hand corner. To make this commercial more difficult to process conceptually, the text explaining the feature was removed, while the photograph of the car was left as a clue to understanding the advertisement.

To ensure that the altered stimuli would still be processed correctly, they were shown independently to a sample of ten psychology students, who were all able to correctly report the various elements of the three advertisements, showing that they were able to perceive what was represented. The semantically altered stimuli were shown independently to another sample of ten psychology students, who were all able to correctly explain the messages of the three advertisements.

In sum, we had four versions of each advertisement: the original one, the semantically altered but visually original one, the visually altered but semantically original one and the semantically and visually altered one. Each participant was asked to rate one of the four versions of one the three advertisements.

Subjective processing fluency scale

This measure is a ten-item scale divided into two five-item subscales that measure perceptual fluency (abbreviated here as SPFS-P) and conceptual fluency (abbreviated as SPFS-C). Subjective perceptual processing fluency is the ease with which the visual characteristics of a specific advertisement can be processed (e.g. "I have no trouble distinguishing all the visual elements"). Subjective conceptual processing fluency is the ease with which the semantic characteristics of a specific advertisement can be processed (e.g. "I have no difficulty understanding the meaning"). Both the SPFS-P and the SPFS-C included two reversed items. The SPFS allowed us to compute a perceptual processing fluency score, a conceptual processing fluency score and a total processing fluency score, which was the sum of the two subscale scores. The items of this scale, built by consumer psychology researchers and cross-validated by a marketing researcher, were statements about the advertisement, to which the participant had to indicate his/her level of agreement using seven-point Likert scales. The basic psychometric properties of the scale and its subscales are reported in the first subsection of the results section. The items are provided in the Appendix.

Advertisement attitude

The "Ad attitude" scale (Smith *et al.*, 2007) was used to measure attitude toward the advertisement. Originally, this scale was composed of four dichotomous items. Participants had to evaluate the advertisement as either good or bad (Item 1), pleasant or unpleasant (Item 2), favorable or unfavorable (Item 3) and likeable or unlikeable (Item 4). To increase the discrimination power of the scale, we changed the dichotomous response scales into seven-point bipolar scales, using the words of the original response scale to define the upper and lower bounds of the bipolar scales. For example, for Item 1, the participants had "1-Bad", "2", "3", "4", "5", "6" and "7-Good" as a response scale.

Procedure

The whole procedure was computerized, and its total duration was about 20 minutes. The participants were randomly assigned to one of the 12 items resulting from the 3 × 2 × 2 experimental design (advertisement × visual clarity × semantic clarity). Participants were told that the experiment was about advertising and that they would have to evaluate an advertisement on several criteria. After a short description of the experiment, the computer program switched to the experiment. The participant was asked to look at the advertisement on the screen for as long as he/she wanted and was able to look at it while responding to the questions. Participants were administered the SPFS, followed by the "Ad attitude" questionnaire.

Results

Scale score reliability

Scale score reliability of the total scale and the subscales of the SPFS were analyzed. The SPFS showed satisfactory scale score reliability: Cronbach's α of both conceptual (α = 0.96;

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95 per cent CI [.95; 0.97]) and perceptual (α = 0.85; 95 per cent CI [.82;.88]) scales, as well as the total scale (α = 0.89; 95 per cent CI [.86;.91]), was satisfactory, especially considering the number of items (Ponterotto and Ruckdeschel, 2007).

Factor structure

Confirmatory factor analyses (CFA) were conducted to investigate the factor structure of the SPFS. The theoretical model that was tested for the SPFS was a model with two correlated factors (SPFS-P and SPFS-C). The fit of the theoretical model was also compared with the fit of a unidimensional model and with the fit of a model with two independent factors.

Various fit indices are reported for each CFA. We used the following cut-off values for an acceptable model: above 0.90 for the goodness-of-fit index (GFI; Byrne, 1994), above 0.93 for the comparative fit index (CFI; Byrne, 1994), under 0.08 for the standardized root mean square residual (SRMR; Hu and Bentler, 1999), under 0.08 for the root mean square error of approximation (RMSEA; Browne and Cudeck, 1992) and under 5 for the χ^2/df ratio (Schumacker and Lomax, 2010). Finally, the comparison between the theoretical models and the alternate models was based on the minimum Akaike Information Criterion (AIC) procedure (Akaike, 1978) that Burnham and Anderson (2004) recommend. According to this procedure, the preferred model should be the one with the lowest AIC.

The fit indices of all the models that were tested are reported in Table I. The observed fit indices suggest that the theoretical model has an acceptable fit. According to the minimal AIC procedure, the theoretical two-correlated-factor models had a better fit than the alternate models. This result supports the theoretical model, as well as the use of both the total scale score and the two subscale scores. The factor loadings of the items for the theoretical model are reported in Figure 1.

External validity analyses

Multi-mediation model

Further analyses were needed to investigate the relationships between self-reported processing fluency and other variables of interest. First, it was hypothesized that self-reported processing fluency should be sensitive to the characteristics of advertisements: an advertisement that is semantically altered should be evaluated as less fluently processed conceptually, while one that is visually altered should be evaluated as less fluently processed perceptually. We also hypothesized that an advertisement that is easily processed, whether semantically or visually, should elicit a positive attitude. Furthermore, we hypothesized that the relationship between semantic clarity and attitude toward the advertisement should be mediated by conceptual processing fluency, and that the relationship between visual clarity and attitude toward the advertisement should be mediated by perceptual processing fluency.

To test these hypotheses, we decided to conduct a multi-mediation analysis. In this analysis, we tested whether self-reported conceptual (M1)/perceptual (M2) processing fluency were mediators of the relationship between the semantic (IV1) / visual (IV2) clarity of the advertisement and the attitude toward it (DV). To conduct this analysis, we followed the recommendations of Preacher and Hayes (2008) on multi-mediation: when there is more than one independent variable or more than one mediator variable, it is preferable to use a single integrative analysis rather than several simple mediation analyses. We used Preacher and Hayes's (2008) Mplus syntax to compute the total, direct and indirect effects in our model. This procedure allows for the computation of direct and indirect effects of specific variables, controlling for other variables.

When samples are small, it is more likely that the coefficients will not follow a normal distribution. We followed Preacher and Hayes's (2008) recommendation to use bootstrapping to compute the confidence intervals for the estimates of the indirect effects. We, therefore, set the number of samples at 10,000. In this analysis, the visually altered version of the advertisement was coded as 0, whereas the original version was coded as 1; the semantically altered version of the advertisement was coded as 0 and the original version was coded as 1.

Conceptual fluency

The total effect of the advertisement's semantic clarity on attitude toward the advertisement was found to be significant (B = 1.38; $p < 0.05$). As hypothesized, the advertisement's semantic clarity was a significant predictor of self-reported conceptual fluency (B = 5.21; $p < 0.001$). Both perceptual (B = 0.26; $p < 0.001$) and conceptual (B = 0.32; $p < 0.001$) self-reported processing fluency proved to be predictors of attitude toward the advertisement. The indirect effect of the advertisement's semantic clarity on attitude toward the advertisement through conceptual processing fluency was also significant (B = 1.67; $p < 0.001$; 95 per cent CI [0.86; 2.52]). Unexpectedly, semantic clarity was also a predictor of self-reported perceptual fluency (B = −2.47; $p < 0.01$).

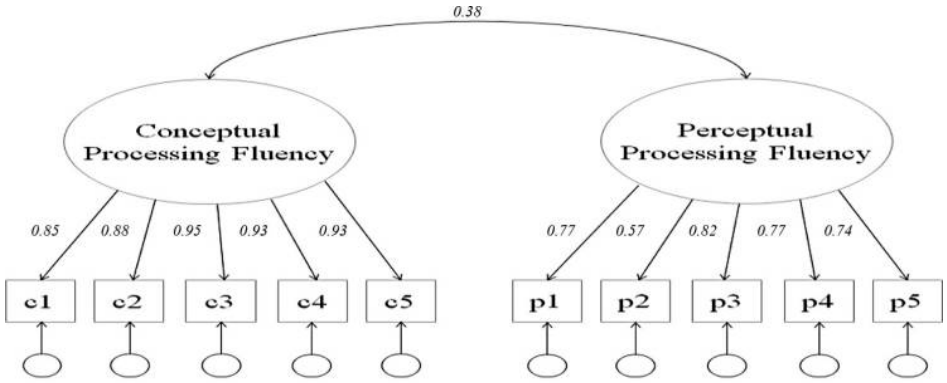
In summary, we found that, as hypothesized, conceptual processing fluency significantly mediated the relationship between the independent variable and the dependent variable. When controlling for visual clarity and both mediators, the conceptual clarity of the advertisement was no longer a significant predictor of attitude toward the advertisement (B = 0.35; p = 0.44), indicating a total mediation effect. These

Table I Fit indices of three structural models of the SPFS, two-correlated factors (theoretical model), two-independent factors and one-factor

Scale (model)	χ^2	df	χ^2/df	GFI	CFI	SRMR	RMSEA	AIC
Two-correlated factors (theoretical model)	68.1	34	2.003	0.932	0.976	0.035	0.076	110.1
Two-independent-factor model	90.9	35	2.596	0.912	0.960	0.176	0.096	130.9
One-factor model	382.0	35	10.914	0.631	0.754	0.197	0.238	422.0

Note: GFI – goodness-of-fit index; CFI – comparative fit index; SRMR – standardized root mean square residual; RMSEA – root mean square error of approximation; AIC – akaike information criterion

Figure 1 Standardized estimates of the parameters from the theoretical model of the scale



Note: All reported parameters were significant ($p < 0.05$)

results suggest that participants reported negative attitudes toward the advertisements that were semantically altered only because of the change in fluency they experienced.

Perceptual fluency

As hypothesized, the advertisement's visual clarity was found to be a significant predictor of attitude toward the advertisement ($B = 1.81$; $p < 0.01$). The visual clarity of the advertisement was also a significant predictor of self-reported perceptual fluency ($B = 2.19$; $p < 0.01$). The indirect effect of the advertisement's visual clarity on attitude toward the advertisement through perceptual processing fluency was significant ($B = 0.57$; $p < 0.01$; 95 per cent CI [0.18; 1.08]), whereas the indirect effect of the visual quality of the advertisement on the attitude toward the advertisement through conceptual processing fluency was not significant, as expected ($B = 0.18$; $p = 0.64$; 95 per cent CI [−0.61;0.96]).

To sum up, as hypothesized, perceptual processing fluency significantly mediated the relationship between the independent variable and the dependent variable. When controlling for semantic clarity and both mediators, the advertisement's visual clarity was still a significant predictor of attitude toward the advertisement ($B = 1.06$; $p < 0.05$), indicating a total mediation effect. These results suggest that participants reported negative attitudes toward the advertisements that were visually altered only because of the change in fluency they experienced.

Discussion

The results of this first study revealed that the *ad hoc* measure of subjective processing fluency had satisfactory psychometric properties. First, the scale and both its subscales showed satisfactory internal consistency. Furthermore, the two-correlated-factor theoretical model showed acceptable fit, contrary to alternate models.

As expected, self-reported conceptual fluency significantly mediated the relationship between semantic clarity and attitude toward the advertisement. This result is in line with the theory of hedonic marking of processing fluency. Moreover, self-reported perceptual fluency significantly mediated the relationship between the visual clarity of the advertisement and the attitude toward it. However, it was not expected that conceptually altered advertisements would also be easier to process perceptually. This result could be explained by the way we changed the message of the advertisement. It is possible that removing parts of the message to semantically alter it made the advertisement easier to process perceptually because the advertisement now had fewer elements to process.

Advertisements are made to not only promote products and the brand but also increase the likelihood that people will buy the products. A positive attitude toward an advertisement predicts a positive attitude toward the brand and also increases the likelihood that the consumer will want to purchase products from the brand in the future. Our second study aimed at investigating whether the amount of cognitive processing of the advertisement could mediate the relationship between subjective processing fluency and attitudes toward the advertisement, attitudes toward the brand and purchase intentions.

Study 2

Study 2 aimed at investigating self-reported processing fluency and its relationships with other key constructs in advertising research: attitude toward the advertisement, attitude toward the brand and purchase intentions. We aimed to investigate the relationship between self-reported processing fluency and various advertisement processing variables, as identified by Smith *et al.* (2007). More specifically, we hypothesized that processing fluency would be positively related with the self-reported amount of attention dedicated to processing the advertisement, the self-reported motivation to process the advertisement and the self-reported depth of processing. In turn, these variables would predict attitudes toward the advertisement, attitudes toward the brand and purchase intentions as part of a cognitive effort justification (Song and Schwarz, 2008; Norton *et al.*, 2011).

Method

Participants

The participants were French second-year university students from Paris, rewarded for their participation with course credit points. The sample was composed of 169 women and 35 men.

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The mean age of the participants was 20.93 years (SD = 3.93). The administration was supervised by research psychologists, and confidentiality was guaranteed.

Materials

Advertisements

We selected three French magazine advertisements promoting three different products: a beverage, a bicycle and a car. The advertisements were not the same as in Study 1. We selected these advertisements because they included both a picture and a written message, allowing different levels of semantic and visual clarity. Each participant had to rate one of the three advertisements. Once again, we investigated the possible differences in effects for each advertisement: although the advertisements elicited different levels of processing fluency and attitudes, the effects remained consistent.

Subjective processing fluency scale

We used the same scale as in Study 1, which allowed us to measure self-reported processing fluency.

Dependent variables

We used psychometrically validated scales from Smith *et al.* (2007) to measure the other variables of interest. We used their entire "Processing and response measures scale", which consists of four subscales: "Amount of attention", "Motivation to process the ad", "Depth of processing" and "Ad attitude".

We also used Smith *et al.*'s (2007) "Brand attitude" scale to measure the attitude toward the brand and the "Purchase intentions" scale to measure the likelihood that participants would purchase the advertised brand in the future. As in Study 1, to increase the discrimination power of the measures, which were, originally, dichotomous (Ad attitude, brand attitude and purchase intention), every item was administered using seven-point bipolar response scales.

Procedure

Participants were first told that the experiment was about advertising. Their screens then displayed one of three advertisements, and they were asked to evaluate the advertisement using the different questionnaires. Participants were administered the questionnaires in the following order: "processing fluency", "amount of attention", "motivation to process the ad", "depth of processing", "Ad attitude", "brand attitude" and "purchase intentions". The total duration was about 20 minutes.

Results

Reliability

The data from the second study allowed us to successfully replicate the analyses of Study 1 regarding the scale score reliability of the SPFS. Cronbach's α of both the conceptual (α = 0.92; 95 per cent CI [.90; 0.94]) and perceptual (α = 0.81; 95 per cent CI [.77;.85]) scales, as well as the total scale (α = 0.88; 95 per cent CI [.86;.91]), was satisfactory.

Factor structure

As in Study 1, we verified the theoretical factor structure of the SPFS using CFA. The χ^2/df associated with the model was 2.01, the GFI was 0.93, the CFI was 0.97, the RMSEA was 0.07 (90 per cent CI = [0.05;.09]) and the SRMR was 0.05, indicating an acceptable fit of the theoretical model. The same alternate models as in Study 1 were tested and showed a poorer fit than the theoretical model. Such results are in line with the results of Study 1 and provide further evidence for the sufficient factorial validity of the SPFS.

Multi-mediation model

The relationship between self-reported processing fluency and Ad attitude, brand attitude and purchase intentions, as well as the mediating role of attention, processing motivation and processing depth, was investigated. To begin with, we computed the correlation coefficients between self-reported perceptual, conceptual and total (perceptual + conceptual) processing fluency and the self-reported amount of attention dedicated to the processing the advertisement, motivation to process the advertisement and depth of processing of the advertisement. It was hypothesized that the last three constructs would be correlated to the three scores of self-reported processing fluency. Consistent with our hypotheses, we found that self-reported perceptual processing fluency was weakly but significantly and positively correlated with the self-reported amount of attention dedicated to the advertisement (r = 0.18; $p < 0.01$), motivation to process the advertisement (r = 0.19; $p < 0.01$) and depth of processing (r = 0.20; $p < 0.01$). Self-reported conceptual processing fluency was also found to be positively correlated with the self-reported amount of attention dedicated to the advertisement (r = 0.20; $p < 0.01$), motivation to process the advertisement (r = 0.20; $p < 0.01$) and depth of processing (r = 0.27; $p < 0.01$). Finally, self-reported total processing fluency was significantly and positively correlated with the self-reported amount of attention dedicated to the advertisement (r = 0.22; $p < 0.01$), motivation to process the advertisement (r = 0.22; $p < 0.01$) and depth of processing (r = 0.27; $p < 0.01$).

Using multiple linear regressions, we investigated the relationship of attention, processing motivation and processing depth with advertisement attitudes, brand attitudes and purchase intentions. The first analysis revealed that advertisement attitudes are predicted by attention (B = 0.45; $p < 0.001$) and marginally by processing motivation (B = 0.22; p = 0.05), but not by processing depth (B = 0.10; p = 0.23). The second analysis showed that brand attitudes are predicted by processing depth (B = 0.20; $p < 0.01$) and marginally by attention (B = 0.18; p = 0.05) and processing motivation (B = 0.18; p = 0.09). The third analysis revealed that purchase intentions are only predicted by processing depth (B = 0.58; $p < 0.001$) but neither by attention (B = 0.08; p = 0.41) nor by processing motivation (B = 0.05; p = 0.68). Lastly, as hypothesized, processing fluency was a significant predictor of attitude toward the advertisement (B = 0.26; $p < 0.001$), attitude toward the brand (B = 0.16; $p < 0.001$) and purchase intentions (B = 0.09; $p < 0.05$).

We finally tested the hypothesis that the relationship between processing fluency and attitude toward the advertisement, attitude toward the brand and purchase intentions would be mediated by attention, processing motivation and processing depth. In this analysis, we focused on self-reported total processing fluency. To compute indirect

effects, we conducted mediation analyses. As in Study 1, we followed the recommendations of Preacher and Hayes (2008) and used their Mplus syntax. Our model included attitude toward the advertisement, attitude toward the brand and purchase intentions as dependent variables; self-reported total processing fluency as the independent variable; and attention, processing motivation and processing depth as mediators. The analyses of the indirect effects revealed that attention mediated the relationship between total processing fluency and Ad attitude ($B = 0.05$; $p < 0.01$; 95 per cent CI [0.01; 0.09]) and that processing depth marginally mediated the relationship between processing fluency and brand attitude ($B = 0.02$; $p < 0.05$; 95 per cent CI [0.00;0.04]) and processing fluency and purchase intentions ($B = 0.07$; $p < 0.001$; 95 per cent CI [0.03;0.12]). None of the other indirect effects was significant.

Discussion

Study 2 replicated the results of the first study and further demonstrated the relevance of taking into account self-reported processing fluency when investigating advertisement processing, Ad attitude and brand attitudes and purchase intentions. As in Study 1, the *ad hoc* self-reported measure of subjective processing fluency showed good internal consistency and satisfactory factorial validity. Furthermore, as in Study 1, we found a positive and significant correlation between self-reported processing fluency and self-reported attitude toward the advertisement.

As hypothesized, significant positive correlations were found between processing fluency and theoretically relevant constructs: attention to the advertisement, motivation to process the advertisement and depth of processing. This revealed that an advertisement that is perceived as easily processed will tend to draw more attention, motivate the consumer to process it and allow the consumer to process it more deeply. In turn, attention to the advertisement predicts attitudes toward the advertisement and the brand, and processing depth predicts attitudes toward the brand and purchase intentions, mediating the relationships between subjective processing fluency and attitude toward the ad, attitude toward the brand and purchase intentions.

General discussion and conclusion

The results of Study 1 suggest that our *ad hoc* scale was successful in capturing subjective processing fluency. More specifically, visually altered advertisements were reported as eliciting less fluent perceptual processing, compared with the original version of the same advertisements. Likewise, semantically altered advertisements were reported as eliciting less fluent conceptual processing, compared with the original version of the same advertisements. Consistent with the theory of hedonic marking of processing fluency, this research also used a multi-mediation analysis to show that self-reported processing fluency mediated the relationship between the advertisement's visual and semantic clarity and attitude toward the advertisement. Indeed, while perceptual processing fluency mediated the relationship between the visual clarity of the advertisement and the attitude toward it, conceptual fluency mediated the relationship between the semantic clarity of the advertisement and the attitude toward it.

Using a correlational design, Study 2 provided further elements to highlight the relevance of considering self-reported subjective processing fluency in advertising research. Indeed, self-reported processing fluency was found to be a predictor of attitude toward the advertisement, attitude toward the brand and purchase intentions. Furthermore, the attention toward the advertisement, the motivation to process it and the depth of processing were found to be mediators of the effect of processing fluency on Ad attitude and brand attitudes and purchase intentions. More specifically, attention is a mediator for attitudes toward the advertisement and the brand, and processing depth is a mediator for attitudes toward the brand and purchase intentions.

The theoretical contribution of this paper is that it highlights the role of attention, processing motivation, and processing depth in how processing fluency affects attitudes and purchase intentions. Our findings confirm the hypotheses that we derived from the literature (Song and Schwarz, 2008; Norton *et al.*, 2011) on how processing fluency can increase positive attitudes toward the advertisement and related objects. Indeed, fluently processed advertisements elicit more cognitive processing (more attention, more motivation and deeper processing), which, in turn, elicits more positive attitudes toward the advertisement and the brand and purchase intentions, as if consumers wanted to justify the amount of cognitive effort they invested in processing the advertisement.

As a secondary outcome of this research, it appears that the *ad hoc* self-reported measure of subjective processing fluency of advertisements created for this research had sufficient internal consistency and factorial validity in both studies. Indeed, the reliability of both subscales (perceptual and conceptual processing fluencies) and the reliability of the total scale were satisfactory in both studies. In addition, the theoretical two-correlated-factor model had an acceptable fit in both studies, whereas alternate models showed poorer fit. This research could be extended to further investigate the psychometric qualities of this measure, notably by investigating its construct validity.

The present research has also several practical implications. In the development stage, our scale may provide a deep analysis of the potential effectiveness of an advertisement by providing information that anticipates how consumers will cognitively process the advertisement and, hence, increase the chances of the advertisement being profitable. An advertisement that is not easily processed can lead to consumers completely missing its message. In cognitive terms, they do not deeply process the information, which increases the risk of their skipping to something else. In the case of poorly perceived advertisements, our scale may help practitioners to identify how the advertisement is flawed and provide information on how to revise either the visuals or the message. Our scale could also be used to adapt the advertisement's visual and semantic features to specific categories of consumers. This simple instrument could help advertisers produce a full array of customized messages and visual designs based on how easily different categories of consumers process the advertisement.

However, these studies have limitations that should be taken into account when conducting further research on the topic. Because the samples are composed of psychology students, these suffer from gender imbalance and a narrow age range. Although there is no reason to believe that different results would have been obtained with different populations, it could be interesting to replicate the studies on different samples, notably samples composed of older adults with a better gender balance.

Another limitation is the sample of advertisements. In both studies, we used only magazine advertisements. Further research could try to replicate the findings of the studies using other types of visual advertisements, such as television or Internet advertisements. It could be hypothesized that, in some domains, it is even more crucial to design advertisements that are easy to process to catch consumers' attention and elicit positive attitudes toward the advertisement and the brand. Such research would help advertisers design more effective advertisements for magazines, television or the Internet.

A further limitation is the correlational design of Study 2. Further research could replicate our findings using an experimental design to investigate the causal relationships. Finally, because it was beyond the scope of this paper, we did not investigate the possible moderating role of individual differences. For example, because the ability to process visual stimuli has been found to be related to intelligence and personality traits (Chamorro-Premuzic and Furnham, 2004; Furnham and Chamorro-Premuzic, 2004; Myszkowski *et al.*, 2014), it could be hypothesized that individuals with such dispositional attributes would seek stimulation in a higher level of complexity. This kind of research could show that advertisements might benefit from being tailored to a consumer's ability to process visual advertisements fluently.

To conclude, this research shows the importance of taking into account the theory of hedonic marking of processing fluency (Winkielman *et al.*, 2003) in advertising research. This framework was shown to be relevant to a series of consumer attitudes and purchase intentions. This study, thus, enables future research using self-reported measures of subjective processing fluency that could allow advertisers and marketing researchers to characterize an individual's advertisement experience through the evaluation of his/her perceived conceptual and perceptual ease of advertisement processing and to evaluate an advertisement's perceived visual and semantic complexity. It also provides practitioners with mechanisms to study how processing fluency affects Ad attitude and brand attitudes and purchase intentions, shedding light on the role of attention, processing motivation and processing depth.

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Appendix

Table AI Items of the subjective processing fluency scale

Item no.	Scale (subscale)	Item
1	Perceptual	I can see the visual details clearly
2*	Conceptual	I have trouble fully understanding the meaning. J'ai du mal à saisir totalement la signification
3*	Perceptual	I have difficulties detecting the shapes
4	Conceptual	I get the meaning easily
5	Perceptual	I perceive the main visual elements easily
6	Conceptual	I understand the message without any problem
7*	Perceptual	I find the visual elements to be difficult to distinguish
8*	Conceptual	I find it is complicated to get the message
9	Perceptual	I can distinguish all the visual elements without any effort
10	Conceptual	I have no difficulty understanding the meaning

Note: Participants respond using a seven-point Likert scale (1 = totally disagree; 2 = disagree; 3 = partially disagree; 4 = neither agree nor disagree; 5 = partially agree; 6 = agree; and 7 = totally agree). Each item yields a score from 1 to 7. High scores indicate higher subjective processing fluency; *Reversed item

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