



Article scientifique

Article

2016

Published version

Public access

This is the published version of the publication, made available in accordance with the publisher's policy.

---

## Revealing the elusive effects of vividness: a meta-analysis of empirical evidences assessing the effect of vividness on persuasion

---

Blonde, Jérôme; Girandola, Fabien

### How to cite

BLONDE, Jérôme, GIRANDOLA, Fabien. Revealing the elusive effects of vividness: a meta-analysis of empirical evidences assessing the effect of vividness on persuasion. In: Social influence, 2016, vol. 11, n° 2, p. 111–129. doi: 10.1080/15534510.2016.1157096

This publication URL: <https://archive-ouverte.unige.ch/unige:183887>

Publication DOI: [10.1080/15534510.2016.1157096](https://doi.org/10.1080/15534510.2016.1157096)

© This document is protected by copyright. Please refer to copyright holder(s) for terms of use.

Last deposit update in Archive ouverte UNIGE on 18.03.2025 16:54



## Revealing the elusive effects of vividness: a meta-analysis of empirical evidences assessing the effect of vividness on persuasion

Jérôme Blondé & Fabien Girandola

To cite this article: Jérôme Blondé & Fabien Girandola (2016) Revealing the elusive effects of vividness: a meta-analysis of empirical evidences assessing the effect of vividness on persuasion, *Social Influence*, 11:2, 111-129, DOI: [10.1080/15534510.2016.1157096](https://doi.org/10.1080/15534510.2016.1157096)

To link to this article: <http://dx.doi.org/10.1080/15534510.2016.1157096>



Published online: 14 Mar 2016.



Submit your article to this journal [↗](#)



Article views: 10



View related articles [↗](#)



View Crossmark data [↗](#)

## Revealing the elusive effects of vividness: a meta-analysis of empirical evidences assessing the effect of vividness on persuasion

Jérôme Blondé and Fabien Girandola

Laboratoire de Psychologie Sociale, Aix-Marseille Université, Aix-en-Provence, France

### ABSTRACT

Despite decades of research, past studies focusing on the effects of vividness on persuasion found mixed and contradictory results. In order to solve this conflicting issue, a meta-analysis was conducted on empirical studies assessing the impact of vivid (vs. pallid) communications on attitude and/or behavioral intention. Overall, 27 articles ( $k = 43$ ;  $N = 7575$ ) were included. Our results showed that vividness yielded significant small-to-medium effect on both attitude ( $d_+ = .31$ ) and behavioral intention ( $d_+ = .39$ ). Furthermore, meta-regression analyses indicated that memory recall, cognitive elaboration, and topic valence moderated these effects, whereas vividness/argument congruency was not significantly related to the variations of effects sizes. Finally, theoretical implications of these findings will be discussed.

### ARTICLE HISTORY

Received 30 July 2015

Accepted 14 February 2016

### KEYWORDS

Vividness; persuasion; meta-analysis; attitude; behavioral intention

Imagine you have to design a commercial for a new product. Which communication strategy would you use to be impactful? One would probably be to give people concrete and catchy information. For instance, you might choose to provide detailed, colorful, and punchy pictures describing every positive feature of the product and advantages of purchasing it. In all cases, it seems obvious not to use abstract informations like unfamiliar words, statistics, or scientific diagrams. By doing so, you may implicitly be thinking that vivid informations will attract people's attention and produce a greater impact on consumer's opinions and purchase behaviors. Actually, you will not be the only one to believe that. Many communicators from various fields (e.g., health, marketing) also think that increasing vividness of a message improves its persuasiveness.

For more than thirty years, an extensive number of studies have tested whether this intuitive belief was true or not (for reviews, see 5; 23; 68). Nevertheless, no consistent results have been found yet and consensus still remains elusive: a greater vividness has been shown to facilitate, reduce or have no effect on persuasion as well (30). To solve this crucial issue, the present study reports a meta-analysis conducted on empirical researches investigating

the effects of vividness on attitude and behavioral intention. The purpose of this analysis is to bring clear evidence about the effects of vividness and assess whether and how it is moderated by some other variables.

### What is vividness?

Vividness can be conceptualized in varied ways. On the one hand, a body of research defined vividness as an individual difference variable corresponding to the subjective capacity of easily visualizing objects into mind. On the other hand, most of studies being about persuasion consider vividness as an objective characteristic of a stimulus (68).

According to the widely used Nisbett and Ross' definition, vivid information is described as "*likely to attract and hold our attention and to excite the imagination to the extent that it is emotionally interesting, concrete and imagery-provoking, and proximate in a sensory, temporal, or spatial way*" (53). Thus, vividly designed communications usually incorporate pictures, metaphors, concrete examples, shocking and affectively charged words, audio or video recordings. As such, in experimental studies, vividness has been manipulated using many operationalizations including the presence (vs. absence) of pictures (e.g., 15; 24), concrete (vs. abstract) words (e.g., 66; 71), concrete (vs. abstract) pictures (e.g., 4; 55), narratives (vs. statistical) evidences (e.g., 22; 40), and direct (vs. indirect) transmission of information (e.g., 34).

### What are the effects of vividness on persuasion?

In accordance with the common belief, most researches confirmed a greater influence of vividness on persuasion: the more a message includes vivid stimuli, the more people are inclined to endorse what it is suggested (e.g., 2; 3; 50; 61, 62; 65). However, findings revealing beneficial effects of vividness have not been strongly supported by empirical evidences. A significant set of studies found either null (e.g., 24; 27; 37) or even negative effects (e.g., 6; 28; 67). For example, 28 showed that participants who were provided a concrete audio-recorded editorial show less acceptance with the position advocated compared with those having received an abstract one. To address that divergent finding, these authors argued that vivid materials interfere with a deep and careful processing of information and distract attention away from the essential meaning of the message.

Faced with these difficulties, it follows the impossibility to conclude whether and how vividness really influences persuasion. Similarly, the literature review conducted by 68 also failed to find conclusive results and stated that "*taken together, the laboratory evidence leads one to the conclusion that the vividness effect, at least as it has been studied to this point, is weak if existent at all*" (68; 172). According to these authors, the mixed findings are mainly due to imprecise and large variety of ways to operationalize vividness. From there, 18 went further asserting that vividness has no "real effect" but just an "illusory effect". As such, they conducted two experiments providing proof of a positive effect of vividness on the evaluation of the message's persuasiveness but not on the effective measure of attitude change. Thus, it might be concluded that the "vividness effect", if not only elusive, could also be simply a matter of a delusive belief.

## What moderates the effects of vividness on persuasion?

The lack of consistency in results previously described has led researchers to identify factors likely to moderate vividness effects. Although some variables have been studied, two of them were the object of special attention in literature: memory recall and cognitive elaboration.

### *Memory recall*

Some researchers suggested that vivid informations affect persuasion only when individuals are easily able to recall them (53; 59). Following the “availability heuristic” hypothesis (70), informations that are strongly available appear to be indeed more influential on judgments. Thus, it may be sustained that vividness might have an increasing effect in case where vivid informations are readily available when judging (34; 39).

For instance, 59 have found that vividness has no immediate influence on judgment. Only a delayed recall is likely to entail a greater impact. As such, it results in that vividness effects only occur when vivid informations are available to mind. However, the case of recall is controversial: it has been shown that vivid material could affect judgment independently of a better recall. Thus, 64 observed that the presence (vs. absence) of photographs actually affected both the availability of arguments and judgments, but causal modeling indicated that availability was not related to vividness effect. Vividness can influence persuasion regardless of informations integrated into memory.

### *Cognitive elaboration*

Cognitive elaboration is a central process in persuasion dynamic (29; 57, 58). That is, some authors have asserted that vivid appeals are persuasive upon the extent to which they allow for greater cognitive elaboration (41, 42; 48). Thereby, limiting an individual’s ability to elaborate on relevant informations may impede the effectiveness of vividness. 48 instructed half of participants to elaborate on vividly constructed informations; the other half did not. Results showed that vividness effects only occur in condition of increased cognitive elaboration. Consequently, vivid informations may have greater influence on evaluations only if people are encouraged to elaborate on it.

According to 42, one reason is that elaboration affects the accessibility of information, which, in turn, should be more influential when judging. From an alternative account, another reason explaining why a superior degree of elaboration improves persuasiveness of vivid messages refers to imagery processes. Actually, thoroughly elaborate on vivid informations has been shown to generate a higher amount of imagery (46). Individuals are more likely to produce visual images of vivid stimuli on the ease with which they generate thoughts of them (11; 55). As we know that instructing to use its imagination enhances the impact of persuasive communications (8; 26; 56), it results in a facilitating effect of cognitive elaboration on persuasion.

### *The present meta-analysis*

Despite a large body of empirical studies that support greater influence of vivid communications, the foregoing literature review explicitly indicates that it is yet as unclear whether and

to what extent vividness affects persuasion. In the same way, a large degree of ambiguities remains about moderating factors: which variables are implied in the effects of vividness? how much did they play a significant role? Thus, it suggests the need to reconcile all these mixed and inconsistent findings and bring clear evidences. To address this issue, the present study used a meta-analytic strategy.

Meta-analysis is a statistical technique used to quantitatively synthesize results from separate studies conducted on a similar topic. This type of analysis is often needed as much as literature become larger and findings more complex. The purpose of this technique can be summarized in three main objectives: to average results from different studies, to assess the homogeneity of the results, and, in case of heterogeneous set of studies, to identify for potential moderating variables. For the present meta-analysis, we attempted to answer four questions: does vividness influence persuasion? does vividness increase or decrease persuasion? to what extent vividness influences persuasion? which variables are likely to moderate the influence of vividness?

## Method

### *Selection of studies*

Empirical studies were located using computer databases (i.e., PsycInfo, Pubmed, Medline, ProQuest, and Francis).<sup>1</sup> Search terms such as *vividness*, *vivid*, *abstract/concrete*, *concreteness*, and *abstractness* were used to begin identifying relevant studies. As persuasion is usually operationalized through both measures of attitude and behavioral intention in literature, these results were filtered with terms such as *persuasion*, *attitude*, *attitude change*, and *behavioral intention* to narrow the results to a useful sample of studies. The databases searched for the terms in the titles, the abstracts, and the main texts of all manuscripts. This electronic search was performed in August 2014 (and updated in March 2015). In total, database searching yielded 1532 potential records and 74 additional relevant publications were identified on the basis of the reference sections in reviews and studies. The majority of them were published, but we also recorded unpublished studies, dissertations, and book chapters. After excluding duplicates ( $N = 644$ ), non-English, French-speaking publications and books, this literature search resulted in 876 references to possibly relevant publications.

### *Inclusion and exclusion criteria*

There were three inclusion criteria for the review. First, studies had to use an experimental and factorial design including random assignment to a low (or pallid, or non-vivid) versus a high (or vivid) condition of vividness. Second, studies had to manipulate vividness depending on informations presented in the message. Suchlike, we excluded studies where vividness was operationalized as an individual capacity of visualizing objects. However, no specific criteria were established about the type of material used to manipulate vividness. Third, studies had to include a measure of attitude and/or behavioral intention. No selection was made regarding the type of topic dealt in the message. Selection of relevant studies was done according informations detailed in the abstracts, or inside the article in case of ambiguous abstracts. We imposed no restrictions with regard to year or type of publication

(i.e., published, unpublished articles, dissertation), countries where studies were conducted, age or type of participants, or disciplines aimed by journals (i.e., psychology, marketing).

The different phases of selection are shown in Figure 1 and followed suggestions of Prisma Group (51). After eliminating non-empirical or no factorial records ( $N = 497$ ), records that do not include a manipulation of vividness ( $N = 279$ ) and records that do not include measure of attitude or behavioral intention ( $N = 43$ ), only 57 records remained as eligible articles. Finally, 30 articles were excluded because full texts were not available or data required for calculations were not yielded. A total of 27 articles met the inclusion criteria for the review. These articles reported a total of 43 experiments assessing the impact of vividness on persuasion. There were 20 that tested the impact on attitude only, 6 on behavioral intention only, and 17 on both.

### Meta-analytic strategy

The effect size metric used in this analysis is the effect size estimator  $d$  (17). For all analysis, the treatment group (i.e., vividness condition) was compared with the control group (i.e., non-vividness condition). Suchlike, a positive effect size indicates that the effect was greater for vivid vs. non-vivid condition (i.e., thus, vividness would improve persuasion). A negative effect size indicates the reverse. Each effect size'  $d$  included were calculated using Wilson's effect size calculator program (45) that was developed to allow computation of effect sizes from various input data. To run these calculations, some statistics were extracted from each

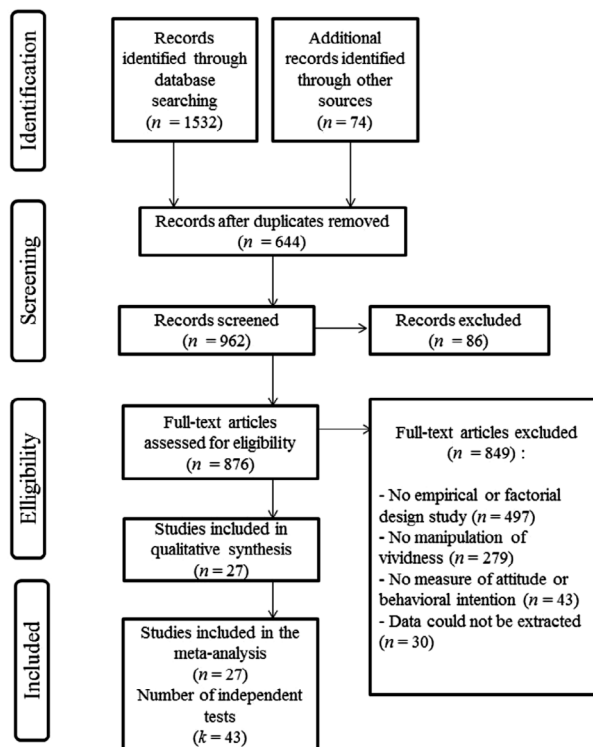


Figure 1. Meta-analysis flow diagram.

study: (1) whenever possible, we account for means, standard deviations, and number of participants per condition; (2) when these ones were not available (mostly for old studies or those reporting non-significant results), effect sizes were derived from inferential statistic *F*-value (one-way analysis). Note that when studies report non-significant results without indicating means and SD's, we excluded them from the analysis. For some cases, when the number of participants per cell was not indicated, we assume equal sample size between groups (those studies were specified in Table 1). In order to avoid small-sample size bias, Cohen's *d* were corrected using Hedges' *g* (32). For each study and variables tested, an effect size was calculated and included in the meta-analysis afterwards.

Vividness was coded as independent variable corresponding to the extent a message is vividly or non-vividly designed.<sup>2</sup> In cases where studies did not precise which condition is low or high, we assumed that high-vivid condition were the one that used the most concrete or pictorial informations. When studies included more than two conditions of vividness,<sup>3</sup> effect sizes were computed using means of the lowest and the highest condition. Doing so allows testing the greater difference between vivid and non-vivid condition. Furthermore, as all studies yielded successful manipulation checks of vividness, we assume a strong quality of manipulation without checking it by ourselves. Attitude was coded as respondents' evaluation of objects (e.g., products) or behaviors (e.g., smoking). In some studies, when attitude was not clearly evoked as such, we integrated corresponding values in the analyses if studies reported proximate variables like "evaluation", "judgment", or "agreement". About studies focused on advertising, note that attitude was sometimes divided into two attitudes: attitude toward ad and product. With respect to the coding of attitude for others studies, we only used data referring to attitude toward product. Finally, behavioral intention was coded as respondents' intention to engage in a suggested behavior (e.g., stop smoking).

### **Moderator variables**

Another objective was to identify the moderators that can account for heterogeneity across studies. Several factors were extracted and included in the analysis as moderator variables. A first set of theory-driven moderators: as mentioned above, we considered memory recall and cognitive elaboration, and for other theoretical concerns, vividness/argument congruency<sup>4</sup> and topic valence.<sup>5</sup> A second set of exploratory moderators with respect to study characteristics: type of vividness manipulation, topic, year of publication, and age of participants. These possible moderators are displayed in Table 2 and coded as following:

Theory-driven moderators. Memory recall was coded in regard to the number of informations correctly recalled by participants while receiving the message.<sup>6</sup> Cognitive elaboration was coded through the number of thoughts participants wrote after being exposed to the message, regardless of the valence of the thoughts.<sup>7</sup> As researches have shown that elaboration of positive thoughts leads to positive attitudes, while elaboration of negative thoughts produces negative attitudes (e.g., 69), we distinguished, when such data were reported, between positive and negative thoughts. These have been included as two other moderators. We coded vividness/argument congruency depending on whether informations used to manipulate vividness are congruent or not with arguments addressed in the message. Finally, topic valence was coded as regards whether the topic is positive or negative (e.g., detecting HIV, selling products).<sup>8</sup>

**Table 1.** Overview of studies included in the meta-analysis with effect sizes (*d*) and standard errors (SE).

Authors	Year	Country	Population	Age	<i>N</i>	Manipulation of vividness	Attitude	Intention
Amos & Spears (a)	2010	U.S.	Students	–	220	Neutral vs. testimonial informations	+37** (.14)	+39** (.14)
Amos & Spears (b)	2010	U.S.	Students	–	84	Neutral vs. testimonial informations	+96*** (.23)	+91*** (.23)
Amos & Spears (c)	2010	U.S.	Passers-by	–	53	Neutral vs. testimonial informations	+1.52*** (.34)	+84** (.32)
Babin & Burnsa	1997	U.S.	Students	–	186	Abstract vs. concrete picture	+47** (.15)	
Block & Keller (a)	1997	U.S.	Students	–	197	Impersonal vs. personal stories		+05 (.14)
Block & Keller (b)	1997	U.S.	Students	–	123	Text vs. picture		+18 (.17)
Blondé & Girandola (a)	2015	France	Students	18.7	42	Text vs. picture	+54 (.31)	+75* (.31)
Blondé & Girandola (b)	2015	France	Students	19.5	93	Scientific schema vs. photograph	+54* (.21)	+61** (.21)
Blondé & Girandola (c)	2015	France	Students	20.6	77	Scientific schema vs. photograph	+45 (.23)	+47* (.23)
Blondé & Girandola (d)	2015	France	Students	20.6	142	Scientific schema vs. photograph	–02 (.17)	–11 (.17)
Burns, Biswas, & Babina	1993	U.S.	Students	–	377	Abstract vs. concrete words	+33** (.10)	+30** (.10)
Chappé, Verhiac, & Meyera	2006	France	Students	20	63	Absence vs. presence of pictures	+26** (.10)	+43 (.25)
Ci	2008	U.S.	Students	–	445	Abstract vs. concrete words	–11 (.34)	+19* (.10)
Collins, Taylor, Wood, & Thompsona	1988	U.S.	Students	–	33	Abstract vs. concrete language		
Courbeta	2004	France	Students	–	108	Absence vs. presence of pictures	+45 (.30)	+46 (.24)
Coyle & Thorsona	2001	U.S.	Passers-by	35.2	68	Absence vs. presence of audiovisual settings		
De Wit, Das, & Vet	2008	Netherlands	Internet users	38.3	118	Statistic vs. narrative evidences		+2.22*** (.36)
Fennis, Das, & Fransena	2010	Netherlands	Students	22.0	78	Picture vs. photograph		
Frey & Eaglya	1993	U.S.	Students	–	171	Abstract vs. concrete message	+51* (.23)	
Guadagno, Rhoada, & Sagarina	2011	U.S.	Students	–	164	Abstract vs. easy-to-visualize informations	–46** (.15)	
He (a)	2008	U.S.	Students	–	56	Abstract vs. concrete informations	+24 (.22)	
He (b)	2008	U.S.	Students	–	96	Abstract vs. concrete informations	+65* (.29)	–25 (.28)
He (c)	2008	U.S.	Students	–	111	Abstract vs. concrete informations	+41* (.21)	+06 (.20)
He (d)	2008	U.S.	Students	–	111	Abstract vs. concrete informations	+04 (.19)	+15 (.19)
Hong & Parka	2012	U.S.	Students	22.3	181	Abstract vs. concrete informations		–01 (.19)
Keller & Block (a)	1997	U.S.	Students	–	120	Statistical vs. narrative evidences	+12 (.15)	
Keller & Block (b)	1997	U.S.	Students	–	94	Verbal vs. pictorial informations	–08 (.18)	
Keller & Block (c)	1997	U.S.	Students	–	90	Use of imagery vs. no use informations	–17 (.20)	
Kisielius & Sternthal (a)	1984	U.S.	Students	–	190	Statistical vs. anecdotal informations	–08 (.15)	
Kisielius & Sternthal (b)	1984	U.S.	Students	–	90	Verbal vs. pictorial informations	–28 (.21)	
Kisielius & Sternthal (c)	1984	U.S.	Students	–	58	Verbal vs. pictorial informations	–46 (.26)	
Macklin, Bruvold, & Sheaa	1985	U.S.	Passers-by	–	58	Verbal vs. pictorial informations	+16 (.26)	
McGill & Ananda	1989	U.S.	Students	–	127	Abstract vs. concrete informations	+09 (.22)	+10 (.22)
Miller & Marks	1992	U.S.	Students	–	30	Imaginable vs. non imaginable informations	+1.35*** (.40)	
Nagaraja	2007	Sweden	Students	–	124	Verbal vs. verbal and sound effects	+07 (.18)	
				–	160	Low vs. high elaborated ad design	+95*** (.17)	+1.35*** (.18)

(Continued)



Table 1. (Continued).

Authors	Year	Country	Population	Age	N	Manipulation of vividness	Effect size <i>d</i> (SE)	
							Attitude	Intention
Petrova & Cialdina	2005	U.S.	Students	–	135	Muted vs. non-muted picture	+14 (.17)	+12 (.17)
Rigney & Lutz	1976	U.S.	Students	–	40	Verbal vs. animated graphic informations	+1.82** (.37)	
Rook (a)	1987	U.S.	Students	20.2	48	Abstract vs. case history informations	+58* (.29)	
Rook (b)	1987	U.S.	–	48.4	20	Abstract vs. case history informations	+1.12* (.46)	
Rook (c)	1987	U.S.	Senior citizens	71.3	40	Abstract vs. case history informations	+27 (.31)	
Smith & Shaffer	2000	U.S.	Students	–	288	Abstract vs. concrete language	+30* (.14)	
Stafford (a) <sup>a</sup>	1996	U.S.	–	–	80	Absence vs. presence of a picture	+20 (.22)	+27 (.22)
Stafford (b)	1996	U.S.	–	–	89	Absence vs. presence of a picture	+17 (.21)	+41 (.21)

Note. *d* = Cohen's *d* effect size; SE = Standard error; *N* = Total number of participants in each study; All *d*'s are corrected for small sample studies using *g*'s and are directly inserted in the table; Positive effect sizes indicate that the effect was stronger for vivid condition than non-vivid condition. A negative effect size indicates the reverse.

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

<sup>a</sup>Studies for which we assumed equal sample size between groups.

**Table 2.** Overview of moderators depending on each study included in the meta-analysis.

Study	Manipulation	Year	Age	Topic	Recall	Elaboration	Positive thoughts	Negative thoughts	Congruency	Topic valence
Amos & Spears (a)	2	2010	–	2					Yes	Positive
Amos & Spears (b)	2	2010	–	2					Yes	Positive
Amos & Spears (c)	2	2010	–	2					Yes	Positive
Babin & Burns	1	1997	–	2					Yes	Positive
Block & Keller (a)	2	1997	–	1		1.81	.71	.42	Yes	Negative
Block & Keller (b)	3	1997	–	1		6.38	4.11	.68	Yes	Negative
Blondé & Girandola (a)	3	2015	18.7	1		3.64	1.60	.90	Yes	Negative
Blondé & Girandola (b)	1	2015	19.5	1		3.15	1.40	.40	Yes	Negative
Blondé & Girandola (c)	1	2015	20.6	1		3.64	1.16	1.01	Yes	Negative
Blondé & Girandola (d)	1	2015	20.6	1		3.34	1.27	.99	Yes	Negative
Burns et al.	1	1993	–	2						Positive
Chappé et al.	3	2006	20	1					Yes	Negative
Ci	1	2008	–	2		1.24	1.24		No	Positive
Collins et al.	1	1988	–	3					Yes	Negative
Courbet	3	2004	–	1					Yes	Negative
Coyle & Thorson	3	2001	35.2	2						Positive
De Wit et al.	2	2008	38.3	1					Yes	Negative
Fennis et al.	1	2010	22.0	2					Yes	Positive
Frey & Eagly	1	1993	–	3	2.51	3.06	.24	.58	No <sup>a</sup>	Negative
Guadagno et al.	1	2011	–	1	5.47				Yes	
He (a)	1	2008	–	1		.92			No	Negative
He (b)	1	2008	–	1					No	Negative
He (c)	1	2008	–	1					No	Negative
He (d)	1	2008	–	1					No	Negative
Hong & Park	2	2012	22.3	2					Yes	
Keller & Block (a)	3	1997	–	1					Yes	Negative
Keller & Block (b)	1	1997	–	1					No	Negative
Keller & Block (c)	2	1997	–	1					Yes	Negative
Kisielius & Sternthal (a)	3	1984	–	2					Yes	
Kisielius & Sternthal (b)	3	1984	–	2					Yes	
Kisielius & Sternthal (c)	3	1984	–	2					Yes	
Macklin et al.	1	1985	–	2					Yes	
McGill & Anand	1	1989	–	2		4.45				Positive
Miller & Marks	3	1992	–	2	2.60				Yes	
Nagaraj	1	2007	–	2	5.84				No	Positive
Petrova & Cialdini	1	2005	–	2	2.62	4.28			No	Positive
Rigney & Lutz	3	1976	–	3					Yes	
Rook (a)	2	1987	20.2	1						
Rook (b)	2	1987	48.4	1						Negative
Rook (c)	2	1987	71.3	1						Negative
Smith & Shaffer	1	2000	–	1	4.94				Yes	Negative
Stafford (a)	1	1996	–	2	4.11				No	
Stafford (b)	1	1996	–	2	2.82				No	

Notes. Manipulation of vividness was coded as follows: 1 = Abstract vs. concrete informations; 2 = Neutral vs. testimonial informations; 3 = Verbal vs. pictorial informations; Topic was coded as follows: 1 = Health; 2 = Commercial; 3 = Other; Recall was coded using the number of informations correctly recalled by participants while receiving the message (except for Frey & Eagly; Miller & Marks; Smith & Shaffer: total number of arguments correctly recalled); Elaboration was coded through the number of thoughts participants wrote after being exposed to the message, regardless the specific type of thoughts (except for Blondé & Girandola: thoughts toward threatening informations and Ci; Petrova & Cialdini: thoughts toward ad product attributes). Congruency refers to whether vivid informations are congruent with arguments or not. Blanks in the last six columns indicate that no informations were available in the articles or not enough to take a definitive decision.

<sup>a</sup>See 66 for a discussion about Frey and Eagly's study.

Exploratory moderators. The year of publication was coded with respect to the year each study was published (or defense date for dissertations), or, for non-published records, the year when the experiment was conducted. The age of participants was coded in regard to the mean age of participants indicated in articles. After reviewing each way of manipulating vividness across studies, manipulation was coded with respect to three categories: 1/ “abstract vs. concrete”; 2/ “neutral vs. testimonial”; 3: “verbal vs. pictorial” (or audiovisual). Lastly, the type of topic referred to the nature of the topic aimed in the message. As they were the most used topics, we coded them depending on whether the message dealt with “health” (e.g., the purpose is to prevent about health risks) or “commercial” (e.g., the purpose is to sell services or products) topics. Nevertheless, three studies could be included in none of these two categories. Thus, we created another category called “other”.

## Results

### *Sample characteristics*

The present meta-analysis included 43 studies with a total of 7575 participants. An overview of studies with sample characteristics and statistics (effects sizes and standard errors) has been displayed in Table 1. These characteristics are: (a) the year when each study was conducted (ranged from 1976 to 2015); (b) the country of the study (most of them were located in the US (79.1%)); (c) the type of participants (most of participants are students (81.4%)); (d) the mean age of participants (the overall mean age of participants is relatively young ( $M = 29.76$ ;  $SD = 16.16$ ); besides, it should be noted that most of the studies did not indicate the mean age of participants, but only the range (i.e., from the youngest to the oldest)); (e) the total number of participants and (f) the type of manipulation of vividness (our review included a large range of experimental procedures: we count a total of 12 different types of operationalizations).

Each effect size was extracted from each study with their significance levels and standard errors. Regardless of statistical findings of meta-analytic analyses, descriptive statistics show that most of effect sizes  $d$ 's are positive (78.4% for attitude and 86.9% for intention) and significant (45.9% for attitude and 43.5% for intention). Furthermore, data reveal that effect sizes'  $d$  are well distributed between each range of Cohen's classification<sup>9</sup>: 37% have a null-to-small effect size (35% for attitude and 39% for intention), 35% have a small-to-medium effect size (35% for attitude and 35% for intention), and 28% have a medium-to-large effect size (30% for attitude and 26% for intention).

### *Meta-analytic findings*

Meta-analytic analyses were executed using the software program Comprehensive Meta-Analysis Version 2 (9) where all effect sizes (with standard errors and moderators) were imported. Random effect models were used in all analyses (including meta-regressions) as we assumed that the true effect may vary from one study to the next and that the impact of the covariates cannot capture all of the true variations among effect sizes. Doing so seems more appropriate for our review which reveals, at first glance, a heterogeneous distribution of effect sizes when looking at the poor overlap in confidence intervals (CI) for the results of individual studies (36). Across 43 studies, overall results indicate that vividness has a

significant effect on attitude ( $d_+ = .31, p < .001, 95\% \text{ CI} = [.18, .43]$ ) and behavioral intention ( $d_+ = .39, p < .001, 95\% \text{ CI} = [.23, .56]$ ). According to Cohen's criteria, we can conclude that vividness had a small-to-medium effect on persuasion and, considering that effect sizes are positively valued, allow a greater influence on both attitude and behavioral intention. Table 3 provides an overview of mean effect sizes with significance levels, confidence limits and homogeneity statistics. A forest plot of these findings is shown in Figure 2.

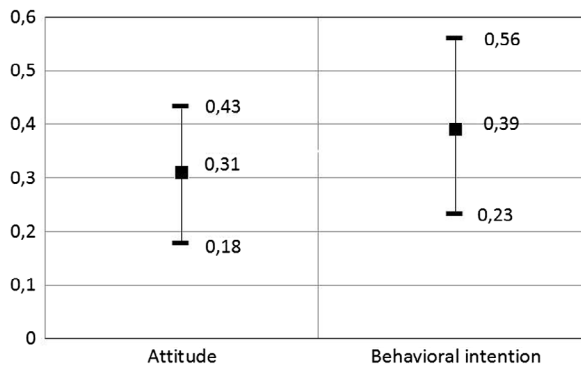
To ensure our conclusions, we ran other analyses excluding some studies. First, we excluded studies with negative values (i.e., vividness reduces persuasion) to limit effects of studies that could have been aimed to account for an undermining effect of vividness. Results show that prior effects were still identical ( $d_{+\text{Attitude}} = .43, p < .001, 95\% \text{ CI} = [.32, .56]$ ;  $d_{+\text{Intention}} = .46, p < .001, 95\% \text{ CI} = [.29, .64]$ ). Second, we reran the analyses removing outliers from our set of studies. Findings remain also unchanged even after doing this removal ( $d_{+\text{Attitude}} = .17, p < .001, 95\% \text{ CI} = [.07, .27]$ ;  $d_{+\text{Intention}} = .22, p < .001, 95\% \text{ CI} = [.13, .31]$ ). Third, following the recommendations suggested by 21, we excluded all small-sample size studies (i.e., studies with fewer than 35 participants per cell). Here too, the exclusion of these studies made no differences on the overall results ( $d_{+\text{Attitude}} = .22, p < .001, 95\% \text{ CI} = [.09, .34]$ ;  $d_{+\text{Intention}} = .32, p < .001, 95\% \text{ CI} = [.16, .48]$ ). Thus, we conclude that evidences of our analysis can be considered as strongly reliable.

**Table 3.** Impact of vividness on attitude and behavioral intention.

Variable	<i>k</i>	<i>N</i>	<i>d</i>	95% CI	<i>Q</i>	<i>I</i> <sup>2</sup>
Overall effects						
Attitude	37	4468	.31***	.18 to .43	138.64***	74.03
Behavioral intention	23	3107	.39***	.23 to .56	103.14***	78.67
Excluding negative values						
Attitude	29	3570	.43***	.32 to .56	72.27***	61.25
Behavioral intention	20	2798	.46***	.29 to .64	88.04	78.42
Excluding outliers						
Attitude	31	4051	.17***	.07 to .27	63.27***	52.59
Behavioral intention	19	2584	.22***	.13 to .31	22.96	21.61
Excluding small-sample size studies						
Attitude	25	3859	.22***	.09 to .34	81.35***	70.50
Behavioral intention	18	2775	.32***	.16 to .48	65.21***	73.93

Notes. *k* = number of studies accounted; *N* = sample size; *d* = effect size; 95% CI = 95% Interval Limits; *Q* and *I*<sup>2</sup> = homogeneity statistics.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



**Figure 2.** Forest plots representing results of the meta-analysis with confidence intervals.

## Heterogeneity tests

Heterogeneity in meta-analysis refers to the variation of effect sizes between different studies. Some statistics are usually used to test heterogeneity: indicators  $Q$  and  $I^2$ . They both correspond to the percentage of variability in effects size estimates that is due to heterogeneity of between-studies (35). While  $Q$  statistic allows identifying the presence of heterogeneity in a set of studies,  $I^2$  may indicate how much it is heterogeneous (38). Furthermore, this index has a greater power when meta-analysis includes a small number of studies (36). Our findings show that  $Q$ 's are statistically significant (Attitude:  $Q(36) = 138.64, p < .001$ ; Intention:  $Q(22) = 103.14, p < .001$ ) and  $I^2$  are equivalents to 74.03% for attitude and 78.67% for intention.<sup>10</sup> Considering these, we concluded that our sets of studies represent a substantial heterogeneity in effect sizes. Consequently, it suggests searching for moderator variables to explain this variability (33).

## Effect of moderators

The impacts of moderators were examined by performing a set of meta-regressions. Meta-regression is a statistical technique used to identify potential moderating variables by regressing effect sizes on covariates likely to play a significant role in heterogeneity of overall variation. In these analyses, indicators used were regression coefficients  $B$ : a significant one means that the corresponding covariate explains significantly variation of effect sizes. Meta-regressions were performed on a range of ten variables. Six of them are theory-driven: memory recall, cognitive elaboration, positive and negative thoughts, vividness/argument congruency, and topic valence. The first four are continuous variables and the last two are categorical variables, each consisting of two categories. Four other variables are exploratory: publication year, age of participants, type of manipulation, and type of topic. The first two are continuous variables and the last two are categorical variables, each consisting of three categories.<sup>11</sup> Overall findings are displayed in Table 4.

**Theory-driven moderators.** First, our results revealed that memory recall significantly predicts effect sizes for both attitude ( $B = .217, p < .01, 95\% \text{ CI} = [.07, .37]$ ) and behavioral intention ( $B = .344, p < .01, 95\% \text{ CI} = [.13, .56]$ ). More specifically, these findings indicated that studies observed larger effect sizes to the extent people are able to recall informations from memory. While cognitive elaboration (i.e., the total number of thoughts) has been found to produce no impact, meta-regression analyses showed a moderating effect of positive thoughts on attitude ( $B = .716, p < .001, 95\% \text{ CI} = [.36, 1.07]$ ). Thus, the beneficial effect of vividness occurred only when individuals generated positive thoughts. However, there was no effect on behavioral intention and no effects of negative thoughts. Then, results indicated that topic valence moderates the effect of vividness on attitude ( $B = .410, p < .01, 95\% \text{ CI} = [.14, .68]$ ), such that empirical studies led to a greater impact of vividness when vivid informations were tied to positive topics, rather than negative topics. No effect occurred on behavioral intention. Contrary to recent proposals (e.g., 30), results finally showed no support for vividness/argument congruency hypothesis.

**Exploratory moderators.** Second, results show that a portion of heterogeneity of effect sizes regarding behavioral intention only can be significantly explained by the age of participants ( $B = .010, p < .01, 95\% \text{ CI} = [.04, .15]$ ). The more participants are older, the more the effects sizes reported across studies are larger. Third, even though findings do not point

**Table 4.** Meta-regressions of effect sizes for moderator variables on attitude and behavioral intention.

Moderators	Attitude					Behavioral intention				
	<i>k</i>	<i>B</i>	SE	95% CI	<i>Q</i>	<i>k</i>	<i>B</i>	SE	95% CI	<i>Q</i>
Recall	8	.217**	.077	.07 to .37	8.03**	4	.344**	.109	.13 to .56	9.97**
Elaboration	9	.029	.139	-.24 to .30	.04	9	.038	.055	-.07 to .15	.48
Positive thoughts	6	.716***	.180	.36 to 1.07	15.84***	7	.01	.098	-.19 to .20	<.01
Negative thoughts	5	.183	1.027	-1.83 to 2.19	.03	6	-.06	.566	-.17 to 1.05	.01
Congruency	31	.089	.154	-.21 to .39	.34	22	.234	.189	-.14 to .60	1.51
Topic valence	26	.410**	.139	.14 to .68	8.66**	20	.225	.197	-.16 to .61	1.31
Year	37	.007	.006	-.01 to .02	1.15	23	.013	.011	-.01 to .04	1.32
Age	10	.002	.007	-.01 to .02	.12	6	.096**	.030	.04 to .15	10.18**
Manipulation	37				2.58	23				4.81
1	21	-.072	.135	-.34 to .18	.28	14	-.342*	.179	-.69 to .01	3.66*
2	8	.249	.164	-.07 to .57	2.32	5	.449*	.213	.03 to .87	4.44*
3	8	-.146	.163	-.47 to .17	.80	4	.045	.237	-.42 to .51	.04
Topic	37				.56	23	-.148	.173	-.49 to .19	.73
1	15	-.069	.134	-.33 to .19	.26	13				
2	19	.093	.129	-.16 to .35	.51	10				
3	3	-.105	.254	-.60 to .39	.17	0				

Notes. *k* = number of studies accounted; *B* = regression coefficient; SE = standard error of the regression coefficient; 95% CI = 95% Confidence interval limits for the regression coefficient; *Q* = percentage of heterogeneity explained by the covariate; Manipulation of vividness was coded as follows: 1 = Abstract vs. concrete informations; 2 = Neutral vs. testimonial informations; 3 = Verbal vs. pictorial informations; Topic was coded as follows: 1 = Health; 2 = Commercial; 3 = Other; A positive *B* indicates that studies using this manipulation/topic lead to greater effect sizes than studies that do not; For behavioral intention, no studies could be included in the category "other": it resulted \*\*\*\* that we only integrate a comparison between the two categories "health vs. commercial" (a positive *b* indicates that studies included in the category "health" leads to greater effect sizes than studies in the category "commercial").

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

significant impact of the type of manipulation on the overall regression coefficient, some evidences have, however, to be mentioned regarding effects on behavioral intention. Studies manipulating vividness through an "abstract/concrete" differentiation leads to lower effect sizes compared to studies using a manipulation that were not based on this manipulation ( $B = -.342$ ,  $p < .05$ , 95% CI =  $[-.69, .01]$ ). On the contrary, studies that chose to manipulate vividness on the basis of a testimonial (vs. neutral informations) are associated with larger impacts on effect sizes than those that did not ( $B = .449$ ,  $p < .05$ , 95% CI =  $[.03, .87]$ ). However, results showed no effects neither of years of publication or the type of topic.

### Publication bias

One problem when doing meta-analysis is that it leads to include mostly published articles likely to yield only large and significant effects. It tends to hold a biased conclusion by overestimating true effects of a treatment and exaggerating its magnitude. This is actually a publication bias (PB; 10). To assess potential PB in our meta-analysis, we first ordered two funnel plots for both attitude (Figure 3) and behavioral intention (Figure 4). Funnel plots are particularly useful to detect the presence of PB (25). In the presence of it, a larger number of studies should be agglomerated at the bottom of the plot and only in one side of the plot, indicating that smaller size studies are more likely to be published when they reported larger effect sizes. According to our results, it seems that we cannot reject the null hypothesis: studies are mostly at the bottom of the plot but distributed only on one side of the mean. This asymmetry suggests the possibility of a PB.

To examine whether there is a PB or not, we executed the Egger test (25). This one allows to statistically examine the relationship between effect sizes and sample size by regressing

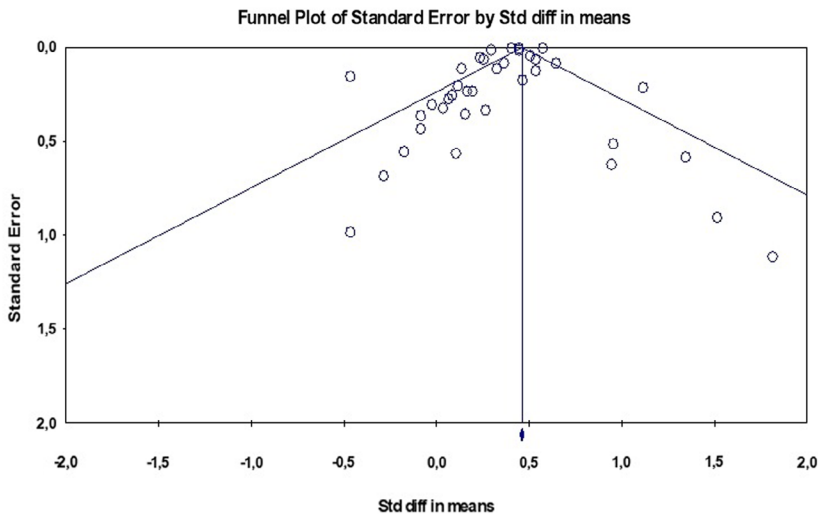


Figure 3. Funnel plot representing publication bias for attitude.

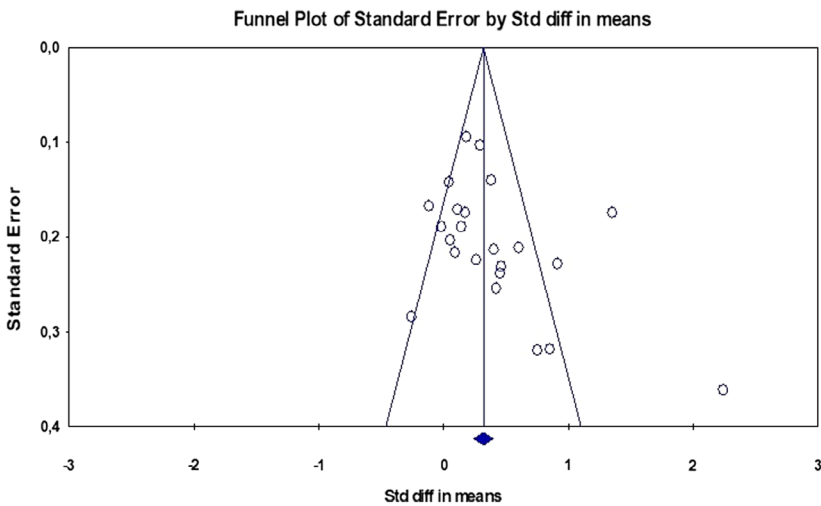


Figure 4. Funnel plot representing publication bias for behavioral intention.

effect sizes on sample sizes (in our case, we used standard errors). After running this test, we observed that standardized regression coefficient was not significant for both attitude ( $B = 2.28, p = .07$ ) and behavioral intention ( $B = 1.67, p = .09$ ) indicating that effect sizes and standard errors were not confounded. Thus, the presence of a PB is unlikely in this meta-analysis.

## Discussion

Despite numerous studies, literature has failed to give consensual evidences as regards the “vividness effect”. Consequently, the present meta-analysis was aimed to provide conclusive

answers. Our findings lead to the conclusion that there is indeed an overall positive impact of vividness: vivid stimuli foster the acceptance of advocated attitude and intention to change. Following Cohen's criteria, overall effect sizes are, however, characterized by a small-to-medium magnitude on outcomes. It suggests that the vividness effect, if existing, is somewhat weak; which may explain why studies have found so different and contradictory results. In parallel with that, this meta-analysis also reported a high level of heterogeneity across studies.

To offer useful insights to account this variability between studies, we identified some moderating variables. First, it is evidenced that memory recall moderates the effects of vivid stimuli. Thus, vivid messages could have an effect on persuasion only when people are able to recall information. When not doing so, vividness has a lower impact on persuasion. Actually, this finding is consistent with 53 who primarily suggested that vividness is likely to produce a greater persuasive impact due to its greater availability. Second, results also provided support for the hypothesis stating that cognitive elaboration acts as a moderator (41, 42; 48), even though we found that this moderating effect is limited to positive thoughts. Hence, vivid stimuli can enhance persuasion in contexts where individuals were given the opportunity to form positive thoughts. Third, we showed that topic valence is also a moderator, such that vividness effects are greater when topic valence is positive rather than negative. Following Kisielius and Sternthal, this indicates that vividness effects primarily depend on whether vivified information (i.e., mainly topic-related ones) are positively or negatively valenced. Consequently, vividness would have the effect to strengthen the prior impact of information as a function of its valence: heightened vividness of positive information leads to more positive attitudes, while increased vividness of negative information leads to more negative attitudes. Conversely, our results revealed no impact of vividness/argument congruency in explaining variability across studies.

To conclude, it should be noted that this meta-analysis has some important limitations. Foremost, it appears that a small number of studies were tested. Despite the fact that a large number of studies were initially available, few of them reported sufficient data for calculating effect sizes. Hence, this poor amount of studies could impair the reliability of our conclusions and could explain the strong heterogeneity across studies. Then, another limitation is about dependent variables. We were indeed restricted only to two measures of attitude and intention. Consideration also needs to be given regarding other variables like emotions or behaviors. Finally, another limitation is that we included studies conceptualizing vividness in many ways depending on the operationalization they used. It is problematic because each of these operationalizations refers to independent concepts (e.g., concreteness), each of which producing different impacts on persuasion, via varied processes. For instance, it has been shown that distinct mechanisms occurred when using abstractness (vs. concreteness; 43, 44) or when using testimonials (vs. statistics; see 54). In this respect, our findings also indicated a moderating effect of the type of vividness manipulation: an abstract/concrete manipulation leads to weaker effects, whereas a neutral/testimonial manipulation increases the effects. From our point of view, this meta-analysis allows, however, asserting that vividness can be understood as a broader category gathering several dimensions which have the overall effect of producing a greater impact on persuasion, as our results evidenced.

## Notes

1. Note that all records were selected, screened, and coded by one of the two authors (JB).
2. Since vividness can be manipulated via various operationalizations, we considered all studies including a manipulation of vividness in accordance with Nisbett and Ross' definition, even if it was not explicitly mentioned in the articles.
3. It was the case for three studies, representing 7% of all studies.
4. It has recently been proposed to distinguish between “figural vividness” (i.e., vivid informations are on thesis and relevant/congruent with arguments) and “ground vividness” (i.e., vivid informations are off-thesis and irrelevant/congruent with arguments) such that “figural vividness” would be beneficial for persuasion, while “ground vividness” would distract attention away from essential portions of the message and impair its persuasiveness (30; 66; see also 13).
5. 41, 42 suggested that the effects of vividness are determined by the valence of informations that are made vivid. Suchlike, make positive informations more vivid is likely to produce a greater attitude and a more successful persuasion. We tested this hypothesis by examining topic valence (see 63). Note that we ensured that all studies manipulated vividness with informations related to the topic.
6. However, it should be noted that we included two studies asking to recall arguments specifically (i.e., 28; 66).
7. Three studies asked for generating thoughts toward specific informations as such threatening informations (i.e., 7) and ad product attributes (i.e., 16; 55). However, as these informations were the most relevant regarding the type of message presented, we also included in the analysis.
8. It should be noted that in case of difficulties in clearly estimating topic valence (i.e., 28% of all studies), we removed studies from moderation analyses.
9. Cohen has specified criteria for interpreting the magnitude of effect size  $d$ . According to these criteria, we speak of a small effect for an effect size of .20, a medium effect for an effect size of .50 and of a large effect when  $d$  is at least .80 (17).
10. 35 proposed the following classification to interpret  $I^2$ 's magnitude: 25% ( $I^2 = 25$ ) mean low heterogeneity, 50% ( $I^2 = 50$ ) mean medium heterogeneity and 75% ( $I^2 = 75$ ) mean high heterogeneity.
11. About these categorical variables, it should be noted that we calculated an overall coefficient regression including all subgroups and then, calculated the impact of each subgroup by creating variables that we dummy-coded as following: 0 = absence of this topic/manipulation; 1 = presence of this topic/manipulation.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## References

- References marked with an asterisk (\*) indicate studies included in the meta-analysis.
- Adaval, R., & Wyer, R. S. (1998). The role of narratives in consumer information processing. *Journal of Consumer Psychology*, 7, 207–245. doi:10.1207/s15327663jcp0703\_01
- \* Amos, C., & Spears, N. (2010). Generating a visceral response. *Journal of Advertising*, 39, 25–38. doi:10.2753/JOA0091-3367390302
- \* Babin, L. A., & Burns, A. C. (1997). Effects of print ad pictures and copy containing instructions to imagine on mental imagery that mediates attitudes. *Journal of Advertising*, 26, 33–44. doi:10.1080/00913367.1997.10673527
- Bell, B. E., & Loftus, E. F. (1985). Vivid persuasion in the courtroom. *Journal of Personality Assessment*, 49, 659–664. doi:10.1207/s15327752jpa4906\_16

- \* Block, L. G., & Keller, P. A. (1997). Effects of self-efficacy and vividness on the persuasiveness of health communications. *Journal of Consumer Psychology*, 6, 31–54. doi:10.1207/s15327663jcp0601\_02
- \* Blondé, J., & Girandola, F. (2015). Menacer pour persuader mais pas n'importe comment! Evaluer le rôle de la vivacité de la menace dans les communications menaçantes. [Threaten to persuade but not anyhow! Assessing the role of threat vividness in threatening communications]. Oral communication presented at the 12th Colloque Jeunes Chercheurs de l'ADRIPS, Dijon, France.
- Bone, P. F., & Ellen, P. S. (1992). The generation and consequences of communication-evoked imagery. *Journal of Consumer Research*, 19, 93–104. doi:10.1086/209289
- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive meta-analysis, version 2*. Englewood, NJ: Biostat.
- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2009). *Introduction to meta-analysis*. Chichester: Wiley.
- Broemer, P. (2004). Ease of imagination moderates reactions to differently framed health messages. *European Journal of Social Psychology*, 34, 103–119. doi:10.1002/ejsp.185
- \* Burns, A. C., Biswas, A., & Babin, L. A. (1993). The operation of visual imagery as a mediator of advertising effects. *Journal of Advertising*, 22, 71–85. doi:10.1080/00913367.1993.10673405
- Chang, C. T., & Lee, Y. K. (2010). Effects of message framing, vividness congruency and statistical framing on responses to charity advertising. *International Journal of Advertising*, 29, 195–220. doi:10.2501/S0265048710201129
- \* Chappé, J., Verliac, J. F., & Meyer, T. (2007). Comparative optimism and pessimism following exposure to several threatening messages. *European Review of Applied Psychology*, 57, 23–35. doi:10.1016/j.erap.2006.07.001
- Childers, T. L., & Houston, M. J. (1984). Conditions for a picture-superiority effect on consumer memory. *Journal of Consumer Research*, 11, 643–654. doi:10.1086/209001
- \* Ci, C. (2008). *The impact of the abstractness-concreteness of an ad copy on consumers' responses to a product: The moderating role of consumers' regulatory foci and types of product attribute*. Unpublished manuscript.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences*. New York, NY: Academic Press.
- \* Collins, R. L., Taylor, S. E., Wood, J. V., & Thompson, S. C. (1988). The vividness effect: Elusive or illusory? *Journal of Experimental Social Psychology*, 24, 1–18. doi:10.1016/0022-1031(88)90041-8
- \* Courbet, D. (2003). Réception des campagnes de communication de santé publique et efficacité des messages suscitant de la peur : Une étude expérimentale sur le rôle de la peur dans le changement des attitudes néfastes [Receiving public health campaigns and effectiveness of fear-arousing messages: an experimental study on the role of fear in changing bad attitudes]. *Communication*, 22, 100–120. doi:10.4000/communication.4786
- \* Coyle, J. R., & Thorson, E. (2001). The effects of progressive levels of interactivity and vividness in web marketing sites. *Journal of Advertising*, 30, 65–77. doi:10.1080/00913367.2001.10673646
- Coyne, J. C., Thombs, B. D., & Hagedoorn, M. (2010). Ain't necessarily so: Review and critique of recent meta-analyses of behavioral medicine interventions in health psychology. *Health Psychology*, 29, 107–116. doi:10.1037/a0017633
- \* De Wit, J. B. F., Das, E., & Vet, R. (2008). What works best: Objective statistics or a personal testimonial? An assessment of the persuasive effects of different types of message evidence on risk perception. *Health Psychology*, 27, 110–115. doi:10.1037/0278-6133.27.1.110
- Eaton, A. (2011). Unraveling the mystery of the elusive effect of vividness on persuasion. *The Journal of Science and Health at the University of Alabama*, 8, 56–60.
- Edell, J., & Staelin, R. (1983). The information processing of pictures in print advertisements. *Journal of Consumer Research*, 10, 45–60. doi:10.1086/208944
- Egger, M., Smith, G., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, 315, 629–634. doi:10.1136/bmj.316.7129.469
- Escalas, J. E. (2004). Imagine yourself in the product : Mental simulation, narrative transportation, and persuasion. *Journal of Advertising*, 33, 37–48. doi:10.1080/00913367.2004.10639163
- \* Fennis, B. M., Das, E., & Franssen, M. L. (2012). Print advertising: Vivid content. *Journal of Business Research*, 65, 861–864. doi:10.1016/j.jbusres.2011.01.008

- \* Frey, K. P., & Eagly, A. H. (1993). Vividness can undermine the persuasiveness of messages. *Journal of Personality and Social Psychology*, 65, 32–44. doi:10.1037/0022-3514.65.1.32
- Greenwald, A. (1968). Cognitive learning, cognitive response to persuasion, and attitude change. In A. Greenwald, T. Brock, & T. Ostrom (Eds.), *Psychological foundations of attitudes* (pp. 147–170). New York, NY: Academic Press.
- \* Guadagno, R. E., Rhoads, K. L., & Sagarin, B. J. (2011). Figural vividness and persuasion: Capturing the “elusive” vividness effect. *Personality and Social Psychology Bulletin*, 37, 626–638. doi:10.1177/0146167211399585
- \* He, Y. (2008). *Verbalizing or visualizing metaphors? The moderating effects of processing mode and temporal orientation*. Unpublished manuscript.
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random-effects models in meta-analysis. *Psychological Methods*, 3, 486–504. doi:10.1037/1082-989X.3.4.486
- Herr, P. M., Kardes, F. R., & Kim, J. (1991). Effects of word-of-mouth and product-attribute information on persuasion: An accessibility-diagnostics perspective. *Journal of Consumer Research*, 17, 454–462. doi:10.1086/208570
- Higgins, J., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine*, 21, 1539–1558. doi:10.1002/sim.1186
- Higgins, J., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, 327, 557–560. doi:10.1136/bmj.327.7414.557
- \* Hong, S., & Park, H. S. (2012). Computer-mediated persuasion in online reviews: Statistical versus narrative evidence. *Computers in Human Behavior*, 28, 906–919. doi:10.1016/j.chb.2011.12.011
- Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or  $I^2$  index? *Psychological Methods*, 11, 193–206. doi:10.1037/1082-989X.11.2.193
- Keller, K. L. (1987). Memory factors in advertising: The effect of advertising retrieval cues on brand evaluations. *Journal of Consumer Research*, 14, 89–101. doi:10.1086/209116
- \* Keller, P. A., & Block, L. G. (1997). Vividness effects: A resource-matching perspective. *Journal of Consumer Research*, 24, 295–304. doi:10.1086/209511
- \* Kisielius, J., & Sternthal, B. (1984). Detecting and explaining vividness effects in attitudinal judgments. *Journal of Marketing Research*, 21, 54–64. doi:10.2307/3151792
- Kisielius, J., & Sternthal, B. (1986). Examining the vividness controversy: An availability-valence interpretation. *Journal of Consumer Research*, 12, 418–431. doi:10.1086/208527
- Liberman, N., & Trope, Y. (2003). Temporal construal. *Psychological Review*, 110, 403–421. doi:10.1037/0033-295X.110.3.403
- Liberman, N., & Trope, Y. (2010). Construal-level theory of psychological distance. *Psychological Review*, 117, 440–463. doi:10.1037/a0018963
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. California: Sage Publications.
- MacInnis, D. J., & Price, L. L. (1987). The role of imagery in information processing: Review and extensions. *Journal of Consumer Research*, 13, 473–491. doi:10.1086/209082
- \* Macklin, M. C., Bruvold, N. T., & Shea, C. L. (1985). Is it always as simple as “keep it simple”? *Journal of Advertising*, 14, 28–35. doi:10.1080/00913367.1985.10672968
- \* McGill, A. L., & Anand, P. (1989). The effect of vivid attributes on the evaluation of cognitive elaboration: The role of differential attention and cognitive elaboration. *Journal of Consumer Research*, 16, 188–196. doi:10.1086/209207
- McKelvie, S. J., & Demers, E. G. (1979). Individual differences in reported visual imagery and memory performance. *British Journal of Psychology*, 70, 51–57. doi:10.1111/j.2044-8295.1979.tb02142
- \* Miller, D. W., & Marks, L. J. (1992). Mental imagery and sound effects in radio commercials. *Journal of Advertising*, 21, 83–93. doi:10.1080/00913367.1992.10673388
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Journal of Clinical Epidemiology*, 62, 1006–1012. doi:10.1016/j.jclinepi.2009.06.005
- Nagaraj, S. (2007). *The impact of consumer knowledge, information mode, and presentation form on advertising effects*. Unpublished manuscript.

- Nisbett, R. E., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment*. Englewood Cliffs, NJ: Prentice Hall.
- O'Keefe, D. J. (2015). *Persuasion: Theory and research* (3rd ed.). Los Angeles, CA: Sage Publications.
- \* Petrova, P. K., & Cialdini, R. B. (2005). Fluency of consumption imagery and the backfire effects of imagery appeals. *Journal of Consumer Research*, 32, 442–452. doi:10.1086/497556
- Petrova, P. K., & Cialdini, R. B. (2008). Evoking the imagination as a strategy of influence. In C. Haugtvedt, P. Herr, & F. Kardès (Eds.), *Handbook of consumer psychology* (pp. 505–524). Mahwah, NJ: Lawrence Erlbaum Associates.
- Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46, 69–81. doi:10.1037/0022-3514.46.1.69
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood of persuasion. *Advances in Experimental Social Psychology*, 19, 193–205. doi:10.1016/S0065-2601(08)60214-2
- Reyes, R. M., Thompson, W. C., & Bower, G. H. (1980). Judgmental biases resulting from differing availabilities of arguments. *Journal of Personality and Social Psychology*, 39, 2–12. doi:10.1037/0022-3514.39.1.2
- \* Rigney, J. W., & Lutz, K. A. (1976). Effect of graphic analogies of concepts in chemistry on learning and attitudes. *Journal of Educational Psychology*, 68, 305–311. doi:10.1037/0022-0663.68.3.305
- Rook, K. S. (1986). Encouraging preventive behavior for distant and proximal health threats: Effects of vivid versus abstract information. *Journal of Gerontology*, 41, 526–534. doi:10.1093/geronj/41.4.526
- \* Rook, K. S. (1987). Effects of case history versus abstract information on health attitudes and behaviors. *Journal of Applied Social Psychology*, 17, 533–553. doi:10.1111/j.1559-1816.1987.tb00329
- Rosen, S., & Grandison, R. J. (1994). Effects of topic valence and pictorial distractor valence on verbalizing and evaluating topic-evoked visual imagery. *Motivation and Emotion*, 18, 249–268. doi:10.1007/BF02254831
- \* Shedler, J., & Manis, M. (1986). Can the availability heuristic explain vividness effects? *Journal of Personality and Social Psychology*, 51, 26–36. doi:10.1037/0022-3514.51.1.26
- Sherer, M., & Rogers, R. W. (1984). The role of vivid information in fear appeals and attitude change. *Journal of Research in Personality*, 18, 321–334. doi:10.1016/0092-6566(84)90016-3
- \* Smith, S. M., & Shaffer, D. R. (2000). Vividness can undermine or enhance message processing: The moderating role of vividness congruency. *Personality and Social Psychology Bulletin*, 26, 769–779. doi:10.1177/0146167200269003
- \* Stafford, M. R. (1996). Tangibility in services advertising: An investigation of verbal versus visual cues. *Journal of Advertising*, 25, 13–28. doi:10.1080/00913367.1996.10673504
- Taylor, S. E., & Thompson, S. C. (1982). Stalking the elusive “vividness” effect. *Psychological Review*, 89, 155–181. doi:10.1037/0033-295X.89.2.155
- Tesser, A. (1978). Self-generated attitude change. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11) (pp. 229–338). New York, NY: Academic Press.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 677–695. doi:10.1016/0010-0285(73)90033-9
- Wilson, M. G., Northcraft, G. B., & Neale, M. A. (1989). Information competition and vividness effects in on-line judgments. *Organizational Behavior and Human Decision Processes*, 44, 132–139. doi:10.1016/0749-5978(89)90039-3