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# Risk Marketing

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## Abstract

In a modern world increasingly perceived as uncertain, the mere purchase of a household cleaning product, or a seemingly harmless bottle of milk, conveys interrogations about potential hazards, from environmental to health impacts. How did this general public concern for risk catch the attention of marketing science and practice? We have examined some fifty years of marketing management literature as well as risk specialized literature. We feel that consumer research could benefit more widely from psychological and evolutionary-grounded risk theories. We suggest that consumer profiles could be enriched by risk-taking attitudes, that risk perception could be part of the 'reason why' of brand positioning, and that brand communication could benefit from a targeted use of risk perception biases. More precisely, we propose to build perceptual maps describing people on both aspiration and risk attitude axis, and to design communication tools according to psychological research on message framing and biases.

**Keywords:** risk, attitude, positioning, perceptual map, perception, framing, questionnaire, bias

## 1 Introduction

As we have deeply changed our environment to increase our safety (against illness, starvation, wars, terrorism, etc.), we feel surrounded by new risks which challenge our understanding. For instance, intensive agricultural production raises doubts as to its health or environmental impacts; driving a diesel car instead of an electrical one or heating one's house, are now related to increasing the risk of climate change. The period is probably ripe for closer interactions between risk concern and marketed offers.

On a broad basis, risk may derive either from the usage of goods and services (due to their intrinsic characteristics), or from the risk of dissatisfaction following the purchase of a specific brand. We propose to distinguish three product categories according to their risk status: first, where risk is salient and is a by-product of the category (nuclear energy,

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automobiles or atmospheric pollution regarding health issues); second, for those products where risk is intentional, salient or not (money gambling, financial products, base jump); third, for product categories in which risk is neither salient nor intentional (personal products and food), however for which some risk concern might arise (such as dietary, process or origin worries).

Marketing academic research has investigated risks since the early works of Bauer (1960), followed by Cox (1967). Since these pioneers, the interactions between marketing research and a growing body of economics and psychology literature have been significant, such as Kahneman and Tversky's loss aversion (Kahneman and Tversky, 1974), Thaler's mental accounting (Thaler, 1985), and others that we shall mention in the sequel.

We have attempted to systematically scan the academic literature – spanning over fifty years, embracing economics, psychology, anthropology, sociology and ergonomics – to get a better understanding of relationships between risk and marketing. Relying upon that literature analysis, we will illustrate specific issues where risk considerations could take a larger part in marketing practices. We have spotted two areas where risk psychology could complement marketing management: risk attitudes as part of perceptual maps, and risk perception in communication. Our claim is that brand or policy promises could be justified and targeted in accordance to their risk-related product category, making perceived-risk attitudes a useful complement of positioning statement, and that brand communication could be framed according to psychological biases in a context of decision under uncertainty.

In Sect. 2, we present an overview of our screening of academic literature on risk and marketing. The following sections address two potential applications in an attempt to illustrate what could be a marketing inspired by risk attitudes and perceptions: risk profiling and perceptual maps in Sect. 3; risk perception and message framing in Sect. 4. These two examples are substantiated by our work in the Axa Research Fund–Paris School of Economics research project *The economics and psychology of risk taking, impatience and financial decisions: confronting survey, experimental and insurance data* (2009-2011), hereafter coined AXA-PSE research project. We conclude in Sect. 5.

## 2 An overview of risk and marketing in the literature

If raising aspiration for a product is a major goal of marketing, the discipline has since long recognized the importance of dealing with risk, to better understand how people make choices. In such perspective, marketing has for a long time investigated the importance of psychology in the process of purchase decision making, product choices and brand preferences and loyalty. Specifically, there is a vast consumer behavior and marketing literature regarding consumer decision under uncertainty, communication of risks and the importance of risk in consumer decision making.

## 2.1 Risk and marketing in academic journals (and books)

Scanning the database *Business Source Complete* (EBSCO) provides access to 250 academic magazines (reviews) published since 1965, in marketing, management, economy, finance, accounting (accounts department) and international affairs (business). Within EBSCO, and using the key words 'risk', 'uncertainty', 'communication', 'marketing', we have retrieved about fifty articles.

Bauer (1960) introduced the concept of perceived risk to the marketing literature, and gave two possible definitions of risks as marketing management is concerned: perceived consequences of an outcome in case of a wrong choice; subjective probability to make a mistake. Risk perception establishes an important and natural connection to marketing. For instance, perceived risk has been used as an explanatory variable in empirical research on consumer behavior (Srinivasan and Ratchford, 1991). Volle (1995) research on risk concept is an attempt to apply perceived risk to marketing management, by establishing that perceived risk is partially depending upon risk attitudes, among many other independent variables. Theory of consumer decision also appears in marketing research, where risk is regarded as one of the possible dimensions of consumer decision making (Bettman, Luce, and Payne, 1998; Fishbein and Ajzen, 1972).

Risk in marketing science is generally based on two elements: adverse consequences and uncertainty (Dowling and Staelin, 1994). However, across disciplines, there is no consensual acceptance of the concept of perceived risks, nor widely accepted definition of uncertainty and consequences. As a result of disseminated and categorized research, risk conceptualization is controversial (Fischhoff, Watson, and Hope, 1984). It all happened as if economics, psychology and marketing advanced, till recently, their research agendas on risk rather separately. An interesting attempt to cross these borders and make a synthesis between economics and psychology risk literature and consumer risk literature has been made in (Conchar, Zinkhan, Peters, and Olavarrieta, 2004).

Speaking of adverse consequences, marketing research distinguishes several kinds of losses. For instance, Jacoby and Kaplan (1972) then Roselius (1971) consider seven types of loss risks: financial; performance; physical; psychological; social; time or convenience risk; linked-decision risk. Extending these works, Conchar, Zinkhan, Peters, and Olavarrieta (2004) conceptualize risk as a multidimensional probability distribution of realizing some of the seven losses described by Jacoby and Kaplan (1972) and further by Roselius (1971).

Speaking of probability, decision theory (economics, mathematics) has inspired marketing. In this setting, risk is seen as an objective characteristic of a given situation, though assessing this risk may depend on each individual. A risky situation is generally modeled as a choice or a decision exhibiting a probability distribution of known consequences, as opposed to certainty when only one outcome is possible with a probability of one (Vann, 1984). In the most formal marketing research literature, *expected utility theory* (von Neuman and Morgenstern, 1947) is widely used. This approach is challenged by the observation that marketing deals with day-to-day choices when purchasing mainstream goods: should such trivial choices now belong to the most complex decision making under uncertainty? Any consumer is transformed into a decision analyst, having to elicit preferences without

knowing the probabilities associated with large amounts of alternatives (as an illustration, a consumer can find some 700 wine stock-keeping units in a supermarket in England or in France). This is why risk marketing literature major topics deal with the links between psychology research and marketing research.

Kahneman and Tversky's *prospect theory* (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) is also well known in consumer research and has inspired some works by economists and psychologists at the interface with marketing through *loss aversion* (Rabin and Thaler, 2001; Novemsky and Kahneman, 2005), and *status quo bias* (Samuelson and Zeckhauser, 1988; Kahneman, Knetsch, and Thaler, 1991). Thaler has exported insights from risk economics and psychology towards marketing, especially with the concept of *mental accounting* (Thaler, 1985; Thaler and Johnson, 1990; Thaler, Tversky, Kahneman, and Schwartz, 1997). Some connections may be established with the "influence and manipulation" focus of Cialdini (1984): for instance, status quo bias may be related to a drive for consistency.

Posterior to the above rather economic stream of research, many psychologists had suggested that there was an ecological ground in the way people interpreted their environment: Simon's bounded rationality (Simon, 1982), Gigerenzer's *frugal heuristics* and *adaptive toolbox* (Gigerenzer, 1991). The convergence of bounded rationality, the feeling of risks (Slovic, 2010) and the role of the emotions, the relatively new behavioral economics initiated by the study of loss aversion and the prospect theory (Kahneman and Tversky, 1979), all lead to the rise of a new approach of decision making under uncertainty, and new applications within *neuroeconomics* (Glimcher, Camerer, Fehr, and Poldrack, 2009). We identified a rich literature whose concepts could be more systematically exploited to the benefit of marketing, and could certainly enlighten the way people perceive and act according to their risk profile and to product's potential threats: risk in consumer science (Williams and Noyes, 2007); risk as *affect* (Zajonc, 1980) and the *affect heuristics* (Finucane, Alhakami, Slovic, and Johnson, 2000; Rottenstreich and Hsee, 2001; Slovic, Finucane, Peters, and MacGregor, 2002, 2004; Peters, Västfjäll, Gärling, and Slovic, 2006; Slovic, Finucane, Peters, and MacGregor, 2007); *risk as feelings* (Loewenstein, Weber, Hsee, and Welch, 2001).

Though not focused especially on risk, an emerging trend in economics — ranging from *neuroeconomics* to *behavioral economics* and *nudges* — tries to identify and to exploit the mental biases influencing our decision-making process. Richard Thaler and Cass Sunstein published in 2008 *Nudge: Improving Decisions about Health, Wealth, and Happiness* as an attempt to apply decades of behavioral economics to the framing of convincing — though not intruding — private and public communications (on big issues like retirement schemes, schools, organ donation, medicare plan. . .) (Thaler and Sunstein, 2008). The nudge framing has been since then applied by several public administrations, to convey efficient messages to their population (in England, in the USA and more recently in France). Nudge marketers investigate how those *gentle messages addressed to free individuals* could be applied to consumers of goods and services (Singler, 2015). The relatively new discipline of *Neuroeconomics* can help designing those communications by focusing on how behavior may be impacted by descriptions and pictures. By doing so, cleverly framed adverts and messages

exploit the mental biases influencing our decision-making process.

Yet behavioral approaches fail (and do not bother so much) to provide *ultimate explanations* of *Homo economicus* choices, that is, the 'reason why' of the observed biases. As Richard Thaler puts it:

I argued, accepting the theory of evolution as true does not mean that it needs to feature prominently in an economic analysis. We know people are loss averse; we don't need to know whether it has an evolutionary explanation. (Thaler, 2015)

We take another stand. Together with other scholars, we claim that evolutionary psychology may provide useful ultimate explanations on the 'reason why' of individual's choices, a central theme of positioning and advertising copy (Boutang and De Lara, 2015). If one understands the universal roots of our inclinations, there might be a chance to craft even more purposely efficient brand copy strategies. The most accomplished contribution in evolutionary grounded marketing is the one of Saad (Saad, 2013). In (Saad, 2011), the author provides ultimate explanations for personality traits such as risk taking:

Evolutionary theory recognizes that phenomena can be investigated at two distinct levels. Proximate explanations deal with mechanistic descriptions of how something operates and which factors affect its inner workings. Ultimate explanations tackle the why question, namely, why has a given behavior, emotion, thought, preference, choice, or morphological trait evolved to be of a particular form (i.e., identifying its Darwinian genesis). Whereas both levels of analyses are needed for a full understanding of the human condition, marketers along with many social scientists have largely focused on proximate explanations.

Steven Pinker quotes the irrational fears of artificial foods and Genetically Modified Organisms on health grounds that could make food more expensive for instance. An evolutionary explanation can be traced back to people's intuitive psychology, imagining

an invisible essence residing in living things, which gives them their form and powers (Pinker, 2002)

Steven Pinker again points out that risk perception can depart from objective hazard evaluation because of evolutionary fears such as *heights, confinement, predation, and poisoning* (Pinker, 2002).

Recent publications regarding sociological, cultural, psychological factors describe a broader view of the complex situation of the consumer in front of risks and make it possible to consider risk in consumer context decision making, (Corstjens and Gautschi, 1983; McGuire, 2000; Swait and Erdem, 2004).

## 2.2 Risk in marketing manuals

Cox published one of the first books on risk taking and information handling in consumer behavior (Cox, 1967). He is considered as the pioneer in modeling perceived risks among

consumers. Since those pioneers, a significant amount of research has explored the place of risk in consumer decision making and in brand attributes. Although consumer research, mainly in the USA, acknowledged the role of risk in consumer decision making, there is much less little mention yet of risk in operational and general guidebooks or manuals of marketing management and consumer behavior, than in academic marketing articles.

## **Product risk and consumer preferences**

The guidebooks that we examined classify risks in the five to seven categories described by Jacoby and Kaplan (1972). As such, classification seems to provide a useful and easy-to-remember operational tool for risk concerns. Widely distributed and read authors such as Kotler, Solomon, or Lendevic hardly mention risk as part of marketing management concerns (Kotler and Armstrong, 1991; Lendevic, Levy, and London, 2006; Solomon, 2005).

As said in (Kotler and Armstrong, 1991), “Many purchases involve some risk taking (...) the amount of perceived risk varies with the amount of money at stake, of purchase uncertainty, and of consumer self confidence. Consumer evaluation has changed since products are multi attribute objects.” Thus, information is to be managed by the firm in order to avoid the anxiety coming out the feeling of risk.

In the Mercator guide (Lendevic, Levy, and London, 2006), the authors do not refer to risks associated to motivation, but to the sole context of decision making. As such, uncertainty is seen as the unknown probability of a gap between expectations and delivering, combined with the consequences of this gap.

Solomon (2005) quotes the five kinds of risks suggested by Jacoby and Kaplan (1972) on one page, as part of a consumer research guidebook, which has been widely translated and distributed. Solomon distinguishes, for each of the five kinds, the buyers most sensitive to risks, and the purchases most sensitive to them. For instance, monetary risk will be associated with money and wealth — with below average revenue being most exposed to risks, top range goods representing a costlier purchase. Also psychological risks will be associated with loss of self-esteem, as well as with guilt of making large expenses.

Despite the above famous examples, the part devoted to risk and uncertainty remains modest in most marketing management books (the words ‘risk’ and ‘uncertainty’ are often not quoted). For instance, Michon’s reference book (Michon, 2003) has one mention of ‘risk’ (p.82) in a 456 pages book; this is again to quote Jacoby and Kaplan classification of perceived risk. In one of the reference marketing guidebooks (Kotler and Armstrong, 1991), ‘uncertainty’ is not mentioned, and the word ‘risk’ is quoted twice, each time within a short paragraph about decision process, when the book itself is about 700 pages. In the 2009 Marketing Encyclopedia, Lehu (2009) devotes 2 pages among more than 800 pages to describe perceived risk, mentioning Bauer and Roselius. Perceived risk is seen as being a consequence of various variables about the individual, the product or the situation. Among these variables we find risk attitudes. Dubois (2000) mentions Cox as the early pioneer of consumer risk psychology.

Concerning consumer behavior, (Hoyer and MacInnis, 2001; Robertson and Kassarian, 2001; Solomon, 2005) briefly describe risk perception referring to Slovic and Fischhoff, or

treat risks in relation to warranties and brand preferences. (Hoyer and MacInnis, 2001) quotes risk perception as:

the extent to which the consumer is uncertain about the personal consequences of buying, using, or disposing of an offering. If negative outcomes as well as positive outcomes are unlikely, perceived risk is high. Consumers are more willing to pay attention and to carefully process marketing communications when risk is high. As perceived risk increases, consumers tend to control information and evaluate it carefully.

### **Uncertainty and consumer involvement**

Involvement is the importance attached to a consumer's decision. Within consumer psychology, both product involvement and perceived risk are considered to be motivational constructs influencing, for instance, information search decision-making process (Dholakia, 2001). Hoyer and MacInnis (2001) also establish a clear link between risk perception and involvement. As high level of risk is generally uncomfortable for consumers, they tend to engage in a higher information-processing activity, to reduce the uncertainty component of risk.

Relationships between product involvement and risk perception are supposed to be two ways. Mainly, when products are perceived to be risky, consumers show higher levels of involvement (e.g. radio frequencies of mobile phones, genetically modified food, higher interest rates, etc.). However, it can also be assumed that, in various circumstances, involvement might affect risk perception. For instance, a closer and deeper search at product information could change risk perception; deeper concern for purchases could provoke a higher sensitivity and less tolerance to perceived risks.

Kapferer and Laurent (1982), and even more Kapferer (1998), mention and analyze risk as one of the variables possibly linked to involvement, interest and brand sensitivity. When Kapferer and Laurent (1982) suggest a framework regarding brand sensitivity, they briefly mention risk perception as the seriousness of negative consequences in case of error (of choice). Probability of an error made in the consumer choosing the brand is, to Kapferer, one of twelve variables explaining brand sensitivity. As such, risk perception is believed to enhance brand sensitivity. However, risk perception is not mentioned as one of the ten variables measuring involvement by Zaichkowsky (1994). Hoyer and MacInnis (2001) mention that perceived risk can be associated with any kind of product or service, but it would be higher in the following cases: little information available, new or high price, or complex offering, high level of brand difference, little consumer's confidence, and social norms. We suspect that complex foods (e.g. organic, fair trade, highly processed, occasional purchases, gambling, financial products), with multiple attributes, will generally be regarded as being associated with higher levels of involvement than simple products (e.g. staple foods and commodities purchased routinely).



## 2.3 Cross-discipline analysis

We have also explored literature outside economics, consumer research and risk psychology to enrich the perspective of risk marketing: anthropology and evolutionary mind (Leakey and Lewin, 1977; Barkow, Cosmides, and Tooby, 1992; Cosmides and Tooby, 1994; Benford, 2000; Haselton and Nettle, 2006), sociology (public and private risks) (Douglas and Wildavsky, 1983; Beck, 1986; Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson, and Ratick, 1988), communication (design, media, questionnaire, copy strategy, etc., see references in Appendix A).

We began to organize the convergence and inspiration from all these sources and literature, with the perspective to suggest to systematically include risk as one of the operational dimensions of marketing, let it be in the most obvious fields where risk is salient – environment, health, finance – but also on mass market products, like food or personal goods. We suggest that risk attitudes, beliefs and motivations offer new perspectives for positioning. We also think that research on risk perception and framing could benefit message design, with possible applications in opinion surveys, advertising and labeling — signs, and more generally all kinds of visual information and wording (Boutang and De Lara, 2015).

Complementing that literature survey, we also took inspiration from our work in the AXA-PSE research project. The first phase of the project consisted of a series of qualitative exploratory studies (focus groups), as an exploratory phase before quantitative questionnaires design. Various evaluation methods of the perceptions, beliefs, attitudes, behaviors, as well as of framing of cognitive and emotional questionnaires, have been tested to elicit the individual parameters of risk preferences and aspiration.

The following sections address two potential applications of risk-related research in marketing: risk-enriched positioning and message framing according to risk biases. In Sect. 3, we examine risk profiling and perceptual maps based upon of the Lopes psychological model (Lopes, 1996; Lopes and Oden, 1999) as regards to the decision-making in investment and in savings. In Sect. 4, we describe message framing techniques in the case of quantitative financial risk questionnaires, on the ground of identified biases.

## 3 Risk profiling and perceptual maps

In the following, we will define the positioning of a brand as a strategic approach which consists in delivering a promise to a specific population target, thus occupying a particular position within targeted people’s mind. We are examining the possibility of enriching this promise, that we will relate to people’s aspiration, with a “risk-attitude dimension”. This enlarged conception of positioning, taking into account both satisfaction and risk attitude, could then be described on perceptual maps.

### 3.1 Risk profiling and perceptual maps literature

Perceptual mapping is a graphics technique used by brand marketers to visually show the perceptions of customers or potential customers within a product category. Competing

alternatives are plotted on a graph with two dimensions that best characterize how customers differentiate between alternatives (Lilien and Rangaswamy, 2003).

Wilcox (2003), among many others, describes simple methods for producing perceptual maps from data. Kohli and Leuthesser (1993) describe various methods to display data: factor analysis, discriminant analysis, and multidimensional scaling. Factor mapping – a graphical representation of products, brands, individuals’s coordinates (positions) according to descriptive and predictive dimensions (most often two dimensions) – is meant to describe attitudes and behavior. Such techniques are largely used in behavior research as well as by communication and marketing professionals (William R. Dillon and Tangpanichdee, 1982). Distances between positioning truly correspond to differences in attitudes. Recent approaches of marketing strategical maps take into account both consumer’s heterogeneity (e.g. segmentation) *and* competitive positioning of brands. As such, positioning becomes segment specific (Day, DeSarbo, and Oliva, 1987). Product positioning is a crucial component of competitive marketing strategy. Typically the position of a product, product line, brand, or company is displayed relative to their competitors. For instance, firm wishing to sell brands within a specific product category may consider the image of that category as well as the firm’s own image. Usually, quantitative perceptual maps are produced when respondents rate the similarity between several dimensions within that category using a paired comparison procedure. Implications are for a firm to select a specific dimension for their brand. Perceptual maps usually reveal that most markets are not homogeneous, and that they can be segmented into smaller homogeneous groups (Wong and Chan, 1999; Blattberg and Sen, 1974; Bijmolt and Wedel, 1999).

We claim that perceptual maps could help to display what people think about risk, provided proper dimensions are chosen. Those dimensions should describe how people choose in a context of uncertainty, and would be related to the attitudes consumers adopt to make such choices.

We found very few examples of risk-based positioning, and they were all recent. And we did not find, in the academic literature, perceptual maps crossing risk attitudes and attitudes towards aspiration. Vanlaar, Simpson, and Robertson (2008) present maps linking driver’s worries to their risky driving behaviors. Two dimensions are found to explain the data: perceived risk and the perceived level of concern of others. The results from these analyses are summarized using a perceptual map. Kimura, Basso, Kayo, and Suen (2009) make use of prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) to explain the dispersal of firm positioning, including risk as one of the strategic dimensions of firm positioning.

Risk/aspiration maps could prove to be useful to marketing, if brand preferences, product choices are related to risk lifestyles and attitudes. Inversely, in a product-based approach, risk attitudes and lifestyles could be inferred from risky products (such as financial ones) consumption analysis. For the purpose of this article we will focus on a specific model of risk combining both types of risk identified in consumer research: on the one hand the probability of achieving an aspiration level, on the other the attitude towards risks.

## 3.2 Lopes SP-A model and positioning

We suggest that Lopes' *security-potential/aspiration* theory (Lopes, 1996; Lopes and Oden, 1999) could provide a useful scheme to characterize individual profiles according to two dimensions of personal aspiration and risk attitude. According to Lopes,

SP/A theory is a dual criterion model in which the process of choosing between lotteries entails integrating two logically and psychologically separate criteria, where SP stands for a security-potential criterion and A for an aspiration criterion.

As for the A (aspiration) criterion, subjects are assumed to assess the attractiveness of lotteries by the probability that a given lottery will yield an outcome at or above the aspiration level. We would expect to be able to differentiate *satisficers* ('good-enough heuristic') from *optimizers* ('best-so-far heuristic'), along this motivational aspiration (A) axis. The other axis of Lopes model is called SP, a bipolar situational axis with security (S) on one side and potential (P) on the other. We interpret this SP axis as measuring an attitude towards risk: a "security-minded" individual (Lopes and Oden, 1999) pays more attention to the worst outcomes than to the best ones. According to this model, the evaluation process of the personal aspiration is subjectively made. It retains choices situated above a personal aspiration threshold, fluctuating with the environment and the individual. As a consequence, a majority of individuals, being risk averse, will rather go for security positions and above level-aspirations than for high potential positions.

In Figure 1, we represent the SP/A model as if it were a mapping of financial saving attitudes. To do this, we refer to the AXA-PSE research project. About the risk attitude dimension, we submitted the following question 1Q26 to 1 000 individuals using a sampling weighted quota method, 7-point Likert scale: (1Q26) *Which proportion of your heritage could you invest in a risky manner?*. Answers were offered from point 1: *less than 5% of total heritage* to point 7: *more than 50%*. Below average score is concerning 88.6% of respondents; above average score only 4.2% of respondents (the rest declared 'did not know'). Regarding the second dimension 'A', we assumed that question 1Q23 was correlated to aspiration level. In question 1Q23 : *I am always expecting more in life* (6 point Thurstone scale), individuals declared to be maximizers: *totally agree plus partially agree* = 48.7%; *totally disagree plus partially disagree* = 23% (the rest nor agree nor disagree). We plotted 1Q26 answers (SP dimension) against 1Q23 answers (A dimension), as in the Lopes model.

Of course, these preliminary results would have to be validated by the correlations existing between declarative statements and actual behaviors. At this stage, we simply formulate the hypothesis that the positioning of the brand, especially in the case of involving purchases, could be strengthened, on the one hand, by including one's risk attitude (SP) and, and on the other hand, by the level of aspiration (A). The combination of three processes of evaluation – Security, Potential and Aspiration – leads *a priori* to a large number of decision-making plans. As far as the behavior seems adapted to the structure of the environment (Simon, 1982), this model of decision under uncertainty could characterize the individuals in a specific environment or personal situation, as well as the construct of attitudes with regard to one

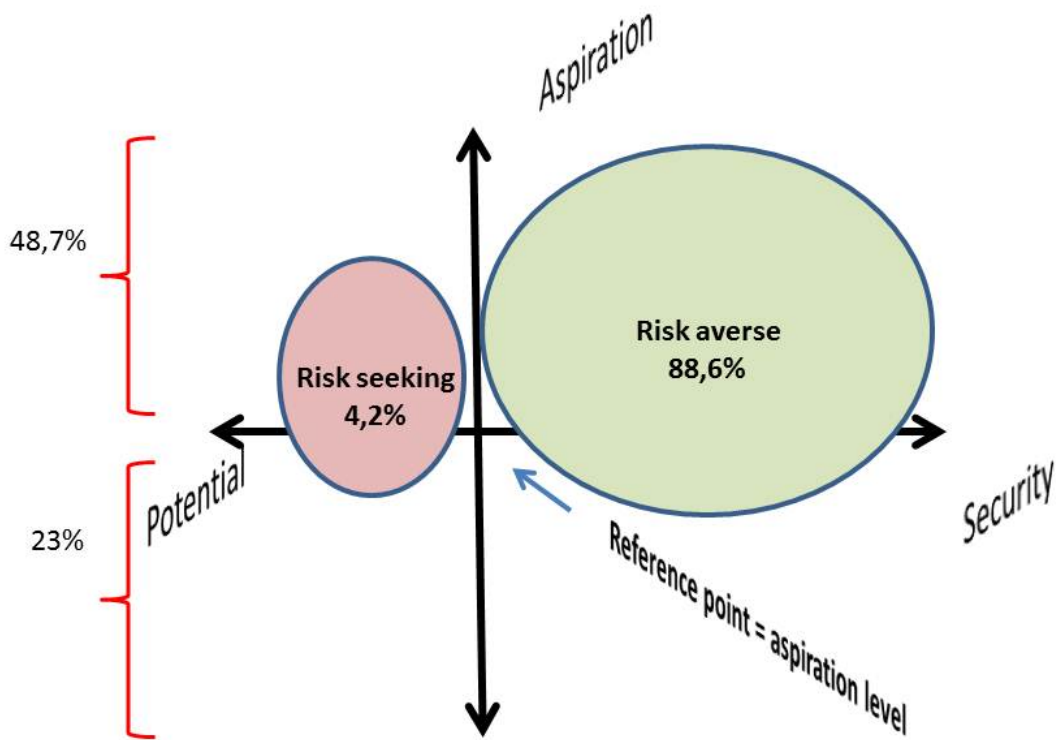


Figure 1: Lopes mapping and financial saving attitude

given product. It could also allow to estimate the attractiveness, in the sense of its level of risk, of a brand. It would also be conceivable to characterize individual's or brand's coordinates, according to their SP/A, and the relative strength of these three poles. A perceptual map crossing risk attitudes and levels of aspiration could be proposed. Within the AXA-PSE research project, we started to investigate the concepts of individuals and brand positioning in the case of a financial risky choice, by proposing an updated vision of the complex decision-making process (McGuire, 2000; Swait and Erdem, 2004). We found several socio-style surveys, such as the ones conducted by specialized socio-style agencies (CCA, Cofremca or TNS), that intuitively position products and brands along similar SP/A axis. For instance, CCA perceptual maps published in 2002, and applied to drinking attitude in France, suggest that people choices may be positioned on one axis in between a traditional expectation and a more exploratory attitude. We would like to consider that such axis is similar to a risk attitude. The other axis opposing two poles, aspiration for sensation and aspiration to meaning, seems analog to the aspiration level described by Lopes.

## 4 Risk perception and message framing

As it has been shown by the tenants of behavioral economics, consumers are sensitive to framing. Although they should react the same way no matter how the message is formulated, it happens that people tend to make distinct judgments when exposed to alternate but equivalent ways of describing a promise. According to Tversky and Kahneman:

Alternative descriptions of a decision problem often give rise to different preferences, contrary to the principle of invariance that underlies the rational theory of choice. Violations of this theory are traced to the rules that govern the framing of decision and to the psychophysical principles of evaluation embodied in prospect theory. (Tversky and Kahneman, 1986)

We claim that systematically taking into account psychological biases in the domain of risk perception could help to build efficient message framing. Thus, brand communication from copy strategy to advert artwork could be strengthened according to risk product category, and to framing according to risk psychology. In this section, we will specifically examine the case of risk questionnaires, in an attempt to take into account risk perception biases, in order to design questionnaires according to message framing.

### 4.1 Risk, framing and questionnaire literature

Risk framing theory takes its source in prospect theory (Kahneman and Tversky, 1974; Kahneman, Slovic, and Tversky, 1982), as it describes how our perception of risk and utility are biased.

A number of factors are identified that have been found in the literature to influence perceptions and evaluations of risk (sources and details are given in Appendix A). Such factors are related to the design of risk messages: the message (color, signal word, surround shape, and the framing effect), the source of the message (credibility and trust), and the target of the message (risk target). In order to design effective risk communications, and to facilitate decision-making and safe behavior, these factors need to be considered, in a context-dependent manner.

To categorize individuals according to their risk profile is a difficult task (Conchar, Zinkhan, Peters, and Olavarrieta, 2004). Properly designed, risk psychology questionnaires can be a powerful mean to capture risk attitudes and profiles. They are expected to be useful for businesses to address the right target specific products, or to give the right risky products (such as financial or chemical) to sell to the right vendor. More generally, they can be quite efficient regarding direct marketing campaigns, targeting the message to the right audience.

Our database search only retrieved a few academic articles having theorized questionnaires, and even fewer regarding more specifically risk questionnaires. According to (Malhotra, 2006), there is no such thing as 'A' standardized method for designing questionnaires. Most of the literature describing questionnaire design and framing is pragmatic, based upon

the experience gathered by finance professionals, marketers, and information specialists. Indeed, main contributors are consumer research and psychology practitioners (Weber, Blais, and Betz, 2002; Yook and Everett, 2003; Baumgartner and Steenkamp, 2006).

Financial advisors counsel suitable investments and classify investors according to their personality traits (Yook and Everett, 2003). Financial questionnaires try to evaluate the level of volatility an investor can tolerate, the personal comfort with risk-return or the amount of loss someone will risk incurring. Respondent’s degree of risk taking appears to be domain-specific, so that specific measures of investment risk tolerance are needed (Weber, Blais, and Betz, 2002).

## 4.2 Designing a bias-free questionnaire

We took inspiration from various authors to design psychometric questionnaires (Barsky, Kimball, Juster, and Shapiro, 1997; Weber, Blais, and Betz, 2002; Malhotra, 2006; Abdellaoui, Bleichrodt, and Paraschiv, 2007; Arrondel, Masson, and Verger, 2004).

Yet, bias-free questionnaires are ideal constructs. Within the AXA-PSE research project, we chose to begin with an exploratory phase prior to a risk quantitative questionnaire, in the form of focus groups. These latter are meant to reduce unintentional biases, and were set up to identify and validate opinions, perceptions, words, symbols and risk visuals, as well as individual attitudes vis-à-vis financial risks and institutions (McDaniels, Axelrod, and Slovic, 1995). We observed the following.

- Risk is mostly perceived as *negative and emotional*.
- Financial risk perceptions and attitudes seem to be *dependent on the amount of wealth*.
- Individuals seem to position themselves according to poles: *emotion/ cognition; dread/ controlled; experience/ diversification*.
- We identified *words and visuals linked to risk and uncertainty*.

We then incorporated those findings into a closed-end questionnaire aimed at eliciting financial risk preferences. For this, we developed a check-list in order to design an “intentionally framed” questionnaire and (supposed to be) free of unintentional biases. This work has been inspired by a vast array of economic, psychological, consumer research and sociological theories, such as loss aversion (prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992)), Lopes decision model combining aspiration with risk preference (Lopes, 1996; Lopes and Oden, 1999), affect theories (Lavine, Thomsen, Zanna, and Borgida, 1998; Finucane, Alhakami, Slovic, and Johnson, 2000; MacGregor, Slovic, Dreman, and Berry, 2000; Loewenstein, Weber, Hsee, and Welch, 2001; Rottenstreich and Hsee, 2001; Slovic, Finucane, Peters, and MacGregor, 2002, 2004; Peters, Västfjäll, Gärling, and Slovic, 2006), Need For Cognition (Cacioppo and Petty, 1982; Cacioppo, Petty, and Kao, 1984) as well as cognitive limitations (Simon, 1982, 1990; Gigerenzer and Goldstein, 1996; Gigerenzer, 1991, 2004, 2007, 2008a,b) and mental accounting (Thaler, 1980).

Before writing the individual contents of each question, we recommend to determine first the psychological constructs (beliefs, motivations and needs, attitudes and behaviors) to be evaluated, as well as the questionnaire's intentions and design. The check-list examines potential biases and framing in each question and their validity and reliability. By designing psychometric questionnaires starting with psychology concepts and risk biases, we hope to decrease the influence of unintentional biases, and to increase the reliability and the validity of short duration quantitative questionnaires.

As an illustration of how we used the above method within the AXA-PSE research project, we present several of the questions that we submitted to 1,000 individuals representing French adult population (quantitative CATI interviewing method, initial questions were in French and have been translated here).

### Example of question 1QS2 (see Figure 2)

- 1QS2 is an attempt (among other similar attempts in our questionnaire) to assess the financial vulnerability of an individual through self evaluation.
- Information needed is risk feeling (*Do you feel...*), a class of risk perception. Employment, the chosen theme to evaluate risk feeling, is known to regularly be one of the main concerns for French adults (IRSN annual risk barometer). It seemed that employment vulnerability could be addressed with one question only, however introducing a certain order of bias. Literally, in French, the question was asked as: *your job is secured AND you have the power to keep it...* We considered that instead of truly having two questions instead of one, thus introducing a clear ambiguity bias, the second part of the sentence was a precision given to the first. Individual economic context, such as possible heritage, or household structure, could also impact answers distribution. Therefore, we have also addressed these issues elsewhere in our questionnaire. We only interviewed people having said they were employed. Question structure is a multiple choice open-ended one. The 7 point Likert scale provides a useful structure to avoid answer overlapping, and relies upon bounded rationality considerations (Miller, 1956). Item 8 was codified as '8' afterward and is related to a 'without opinion' answer. All words used in the question are ordinary, and we carefully avoided implicit guidance. Pilot testing was used prior to quantitative phase. Question structure was inspired by similar experiments made by Taylor on anxiety evaluation (5-item Likert scale, with good reliability) (Taylor and Claxton, Summer 1994); and 9-item Likert scale used in (Grewel, Gotlieb, and Marmorstein, 1994) to evaluate the perceived degree of financial risk; or even 7-point Likert scales on skepticism,(the level of doubt and uncertainty) in (Babin, Boles, and Darden, 1995), with an excellent reliability score.
- Regarding the results from 1QS2 (see Figure 3), we can see that people massively consider that they will retain their job in the future, so they do not express a state of vulnerability regarding employment. Because of the distribution of the results, we have not been able to infer from employment vulnerability any financial risk attitude nor behavior, in the following of the questionnaire. We can also interpret the results

Question S2	Do you feel that you will be able to keep your job ? Choose from 1 (not sure at all) to 7 (my job is secured) <i>Avez-vous le sentiment que votre emploi est sûr et que vous allez pouvoir le conserver ? Notez de 1 (pas du tout sûr) à 7 (mon emploi est totalement sûr)</i>
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- 1 (Not sure at all)
- 2
- 3
- 4
- 5
- 6
- 7 (I am absolutely sure to keep it)
- Without opinion

Figure 2: Question 1QS2

as a consequence of a bias called *illusion of control*, introduced by (Langer, 1975). It has been reported that people tend to believe they have a better control of events than they actually do. Employment vulnerability is therefore quite difficult to assess through declarative statements, and has to be evaluated through factual descriptions of revenues, past history, and job description.

#### Example of question 1Q3 (see Figure 4)

- In Figure 4, we reproduced a visually assisted question, as a trial to identify sub-attributes and dimensions of financial risk constructs. In the same questionnaire as above, people were exposed to several visuals which had been exhibited, in an exploratory phase of several focus groups, as conveying different possible meanings of financial risk. They were asked to pick up 3 visuals among 9 choices. We chose the combination of words and visuals, following the observation that images generally convey a stronger impression (vividness) than words (Sandman, Miller, Johnson, and Weinstein, 1993;



Do you feel that you will be able to keep your job ?				
Mode	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	47	6.49	47	6.49
2	31	4.28	78	10.77
3	34	4.70	112	15.47
4	75	10.36	187	25.83
5	134	18.51	321	44.34
6	129	17.82	450	62.15
7	263	36.33	713	98.48
8	11	1.52	724	100.00

Figure 3: Answers to question 1QS2

Jones and Nisbett, 1971; Loewenstein, Weber, Hsee, and Welch, 2001). We did not find similar questions in the academic literature, and most bank questionnaires rely on words and numbers in order to evaluate risk profiles.

- Results from 1Q3 (see Figure 4) show that preferred risk items are the revolver, the tightrope walker, the syringe and the wrecked ship. They were chosen well ahead of other suggested items. Symbolic visuals – the red point-down triangle (suggesting alarm and instability (Williams and Noyes, 2007)), bank logotypes (suggesting bank institutions and power), Napoleon (suggesting war to French people) and banknotes (suggesting money) – were probably less vivid than concrete dangers. Chosen items were directly related to the probability of a danger that may harm everyone of us personally (drowning, pain, fall). The possibility of death is behind every preferred items. Risk is therefore first of all physical. Physical integrity may apparently be threatened by some kind of intrusion in our body (by a needle, a bullet, a cliff, water), or by a fall from a high position. These findings relate quite well with the etymology

QUESTION 3		
Indicate the 3 visuals below that you link the most to the notion of risk Indiquez les 3 visuels que vous associez le plus étroitement à la notion de risque.		
	freq choosing alternative	percent of 1000
1. Revolver	660	66
1. Reversed red triangle	93	9.3
1. Napoleon	42	4.2
1. Tightrope walker	680	68
1. World Trade Center towers	178	17.8
1. Syringe	473	47.3
1. Bank notes (10, 20, 50 euros)	180	18
1. Bank logotypes	179	17.9
1. Ships in a storm	509	50.9

Figure 4: Answers to question 1Q3

of risk as what cuts: greek navigation term *rhizikon*, *rhiza* which meant "root, stone, cut of the firm land" as a metaphor for "difficulty to avoid in the sea"; latin *resicum*, *risicum*, *riscus*, meaning cliff (Boutang and De Lara, 2015).

## 5 Conclusion

Our starting point was the observation that modern world is growingly perceived as uncertain and that all products tend to be considered as conveying potential hazards. This rising concern for risk certainly challenges marketing scope and methods. In an attempt to identify potential applications, we scanned some fifty years of risk in marketing literature, cognitive sciences, behavioral economics and, more recently, evolutionary psychology. We observed that, in some key areas of marketing management — individual profiling, brand positioning (brand promises being considered as main choice's criteria), message framing and, before that, take-away messages of the brand copy strategy — risk psychology has

diffused to a limited extent. We investigated positioning statements and communications according to risk's perception and attitudes in the field of insurance and investment, within the Axa Research Fund–Paris School of Economics research project *The economics and psychology of risk taking, impatience and financial decisions: confronting survey, experimental and insurance data* (2009-2011).

We make the hypothesis that people's aspirations, the core of operational marketing, could be profitably complemented by people's risk attitudes and perceptions, so as to formulate brand and product promises regarding potential risks. At the same time, the framing of brand messages — in all categories of products and services, even riskless ones — could benefit from the knowledge of risk psychological biases.

Risk positioning and communication are two domains of marketing where we have tried to incorporate ideas and concepts inspired by research on risk. This can be a first tentative step within a larger prospective program for risk marketing, where combining aspiration levels with risk attitudes and perceptions would form a wider risk preference model; risk perceptions themselves would derive from message framing methods backed on psychological biases. This program for risk marketing could also comprise brand positioning and targeting, and further development could include attitudes as one of the keys of a revisited risk marketing. Besides, an evolutionary psychology approach of risk perception might provide useful keys to the positioning and the copy strategy of brands, considering risk perception as one dimension of choice. Running quantitative multivariate analysis could reveal the existence of people and group clusters shaped by principal criteria — such as a security-potential criterion and an aspiration criterion — in other product categories than finance and investment. Also, questionnaires, advertising and referendum framing is an empirical field that might benefit from statistical confirmation, in a wide array of situations and decision-making contexts, in a search of bias-free formulations.

## A Appendix. Risk communication

We point to various fields from which risk communication could find inspiration.

- How to present risk probabilities? Formatted as chances, percentages, frequencies? (Spetzler and Holstein, 1975; Gigerenzer and Hoffrage, 1995; Cosmides and Tooby, 1996; Lipkus, 2007; Raghurir, 2008)
- Verbal and numerical expressions of probability (Bruine de Bruin, Fischhoff, Millstein, and Halpern-Felsher, 2000)
- Warning visualization (ergonomics) (Young, Wogalter, Laughery, Magurno, and Lovvoll, 1995; Kalsher, Wogalter, Brewster, and Spunar, 1995; Wogalter, Sojourner, and Brelsford, 1997; Adams, Bochner, and Bilik, 1998; Wogalter, Conzola, and Smith-Jackson, 2002; Laughery, 2006)
- Warning words (Hellier, Wright, and Edworthy, 2000; Hellier, Aldrich, Wright, Daunt, and Edworthy, 2007)

- Designing risk communication (Mumpower, 1988; Atman, Bostrom, Fischhoff, and Morgan, 1994; Fischhoff, 1995; Williams and Noyes, 2007)
- Graphics in risk communication (Lipkus and Hollands, 1999; Leonard, 1999; Kontio, Jokinen, and Rosendahl, 2004; Hogganvik and Stølen, 2006; Lipkus, 2007; Tufte, 1997)
- Role of media and graphics on risk perception (Joffe, 2005; Fischhoff, 1995; Hogganvik and Stølen, 2006)
- Framing of messages (Tversky and Kahneman, 1981; Meyerowitz and Chaiken, 1987; Slovic, Fischhoff, and Lichtenstein, 1988; Kühberger, 1998)
- Risk representation in the media (Joffe, 2005) audiovisual risk communication (Visschers, Meertens, Passchier, and de Vries, 2008)
- Social amplification of risk (Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson, and Ratick, 1988)
- Cultural aspects of risk (Lesch, Rau, Zhao, and Liu, 2009) ecological risk perceptions (Mcdaniels, Axelrod, and Slovic, 1995)
- Moral dimension of risk (Söberg, 2000) “risk = hazard + outrage” (Sandman, Miller, Johnson, and Weinstein, 1993)
- Source credibility (Wogalter, Kalsher, and Rashid, 1999; McComas and Trumbo, 2001; Viklund, 2003; Siegrist, Gutscher, and Earle, 2005; Boutang and Vilmann, 2014)

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## References

- M. Abdellaoui, H. Bleichrodt, and C. Paraschiv. Loss aversion under prospect theory: A parameter-free measurement. *Management Science*, 53(10):1659–1674, October 2007.
- A. Adams, S. Bochner, and L. Bilik. The effectiveness of warning signs in hazardous work places: cognitive and social determinants. *Applied Ergonomics*, 29(4):247–254, 1998.
- L. Arrondel, A. Masson, and D. Verger. Mesurer les préférences individuelles à l’égard du risque. *Economie et statistiques*, 374-375:53–85, 2004.

- C. J. Atman, A. Bostrom, B. Fischhoff, and M. G. Morgan. Designing risk communications: completing and correcting mental models of hazardous processes, part I. *Risk analysis: an official publication of the Society for Risk Analysis*, 14(5):779–788, October 1994.
- Barry J. Babin, James S. Boles, and William R. Darden. Salesperson stereotypes, consumer emotions, and their impact on information processing. *Journal of the Academy of Marketing Science*, 23(2):94–105, 1995.
- Jerome H. Barkow, Leda Cosmides, and John Tooby, editors. *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*. Oxford University Press, 1992.
- Robert B. Barsky, Miles S. Kimball, F. Thomas Juster, and Matthew D. Shapiro. Preference parameters and behavioral heterogeneity: An experimental approach in the health and retirement survey. *NBER working paper*, 1997.
- Raymond A. Bauer. Consumer behavior as risk taking. *American Marketing Association*, pages 389–398, 1960.
- Hans Baumgartner and Jan-Benedict E. M. Steenkamp. Responses biases in marketing research. In Rajiv Grover and Marco Vriens, editors, *The Handbook of marketing research*. Sage Publications, Inc., 2006.
- Ulrich Beck. *Risikogesellschaft*. Suhrkamp Verlag, Frankfurt am Main, 1986.
- Gregory Benford. *Deep Time: How humanity communicates across millenia*. Abbenford Associates, 2000.
- James R. Bettman, Mary Frances Luce, and John W. Payne. Constructive consumer choice processes. *Journal of Consumer Research*, 25(3):187–217, December 1998.
- Tammo H. A. Bijmolt and Michel Wedel. A comparison of multidimensional scaling methods for perceptual mapping. *Journal of Marketing Research*, 36(2):277–285, 1999.
- Robert C. Blattberg and Subrata K. Sen. Market segmentation using models of multidimensional purchasing behavior. *The Journal of Marketing*, 38(4):17–28, 1974.
- J. Boutang and M. De Lara. *The Biased Mind. How Evolution Shaped our Psychology, Including Anecdotes and Tips for Making Sound Decisions*. Springer-Verlag, Berlin, 2015.
- Jérôme Boutang and Jean-Baptiste Vilmain. Émissions de gaz à effet de serre liées aux gaz de schiste. Aperçu bibliographique. *Revue de Pollution Atmosphérique*, 223, 2014.
- W. Bruine de Bruin, B. Fischhoff, S.G. Millstein, and B.L. Halpern-Felsher. Verbal and numerical expressions of probability: 'it's a fifty-fifty chance'. *Organizational Behavior and Human Decision Processes*, 81(1):115–131, January 2000.
- J. T. Cacioppo and R.E. Petty. The need for cognition. *Journal of Personality and Social Psychology*, 42:116–131, 1982.

- J. T. Cacioppo, R.E. Petty, and C.F. Kao. The efficient assessment of need for cognition. *Journal of Personality Assessment*, 48:306–307, 1984.
- Robert B. Cialdini. *Influence: The Psychology of Persuasion*. Collins, 1984.
- M. P. Conchar, G. M. Zinkhan, C. Peters, and S. Olavarrieta. An integrated framework for the conceptualization of consumer’s perceived-risk processing. *Academy of Marketing Science*, 4(32):418–436, Fall 2004.
- Marcel L. Corstjens and David A. Gautschi. Formal choice models in marketing. *Marketing Science*, 2(1):19–55, Winter 1983.
- L. Cosmides and J. Tooby. Are humans good intuitive statisticians after all? Rethinking some conclusions of the literature on judgment under uncertainty. *Cognition*, 58:1–73, 1996.
- Leda Cosmides and John Tooby. Better than rational: Evolutionary psychology and the invisible hand. *American Economic Review*, 84(2):327–32, May 1994.
- Donald F Cox. *Risk taking and information handling in consumer behavior*. Harvard University, Graduate School of Business Administration, 1967.
- Diana L. Day, Wayne S. DeSarbo, and Terence A. Oliva. Strategy maps: A spatial representation of intra-industry competitive strategy. *Management Science*, 33(12):1534–1551, 1987.
- Utpal M. Dholakia. A motivational process model of product involvement and consumer risk perception. *European Journal of Marketing*, 35(11/12):1340–1360, 2001.
- Mary Douglas and Aaron Wildavsky. Risk and culture. *Journal of Policy Analysis and Management*, 2(2):309–309, 1983.
- Grahame R. Dowling and Richard Staelin. A model of perceived risk and intended risk-handling activity. *Journal of Consumer Research: An Interdisciplinary Quarterly*, 21(1): 119–34, June 1994.
- Bernard Dubois. *Understanding the consumer*. Prentice Hall Harlow, UK, 2000.
- M. L. Finucane, A. Alhakami, P. Slovic, and S. M. Johnson. The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, 13(1):1–17, 2000.
- Baruch Fischhoff. Risk perception and communication unplugged: Twenty years of process. *Risk Analysis*, 15(2):137–145, 1995.
- Baruch Fischhoff, Stephen R. Watson, and Chris Hope. Defining risk. *Policy Sciences*, 17 (2):123–139, October 1984.

- Martin Fishbein and Icek Ajzen. Attitudes and opinions. *Annual Review of Psychology*, 23: 487–544, 1972.
- Gerd Gigerenzer. How to make cognitive illusions disappear: Beyond heuristics and biases. *European Review of Social Psychology*, 2:83–115, 1991.
- Gerd Gigerenzer. Fast and frugal heuristics: The tools of bounded rationality. In Derek J. Koehler and Nigel Harvey, editors, *Blackwell handbook of judgement and decision making*, pages 62–88. Blackwell Publishing, Oxford, 2004.
- Gerd Gigerenzer. *Gut feelings*. Penguin Book, 2007.
- Gerd Gigerenzer. Why heuristics work. *Perspectives on psychological science*, 3(1):20–29, 2008a.
- Gerd Gigerenzer. *Rationality for Mortals*. Oxford University Press, 2008b.
- Gerd Gigerenzer and Daniel G. Goldstein. Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review*, 103:650–669, 1996.
- Gerd Gigerenzer and Ulrich Hoffrage. How to improve Bayesian reasoning without instruction: Frequency formats. *Psychological Review*, 102:684, 1995.
- Paul W. Glimcher, Colin F. Camerer, Ernst Fehr, and Russell A. Poldrack, editors. *Neuroeconomics*. Academic Press, London, 2009.
- Dhruv Grewel, Jerry Gotlieb, and Howard Marmorstein. The moderating effects of message framing and source credibility on the price perceived risk relationship. *Journal of Consumer Research*, 21(1):145–153, 1994.
- M. G. Haselton and D. Nettle. The paranoid optimist: An integrative evolutionary model of cognitive biases. *Personality and Social Psychology Review*, 10(1):47–66, 2006.
- Elizabeth Hellier, Daniel B. Wright, and Judy Edworthy. Investigating the perceived hazard of warning signal words. *Risk Decision and Policy*, 5(01):39–48, April 2000.
- Elizabeth Hellier, Kirsteen Aldrich, Daniel Wright, Denny Daunt, and Judy Edworthy. A multi dimensional analysis of warning signal words. *Journal of Risk Research*, 10(3): 323–338, April 2007.
- Ida Hogganvik and Ketil Stølen. A graphical approach to risk identification, motivated by empirical investigations. In Oscar Nierstrasz, Jon Whittle, David Harel, and Gianna Reggio, editors, *MoDELS*, volume 4199 of *Lecture Notes in Computer Science*, pages 574–588. Springer, 2006.
- Wayne D. Hoyer and Deborah J. MacInnis, editors. *Consumer behavior*. Houghton Mifflin Company, 2001.

- Jacoby and Kaplan. *The components of perceived risk*, volume 3. Venkateran Ed., 1972.
- H. Joffe. De la perception à la représentation du risque: le rôle des médias. *Hermes*, 41: 121–129, 2005.
- E. E. Jones and R. E. Nisbett. The actor and the observer: Divergent perceptions of the causes of behavior. *New York: General Learning Press*, 1971.
- D. Kahneman and A. Tversky. Judgment under uncertainty: heuristics and biases. *Science*, 185:1124–1131, 1974.
- Daniel Kahneman and Amos Tversky. Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2):263–292, 1979.
- Daniel Kahneman, Paul Slovic, and Amos Tversky, editors. *Judgment under Uncertainty : Heuristics and Biases*. Cambridge University Press, April 1982.
- Daniel Kahneman, Jack L Knetsch, and Richard H Thaler. The endowment effect, loss aversion, and status quo bias: Anomalies. *Journal of Economic Perspectives*, 5(1):193–206, Winter 1991.
- Michael J. Kalsher, Michael S. Wogalter, Blair M. Brewster, and Marilyn E. Spunar. Hazard level perceptions of current and proposed warning sign and label panels. In *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting*, pages 351–355. Human Factors Society, 1995.
- Jean-Noël Kapferer. *Les marques, capital de l'entreprise*. Éditions Organisation, 1998.
- Jean-Noël Kapferer and Gilles Laurent. *La sensibilité aux marques*. Éditions Organisation, 1982.
- Roger E. Kasperson, Ortwin Renn, Paul Slovic, Halina S. Brown, Jacque Emel, Robert Goble, Jeanne X. Kasperson, and Samuel Ratick. The social amplification of risk: A conceptual framework. *Risk Analysis*, 8(2):177–187, 1988.
- Herbert Kimura, Leonardo Cruz Basso, Eduardo Kayo, and Alberto Sanyuan Suen. Strategic positioning and risk-return behavior. *Journal of International Business and Economics*, 9(4):126–133, 2009.
- Chiranjeev S. Kohli and Lance Leuthesser. Product positioning: A comparison of perceptual mapping techniques. *Journal of Product and Brand Management*, 2(4):10 – 19, 1993.
- Jyrki Kontio, Jani-Pekka Jokinen, and Esa Rosendahl. Visualizing and formalizing risk information: An experiment. In *IEEE Metrics*, pages 196–206. IEEE Computer Society, 2004.
- Philip Kotler and Gary Armstrong, editors. *Principles of Marketing*. Prentice Hall Int., fifth edition, 1991.



- Anton Kühberger. The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes*, 75(1):23–55, July 1998.
- E. J Langer. The illusion of control. *Journal of Personality and Social Psychology*, 32(2): 311–328, 1975.
- Kenneth R. Laughery. Safety communications: Warning. *Applied Ergonomics*, 37:467–478, 2006.
- Howard Lavine, Cynthia J. Thomsen, Mark P. Zanna, and Eugene Borgida. On the primacy of affect in the determination of attitudes and behavior: The moderating influence of affective-cognitive ambivalence. *Journal of Experimental Social Psychology*, 34:398–421, 1998.
- Richard E. Leakey and Roger Lewin. *The origins of man*. E.P. Dutton, New York, 1977.
- Jean-Marc Lehu, editor. *L'Encyclopédie du marketing*. Éditions d'Organisations, 2009.
- Lendevic, Levy, and London. *Mercator*. Dunod, sixth edition, 2006.
- S.D. Leonard. Does color of warnings affect risk perception? *International Journal of Industrial Ergonomics*, 5-6(23):499–504, 1999.
- Mary F. Lesch, Pei-Luen Patrick Rau, Zhengxuan Zhao, and Chengyi Liu. A cross-cultural comparison of perceived hazard in response to warning components and configurations: US vs. China. *Applied Ergonomics*, 40(5):953–961, 2009.
- G. L. Lilien and A. Rangaswamy. *Marketing engineering: computer-assisted marketing analysis and planning*. Prentice Hall, Upper Saddle River, second edition, 2003.
- Isaac M. Lipkus. Numeric, verbal, and visual formats of conveying health risks: Suggested best practices and future recommendations. *Medical Decision Making*, 27(5):696–713, 2007.
- Isaac M. Lipkus and J. G. Hollands. The visual communication of risk. *J Natl Cancer Inst Monogr*, 1999(25):149–163, January 1999.
- G. F. Loewenstein, E. U. Weber, C. K. Hsee, and N. Welch. Risk as feelings. *Psychological Bulletin*, 127(2):267–286, 2001.
- Lola L. Lopes. When time is of the essence: Averaging, aspiration, and the short run. *Organizational Behavior and Human Decision Processes*, 65(3):179–189, March 1996.
- Lola L. Lopes and Gregg C. Oden. The role of aspiration level in risky choice: a comparison of cumulative prospect theory and SP/A theory. *J. Math. Psychol.*, 43(2):286–313, 1999.

- Donald G. MacGregor, Paul Slovic, David Dreman, and Michael Berry. Imagery, affect, and financial judgment. *The Journal of Psychology and Financial Markets*, 1(2):104–110, 2000.
- Naresh K. Malhotra. Questionnaire design and scale development. In Rajiv Grover and Marco Vriens, editors, *The Handbook of marketing research*. Sage Publications, Inc., 2006.
- Katherine A. McComas and Craig W. Trumbo. Source credibility in environmental health – risk controversies: Application of Meyer’s credibility index. *Risk Analysis*, 21(3):467–480, 2001.
- Timothy Mcdaniels, Lawrence J. Axelrod, and Paul Slovic. Characterizing perception of ecological risk. *Risk Analysis*, 15(5):575–588, 1995.
- William J McGuire. Standing on the shoulders of ancients: Consumer research, persuasion, and figurative language. *Journal of Consumer Research: An Interdisciplinary Quarterly*, 27(1):109–14, June 2000.
- Beth E. Meyerowitz and Shelly Chaiken. The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology*, 52(3):500–510, March 1987.
- Ch. Michon. *Le Marketer*. Pearson Education, 2003.
- G. A. Miller. The magical number seven, plus or minus two: some limits on our capacity for processing information. 1956. *Psychological review*, 101(2):343–52, 1956.
- Jeryl L. Mumpower. Lottery games and risky technologies: Communications about low-probability/high-consequence events. *Risk Analysis*, 8(2):231–235, 1988.
- Nathan Novemsky and Daniel Kahneman. The boundaries of loss aversion. *Journal of Marketing Research*, 42(2):119–128, 2005.
- Ellen Peters, Daniel Västfjäll, Tommy Gärling, and Paul Slovic. Affect and decision making: a "hot" topic. *Journal of Behavioral Decision Making*, 19(2):79–85, 2006.
- Steven Pinker. *The Blank Slate*. Viking, 2002.
- Matthew Rabin and Richard H. Thaler. Anomalies: Risk aversion. *Journal of Economic Perspectives*, 15(1):219–232, Winter 2001.
- P. Raghurir. Is  $1/10 > 10/100$ ? the effect of denominator salience on perceptions of base rates of health risk. *International Journal of Research in Marketing*, 25(4):327–334, December 2008.
- Thomas S. Robertson and Harold H. Kassarian, editors. *Handbook of consumer behavior*. Prentice Hall, NJ, 2001.

- T. Roselius. Consumer rankings of risk reduction methods. *Journal of Marketing*, 35:56–61, 1971.
- Y. Rottenstreich and C.K. Hsee. Money, kisses, and electric shocks: On the affective psychology of risk. *Psychological Science*, 12(3):185–190, 2001.
- Gad Saad. *The Consuming Instinct: What Juicy Burgers, Ferraris, Pornography, and Gift Giving Reveal About Human Nature*. Prometheus Books, 2011.
- Gad Saad. Evolutionary consumption. *Journal of Consumer Psychology*, 23(3):351 – 371, 2013.
- William Samuelson and Richard Zeckhauser. Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1(1):7–59, March 1988.
- Peter M. Sandman, Paul M. Miller, Branden B. Johnson, and Neil D. Weinstein. Agency communication, community outrage, and perception of risk: Three simulation experiments. *Risk analysis*, 13(6):585–598, 1993.
- Michael Siegrist, Heinz Gutscher, and Timothy C. Earle. Perception of risk: the influence of general trust, and general confidence. *Journal of Risk Research*, 8(2):145–156, 2005.
- Herbert A. Simon. *Models of bounded rationality*. Cambridge MA: MIT Press, 1982.
- Herbert A. Simon. Invariants of human behavior. *Annual Review of Psychology*, 41:1–19, 1990.
- Eric Singler. *Nudge marketing : comment changer efficacement les comportements*. Pearson, 2015.
- P. Slovic, B. Fischhoff, and S. Lichtenstein. Response mode, framing, and information-processing effects in risk assessment. In D. Bell, H. Raiffa, and A. Tversky, editors, *Decision making : descriptive, normative, and prescriptive interactions*. Cambridge university press, Cambridge, 1988.
- P. Slovic, M. L. Finucane, E. Peters, and D. G. MacGregor. *The affect heuristic. Intuitive Judgement: Heuristics and Biases*. In T. Gilovich, D. Griffin, D. Kahneman, (Eds.). Cambridge University Press, 2002.
- P. Slovic, M. L. Finucane, E. Peters, and D. G. MacGregor. Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, 2(24): 311–322, 2004.
- Paul Slovic. *The feeling of Risk*. Earthscan, 2010.
- Paul Slovic, Melissa L. Finucane, Ellen Peters, and Donald G. MacGregor. The affect heuristic. *European Journal of Operational Research*, 177(3):1333–1352, March 2007.

- Lennart Söberg. Factors in risk perception. *Risk analysis*, 20(1):1–11, 2000.
- Michael Solomon. *Comportement du consommateur*. Pearson Education, 2005.
- Carl S. Spetzler and Carl-Axel S. Stael Von Holstein. Probability encoding in decision analysis. *Management Science*, 22(3):340–358, Nov. 1975.
- Narasimhan Srinivasan and Brian T Ratchford. An empirical test of a model of external search for automobiles. *Journal of Consumer Research: An Interdisciplinary Quarterly*, 18(2):233–42, September 1991.
- Joffre Swait and Tulim Erdem. Brand credibility, brand consideration, and choice. *Journal of Consumer Research*, 31, 2004.
- S. Taylor and J.D. Claxton. Delays and the dynamics of service evaluations. *Journal of the Academy of Marketing Science*, 22(3):254–264, Summer 1994.
- R. H. Thaler and E. J. Johnson. Gambling with the house money and trying to break even: the effects of prior outcomes on risky choice. *Management Science*, 36(6):643–660, 1990.
- Richard Thaler. Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, 1:39–60, 1980.
- Richard Thaler. Mental accounting and consumer choice. *Marketing Science*, 4(3):199–214, 1985.
- Richard Thaler and Cass Sunstein. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Penguin Books, 2008.
- Richard Thaler, Amos Tversky, Daniel Kahneman, and Alan Schwartz. The effect of myopia and loss aversion on risk taking: An experimental test. *The Quarterly Journal of Economics*, 112(2):647–61, May 1997.
- Richard H. Thaler. *Misbehaving: The Making of Behavioral Economics*. Norton and Co., 2015.
- Edward R. Tufte. *Visual and Statistical Thinking: Displays of Evidence for Decision Making*. Graphics Press, 1997.
- A. Tversky and D. Kahneman. The framing of decisions and the psychology of choice. *Science*, 211(4481):453–458, 1981.
- Amos Tversky and Daniel Kahneman. Rational choice and the framing of decisions. *The Journal of Business*, 59(4):251–278, 1986.
- Amos Tversky and Daniel Kahneman. Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4):297–323, October 1992.

- Ward Vanlaar, Herb Simpson, and Robyn Robertson. A perceptual map for understanding concern about unsafe driving behaviours. *Accident Analysis & Prevention*, 40(5):1667 – 1673, 2008.
- John W. Vann. A multi-distributional, conceptual framework for the study of perceived. *Advances in Consumer Research*, 11:442–446, 1984.
- Mattias J. Viklund. Trust and risk perception in Western Europe: a cross-national study. *Risk Analysis*, 23(4):727–738, 2003.
- Vivianne H. Visschers, Ree M. Meertens, Wim F. Passchier, and Nanne K. de Vries. Audiovisual risk communication unravelled: effects on gut feelings and cognitive processes. *Journal of Risk Research*, 11(1):207–221, 2008.
- Pierre Volle. Le concept de risque perçu en psychologie du consommateur : antécédents et statut théorique. *Recherche et applications en marketing*, 10(1):47, 1995.
- J. von Neuman and O. Morgenstern. *Theory of games and economic behaviour*. Princeton University Press, Princeton, second edition, 1947.
- Elke U. Weber, Ann-René Blais, and Nancy E. Betz. A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, 15:263–290, 2002.
- Ronald T. Wilcox. *Methods for Producing Perceptual Maps from Data*. Harvard Business School, 2003.
- Donald G. Frederick William R. Dillon and Vanchai Tangpanichdee. A note on accounting for sources of variation in perceptual maps. *Journal of Marketing Research*, 19:302–311, Aug. 1982.
- Damien J. Williams and Jan M. Noyes. How does our perception of risk influence decision-making? *Theoretical Issues in Ergonomics Science*, 8(1):1–35, January 2007.
- M. S. Wogalter, R. J. Sojourner, and J. W Brelsford. Comprehension and retention of safety pictorials. *Ergonomics*, 40(5):531–542, May 1997.
- M. S. Wogalter, M.J. Kalsher, and R. Rashid. Effect of signal word and source attribution on judgments of warning credibility and compliance likelihood. *International Journal of Industrial Ergonomics*, 24(2):185–192, May 1999.
- Michael S. Wogalter, Vincent C. Conzola, and Tonya L. Smith-Jackson. Research-based guidelines for warning design and evaluation. *Applied Ergonomics*, 33(3):219–230, May 2002.
- Y. H. Wong and Ricky Yee-kwong Chan. Relationship marketing in China: Guanxi, favouritism and adaptation. *Journal of Business Ethics*, 22:107–118, 1999.

- K. C. Yook and R. Everett. Assessing risk tolerance: Questioning the questionnaire method. *Journal of Financial Planning*, pages 48–55, August 2003.
- Stephen L. Young, Michael S. Wogalter, Kenneth R. Laughery, Amy Magurno, and David Lovvoll. Relative order and space allocation of message components in hazard warning signs. In *Proceedings of the Human Factors and Ergonomics Society 39th Annual Meeting*, pages 969–973. Human Factors Society, 1995.
- Judith L. Zaichkowsky. The personal involvement inventory: reduction, revision and application to advertising. *Journal of Advertising*, 23:59–70, December 1994.
- R. B. Zajonc. Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35(2):151–175, February 1980.