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## Creativity and innovation: A contribution of behavioral economics

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### ABSTRACT

Innovation in products and services is seen by scholars, by specialized media in management, and by some managers as the main currency in modern economies. This is because it allows high average market profits, fame for innovators, or brand growth, for example. However, in practice, most managers still treat innovation as a secondary issue on their agendas. This problem results from the inability of market professionals to analyze people inside and outside their companies. It is not possible to develop innovative products in a systematic way without treating this point effectively. Moreover, in this process, creativity is a necessary, but not necessarily sufficient, condition to be fulfilled and requires behavioral transformation. In this context, it is believed that behavioral economics can make a sufficient contribution in the form of an analytical marketing tool by offering an analysis closer to human beings' reality, and, thus, allow a better understanding of people's behavior in the process of innovation in the market.

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## 1. Introduction

The economic world about which managers - including marketers - were educated no longer exists. This means that the main traditional existing tools for dealing with markets have become outdated. Despite this, managers still insist on using them. Perhaps the best explanation may be that, so far, no better solution than the hypothesis of full rationality seems to exist - but it may also be for pure convenience. In addition, those solutions that are considered *avant-garde* - which are more concerned with results than with physiological and behavioral models and theories - are generally perceived as a threat to the *status quo*. This naturally raises the level of skepticism regarding effectiveness in dealing with economic problems.

Everything in economic life has become faster, inconsistent, and particularly dynamic, resulting in a diminished sense of control over economic variables. Consumers now shop while watching their team in a football match; while talking with their relatives, who may live on the other side of their country; they have easy access to prices, delivery terms, and product characteristics on specialized sites; and other consumers' comments on forums, to mention but a few current real world topics about this issue. Furthermore, all this is only a click away; the consumer is always watching the world from a fashion

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smartphone. With this in mind, it is possible to conclude that an action, which until recently has been coherent with the company's strategy, now runs the risk of not matching consumers' requirements anymore. See [Mittal \(2015\)](#) for an analysis of the importance of the clarity of self-concept in the behavior of consumers. Logically this also means that the company's marketing communications will no longer have any positive effect on consumer behavior. However, it is particularly relevant to see that the effect of context sometimes has relevant effects when considering the consumer ability to decide (see for example [Chavaglia, Filipe, & Ramalheiro, 2013](#)).

The effort needed to meet this new consumer behavior has forced companies to focus on talent attraction directed to the production and launching of innovative products and services. However, attracting innovative professionals may be too expensive and difficult to achieve. Besides, they are often already happy in their ongoing projects in other companies or as independent professionals. Consequently, the alternative left to companies is to develop these innovative professionals in-house. This highlights the great management question of how to create these innovative professionals. A good answer to this question may be the development of creativity in the company's employees. However, creativity by itself does not guarantee innovative professionals. As explained later, this is just one of the factors responsible for innovator creation. Some authors, such as Gregory Berns, Professor of Neuroeconomics at Emory University, argue that this is - possibly - the most important variable for the development of innovation, but definitely does not explain everything.

For many market professionals, some academic authors, as well as in popular knowledge, there is an aspect of innovation that it is something born from magic. However, for many people, innovation is derived from much effort and work. Furthermore, neoclassic economics simply ignores the role of creativity in innovation. Besides, there is no failsafe way. No-one is sure of anything; there is no correct path that marketers may follow without taking many unnecessary risks. At least, this has been so until now. Nevertheless, there is now a field of study that offers more assertive explanations than the ones proposed by traditional economics (and other fields of knowledge based on the full rationality of man) about the development of innovative products and services - this is behavioral economics.

From what has been said above, it is desirable to present a clear framework of what is, in our view, the relationship between innovation, creativity, and (economic) behavior. See [Anderson, Potočnik, and Zhou \(2014\)](#) for a comprehensive, and relatively recent review of the literature on the relationships between creativity and innovation. In general, the literature on these matters assumes some sort of sequential process between creativity and innovation where the first would correspond to the stage of idea formation, and the second would correspond to the stage where those ideas are implemented. In this sense, creativity is generally assumed to be a pre-condition for innovation.

In fact, the process of transforming creative ideas, or creativity, into innovative products, or innovation, is often very complex, and, therefore, far from being a sequential process with guaranteed results ([Amabile & Pratt, 2016](#); [Sarooghi, Libaers, & Burkemper, 2015](#)). In simple terms, this means that creativity does not always generate innovation. For that to happen, the appropriate behavior of the decisive factors in that transformation relationship must be ensured ([Edwards-Schachter, García-Granero, Sánchez-Barriluengo, Quesada-Pineda, & Amara, 2015](#); [Khalili, 2016](#); [Liu, Gong, Zhou, & Huang, 2017](#); [Wu, Parker, & De Jong, 2014](#)). In the analysis of the favorable behavior of the decisive factors that assure the transformation of creativity into innovation, it is our view that the behavioral economics approach should (also) be considered. To the best of our knowledge, this is not (yet) sufficiently covered by the literature.

## 2. Some conceptual considerations about behavioral economics, creativity, and innovation

### 2.1. Behavioral economics

Behavioral economics is an important tool for the analysis of economic decision making. It would not be excessive to say that behavioral economics is one of the few analytical tools that have been able to come close to reflecting the reality of human behavior in day-to-day living while shopping, selling, negotiating, and participating in government projects, among other economic decision-making situations.

The analytical scope of behavioral economics is multidisciplinary. Therefore, the name given to it does not determine its quality as a tool itself. More important than a specific "tag" - which is what the name behavioral economics represents - is to verify if it satisfies assumptions derived from the following questions: is the human being the object of study? Are people acting contrary to their best interests? Can the problem be set accurately? ([Beshears & Gino, 2015](#)). Therefore, in this study, behavioral economics, neuroeconomics, economic psychology, or any other denomination for it will not be differentiated. From this perspective, they represent the same thing.

As is well-known, behavioral economics has gained prominence with the psychologist Daniel Kahneman. On the emergence of behavioral economics and the existing *status quo*, Kahneman has pointed out that the social scientists of the 1970s widely accepted two ideas about human nature. First, the idea that people are, in general, rational and their opinions are usually solid. Second, that emotions such as fear, affection, and hate explain most of the occasions when people deviate from rationality ([Kahneman, 2011](#), p. 8).

Economics traditionally conceptualizes a world populated by calculating, unemotional maximizers that have been dubbed *Homo economicus*. The standard economic framework ignores or rules out virtually all the behavior studied by cognitive and social psychologists. This "unbehavioral" economic agent was once defended on numerous grounds: some claimed that the model was "right"; most others simply argued that the standard model was easier to formalize and practically more relevant. Behavioral economics blossomed from the realization that neither point of view was correct ([Mullainathan & Thaler, 2017](#), p.

1). The field of behavioral economics is devoted to the study of how consumers actually make their choices. In this field, some of the insights of psychology are employed to make predictions about the choices that will be made (Mittal, 2015). By studying consumer behavior and the anchoring effect, Chavaglia, Filipe, and Ramalheiro (2011) showed also that people can be influenced by apparently irrelevant information in the purchasing process of a product or service and that this may be relevant in the moment of making the choice.

The inability of rational decision making is one of the main sources of analysis of behavioral economics and has been recognized by one of the biggest names in Economics, John Maynard Keynes (1883–1946). He defended that the economy was not run only by rational agents, as was supposed by the classics, but was rather handled by the “invisible hand”, participating in transactions exclusively in mutual benefit (Akerlof & Shiller, 2010).

One of the biggest gains provided by scholars of behavioral economics is the definition of how the decision-making process works (Brocas & Carrillo, 2014); see Table 1.

**Table 1**

Two cognitive systems.

System 1 (or automatic)	System 2 (or reflective)
Out of control	Painful
Easy to do/low effort	Complicated
Associative	Deductive reasoning
Rapid	Slow
Unconscious Reasoning	Self-Conscious Reasoning
Practical	Rule-Based

Source: Thaler and Sunstein (2009, p. 77).

System 1 is fast and is, or seems to be, intuitive; however, it does not refer to what we normally associate with thought. Scientists studying the activities of system 1 realized that they are associated with the oldest parts of the brain, those that we share with lizards and dogs. System 2 is more deliberate and self-conscious. Humans use system 2 when they solve a computation problem. Most people tend to use it when deciding which route to take on a trip or when studying law or management, for example (see Thaler & Sunstein, 2009, p. 78).

Systems 1 and 2 are both active whenever we are awake. As pointed out previously, system 1 works automatically and typically in a comfortable way with little effort, in which only a fraction of one's ability is involved. It continuously generates suggestions for system 2; impressions and insights become beliefs and impulses that become voluntary actions (see Kahneman, 2011, p. 21). Each of the two modes of thought has advantages and disadvantages. In many cases, system 1 captures information and correct conclusions almost effortlessly, using intuition and general rules. Of course, these shortcuts can lead to errors. Thus, system 2, with methodical thought, tells us when our intuition is wrong or when emotions get in the way of our judgment; it also corrects bad judgments made rashly. Too often, however, we allow our intuition or emotions to flow without being controlled by analysis or deliberation, which results in bad decisions (see Beshears & Gino, 2015, p. 1).

It is expected that marketing professionals, economists, and business managers know how people behave in the market. Nevertheless, in this sense, behavioral economics can improve the performance of these professionals in making important economic decisions, which have to be taken every day. That is because it allows decision-makers to incorporate a different view closer to how people really make decisions – which was not the case with traditional economic models.

## 2.2. Creativity

There are many examples of creative people who inspire others in different branches of economic activity. Despite studying, observing, and asking these people what they do to be so creative, no consensus has been reached. However, some insights were obtained through behavioral economics, which are worthy of emphasis in the understanding of this subject. After all, creativity is born from the brain and is the raw material for the inventor, in that invention is the starting point of innovation.

At this point it is important to define “creativity.” The *Oxford Dictionary* defines creativity as “the use of imagination or original ideas to create something,” and this is an adequate starting point. Bright ideas are fuel for innovation, therefore understanding how we come up with them is worth exploring. There has been plenty of investigation into how this process operates and how we can help it happen (Bessant & Tidd, 2018, p. 125).

There is the idea that creativity is something that arises from conscious human intervention (Ashton, 2015, p. 65). This is an interesting definition as it touches a point that matters – conscious human intervention. However, it is incomplete, because it lacks when nothing else is added, simply referring to the fact that creativity is only a conscious act. Creativity is the ability to reformulate what we know, generally in light of new information, and to develop a new concept or an original idea (Carter, 2014, p. 170). This last definition, although more generalist than the first, represents best what creativity is, because it does not exclude the possibility of the involvement of decision – making systems in the creative process.

First of all, it is essential to understand that creativity is a habit. The more an individual strives to learn and practices having creative thoughts and actions, the greater the probability of actually having those creative thoughts – as will be seen later, these thoughts are not conventional. The brain and the body literally learn to spend less energy – a process that neuroscientists call “repetition suppression”. However, we are not talking here about focus or about a general approach to creative stimulation, which depends on several factors as will be seen.

Usually, there are two antagonistic views about creative professionals. The first relates to the lone genius, who has creative insights and solves problems as if by “magic”. In this view, only a few extraordinary individuals are capable of developing creative thinking. The second demystifies this hypothesis by stating that creativity comes from very repetitive work, either daily or at least frequently, with few interruptions, as if it is some kind of positive dependence, and that the insight is only the end of the process, which is triggered after much effort. In this view, creation may be considered a small contribution to the knowledge generated over the course of human evolution. In this sense, anyone can be creative. An additional comment is needed to dissipate the possibility of any confusion that may affect the remainder of this paper. It is not possible – or even wise – to exclude either of the two hypotheses about creativity, as referred to above. The first exists in reality and is much appreciated in the labor market. After all, we have different brains, different intelligences, and a different life history as much as we grew up and live in different environments. Thus, it is conceivable to accept that some people have an enhanced capacity to have a greater number of insights than an ordinary person. The second hypothesis, creation as a result of hard work, is also real and easily viewed in human history. Nowadays, individual results are a combination of the global efforts of mankind to solve problems. Another point that can be mentioned is the fact that neuroscience today uses many tools to develop innovative people in specific contexts and moments through natural and pharmacological stimuli – whatever be the field of understanding about creativity.

A question can be posed about what the triggering factor of creative thinking is. Nevertheless, both decision – making systems influence the development of this creative thinking and are not questionable. Nobody is born a blank piece of paper that is being written on over the course of a lifetime. This concept is erroneous and dangerous. Today neuroscientists have knowledge about the “genomic unconscious” that gives us certain traits or developed behavioral patterns that belong to system 1. These influence our tastes, beliefs, and desires, among others, aiming to decide in terms of the trade – off between “fight or flight” and “opportunity or threat”. This mechanism was developed along the evolution of man as a species in learning to deal not only with the biological issues of the maintenance of the organism (biological homeostasis), but also the maintenance of the organism while being social.

This means that some people have a latent ability to develop creative ideas, but also that these ideas can be generated through stimulation derived from the habit of solving problems through original ideas. The creative person can be conditioned by conscious stimuli which can produce in him/her an increased possibility of creative ideas. Therefore, both the unconscious (system 1) and the conscious (system 2) are involved in this process.

The human brain saves energy all the time and it takes shortcuts that allow the optimized use of resources in the body and the brain. These shortcuts taken by the brain have a price – they cause us to have serious difficulty in making rational decisions. The denial of this limited decision-making capacity in the market was the “cardinal sin” of traditional economics which believes that creativity is just a process determined by system 2 (conscious).

Individuals who see what no one else can see are those that offer “the new” to the market. This, of course, depends on creativity, which depends on visual perception that in turn depends on three elements: first on epigenetic inheritance; then on the life experience of each individual; and finally, on the interaction with the environment.

However, it is necessary to understand the kind of creativity in the market (Bessant & Tidd, 2018, p. 125):

- **Associations** – we know, for example, that the brain is involved in making associations, often between hitherto unconnected things. That is why daydreaming or coming up with ideas while we sleep is often an important part of the story; these are times when the unconscious brain is able to relax and forge new unexpected links.
- **Incremental and radical** – creativity is about breaking through to radical new ideas, framing the problem differently, and finding new directions for solving it. However, it is also about the hard work of polishing and refining those breakthrough ideas, debugging, and problem-solving to get them to work.
- **Divergent and convergent thinking** – many studies of creative thinking have looked at two different modes of thinking: convergent and divergent. Convergent thinking is about focus, homing in on a single “best” answer, while divergent thinking is about making associations, often exploring round the edges of a problem. While there are some examples of problems which have a single “right” answer and need a convergent approach, most require a mixture of the two thinking skills.
- **Pattern Recognition** – creativity is particularly about patterns and our ability to see them. In its simplest form if we see a pattern, which we are able to recognize, we then have access to solutions which worked in the past and which we can apply again. But sometimes it is a case of recognizing a similarity between a new problem and something like it, which we have seen before.

However, does every invention (or the implementation of creative thinking) bring strategic, professional, and financial results in the market? We discuss this next.



### 2.3. Innovation

Innovative professionals are those who can turn their creativity into products and services in the market.

Innovation is not a new subject. In 1911, Joseph Schumpeter stated in his famous book *The Theory of Economic Development* that it is the economic agent who brings new products to the market through more efficient combinations of production factors, or through the practical application of any invention or technological innovation. Consequently, studies on this subject have become particularly rigorous and productive. Therefore, it seems to be more appropriate to present innovation through the words of the father of the study of innovation in economy. For Schumpeter, producing means combining materials and forces that are within our capacity to influence. In this sense, innovation is a force to produce other things, or the same things with a different method. This demands the combination of different materials and forces. For that, there are five cases of possible new combinations (Schumpeter, 1983, p. 48):

1. The introduction of a new good;
2. The introduction of a new production method;
3. Opening a new market;
4. The achievement of a new source of supply of raw materials or semi-manufactured goods;
5. The establishment of a new way of organizing an industry.

Innovation implies offering a product that changes the reality of a market, or creating a specific market for that product or service. Innovation also implies producing the same goods differently, if that generates added value for the company.

Evidently, it is necessary to adapt these concepts of the creation of innovations to the modern context of the existence of online media and to service innovation. In this sense it is important to consider that an innovation occurs in three platforms (Kim & Mauborgne, 2004):

- Product - which is the physical product;
- Service - which is services to customers, guarantees, and training of distributors and retailers;
- Delivery - which covers logistics and the channels used to transfer the product to customers.

Innovation has some important features that allow managers to better identify it in the market. An innovation generates the achievement of high rates of sustained growth in revenues and profits to innovators or enterprises with an innovative product or service (Kim & Mauborgne, 2004). In other words, companies which benefit from innovation have a “monopoly profit in the very short term.” This situation is temporary because both traditional and new competitors, or even opportunistic capital, tend to copy such innovations.

After exploring what innovation is, where it happens, and the benefits from it for a company and for the economy, it is now time to explore who generates the innovation, that is, innovators. An innovator is someone who asks every day: How can I be different? How can I do this in a way completely distinct, new way? A new definition for an innovator is given by the neuroeconomist Gregory Berns: an innovator is someone who does what no one else does.

### 3. Discussion: turning creativity into innovation

An invention is not an innovation. For an invention to be considered an innovation, a consumer or group of consumers must have paid for this invention. Let us examine a case. For example, Amazon's delivery of goods (weighing up to 2 kg) through drones is an innovation on the delivery platform. However, this innovation is an invention that took place in the market, and not necessarily on the product itself.

Another point that characterizes an innovation is that the product or service can be produced on a large scale freely on the market. Considering this definition, products like a picture painted by an artist or a football team are not considered innovations. These cases, despite generating a high market value, cannot be produced systematically in the market. However, in this study, we will consider such situations as innovations in the market. They are special products and services, and, therefore, they are exceptions that should be considered in a product marketing strategy.

Therefore, what, precisely, can a person do to generate innovations? Modern neuroscience presents some possibilities. One of them is the neuroinnovation - or iconoclasm. Neuroinnovation results from a model based on studies of the human brain to explain the endogenous concepts inherent to the process of developing innovations in the market. Today, it is known that the decisions made by man can be located in specific parts of the brain in terms of neural discharge patterns (Berns, 2010, p. 94).

Creating means to see the world differently. However, innovation is much more than creating. Innovation is directly connected to the understanding and generation of stimuli in system 1 (unconscious) to provide the “new” in the mind of a marketer - and then to potential clients. However, it is also connected to the insights from system 2, which direct the inventor's effort beyond the mere “spectacular,” usually provided by the creative solutions. There is a transformation process of the spectacular insights obtained from system 1 in a conscious process, and, later on, the creation of innovative products and services. However, to innovate it is necessary to go beyond the creation. If the innovative agent is unable to face his fears, or to

spread the good news to potential customers and other potentially interested people, the creation will not be turned into an innovation.

Therefore, the development of innovative products and services in the market happens through keen awareness of market opportunities, the control of fear, and through social intelligence. These three variables are dependent on the genetic load and life experience of each person. Although the human being is born programmed by genes, he is also influenced by his life experience.

Considering neuroinnovation as a process, Berns (2010) proposes that the elements of innovation (perception, control of fear, and social intelligence) depend on neurological factors that can be molded by conditioning professional agents to adopt specific habits, for the extension of their capacity to generate innovations in the market. This proposal presents itself as a prudent approach compared with traditional models found in the literature.

### 3.1. Perception

When the context, that is, the pillars on which people build their perception of the world, is strongly changed, actions also change in a compatible way (Goss, Pascale, & Anthony, 1993). This is the basis of creation that subverts markets and people's lives, of creation that turns into music, smartphones, soccer balls, 3D prints, or social networks, for example, among many other innovations.

Undeniably, perceiving the world differently from most people is a prerequisite for innovation. It is only possible to generate innovations if a market professional stops thinking according to common sense and thinks differently. Neuroscientists can explain this fact. The human brain sees things in ways more familiar to them, but insights of an innovation rarely happens in this context (Berns, 2010, p. 4). To view the world as an innovator is necessary to see things that no one else can see. In this way, simply looking at the problem or object and focusing increasingly on it is not enough. The synthesis of innovation happens when the brain receives completely new information that it does not fully know how to interpret. A simple change of setting, a drastic change in the environment, or new social relations are a few examples of how the brain can be influenced to think more creatively and to break the pattern of familiarity.

Certain people in human history have been able to think differently from others: John Lennon Wilhelm Conrad Röntgen (who discovered X-rays), George Eastman (who popularized the camera), Santos Dumont (who invented the airplane), or Charles Weisenthal (who patented the first sewing machine), just to mention a few. All of them presented pattern-breaking within the existing *status quo*.

In this sense, the process of visual perception is very important when a market professional sees opportunities to innovate. Everything starts with an image that is captured by the eye, and after that, with the transmission of this raw information to the brain. This happens very quickly, and most people only realize this when the brain has already processed the information in several ways. In this case, the first conclusion to arrive at is that vision is not the same as perception. The part of the brain responsible for processing the early signs of vision is the occipital cortex, which is located at the back of the brain. Then, the information is transmitted to the front of the brain, precisely, to the frontal lobes. The information takes two paths: the primary and the secondary. The primary passes through the upper part of the brain, extracting information about where objects are located in space in relation to the body. The secondary is a route through the temporal lobes, located above the ears, which process the visual information in order to categorize what the person sees. Both routes are coordinated, so that the final result is the full perception of what the eyes convey (Berns, 2010, p. 20).

The ability to play with such complicated perceptual functions has a price. We do not see what we think we see. Observing a scene, we have the impression of seeing everything, but normally we have selected just a set of details (Carter, 2014, p. 84). Evolution allowed humans to develop a brain that is capable of performing amazing perceptual tasks, saving energy all the time. The need to distinguish a friend from an enemy, or a predator from prey, and to do it with the necessary speed to decide to fight or run away means that the brain has to take shortcuts and make assumptions about what it is seeing (Berns, 2010, p. 84).

Some neuroscientists - as in the case of Professor Dale Purves (1938-) (Duke University) - believe that visual perception is mostly the result of statistical expectations (Yang & Purves, 2003). Perception is the way the brain interprets ambiguous visual signals using the most likely explanation, which is a direct result of past experiences. The experience modifies the connections between neurons in such a way that they become more efficient when processing information. For example, in the perceptive system, the more the brain receives information, the less effort it will make to interpret it; in other words, the brain continues to waste energy, but at decreasing rates, in an effect that neuroscientists call "repetition suppression." By processing the same stimuli repeatedly, neurons specialize in a particular activity. In other words, at first, the entire network of neurons process a stimulus; however, from approximately the sixth repetition, most of that work is performed only by a fraction of the network of neurons, which culminates in a decrease in neural activity (Berns, 2010, p. 28).

Perception also depends on the categorization of what is seen in the environment because it is a way to differentiate the objects one from each other. This is precisely the function which allows men and women to find, for example, an object they are looking for. After all, to find something, it is necessary to know its characteristics.

However, it is necessary to highlight another topic. Books in psychology tend to divide the mind into functional segments, such as perception and memory. This division is useful for organizing information in general search fields, but it does not refer to real functions. For example, the brain does not have a system dedicated to perception. The word perception generally describes what happens in a series of specific neural systems (Ledoux, 1998, p. 37).

Therefore, vision is the first step in the formation of perception, which is a complex process, crucial for understanding the effects of people's decision-making processes on their lives. This is a key point in this study. Any attempt to modify the perception of a professional should consider several aspects related to breaking the *status quo* or the existing standard. For this, environmental change and information shift contribute to the occurrence of the innovation synthesis.

### 3.2. Control of fear

Proposing a paradigm shift through an innovative idea may underestimate the effects with regard to difficulties for proposing such a change.

To become an innovation, a creative idea needs to be accepted by bosses, colleagues, customers, and other interested people. However, this process is not simple. Biologically, the brain is wired to reject new ideas. Consequently, the second factor of success for an innovator is his ability to control fear in order to do what needs to be done, representing the big challenge of confronting his own "demons," that is, his fears.

Fear is an emotion, and emotions are, more than anything, something that happens to the body; it is a physiological reaction to environmental events - or, of course, a consequence of thoughts and the imagination that stimulate them - that is manifested through various physiological changes (Frazzetto, 2013, p. 167). Fear is triggered by the danger of physical or emotional damage. In biological terms, fear prepares us to hide or to escape (Fexeus, 2012, p. 39). Physiologically, fear is located in a region of the brain called the amygdala, which has direct connections with the excitation system of the brain, the hippocampus. When a person is exposed to a decision-making situation, the relationship between the amygdala and the hippocampus generates symptoms of stress as a result of fear (Berns, 2010, p. 61). Therefore, fear lives in system 1 of decision making. This means that it is a powerful, fast, and autonomous process that sends signals that are only indicators of a deleterious feeling, experienced as a "paralyzing" effect, which prevents most people from assertively making decisions in the synthesis process of innovation.

Therefore, innovating means confronting the *status quo*. This requires that a market professional accepts being alone in many instances, that he will sometimes undergo professional ridicule, and will face internal and external competitors, bosses, and colleagues in his comfort zone. However, why do people have an aversion to new things when this is exactly what generates wealth and success for them? The answer requires an evolutionary approach in biological terms. People were set to reject new things, or at least to be suspicious of them (Ashton, 2015, p. 75). For a candidate innovator, fear may be reduced to three types: first, fear of the unknown; second, fear of failure; and third, fear of looking like an idiot, or the fear of ridicule (Berns, 2010, p. 112).

The possibility of failure in the market is a type of risk inherent in any business. In this sense, an innovation has three types of risk: technical, operational, and market risk. If the new product or service has some technical failures, if the organization cannot actually market it or make it in reality, or even if the market does not accept the product as planned, the company runs the risk of not getting the return required or desired (Andrew, Sirkin, & Butman, 2006, p. 3). Logically, if a company is not being successful in the market, there is a tendency for the professional who has participated in the project also to be seen as a loser - and that generates fear.

Innovators have the power to control the fear and, therefore, do not fear seeing their ideas fail in the market; these professionals are not paralyzed when they face an imminent danger, they do not fear looking ridiculous in these circumstances, or facing any kind of judgment, or even do not fear any physical danger (Berns, 2010, p. 12). Let us look at a case that was published recently by the Brazil BBC website. Collette Divitto has Down syndrome and refused to hear in job interviews that "she was not the right person for that job" or that "she didn't fit the job." Confident in her abilities, she decided to respond by opening her own business: the Colletey's cookies factory. Her cookies have become a success in Boston, the American city where she lives. After telling her story on TV, she received thousands of requests. Collette now wants to expand her business to hire people with disabilities. She is proud to be an example for others who have the same kind of problems she faces. Daring people tend to perceive the risk less severely than others in certain situations. In a study conducted by the University of Virginia, United States, volunteers stood on top of a hill with a skateboard and were instructed to look down the hill. The most fearful volunteers said that the hill was too steep, an opinion different from that of the more courageous, who said that it was not very inclined (Berns, 2010).

Many studies of psychology, and some others in neuroscience, show techniques to control fear; for example, run away from what causes the fear or face the fear. Certainly, the first option is the easiest to perform in the very short term; however, every time a market professional again faces something that causes him fear, he will become paralyzed or will run away again.

The fear never goes away completely, but it can be controlled. This is the difficult choice of facing fear. This technique is more complex to perform, but it can transform an ordinary professional into a real innovator, making him comfortable to introduce his new ideas to the market.

In the book *Whatever You Think, Think the Opposite*, Paul Arden (2006) clarifies assertively the desire to accomplish something. For him, making the right decision is boring, predictable, and pointless. A risky decision makes someone think and react in a way that he has never thought about before. This is possible to state once it is known that some things can only happen if fear is controlled to break down the *status quo*. In fact, unfortunately, without controlling fear, a professional will never become an innovator.

### 3.3. Social intelligence

As human beings we are social beings. This makes the incredible ability of social communication a fundamental weapon for the claims of an innovator. It is exactly this variable that allows an individual to identify himself with a particular group (e.g., family, football team, church, etc.). Therefore, issues such as sex, love and survival, social emotions and expression, self-awareness, and morals are important to the invention coming to the attention of potential customers and becoming an innovation.

Having social intelligence means having the ability to generate the power to access and have influence over people, in particular, those relevant to the product or service to be adopted by economic agents on a large scale. Among the main ones are, for example, customers, suppliers, or government.

Some scientists treat this subject related to the power that social intelligence can generate with particular care. However, the same care does not exist in some literature in the self-help area (among them many bestsellers). This is a recurring problem in this kind of literature and can generate considerable losses to the professional who dares to use this type of instrument. Nevertheless, the mode by which social groups are influenced arouses the interest of business professionals globally, even if, until today, few assumptions have been proven. There are effective methods and disciplines to analyze influence on social groups, such as anthropology and biology. Neuroscience is now contributing significantly to this field because it has enhanced the ability to understand how the brain makes decisions in the social context.

After realizing the world differently and doing what needs to be done, the innovator spreads his ideas in society, creating true foibles among consumers. This can be accomplished through social intelligence, which can be summarized as the capacity to make a particular idea stay on in people's minds.

Recent neuroscience experiments have revealed which circuits in the brain are responsible for functions such as understanding what other people think, empathy, fairness, and social identity. These brain regions play key roles in whether or not an individual can convince other people of his ideas (Berns, 2010, p. 9).

There are two ways to sell or to spread an idea. The first refers to the allusion to new things; this works conveniently for teenagers with a still-developing brain (seeking uniqueness). The second refers to the possibility of spreading an idea through familiarity; this tactic works effectively on adults with already developed brains. Of course, cultural patterns influence such contexts, but only to a certain extent, because the physiological factors of brain evolution are strong enough to ensure the action of individuals in the face of these stimuli into their unconscious.

### 3.4. Innovation and decision-making systems

If innovation means to combine productive factors in different ways in the production of goods and services in the market, then, logically, everything else in the production process will also be transformed. A good example is what happens to consumers who are educated by the supplier in terms of the new product or service. However, all this happens dynamically, as in a board game that has endless rounds in which the player acquires game experience in each round by interacting with rules, opponents, partners, and so on. This knowledge modifies not only the way a player plays, but also the game itself. For the innovative professional this is no different, he will gain experience by adopting the best practices in terms of innovation.

As seen previously, to perform these "good practices" or neuroinnovation, the professional needs to develop the habit of seeing market opportunities through keen perception, of facing fear, and of developing social intelligence. This happens through a process of repetition suppression, by which the brain will spend less energy through the specialization of some groups of neurons, that is, it will develop neuroinnovation; a process that was rational (system 2) becomes automatic (system 1).

It is possible to interpret the dynamism of the innovation process as essentially dialectic. Referring to Wikipedia, the following definition of dialectic can be found: it is the science that shows how contradictions may be identical, in particular as they pass each other, also showing why the reason should not take these contradictions as dead things, petrified, but as living things, moveable, fighting against each other in and through their interaction. Therefore, the innovation process, as noted earlier, is associated with systems 1 and 2 being seen as a dialectical process considering the following: *a.* they coexist; *b.* they are two antagonistic systems; and *c.* they influence each other.

It is possible to interpret the process of developing innovations through the logic of the model of brain learning (Barton, 2011, p. 10).

- Step 1: unconscious ignorance;
- Step 2: conscious ignorance;
- Step 3: conscious knowledge;
- Step 4: unconscious knowledge.

Before interpreting the innovation process under the prism of the functioning logic of the brain learning model, a simple example may illustrate the process. The example is of a little boy who is learning to ride a bike. In this case, "unconscious ignorance" happens when the little boy does not know there is a bike, much less that the act of pedaling the bike exists; in "conscious ignorance," the little boy knows that there is a bike and that he has to pedal the bike, but he does not know how to



pedal it; in “conscious knowledge,” the little boy knows that there is a bike, that he must pedal it to cycle, and he pedals in an unnatural way, therefore using system 1 for cycling; in “unconscious knowledge,” the little boy is already cycling naturally and not thinking too much about how to pedal, just pedals – without thinking much about the mechanical act of pedaling – and likes it.

In the market professional situation, something similar happens on this basis:

- Step 1: unconscious ignorance – the professional does not know that innovation exists and therefore does not know what to do to innovate;
- Step 2: conscious ignorance – the professional knows that the act of innovating exists, but he does not know how to innovate.
- Step 3: conscious knowledge – the professional knows that innovation exists and tries to innovate through a conscious stimulation of his perception, through the control of fear, and through his social intelligence.
- Step 4: unconscious knowledge – the professional knows that innovation exists, he knows what to do, and does it automatically.

Thus, innovation is a complex process that can be interestingly visualized through the dialectic: systems 1 and 2 coexist, are antagonistic, and feed themselves. This process happens through repetition suppression, the process through which some groups of neurons become experts in the development of innovation (through the stimulus of perception, control of fear, and development of social intelligence, as seen).

#### 4. Conclusion

This strange new world – so dynamic, competitive, and watched – is full of opportunities for innovative professionals, since innovation is developed consistently and allows the systematic development of differentiated products and services.

The best way to analyze innovation is through the understanding and use of the decision-making systems (system 1/ unconscious and system 2/conscious). Innovation is a human ability. Thus, basing the analysis thereof on human variables is prudent and closer to the reality of how people behave in their everyday life.

Creativity is the raw material of invention. Creative people have the ability to see solutions that no one else can see. However, creating is not something simple for ordinary professionals. Creative people may be a threat to the *status quo* in the company; and innovation depends on the level of connections and influence that a professional has in his social groups.

Modern neuroscience allows a deep understanding of the professional innovator's decision-making process. Nowadays it is possible to see what happens to the body and brain when an insight happens.

Another worthy point in the study of creativity and innovation is the profile analysis of innovative professionals. According to Gregory Berns, innovative professionals have a keen perception to find market opportunities. From this perspective, these professionals know how to deal with and control the feeling of fear when presenting their ideas and when facing the effects resulting from trying to innovate in a social environment context; they also have a high social intelligence that allows them to introduce new (potentially threatening) ideas in a more familiar way, including the possibility of using their good reputation.

The ability to innovate is a skill that can be learned. Just as with any other scientific discipline, this can be learned through the process of repetition suppression by which groups of neurons specialize in certain tasks (or information). Thus, a process that was based on system 2 now becomes automatic, and therefore, now belongs to system 1 of decision making.

Considering the potential of behavioral economics as an analytic tool, it is possible to consider a general improvement of the analytical basis for implementing a survey in order to understand people's behavior in the economy. The understanding of creativity for innovation in products and services can allow marketers and other business management professionals the ability to visualize how specific behaviors can transform systematically transforming creative ideas into products in the market, and how consumers react when they interact with these products and services in the market.

#### Conflicts of interest

The authors declare that there are no conflicts of interest.

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