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Eye-Tracking of wine labels and their associations with hedonic, emotional, provenance, and sensory responses

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A Dissertation

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Chang Liu

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Abstract of a Dissertation submitted in partial fulfilment of the requirements for the Degree of Master of Science in Food Innovation.

Eye-Tracking of wine labels and their associations with hedonic, emotional, provenance, and sensory responses

by

Chang Liu

The aim of this paper is to use the eye-tracking method to monitor and analyse the influence of origin information on the wine label and its association with purchase intention, hedonic, emotional, and sensory response. Two studies were carried out on untrained Lincoln University staff and students within the age range of 20 – 60 years old. In study 1, an eye-tracking machine was applied to obtain eye movement and facial expression information when participants (N=55, 55% males, and 45% females) evaluating four design labels that with and without New Zealand origin name or origin logo. In study 2, participants did the evaluation (N=72, 56% males, and 44% females) after tasting the wine sample. Study 1 found no significant difference on fixation between origin name and origin logo but participants paid more attention to the image and the brand name on the wine label. Study 2 found with or without origin name or logo had no significant influence on emotional and tasting response. Among results from studies 1 and 2, no significant influence of origin information was founded on purchase intention and hedonic response. These findings can be used to design the label of the wine selling online.

Keywords: eye-tracking, wine, origin, purchase decision, purchase intention, hedonic, emotion, tasting, fixation, Pinot Noir

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Chapter 1

Literature Review

1.1 Eye-Tracking

1.1.1 Eye Movement

The visual system enables humans to acquire external information and reveal how humans process information. One of the functions of eye movements is to jump to a new fixation point, which is called a saccade. It is usually unconscious of the individual because the average saccadic velocity is 300° to 400°/second (Wong & Wong, 2013). The saccades can search and capture stimulating information but cannot leave clear images. It is because of the relatively slower information process speed of the retina (Wong & Wong, 2013). Therefore, a steady gaze stays on the target is necessary for the retina to obtain information. It is call fixation, and the fixation duration ranges are 150 to 300 milliseconds (Land & Tatler, 2009). The eyes are not staying still but compensating head movement during fixation. In general, longer fixation duration represent higher engagement with the object (Land & Tatler, 2009). In 1879, Louis Emile Javal noticed the different eye movements in human reading behavior (Rohrbach, Dzhelebov, & Neuhann, 2012). In 1908, the first device used to track eye movement was built by Edmund Huey (Walczyk, Tcholakian, Igou, & Dixon, 2014). Nowadays, eye-tracking is defined as a method to record eye movement on visual stimuli, such as images. It can be used to provide information related to visual attention, such as the object being noticed, fixation duration, and the sequence of fixation. The eye-tracking technology has been applied in aviation, neuroscience, psychology, and marketing research (Haida, Ishikawa, Minamitani, & Shinohara, 2003; Mele & Federici, 2012; Peißl, Wickens, & Baruah, 2018; Wedel & Pieters, 2008).

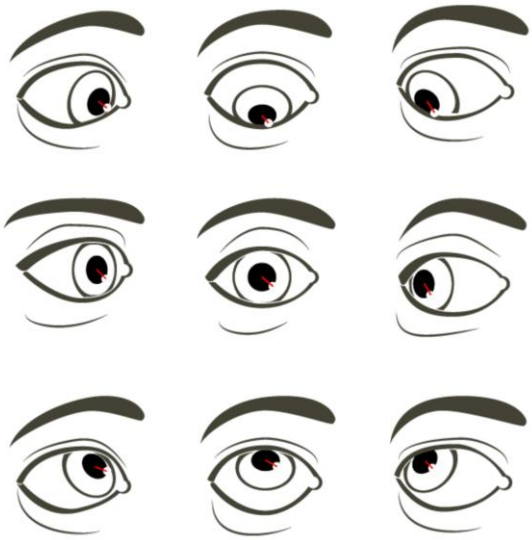
1.1.2 Eye-tracking principle

There are many ways used to track eye movement, such as the electrooculogram method, dual-Purkinje-image method, iris/sclera boundary method. 1) EOG: In a normal eyeball, there is about a 10mV difference between the cornea and retinal while the cornea has a positive charge and the retinal has a negative charger (Brown, Marmor, Zrenner, Brigell, & Bach, 2006). The electric potential changes during eye movement. To know the eye position, EOG detects and amplifies the change of electrical signal by placing silver chloride electrodes around the eye (Brown et al., 2006). 2) Contact lens method: Participants wear the wireless contact lens embedded with an infrared laser pointer. A beam detection system is used to locate the fixation point (Khaldi et al., 2020). 3) Corneal reflection method: This method monitors the change of image reflected by corneal to indicate the position of the eye (Cleveland, Cleveland, & Norloff, 1993). 4) Pupil and cornea reflection method (Figure 1): base

Figure 1 The relative difference in location of the pupil centre and corneal reflection in eye-tracking (Farnsworth, 2019)

on the corneal reflection method, this method combines the position of pupil capture by the camera. The coordinate of the pupil center indicates the position of the fixation point (Duchowski, 2007). 5) dual-Purkinje-image: To find the fixation position of the eye, the double-plain field image method detects and analysis the reflected image of the anterior and posterior surface of the corneal, anterior and posterior surface of the crystalline lens (Crane & Steele, 1985). 6) Iris/scleral boundary method: the light reflected by the left and right edges of the iris and sclera will be measured. The difference of light reflection is to use the determined position of eyes(Reulen et al., 1988).

Pupil and cornea reflection is the most commonly used to track eye movement. To get an accurate demarcation of pupil and cornea reflection, the infrared light source is essential. Infrared light provides more controlled specular reflection compare to visile light (Duchowski, 2007). In addition, infrared light is invisible to humans so that it will not interfere with the eye-tracking experiment.



1.1.3 Pupil and cornea reflection Eye-tracking equipment

Pupil and cornea reflection tye tracking equipment is a device that uses infrared rays and a camera to record eye movements when people notice stimuli. The basic principle is that the infrared light results in the reflection of the pupil and corneal; Then, the camera determines the fixation position by calculating the distance between pupil reflection and corneal reflection (Duchowski, 2007). Equipment calibration is usually needed for each participant before the monitor eye movement. Eye-tracking equipment is mainly divided into remote eye tracker and head-mounted eye tracker. As shown in Figure. 2, the remote eye tracker is mainly composed of a camera and a light source, which is placed under the displayer or integrated into the display unit (X. Zhang & MacKenzie, 2007). It doesn't have direct contact with experimental participants. On the other hand, the participant can only observe the

screen-based content within a certain range. The relative positions of the participant, eye tracker, and screen are used to analysis the participant's viewing pattern (X. Zhang & MacKenzie, 2007). The head-mounted eye tracker is similar to ordinary glasses. It has two cameras and a light source. The front camera records the real scene seen by the participants while the rear camera captures the movement of the eyeballs (Gustafsson, Kingbäck, & Cederlund, 2017). Head-mounted eye trackers are especially suitable for research in three-dimensional space that participants can move freely, such as cultural relics in museums. However, the data analyzed is more complicated because the position relative to the stimulus is not fixed.

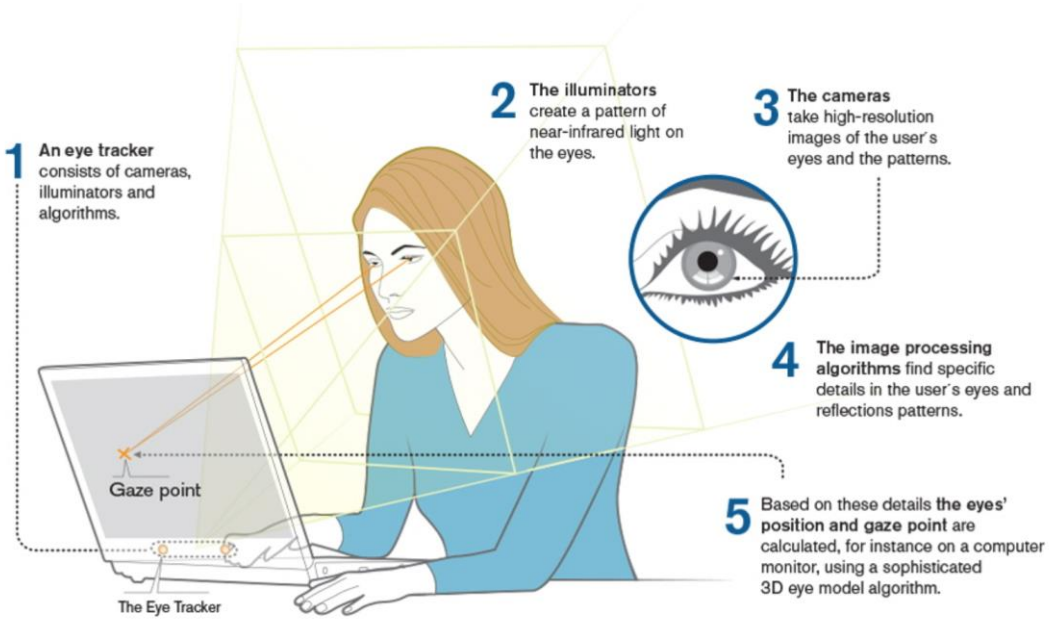


Figure 2 The principle of eye-tracking equipment ("How do Tobii Eye Trackers work?," 2021)

2.1.4 Eye-tracking metrics

Corresponding to eye movements, the specific index measured by eye-tracking equipment can be divided into fixation index and saccadic index. Fixation index mainly includes fixation count, the number of fixation points, and fixation duration, the length of time to stay in a specific area. Fixation duration also includes first fixation duration, average fixation duration. Fixation index is generally used in combination with areas of interest (AOI), which are areas defined by researchers over certain parts of display on the experimental materials according to research purpose (Poole & Ball, 2006).

The most widely used saccade indexes are regression rate and scan path (Poole & Ball, 2006). Regression rate is the movement of the eyeball from right to left (excluding the eye movement from the end of each line to the beginning of the next line) (Poole & Ball, 2006). The reflex rate is the number of fixations divided by the total number of fixations (Poole & Ball, 2006). For example, in the study of reading behavior, readers with poor reading ability have a higher regression rate than ordinary readers

(Busjahn et al., 2015). The saccade path is also known as the fixation sequence, which is the saccade-fixation-saccade sequence presented by the eyeball on the experimental materials (Poole & Ball, 2006). This index is often used to evaluate the efficiency of the user interface.

Fixation and saccade of participant's eye movement can be visualized in gaze plots and heat maps by superimposing the gazing situation with the test picture (Bergstrom, 2014). The gaze plot reflects the fixation (dots) and saccades (line) over time. Connecting fixation with saccades in order can show the sequence of eye movement. The heat map reflects the number of fixations of participants. The area with the longest fixation time is displayed in red, followed by yellow and green. After subdividing the AOI, the attraction of specific items area can be obtained.

1.2 Wine Purchase

2.2.1 Purchase decision

The purchase decision is defined as a process that consumers choose after carefully evaluating a product, brand, or service and decide to buy in order to satisfy specific needs (Barden & Marketing, 2015). There are four major characteristics of a purchase decision. 1) the purpose of purchase: Consumers make decisions to promote the achievement of one or several goals. In the decision-making process, the activities involve planning, selection, arrangement, which is the purpose of implementation purchase decision (Rossiter & Bellman, 2005). 2) The process of consumer purchase decision: It is a cycle process. In the beginning, consumers are stimulated by internal and external factors that generate demand and become the purchase motivation. Then, the consumer searched for information and evaluated the alternative choices. Finally, implementation of the purchasing plan. In the end, the purchasing experience becomes feedback that affects the purchase decision next time (Rossiter & Bellman, 2005). 3) Individualize requirement: as a subjective demand and external expression of will, purchase behavior is affected by many objective factors. Except for collective consumption, consumer purchase decisions are generally made by consumers independently. As consumers increase the level of consumption, the indicisualize requirment become more and more important (Rossiter & Bellman, 2005). 4) the complexity of consumer purchase decision: not only carry out feeling, perception, attention, memory, and a series of psychological activity, the consumer, also need to carry on the analysis, reasoning, judgment, and a series of thinking activities. Then, consumers calculate costs and the possibility of a variety of interests (Rossiter & Bellman, 2005). Accordingly, the consumer purchase decision process is generally a complex psychological activity.

Quality perception is one of the factor influence purchase decision. Zeithaml, Berry, and Parasuraman (1988) indicate the perceived quality is the judgment of the overall product experience

by the consumer. It is an abstract concept which differs from actual product quality. As shown in Figure 3, this subjective evaluation comes from the combination of their own purpose and experience during using the product with the comprehensive understanding and analysis of related products in the market such as corporate image (Zeithaml et al., 1988). Insufficient information is one of the main reasons cause the quality perception difference between the consumer (Harper & Makatouni, 2002). Overall, quality perception is sharply different among consumers.

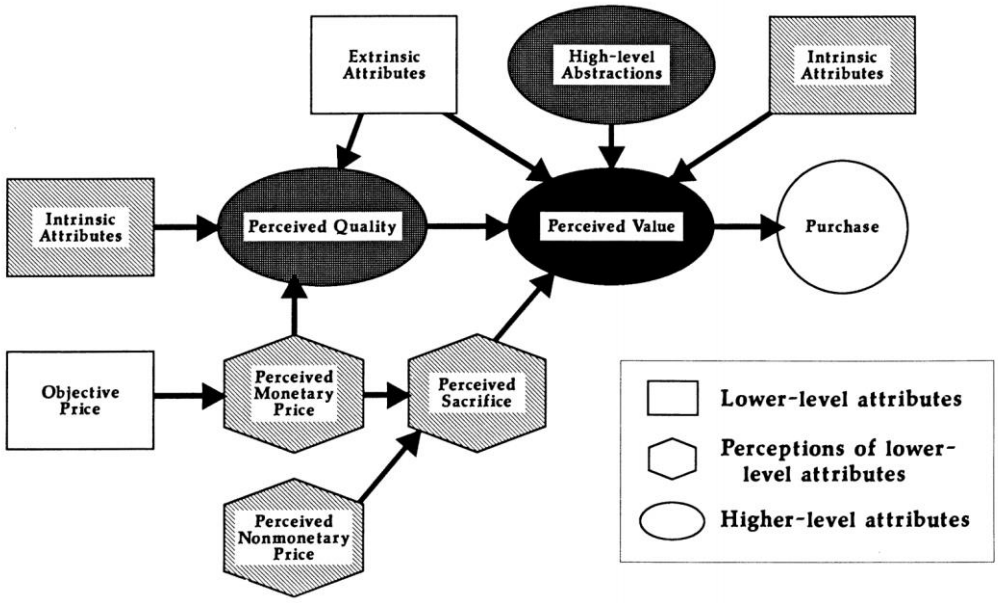


Figure 3 Relationship of perceived quality and purchase (Zeithaml et al., 1988)

1.2.2 The effect of Origin – Wine purchase decision

Global marketing thinks highly of the product's origin. It allows the product to differentiate in the global competition. Although many researchers studied the effect of origin, there is not a consistent conclusion on how it works due to the variety of products and different markets. Agricultural products are more affected by their origin because they relied more on the natural environment comparing to industrial products. As an agricultural product, the origin of wine has an important effect on consumer quality preception (Famularo, Bruwer, & Li, 2010; McCutcheon, Bruwer, & Li, 2009; Monteiro, Guerreiro, & Loureiro, 2019; Veale & Quester, 2009). The image of an origin as the wine producer has two dimensions: environment factors and human factors.

Firstly is the nature of the origin. The local climate, soil, minerals have a great influence on the agricultural product. Novikova and Naumova (2020) compare the taste score of fresh grapes and wine on varieties of origin and weather. They suggested that the climate variability on different origins would affect the organoleptic characteristics of grapes and wine. J. Wu and Fu (2007) found that when it comes to the image of origin, people often think of certain unique natural resources. This is particularly prominent in primary products. For example, coffee beans remind people of South

American. The unique natural sources ensure the quality of agricultural products is different from others.

Secondly is the human factor. The image of the origin is a mental picture in consumers' minds (Lee, Lee, & Lee, 2013). The knowledge of wine production is based on accumulated drinking experiences. Base on their preference, consumers evaluate the origin of wine differently. Except for the taste, the different consumers could have the knowledge of the origin around a number of dimensions. The degree of economic development, political system culture, and other factors are important to the image of origin (White, 2012).

1.3 Emotion

Many intelligence devices such as remote eye trackers and head-mounted glasses are used to understand how the consumer interacts with the environment have been used in the research field. These devices gather information from consumers' views so that researchers can understand what attract consumer attention and how consumers make decisions. Emotion is seen as a better predictor of purchase intention than cognitive satisfaction measurement (Martin, O'neill, Hubbard, & Palmer, 2008). Ekman (1992) defined six basic universal emotions are happiness, sadness, disgust, fear, surprise, and anger. Zhao et al. (2017) suggested that people do not hide their real emotions while in a relaxed environment. Therefore, gather emotional information while using an eye-tracking device would be useful. Emotion detection is identified by a physiological and non-physiological signal.

1.3.1 Physiological signal

In order to detect masking emotion, a physiological signal is used. Generally, a detection device attaches to the participant is necessary. Participant body situation and environment would interfere with the signal. An electroencephalograph (EEG) collects and amplified the bioelectricity by electrodes on the human scalp. Then, data is shown in a line graph. After comparing with the baseline, the emotion can be revealed. Pupil diameter is another physiological signal. Kawai, Takano, and Nakamura (2013) suggested the pupil diameter variation is related to emotion changes, attention, and interest. They found that people tend to have smaller pupil diameter in positive affective stimulus than negative affective stimulus(Kawai et al., 2013). Some other research suggested that emotion arousal (positive or negative) enhanced pupil diameter compared to neutral emotion (Henderson, Bradley, & Lang, 2018; Kawai et al., 2013). Other physiological signals include heart rate, body temperature, electrodermal response (GSR), and so on (Nasoz, Lisetti, Alvarez, & Finkelstein, 2003; Wiens, Mezzacappa, & Katkin, 2000; G. Wu, Liu, & Hao, 2010).

1.3.2 Non-physiological signal

The non-physiological signal is mainly detected by facial expression and speech inflections. Facial expression detection is usually used in eye-tracking research because the conversation is usually not necessary. Eyebrow, mouth, nose, and eyes are the basic facial features. Naïve Bayes, k-nearest neighbour (KNN), decision trees, neural networks, and support vector machines (SVM) are the main classifiers used in emotion detection (J. Z. Lim, Mountstephens, & Teo, 2020). In some cases, the whole facial picture is not available, such as AR and VR that the device occludes a large portion of the face. XXX used an algorithm to analyse the partial face image captured by the camera within the VR device (Hickson, Dufour, Sud, Kwatra, & Essa, 2019).

Chapter 2

Introduction

2.1 Background

Wine purchase decision making is a complex psychological activity, including psychological cognition and behavioral perception. The cognitive stage includes a number of psychological activities such as stimulation, impression, memory, thinking, imagination, etc., which are generally expressed as consumers' evaluation of the quality, function, and image of a certain wine product (Rossiter & Bellman, 2005). Base on cognition, consumers will generate wine consumption requirements and the motivation to purchase wine. Wine purchase motivation will gradually change into wine purchase behaviors in a certain condition. As international market competition getting intensifies in the wine sector, it is important to understand the trade-off between different wine criteria on consumer decision-making. Research suggests many wine purchase decisions are made quickly in the shop without much prior information (Barber & Almanza, 2007). There are four main factors that influence the wine purchase decision: 1. Demographics such as gender, age, and education status; 2. Wine cognitive level can divide into subjective and objective knowledge; 3. Purpose such as social and health; 4. Product characteristics such as origin, price (Rossiter & Bellman, 2005). The origin of wine is one of the key criteria. Different from industrial products, wine is more affected by the natural environment of the origin, and more easily affected by the origin effect (Gallego, Mera, & García-Galán, 2015). In addition to the natural environment, other factors of the origin such as the political system, economic development, and culture will affect its image (Gaeta & Corsinovi, 2014). These factors affect consumers' perceived quality and value of the wine before making a purchase decision. Therefore, the information in the wine label would effectively attract consumers' attention and guarantee the success of the wine.

Human eyes constantly move to obtain information from the outside world. The eye movement can divide into a fixation, saccades that can represent the different feelings of the information brings to humans (Bergstrom, 2014). Eye-tracking is a technology that records eye movement through computers, infrared sensors, and image acquisition devices (Bergstrom, 2014). This technology originated used in psychological research in the late 19th century and has been widely applied in virtual reality, human-computer interaction, web page layout, medical services, and other fields (Bergstrom, 2014). Using eye-tracking technology can effectively explore people's psychological activities and psychological phenomena in the process of information acquisition (Mele & Federici, 2012). With the improvement and simplified of the technical level, instrument operation, and data processing, eye-

tracking has been applied to many wine label researches (Laeng, Suegami, & Aminihajibashi, 2016; Mokrý, Birčiaková, Slováčková, Stávková, & Nagyová, 2016; Monteiro et al., 2019).

2.2 Objective

The aim of this experiment is to understand the influence of origin on emotion and sensory perception, overall hedonic, and purchase decision by using the eye-tracking technique.

Chapter 3

Materials and methods

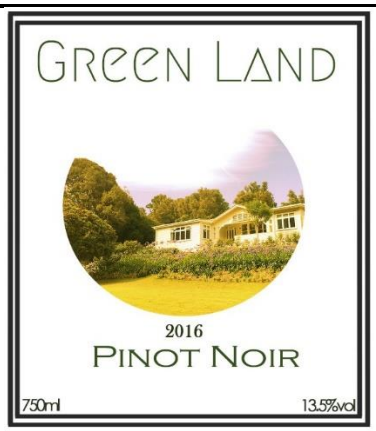
The research proposal of this study was approved by the Research Committee of The University of Lincoln, New Zealand. Untrained Lincoln University staff and students within the age range of 20 – 60 years old were recruited in this study as participants. Participants were pre-screened to make sure they consume wine occasionally. In study 1, a total of N=55 participants [71% Asians (predominantly Chinese), 22% Oceanian (predominantly New Zealander), 55% males, and 45% females]. In study 2, a total of N=72 participants [64% Asian (predominantly Chinese), 24% New Zealander, 56% males, and 44% female].

3.1 Material

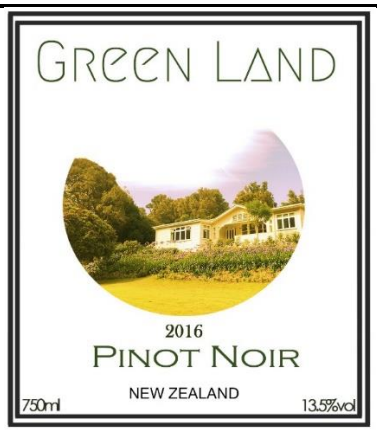
Study 1: Gazepoint GP3 and iMotions software from iMotions A/S (Frederiksberg Allé 1-3, 1621 København V, Denmark) were used to obtain and process eye movement (time to first fixation, fixation duration, average fixation duration, and fixation count) and facial expression (Anger, Contempt, Disgust, Fear, Joy, Sadness, Surprise, Engagement, Attention, and Overall liking) information of participants. iMotion software also recorded responses to the questionnaire. The label and question were shown and answered a computer screen. As shown in Figure 4, the 4 different labels used for this study were designed by Qiqi Xu. The design is based on common elements (logo, brand name, origin, type of wine, and year) found on wine labels around New Zealand.

Labels 1 and 2 are the same design but with and without origin name (“New Zealand”) on it. Label 3 and 4 are the same design but with and without the origin logo (“silver fern” a well recognized NZ logo) on it. The different elements' areas used for AOI analysis were graph/photo, brand name, year, type of wine, volume, origin logo or name/ blank, and alcohol % that indicated in Figure 5.

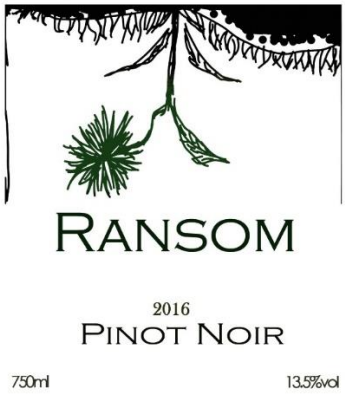
Figure 4 Four different labels for eye-tracking analysis



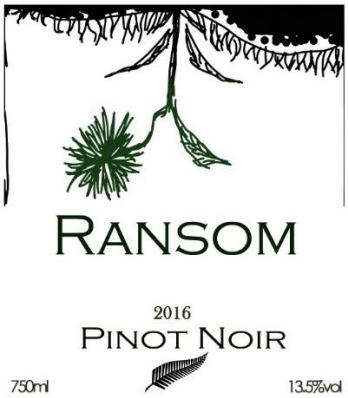
Label 1: No Name- Photo and without NZ text



Label 2: Name- Photo and with NZ text



Label 3: No Logo- Graph without NZ logo



Label 4: Logo- Graph with NZ logo

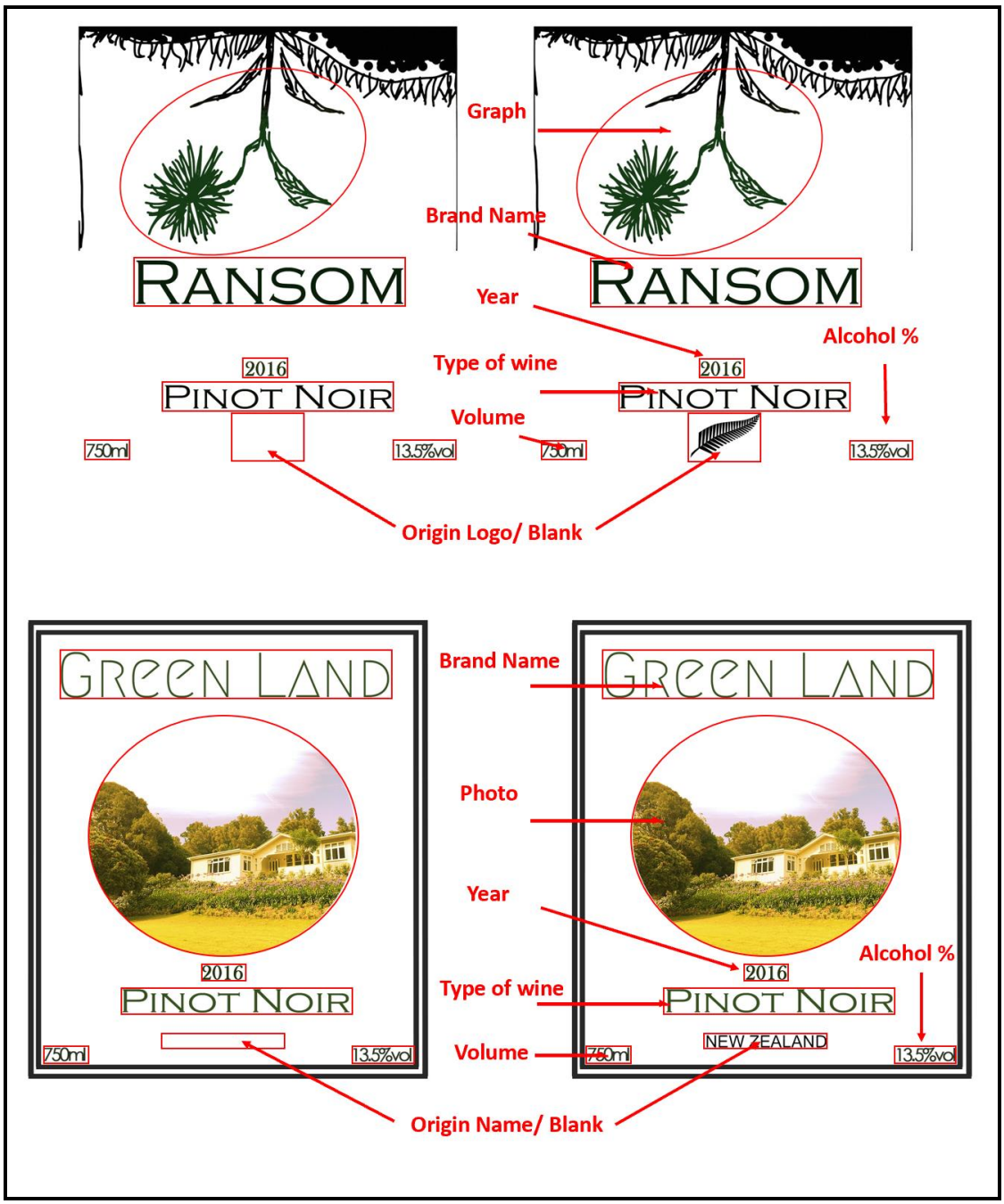


Figure 5 Eyetraking area identification - Label elements used for AOI

Study 2: The red wine Akarua Rua Point Noir used in this experiment is shown in Figure 6. The 4 different labels were stuck to the wine bottle shown in Figure 7. 750ml red colour solution was used to fill the bottle to mimic the condition of wine sold in the market. Three glass 35ml of Point Noir wine was served at room temperature. Other materials include water, crackers, and tissues. A tablet was used to shown and answered the questionnaire.

Figure 6. Red wine Point Noir used for tasting in study 2

Figure 7 Wine bottles used to show participants

3.2 Sensory procedure

Participants were randomly separated into two groups for both studies 1 and 2. Group A was shown Label 1 and Label 4, while Group B was shown Label 2 and Label 3 in random order. A brief introduction was carried out before the study. Then the participant was asked to sign the consent form. Both studies 1 and 2 were held in a sensory booth equipped with standard fluorescent lights at room temperature 25°C.

Study 1: Firstly, participants were asked to sit comfortably in front of the screen and do the calibration by using iMotion. The calibration procedure is attached in Appendix 1. Secondly, the participant was instructed to look at the first label shown on the screen for 10 seconds. Then, the participant was asked to evaluate the label by answering the questionnaire showing after. The overall liking of this label was evaluated by a 9-point hedonic scale (1=dislike extremely, 5=neither like nor dislike, 9=like extremely). The purchase intention was reported by the binomial answer “yes or no”. Thirdly, the second label was shown following the same procedure as the second step. Fourthly, after the evaluation of two labels, the importance of label elements (logo, brand name, origin, type of wine, and year) on purchasing decision making were determined on 9 point scale (1=Not At All, 5=Neutral, 9=Important Extremely). Then, the wine-drinking frequency (1=Everyday, 2=Every week, 3=Once every two weeks, 4=Once a month, 5=Occasionally), gender, age, nationality was reported.

Study 2: Wine was poured out 30 minutes before tasting. Participants were asked to taste and evaluate the wine with a different label without aware these three samples are the same wine repeatedly. Participants were instructed to have 30-second break and rinse with water thoroughly between samples. Firstly, participants tasted a glass of wine and answered the question as a baseline by using the RedJade system (Redjade Sensory Solutions, LLC of Martinez, CA.) on the tablet. Participants were asked to tick emotion Check-all-that-apply (CATA) (Happy, neutral, sad, curious, disgusted, surprised, excited, pleased, calmed, apprehensive, comforted, satisfied, bored, guilty, healthy, unhealthy), and sensory CATA (Processed fruit aroma, sweet aroma, green aroma, spicy aroma, spicy aroma, earthy aroma, chemical aroma, heat feeling, sweet taste, bitter taste, astringent). The overall liking and purchase intention of the wine was also asked same as study 1. Secondly, participants were served with two trays at the same time. Each tray contains a glass of wine, and the labelled bottle indicated the wine they tasted was from this bottle. The questionnaire on the tablet instructed participants with randomized tasting the order. After each wine, the participant need to answer the same questions as the baseline question shown above. Thirdly, the wine-drinking frequency, gender, age, nationality was reported.

3.3 Statistical analysis

The data of overall liking, the importance of label elements on purchasing decision making analysis, eye movement, and emotions were analysed by Analysis of Variance (ANOVA) and Tukey test ($P<0.05$) using Minitab 18.1 (Minitab, Inc, 1829 Pine Hall Rd, State College, PA 16801, USA). In study 1, Principal Component Analysis(PCA) was used to analyse the relationship between four labels and emotions by using XLSTAT (Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 USA). Multiple regression analysis was used to indicate the importance of different label elements on overall liking by using Minitab 18.1. In study 2, Cochran's Q test was used to analyse the result of sensory CATA and emotion CATA by using XLSTAT as well.

Chapter 4

Result and Discussion

4.1 Eye-tracking parameter

Table 1 shows the Time to First Fixation (TTFF)(ms) on each AOI area of four labels. The TTFF reflected the ability of information to capture participants' attention (Graham, Orquin, & Visschers, 2012). The lower the number, the quicker the element gets noticed by participants. No significant difference (p>0.05) of TTFF was found on each label element among labels (each row), except for the Blank Area compare with Origin Name/Logo, which is obvious. However, the Graph/Photo has significantly lower (p<0.05) TTFF comparing to other elements in all four labels (each column). Following the Graph/Photo, the brand name also shows significantly lower (p<0.05) TTFF than the other element in the label Name, No Name, and Logo. It indicates that the Graph/Photo and the Brand Name, are the primary elements that capture consumers' attention on the wine label. The duration of the first fixation shows in Table 2. The graph/photo followed has a significantly longer duration compared to other elements. Areas with short TTFF and long first fixation duration is likely to attract more attention (Orquin, Scholderer, & Jeppesen, 2012). It is clear that the Origin Name or Logo in this label is not an eye-catching element for the consumer on their first glance. Ares et al. (2013) also found the image and brand name are more attractive elements than origin during the study the consumer visual processing of food label.

Table 1 Time to First Fixation(ms) on each AOI of four labels (Study 1)

	Name	No Name	Logo	No Logo
Alcohol%	8873±2198 ^{A,ab}	8557±2520 ^{A,ab}	8785±2460 ^{A,a}	8433±2569 ^{A,a}
Origin Name or logo/Blank	8508±3309 ^{B,ab}	9961.9±83.3 ^{A,ab}	8440±3163 ^{B,a}	8554±3422 ^{A,a}
Brand Name	6443±4134 ^{A,bc}	6829±3945 ^{A,b}	5714±3951 ^{A,b}	6478±4154 ^{A,a}
Graph/Photo	4119±3994 ^{A,c}	3771±4440 ^{A,c}	5209±4005 ^{A,b}	3522±3761 ^{A,b}
Type of wine	7674±3092 ^{A,ab}	8447±3056 ^{A,ab}	7394±3462 ^{A,ab}	7730±3323 ^{A,a}
Volume	9137±2111 ^{A,a}	9469±1689 ^{A,a}	9650±1362 ^{A,a}	8861±2249 ^{A,a}
Year	9038±2309 ^{A,a}	8214±3162 ^{A,a}	7475±3537 ^{A,ab}	8597±2537 ^{A,a}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns

Table 2 First Fixation Duration on each AOI of four labels (Study 1)

AOI elements	Name	No Name	Logo	No Logo
Alcohol%	20.4±40.5 ^{A,b}	31.2±45.2 ^{A,bc}	23.0±44.4 ^{A,ab}	35.1±61.8 ^{A,b}
Origin Name or Logo/Blank	18.9±45.7 ^{A,b}	1.5±13.1 ^{A,c}	30.3±54 ^{A,ab}	19.0±46.8 ^{A,b}
Brand Name	46.5±53.2 ^{A,ab}	42.1±48.1 ^{A,ab}	57.3±50.9 ^{A,a}	54.3±65.7 ^{A,ab}
Graph/Photo	63.6±46.3 ^{A,a}	73.9±58.4 ^{A,a}	57.8±50.7 ^{A,a}	84.1±47.8 ^{A,a}
Type of wine	36.4±42.5 ^{A,ab}	26.8±50.3 ^{A,bc}	43.6±62.8 ^{A,ab}	36.4±62.7 ^{A,b}
Volume	18.7±41.5 ^{A,b}	17.6±41.1 ^{A,bc}	6.9±30.7 ^{A,b}	29.2±56.6 ^{A,b}
Year	22.1±53.2 ^{A,b}	29.1±56.5 ^{A,bc}	43.8±58.3 ^{A,ab}	19.1±36.2 ^{A,b}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns

Similar results are also for average fixation duration and fixation count shown in Table 3 and Table 4. The other elements have similar fixation duration and fixation count except for the Graph/Photo and the Brand Name. It means after the first fixation, participants tend to look back and spend more time on these areas. Average fixation time and fixation count are positively related to participants' attention and the importance of information (Radach, Hyona, & Deubel, 2003). However, the longer average fixation duration and high fixation count could also mean the image or text's information has high complexity so that the information needs more time to be processed (Pannasch, Schulz, & Velichkovsky, 2011). For example, the blank area has less information than the Origin Name. Thus, it shows a significantly lower average fixation duration than the Origin Name (Table 3).

The not significant difference between Name, No Name, Logo, and No logo also suggests that the wine label viewing hierarchy and viewing behaviour of participants are similar. Gofman, Moskowitz, Fyrbjork, Moskowitz, and Mets (2009) found that the fixation path most typically starts at the middle of the image on the wine box. Same as other food labels, researchers found consumers tend to be more attracted by the image (Guo, Zheng, Fan, Yu, & Wang, 2019; Tatler, 2007; Torrico, Fuentes, et al., 2018; B. Zhang & Seo, 2015). It means the fixation of participants is an automatic bottom-up viewing pattern, which means that the element's physical characteristics, e.g., the size, colour of the Graph determine the attentional capture (Rutishauser, Walther, Koch, & Perona, 2004). Rutishauser et al. (2004) suggested that the bottom-up information capture based on interest and purpose had an essential influence on image information acquisition.

Table 3 Average Fixation Duration(ms) on each AOI of four labels (Study 1)

AOI elements	Name	No Name	Logo	No Logo
Alcohol%	21.0±41.5 ^{A,b}	31.2±45.2 $^{A, bc}$	24.2±46 $^{A, ab}$	35.1±61.8 $^{A, ab}$
Origin Name or logo/Blank	19.1±46.1 ^{A,b}	1.5±13.1 ^{B,c}	30.3±54 ^{A,ab}	19.0±46.8 ^{A,b}
Brand Name	49.4±54.5 ^{A,ab}	42.1±48.1 ^{A,ab}	56.7±48.5 ^{A,a}	54.3±65.7 ^{A,ab}
Graph/Photo	71.8±48.5 ^{A,a}	73.9±58.4 ^{A,a}	59.3±51.5 ^{A,a}	84.1±47.8 ^{A,a}
Type of wine	37.7±43.6 ^{A,ab}	26.8±50.3 ^{A,bc}	41.5±57.1 ^{A,ab}	36.4±62.7 ^{A,b}
Volume	20.1±44.4 ^{A,b}	17.6±41.1 ^{A,bc}	6.9±30.7 ^{B,b}	29.2±56.6 ^{A,b}
Year	20.4±48.9 ^{A,b}	29.1±56.5 ^{A,bc}	40.9±54.5 ^{A,ab}	19.1±36.2 ^{A,b}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns)

Table 4 Fixation Count on each AOI of four labels (Study 1)

AOI elements	Name	No Name	Logo	No Logo
Alcohol%	0.3±0.6 ^{A,b}	0.6±1 ^{A,b}	0.3±0.5 ^{A,bc}	0.8±1.5 ^{A,b}
Origin Name or Logo/Blank	0.6±1.6 ^{A,b}	0±0.2 ^{A,b}	0.3±0.5 ^{A,bc}	0.2±0.4 ^{A,b}
Brand Name	1.1±1.5 ^{A,b}	1.6±2 ^{A,b}	1.6±1.6 ^{A,b}	1.2±1.7 ^{A,ab}
Graph/Photo	3.9±3.7 ^{A,a}	5.1±4.9 ^{A,a}	3.4±4.2 ^{A,a}	4.4±3.3 ^{A,a}
Type of wine	0.9±1.1 ^{A,b}	0.6±1.2 ^{A,b}	0.9±1.3 ^{A,bc}	1.1±1.9 ^{A,b}
Volume	0.3±0.5 ^{A,b}	0.2±0.5 ^{A,b}	0.1±0.3 ^{A,c}	0.3±0.5 ^{A,b}
Year	0.2±0.5 ^{A,b}	0.3±0.6 ^{A,b}	0.7±1.0 ^{A,bc}	0.8±1.7 ^{A,b}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns)

Figure 8. shows the heatmaps of all four labels. The visualization of fixation distribution intensity of all participants by colour gradient overlay, red denote the most intense fixations followed by yellow, then green (Špakov & Miniotas, 2007). No colour on the heat map means no fixation on this part. Despite two groups of labels have different graphic designs, the red zone (Figure 8) stays in the middle part of the label in all four heatmaps imply that participants tend to fixate their gaze on the middle part of the label or says the Graph/Photo on labels. It has a similar result as illustrated above, which suggests during visual processing of the labels, the majority of consumers focus on Graph/Photo and Brand. Comparing among four labels (Figure 8), it is clear that participants were more focused on the brand name if it is in the middle of the label ("RANSOM" on Name and No Name), but not on the top of the label ("GREEN LAND" on Logo and No Logo). The result endorses with other researchers (Guo et al., 2019; Hessels, Kemner, van den Boomen, & Hooge, 2016; Torrico, Fuentes, et al., 2018; B. Zhang & Seo, 2015)

Moreover, it is important to highlight that albeit the Graph has a significant longer fixation duration and higher fixation count, the green zone on the Graph represents that participants dispersed the fixation around the Graph on both Logo and No Logo (Figure 8). Participants were more focused on the middle part of other elements, e.g., Brand Name and Origin in Logo and No Logo, which is shown in the red zone in Figure 8. Different from Name and No Name, participants were focused on the middle part of the Photo as well as other elements (Gofman et al., 2009). The possible reason could be the Graph is a more simple image compare to the Photo and has less information to process.

It also shows in the heatmaps (Figure 8) the red zone tends to get bigger on the adjoining area of the Origin Name or Logo. The red zone shifts to the bottom part of the label which is close to the Origin Name or Logo. Although no significant difference in fixation count and duration on Origin Name or Logo, with the Origin Name or Logo added to the label, participants pay more attention to the adjoining elements, which are the Type of wine and Year on the label. Same as the Logo and No Logo, the adjoining elements Type of wine, Year, and Brand Name attract more attention. The possible explanation is the food label viewing pattern is usually from top to bottom (Rebollar, Lidón, Martín, & Puebla, 2015). Participants tend to move to another element on the label if it is blank at the bottom. With the extra origin information added at the bottom, the time for the participant to process the information is longer with unconscious saccades searching and capturing stimulating information (Tatler, 2007; Wong & Wong, 2013).

The other interesting finding on the heatmaps (Figure 8) is that the Year is shown in the red zone in all four labels, despite the fact that no significant higher fixation on the Year. Hessels et al. (2016) indicated the shape, size, and location of various the AOIs for elements cause a significant effect on eye-tracking analysis. The significant higher attention on Graph/Photo is also because of the size of the AOI (Peschel & Orquin, 2013). Nevertheless, the AOI of Year and Origin Name or Logo is the same. The possible reason for the red zone on the Year instead of Origin Name or Logo could be the design of the label (Renshaw, Finlay, Tyfa, & Ward, 2004). The Year is in the middle of labels and close to the Graph/Photo and the Brand Name in all four labels. However, the Origin Name or Logo is on the bottom part of the image. The top to bottom and start at the middle viewing pattern could be why more gaze on the Year than the Origin Name or Logo.

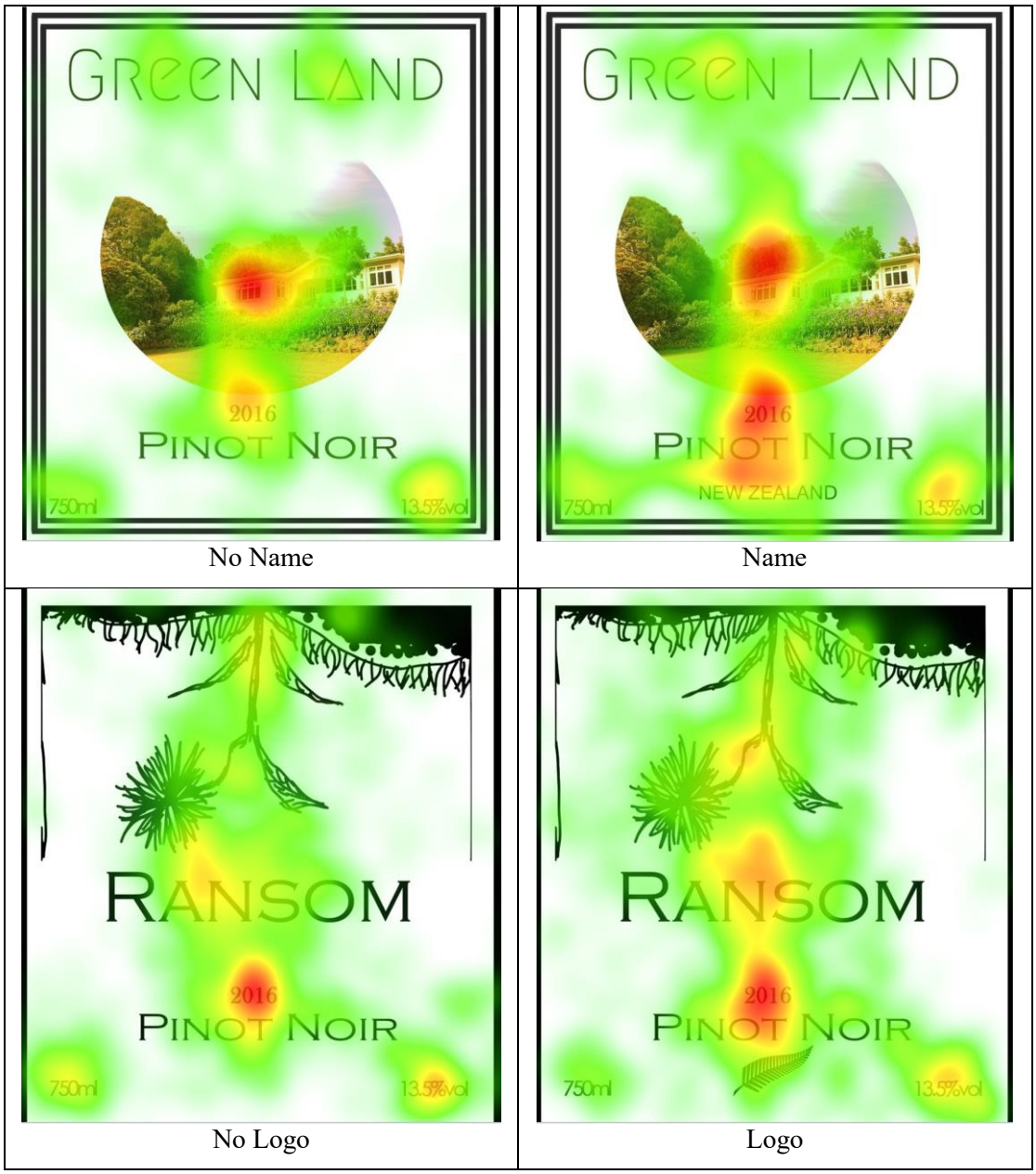


Figure 8. Heatmaps of four labels (Study 1)

4.2 Emotion

Emotion can be measure through a non-physiological parameter, which is facial expression obtain by iMotion in Study 1. Shown in Table 5, no significant difference (p>0.05) of emotion can be found on four different labels. It could because people do not tend to change facial expressions during reading labels on the screen. The relationship between different facial expressions and labels can be told by the PCA shown in Figure 9. The PCA graph illustrates No Name and No Logo have higher similarity than Name and Logo. The Name has a positive correlation with the contempt and sadness facial expression, also with overall liking. The Logo has a positive correlation with disgust, anger, surprise, and fear, while No Name and No Logo have a negative correlation. The other way to measure emotion is by self-reported. Sixteen different emotions used in CATA are shown in Table 6. In Table 6, the self-reported emotion after testing the wine sample in Study 2 shows no significant difference (*p>0.05*) except for Neutral. Gofman et al. (2009) reported that neutral and clam is the most self-reported emotion when consumer look at wine packaging. However, they found no significant emotional changes during wine package perception (Gofman et al., 2009). This can be the reason for no significant facial expression differences were found in Study 1. The other study suggests the minimal differences in facial expression and self-reported emotion during beverage tasting (Leitch, Duncan, O'keefe, Rudd, & Gallagher, 2015). Therefore, the difference in the red wine label does not have a great influence on emotion. On the other hand, Orth, Wolf, and Dodd (2005) reveal that emotion is a significant predictor of wine origin preference. The physiological signal could be used to monitor the masking emotion changes on food on further origin study (Torrico, Hutchings, et al., 2018). In addition, the emotional changes under different food categories were found. The research on dairy food shows different information on the label has a significant influence on emotion (Ares et al., 2011; Jiang et al., 2021).

Table 5 Facial expression result (Study1)

Emotion	Logo	No Logo	Name	No Name
Anger	0.07±0.15 ^{A,a}	0.03±0.07 ^{A,a}	0.01±0.02 ^{A,a}	0.03±0.07 ^{A,a}
Contempt	0.19±0.02 ^{A,a}	0.22±0.07 ^{A,a}	0.19±0.02 ^{A,a}	0.19±0.02 ^{A,a}
Disgust	1.06±2.31 ^{A,a}	0.92±1.29 ^{A,a}	0.58±0.46 ^{A,a}	0.49±0.25 ^{A,a}
Fear	1.06±3.79 ^{A,a}	0.30±0.74 ^{A,a}	0.22±0.69 ^{A,a}	0.17±0.33 ^{A,a}
Joy	0.47±2.03 ^{A,a}	0.00±0.01 ^{A,a}	0.43±1.87 ^{A,a}	0.00±0.00 ^{A,a}
Sadness	0.02±0.01 ^{A,a}	0.06±0.11 ^{A,a}	0.03±0.03 ^{A,a}	0.08±0.27 ^{A,a}
Surprise	0.92±1.94 ^{A,a}	0.47±0.69 ^{A,a}	0.36±0.33 ^{A,a}	0.42±0.32 ^{A,a}
Engagement	8.18±12.29 ^{A,a}	4.08±5.86 ^{A,a}	3.42±6.68 ^{A,a}	4.56±8.53 ^{A,a}
Attention	97.02±1.61 ^{A,a}	91.71±22.09 ^{A,a}	96.40±2.66 ^{A,a}	97.82±0.68 ^{A,a}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower case letters indicate no statistically significant difference (p<0.05) between facial expression (columns).

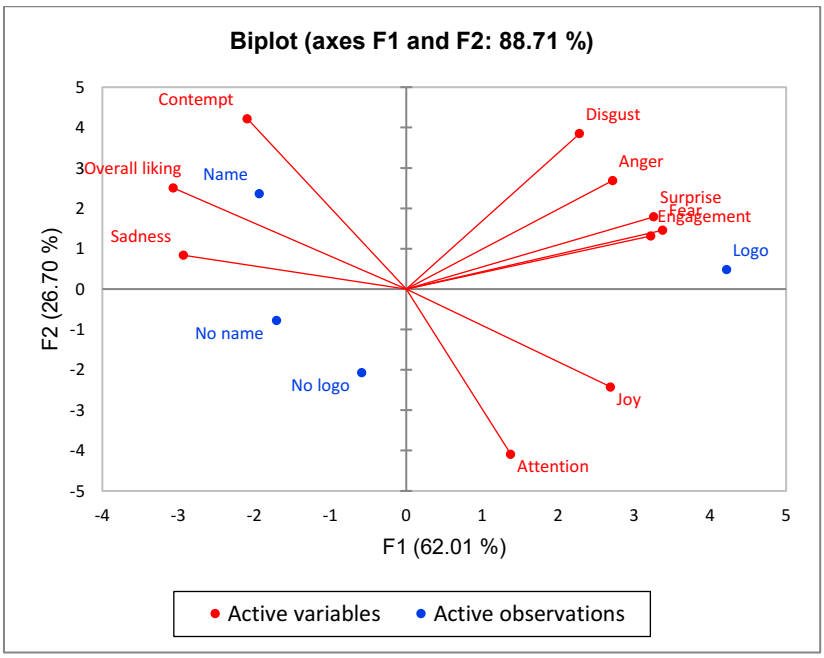


Figure 9 PCA of labels and facial expression (study 1)

Table 6 Cochran's Q test result of emotion frequency CATA (Study 2)

Attributes	Baseline	Name	No name	Logo	No Logo
Happy	0.23 [a]	0.29 [a]	0.34 [a]	0.26 [a]	0.27 [a]
Neutral	0.39 [b]	0.27 [b]	0.45 [a]	0.16 [b]	0.32 [b]
Sad	0.01 [a]	0.00 [a]	0.05 [a]	0.05 [a]	0.03 [a]
Curious	0.36 [a]	0.24 [a]	0.24 [a]	0.34 [a]	0.27 [a]
Disgusted	0.02 [a]	0.03 [a]	0.08 [a]	0.08 [a]	0.03 [a]
Surprised	0.13 [a]	0.12 [a]	0.054 [a]	0.08 [a]	0.15 [a]
Excited	0.18 [a]	0.12 [a]	0.24 [a]	0.16 [a]	0.12 [a]
Pleased	0.28 [a]	0.35 [a]	0.40 [a]	0.37 [a]	0.32 [a]
Calmed	0.25 [a]	0.21 [a]	0.32 [a]	0.24 [a]	0.29 [a]
Apprehensive	0.07 [a]	0.06 [a]	0.05 [a]	0.21 [a]	0.12 [a]
Comforted	0.27 [a]	0.29 [a]	0.26 [a]	0.34 [a]	0.27 [a]
Satisfied	0.27 [a]	0.18 [a]	0.18 [a]	0.34 [a]	0.15 [a]
Bored	0.04 [a]	0.09 [a]	0.11 [a]	0.08 [a]	0.09 [a]
Guilty	0.03 [a]	0.00 [a]	0.03 [a]	0.05 [a]	0.03 [a]
Healthy	0.18 [a]	0.18 [a]	0.16 [a]	0.11 [a]	0.06 [a]
Unhealthy	0.07 [a]	0.06 [a]	0.00 [a]	0.03 [a]	0.09 [a]

If the groups share the same lowercase letters indicate no statistically significant difference (p<0.05) between labels (rows)

4.3 Tasting

Sixteen different tasting attributes used in CATA were shown in Table 7. No Logo has significantly($p<0.05$) fewer participants perceive the chemical flavour and significantly($p<0.05$) more participants perceive the sweet taste of the red wine. Thus, the result indicates participant associate no Origin Logo - silver fern to more chemical flavour and less sweet taste. Moreover, the No Logo purchase intention 62% which is higher than others (Table 10.). It could be due to the trust of wine origin and brand familiarity (Jiménez & San Martín, 2010). However, no Origin Name does no show similar influence. Therefore, the taste difference might be more related to the design of the label (Renshaw et al., 2004). Instead of comparing with and without origin, Veale and Quester (2009) used three different origins (USA, France, and Chilli) and found significant differences in taste and quality perception of wine. Baseline which had no label showing to a participant has significantly higher heat feeling than four groups with the label. The heat of alcohol is mediated by the pain senses (Green, 1991). The Alcohol% on the wine label is 13.5%. The low alcohol % might lead to lower reported heat feeling. Table 8 shows no significant difference ($p>0.05$) on the rating (from 0 to 9) of overall liking, sweetness, astringency, aroma, taste/flavour of baseline, and four different labels. It means although Table 7 shows the number of participants who perceive sweet taste is different but on the level of sweetness.

Table 7 Cochran's Q test result of sensory frequency CATA (Study 2)

Attributes	Baseline	Name	No name	Logo	No Logo
Processed fruit flavour	0.12 [a]	0.09 [a]	0.16 [a]	0.32 [a]	0.24 [a]
Green flavour	0.11 [a]	0.15 [a]	0.11 [a]	0.05 [a]	0.12 [a]
Spicy flavour	0.22 [a]	0.06 [a]	0.24 [a]	0.32 [a]	0.06 [a]
Earthy flavour	0.09 [a]	0.18 [a]	0.13 [a]	0.11 [a]	0.12 [a]
Chemical flavour	0.08 [ab]	0.18 [a]	0.18 [a]	0.16 [a]	0.00 [b]
Heat feeling	0.36 [a]	0.15 [b]	0.18 [b]	0.26 [b]	0.12 [b]
Sweet taste	0.15 [b]	0.15 [b]	0.26 [b]	0.24 [b]	0.38 [a]
Bitter taste	0.36 [a]	0.41 [a]	0.37 [a]	0.32 [a]	0.29 [a]
Astringent	0.51 [a]	0.38 [a]	0.58 [a]	0.53 [a]	0.27 [a]
Sour taste	0.43 [a]	0.47 [a]	0.37 [a]	0.47 [a]	0.32 [a]
Floral	0.11 [a]	0.12 [a]	0.26 [a]	0.29 [a]	0.18 [a]
Fruity flavour	0.45 [a]	0.32 [a]	0.34 [a]	0.42 [a]	0.35 [a]

If the groups share the same lowercase letters indicate no statistically significant difference ($p<0.05$) between labels (rows)

Table 8 Purchase intention, overall liking* and sensory attribute rating after tasting* (Study 2)

Attribute	Baseline	Logo	No logo	Name	No name
Overall liking	5.74±1.67 ^{A,a}	5.84±1.90 ^{A,a}	5.5±1.58 ^{A,a}	5.06±1.86 ^{A,a}	5.47±1.74 ^{A,a}
Sweetness	4.15±2.94 ^{A,a}	4.99±3.56 ^{A,a}	5.12±3.2 ^{A,a}	4.17±3.27 ^{A,a}	5.13±2.86 ^{A,a}
Astringency	8.18±2.87 ^{A,a}	6.96±3.66 ^{A,a}	6.7±3.74 ^{A,a}	7.33±3.80 ^{A,a}	7.28±3.47 ^{A,a}
Aroma	6.26±1.44 ^{A,a}	5.95±1.58 ^{A,a}	5.74±1.40 ^{A,a}	5.53±1.66 ^{A,a}	5.95±1.54 ^{A,a}
Taste/Flavour	5.53±1.90 ^{A,a}	5.74±1.91 ^{A,a}	5.56±1.67 ^{A,a}	4.94±1.87 ^{A,a}	5.40±1.75 ^{A,a}

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns).
*The rating is from 0 to 9, while 0 is the lowest and 9 is the highest.

4.4 Consumer Attitude

The result of the importance of different wine element evaluation is shown in Table 9. It is widely recognized that visual attention is highly related to purchasing intention (Pieters & Warlop, 1999). The effect of origin is not significantly (p>0.05) affect the purchase decision. The influence of origin was found in some other research (Berry, Mukherjee, Burton, & Howlett, 2015; K. H. Lim, Hu, & Nayga Jr, 2018; Vendrell-Herrero, Gomes, Collinson, Parry, & Bustinza, 2018). In this study, the type of wine has significantly higher importance on purchase decision making by self-reported (Table 10), but the eye-tracking result (Table 1 to Table 4) shows participant has no significant higher fixation on the type of wine. In contrast, graph/photo shows not significantly influence on purchase decision but significant higher fixation. It could because the attention to a certain element is not always active and self-conscious (Kellogg, 1980), participants may not realize the effect of graph/photo on purchase decision making. Also, the self-reported importance is based on memory, which is a poor indicator (Van de Mortel, 2008). In addition, the element people pay more attention to does not automatically transform into a higher perception of value and interest in wine (Merdian, Piroth, Rueger-Muck, & Raab, 2020). Thus, cognitive bias could lead to the difference between data obtaining behaviour and the mind to make a response. The difference between unconscious and conscious perception goes in line with Merdian et al. (2020) result that a significant difference was found between the unconscious perception of wine bottles and the conscious purchase decision.

Table 9 Evaluation of the importance of different wine element (out of 9) on purchase decision making (Study 1)

Variable	Score
Wine consumption frequency	2.91±1.49 ^{b}
Origin	3.95±0.95 ^{b}
Type of wine	4.29±0.71 ^{a}
Year	3.29±1.17 ^{b}
Graph/Photo	3.39±1.01 ^{b}
Brand name	3.24±1.08 ^{b}

If the groups share the same lowercase letters indicate no statistically significant difference (p<0.05) between elements

On the other hand, the brand name shows significant differences in both eye-tracking results (Table 1 to Table 4) and self-reported results. The relationship among different element and overall liking are shown in the regression equation. It means the major factor in purchase decision-making is a type of wine, which also shows a negative effect on overall liking in this study. Therefore, the participant may elaborate wine by brand name and type of wine. It has also found in another study that the brand name on the label is the most important element in the overall acceptability of the product (Torrico, Fuentes, et al., 2018). However, the brand name used in the study is made up Name that participants did not become familiar with. The purchase intention on Logo and No Logo (with the brand name "RANSOM") is higher than Name and No Name (with the brand name "GREEN LAND"). It could because of the preference of "RANSOM" as the brand name (Table 10). More importantly, Jiménez and San Martín (2010) suggest the influence of origin is based on trust and familiarity. The unfamiliar brand name could influence the perception of origin.

The regression equation also indicates the type of wine has a significant negative effect on overall liking. This mean participant did not prefer the red wine Pinot Noir in general. The origin seems not as important as the type of wine and brand name. Thus, except for No Logo in study 2, the purchase intention is all lower than 50%.

Regression Equation of overall liking and label elements:

Overall liking = 5.637 + 0.183 logo + 0.091 brand name + 0.0957 wine consumption frequency + 0.318 origin - 0.638 type of wine* + 0.039 year

*p<0.05

Table 10. Purchase Intention and Overall Liking (Study1 and 2)

Labels	Purchase decision1	Overall liking1	Purchase Intention2	Overall liking2
Baseline			46%	5.74±1.67 [a]
Logo	45%	5.11±1.42 [A,a]	47%	5.84±1.90 [A,a]
No logo	45%	5.32±1.34 [A,a]	62%	5.50±1.58 [A,a]
Name	39%	5.82±0.98 [A,a]	32%	5.06±1.86 [A,a]
No name	26%	5.63±1.64 [A,a]	47%	5.47±1.74 [A,a]

If the groups share the same capital letters indicate no statistically significant difference (p<0.05) between labels (rows), the same lower-case letters indicate no statistically significant difference (p<0.05) between facial expression (columns).

4.5 Limitation & Future study

The eye-tracking data obtained from participants while they evaluated the label on the computer screen which different from the real label. It is based on fix time (10s) label showing. Participant many do not pay attention to the wine label during the whole 10 seconds. The compulsory

calibration process increases the awareness of eye movement. Also, the study only designs the label for the front of the wine bottle. The back label of the wine bottle usually contains other information, e.g., the adjectives describe the flavour, the information of the importer, and clams. There is no price information provided. Under the real purchase condition, Noussair, Robin, and Ruffieux (2004) suggested consumers search for information with different viewing patterns. Escandon-Barbosa and Rialp-Criado (2019) reveal that under real purchase conditions, the information of origin significantly increases the wiliness to pay of the consumer. One of the reasons is that in real purchase condition, consumers look at the wine label and bottle as a whole. Another eye-tracking study look at the wine label on the bottle as a whole found that the attention of the wine label determined consumer purchase intentions (Merdian et al., 2020). Therefore, no significant differences in attention was shown on wine origin. Origin shows no moderating effect on purchase intentions in this study.

Escandon-Barbosa and Rialp-Criado (2019) found that consumers read wine label information depend on their experience, and it influences purchase intention. The relatively even distribution of wine consumption frequency of participants in this study may be the other reason that not a significant difference of origin influence was shown (Occasionally 29%, Once every two months 9%, Once a month 22%, Once every two weeks 22%, Every week 18%). The effect of origin on wine is moderated by self-perceived expertise on the wine of consumers (Perrouty, d'Hauteville, & Lockshin, 2006). The low wine drinking frequency can be related to less wine familiarity. Besides, participants are mainly Asian (predominantly Chinese). The consumer lifestyle, demographic, and behavioural variables need to be considered. Different ethnic groups evaluate wine differently (Guidry, Babin, Graziano, & Schneider, 2009). In addition, according to some participants' feedback, they considered the wine was made specifically for the study. Therefore, they were not sensitive to the origin, which is New Zealand, where the study was held.

Therefore, to overcome the limitation, a new eye movement acquisition technique in the real purchase choice-based environment is suggested. A central pre-trial fixation marker should be used to avoid the central effect on the eye-tracking data. Another country origin should be used in a future study to see if the origin makes a difference in purchase intention. The eye-tracking research of origin effect on wine label should focus on the specific ethnic group should be carried out in the future.

Chapter 5

Conclusion

In this study, four designed labels with or without the origin name or logo were used to investigate the effect of origin on eye movement as well as purchase intention, hedonic, emotional, and tasting response. No significant difference was found on time to first fixation, first fixation duration, average fixation duration, and fixation counts of origin name or logo. The image on the label and brand name drew more attention to participants. However, shown on the heatmaps, the additional information of origin did shift people's attention close to that area. In general, both facial expression and self-reported emotion were not significantly influenced by with or without origin on the label. Nevertheless, the small unconscious emotion changes might not be detectable by the non-physiological signal. The label with the origin logo was reported with significantly more chemical taste and less sweetness detection. However, it was deemed more related to the label design.

Comparing between eye-tracking and self-reported data, the attention to a certain element is not always active and self-conscious, and more attention does not automatically transform into a higher perception of value and interest of wine. Also need to mention that the type of wine in this study shows a negative effect on overall liking. This could mean participants did not prefer the red wine Pinot Noir in general.

In summary, the origin has no significant influence on purchase intention, hedonic, emotional, and tasting response. Not conducting under real purchase condition, participants demographic, and label design could be the vital factor influence the result. However, this result is useful to design the label of the wine selling online. The improvement of eye movement acquisition technique and use in the real purchase choice-based environment, as well as focus on the specific ethnic group, are suggested in the future study.

References

Ares, G., Giménez, A., Bruzzone, F., Vidal, L., Antúnez, L., & Maiche, A. (2013). Consumer visual processing of food labels: results from an eye‐tracking study. *Journal of Sensory Studies, 28*(2), 138-153.

Ares, G., Piqueras-Fiszman, B., Varela, P., Marco, R. M., López, A. M., & Fiszman, S. (2011). Food labels: Do consumers perceive what semiotics want to convey? *Food quality and preference, 22*(7), 689-698.

Barber, N., & Almanza, B. A. (2007). Influence of wine packaging on consumers' decision to purchase. *Journal of foodservice business research, 9*(4), 83-98.

Barden, P., & Marketing, D. (2015). From Branding to Action. *THE BEHAVIORAL ECONOMICS GUIDE 2015*, 105.

Bergstrom, J. R. (2014). *Eye-tracking in user experience design*: Waltham, Massachusetts : Morgan Kaufmann.

Berry, C., Mukherjee, A., Burton, S., & Howlett, E. (2015). A COOL effect: The direct and indirect impact of country-of-origin disclosures on purchase intentions for retail food products. *Journal of Retailing, 91*(3), 533-542.

Brown, M., Marmor, M., Zrenner, E., Brigell, M., & Bach, M. (2006). ISCEV standard for clinical electro-oculography (EOG) 2006. *Documenta ophthalmologica, 113*(3), 205-212.

Busjahn, T., Bednarik, R., Begel, A., Crosby, M., Paterson, J. H., Schulte, C., . . . Tamm, S. (2015). *Eye movements in code reading: Relaxing the linear order.* Paper presented at the 2015 IEEE 23rd International Conference on Program Comprehension.

Cleveland, D., Cleveland, J. H., & Norloff, P. L. (1993). Eye-tracking method and apparatus. In: Google Patents.

Crane, H. D., & Steele, C. M. (1985). Generation-V dual-Purkinje-image eyetracker. *Applied optics, 24*(4), 527-537.

Duchowski, A. (2007). Eye-tracking techniques. In *Eye-tracking methodology* (pp. 51-59): Springer.

Ekman, P. (1992). Are there basic emotions?

Escandon-Barbosa, D., & Rialp-Criado, J. (2019). The Impact of the Content of the Label on the Buying Intention of a Wine Consumer. *Frontiers in psychology, 9*, 2761.

Famularo, B., Bruwer, J., & Li, E. (2010). Region of origin as choice factor: wine knowledge and wine tourism involvement influence. *International Journal of Wine Business Research*.

Farnsworth, B. (2019). What is eye-tracking and how does it work? In.

Gaeta, D., & Corsinovi, P. (2014). *Economics, governance, and politics in the wine market: European Union developments*: Springer.

Gallego, J. M. G., Mera, A. C., & García-Galán, M. D. M. (2015). The region-of-origin effect in the purchase of wine: The moderating role of familiarity. *Spanish Journal of Agricultural Research, 13*(3).

Gofman, A., Moskowitz, H. R., Fyrbjork, J., Moskowitz, D., & Mets, T. (2009). Extending rule developing experimentation to perception of food packages with eye-tracking. *The Open Food Science Journal, 3*(1).

Graham, D. J., Orquin, J. L., & Visschers, V. H. (2012). Eye-tracking and nutrition label use: A review of the literature and recommendations for label enhancement. *Food Policy, 37*(4), 378-382.

Green, B. G. (1991). Capsaicin cross-desensitization on the tongue: psychophysical evidence that oral chemical irritation is mediated by more than one sensory pathway. *Chemical senses, 16*(6), 675-689.

Guidry, J. A., Babin, B. J., Graziano, W. G., & Schneider, W. J. (2009). Pride and prejudice in the evaluation of wine? *International Journal of Wine Business Research*.

Guo, H., Zheng, K., Fan, X., Yu, H., & Wang, S. (2019). *Visual attention consistency under image transforms for multi-label image classification.* Paper presented at the Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition.

Gustafsson, S., Kingbäck, A., & Cederlund, M. (2017). Portable eye-tracking device. In: Google Patents.

Haida, M., Ishikawa, N., Minamitani, H., & Shinohara, Y. (2003). *Head mounted goggle system with liquid crystal display for evaluation of eye-tracking functions on neurological disease patients.* Paper presented at the Proceedings of the 25th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (IEEE Cat. No. 03CH37439).

Harper, G. C., & Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. *British Food Journal*.

Henderson, R. R., Bradley, M. M., & Lang, P. J. (2018). Emotional imagery and pupil diameter. *Psychophysiology, 55*(6), e13050.

Hessels, R. S., Kemner, C., van den Boomen, C., & Hooge, I. T. (2016). The area-of-interest problem in eyetracking research: A noise-robust solution for face and sparse stimuli. *Behavior research methods, 48*(4), 1694-1712.

Hickson, S., Dufour, N., Sud, A., Kwatra, V., & Essa, I. (2019). *Eyemotion: Classifying facial expressions in VR using eye-tracking cameras.* Paper presented at the 2019 IEEE Winter Conference on Applications of Computer Vision (WACV).

How do Tobii Eye Trackers work? (2021). In.

Jiang, R., Sharma, C., Bryant, R., Mohan, M. S., Al-Marashdeh, O., Harrison, R., & Torrico, D. D. (2021). Animal welfare information affects consumers' hedonic and emotional responses towards milk. *Food Research International, 141*, 110006.

Jiménez, N. H., & San Martín, S. (2010). The role of country-of-origin, ethnocentrism and animosity in promoting consumer trust. The moderating role of familiarity. *International business review, 19*(1), 34-45.

Kawai, S., Takano, H., & Nakamura, K. (2013). *Pupil diameter variation in positive and negative emotions with visual stimulus.* Paper presented at the 2013 IEEE International Conference on Systems, Man, and Cybernetics.

Kellogg, R. T. (1980). Is conscious attention necessary for long-term storage? *Journal of Experimental Psychology: Human Learning and Memory, 6*(4), 379.

Khaldi, A., Daniel, E., Massin, L., Kärnfelt, C., Ferranti, F., Lahuec, C., . . . Nourrit, V. (2020). A laser emitting contact lens for eye-tracking. *Scientific reports, 10*(1), 1-8.

Laeng, B., Suegami, T., & Aminihajibashi, S. (2016). Wine labels: An eye-tracking and pupillometry study. *International Journal of Wine Business Research*.

Land, M., & Tatler, B. (2009). *Looking and acting: vision and eye movements in natural behaviour*: Oxford University Press.

Lee, J. K., Lee, B.-K., & Lee, W.-N. (2013). Country-of-origin fit's effect on consumer product evaluation in cross-border strategic brand alliance. *Journal of Business Research, 66*(3), 354-363.

Leitch, K., Duncan, S., O'keefe, S., Rudd, R., & Gallagher, D. (2015). Characterizing consumer emotional response to sweeteners using an emotion terminology questionnaire and facial expression analysis. *Food Research International, 76*, 283-292.

Lim, J. Z., Mountstephens, J., & Teo, J. (2020). Emotion recognition using eye-tracking: taxonomy, review and current challenges. *Sensors, 20*(8), 2384.

Lim, K. H., Hu, W., & Nayga Jr, R. M. (2018). Is Marine Stewardship Council's ecolabel a rising tide for all? Consumers' willingness to pay for origin-differentiated ecolabeled canned tuna. *Marine Policy, 96*, 18-26.

Martin, D., O'neill, M., Hubbard, S., & Palmer, A. (2008). The role of emotion in explaining consumer satisfaction and future behavioural intention. *Journal of Services Marketing*.

McCutcheon, E., Bruwer, J., & Li, E. (2009). Region of origin and its importance among choice factors in the wine‐buying decision making of consumers. *International Journal of Wine Business Research*.

Mele, M. L., & Federici, S. (2012). Gaze and eye-tracking solutions for psychological research. *Cognitive processing, 13*(1), 261-265.

Merdian, P., Piroth, P., Rueger-Muck, E., & Raab, G. (2020). Looking behind eye-catching design: an eye-tracking study on wine bottle design preference. *International Journal of Wine Business Research*.

Mokrý, S., Birčiaková, N., Slováčková, T., Stávková, J., & Nagyová, Ľ. (2016). Perception of wine labels by generation Z: eye-tracking experiment. *Potravinarstvo Slovak Journal of Food Sciences, 10*(1), 524-531.

Monteiro, P., Guerreiro, J., & Loureiro, S. M. C. (2019). Understanding the role of visual attention on wines' purchase intention: an eye-tracking study. *International Journal of Wine Business Research*.

Nasoz, F., Lisetti, C. L., Alvarez, K., & Finkelstein, N. (2003). *Emotion recognition from physiological signals for user modeling of affect.* Paper presented at the Proceedings of the 3rd Workshop on Affective and Attitude User Modelling (Pittsburgh, PA, USA.

Noussair, C., Robin, S., & Ruffieux, B. (2004). Do consumers really refuse to buy genetically modified food? *The economic journal, 114*(492), 102-120.

Novikova, L. Y., & Naumova, L. G. (2020). Dependence of Fresh Grapes and Wine Taste Scores on the Origin of Varieties and Weather Conditions of the Harvest Year in the Northern Zone of Industrial Viticulture in Russia. *Agronomy, 10*(10), 1613.

Orquin, J. L., Scholderer, J., & Jeppesen, H. (2012). What you see is what you buy: How saliency and surface size of packaging elements affect attention and choice. *Society for Advancement of Behavioural Economics, 12*, 15.

Orth, U. R., Wolf, M. M., & Dodd, T. H. (2005). Dimensions of wine region equity and their impact on consumer preferences. *Journal of Product & Brand Management*.

Pannasch, S., Schulz, J., & Velichkovsky, B. M. (2011). On the control of visual fixation durations in free viewing of complex images. *Attention, Perception, & Psychophysics, 73*(4), 1120-1132.

Peißl, S., Wickens, C. D., & Baruah, R. (2018). Eye-tracking measures in aviation: A selective literature review. *The International Journal of Aerospace Psychology, 28*(3-4), 98-112.

Perrouty, J. P., d'Hauteville, F., & Lockshin, L. (2006). The influence of wine attributes on region of origin equity: An analysis of the moderating effect of consumer's perceived expertise. *Agribusiness: An International Journal, 22*(3), 323-341.

Peschel, A. O., & Orquin, J. L. (2013). A review of the findings and theories on surface size effects on visual attention. *Frontiers in psychology, 4*, 902.

Pieters, R., & Warlop, L. (1999). Visual attention during brand choice: The impact of time pressure and task motivation. *International Journal of research in Marketing, 16*(1), 1-16.

Poole, A., & Ball, L. J. (2006). Eye-tracking in HCI and usability research. In *Encyclopedia of human computer interaction* (pp. 211-219): IGI Global.

Radach, R., Hyona, J., & Deubel, H. (2003). *The mind's eye: Cognitive and applied aspects of eye movement research*: Elsevier.

Rebollar, R., Lidón, I., Martín, J., & Puebla, M. (2015). The identification of viewing patterns of chocolate snack packages using eye-tracking techniques. *Food quality and preference, 39*, 251-258.

Renshaw, J. A., Finlay, J., Tyfa, D., & Ward, R. D. (2004). Understanding visual influence in graph design through temporal and spatial eye movement characteristics. *Interacting with computers, 16*(3), 557-578.

Reulen, J., Marcus, J., Koops, D., De Vries, F., Tiesinga, G., Boshuizen, K., & Bos, J. (1988). Precise recording of eye movement: the IRIS technique Part 1. *Medical and Biological Engineering and Computing, 26*(1), 20-26.

Rohrbach, J., Dzhelebov, D., & Neuhann, I. (2012). Emile Javal (1839-1907) and his glaucoma blindness-a life for politics, publishing, vision research, and blind fellow men. *Klinische Monatsblatter fur Augenheilkunde, 229*(2), 166-169.

Rossiter, J. R., & Bellman, S. (2005). *Marketing communications*: Pearson/Prentice Hall.

Rutishauser, U., Walther, D., Koch, C., & Perona, P. (2004). *Is bottom-up attention useful for object recognition?* Paper presented at the Proceedings of the 2004 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2004. CVPR 2004.

Špakov, O., & Miniotas, D. (2007). Visualization of eye gaze data using heat maps. *Elektronika ir elektrotechnika, 74*(2), 55-58.

Tatler, B. W. (2007). The central fixation bias in scene viewing: Selecting an optimal viewing position independently of motor biases and image feature distributions. *Journal of vision, 7*(14), 4-4.

Torrico, D. D., Fuentes, S., Viejo, C. G., Ashman, H., Gurr, P. A., & Dunshea, F. R. (2018). Analysis of thermochromic label elements and colour transitions using sensory acceptability and eye-tracking techniques. *LWT, 89*, 475-481.

Torrico, D. D., Hutchings, S. C., Ha, M., Bittner, E. P., Fuentes, S., Warner, R. D., & Dunshea, F. R. (2018). Novel techniques to understand consumer responses towards food products: A review with a focus on meat. *Meat science, 144*, 30-42.

Van de Mortel, T. F. (2008). Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, The, 25*(4), 40.

Veale, R., & Quester, P. (2009). Do consumer expectations match experience? Predicting the influence of price and country of origin on perceptions of product quality. *International business review, 18*(2), 134-144.

Vendrell-Herrero, F., Gomes, E., Collinson, S., Parry, G., & Bustinza, O. F. (2018). Selling digital services abroad: How do extrinsic attributes influence foreign consumers' purchase intentions? *International business review, 27*(1), 173-185.

Walczyk, J. J., Tcholakian, T., Igou, F., & Dixon, A. P. (2014). One hundred years of reading research: Successes and missteps of Edmund Burke Huey and other pioneers. *Reading psychology, 35*(7), 601-621.

Wedel, M., & Pieters, R. (2008). A review of eye-tracking research in marketing. *Review of marketing research*.

White, C. L. (2012). Brands and national image: An exploration of inverse country-of-origin effect. *Place Branding and Public Diplomacy, 8*(2), 110-118.

Wiens, S., Mezzacappa, E. S., & Katkin, E. S. (2000). Heartbeat detection and the experience of emotions. *Cognition & Emotion, 14*(3), 417-427.

Wong, I., & Wong, D. (2013). Special adjuncts to treatment. *Retina (5th ed.)*.

Wu, G., Liu, G., & Hao, M. (2010). *The analysis of emotion recognition from GSR based on PSO.* Paper presented at the 2010 International symposium on intelligence information processing and trusted computing.

Wu, J., & Fu, G. (2007). The effects of brand origin country and made-in country on consumers' product evaluations and purchase intention. *Frontiers of Business Research in China, 1*(3), 333-350.

Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1988). Communication and control processes in the delivery of service quality. *Journal of marketing, 52*(2), 35-48.

Zhang, B., & Seo, H.-S. (2015). Visual attention toward food-item images can vary as a function of background saliency and culture: An eye-tracking study. *Food quality and preference, 41*, 172-179.

Zhang, X., & MacKenzie, I. S. (2007). *Evaluating eye-tracking with ISO 9241-Part 9.* Paper presented at the International Conference on Human-Computer Interaction.

Zhao, Z., Han, L., Fang, Z., Chen, x., Du, L., & Liu, Z. (2017). A study of daily stress state assessment based on wearable devices. *Journal of Electronics Information Technology, 39*(11), 2669-2676.

Appendix

A.1 iMotion Calibration

Eye Tracking Calibration: Configurations and Settings

help.imotions.com/hc/en-us/articles/203318361-Eye-Tracking-Calibration-Configurations-and-Settings

This article walks you through setting up the custom calibration feature.

Background

For Tobii eye trackers there are extended possibilities to customise the calibration process.
The use case could e.g. be for infants or children or populations with attention deficiencies (ADHD, Autism Spectrum etc).

The extended customisations for eye tracking calibration is available from iMotions version 5.5.1.

The customisation options include
- Adding images and videos to represent the calibration points (available for all eye trackers)
- Set the exact location for each calibration point (Tobii eye trackers only)

The calibration settings can be reviewed and set in Global Settings/Calibration.

Multiple Visualizations

You can now save multiple visualization files to choose from when using animations or images instead of fixation points. Click add and upload the image or video.

Instruction Slide
It is possible to insert an instruction slide prior to the calibration.

When clicking Open in the above dialog, user can set the position using this screen:

Click on "Preview" in the bottom of the screen to live view your current calibration setup, and click save to apply the current calibration to the study.

Eye Tracking Calibration: Experimental Set-up

help.imotions.com/hc/en-us/articles/202976852-Eye-Tracking-Calibration-Experimental-Set-up-

This article contains important guidelines and information to obtain proper eyetracking data.

This guide contains the following topics:

1. Factors that negatively influence eye tracking
2. Position Respondent
3. Eye Finder
4. Gaze Calibration
5. Live Data Quality
6. Data Quality Summary

1. Factors that negatively influence eye tracking

Room Light

Some external light sources can interfere with the eye tracker:

- Avoid fluorescent "Office lights" typically placed in the ceiling.
  They have an infrared component that can influence the trackers performance.
- Avoid sunlight from windows.
  Both because of the strong infrared component and because a window will provide changing light conditions over time.
- Create an environment with dispersed ambient light. For example point one or more incandescent lights towards a wall. Make sure there the level of light is adequate - too dark of lighting may make some respondents uncomfortable.
- If you have a respondent camera, make sure the light is bright enough to support the desired frame rate of the camera.

Human conditions

Some people can be difficult or even impossible to track due to some factors:

- Glasses - thick rim and/or severe near/far-sightedness
- Contact lenses - severe near/far-sightedness
- Astigmatism
- One-eyed
- Cross-eyed
- Previous Laser-eye surgery

People with glasses can be tracked but expect longer calibration time due to several calibration trials. If a subject has severe far or near-sightedness, it may be difficult to get a good calibration in any case.

2. Position Respondent

By using the iMotions's **Eye Finder** widget as a guide, make sure that

- The respondent's head is approximately 60 cm from the screen
- The respondent's eyes are approximately at the center of the screen.

3. Eye Finder

The eye finder shows the position of the eyes according to the eye tracker, and the distance of the eyes to the eye tracker. Double click on the Eye Finder to detach it to a separate window.

Below is a list of all the eye finder states:

The eye finder cannot detect any eyes. Make sure that the respondent is positioned according to this guide. Also, make sure that the eye tracker is configured properly (according to the configuration guide of the specific eye tracker)	
The respondent is not positioned properly. Adjust the distance of the respondent from the eye tracker – according to the feedback presented in the eye finder	
The respondent is not positioned properly. Adjust the position of the respondent from the eye tracker – according to the feedback presented in the eye finder	
When the two dotted squares merge, and the distance indicator shows arround 60 cm - the optimal positioning has been established	
The eye tracker is not connected. Make sure that the eye tracker is installed and configured properly (according to the installation and configuration guide of the specific eye tracker)	

4. Gaze Calibration

When you click the record button in iMotions, the eye tracking calibration will start automatically, after an instruction slide.

NOTE: This will only happen if the study and respondent is set to "Compact" and "One Screen Calibration" see guide: https://help.imotions.com/hc/en-us/articles/202971102-How-to-use-the-One-Screen-Calibration

It is also possible to input a custom instruction slide for calibration. Go to "Preferences" select "Global Settings", and look at the bottom of "Calibration" tab. Here you can adjust the slide settings for "Compact Calibration". Select "Custom" to import a specific calibration instruction slide.

NOTE: Make it a habit to also tell the respondent, to follow the red circle with his eyes.

NOTE: To obtain the best results, ask the respondent to focus on the black dot in the middle of the red circle!

You can change the number of calibration points, and the size, color and speed of the calibration points under *Preferences --> Global Settings* and under *Calibration* tab, scroll down to *Eye Tracker Calibration:*

Preferences.jpg

Eye_Tracker_Setting.JPG

NOTE: For better eye tracking quality, use at least 9 calibration points.

When the respondent has finished the eye tracking calibration, you see the result which can either be Excellent, Good or Poor.

Excellent Calibration

Continue to test

Good Calibration

Try to recalibrate once or twice to see if you can improve the calibration to become Excellent. Otherwise, continue to test

Poor Calibration

Try to recalibrate once or twice to see if you can improve the calibration to become Good or Excellent. If calibration never goes above poor you may want to skip the respondent altogether.

While you are waiting for the calibration to finish you will see a spinning wheel

Depending on the results a different scene will be shown, the optimal case will be Excellent, in which case you will see this:

If you did not get Excellent calibration, consider recalibration.

A.2 Questionnaire

Study 1

(Show Picture 1.)

1. Overall, how much do you like or dislike this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

2. Would you purchase this wine?

YES	NO

3. Please rate the importance **logo** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

4. Please rate the importance **Brand Name** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

Questions:

(Show Picture 2.)

1. Overall, how much do you like or dislike this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

2. Would you purchase this wine?

YES	NO

3. Please rate the importance **logo** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

4. Please rate the importance **Brand Name** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

1. How often do you drink wine?
   A. Everyday
   B. Every week
   C. Once every two weeks
   D. Once a month

1. Please rate the importance **origin** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

2. Please rate the importance **type of wine** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

3. Please rate the importance **year** on purchasing decision making

Not At All Important	Not Important Very Much	Not Important Moderately	Not Important Slightly	Neutral	Important Slightly	Important Moderately	Important Very Much	Important Extremely
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**

Study 2

Sample 1 (Baseline)

1. Please take a sip of this wine sample and select all the emotions that you think apply:

Happy, neutral, sad, curious, disgusted, surprised, excited, pleased, calmed, apprehensive, comforted, satisfied, bored, guilty, healthy, unhealthy.

2. Please take a sip of this wine sample and select all the sensory attributes that you think apply:

Processed fruit aroma, sweet aroma, green aroma, spicy aroma, spicy aroma, earthy aroma, chemical aroma, heat feeling, sweet taste, bitter taste, astringent.

3. How much do you like the aroma of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

4. How much do you like the Taste/Flavour of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

5. Overall, how much do you like or dislike this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

6. Would you purchase this wine?

YES **NO**

Please fill this information:
Name
Gender
Age
Nationality
How often do you drink wine?

A. Everyday
B. Every week
C. Once every two weeks
D. Once a month
E. Occasionally

Sample 2

1. Please take a sip of this wine sample and select all the emotions that you think apply:

Happy, neutral, sad, curious, disgusted, surprised, excited, pleased, calmed, apprehensive, comforted, satisfied, bored, guilty, healthy, unhealthy.

2. Please take a sip of this wine sample and select all the sensory attributes that you think apply:

Processed fruit aroma, sweet aroma, green aroma, spicy aroma, spicy aroma, earthy aroma, chemical aroma, heat feeling, sweet taste, bitter taste, astringent.

3. How much do you like the aroma of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

4. How much do you like the Taste/Flavour of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

5. Overall, how much do you like or dislike this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

6. Would you purchase this wine?

YES NO

Sample 3

1. Please take a sip of this wine sample and select all the emotions that you think apply:

Happy, neutral, sad, curious, disgusted, surprised, excited, pleased, calmed, apprehensive, comforted, satisfied, bored, guilty, healthy, unhealthy.

2. Please take a sip of this wine sample and select all the sensory attributes that you think apply:

Processed fruit aroma, sweet aroma, green aroma, spicy aroma, spicy aroma, earthy aroma, chemical aroma, heat feeling, sweet taste, bitter taste, astringent.

3. How much do you like the aroma of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

4. How much do you like the Taste/Flavour of this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

5. Overall, how much do you like or dislike this wine?

Dislike Extremely	Dislike Very Much	Dislike Moderately	Dislike Slightly	Neither Like Nor Dislike	Like Slightly	Like Moderately	Like Very Much	Like Extremely
1	2	3	4	5	6	7	8	9

6. Would you purchase this wine?

YES NO