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The effect of consumption context on consumer hedonics, emotional response and beer choice

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Key words: Context, Emotional response, Liking, Product Choice, Beer

Abstract

The context of a consumer test affects participant response. Data collected in a sensory laboratory is likely to have little predictive value of consumer experience in real-life situations. This study determined the effects of context on consumer response to two commercial beers. Regular beer consumers (n=100) rated liking and emotional response using ten beer-specific emotion categories for two beers (Lager and Ale) under three different conditions: (1) a sensory testing facility (Lab), (2) a natural consumption environment (Bar) and (3) using an evoked context (Evoked). Their choice of product to take home was also recorded. Overall results showed significant product differentiation for liking (F (99, 2, 1) = 8.46, p = 0.004) and product choice (Q (1, N = 100) = 4.85, p = 0.028) in the Bar but not in the Lab or Evoked context. Emotional variables highlighted significant product differentiation ($p < 0.05$) but more so in the Bar than in the Lab or Evoked context. However, clustering participants on liking revealed three distinct clusters differing in sensitivity to context. Two clusters showed opposing but consistent preference for one of the two products regardless of context. The third cluster was more influenced by context, showing a more discriminating response in the Bar. These findings showed that consumers differ in their degree of context-sensitivity and the extent to which evoking a context gives similar results to a real environment. They also highlighted the importance of segmentation and confirmed the added insights gained by measuring emotional response compared to liking.

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1. Introduction

Not taking the situation in which a product is consumed into account has been mentioned as a common fallacy in sensory science and consumer research (Köster, 2003). Eating is a multisensory experience (Spence, 2013) and human beings are influenced by the context and environment in which they consume products (Bell, Meiselman, Pierson, & Reeve, 1994; Edwards, Hartwell, & Giboreau, 2016). Good practice in sensory research dictates that a lot of effort goes into minimising variation due to external sensory signals by having white/neutral walls and furniture, an odourless environment and temperature and humidity control to avoid introduction of experimental error. While this setting might be preferred for objective testing, it provides an unrepresentative consumption situation for consumers and therefore is likely to have little predictive power for how consumers experience products 'in the real world' (de Graaf, Cardello, et al., 2005). It has also been argued that testing in isolated sensory booths leads to boredom and a lack of attention amongst participants, thus further diminishing the external validity of consumer data (Bangcuyo et al., 2015). Since the setting in which a sensory consumer test is performed can affect the way participants respond to the tested products, providing participants with a context that is closer to the natural consumption situation of the tested products is an area of increasing interest for sensory researchers (Jaeger et al., 2017). One strategy to improve validity of sensory consumer tests has focussed on the use of 'evoked contexts' by describing meal situations in a written scenario (Piqueras-Fiszman & Jaeger, 2014b), asking consumers to write their own scenario (Dorado, Chaya, Tarrega, & Hort, 2016; Hein, Hamid, Jaeger, & Delahunty, 2010) or by re-creating a natural consumption environment by manipulating elements in a controlled setting (Bangcuyo, Smith, Zumach, Pierce, Guttman, & Simons, 2015; Holthuysen, Vrijhof, de Wijk, & Kremer, 2017; King, Weber, Meiselman & Lv, 2004).

Context is known to impact food choice and acceptability. Studies comparing hedonic ratings obtained in laboratory and real-life consumption environments found that, depending on the product type, liking scores can vary between sensory laboratories and Home Use Tests (Boutrolle, Delarue, Arranz, Rogeaux, & Köster, 2007), restaurants (King, Meiselman, Hottenstein, Work, & Cronk, 2007; Meiselman, Johnson, Reeve, & Crouch, 2000) and cafeterias (Meiselman et al., 2000) respectively. It

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has also been demonstrated that consumer choice behaviour can be manipulated by the decoration in a restaurant (Bell et al., 1994) or the ambiance of a bar (Sester et al., 2013). Several authors suggest context affects emotional response as well (Edwards et al., 2016; Piqueras-Fiszman & Jaeger, 2014a), however, limited research has been done in this area. Although there is no consensus amongst scientists on the definition of emotion and this topic is subject to debate in the field of sensory and consumer science, the measurement of 'emotions' has gained popularity in recent years. Coppin and Sander (2016) discuss a consensus definition based on the current emotion literature: an emotion is an "event-focused, two-step, fast process consisting of (1) relevance-based emotion elicitation mechanisms that (2) shape a multiple emotional response (i.e., action tendency, automatic reaction, expression, and feeling)". This definition was adopted for the purpose of defining emotion in the current research, assuming that exposure to the beer causes a relevance-based emotion elicitation mechanism and that a self-report measure can capture the 'feeling' aspect of the multiple emotional response. It has been shown that measuring consumer emotional response using self-report methods is more discriminating than simply measuring liking (Ng, Chaya, & Hort, 2013) and may provide deeper insights into food choice decisions (Gutjar, Dalenberg, et al., 2015; Gutjar, de Graaf, et al., 2015). Therefore, there is a need to determine if and how context affects emotional response data in order to improve practice in consumer testing of products. Piqueras-Fiszman and Jaeger (2014a) found that asking consumers to imagine eating the same food in different contexts using written scenarios changed their emotional response depending on their perceived appropriateness of the evoked consumption occasion. Dorado et al. (2016) found that imagining a consumption context with the use of a written scenario impacted emotional response to beer compared to testing without evoking a context. However, Jiang, Niimi, Ristic, and Bastian (2016) studied the effects of decorations in an immersive environment on the emotional response to wine and found that the immersive environment had no effect. Despite contradicting evidence on the effects of context, some researchers choose 'real-life' settings to measure liking and emotional response to beer (Gomez-Corona, Chollet, Escalona-Buendia, & Valentin, 2017; Silva et al., 2017). Beer as a product category is associated with positive high arousal emotional responses (Silva et al., 2016) and the use of an emotion lexicon has been

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shown to discriminate between beer samples (Chaya et al., 2015). Hence, beer can be considered an effective stimulus to study product related emotional responses.

There have been no previous studies that compared emotional response to beer obtained in a laboratory setting to a natural consumption context or evoked context. The current study aimed to fill the gap of knowledge in this area by comparing consumer liking, emotional response and choice of beer products in a natural consumption context, i.e. a bar, to a traditional sensory test setting, and to determine the relative effect of evoking a context. Regular beer consumers were invited to evaluate beer and complete a questionnaire in a bar, a sensory lab and under an evoked context condition in three separate sessions. The study was approved by the Faculty of Medicine & Health Sciences Research Ethics Committee of the University of Nottingham (Ethics reference number H12092016).

2. Materials and methods

2.1 Products

A commercial ale and lager beer were selected as sensory stimuli. These two products were selected for being visually similar but noticeably different in taste, flavour and mouthfeel. Similarity in appearance was deemed necessary to prevent differences in results due to visual cues. The products were characterised by The University of Nottingham trained beer panel as having different sensory profiles. Eight of these panellists generated sensory attributes to describe the beer and performed 2-Alernative Forced Choice (2-AFC) tests comparing the two products on each of the attribute for intensity in triplicate. The Ale was found to be significantly stronger in fruity aroma ($p = 0.003$), bitter taste ($p < 0.001$) viscosity (mouthfeel) ($p = 0.001$) and astringent mouthfeel ($p = 0.003$) than the Lager. The Lager was found to be significantly stronger in sulphury aroma ($p = 0.011$) and apple flavour ($p < 0.001$) than the Ale. The Ale had an alcohol content of 4.1% Alcohol by Volume (ABV). The Lager beer contained 4.8% ABV.

2.2 Participants

One hundred regular beer consumers (consuming beer at least once a month) were recruited from staff (15%), and student (82%) volunteers at the University of Nottingham plus some locals external to the

University (3%). The participants (40% female) ranged in age from 18 to 65 with an average age of 25 years. Pregnant women and individuals that had any reason to refrain from drinking alcoholic beverages (including declared health, religion or addiction) were excluded from participation. Seventy-four participants (74%) were from the UK and 87% declared that they spoke English as their first language. Non-UK participants were from Europe (11%), Asia (11%), the Americas (3%) and Africa (1%) and declared that they had been living in the UK for at least one year. Participants received an inconvenience allowance in recompense for their time.

2.3 Experimental design

Participants attended three sessions over the course of five weeks during which they were asked to taste two beer products and record their responses via an online questionnaire. To balance out session order effects over the three context conditions, participants were divided into three groups based on their availability resulting in 39 participants having their first session in the Bar, 33 in the Lab and 22 starting with the Evoked context. Because session order was partially based on participants' availability, the order of the contexts was not completely balanced. The number of participants per each of the six possible session orders for attending the Lab, Bar and Evoked contexts ranged from 10 to 22. All test sessions took place on Mondays, Tuesdays and Wednesdays in 30-minute timeslots between 5pm and 8:30pm. As much as individual schedules allowed, all three sessions were scheduled for the same time and on the same day of the week for a specific individual participant.

2.4 Context conditions

Data was collected during three sessions, each under a different context condition. A Student Union bar at the University of Nottingham (Figure 1) was used as the natural consumption context (Bar) for one session. The usual ambiance of the bar was unchanged during the experiment and the bar remained open as usual for other customers. After receiving test instructions participants were free to sit anywhere in the bar. Talking was allowed during the test, but instructions were given to not discuss the questionnaire or the samples. In order to mimic a natural consumption context as much as possible, samples were prepared behind the bar and participants were instructed to pick up their beer from the bar at specified moments during the questionnaire. Questionnaires were completed on

participant's smartphones. Tablets were available for participants that did not have a smartphone. Since it is common to use a smartphone in a bar this was considered to cause minimal disturbance to the natural setting. The other two sessions took place in the Sensory Science Centre sensory booths (ISO: 8589:1988) at the University of Nottingham (Figure 1), one under standard conditions (Lab) and another where the context was evoked (Evoked). Under the Lab and Evoked context conditions questionnaires were completed on desktop computers in the sensory booths. In the Evoked context condition participants were asked to imagine that they were in the Student Union bar context condition while they were physically in the same sensory booths as under the Lab condition. Before receiving their first sample the participants were exposed to a written instruction describing the Student Union bar and asked to imagine what it would be like to be there. To help participants to imagine the Bar context, they were exposed to sound recordings and pictures from the Student Union Bar on a tablet in their tasting booth. Thirty minutes of sounds were recorded on a regular Tuesday evening in the Student Union Bar and consisted of music, indistinguishable conversation and background noises. Five photos were taken from different angles in the Bar during a regular Tuesday evening and were displayed as a repeating slideshow with a duration of five seconds per photo. The slideshow and sound recordings played for the entire duration of the test, which took on average 10 minutes per participant. Participants were instructed to keep their earphones in and listen to the sound recordings until they had completed the entire questionnaire. No data was collected on compliance with instructions or the time participants actually spent watching the slideshow.

2.5 Sample preparation and temperature

Sample preparation initiated when participants started their questionnaire. Both beers were presented in identical standard half pint glasses (284ml). For each sample a full glass containing approximately 284ml was presented on a plain cardboard beer coaster labelled with a random 3-digit code. The temperature of the beer samples was recorded. As a result of limited cooling facilities and lack of control over the room temperature the average temperature of the samples in the Bar was relatively high at an average of 11.27°C (SD = 2.72). To avoid differences between the two locations, the sample temperatures in the sensory test facility were adjusted to match those in the Bar by storing the

samples at room temperature for 30 minutes before each session. The average temperature of samples

served in the sensory test facility was 10.17°C (SD = 1.56). The average temperature of the Ale was

10.38°C (SD = 2.15) and for the Lager the average temperature was 10.87°C (SD = 2.11). To check

for any significant differences in serving temperature between the two locations, and the two

products, a two-factor Analysis of Variance (ANOVA) was performed (location, product) with

interaction on the recorded sample temperatures. In the Bar the average sample temperature was

found to be significantly higher than in the Sensory test facility (F (1, 1) = 6.26, p = 0.014). However,

this significant difference was only due to the exceptional high average temperature that was recorded

during the first test week in the Bar context (M = 12.66, SD = 2.16). There was no significant

difference in temperature between the two products (F (1, 1) = 0.86, p = 0.367). ANOVA showed no

significant interaction effect between context and product (F (1, 1) = 0.577, p = 0.449). It is unknown

if the magnitude of the temperature differences in the beer samples would have been perceived by the

participants. The temperature variations can be considered part of the experimental set-up, as in

sensory test facilities there is more control over serving temperatures and the room temperature

whereas in real consumption environments that level of control does not exist. Since the difference in

temperature was caused by the first week of sessions, additional analyses were performed to check for

session order effects.

2.6 Sample presentation

Beers were presented to participants monadically under blind conditions and in the same way across

the three context conditions according to a randomised balanced design. A two-minute break was

enforced between samples during which participants were instructed to cleanse their palate with

mineral water. Palate cleansing is not normally carried out in real life consumption situations but as

two different beers were tasted close together in all contexts, palate cleansing was necessary to avoid

carry over. It is important to note that participants were only allowed to take one sip of each sample.

For this first investigation, one sip was deemed sufficient to measure participants' responses to the

beers without the additional effects related to satiety and alcohol consumption. Future work will aim

to determine the effects of consumed beer volume on consumer responses. The sip size was not

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controlled or standardised between participants as in this study the objective was to keep the consumption as natural as possible. Participants were instructed to take a sip as they would normally and thus the sip-size likely varied between participants.

2.7 Questionnaires

Data was collected using an online questionnaire via Compusense Cloud (Version 8.0.6288.23054, Compusense Inc., Guelph, Ontario, Canada). Participant's emotional response to each product was measured directly after tasting the beer using a previously developed beer specific emotion lexicon (Dorado et al., 2016; Eaton, Chaya, Smart, & Hort, 2018) consisting of ten emotion categories (Table 1). Each of the ten emotion categories was presented together with the associated terms and participants were asked to indicate the extent to which they were experiencing the emotions associated with those descriptors by giving an intensity rating on continuous line scale anchored from 'very low' to 'very high' at 5% and 95% of the scale. The order of the emotion categories was randomised between different participants, but the order was kept the same over the three sessions for each participant. After evaluating emotional response, participants were asked to rate overall liking on a continuous line scale, anchored at 5% and 95% with 'dislike extremely' and 'like extremely'. At the end of each test session participants were also asked which of the two tasted beers they would like to receive at the end of the study as a further thank you. They could indicate their choice by selecting one of the 3-digit codes of the samples tasted during that test session, or choose to express no preference for either product. At the end of their last session, participants received the bottle of the beer that they chose during that session. Although the choice was recorded during each of the three sessions, the participants only received the beer of choice after completion of the study, since presenting beer would reveal the brand and product information which could have biased their responses in subsequent sessions.

2.8 Data analysis

Statistical analyses were performed using Microsoft Excel 2013/XLSTAT (XLSTAT Version 18.07.39020, Addinsoft, New York, USA). An α-risk of 0.05 was set as the level of significance in all data analyses, unless indicated otherwise.

Mean intensity scores and standard errors (SE) for all emotional categories and liking were calculated for each product (Ale and Lager) under each context condition (Bar, Lab and Evoked). To determine the overall effects of product and context, four-factor mixed model Analysis of Variance (ANOVA) with product, context and session number as fixed factors, and participants as a random factor, was performed for each emotion category and liking. Where significant product and/or context effects were found, Tukey post hoc analyses were applied. Session number (whether it was the first, second or third session for the participant) was included in the ANOVA model to account for the effect this might have had. As an aim of this study was to determine the consequences of decisions made regarding the context for consumer test designs, each context was also considered separately to demonstrate the impact of using a different context on product differentiation. Within each of the three context conditions, the data was split by context and a mixed model ANOVA with participant as random factor and product as fixed factor was performed on liking and emotional response from the Bar, Lab and Evoked context separately and given the lack of context*product*session interactions in the full data set. To study differences in product choice per context Cochran's Q tests were performed comparing the number of times the Ale and the Lager were selected under each context condition. Participants not expressing a preference were excluded from the analyses.

A hierarchical agglomerative cluster analysis using Wards method was performed using product liking scores across all contexts to determine if liking patterns were homogeneous amongst participants. The resulting dendogram was visually inspected to determine obvious clusters present. The data were then split by cluster. Mean scores and standard errors (SE) were calculated for each of the ten emotion categories and liking for each product under each context condition separately. To determine product and context effects within each cluster, a four-factor mixed model ANOVA with product, context and session number as fixed factors and participants as random factor was performed for each cluster separately. To determine how context affected liking and emotional response per product within each cluster, the data was split per product and analysed with a three-factor mixed model ANOVA with participant as random factor and context and session as fixed factors, separately for each cluster. The choice behaviour of each cluster was analysed per context with Cochran's Q test,

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as above. The emotional data, separated by product, context and cluster was subjected to a principal component analysis (PCA) in order to enable visualisation of the product-context-cluster emotional space.

3. Results

Emotional response, liking scores and preferred product choice for two commercial beer products were collected from 100 consumers in three different context conditions. Here, the first section describes relevant findings from analysis of the complete dataset (all 100 participants), the second section presents separate analyses of three distinct consumer clusters discovered in the data.

3.1 Overall consumer response to beer in different contexts

3.1.1 Context, product and interaction effects when considering all participants

Table 2 displays the mean scores per product for liking and each of the ten emotion categories when evaluated by 100 participants in the Bar, Lab and Evoked contexts. Table 3 presents the *F* and *p*-values from the four-factor ANOVAs for each emotion category and liking with all 100 participants were considered. As is expected in consumer studies, significant differences amongst participants were evident for all emotion categories as well as liking. The analysis over all participants revealed limited effects of context on consumers' responses to the two beers. A significant context effect ($p <$ 0.05) was found for emotion category Curious, and context effects for Tame/safe and Underwhelmed were approaching significance ($p < 0.10$). As can be seen in Table 2, average scores on Curious were higher in the Bar than in the other two context conditions and Tukey post hoc groupings confirmed that the difference between the Bar and Lab was significant ($p = 0.006$) while the difference between the Bar and Evoked context approached significance ($p = 0.070$) for this emotion. The ANOVA results in Table 3 also showed a significant product effect ($p < 0.05$) for overall liking, as well as for emotion categories Shocked, Content, Nostalgic, Disgusted and Tame/safe. As can be seen from the means in Table 2, the lager was scored higher on liking and the significant positive emotions, whereas the Ale received higher scores for the significant negative emotion categories. Significant session effects were found for Shocked, Bored, Content, Excited, Disconfirmed, Disgusted, Underwhelmed, Curious and liking (Table 3). Tukey post hoc groupings revealed that this was due to first order

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session effects, where participants gave a more positive response during in the first session compared to the second and third sessions. No significant interactions were found between context and product or product and session (Table 3). The only significant interaction between context and session was found for Bored (Table 3). In the Bar slightly higher scores for Bored were given during the second session than during the first and last session. The cause of this effect is unknown. The only significant interaction between context, product and session was for the emotion category Disgusted (Table 3). The Ale was scored higher on Disgusted during the third session in the Bar context than during other sessions. It is not clear what caused this higher score.

3.1.2 Product differentiation per context when considering all participants

Figure 2 shows the average emotional response and liking for each product, separately in each of the three context conditions when all 100 participants were considered. Although little effect of context or context*product interaction was found when analysing the data of all context conditions together, there was a stronger product differentiation in the Bar context than in the Lab and Evoked context. When the products were tasted in the Bar, the Ale was scored significantly higher than the Lager on two negative emotion categories (Shocked and Disgusted) and lower on liking and three positive emotion categories (Content, Nostalgic and Tame/safe) (Figure 2). In the Lab context the two products were only differentiated on two emotion categories and there was no significant difference on liking. When participants tasted the beers in the Lab setting, the Ale was scored significantly higher than the Lager on Shocked and lower on Tame/Safe. In the Evoked context only one significant difference between the two beers was found, namely a significantly higher score for the Ale on Disgusted. Table 4 shows the number of participants that, given the choice, would take home either the Lager or the Ale in each of the three context conditions, together with the results from the associated Cochran's Q test. A significant majority of the participants chose to receive the Lager in the Bar ($p = 0.028$), while in the Lab ($p = 0.518$) and Evoked context ($p = 0.750$) there was no significant difference in the number of participants that chose to receive the Lager or the Ale (Table 4). These results showed that context had a significant effect on product choice and not surprisingly, a

significant majority of the participants chose to receive the product they liked best and was associated with a positive emotional response.

3.2 Response of different consumer clusters to beer in each context

3.2.1 Three clusters based on product liking per context

To study the relative effects of context versus hedonic preference on emotional response and product choice, participants were clustered based on their liking of each product across each context. The cluster analysis revealed three consumer clusters that differed in their overall liking for the Ale and the Lager in the three context conditions. The average scores for liking and emotional response per cluster are depicted in Figure 3a-f and listed in Table 5a-c. Table 6a-c displays the *F* and *p*-values from the four-factor ANOVAs per cluster for each emotion category and liking. One cluster containing 26 participants was characterised as rating the Ale significantly higher in liking than the Lager in each context (Table 5a and 6a). A second cluster, (34 participants) gave significantly higher liking scores for the Lager than for the Ale under each context condition (Table 5b and 6b). The third, and largest, cluster consisted of 40 participants that, unlike the other two clusters, did not show a consistent hedonic preference for one of the two products (Table 5c and 6c). The clusters were consequently named the 'Ale Likers', 'Lager likers' and the 'Context Sensitives' respectively.

3.2.2 Ale likers

Within the Ale Likers cluster ANOVA revealed that this cluster scored the Ale significantly higher than the Lager on four out of five positive emotion categories (Content, Excited, Nostalgic and Curious) and significantly lower on four out of five negative emotion categories (Bored, Disconfirmed, Disgusted and Underwhelmed) (Table 5a and 6a). The emotional response of this cluster to the two products is visually represented by Figure 3a and 3b. The four-factor ANOVA revealed a significant context effect for the emotion category Tame/safe within the Ale Likers cluster (Table 6a). Comparing the responses between the three context conditions separately for each product revealed slightly more context variation for the Lager than the Ale within the Ale Liker cluster (Figure 3a and 3b). Session order effect was significant for Content, Excited, Underwhelmed and Liking. Tukey post hoc groupings showed a more positive response during the first session. ANOVA

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also revealed a significant interaction effect between context and product for liking (Table 6a), which was caused by a stronger product differentiation on liking in the Evoked context (Table 5a). Figure 4 illustrates the choice behaviour of each cluster in each context. As can be seen in Figure 4a most of the Ale Likers chose to receive the Ale in each of the three contexts. According to Cochran's Q analysis the Ale was chosen significantly more frequently than the Lager in the Bar (Q (1, $n = 22$) = 18.18, $p < 0.001$), Lab context (Q (1, $n = 21$) = 13.76, $p < 0.001$) and Evoked (Q (1, $n = 25$) = 21.16, $p < 0.001$) by this cluster.

3.2.3 Lager Likers

The cluster of Lager Likers scored the Lager significantly higher than the Ale on all positive emotion categories (Content, Excited, Nostalgic, Tame/safe and Curious) and lower on four out of five negative emotion categories (Shocked, Disconfirmed, Disgusted and Underwhelmed) (Table 5b and 6b). The response of the Lager Likers to the Ale differed significantly between the context conditions on four out of ten emotion categories (Bored, Excited, Disgusted, Tame/safe) as well as on liking (Table 6b). For three more emotion categories context effect was approaching significance (Content, Disconfirmed and Curious) (Table 6b). No significant differences were found in how the Lager Likers felt about the Lager in the three different context conditions (Figure 3c). For the Ale however, six emotion categories (Bored, Content, Excited, Disconfirmed, Disgusted and Tame/Safe) and liking were rated differently depending on which context the Ale was tasted (Figure 3d). No significant session effects were found within this cluster. The four-factor ANOVA revealed a significant context*product interaction effect for Disconfirmed (Table 6b) which was a result of a significantly higher feeling of Disconfirmation for the Ale in the Lab than in the Bar and Evoked context (Figure 3d). A significant three-factor interaction between context, product and session was found for Tame/Safe (Table 6b). This significant effect was caused by relatively high scores for the Ale during the first session in the Bar context and relatively low scores for the Ale during the first session in the Lab. From Figure 4b it can be seen that in each context the majority of the Lager Likers chose to receive the Lager. Cochran's Q analysis revealed that the Lager was selected significantly more

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frequently than the Ale by the Lager Likers in the Bar (Q (1, n = 32) = 15.13, p < 0.001), Evoked (Q (1, n = 31) = 11.65, p = 0.001) and Lab context (Q (1, n = 32) = 28.13, p < 0.001).

3.2.3 Context Sensitives

Unlike the Ale Likers and Lager Likers, the Context Sensitives did not have a stable hedonic preference for one of the two products. There were significant context, product and context*product interaction effects on liking for this cluster (Table 6c). The liking for the Lager did not vary significantly (p < 0.05) between the three contexts, although for Excited, Nostalgic, Underwhelmed and Curious context effects neared significance (p < 0.10) (Figure 3e). The Ale however, received a significantly higher liking score in the Lab than in the Bar and Evoked context (Figure 3f). For the emotional response ANOVA revealed significant contexts on five out of ten categories (Shocked, Content, Excited, Disconfirmed and Disgusted) (Table 6), as well as significant interaction between product and context on six out of ten emotion categories (Content, Excited, Nostalgic, Disconfirmed, Disgusted and Underwhelmed) (Table 6c). What is striking from the results in Figure 3f is that in the Lab context, the Context Sensitives gave the Ale higher scores on positive emotion categories and lower scores for negative emotions compared to when they tasted the same product in the Bar or Evoked Context. Session order had an effect on eight out of ten emotion categories and liking. Examining the Tukey post hoc groupings made clear that this was due to a first order effect where participants reacted more positively to the beers during their first session. No significant interaction effects between context*session, product*session or context*product*session were found for this cluster.

The choice behaviour of the Context Sensitive cluster differed depending on the context condition (Figure 4c). In the Bar, Cochran's Q test showed that the Lager was chosen over the Ale by a significant number of participants in the Context Sensitive cluster (Q (1, n = 37) = 9.76, p = 0.002). In the Lab context however, there was no significant difference between the number of times the Lager and the Ale were chosen by the Context Sensitive cluster (Q (1, n = 33) = 1.48, p = 0.223). Visually, the choice behaviour in the Evoked context appears to approach the choice behaviour in the Bar, as Figure 4c shows a larger proportion of participants choosing the Lager in the evoked context.

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However, Cochran's Q analysis revealed that there was no significant difference between the number of times the Lager and the Ale were chosen by the Context Sensitive cluster in the Evoked context (Q $(1, n = 33) = 1.48, p = 0.223$).

3.2.4 Emotional Context-Product-Cluster Space

The emotional space for the two samples as evaluated by the three clusters in the three contexts was visualised using PCA. Figure 5 displays the bi-plot of the first two principal components that accounted for 80.28% of the variance in the data and represents the different positioning of the products for each cluster in the emotional space. Most of the variance (67.61%) was explained by the first principal component (PC1) which was positively correlated with emotion categories Disconfirmed (r (18) = 0.97), Disgusted (r (18) = 0.91), Shocked (r (18) = 0.82), Underwhelmed (r (18) = 0.80) and Bored (r (18) = 0.69). The emotion categories Content (r (18) = -0.96), Excited (r (18) = -0.95), Nostalgic (r (18) = -0.86), Curious (r (18) = -0.64) and Tame/safe (r (18) = -0.48) were negatively correlated with PC1. This component was described as being associated with pleasantness. The second principal component (PC2) explained an additional 12.67% of the variance in the data and was mainly driven by Tame/safe which correlated positively with PC2 (r (18) = 0.79). Underwhelmed (r (18) = 0.42) and Bored (r (18) = 0.30) also showed a positive correlation with F2. Similarly, Shocked (r (18) = -0.43), Curious (r (18) = -0.32) and Excited (r (18) = -0.22) negatively correlated with PC2. This component was described as being associated with level of activation. The emotional response to the Lager was projected towards the positive direction of PC2 for all three clusters, regardless of context. The emotional response to the Ale was mostly projected towards the negative direction of PC2, with the exception of the response of the Lager Likers to the Ale in the Bar which was located closer to the centre of the plot (Figure 5).

The emotional response of the Ale Likers to the Ale was projected towards the negative direction of both PC1 and PC2 in Figure 5, indicating that the emotional response of this cluster to the product they preferred was towards high activation and pleasantness. Their emotional response to the Lager was projected in the positive direction of PC1 and PC2 and hence associated with low activation and unpleasantness (Figure 5). For Ale Likers Figure 5 depicts an effect of context in the second

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dimension where the responses in the Lab were projected more towards a low level of activation than the responses from the Bar and the Evoked context for both products. This relates to the significant context effect that was found for Tame/safe for this cluster (Table 6a).

The emotional response of the Lager Likers to the Lager was projected in the negative direction of PC1 and positive direction of PC2, indicating that their emotional response to the product they liked best was associated with low activation and pleasantness. The emotional response of the Lager Likers to Lager did not differ significantly between the context conditions (Figure 3c). To the Ale however, Lager Likers did respond differently depending on the context (Figure 3d). The emotional response of Lager Likers to the Ale in the Lab was associated with high activation and unpleasantness and consequently projected in the lower right corner of the bi-plot (Figure 5). The emotional response to the Ale in the Bar was located closer to the centre of the bi-plot and less far from the response of this cluster to the Lager (Figure 5). It appears that for the Lager Likers, tasting Ale in a Bar made their emotional response more similar to that of the Lager, which as a consequence, reduced product differentiation. In the Evoked context the Lager Likers' emotional response to the Ale was also associated with higher activation and unpleasantness, but to a lesser extent than in the Lab context (Figure 5). In fact, Evoking a context made their emotional response more similar to their response in the Bar compared to their response in the Lab.

The difference in emotional response of the Context Sensitives to the Ale in the Lab compared to the Bar and Evoked context can be clearly seen in Figure 5. While the emotional response of Context Sensitives to the Ale in the Bar and Evoked context was associated with high activation and unpleasant emotions, the response to the same product in the Lab was associated with high activation and pleasantness (Figure 5). The emotional response of the Context Sensitive cluster to the Lager was close to the centre of the bi-plot and associated with low activation and pleasantness (Figure 5). The location of the Bar responses in the emotional space show that the Context Sensitive cluster behaves similarly to the Lager Likers when tasting the products in the Bar, but in the Lab their emotional response to the Ale becomes more positive and thus more similar to their response to the Lager (Figure 5), with a weaker product differentiation as a result. The responses in the Evoked context

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approach the results from the Bar for the Context Sensitive cluster (Figure 5), leading to a stronger product differentiation than in the Lab context.

4. Discussion

4.1 Context affects product differentiation on liking, emotional response and choice

Although only one emotion category (Curious) appeared to be significantly impacted by context when all 100 participants were considered, analysing the data separately for each context condition revealed a clear difference between the Bar and Lab in terms of product differentiation on liking, emotional response and product choice. The stronger differentiation on liking in a natural context is in line with other studies that found that liking differentiated between products in a real-life environment but not in the sensory lab (Boutrolle et al., 2007; Hersleth, Ueland, Allain, & Naes, 2005; Holthuysen, Vrijhof, de Wijk, & Kremer, 2017).

Previous research has suggested that context has an effect on product choice (de Graaf, Kramer, et al., 2005; Sester et al., 2013). In the current study, overall beer choice was in line with liking and a positive emotional response in the Bar context while in the Lab there was no significant difference in choice for either beer. It should be noted that even though effort was made to make the bar condition as 'natural' as possible by conducting the experiment in the evenings during normal opening hours, letting participants pick up their own beers at the bar, allowing free social interaction, and using participants' own smartphones to complete the questionnaire, there are limitations as to how this experiment compares to a real-life consumption situation. Participants were aware of the fact that they were part of an experiment and were asked to consciously evaluate and report their emotional response using a questionnaire. The use of direct questions has been criticised for inducing analytical attitudes that may disturb the natural relationship with the product (Köster, 2003). Secondly, the beer tasting protocol can be considered 'unnatural' since participants were only allowed to take one sip of each beer and asked to rinse their palate with water between the samples. In real-life situations consumers are free to choose the product they wish to consume and having a choice has been shown to impact product acceptability (de Graaf, Cardello, et al., 2005). However, the participants in the current study did not get to choose the beers before tasting them. In addition, participants did not

receive any information on which products they were tasting and as mentioned by Dijksterhuis (2016), consumers usually do not encounter a product without knowing anything about what it is they are consuming. These limitations to the realism of the Bar context also apply to the Evoked context. In addition it is unclear how much time participants actually spent watching the picture slideshow under the Evoked context condition and whether they made an effort to imagine being in the Bar. When analysing the results from all 100 participants together, evoking a bar context using pictures and sound recordings did not appear to modify results towards those obtained when participants were physically in the Bar environment. Other researchers, using different levels of context evocation, found that these methods lead to stronger product differentiation on liking (Hein, Hamid, Jaeger, & Delahunty, 2012; Holthuysen et al., 2017). The current study found no significant effect of evoking context on liking or product choice when considering all participants. In addition, only one emotion category differentiated between the two products when the Evoked context was applied. More immersive methods of context evocation could possibly have a greater effect on consumer responses than the method used in this study.

Although product differentiation on emotional response was stronger in the Bar, it should be noted that the direction of the product differences was the same in all three contexts, namely a preference for the Lager, which was expressed by higher scores for positive emotion categories and lower scores for negative emotion categories compared to the Ale. This finding shows that overall preference was not changed by the different contexts, only the degree of product differentiation.

4.2 Emotional response provides information beyond liking and relates to product choice

The results of this study agree with previous studies that products can be differentiated by measuring consumer emotional response with questionnaires (Beyts et al., 2017; King & Meiselman, 2010; Ng et al., 2013). Products' sensory attributes are a source of food emotions (Desmet & Schifferstein, 2008) and measuring emotional responses to products provides incremental information to overall acceptability data (King, Meiselman, & Carr, 2010). When comparing the relative effectiveness of liking, emotional response and product choice measures to discriminate between products in this study, it is clear that in the Lab and Evoked context emotional response allowed for product

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differentiation while there was no significant difference in liking or product choice. This demonstrates the benefit of measuring emotional response for further discriminating between products that have similar hedonic ratings. It has been argued that a single hedonic measurement is insufficient for the prediction of the acceptance of products in the long term (Köster, 2003). Similarly, it would be of interest to study the stability of emotional responses over time and after repeated exposure to a given product.

4.3 Clustering participants provides valuable insights

Looking at the cluster results it is clear that a deeper insight regarding consumer responses and context was gained. Two consumer clusters that were discovered in the current study showed a clear hedonic preference for one of the two products that was stable over context. Regardless of whether the Lager Likers and the Ale Likers were tasting the products in the Bar, Lab or Evoked context condition, they expressed the same preference through their liking scores, emotional response and choice behaviour. This finding suggests that the hedonic preference, emotional response and choice behaviour of the Ale Likers and Lager Likers were driven by the sensory characteristics of the products rather than by the context in which they were exposed to the products. A third and largest cluster however, was found to be very sensitive to context. The effect that context had on the responses of the Context Sensitives demonstrates that for some consumers context can be just as important for preference as sensory characteristics, a fact that was earlier demonstrated by Hersleth, Mevik, Naes, and Guinard (2003). This leads to questions on whether performing consumer tests in natural consumption environments provides more reliable data than testing in sensory laboratories. More work needs to be done on the stability and reproducibility of data in real-life consumption environments, where there is a lack of control over external sensory cues that might affect emotional response. Interestingly, for the Context Sensitives the emotional response and choice behaviour in the Evoked context appeared to approach the results from the Bar, showing that for this cluster evoking a context led to results more similar to those of a real-life consumption environment. This fact was lost when data was analysed with all participants included in the analysis together. Heterogeneity in consumer data in terms of emotional response to products has been shown before (Piqueras-Fiszman

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& Jaeger, 2016). Individual variation between consumers is apparent and treating consumers as a homogenous group is a common fallacy in sensory and consumer research (Köster, 2003). The current study shows the importance of clustering when looking at emotional response as well. It should be noted however, that the number of participants in this study ($N = 100$) was limited and therefore it would be interesting to see if similar patterns appear in similar studies with larger participant numbers.

4.4 Consumers differentiate beer on level of arousal

Similar to the results found by earlier studies on beverages (Chaya et al., 2015; Gutjar, de Graaf, et al., 2015; Ng et al., 2013) the emotional space as visualised by the PCA was consistent with circumplex models of emotion that describe human emotion as a two-dimensional structure of pleasantness and activation (Larsen & Diener, 1992), with PC1 associated with pleasantness and PC2 with activation. Although the Ale Likers and Lager Likers had an opposite hedonic preference, the response to the product they scored highest on liking was similarly characterised by relatively high scores for positive emotion categories and low scores for negative emotion categories. It is striking that all three clusters differentiated the two products in the same way with regards to the activation dimension of the emotional space, with Lager towards low activation emotional response and Ale towards the high activation emotional response. Silva et al. (2016) found that beer in general was associated with positive high arousal emotional responses. The current study shows that within the beer product category, some products can also be associated with relatively low activation emotional response, which is similar to findings by Chaya et al. (2015). These findings further demonstrate the benefit of measuring consumer emotional responses to beer products by providing additional information on consumer reactions to products beyond hedonic preference. The relationship between liking, emotional response and choice that was observed when considering all 100 participants together was seen at a cluster level as well. A significant majority of the Ale Likers and Lager Likers chose the product that they scored significantly higher on liking and positive emotion categories and lower on negative emotion categories, confirming previous research that has shown that liking and emotional response predict choice behaviour (Gutjar, de Graaf, et al., 2015).

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4.5 Context effects are related to product liking

Similar to previous findings from other studies, the results from this experiment showed that emotional response to beer products is related to liking (Cardello et al., 2012; Chaya et al., 2015; Dorado et al., 2016; Silva et al., 2017) and it is not surprising that clustering participants on liking resulted in the discovery that the different consumer clusters differed in their emotional response to the products. The differences between clusters with different hedonic preference in terms of product-specific emotional response has been shown before with coffee (Bhumiratana, Adhikari, & Chambers, 2014) and wine (Jiang et al., 2016). Although the preference of the Ale Likers and Lager Likers was stable over the three contexts, there were some differences between their responses from the Bar, Lab and Evoked context that could be observed from the results. Lager likers had a stronger negative emotional response to the Ale in the Lab, which was expressed by higher scores on negative emotion categories and lower scores on positive emotion categories compared to the Bar and Evoked context. Evoking a context seemed to assimilate the emotional response towards the Bar for the Lager Likers, mainly for the Ale, which was the product that they liked least. Ale likers responded to the products with a higher level of activation in their emotion response in the Evoked context, which was clearly visualised in the emotional space. Amongst the Lager Likers and Ale Likers more context effects were observed for products that were less liked than for products that were preferred by the individual clusters respectively. The results suggest that emotional response was more stable across contexts when a product was well liked. This offers a possible explanation as to why hedonic scores of some products and product categories are more affected by context than others (Boutrolle et al., 2007; de Graaf, Cardello, et al., 2005; Meiselman et al., 2000).

5. Conclusion

This study aimed to compare liking, emotional response and product choice of beer products in a natural consumption context, i.e. a bar, with a traditional sensory test setting, and to determine the relative effect of evoking a context. When all consumers were considered only limited effects of context on consumer response to beer products were found with no overall impact of context on liking. Overall, more product differentiation was evident in the bar than the other contexts, and emotions were shown to be more discriminating than liking. However, analysing the data separately for three distinct consumer clusters of liking behaviour gave far deeper insights to the effect of context on consumer preference and the relative effects of evoking a context highlighting the importance of consumer segmentation. Two clusters had opposing but stable product preference no matter what the context, but interestingly, the product preference of the third and largest cluster changed depending on the context, preferring the Lager in the bar but the Ale in the lab. This highlights the importance of carrying out consumer testing of beer, and potentially other products, in realistic contexts. Evoking a bar context may provide a more efficient alternative but as it produced different effects for the different clusters more research is recommended to understand the importance of elements within an evoked context to simulate a realistic environment.

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Figure 1: On-campus Student Union bar at the University of Nottingham (left) and sensory test facility at the University of Nottingham (right).
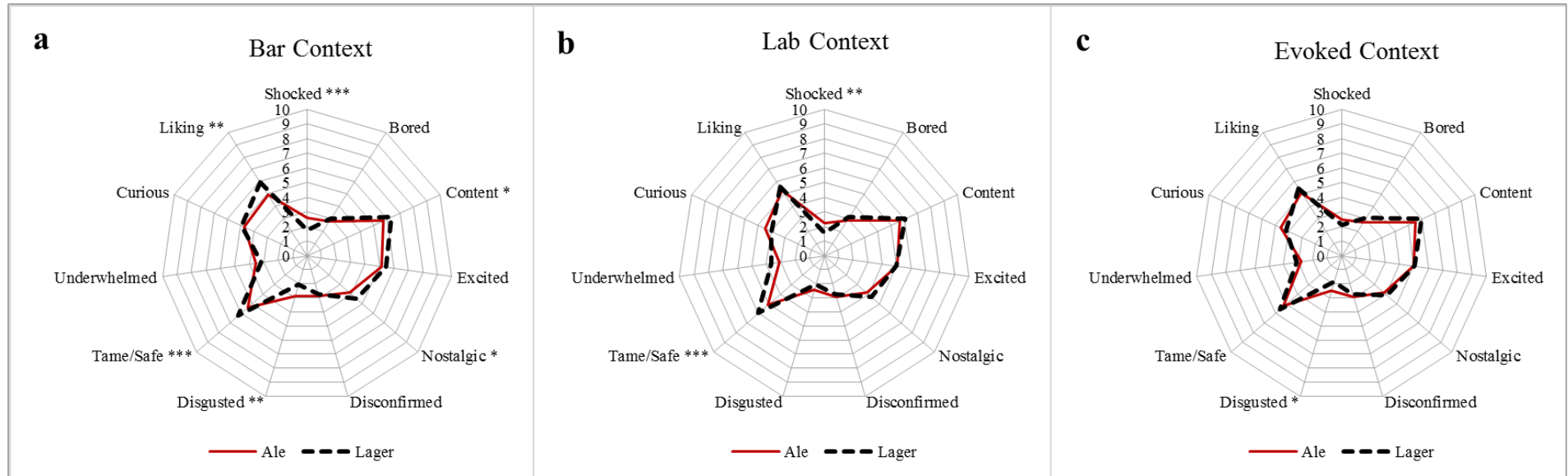
Figure 2: Mean scores for the ale and lager when evaluated by 100 participants in the Bar (a) the Lab (b) and the Evoked context (c). Terms with *** are significantly different between the two products at $p < 0.001$; ** $p < 0.01$; * at $p < 0.05$.
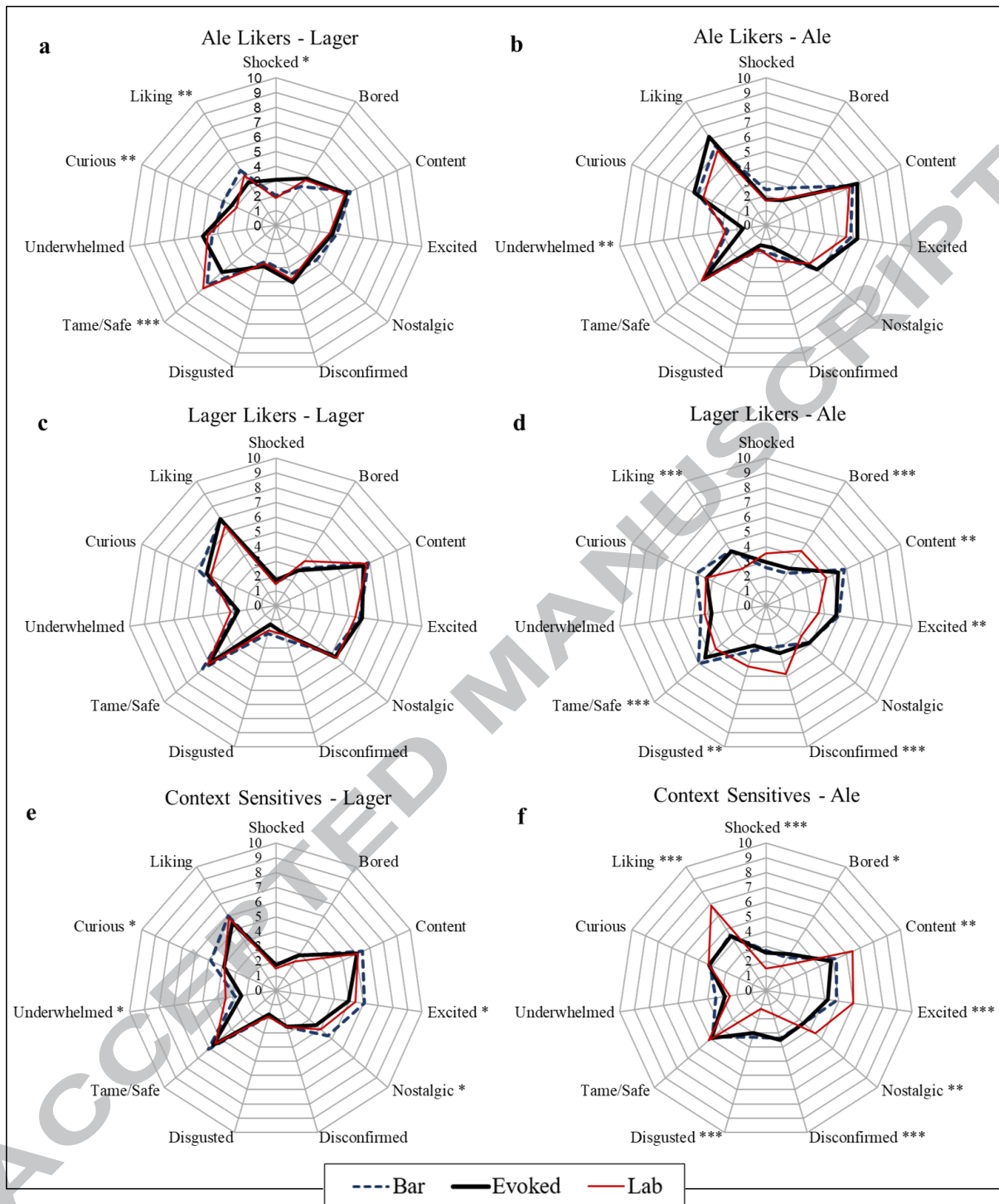
Figure 3: Mean scores for the lager (a, c, e) and ale (b, d, f) when evaluated by each of three consumer clusters (Ale Likers, Lager Likers and Context Sensitives) in the Bar, the Lab and the Evoked context. Terms with *** are significantly different between the two products at $p < 0.01$; ** $p < 0.05$. Terms with * are nearing significance at $p < 0.1$.
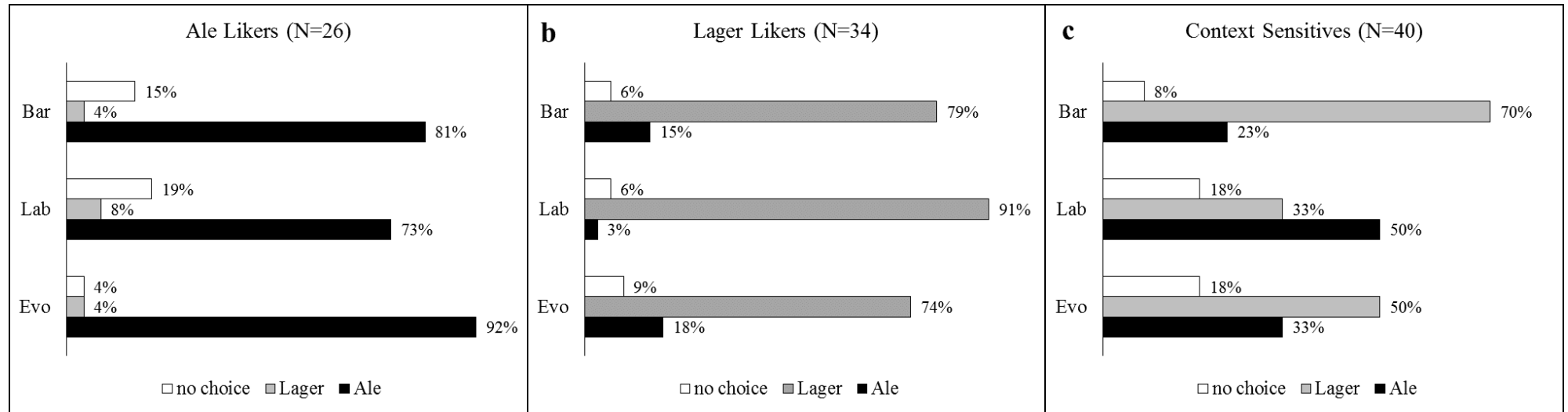
Figure 4: Percentage of participants per cluster of Ale Likers (a) Lager Likers (b) and Context Sensitives (c) that chose to receive the ale, the lager or did not make a choice between the two products when tasting the products in the bar ('Bar'), the sensory laboratory ('Lab') and evoked context ('Evo').
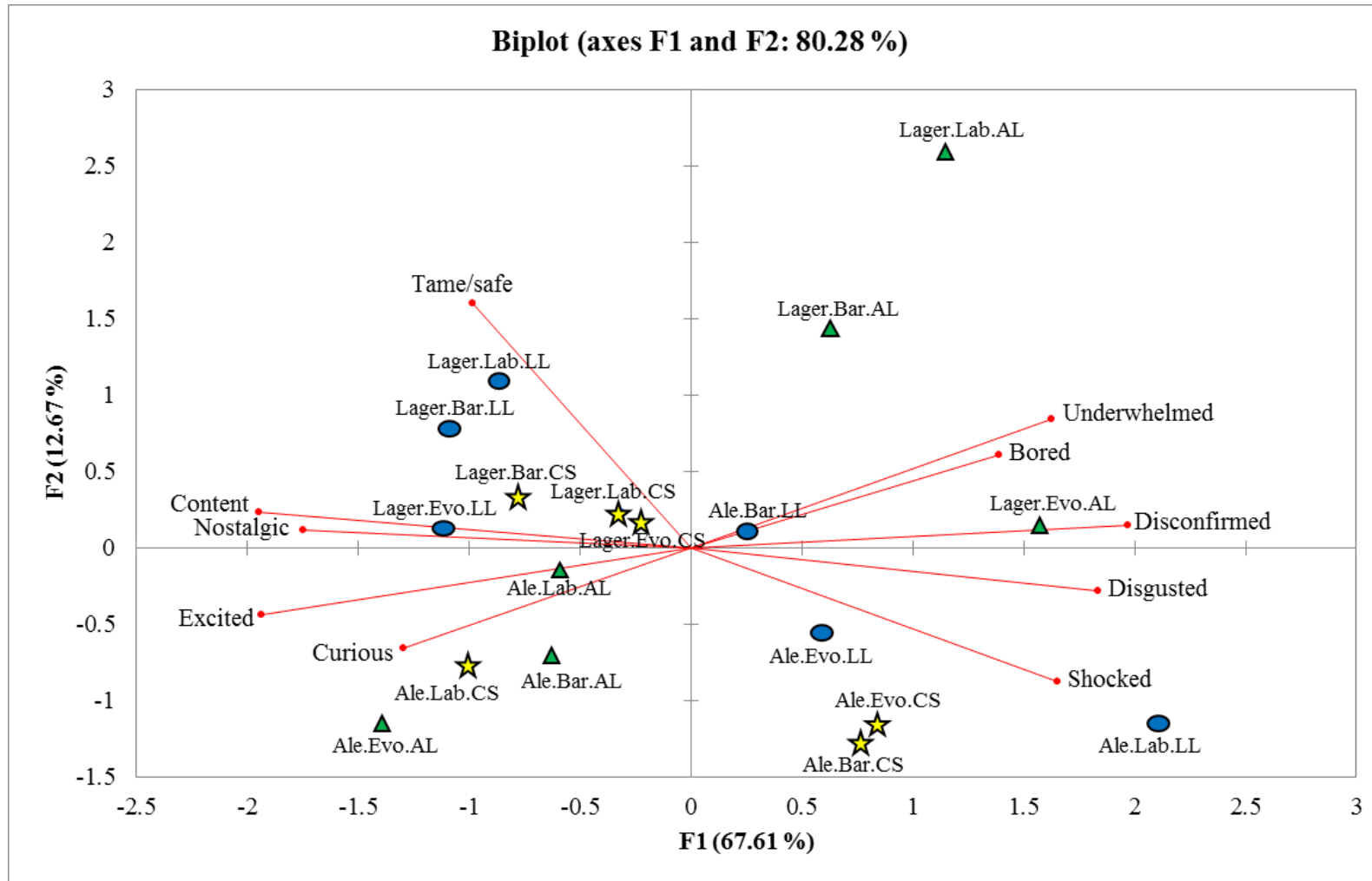
Figure 5: *Bi-plot of the first two dimensions of the Principal Component Analysis showing the emotional space and positioning of the three clusters to the Ale (represented in Bold and Italic) and Lager (represented underlined) in each of the three context conditions, represented by Bar (Bar context), Lab (Sensory Laboratory) and Evo (Evoked context). The three clusters are represented by ● LL (Lager Likers), ▲ AL (Ale Likers) and ★ CS (Context Sensitives).*

Table 1: Emotion categories and associated terms adapted from Dorado et al. (2016).

Shocked	Shocked, alarmed, cheated, confused, overwhelmed, strange, weird
Bored	Bored
Content	Content, calm, comfortable, comforted, enjoyment, good, happy, nice, pleasant, pleased, relaxed, satisfied
Excited	Excited, enthusiastic, fulfilled, fun, impressed, interested, optimistic, pleasantly surprised, want, warm
Nostalgic	Nostalgic, delirious, relieved
Disconfirmed	Disappointed, dissatisfied, unpleasantly surprised
Disgusted	Disgusted, horrible, repulsed, repelled, unpleasant
Tame/safe	Tame, safe
Underwhelmed	Underwhelmed
Curious	Curious

Table 2: Mean scores and standard errors (SE) for the Lager and Ale when evaluated by 100 participants in the Bar, Lab and Evoked context.

| | | Bar | | | | Lab | | | | Evoked | | | |
| | | Lager | | Ale | | Lager | | Ale | | Lager | | Ale | |
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Emotional response	Shocked	1.73	0.15	2.58	0.24	1.57	0.17	2.25	0.25	2.09	0.22	2.48	0.26
	Bored	2.96	0.21	2.76	0.21	3.12	0.24	2.84	0.22	3.08	0.24	2.71	0.22
	Content	6.36	0.19	5.76	0.24	6.07	0.20	5.72	0.24	6.00	0.22	5.53	0.26
	Excited	5.46	0.21	5.13	0.26	4.98	0.23	5.05	0.25	5.02	0.24	4.96	0.23
	Nostalgic	4.51	0.24	3.87	0.26	4.26	0.26	3.87	0.26	4.10	0.26	3.86	0.25
	Disconfirmed	2.75	0.24	2.88	0.26	2.72	0.23	2.96	0.27	2.74	0.24	2.95	0.26
	Disgusted	2.06	0.19	2.87	0.26	2.04	0.21	2.43	0.26	1.87	0.19	2.51	0.26
	Tame/safe	6.28	0.21	5.41	0.26	5.96	0.23	5.09	0.25	5.55	0.26	5.25	0.27
	Underwhelmed	3.18	0.24	3.57	0.27	3.65	0.27	3.13	0.24	3.14	0.27	2.80	0.24
	Curious	4.90	0.24	4.76	0.25	3.95	0.25	4.44	0.26	4.16	0.26	4.59	0.25
	Liking	5.94	0.21	4.95	0.26	5.58	0.23	5.32	0.27	5.48	0.23	5.11	0.27

Table 3: With *p*-values from a mixed model four-factor ANOVA (participant, context, product, session). Bold font highlights significant *p*-values ($p < 0.05$).

		Main effects 4-factor ANOVA								Interaction effects 4-factor ANOVA							
		Participant (DF=99)		*Context (DF=2)*		*Product (DF=1)*		*Session (DF=2)*		*Context* Product*		*Context* Session*		*Product* Session*		*Context* Product*Session*	
		F	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*
Emotional response	Shocked	3.26	**< 0.001**	2.23	0.109	17.85	**< 0.001**	4.115	**0.017**	0.821	0.441	0.950	0.435	0.101	0.904	1.388	0.237
	Bored	3.55	**< 0.001**	0.24	0.787	3.45	0.064	7.441	**0.001**	0.076	0.927	3.082	**0.016**	0.165	0.848	0.101	0.982
	Content	3.42	**< 0.001**	0.76	0.471	9.13	**0.003**	4.665	**0.010**	0.269	0.764	0.971	0.423	0.425	0.654	1.173	0.322
	Excited	3.45	**< 0.001**	0.92	0.398	0.40	0.526	4.066	**0.018**	0.512	0.599	0.595	0.667	0.009	0.991	2.189	0.069
	Nostalgic	4.67	**< 0.001**	0.63	0.532	6.63	**0.010**	0.305	0.737	0.428	0.652	1.829	0.122	0.249	0.780	1.242	0.292
	Disconfirmed	2.12	**< 0.001**	0.02	0.982	1.08	0.299	4.890	**0.008**	0.084	0.919	1.815	0.125	0.708	0.493	0.912	0.457
	Disgusted	2.46	**< 0.001**	1.58	0.208	13.72	**< 0.001**	6.376	**0.002**	0.520	0.595	0.485	0.747	0.523	0.593	2.673	**0.031**
	Tame/safe	5.84	**< 0.001**	2.65	0.072	21.18	**< 0.001**	1.420	0.243	1.703	0.183	0.819	0.513	0.165	0.848	0.807	0.521
	Underwhelmed	2.96	**< 0.001**	2.77	0.063	0.75	0.386	3.421	**0.033**	2.218	0.110	1.231	0.297	0.226	0.798	0.794	0.530
	Curious	3.68	**< 0.001**	4.29	**0.014**	2.40	0.122	4.375	**0.013**	1.437	0.239	1.354	0.249	0.010	0.990	0.286	0.887
	Liking	2.05	**< 0.001**	0.17	0.844	8.65	**0.003**	4.275	**0.014**	1.458	0.234	1.446	0.218	0.047	0.954	1.891	0.111

Table 4: Number of participants that chose to receive either the Lager or the Ale in each context (Bar, Lab, Evoked) and observed Q and p-value from Cochran's Q test per context condition (DF=1). Bold font highlights significant p-value at an α-risk of 0.05. Participants that did not express a preference for either product were excluded from the analysis.

	Bar	Lab	Evoked
Lager	56	46	46
Ale	35	40	43
Q (observed)	4.85	0.10	0.42
p-value	**0.028**	0.518	0.750

Table 5: Mean scores and standard errors (SE) for the Lager and Ale when evaluated in the Bar, Lab and Evoked context by each of three consumer clusters (Ale Likers, Lager Likers and Context Sensitives). All data was collected on a continuous line scale from 0 to 10.

a) Ale likers ($n = 26$)

	Bar				Lab				Evoked			
	Lager		Ale		Lager		Ale		Lager		Ale	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Shocked	2.05	0.37	2.41	0.35	1.85	0.41	1.69	0.38	3.11	0.55	1.75	0.39
Bored	3.14	0.46	3.06	0.42	3.67	0.61	2.15	0.31	3.78	0.52	2.03	0.43
Content	5.52	0.42	6.47	0.36	5.13	0.27	6.22	0.37	5.27	0.47	6.82	0.39
Excited	4.15	0.41	5.78	0.41	3.67	0.32	5.48	0.41	3.89	0.42	6.26	0.34
Nostalgic	3.59	0.43	4.63	0.55	3.07	0.45	3.92	0.52	3.27	0.43	4.58	0.46
Disconfirmed	3.45	0.52	2.09	0.36	3.83	0.41	2.50	0.47	4.02	0.55	1.60	0.39
Disgusted	2.56	0.44	1.76	0.33	2.71	0.37	1.69	0.42	2.88	0.45	1.40	0.38
Tame/safe	6.18	0.40	5.48	0.44	6.52	0.39	5.75	0.49	4.84	0.50	5.58	0.58
Underwhelmed	4.39	0.56	2.62	0.42	4.68	0.51	2.78	0.42	5.02	0.63	1.58	0.26
Curious	3.91	0.48	5.09	0.44	2.92	0.43	4.65	0.53	3.30	0.50	5.34	0.48
Liking	4.42	0.39	6.40	0.43	4.01	0.30	6.03	0.49	3.46	0.32	7.15	0.30

b) Lager Likers ($n = 34$)

	Bar				Lab				Evoked			
	Lager		Ale		Lager		Ale		Lager		Ale	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Shocked	1.51	0.23	2.56	0.46	1.44	0.25	3.55	0.52	1.74	0.30	2.92	0.48
Bored	2.94	0.35	2.61	0.33	3.58	0.39	4.38	0.41	2.82	0.39	2.96	0.38
Content	6.89	0.28	5.84	0.45	6.79	0.29	4.50	0.40	6.49	0.37	5.37	0.43
Excited	5.76	0.37	5.00	0.51	5.42	0.39	3.61	0.39	5.92	0.38	4.80	0.38
Nostalgic	5.04	0.45	3.87	0.48	5.44	0.43	3.16	0.38	5.33	0.42	3.88	0.38
Disconfirmed	2.44	0.38	2.90	0.47	2.08	0.34	4.84	0.46	2.01	0.31	3.36	0.44
Disgusted	1.98	0.32	3.23	0.48	1.75	0.33	4.32	0.48	1.33	0.23	2.82	0.46
Tame/safe	6.60	0.32	6.05	0.42	6.13	0.37	4.51	0.44	5.99	0.46	5.42	0.44
Underwhelmed	2.71	0.36	4.44	0.53	3.10	0.41	4.18	0.42	2.61	0.37	3.71	0.46
Curious	5.70	0.39	5.19	0.39	4.87	0.41	4.47	0.38	5.19	0.42	4.44	0.41
Liking	6.99	0.27	4.41	0.47	6.40	0.33	2.97	0.30	6.98	0.28	4.35	0.44

c) Context Sensitives ($n = 40$)

	Bar				Lab				Evoked			
	Lager		Ale		Lager		Ale		Lager		Ale	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Shocked	1.73	0.23	2.71	0.41	1.50	0.26	1.50	0.27	1.73	0.32	2.59	0.43
Bored	2.85	0.33	2.68	0.35	2.38	0.29	1.98	0.28	2.84	0.37	2.94	0.35
Content	6.45	0.30	5.24	0.40	6.08	0.39	6.44	0.39	6.05	0.33	4.84	0.43
Excited	6.05	0.28	4.82	0.39	5.45	0.38	5.98	0.36	4.98	0.40	4.26	0.38
Nostalgic	4.66	0.37	3.37	0.35	4.03	0.41	4.44	0.46	3.60	0.43	3.37	0.43
Disconfirmed	2.57	0.36	3.37	0.44	2.54	0.39	1.66	0.30	2.52	0.34	3.48	0.44
Disgusted	1.80	0.26	3.29	0.44	1.84	0.36	1.31	0.23	1.68	0.29	2.97	0.44
Tame/safe	6.09	0.36	4.81	0.44	5.46	0.40	5.15	0.37	5.64	0.41	4.89	0.43
Underwhelmed	2.80	0.32	3.44	0.41	3.44	0.45	2.46	0.37	2.36	0.32	2.81	0.40
Curious	4.87	0.36	4.18	0.42	3.83	0.39	4.27	0.44	3.85	0.41	4.23	0.42
Liking	6.03	0.31	4.48	0.39	5.90	0.38	6.85	0.31	5.51	0.34	4.43	0.42

Table 6: *F* and *p*-values from a four-factor ANOVA (participant, context, product, session) per each of three consumer clusters (Ale Likers, Lager Likers and Context Sensitives). Bold font highlights significant *p*-values ($p < 0.05$).

a) Ale likers (*n* = 26)

	Participant (DF=25)		Context (DF=2)		Product (DF=1)		Session (DF=2)		Context*Product		Context*Session		Product*Session		Context*Product*Session	
	F	p	F	p	F	p	F	p	F	p	F	p	F	p	F	p
Shocked	2.13	**0.004**	2.04	0.135	1.55	0.216	2.741	0.069	2.63	0.077	0.96	0.433	0.043	0.958	0.32	0.862
Bored	4.33	**< 0.001**	0.08	0.926	13.54	**< 0.001**	1.967	0.145	2.80	0.065	2.80	**0.029**	1.059	0.350	0.77	0.546
Content	2.90	**< 0.001**	0.58	0.560	19.90	**< 0.001**	4.801	**0.010**	0.75	0.472	0.53	0.717	0.607	0.547	0.27	0.900
Excited	5.42	**< 0.001**	1.14	0.322	66.53	**< 0.001**	4.319	**0.016**	1.74	0.180	0.35	0.845	1.951	0.147	0.38	0.821
Nostalgic	7.07	**< 0.001**	2.54	0.083	15.27	**< 0.001**	2.328	0.102	0.37	0.692	0.56	0.691	1.100	0.336	0.99	0.415
Disconfirmed	2.33	**0.001**	0.48	0.620	26.41	**< 0.001**	2.718	0.070	0.59	0.556	0.97	0.426	2.021	0.137	1.57	0.188
Disgusted	2.00	**0.007**	0.03	0.966	13.15	**< 0.001**	1.525	0.222	0.37	0.695	1.70	0.154	0.029	0.972	0.86	0.489
Tame/safe	4.56	**< 0.001**	3.39	**0.037**	0.64	0.425	1.039	0.357	2.59	0.079	0.44	0.778	0.401	0.670	0.30	0.875
Underwhelmed	3.61	**< 0.001**	0.33	0.721	52.88	**< 0.001**	4.698	**0.011**	2.57	0.081	0.52	0.722	0.034	0.966	0.38	0.821
Curious	4.94	**< 0.001**	2.38	0.098	31.80	**< 0.001**	1.598	0.207	1.12	0.331	3.40	**0.011**	0.624	0.537	1.12	0.352
Liking	3.72	**< 0.001**	1.11	0.333	102.46	**< 0.001**	4.061	**0.020**	4.23	**0.017**	0.30	0.877	0.655	0.521	1.60	0.179

b) Lager Likers (*n* = 34)

	Participant (DF=33)		Context (DF=2)		Product (DF=1)		Session (DF=2)		Context*Product		Context*Session		Product*Session		Context*Product*Session	
	F	p	F	p	F	p	F	p	F	p	F	p	F	p	F	p
Shocked	3.50	**< 0.001**	0.95	0.388	30.40	**< 0.001**	0.81	0.449	1.43	0.243	1.08	0.367	0.25	0.780	1.01	0.405
Bored	3.01	**< 0.001**	7.74	**0.001**	0.57	0.453	0.42	0.661	1.36	0.259	0.59	0.669	0.25	0.777	0.14	0.965
Content	4.15	**< 0.001**	2.60	0.078	35.71	**< 0.001**	0.42	0.658	2.45	0.090	0.26	0.902	0.09	0.910	1.42	0.231
Excited	3.38	**< 0.001**	3.80	**0.024**	19.37	**< 0.001**	1.13	0.324	1.03	0.358	0.18	0.949	0.13	0.881	2.42	0.051
Nostalgic	5.04	**< 0.001**	0.43	0.649	37.02	**< 0.001**	0.04	0.960	1.48	0.230	1.10	0.358	0.09	0.914	1.67	0.159
Disconfirmed	2.57	**< 0.001**	2.90	0.058	26.01	**< 0.001**	0.56	0.575	4.76	**0.010**	0.56	0.690	0.04	0.957	0.24	0.917
Disgusted	3.76	**< 0.001**	4.30	**0.015**	45.70	**< 0.001**	1.87	0.157	2.02	0.136	0.96	0.433	0.53	0.591	1.73	0.145
Tame/safe	5.35	**< 0.001**	4.94	**0.008**	13.63	**< 0.001**	0.71	0.495	1.81	0.168	0.76	0.553	0.18	0.838	3.35	**0.012**
Underwhelmed	3.28	**< 0.001**	1.08	0.343	19.50	**< 0.001**	0.47	0.628	0.57	0.565	1.23	0.302	0.18	0.834	0.45	0.774
Curious	4.25	**< 0.001**	2.41	0.093	4.50	**0.036**	3.03	0.051	0.15	0.861	2.03	0.093	0.06	0.937	1.18	0.320
Liking	3.62	**< 0.001**	7.25	**0.001**	136.22	**< 0.001**	0.09	0.913	1.28	0.281	0.20	0.940	0.02	0.977	0.20	0.940

c) Context Sensitives (*n* = 40)

	Results 4-factor ANOVA								Interaction effects 4-factor ANOVA							
	Participant (DF=39)		Context (DF=2)		Product (DF=1)		Session (DF=2)		Context* Product		Context* Session		Product* Session		Context* Product*Session	
	F	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*
Shocked	4.29	**< 0.001**	4.22	**0.016**	8.28	**0.004**	1.64	0.196	2.39	0.095	1.74	0.143	0.38	0.682	0.75	0.560
Bored	3.83	**< 0.001**	2.65	0.074	0.53	0.468	7.38	**0.001**	0.56	0.573	0.65	0.628	0.24	0.789	2.14	0.078
Content	4.13	**< 0.001**	3.10	**0.048**	8.12	**0.005**	2.40	0.093	4.61	**0.011**	1.91	0.110	0.08	0.921	0.71	0.584
Excited	4.22	**< 0.001**	6.77	**0.001**	3.84	0.052	1.46	0.235	4.62	**0.011**	1.09	0.362	0.73	0.482	0.95	0.437
Nostalgic	4.02	**< 0.001**	2.70	0.070	1.82	0.179	0.07	0.934	3.20	**0.043**	0.71	0.588	0.17	0.848	0.35	0.841
Disconfirmed	2.29	**< 0.001**	4.22	**0.016**	1.09	0.298	4.53	**0.012**	5.12	**0.007**	1.22	0.302	0.99	0.372	0.61	0.657
Disgusted	2.42	**< 0.001**	5.09	**0.007**	8.78	**0.003**	3.42	**0.035**	6.63	**0.002**	0.72	0.576	0.17	0.841	0.78	0.542
Tame/safe	7.84	**< 0.001**	0.06	0.945	12.24	**0.001**	4.23	**0.016**	1.74	0.178	1.60	0.177	0.63	0.535	0.69	0.601
Underwhelmed	2.90	**< 0.001**	1.72	0.182	0.02	0.894	0.82	0.443	3.33	**0.038**	0.81	0.519	0.00	0.998	0.39	0.818
Curious	3.00	**< 0.001**	0.86	0.427	0.02	0.887	2.17	0.117	1.54	0.217	0.07	0.990	0.03	0.972	0.54	0.706
Liking	2.49	**< 0.001**	9.10	**< 0.001**	4.55	**0.034**	4.86	**0.009**	9.55	**0.000**	1.85	0.121	1.39	0.251	0.82	0.511

Highlights

- Consumer response to beer was affected by context.
- Some consumers maintained their response to beer independent of context
- Some consumers were more context sensitive when expressing affective response
- Context sensitive consumers discriminated products in the bar but not in the lab
- Emotional variables provided additional insights compared to liking