

PRIVATE LABEL BRANDS VS. NATIONAL BRANDS: THE EFFECT OF TASTE ON
CONSUMERS' EMOTIONS, PERCEIVED TASTE AND WILLINGNESS TO BUY

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Abstract

Private Label Brands (PLB), which are sold under a retailers' brand, demonstrate increasingly levels of quality and acceptance. National Brands (NB) are owned and advertised by a specific brand.

Taste is one the most important factors of decision for consumers' regarding food products. However, most research on this subject falls under the domain of traditional methods relying many times on inaccurate results, as it is not possible to fully measure and understand what consumers' truly feel. The experience conducted for this dissertation (N=19) in an adequate laboratory with the use of Consumers Neuroscience methods, more specifically Electrodermal Activity, evaluated through blind and non-blind taste tests, the actual effect of taste on consumers' Emotions (Arousal), Perceived Taste and Willingness to Buy. Valence was also measured through the Self-Assessment Manikin.

Findings demonstrate that even though national brands are still perceived by consumers as superior, consumers' willingness to buy will not necessarily be higher for national brands. The finding that consumers' decision will not always be in favour for the product which is perceived of highest quality (i.e. NB), leads to the conclusion that the "quality gap" is fading and the two are increasingly equitable and is now crucial to tackle the "branding gap".

Keywords: Private Label Brands; National Brands; Consumer Neuroscience; Consumer Goods.

JEL Classification System:

M30 - Geral

M31 - Marketing

Resumo

Private Label Brands (PLB), vendidas sob marca dos retalhistas, demonstram cada vez melhores níveis de qualidade e aceitação. Por outro lado, National Brands (NB) são marcas de detidas e publicitadas por uma entidade específica.

O sabor é o factor de decisão mais importante para os consumidores em relação aos produtos alimentares. No entanto, a maioria das pesquisas neste assunto enquadra-se no domínio dos métodos tradicionais dependendo muitas vezes de resultados imprecisos, uma vez que não é possível medir e perceber a nível fisiológico, o que os consumidores realmente sentem. A experiência conduzida para esta dissertação (N = 19) em laboratório adequado, LAPSO, com o uso de métodos de *Consumer Neuroscience*, mais especificamente *Electrodermal Activity*, avaliando através de testes de sabor em cenário cego e não cego, o efeito real do sabor nas Emoções dos consumidores (Excitação), *Perceived Taste* e *Willigness to Buy* (WTB). Valência também foi medida através do *Self-Assessment Manikin* (SAM).

Os resultados demonstram que NB ainda são considerados pelos consumidores como superiores a nível de qualidade, porém o WTB dos consumidores não será necessariamente maior para NB. O resultado de que a intenção de compra dos consumidores nem sempre é favorável ao produto considerado de melhor qualidade (NB) leva à conclusão de que a "desigualdade da qualidade" está desaparecendo e que os dois são cada vez mais comparáveis, sendo agora crucial enfrentar a "desigualdade da marca".

Key-words: Marca Branca; Marca Fabricante; Comportamento Consumidor - Neurociência; Bens de Consumo.

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Executive Summary

Whereas Private Label Brands (PLB) are products sold under a retailers' brand, not necessarily produced by retailers themselves, National Brands (NB), are owned, managed and advertised by a specific brand. PLB increase in popularity was due to the financial crisis of 2007 and the sub-prime of 2009. More interesting is the fact that consumers' confidence in PLB products and quality were firmly established, to the extent that consumers' didn't return to NB even in times of prosperity. In order to understand this shift, it is necessary to first understand human motivation. Motivation theories focuses on what drives consumers into a determined behaviour, two mainstream foundations can be found in the literature: mechanistic theories and Organismic Theories. Two important concepts that rose from these two foundations are the notions of "intrinsic" and "extrinsic" motivation. This research will focus on the effects of intrinsic cues, since there is a general agreement that it is important to move beyond the effects of exhaustively researched cues such as: branding, price; packaging; other extrinsic cues. Of most importance for food products, is the cue of taste, which is regarded by some as singularly the most important. Taste has been researched in literature through traditional methods, such as taste tests and surveys, which rely on the consumers' view of the product, not its actual feelings, thus creating the concept of perceived taste. This research however, moves beyond the traditional methods of investigation, relying instead on actual measures of consumer neuroscience (CN). CN is related to neuromarketing which links the individuals' underlying physiological mechanisms with the human behaviour, through the usage of different methods, such as heartbeat, electro-dermal activity (EDA), fMRI. It is by observing the effects of distinct stimulus into the human physiological anatomy, that CN infers its behavioural conclusions. Emotions are the expression of this physiological effects, which then result into an adequate behaviour depending on whether the emotion is positive or negative. Food triggers emotions of arousal and valence into consumers', which ultimately impact consumers' perceived taste, and also, decision-making. For this reason, it will be assessed how emotions (arousal and valence), affect consumers perceived taste and willingness to buy (WTB), when exposed to PLB and NB. A common method to understand this dynamic is to rely on blind and non-blind taste scenarios. Besides moving beyond the extrinsic attributes, it is by introducing the element of sensorial analysis through actual methods of evaluation that this research truly sets apart from existing literature. In a controlled environment of a laboratory, LAPSO, arousal was measured through electro-dermal Activity equipment (N=19). Three bundles of chocolates were selected, comprised of two identical chocolates, but one of which is a PLB and the other a NB (e.g. Twix

vs. Twix Pingo Doce). The experiment took approximately thirty minutes, with participants arousal being measured (through EDA) in a blind scenario and then in a non-blind scenario. Four final factors were obtained: F1=BlindPLB; F2=BlindNB; F3=NonBlindPLB; F4=NonBlindNB. Immense care and precaution was given in order to allow maximum feasibility of the experiment, accounting for appropriate baseline periods allowing participants emotions to stabilize. Also, between the different factors consumers filled a questionnaire accounting for arousal and valence (through Self-Assessment Manikin Method - SAM), allowing for the comparison of objective and physiological methods, perceived Taste, WTB. It was expected that in a blind setting, that ArousalEDA, ArousalSAM, ValenceSAM, perceived taste and WTB to be similar for PLB vs. NB. On the other hand, in a non-blind scenario, it was expected for the latter concepts to demonstrate higher levels for the NB than PLB. All the assumptions were held for the blind setting, aligning this way with literature expectations. It was in a non-blind scenario that findings were interesting, demonstrating a discrepancy between arousalEDA and arousalSAM. While arousalEDA is aligned with literature, arousalSAM does not hold, suggesting that consumers do not feel more aroused for NB. Moreover, valenceSAM is also not aligned with literature, suggesting that consumers do not feel better about NB. To make it even more intriguing, is the fact that Perceived Taste was found to be higher for NB as opposed to PLB, as expected. So, the question was then how to resolve this standoff. This is where the importance of relying on actual sensorial methods as opposed to objective measures is reinforced and established. Following literature consensus that sensorial measures, such as EDA, are superior to measures that depend on consumers' rationale, a prevalence was given to the results of arousalEDA. This was further backed, as perceived Taste demonstrates a preference for NB in a non-blind setting, aligning with arousalEDA. Moreover, it is important to notice that participants WTB in a non-blind scenario was not higher for NB, even if arousal and perceived Taste were higher, which leads to very interesting conclusions.

This research concludes that even though NB are still considered as being superior and of better quality (i.e. perceived taste), triggering more positive feelings on consumers', PLB quality as intrinsically grown as comparable to NB. This is demonstrated by the fact that in a blind setting, with a single cue of taste, no differences of either arousal or perceived Taste or WTB were found. This increase in confidence for PLB, is what leads consumers to not opting to buy NB, even if they perceived them as superior. Thus, it is ultimately concluded that the "quality gap" is fading and is now time for the "branding gap" to be tackled.

1. Introduction

In accordance with the definition of the American Marketing Association (AMA, 2016), a brand identifies the goods and services of a manufacturer and differentiates them from those of the competition. National Brands (NB) are owned and advertised by a specific manufacturer while Private Label Brands (PLB), in turn, are defined as products which are sold under a retailer's brand, not usually manufactured by retailers themselves, and can either be sold under the retailers' own brand name or a distinct and exclusive name (Private Label Manufacturer's Association, 2016). Since their appearance in the late 1970s, PLB have established themselves firmly in the modern retail landscape of developed economies and particularly Europe (Weib, 2015). However, private label brands were initially associated with poor quality levels, since they were restricted to pushing heavily discounted goods with a simple and basic packaging (PWC Report, 2011). It was during the 1980s that PLB quality was improved and their resemblance to national brands increased (International Markets Bureau, 2010). Also, PLB started being of importance towards retailers, allowing a standardized low margin sector as the retailing industry, more specifically the Fast Moving Consumer Goods, to obtain positive increments in their overall margins, since PLB, as opposed to NB, have shown a 44% increase in their Gross Profit Margin (Davies and Brito, 2002). The value for money for both consumers and retailers (lower prices for consumers and higher margins for retailers) has therefore established the explicit importance of this category. According to Kamakura and Du (2012), consumers' consumption habits in times of financial crisis suffer alterations. This is well observed on the USA and Europe during the financial crisis of 2007 and the Sub-prime mortgage crisis of 2009. From 2003 up to 2007, Portugal GDP Annual Growth rate has seen a positive tendency, demonstrating economic recovery and prosperity since the Crisis of 2001. However, in 2007, with rippling effects of the USA crisis on Europe, Portugal faced a negative GDP Annual Growth of 3% and minus 4% in 2009 and 2012, respectively (The World Bank, 2016). Since 2012, GDP's rate is once again rising, recovering from the crisis and showing signs towards economic prosperity. Portugal, in 2009 demonstrated an alarming Unemployment Rate of 9.4%, and a record-breaking of 16.2% in 2013 (Pordata, 2016). Private Consumption among Portuguese families tumbled both in durable goods, with a decrease from 11M€ in 2008 to 7M€ in 2012, and in non-durable goods, from 107.868,2 M€ in 2008 to 106.643,7 M€ in 2012. This is an indication that consumers shift, out of necessity, their focus and importance of consumption towards primary necessities as opposite to less frugal goods.

In regard to food consumption, since this is where families allocate most of their spending it is important to notice that this need to save money on daily necessities, cause consumers to become more price sensitive and shift their focus towards private labels brands, which deliver acceptable levels of quality at a reasonable price (Weib, 2015; Sethuraman & Mittelstaedt, 1992). Moreover, according to Goldsmith et al. (2010), consumers don't return to NB after being satisfied with PLB. This continuity of consumers' consumption of PLB even in times of economic recovery, is according to Lamey et al. (2007), due to an acquired familiarity with the product, and also, trust on the products quality. Thus it is important to understand what drives and distinguishes consumers' choices of food products, which elements play a role into deciding for one product in detriment to another.

1.1 Investigation Objectives

In order to understand consumers' evaluation and decision-making in regard to food, this research will focus on understanding how emotions (i.e. arousal and valence) affect taste, as taste is considered the most relevant cue in decision-making (Lowengart, 2012). Taste is an intrinsic stimuli, as opposed to the already extensively researched extrinsic stimuli found in literature (e.g. branding; packaging; price) (Field et al., 2009). Moreover, this research further enriches existing literature by relying on sensorial methods (i.e. electrodermal activity), instead of objective measures. Thus, this research purpose and objective is:

1. To theoretically contribute to pre-existing literature on consumers neuroscience, by focusing instead on intrinsic stimulus and sensorial methods, as opposed to extrinsic stimulus and objective measures. By reinforcing or shedding new views on consumer neuroscience, it contributes to a more comprehensive understanding of the relevance of PLB and its dynamic with NB, and also, a better insight into consumers' decision making, especially since they increasingly are faced with a PLB vs. NB choice, allowing for distinct managerial implications to be made.

1.2 Dissertation Framework

This dissertation is structured within 8 chapters, as follows:

1. Introduction

This chapter's purpose is to introduce the main topic of the research, by highlighting the importance of PLB and NB throughout history and economic scenarios. It also highlights the objective of this research along with its theoretical and practical contributions.

2. Literature Review

In order to understand consumers' what affects consumers' and drives consumers' decisions it is first necessary to understand the Motivation Theories. This will allow for a broad understanding of the notions of intrinsic and extrinsic stimuli, perceived taste, blind vs non-blind taste tests and the importance of consumers neuroscience and its sensorial methods of research. This serves as a basis towards a solid and robust theoretical framework.

3. Theoretical Framework

This chapter serves as a link towards literature and methodology. It leverages on literature to outline the hypothesis development. Only by linking both, it is possible to develop relevant hypothesis allowing for a robust methodology process.

4. Methodology

Given that this research relies on sensorial methods, a great care had to be directed towards ensure maximum feasibility of the results. This chapter describes the methodological approach, detailing its specifications and the advantages of sensorial methods as opposed to objective methods. Moreover, it describes the design and procedure, accounting for all the necessary steps towards ensuring a valid investigation and achieving robust results.

5. Results and Discussion

Subsequently, a summary of how the results were attained through Acknowledge software. Results from SPSS procedures are presented, accounting for the validity of the hypothesis. Followed by a discussion section, breaking down and shedding possible insights on the results, taking into account existing literature. Finally, a conclusion is presented, accounting for the main findings of this thesis and its limitations, suggestions and implications.

2. Literature Review

2.1 Motivation Theories

According to Deci and Ryan (1985), Motivational theories sets its foundation on two main and transversal constructs, which are: energy and direction. According to the authors, energy is a matter of needs and should therefore consider both the nature of needs that are innate to a human organism, and also, the needs which are influenced and adopted with interaction with the environment. Direction concerns all organism processes and structures which act upon a stimuli, either internal or external, resulting in action. In simple terms, the authors simplify

motivational theories as a study of human needs and behaviour, with interest on understanding the cause and “why” of that behaviour. The link between motives and behaviour is integral, since one relates innately to the other, as DeCharms (1968) simply defines, motives as the causes of behaviour.

According to Deci & Ryan (1985), two approaches to motivational theories can be found in literature, which are the Mechanistic theories, which views humans as passive and responsive to physiological and environmental stimulus, and on the other hand, Organismic theories, which view human organism as active and with initiative towards behaviour (as seen in Deci & Ryan, 2000a). Several pivotal theories can be highlighted on the spectrum of motivational theories, such as Hull’s drive theory. The nature of Hulls drive theory falls under the spectrum of organismic theories, as Hull (1943) states in his book entitled *Principals of Behaviour*: “At the outset of the independent life of an organism there begins a dynamic relationship between the organism and its environment”. Also the Self-determination Theory founded by Deci and Ryan, which sets its foundations on the assumption that humans are active and growth-oriented organisms (Deci & Ryan, 2000b). According to Deci & Ryan (2000a) it was through White’s (1959) experimental research on animal behaviour, which observed that many organisms had innately curiosity-driven motives leading to an exploratory drive, thus acknowledging for the first time, the concept of Intrinsic Motivation. However, several studies highlight the importance of External Motivation, such as the above mentioned self-determination theory, which derives from studying the effects of extrinsic rewards on intrinsic motivation, and other studies such as Lepper et al. (1973) as seen in Deci & Ryan (2000b) which suggest that with the introduction of extrinsic rewards when an individual acts upon an intrinsically interesting activity, a shift towards a more dominant extrinsic behaviour becomes salient (Deci & Ryan, 2000a; Deci and Ryan, 2000c).

2.2 Intrinsic vs. Extrinsic Motivation

Intrinsic motivation takes place when behaviour is intrinsically linked with the organisms own interest and enjoyment, with no regard to other rewards, engaging in this way in a task for its own well-being (Isen & Reeve, 2005; Veale & Quester, 2009). According to Harackiewicz (1979), as cited by Isen and Reeve (2005), empirical literature has defined and measured intrinsic motivation in two distinct ways: 1) through a self-belief and own acknowledgement of how enjoyable the task is; 2) through behavioural measures of choice and the time taken to be

in contact and engaged with the task in a moment of free-choice with no influence of rewards or incentives.

It's when moving beyond motivation that the real importance of these theories arise, which allow to understand the impact of distinct intrinsic and extrinsic cues on consumer behaviour. For instance, Kasser and Ryan (1993, 1996), defined the term of intrinsic aspirations, which are closely linked to basic needs of satisfaction, such as: goals for affiliation; community contribution; personal growth (as seen in Deci and Ryan, 2000b). Distinctively, on the other side, the authors define extrinsic aspiration which is related to external measures of worth, such as fame, wealth and reputation. Moreover, these studies with origin on motivation, grow in importance when dragged towards the realm of consumer decision-making. Espejel et al. (2007), studied the interaction and influence of perceived quality (of Intrinsic vs. Extrinsic attributes) on consumer satisfaction, loyalty and purchase intention. The implications of quality in decision-making are of great relevance to this research and it is important to dig deeper, understanding this way which quality cues impact consumer's emotions and purchase intentions in the food category and PLB vs. NB dynamic.

2.3 Perceived Quality

Zeithaml (1988) refers to Holbrook and Corfman (1985), which note that early philosophers would use the word "quality" referring to explicit features (i.e., properties or characteristics) of an object perceived by a subject.

Meiselman (2001), separates quality into three constructs: quality based on the product; quality based on the consumer; quality based on product-consumer in a service setting. The two first constructs go in line with the concept of quality determined by Brunso et al., (2005), which is separated into two domains: objective quality and perceived quality. Objective quality relates to the technical superiority or excellence of a product/service, which is, by its own nature, measurable and verifiable. On the other hand, subjective or perceived quality refers to the consumers' value judgements or perceptions of quality based on a pre-determined notion of standards. Whereas before consumer models of food quality would focus on objective quality, nowadays, they are increasingly being considered as perceived quality models (Meiselman, 2001). Richardson et al., (1994), further deepen the importance of studying perceived quality, by arguing that quality perception has been found to be more important than objective quality in influencing consumer purchase intention of PLB. The importance of perceived quality for this research is immense since this construct, according to Espejel et al., (2007) and Zeithaml,

(1988), can be compared based on its excellence and superiority with similar products, such as a scenario of PLB vis a vis NB, with one being ranked higher or lower. However, in order for consumers to evaluate quality it is necessary that information on the quality of the product/service is available through quality cues, which are, according to Steenkamp (2007) informational stimuli which allow consumers to compare its own evaluation of the product with its own demands (As seen in Bernués et al., 2003). Thus the relation between quality and motivation theories is inseparable, with Veale (2009) and Espejel et al. (2007), referencing several authors confirming that consumers' classify the concept of quality into two main factors, which allow them to evaluate and shape their opinions on either the experienced or expected outcome of the product: intrinsic and extrinsic attributes (Lee & Lou, 1996; Olson and Jacoby, 1972; Olson and Jacoby, 1976; Olson and Jacoby, 1978; Szbillo & Jacoby, 1974; Ophuis & Trijp, 1995; Steenkamp, 1997; Zeithaml, 1988). Extrinsic cues, which are related to the objective nature of the product itself, have demonstrated to influence consumers' perceptions of product performance and quality can be: price; brand name; brand image; company image; advertising budget; packaging; country of origin seals; among others (Veale & Quester, 2009; Field et al., 2009; Zeithaml, 1988). Intrinsic cues, include the attribute of taste, texture, aroma, shape and appearance features such as colour and form (Meiselman, 2001; Espejel et al., 2007; Field et al., 2009; Olson & Jacoby, 1972; Bernués et al., 2003)

However, as important as extrinsic cues can be, according to Field et al., (2009), in their studies of the influence of brand name and product packaging, the authors tricked participants by exchanging cookies between packages. For the experiment, the authors took the PLB cookie (Great Value) and switched to a NB package (Chips Ahoy), "blinding" consumers. The same was done for the NB cookie, which was placed into the PLB (Great Value) packaging. The research demonstrated that although packaging did play an effect on consumers', this was not statistically significant. Thus, the authors suffice that brand name and product packaging (both extrinsic cues) are insufficient in overcoming deficiencies in consumers' perceptions of intrinsic attributes, reinforcing reinforce that quality increase of food products is a must if retailers wish to increase PLB acceptability and gain additional market share. For this reason, this research will be move beyond the extrinsic attributes, and focus on the intrinsic attributes of food products.

2.4 Beyond Extrinsic Cues: Perceived Taste

Agarwal & Teas (2002), clearly lay ground for the importance of this research focus on quality, by stating that a direct link exists of PLB to quality, followed by price and finally, to the reputation of retailer. However, according to Veale & Quester (2009) the influence of price and other extrinsic cues, have already been previously studied and assessed, as for the case of Hurling and Shepherd (2003), Pechmann & Ratneshwar (1992), Wansink et al., (2000) with the use of a variety of sensory evaluation methods, such as taste tests and visual. Moreover, ongoing research suggests that price individually falls short of explaining consumers buying intentions (Walsh & Mitchell, 2010; Nielsen Report, 2014) and other factors should be included in analysis. Other factors of influence towards consumers' motives to choose PLB over NB must be taken into consideration, such as: previous experience with PLB; value consciousness of the consumer; demographics and personality traits; branding; advertising; store image/reputation; expectations (Kara et al., 2009; Wyma et al., 2012; Field et al., 2009; Lowengart, 2012; Bao et al., 2011).

However, this research focus is directed towards the cue of taste which is a very important factor for consumers' when in a situation of decision regarding food products (Allison & Uhl, 1964). Lowengart (2012), goes to the extent of citing several authors within empirical literature, as the likes of Holm & Kildevang (1996), Koivisto & Sjöden (1997), Moskovich, et al., (2005), which agree and consent that taste is singularly the most important factor for consumers' when choosing food products. For this reason, it is crucial to understand how taste affects consumers and how is it perceived when faced with an option of a PLB vs. NB, ultimately understanding the outcomes for decision-making, thus rises the concept of Perceived Taste.

2.5 Taste in a blind vs. non-blind condition of PLB vs. NB

A common practice in literature of PLB and NB is to compare this two in a setting of blind and non-blind conditions. Field et al., (2009) mention two studies, Allison & Uhl (1964) and Angela (2006), which rely on blind and non-blind conditions to understand the branding impacts of consumers' preference for NB over PLB, or vice-versa. The research of Field et al., (2009), although not purely of blind vs. non-blind format, it replicates this scenario by switching products of its packaging, thus tricking and "blinding" consumers'. Lowengart (2012) research aims at understanding the effects of branding on consumers choice, by having participants taste in a blind and non-blind scenario while measuring the sensorial impacts of taste in consumers' and their choice over PLB or NB. As the latter author says, by relying on blind and non-blind

taste tests it's possible to determine the effects of distinct cues (e.g. branding; taste; price; etc...), and review the differences of how consumers' choice switches from a setting of blind to a non-blind. This switch will demonstrate that consumers' evaluation of food and its constructs can differ simply by the nature of the product as being either a private label or national. Rossi et al., (2005) research analysed the effects of branding on sensory perception and purchase intention, also through blind and non-blind taste tests, finding relevant differences of choice between two settings. As Lowengart (2012) states, it is important to move beyond the singular evaluation of how branding and other cues impact consumer choice, preference or perceptions, and understand how this are affected when sensory-based factors are available. The above mentioned, and existing literature on the sensorial impacts of various cues on consumers choice and preference, restrict themselves by relying on surveys and not on actual sensorial measures, failing to understand its true impacts. By relying on objective measures, it is lost the possibility of understanding consumers' true and actual felt physiological affects towards a stimuli. Only through sensorial methods, it is possible to yield accurate findings on consumers' emotions, whereas through objective measures, a room for subjective and biased results exists as consumers' cannot always precisely express their emotions. The field of Consumer Neuroscience thus allows for a ground-breaking measurement of consumers' internal reactions to different stimuli, providing distinct views on pre-existing notions in literature.

2.6 Consumer Neuroscience - Origin

“We can say goodbye to those endless expensive bloody research groups where consumers' either lie their heads off or tell us what they think we want to hear” (Walton, 2004).

Figuratively, classical consumer research has depicted the human organism as a “black box”, which investigators were unable to gather direct insight, resorting so, to theoretical constructs that explain behaviour (Hubert & Kenning, 2008). Although the first remarks of the “black box” can be traced to the ancient greek philosopher, Plato, comparing the human soul to a chariot pulled by two horses, one of reason and one of emotion, only recently has the importance of emotion been established in the studies of the human mind. In the field of consumer behaviour, scientists have been relying on traditional tools of psychology in order to aid them on understanding consumers' behaviour and decisions and how this two are affected (Miljkovic &

Alcakovic, 2010). According to the latter authors and also to Morin (2011), researchers and marketers were restrained to limited techniques to understand what consumers' think about a product/service or advertisement, such as focus groups, interviews and surveys, which many times demonstrate a large discrepancy between what consumers' say they think and what they actually think. First, an assumption that consumers understand and are able to describe their cognitive process is somewhat dubious, since major subconscious components play part. Secondly, an array of different factors can lead participants to distort the reporting of their feelings, such as incentives, time and peer pressure. Howard and Sheth (1969), summarize the limitations of this techniques, stating that the result of an observable reaction to a stimulus (e.g., purchase) derives from an unobservable processing of this stimuli inside the organism (in, Hubert & Kenning, 2008).

The unobservable processes mentioned latter is diminished by various fields which adopted the prefix "neuro", such as: neuropsychology; neurophysiology; neuro-ethology; neuro-aesthetics; neuroanatomy; neuro-education; among others; which comprise the so called *Neuroculture* (Fisher et al., 2010). An important field of study that rose from this trend is Neuro-economics which resources to methods used in scientific brain research to employ conclusions on economic problems (Hubert & Kenning, 2008). Of more important notice to this research is a sub-area of neuro-economics that addresses marketing problems with methods and insights from brain research, Neuromarketing (Fugate, 2007; Lee et al, 2007).

2.7 Neuro-marketing & Consumer Neuroscience

Although the term neuromarketing cannot be credited to a specific individual (Morin, 2011), its earliest report was in a press release by an Atlanta advertising firm called BrightHouse, which announced in 2002, the founding of a marketing research business division which resourced to fMRI (Functional Magnetic Resonance Imaging) (BrightHouse Institute for Thought Sciences, 2002, as seen in Fisher et al., 2010). Neuromarketing implies a merge between the terms "neuro" and "marketing" and as a field of study it is simply defined as the employment of neuroscientific methods, to analyse and understand human behaviour in relation to markets and marketing (Morin; 2011; Alcakovic 2010; Lee et al. 2007). Neuromarketing brings the dimension of the brain perspective into consumer behaviour (Morin, 2011). An important distinction has to be made between neuromarketing and consumer neuroscience (CN). Consumer Neuroscience refers to the broader field of neuroscientific consumer research, while neuromarketing is more narrowly defined as the application of consumer neuroscience

findings within the sphere of managerial practices (Hubert & Kenning, 2008)¹. However, as exciting as the new dimensions that CN introduced, the increased attention it gained rapidly sparked great controversy (Fisher et al., 2010; Lee et al., 2007). The usage of neuromarketing findings raised ethical and social concerns with implications towards the self and free will (Roskies, 2002; Sebastian, 2014), with rising concerns that this field might one day threaten individual autonomy by effectively manipulating consumer behaviour (Murphy et al., 2008; as seen in Fisher et al., 2010). Fugate (2007), explains that the controversy resides in the exploratory, rather than confirmatory nature of neuromarketing. What the findings of neuromarketing brought is a powerful contribution that tear solid and inferred standard assumptions about brain functioning and consumer choice and decision making mechanism, thus suggesting more complex brain interactions, a broader role of emotions and a disconnection between conscious reasoning and internal preference. As Alcakovic (2010) states, many academics and private companies defend that this new methods will aid in better understanding humans/consumers by figuring out how they create, store and relate to various cues, such as brand elements. Moreover, the author refers to further contributions such as the increase in advertising effectiveness, with less usage of shock tactics and sexual imagery. It is important to note that a consent in literature is clear that the techniques offered by neuromarketing tackle the biggest flaw of traditional research, which is relying and trusting on peoples' judgement, by allowing marketers to study consumers' brain and gain valuable insight on the subconscious and behaviour.

2.8 Neuro-marketing Methods of Research

Several studies are of notable importance in this field, such as the academic research conducted by neuroscience Professor at Baylor College of Medicine, Read Montague, called the "Pepsi Paradox" published in 2004 (Morin, 2011). Citing Montague et al., (2011) his research relies on fMRI imaging to probe the neural responses that correlate with behavioural preference for noncarbonated versions of Coke and Pepsi. *Pepsi Paradox* research examined subjects' neural activity, by tracking blood flow to different brain regions in a scenario similar to blind and non-blind taste tests: 1) anonymous consumption of the drinks; 2) knowledgeable consumption of the drinks. As seen before by Fugate (2007), much of the controversy in this field is due to the exploratory nature of findings. Surely, the findings of the *Pepsi Paradox* fuelled great controversy and discussion, since it demonstrated different parts of the brain reacted on each

¹ The concepts will be used interchangeably.

scenario, raising fears of a hidden code to tweak our perceptions below consciousness (Morin, 2011). While participants preferred pepsi in the first scenario, with sharp activities on the ventromedial prefrontal cortex part of the brain, responsible for detection of appealing taste, in the second scenario, more than $\frac{3}{4}$ of participants' preference was directed towards coke, and surprisingly, different regions of the brain highlighted on fMRI imaging. These findings were a breakthrough since they demonstrated that emotional attachment to coke was higher than rational preference to pepsi (Montague et al., 2004; Alcaovic, 2010). Also of notice is Erk et al., (2002) which found that the ventral striatum can be an indicating measure of how attractive is a visual stimulus, with results showing that reward-related brain areas are increasingly activated as more reputable cars were considered, from small cars to limousines, and finally sports cars (as seen in Lee et al., 2007 and Hubert & Kenning, 2008).

Several methods of evaluation are available in the fields of CN, such as: fMRI; Electroencephalography (EEG); Magnetoencephalography (MEG); Positron Emission Tomography (PET); eye-tracking and pupil dilatation; galvanic skin response (EDA); electrocardiography; electromyography (Ângelo et al., 2013; Moura, 2014); analysis of blush, blinking, breathing or heartbeat (Fisher et al., 2010; Camerer et al., 2004). Kumar (2015) defines several of this methods, such as the fMRI, which is a medical procedure that measures brain activity by detecting oxygen levels in blood flow, since the more active the brain is, higher its oxygen necessity. EEG, measures and records electrical activity of the brain. Heart rate measures the number of heartbeats occurred in a space of a minute. Eye-tracking follows the focus of the eye and a pupilometer is able to measure the dilatation of the pupil when visual stimulus occur. Skin Conductance, which measures Electrodermal Activity (EDA), this is, the electrical changes of the skin properties depending on the level of moisture. Probably the most important contribution of CN is shifting the focus towards Plato's "horse of emotion", providing emotions, unconscious and automatic responses, a new dimension and relevance towards behaviour and consumer decision-making (Camerer et al. 2004; Hubert & Kenning, 2008).

2.9 Sensory, Emotions and Taste, Arousal and Valence

“I hesitate to say that men will ever have the means of measuring directly the feelings of the human heart. It is from the quantitative effects of the feelings that we must estimate their comparative amounts” – Jevons (1871), as seen in Camerer et al., (2004)

Singham et al., (2015) define sensory science as a multidisciplinary area comprising of the measurement, interpretation and understanding of human responses to product properties as perceived by the five senses: vision; hearing; taste; smell; touch. Zurawicki (2010) in his book entitled “Neuromarketing – Exploring the Brain of the Consumer” comprehensively addresses many aspects of CN and neuromarketing and its dependency, relation and effect with various concepts. The author affirms that human responses when measured by sensory analysis are comprised of emotions felt upon the existence of a stimuli, and even though this felt emotions remain by humans undetected, they do affect people’s behaviour. Emotions express what the world means to the individual and determine a subjective well-being (Frijda, 2007). In a more scientific basis, as Zurawicki (2010) says, emotions are diverse physiological reactions of a human body, such as hormonal responses, sexual excitement or changes in blood pressure and salivation (felt for example, when exposed to the smell and taste of food). Moreover, the author emphasizes the fact that even though the human brain structures itself with separate emotion and cognitive processes, this two interact and converge playing both a central role in determination of human action.

The senses of vision, hearing, taste and smell are designated as special senses and each rely on specific receptors (Zurawicki, 2010). Taste and smell both rely on chemoreceptors. Taste perception is achieved through taste cells, which are situated on the specialized structures of the tongue and the soft palate, known as taste buds. Also, of important notice towards the perception of taste is the sense of smell, which is capable of affecting the global experience of taste, called flavour. When an individual receives its first taste stimulus, a process is triggered in order to recognize taste quality. For this, the frequency of discharge of nerve fibres increasingly ascends until reaching its peak, all in a fraction of a second. In a mere two seconds after, the nerve fibres return to its initial state and the taste nerves start the transmission and connection with the brain stem, before reaching the thalamus and two regions of the frontal lobe, the insula and the frontal operculum cortex (Zurawicki, 2010) . Depending on how the signal is recognized by the brain, the food is either considered pleasant or unpleasant. Of importance is to understand where this sense of pleasantness derives from. Still referencing Zurawicki (2010), emotions are the domain of the limbic system, located on the subcortical part of the brain, comprising of: the hypothalamus; amygdala; thalamus; hippocampus; and combined with the cingulate cortex it is involved in emotion formation and processing, learning and memory. The hypothalamus is the source of many of most elementary feelings, such as hunger, thirst, chills and ultimately pleasure or pain. The almond shaped structure in the medial temporal lobe, commonly known as the amygdala, detains a privileged position of the emotional

guard in the brain (Zurawicki, 2010). It is the amygdala, which serves the purpose of a repository of emotional impressions and memories of which the human being is not entirely conscious. A research conducted by the University of California Los Angeles, with resource to fMRI, the amygdala acts as a threat-detector, with visible increased levels of activity for the amygdala while participants visualized Super Bowl advertisements (Sherman, 2007). The amygdala receives a stimulus via the “fast track” during the process of registering emotions, producing automatic and instantaneous reactions such as laughter or crying. However, it is a quarter of a second later that the information arrives in the cortex, where it is contextually evaluated, preparing the individual for a rational plan of action, such as buy or not? (Zurawicki, 2010). As seen before, a wide array of tests are available for the study of biological reactions of a stimuli and for this research, arousal will be measured through EDA and valence will be measured to the Self-Assessment Manikin (no available equipment for physiological measurement of valence during investigation period). These two methods are closely linked to emotions, with Zurawicki (2010) saying that skin conductivity is a sensitive gauge of emotional arousal and Damasio (1994) affirming that EDA, as an indicator of arousal, is able to observe differences in sweat, as more aroused an individual becomes, whether this is a positive or negative arousal (as seen in Kenning & Linzmajer, 2010). Valence is easily explained and exemplified by sadness involving negative valence, while happiness typically involves positive valence (Zawadzki et al., 2016). Russel (1980) and Watson & Tellegen (1985), as summarized by Zawadzki et al., (2016) account to the importance and relevance of studying this two constructs in combination, by affirming that emotions are composed of a distinct pattern of both valence and arousal, and therefore should be both examined.

3. Theoretical Framework

“Both (quantitative and qualitative researchers) begin with a concrete world and step into another world of abstraction” - Jeongeun Park, Minhye Park (2016)

Prior to defining the research questions, it is important to lay ground for accurately and relevantly setting such questions with a robust support from existing literature. Existing literature with sight on the dynamics and interactions between PLB and NB fall extensively under the effects of price, of which is important to move beyond (Veale & Quester, 2009; Walsh & Mitchell, 2010; Nielsen Report, 2014). Also extensively researched is the effects of branding on consumer preference and choice, such as the likes of: Fornerino and d’Hautville (2010); McClure et al., (2004); Sethuraman (2003); Nenycz-Thiel & Romaniuk (2014); Field et al.,

(2009), Lowengart (2012), Rossi et al., (2015). The importance of understanding what affects consumers choice for food products is of increasing importance, with Yeomans et al., (2007) going to the extent of analysing how human taste genetics and anatomy affect consumers hedonic responses to sweetness and, for instance, Drescher et al., (2008), Moore (2012) and Labbe et al., (2015) which studied the hedonic/utilitarian impacts on consumers perceptions of taste, emotions and pleasantness and choice of food products.

However, existing literature on sensory perceptions and emotions, measured by taste, as the likes of Lowengart (2012) and Rossi et al., (2015), fall short and fail to fully understand and measure the sensory cues and emotions that are actually felt by consumers when tasting food. Research under this domain is evaluated and measured mainly through surveys, a self-reporting method, which doesn't portray the true emotions felt when consuming the product, leaving room for a bias of subjectivity (Camerer & Yoon, 2015). As the latter authors say: "Neuroscientific methods allow for more proximal examination of implicit or unconscious processes by enabling researchers to identify the neural processes underlying consumers' responses". Plassmann et al., (2005) say that CN allows a sharpening of understanding about consumers' processes underlying information processing and decision making, such as attention, memory and emotion, offering revolutionary insights that are not constrained by traditional methods of memory and information processes, this way truly being useful to both academic scholars and marketing practitioners.

3.1 Hypothesis Development

The purpose of this research is to understand the differences in consumers' emotions, perceived taste and willingness to buy, based on whether the product is a PLB or NB. In order to understand this discrepancies, common practice within literature is to rely on blind and non-blind tests. This method allows for an understanding of the dynamics of choice between this two types of products and also, to evaluate the impacts of singular attributes on choice (e.g. price; branding; hed/ut; others...). Three studies are of pivotal importance for the definition of the Research Questions, which are Lowengart (2012), Rossi et al., (2015) and Field et al., (2009). All the mentioned rely on blind and non-blind testing as a means to understand consumers' differences of choice, with the exception of Field et al., (2009), which uses a similar approach.

Lowengart (2012) through blind vs. non blind taste tests of wine, suggest that firstly consumers should be tested in a blind condition, thus acknowledging their actual and true preference (with

no influence of cues other than taste), and that is expected that consumers emotions and preference will be similar for both NB and PLB. Moreover, Rossi et al., (2015) research expected that consumers' sensory perceptions and purchase intention would be similar for PLB and NB in a blind setting. For this reason, the following research questions are defined:

H1A: Emotions measured by ArousalEDA - will be similar for NB and PLB when faced a blind condition.

H1B: Emotions measured by ArousalSAM - will be similar for NB and PLB when faced a blind condition.

H1C: Emotions measured by Valence - will be similar for NB and PLB when faced a blind condition.

H1D: Consumers' Perceived Taste will be similar for NB and PLB when faced a blind condition.

H1E: Consumers' WTB will be similar for NB and PLB when faced a blind condition.

Both latter studies, when evaluating in a non-blind condition, expected and concluded the opposite of the research questions defined, with consumers' sensory perceptions, preference and purchase intentions higher for NB vs. PLB, due to the effect of branding. However, it is important to notice that this research will not be evaluating branding, but focusing on solely the effects of taste on the rivalry of PLB and NB. Moreover, Field et al., (2009), which "blinded" participants by exchanging cookies from its packaging between PLB and NB, noted that branding had a positive effect and that NB boasted more positive ratings of taste and preference, even though consumers would be tasting a PLB cookie in a NB packaging. For this reason, the following research questions are defined:

H2A: Emotions - ArousalEDA - will be higher for NB vs. PLB when faced a non-blind condition.

H2B: Emotions - ArousalSAM - will be higher for NB vs. PLB when faced a non-blind condition.

H2C: Emotions - Valence - will be higher for NB vs. PLB when faced a non-blind condition.

H2D: Consumers' Perceived Taste will be higher for NB vs. PLB when faced a non-blind condition.

H2E: Consumers WTB will be higher for NB vs. PLB when faced a non-blind condition.

Also, it is important to understand the effects of emotion, with existing literature, as the mentioned above, all suggest that with positive emotions, higher the Perceived Quality, and vice-versa. Moreover, according to literature and with special focus in Grewal et al., (1998), it is determined through the proposed model that Perceived Quality is linked with WTB, exerting a positive influence on consumers' WTB.

H3A: Level of emotion positively influences Perceived Taste.

H3B: Level of Perceived Taste positively influences WTB.

Thus, the proposed conceptual model based on theoretical framework is the following (Figure 1).

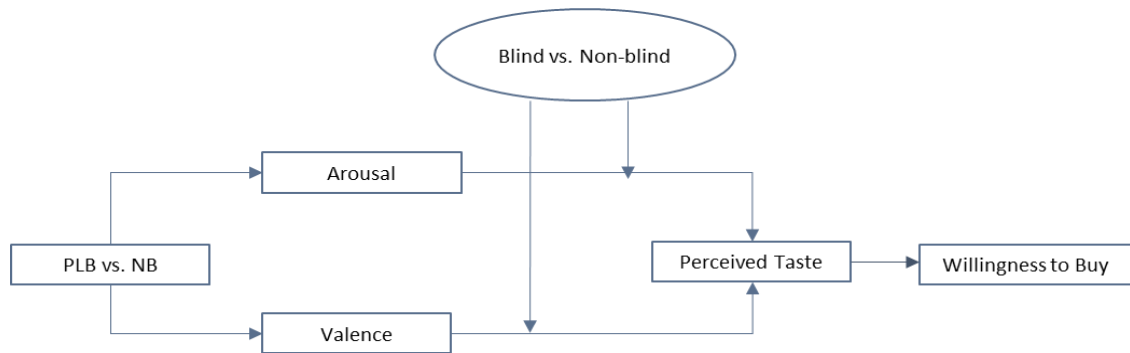


Figure 1 – Conceptual Model

4. Methodology

4.1 Methodological Approach

Park & Park (2016) state that there is no single set of procedures which can be defended as optimal, as each methodological process must be able to accurately and in the most effective manner answer its theoretical questions and problems. For this reason, the authors say that each approach should be adapted to its context and intentions of results. The latter authors also state that excellent quantitative approaches can be attained by leveraging on a combination of experimental design and survey. For this reason two paths will be adopted, in order to yield more robust and conclusive insights. A crucial and very important sensorial analysis with foundations set on actual consumer neuroscience techniques, such as skin conductance, since one of the greatest advantages of this methods is the simultaneous possibility of experiment and measurement of the impacts of a stimuli (Hubert & Kenning, 2008). However, the registered emotions with use of this methods, falls short on evaluating and assessing what do those emotions mean. This is, although it registers physiological changes in the human organism, it does not assess the nature of that stimuli, as for instance, if it was good or bad. For that reason, as Park & Park (2016) say, surveys aid in identifying and isolating specific variable within context, seeking correlation, relationship and causality of the study. Complementing the experimental procedure with a survey allows a degree of comparison, bridging between emotions felt and their nature, with participants' outcome. For this, the self-assessment manikin method will be resourced to. This combination of methods will allow to understand if consumers felt emotions portray accordingly reactions and intentions.

4.2 Self-Assessment Manikin, Willingness to Buy and Perceived Quality

According to Lang (1969) the hardest method of measurement of emotions is through affective reports, as opposed to physiological reactivity and behavioural acts (as seen in Bradley & Lang, 1994). For this reason, Lang (1980) and Lang et al., (1985), as seen in Bradley & Lang (1994), constructed a picture-oriented method called the self-assessment manikin (SAM) which directly measures the pleasure, arousal, and dominance associated in response to an object or event. SAM has been widely used in a variety of occasions for effectively measuring emotional responses, as seen in Bradley & Lang (1994), such as reactions to pictures (Lang et al., 1989; 1993), images (Lang et al., 1987), sounds (Bradley, 1994), painful stimuli (McNeil & Brunetti, 1992) and with children (Greenbaum et al., 1990) anxiety patients (Lang et al., 1988), and

psychopaths (Lang et al., 1993). SAM relies on three core constructs of emotion, which are: pleasure; arousal; dominance. However, according to Bradley & Lang (1994), it is pleasure and arousal that account for most of variance in emotional judgement. In Guerreiro et al., (2015), when studying attention, emotion and cause-related marketing, the construct of dominance was also singled out due to low correlation levels, citing Donovan and Rossiter (1982), Mehrabian (1995) Russell and Pratt (1980) and Vieira (2013). Thus, this study will be using a two-dimensional approach, with focus on arousal and valence. The non-verbal and graphic representations of pleasure and arousal in SAM, can be relied on a direct manner towards assessing the amount of this two constructs, while processing emotional stimuli. This method will be of particular importance due to the fact that, although skin conductance is a reliable method of evaluation of arousal, it fails to separate whether the stimuli evoked positive or negative reactions.

As seen before, emotions resulting on a stimuli of tasting leads to consumers' evaluating the product, through its perceived taste. It is first important to understand how perceived taste is affected through positive and negative emotions, thus being necessary to obtain a value measure of this construct. Grewal et al., (1998), proposed a model which this research will leverage on, allowing to numerically account for perceived taste through a seven-point scale ranging from (1) = *Strongly disagree* to (7) = *Strongly Agree*, based on three core items. An adaptation of the core items will be done, better tailoring the questions to a food product (the latter study focused on bicycles), thus changing the attribute of "durability" to "freshness":

1. The "product" appears to be of good quality.
2. The "product" appears to be fresh
3. The "product" appears to be reliable.

Moreover, as seen in the latter citation, perceived taste will have an impact on willingness to buy. For this reason it is important to determine the correlations and to bridge between perceived taste and its implications for consumers' WTB. Grewal et al., (1998) also proposed a model of a three-item scale ranging from (1) = *Very Low* to (7) = *Very High*, which measured in combination account for a value of WTB:

1. If I were going to buy a "product", the probability of buying this "product" is?
2. The probability that I would consider buying this "product" is?
3. The likelihood that I would purchase this "product" is?

4.3 Sensory Analysis

The Social and Organizational Psychology Lab (LAPSO) is a laboratory used for psychology research, discovery, and learning within ISCTE-IUL facilities, boasting an array of equipment, material and software allowing for a diverse conductance of research on various fields. Sensory analysis of this research, as opposed to usual existing literature, which is conducted with no use of neurological methods, will be pursued within LAPSO facilities, with appropriate equipment and environment. With sight into pursuing a robust analysis of sensorial affects, a valuable method of evaluation and measurement of emotions will be used, which is Skin Conductance (EDA)².

Hike Plassmann's among the names of reference and highlight in the fields of Neuroscience and CN. In Plassmann et al., (2015) article analysing the last decade of CN, the authors' defines this fields applications, challenges and possible solutions. Transparency is key when conducting research and for ethical reasons it is important to understand where the advantages and disadvantages of this methods reside, thus acknowledging the benefits and limitations of this research. Five advantages are mentioned in Plassmann et al., (2015) research regarding the usefulness of CN:

1. **Identifying mechanisms:** Neuroimaging methods, for instance, allow a look into underlying mechanisms, at a psychological or physiological level, helping to validate, refine or extend existing marketing theories.
2. **Measuring implicit processes:** CN methods, with special incidence to neuroimaging, can provide information on implicit processes typically difficult to assess by other methods, mostly because this internal processes of the human body are usually not easily understandable.
3. **Dissociating between psychological processes:** Looking into the brain allows a before unattainable alienation of distinct process that may occur simultaneously when faced with a stimuli or decision, this way extending the knowledge on consumer behaviour.
4. **Understanding individual differences:** Neuroscientific methods can be used to understand individual differences enlightening on the sources of heterogeneity in consumer behaviour.

² For detailed information, see chapter 4.2

- 5. Improving predictions of behaviour:** By adopting multimethod approaches, establishing meaningful multilevel brain-behaviour relationships and incorporating this neural measures into decision-making models, will improve predictions of marketing-relevant behaviour.

Hubert & Kenning (2008), point out 4 advantages, which correlate with the mentioned above, which are: CN enables to reassess existing theories that are known to theoretically assume different brain mechanisms; observing the totality of the brain, has the potential to yield new and unpredictable results; CN methods may offer a more objective perspective than self-assessment methods, which rely on the responds own evaluations, which fail to observe sub-conscious mechanisms; lastly, the advantage of ability of a scenario of simultaneous measurement and experiment.

Both researches mentioned above acknowledge that CN is an area of revolutionary development and progress. The increasing usage of CN methods, generating meaningful progress and insightful findings across the world is the main counter-argument for its challenges, since more and more converging findings are being found within CN literature.

4.4 Experimental Design

According to Guerreiro et al., (2015) it is of crucial importance when conducting autonomic physiologic measurements, that studies are performed within controlled environments (Lohse, 1997; Pieters et al., 1999; Van der Lans et al., 2008; Milosavljevic et al., 2011; Reimann et al., 2011). This is of particular importance in order to diminish or even eliminate bias external stimuli, which can cause participants not to express their true outcomes. As seen previously, this experiment will be conducted under the safe environment of LAPSO. In order to allow robust conclusions, consumers will be tasting different chocolate types from the most sought-out local retailers, Continente, Pingo Doce and Lidl. Three bundles were created, each one comprising of similar PLB and NB chocolates, accounting for the different types of chocolates. The bundles were as follows (Appendix 1):

Bundles
Continente Milk Chocolate (No sugar added) vs. Guylian Milk Chocolate (No sugar added)
Pingo Doce Chocolate with Caramel and Biscuit (Twix) vs. Twix.
Lidl J.D. Gross Ecuador Dark Chocolate Berry vs. Lindt Excellence Strawberry

With this three bundles, a wide range and variety is targeted (i.e. bundle one is a tablet milk chocolate, bundle two a snack type chocolate and bundle three a tablet dark chocolate), providing this experiment with broader accountability for taste preferences, minimizing the risk for bias results and ensuring more robust conclusions. Through blind and non-blind conditions, this experiment will measure consumers' emotions through EDA and SAM, and also, their perceived taste and WTB.

4.5 Sample Design

A total of 20 individuals were gathered through social media to voluntarily participate in the experiment. However, 19 participants were considered for valid analysis as one subjects data collection was frequently disconnected, producing incomplete readings. From the valid sample of 13 females and 6 males, 18 were aged from 15-24 and 1 was aged from 25-34. Moreover, all resided in Lisbon, 18 studied or completed Superior Education and only one attended or completed Secondary Education. From the 19 participants, 6 were presented with bundle one (Continente/Guylian), other 6 with bundle 2 (Pingo Doce/Twix), and the remaining 8 were presented with bundle 3 (Lidl/Lindt). It is not unusual for sample sizes on CN with usage of neuromarketing methods of investigations to be under 30 subjects. Several notable researches can be highlighted such as Holper et al., (2014; 2013), which also relied on EDA within 20 and 13 subjects respectively. Also, Pontarollo et al., (2010) with 10 subjects, Mobascher et al., (2009) with 12 subjects, Posada-Quintero et al., (2016) with 12 subjects, Bonnet et al., (2015) with 18 subjects and Francis et al., (2016) with 14 subjects.

4.6 Pre-test

In order to guarantee maximum efficiency and feasibility of results pre-testing was conducted on one participant, which will not therefore be participating in the actual testing. The subject was a female, aged 56.

An appropriate setting of a laboratory was prepared for the experiment. The researcher was appropriately briefed on the usage of the equipment prior to the experiment. The respondent filled a consent report agreeing to participate in the experiment, briefly explaining the methods to be used. Upon agreement, the experiment begins, taking into account the timeline of experimental events (figure 2). First participants are briefed and given instruction on the progression of the experiment, the different phases, the questionnaires to be responded and the overall design of the experiment. After the participant signalled that the instructions were understood and clear, the subject was blind-folded and proceeded with the experiment as described (figure 2). Conducting the pre-test was highly important as to first familiarize the researcher with the equipment and also put in practice the experimental timeline, and this way, understanding and correcting certain procedures which should be done differently, ensuring maximum feasibility of the experiment.

4.7 Design and Procedure

For the realization of this experiment, other than the researcher, a second person, which was instructed on the procedure and its cautions, was present giving assistance during the experiment. Light display was maintained unvarying and room temperature was controlled and set to approximately 23 degrees as according to Bouscein (1992), as seen in Guerreiro et al., (2015), it can influence skin conductance response (SCR). Upon arrival, participants were asked to sit in a chair and fill a consent form, by which completed, the experiment begins. Following the timeline (figure 2) participants were seated approximately at 60 cm of distance from the table and presented with the instructions, which included information of the progression of the experiment such as all the technological equipment used and the realization of questionnaires following the tasting. For the appropriate measure of SCR, an isotonic NaCl gel solution was placed on the electrodermal electrodes, guaranteeing feasible measurement (Bouscein, 1992; as seen in Guerreiro et al., 2015). Then, two electrode were placed in the middle phalanges of the index finger and middle finger of the non-dominant hand. The settings of SCR, were set to a 5,000 μV rate of gain, and a low pass filter of 1,000 Hz was used, in order to remove readings that may arise from unwanted interferences of natural body movement (Schmidt and Walach, 2000). Participants were advised to minimise, to the best of their ability, they're non-dominant hand motion, in order not to allow intrusive effects of noise in readings and to place their hands on the table, facilitating finding the plate with chocolate.

With the synchronization of the EDA machine and its measuring software, AcqKnowledge, a loud clap was given in order to rattle and scare the participant, allowing for appropriate measure of their peaks of emotion as suggested by Lykken & Venables (1971). Subsequently was given one minute of silent baseline, followed by three more minutes of calming music, totalling to an initial four minutes of baseline. The end of the music marked the four-minute conclusion of baseline, of which served as a signal for commencing the two minute event of tasting the chocolate carefully placed on the table. To mark the end of this two minutes a simple phone alarm was used, and participants were given some time to fill a questionnaire on a digital tablet. With the completion of the questionnaire, the participant underwent two minutes of baseline with calming music, lowering and stabilizing its emotion levels, of which the end again marked the commencement of the two minute of tasting, followed by the same questionnaire. This first two blocks of experiment were done on a blind setting, which was always placed before initiating the baseline. For the first block, participants were presented with a PLB chocolate and the second block its similar NB chocolate (e.g. Twix Pingo Doce; Twix). For the next two blocks, the exact same procedure was conducted, however no blind was used and the participants were asked to only open their eyes in the moment of tasting, not provoking this way emotions with the sight of the product before tasting. Also on this blocks, the logo was cut from the packaging and placed on the plate along with the chocolate, giving the cue of brand (retailer and/or manufacturer) with no interference of packaging or any other unwanted cues. The same routine was adopted as the first two blocks, with the PLB first and the NB second (only now visible).

The questionnaire (Appendix 2) was the same for all four blocks of experiment, allowing for an evaluation and comparison of the different experimental settings. First question was SAM – Arousal, which was rated through a nine-point pictorial scale ranging from (9) = *stimulated, excited, tense* to (1) = *relaxed, calm, indifferent*. Following, was presented SAM – Valence, which was rated with a scale ranging from (9) = *pleased, positive, satisfied* to (1) = *displeased, negative, unsatisfied*. Then, participants evaluated Perceived Taste by rating its three core constructs through a seven-point scale, following by WTB, by rating its three core constructs through a seven point scale³. On the last block, this is a non-blind setting with NB chocolate, participants were presented with an additional questionnaire accounting for their socio-demographics (age, gender and education level) and also other cautionary questions

³ Detailed information in Chapter 5.2.1

guaranteeing the feasibility of the experiment (Appendix 3). This cautionary questions were replicated from Rossi et al., (2015) and were as follows:

1. Hunger - “Are you hungry right now?” with a seven-item scale, ranging from (1) = *not hungry at all* to (7) = *very hungry*.
2. Likeability of chocolate – “How much do you like chocolate?” with a seven-item scale, ranging from (1) = *not at all* to (7) = *a lot*.
3. Previous experience with chocolate – “How often do you eat chocolate” with a seven-item scale ranging from (1) = *never* to (7) = *frequently*
4. According to Desmet and Schifferstein(2008), as seen in Rossi et al., (2015), mood can be a source of negative or positive food evaluations and for this reason it was controlled – “I feel happy right now.”, with a seven-item scale ranging from (1) = *strongly disagree* to (7) *strongly agree*.
5. Preferred brand? – Open answer

After concluding and escorting the participants out, the electrodes were cleaned with a cotton swab as advised, and the gel was solution was used again.

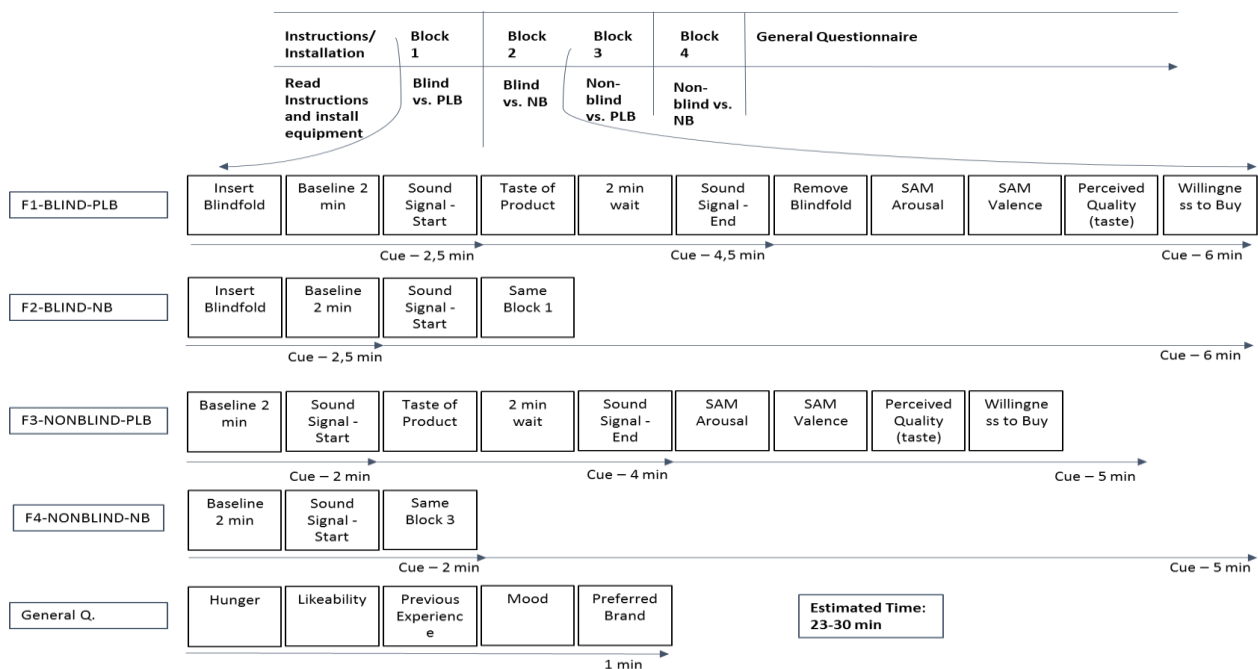


Figure 2 - Timeline of Experimental Events

5. Results and Discussions

5.1 Preliminary work and control checks

After data collection, results were then extracted from AcqKnowledge software. First, a low-pass filter of 5 Hz was used to remove undesirable artefacts that may have occurred due to unwanted natural body movements that can interfere with skin conductance response (Schmidt and Walach, 2000). Secondly, the sections of tasting were selected and copied to an excel sheet, resulting in a lengthy list accounting for the values of ArousalEDA, which are continuously measured throughout each experimental group. For each participant four blocks of measurement of arousalEDA were available. Subsequently, it was necessary to obtain a specific value of arousalEDA, for each experimental group of each participant. A simple average of the recorded values of EDA on each block of experiment is, according to Lykken & Venables (1971), not ideal as it would not account for individual differences in range. To better exemplify this discrepancy in skin conductance range the latter authors, reported that one subject minimum skin conductance response after thirty minutes of relaxation was twice as high as other subjects maximum SCR when startled by a balloon bursting. This is, according to the authors, due to individual innate physiological differences. The author further emphasizes that it is this variation of minimum and maximum SCR that normally accounts for the desired physiological measurement of the psychological event response in study. So, in order to correct individual differences in range, ensuring that solely the psychological measurement of SCR, Lykken et al., (1966) as seen in Lykken & Venables (1971), proposed a range correction model that transforms SCR values, reducing error variance and this way increasing correlation of effects. The proposed range correction model used is the following:

$$\Phi_{ix} = \frac{SCR_{ix} - SCR_{min}}{SCR_{max} - SCR_{min}} \quad (1)$$

The maximum value of SCR is the individual registered peak of emotion, attained with the loud clap, whereas the minimum SCR value is attained through the baseline. With the corrected values of SCR level, it was then calculated the average of SCR level for each experimental group for every participant. This final values were then grouped, forming a series with every participants' final averaged SCR level, for each of the four experimental blocks. This values were then exported to SPSS, along with the results of ArousalSAM, ValenceSAM, perceived taste and WTB. As seen before (chapter 6.4), cautionary questions were done post-experiment

in order to guarantee feasibility of the experiment. No significant differences were found ($p > 0.05$) among the experimental groups, thus discarding this variables from analysis.

5.2 Results

This research studied arousal, both from EDA and from a survey (i.e. SAM) and also valence through SAM. A nonparametric independent samples Kruskal-Wallis was conducted accounting for differences of arousalEDA, arousalSAM and valenceSAM, within the four experimental groups: F1=BlindPLB; F2=BlindNB; F3=NonBlindPLB; F4=NonBlindNB (Appendix 5). There is no statistical difference evidence found among the blind groups (i.e. F1 and F2) for all measures of emotion, thus aligning the hypothesis with literature. H1A is not rejected, thus concluding that arousalEDA is similar for NB and PLB in a blind setting ($\chi(3) = 7,368, p = 1,000$ with a mean rank F1 = 41,42 and F2 = 34,05). The same applies for arousalSAM ($\chi(3) = 0,841, p = 0,840$ with a mean rank F1 = 38,05 and F2 = 35,18) and valenceSAM ($\chi(3) = 3,226, p = 0,358$ with a mean rank F1 = 39,76 and F2 = 40,84, thus supporting H1B and H1C, respectively. It is also concluded, according to expectation of literature, that significant differences are found within the non-blind setting for arousalEDA, supporting H2A, demonstrating higher values of arousal for NB over PLB ($\chi(3) = -23,58, p = 0,12$ with a mean rank F3 = 27,68 and F4 = 50,84). However, the remaining hypothesis regarding non-blind setting, which were expected to follow in line with literature as H2A, demonstrated opposite values, concluding against what was expected. H2B showed no statistical difference for arousalSAM ($\chi(3) = 0,841, p = 0,840$ with a mean rank F1 = 39,21 and F2 = 41,55) and valenceSAM (H2C), also showed no statistical difference ($\chi(3) = 3,226, p = 0,358$ with a mean rank F1 = 30,97 and F2 = 42,42). Regarding perceived taste, similarity among PLB and NB in a blind scenario was confirmed, verifying H1D ($\chi(3) = -6,763, p = 1,000$ with a mean rank F1 = 33,21 and F2 = 39,97). Perceived taste in regard to H2D, was also verified, concluding as expected, that NB would present higher values than PLB in a non-blind scenario ($\chi(3) = -24,447, p = 0,006$ with a mean rank F3 = 28,18 and F4 = 52,63). Moreover, WTB was confirmed similar for NB vs. PLB in a blind condition, supporting H1E ($\chi(3) = 2,658, p = 0,447$ with a mean rank F1 = 33,71 and F2 = 40,58) However, WTB was not higher for NB as opposed to PLB in a non-blind setting, not supporting H2E ($\chi(3) = 2,658, p = 0,447$ with a mean rank F3 = 35,58 and F4 = 44,13). As seen in *Figure 1* it was important to understand the influence of emotions on perceived taste, and subsequently its

impact on WTB. For this two simple linear regressions were made (Appendix 6; Appendix 7). Firstly, it was tested H3A with perceived taste as the dependent variable and arousalEDA, arousalSAM and valenceSAM as independent variables. It was concluded that Emotions play a significant role in explaining Perceived Taste, verifying the hypothesis that the level of emotion positively influences perceived taste, with arousalEDA contributing the most ($Sig = 0,03 < 0,05; \beta = 5,147$), followed by valenceSAM ($Sig = 0,000 < 0,05; \beta = 0,390$) and lastly by arousalSAM ($Sig = 0,017 < 0,05; \beta = 1,174$). All the assumptions hold: Durbin-Watson = 1,767; ANOVA ($Sig = 0,00 < 0,05$); $E(\epsilon_i) = 0$; $Cov(\epsilon_i, x_k) = 0$; $VAR(\epsilon_i) = \sigma^2$; $\epsilon_i \cap N(0, \sigma^2)$. Secondly, a simple linear regression was done for H3B leading to the conclusion, as expected, that the level of perceived taste positively influences WTB on a proportion of $\beta = 1,011$. Once again, all the assumptions hold, with Durbin-Watson=1,218. The proposed theoretical model for H3A is: $Y = 5,147(ArousalEDA) + 1,74(ArousalSAM) + 0,390(ValencSAM)$ and for H3B is: $Y = 1.011(PerceivedTaste)$

Hypothesis	Results	Hypothesis	Results
H1A	Valid	H2A	Valid
H1B	Valid	H2B	Not Valid
H1C	Valid	H2C	Not Valid
H1D	Valid	H2D	Valid
H1E	Valid	H2E	Not Valid
H3A	Valid	H3B	Valid

Table 2 – Hypothesis Results

5.3 Discussion – Emotions influence Perceived Taste which influences Willingness to Buy?

First and foremost, it is highly important to understand and highlight the differences of two dimensions of measurement studied in this research: objective and sensorial. Both methods of measurement have weaknesses and strengths and should therefore be used in combination, producing more reliable conclusions (Camerer et al., 2004). For this reason, emotions were recorded through EDA, a sensorial method of measurement, and also, through the SAM surveys which are objective measurements. Results reveal a curious discrepancy between the true emotions felt from participants, called arousalEDA, and its objective measure of arousalSAM.

While on arousalEDA there is clear alignment with literature, presenting similar emotions for PLB vs. NB in a blind setting (H1A) and higher emotions for the NB's as opposed to PLB in a non-blind scenario (H2A), the results for arousalSAM, which were expected to follow the same results, although aligned with literature in a blind setting (H2A), it is in a non-blind setting which tears the pre-assumptions of literature that NB will produce higher levels of arousal. This discrepancy between the results of arousalEDA and arousalSAM in a non-blind setting becomes more curious when the results of valenceSAM, also does not demonstrate higher values for NB in a non-blind scenario as expected. To make this even more intriguing is the fact that perceived taste (H2D), an objective measure, goes in line with literature in a non-blind scenario, following the same results of arousalEDA. This is where the importance of sensory analysis becomes indispensable, since most felt emotions remain undetected by humans (Zurawicki, 2010), hiding its true impacts and often producing unreliable or biased responses of an objective measurement such as surveys (Camerer, 2004; Miljkovic & Alcakovic, 2010; Morin, 2011). Camerer (2004; 2005), states that sensorial analysis, such as conducted for arousalEDA, are direct measures that will generate more reliable results and therefore better than self-assessment methods. There is a clear consensus of literature that consumer neuroscience, neuromarketing and sensorial methods produce more reliable results. Kenning & Linzmajer (2010) also state that CN is able to deliver more objective and complete understanding of consumers desires, as does Britt (2004) and Nature Neuroscience (2004), as seen in Fugate (2007). The consensus in literature is towards prevailing the measure of arousalEDA, conceding it more strength and superiority comparatively to its objective measure, arousalSAM, and also, to valenceSAM. For this reason it is understood that consumers' emotions will be similar in a blind setting and will be higher for NB's in a non-blind setting. This findings support the notion that taste-wise, PLB quality is in fact, increasing and reaching closer and closer to NB's. However, consumers still rate NB superior, and while taste is singularly the most important element of food products (Lowengart, 2012), it is composed of various elements and cues, such as packaging, reputation and price and brand name, which still play an important role for consumers (Rossi et al. 2015). For this reason, it is important that retailers adopt one or both of this strategies: 1) reinforcement of quality and strengthen of branding; 2) dissociation with retailer name. First and foremost, it is imperial that retailers explore the wonders of branding, and evince its high quality standards while betting strong on branding. It is by doing this that consumers' perceptions of PLB will become more favourable, yielding higher Brand Equity, maybe equal to NB. This could be done also, as suggested by Rossi et al. (2015), by conducting in-store blind testing, generating buzz and desire. Other approach could be for retailers to dissociate themselves from their brand

name, therefore distancing from their corporate brand image. However, as concluded by Rossi et al. (2015), consumers' can still have negative biases even when not presented with the retailers brand name, and for therefore, the best solution would be increasingly strengthening PLB Brand Image and brand equity, possibly yielding consistent long-term gains. For NB, its high and established reputation, consumers' confidence in its products quality and its strong branding, is a strong force to which manufacturers should further leverage on, exploit and figure ways of making it more salient. This lengthy advantage, with a capability of not only establishing bench-marks quality-wise, but also relating to consumers in a more affectionate and hedonic way, leading them to ignore their subconscious feelings and perceiving NB as superior should be manufacturers main focus, both by reinforcement and creation of positive associations with the brand. A continuous evolvement of its brand equity should be ensured, always in sight with being innovative and maintaining or increasing its quality.

This need to find a way for retailers to create more positive hedonic associations, thus making consumers equality of PLB and NB in regard to quality more consciously salient, is further emphasized as the level of emotion exerts a positive influence on perceived taste (H3A), demonstrating that with higher levels of emotion, higher the perceived taste will be. This finding in line with literature, reinforces the importance of emotions for consumers, retailers and also, for manufacturers which should keep betting on its branding. Moreover, the findings suggest that perceived taste positively influences WTB, demonstrating this way a clear correlation between taste and consumers' purchase intentions (H3A). However, this influence may not always be strong or sufficient to lead consumers to an actual purchase. This is made evident in this research by the fact that in a non-blind scenario, although perceived taste was higher for NB as opposed to PLB, participants did not particularly score their WTB higher for NB as expected (H2E). This suggests that the emphasis on quality, in this case, on taste, should not be disregarded, in fact a great amount of care should be taken into assuring that consumers' are more than satisfied with the products taste. If retailers are able to replicate or match NB taste, which this research shows they have (H1A, H1B, H1C, H1D), it is now important for retailers to bet on other cues, such as packaging and brand name. Hardly any product is purchased for one sole attribute, but due to a combination of intrinsic and extrinsic cues, and it's through a combination of high quality products, both in taste and nutritional value, with a more relevant branding presence and exposure, that retailers will be able to increase similarity of PLB and NB in consumers minds. And as said, it is the manufactures role to feed this advantage of which NB are perceived as superior.

6. Conclusion, Limitations and Future Research

“The strongest arguments prove nothing so long as the conclusions are not verified by experience. Experimental science is the queen of sciences and the goal of all speculation.” –

Roger Bacon (1912) in *Opus Tertium*

The dynamics of PLB vs. NB are of increased importance for consumers, retailers and manufacturers. Various motivational cues, either intrinsic or extrinsic, will influence consumers' decision-making for food products (Veale, 2009; Espejel et al. 2007; Lowengart 2012). While price and packaging are exhaustively researched, with solid conclusions of its impacts, taste on the other hand, is not as widely investigated. Hence, a focus on this important gap was given, making it even more relevant by using actual CN methods of investigation, differentiating this research from existing literature and producing distinct and more robust conclusions. The conclusions achieved on this research, aligned with general literature, stating that NB are still perceived by consumers as superior (H2A/H2B), although PLB are tightening the gap projecting similarity within blind tests (H1A/H1B/H1C/H1D/H1E), are important findings that shed some light on consumers actual emotions and root this conclusions to a solid ground, which would not be possible through objective measurements. Even though, objective measures (i.e. surveys) demonstrate incoherent results with EDA measurements (H2A opposed to H2B), it will prevail the physiological findings as this are more reliable. Findings also suggest that consumers WTB will not necessarily be higher for NB (H2E), even if they are perceived of a better quality (H2D), concluding this way that consumers may not opt to purchase the highest quality product such as NB. Rossi et al (2015) reaches the conclusion that the “quality gap” is fading and it's now time to confront the “branding gap”, and this very well points out and summarizes the main conclusion of this research. When consumers opt to purchase PLB even when acknowledging that NB quality can be superior, solely based on the element of taste, this demonstrates that in fact, the first step of increased quality parity is achieved.

Care was taken in order to ensure that no unwanted cues would influence consumers' emotions and decisions, such as presenting during experiment no cues of price and no elements of branding. However, a small cue with the products brand name was made available on non-blind scenarios as otherwise it would not be possible to distinguish the PLB to the NB. This obligation poses as a limitation to this research as it may allow some force of either the reputation of the retailer/manufacturer on participants' decisions and/or emotions. Besides this, the following limitations shall be viewed more as suggestions for future research, opening up an array of opportunities to enrich existing literature further more. When dealing with neuroscience

methods, it is usual for the sample size to be of a smaller scale compared to objective measurements due to their inherent difficulty of evaluation. Replicating this research with a higher sample size would eliminate this weakness and make it more robust. Also, an interesting complement to this research would be accounting for valence in a physiological procedure, such as heartbeat, which was not possible due to lack of equipment. Moreover, it would be interesting to study other elements such as: reputation of retailer; price; branding (e.g. brand equity, brand awareness, budget); nutritional value; social or environmental impacts (e.g. fair trade, eco labels, corporate social responsibility); country of origin labels; among others. This could be done by either replacing the taste component for one of the mentioned above, or more interestingly, by combining several of this element, accounting for the impacts of both taste and social presence for instance. Other interesting possibility would be to replicate this experiment to other product categories other than food, such as beauty, homecare or clothing segments. This is a field of little exploration and of importance, since retailers are increasingly betting on this segments as ways of diversification and acquiring higher margins.

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7. Appendices

Appendix 1

Chocolate Bundles



Appendix 2

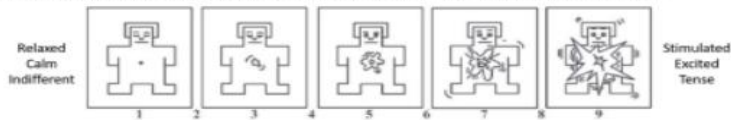
Questionnaire – Emotions and Food

Emotions and Food

This survey aims at measuring and evaluating the felt Emotions during this experience, Please read the questions carefully and respond with maximum of certainty possible, taking solely into account your experience,

Thankyou,

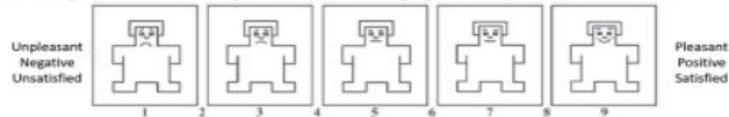
1. This image measures the degree of Arousal, ranging from Relaxed to Stimulated



Marcar apenas uma oval.

1 2 3 4 5 6 7 8 9

2. This image measures the degree of Valence, ranging from Unpleasant to Pleasant



Marcar apenas uma oval.

1 2 3 4 5 6 7 8 9

3. If you bought a chocolate, the probability of buying this one is:

Marcar apenas uma oval.

1 2 3 4 5 6 7

4. The probability of considering to buy this chocolate is?

Marcar apenas uma oval.

1 2 3 4 5 6 7

5. The probability of actually buying this chocolate is?

Marcar apenas uma oval.

1 2 3 4 5 6 7

6. Choose the degree of agreement with the statement: The chocolate is of good quality.

Marcar apenas uma oval.

1 2 3 4 5 6 7

7. Choose the degree of agreement with the statement: The chocolate is fresh.

Marcar apenas uma oval.

1 2 3 4 5 6 7

8. Choose the degree of agreement with the statement: The chocolate appears to be from a reliable brand.

Marcar apenas uma oval.

1 2 3 4 5 6 7

Appendix 3

Questionnaire – General

Emotions and Food - General

1. Are you hungry right now?

Marcar apenas uma oval.

1 2 3 4 5 6 7

Not hungry at all Very hungry

2. How much do you like chocolate?

Marcar apenas uma oval.

1 2 3 4 5 6 7

Not at all A lot

3. How frequently do you eat chocolate?

Marcar apenas uma oval.

1 2 3 4 5 6 7

Never Frequently

4. I feel happy right now.

Marcar apenas uma oval.

1 2 3 4 5 6 7

Strongly Disagree Strongly Agree

5. What's your favourite chocolate brand?

6. Age

Marcar apenas uma oval.

- 15-24
 25-34
 35-44
 45+

7. Sex

Marcar apenas uma oval.

- Masculino
 Feminino

8. Where do you reside right now?

Marcar apenas uma oval.

- Lisboa
 Outra: _____

9. School Level? (Portuguese System)

Marcar apenas uma oval.

- 3rd Cycle
 Secondary Education
 Superior Education
 Outra: _____

Appendix 4

SPSS – Preliminary Control Checks

H0: the distribution of the scores of Hunger, Likeability, Previous Experience and Mood is the same for each of the four experimental factors defined by the PLB vs. NB among a blind and non-blind setting.

H1: the distribution of the scores of Hunger, Likeability, Previous Experience and Mood is different for each of the four experimental factors defined by the PLB vs. NB among a blind and non-blind setting.

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Hunger is the same across categories of ExperimentalGroup.	Independent-Samples Kruskal-Wallis Test	,305	Retain the null hypothesis.
2	The distribution of Likeability is the same across categories of ExperimentalGroup.	Independent-Samples Kruskal-Wallis Test	,673	Retain the null hypothesis.
3	The distribution of PreviousExperience is the same across categories of ExperimentalGroup.	Independent-Samples Kruskal-Wallis Test	,300	Retain the null hypothesis.
4	The distribution of Mood is the same across categories of ExperimentalGroup.	Independent-Samples Kruskal-Wallis Test	,509	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Based on this sample and assuming $\alpha = 0.05$ it is concluded that there are no significant differences in all distributions across the four experimental groups.

Appendix 5

H0: the distribution of the scores of Emotions, Perceived Taste and WTB is the same for each of the four experimental factors defined by the PLB vs. NB among a blind and non-blind setting.

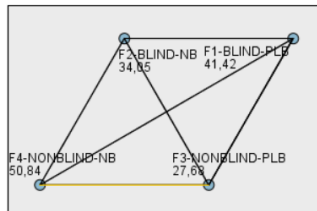
H1: the distribution of the scores of Emotions, Perceived Taste and WTB is different for each of the four experimental factors defined by the PLB vs. NB among a blind and non-blind setting.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of ArousalEDA is the same across categories of ExperimentalDesign.	Independent-Samples Kruskal-Wallis Test	,009	Reject the null hypothesis.
2	The distribution of ArousalSAM is the same across categories of ExperimentalDesign.	Independent-Samples Kruskal-Wallis Test	,840	Retain the null hypothesis.
3	The distribution of ValenceSAM is the same across categories of ExperimentalDesign.	Independent-Samples Kruskal-Wallis Test	,358	Retain the null hypothesis.
4	The distribution of PerceivedTaste is the same across categories of ExperimentalDesign.	Independent-Samples Kruskal-Wallis Test	,004	Reject the null hypothesis.
5	The distribution of WTB is the same across categories of ExperimentalDesign.	Independent-Samples Kruskal-Wallis Test	,447	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is ,05.

Pairwise Comparisons of ExperimentalDesign

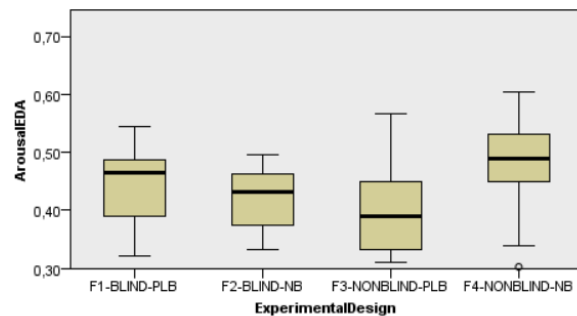


Each node shows the sample average rank of ExperimentalDesign.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
F3-NONBLIND-PLB-F2-BLIND-NB	6,368	7,165	,889	,374	1,000
F3-NONBLIND-PLB-F1-BLIND-PLB	13,737	7,165	1,917	,055	,552
F3-NONBLIND-PLB-F4-NONBLIND-NB	-23,158	7,165	-3,232	,001	,012
F2-BLIND-NB-F1-BLIND-PLB	7,368	7,165	1,028	,304	1,000
F2-BLIND-NB-F4-NONBLIND-NB	-16,789	7,165	-2,343	,019	,191
F1-BLIND-PLB-F4-NONBLIND-NB	-9,421	7,165	-1,315	,189	1,000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is ,05.

Independent-Samples Kruskal-Wallis Test



Total N	76
Test Statistic	11,596
Degrees of Freedom	3
Asymptotic Sig. (2-sided test)	,009

Based on this sample it is concluded that there is significant difference for ArousalEDA between groups F3 and F4 (Mean Rank= 27,68 vs. Mean Rank = 50,84).

Appendix 6

Simple Regression – Emotions influence in Perceived Taste

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	ValenceSAM, ArousalEDA, ArousalSAM ^b		Enter

a. Dependent Variable: PerceivedTaste

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,582 ^a	,339	,311	1,061245	1,767

a. Predictors: (Constant), ValenceSAM, ArousalEDA, ArousalSAM

b. Dependent Variable: PerceivedTaste

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41,542	3	13,847	12,295	,000 ^b
	Residual	81,089	72	1,126		
	Total	122,632	75			

a. Dependent Variable: PerceivedTaste

b. Predictors: (Constant), ValenceSAM, ArousalEDA, ArousalSAM

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,473	,945		-,500	,619
	ArousalEDA	5,147	1,686	,302	3,053	,003
	ArousalSAM	,174	,072	,248	2,437	,017
	ValenceSAM	,390	,088	,440	4,440	,000

a. Dependent Variable: PerceivedTaste

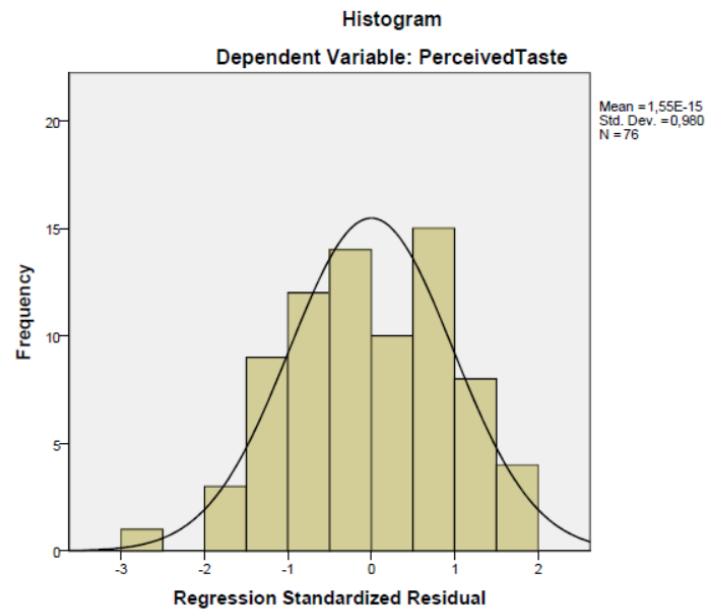
Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3,28210	7,16116	5,12283	,744244	76
Residual	-3,146565	1,968187	,000000	1,039804	76
Std. Predicted Value	-2,473	2,739	,000	1,000	76
Std. Residual	-2,965	1,855	,000	,980	76

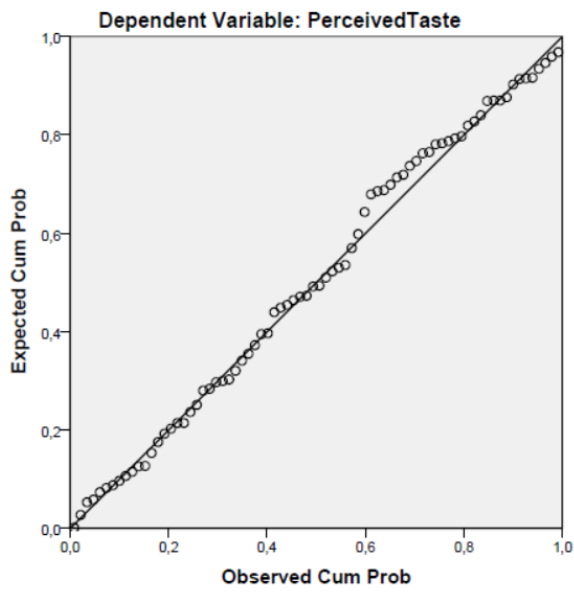
a. Dependent Variable: PerceivedTaste

PLB vs. NB – Emotions, Perceived Taste and WTB

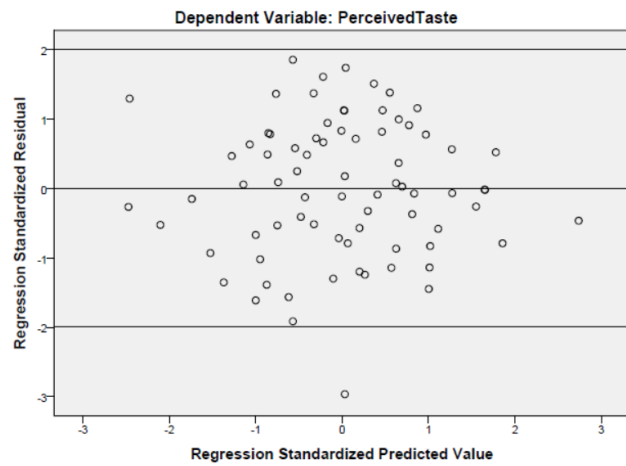
Charts



Normal P-P Plot of Regression Standardized Residual



Scatterplot



Based on the sample, it is concluded that Emotions exert a positive influence in Perceived Taste.

Appendix 7

Simple Regression – Perceived Taste influence in WTB

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	PerceivedTaste ^b	.	Enter

a. Dependent Variable: WTB

b. All requested variables entered.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,748 ^a	,559	,553	1,155988	1,218

a. Predictors: (Constant), PerceivedTaste

b. Dependent Variable: WTB

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	125,235	1	125,235	93,717	,000 ^b
	Residual	98,887	74	1,336		
	Total	224,122	75			

a. Dependent Variable: WTB

b. Predictors: (Constant), PerceivedTaste

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,668	,551		-1,213	,229
	PerceivedTaste	1,011	,104	,748	9,681	,000

a. Dependent Variable: WTB

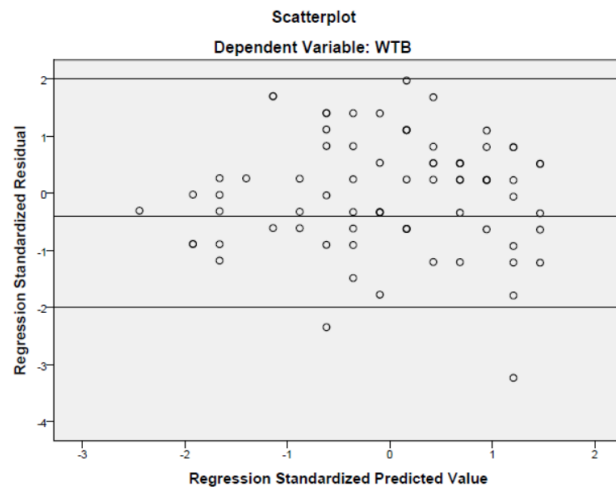
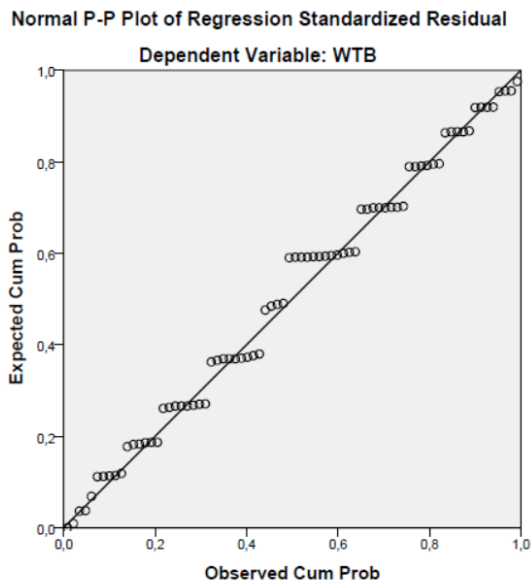
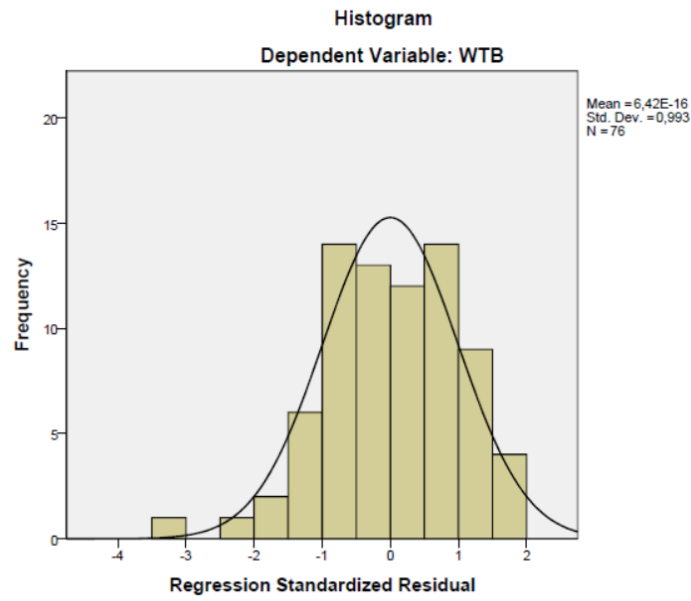
Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,35287	6,40566	4,50867	1,292209	76
Residual	-3,736148	2,278602	,000000	1,148256	76
Std. Predicted Value	-2,442	1,468	,000	1,000	76
Std. Residual	-3,232	1,971	,000	,993	76

a. Dependent Variable: WTB

PLB vs. NB – Emotions, Perceived Taste and WTB

Charts



Based on the sample, it is concluded that Emotions exert a positive influence in WTB.