The taste of seasonal colors

The influence of seasonal color associations in product packaging on taste evaluation, hedonic evaluation and purchase intention of a seasonally themed hot beverage

Master thesis Msc Communication Studies

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Abstract

Whereas many examples of research on packaging design and seasonal atmospherics can be found, scientific research into the effect of seasonal colors used in packaging material has been sparse in the field of communication studies. This study investigates the effect of using seasonal colors in packaging material on taste evaluation, hedonic evaluation and purchase intention of a seasonally themed tea flavor. Data was collected by conducting a taste test experiment in a workplace cafeteria, using three seasonally colored posters and two seasonal tea flavors. Results indicate, contrary to expectations, that congruency between poster color and tea flavor does not lead to the highest scores on taste evaluation, hedonic judgement or purchase intention. Instead, the results show that a incongruent mixed poster evokes the highest taste liking, taste intensity and seasonal taste recognition. These results could be ascribed to a 'surprise effect' that highlights the unexpected flavors in the tea, thus making them more prominent. In line with this, the results showed that a (semi)incongruent combination of a winter or mixed poster and summer tea was most often recognized as a seasonal beverage. None of the conditions seemed to have a significant effect on purchase intention or hedonic evaluation. The paper concludes with a thorough discussion about these findings, as well as indications for further research into the effects of (in)congruency in seasonal packaging design.

Keywords: Seasonal packaging design, taste evaluation, taste expectations, purchase intention, hedonic evaluation, congruency, surprise effect.

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1. Introduction

Nearly all brands make use of packaging design for marketing purposes. An effective strategy, given that a product's packaging represents the characteristic and differentiating elements of the brand's personality, and promotes retention and recall in the mind of consumers (Visser, 1999). In recent years, brands have increasingly started using seasonally themed packaging design. This use of time-sensitive packaging design is, however, not a recent trend. In 1999, Visser already claimed topical packaging to be an increasing trend in marketing. Topical packaging refers to a lot of different temporal packages that differ from the regular design of the product, such as product packages that tie in with current sporting events, packages that use a season or holiday as theme, and products that use packaging to communicate a special offer for a limited time period (Visser, 1999). By using topical packaging, brands can increase turnover, for example by gaining new customers by offering a limited edition 'collector's item' which will increase sales (Visser, 1999). A clear example of topical packaging design are the Christmas themed coffee cups at Starbucks (see Figure 1; Peiper, 2017). Starbucks also regularly uses other seasonal themes, such as the four seasons, in their marketing strategy. Examples include spring (see figure 2; ''Sakura beverages'', 2018) or fall (see figure 3; ''Starbucks coffee'', 2016) themed packaging designs.

Fig. 1. From left to right: Starbucks holiday cups from 2003, 2008, 2012 and 2016 (Peiper, 2017)

Fig. 2. (left) Spring packaging design at Starbucks Japan (2018)

Fig. 3. (right) Fall packaging design at Starbucks (2016)

It is thus not surprising that packaging design has been a much researched topic in the field of communication science. Particularly interesting is the theory of multi-sensory design (Spencer & Gallace, 2011), which states that product perceptions such as smell, taste and feel can be influenced by the design of the product or the package it comes in. For example, Van Rompay (2011) concluded that surface design influences beverage evaluation, in the sense that angular surface patterns result in a more bitter taste experience. Similarly, Carvalho and Spence (2018) found that the shape of a cup significantly affects the perception of sensory attributes of specialty coffee (2018). There are, however, topics within packaging design research that have been under-researched, one of which includes seasonal packaging design.

Although not studied in relation to packaging design, several scholars have studied seasonally-themed atmospherics in retail environments. For example, Spangenberg (2005) has researched the extent to which Christmas atmospherics in a retail environment influences consumers, concluding that consumers' evaluations are more favorable when a Christmas scent is experienced in the presence of Christmas music. Similarly, Gilbert, Seo and Hummel (2011) found that the smell of cinnamon is rated as more pleasant when paired with Christmas carols. Neither of these works, however, provide in-depth knowledge about the influence of seasonally themed packaging designs on consumer's product evaluation or subsequent purchase intention. Similarly, there has not yet been convincing prove of the effect of seasonal packaging design on product liking. Research that does investigate the ways in which packaging design effects consumer product perception (Van Rompay et. al., 2016; Spence & Gallace, 2011), does not include the aforementioned seasonal aspects.

Research into seasonal packaging design can provide a more thorough understanding of seasonal packaging and its practical applications, which is particularly interesting for retailers and companies, who can garner sales by offering seasonal products that consumer did not even know they wanted, as the majority of seasonal sales are made as impulse decisions (Lindell, 2013) and could thus be more susceptible to the influence of a persuasive packaging design. Furthermore, contemporary media content heavily focusses on promoting seasonally themed goods and seasonal variations in eating behaviors (Spencer, Russel & Barker, 2014), indicating the growing popularity of seasonally themed products among consumers.

The aim of this paper is to infer to what extent a seasonally colored packaging design influences the taste evaluation of a seasonally flavored hot beverage, in this case seasonal tea. Furthermore, this paper will investigate whether congruency between seasonal packaging colors and seasonal flavors of a beverage will lead to a better taste perception, a higher hedonic evaluation and a higher purchase intention of the respective beverage. Congruence

refers to ‘’the degree to which two stimuli match or fit together’’ (Garretson & Niedrich, 2004, p. 27) and is relevant because incorporating cross modal congruent features in packaging material could be used by tea fabricants to improve taste evaluations and overall liking of the product, as congruency seems to enhance both (Seo & Hummel, 2011).

To this end, a 3 (poster color: summer colors versus winter colors versus mixed colors) x 2 (tea flavor: summer flavor versus winter flavor) independent between-groups design was employed to study consumers’ taste evaluations during a sample test conducted at a workplace cafeteria.

This leads to the following research question: *To what extent do (in)congruent seasonal color associations in a products’ packaging influence taste perception, hedonic evaluation and purchase intention of a seasonally flavored hot beverage?*

2. Theoretical framework

2.1. The effects of food packaging

Food packaging does not only attract consumer attention, it also generates expectations that influence product taste perception and subsequent hedonic evaluation of the product, as people are able to make intuitive connections between different sensory domains. This phenomenon is known as crossmodal integration (Lalanne & Lorenceau, 2004) or crossmodel correspondences (Spence, 2011; 2012), a process in which people use different sensory domains together, in order to define a coherent representation of the product in question. Research shows that visual product cues help inform the consumer about what they are about to experience, by putting the mind in an anticipatory mode that is powerful enough to modify the pattern of activation in primary sensory regions in the brain. In essence, this means that the expectation of, for example, sweetness can be primed by a label on the packaging (Woods, Lloyd, Keunzel, Poliakoff, Dijksterhuis & Thomas, 2011). Their study used neuroimaging data to show that the expectation of sweetness primed by a label on the package, increased perceived sweetness and activated the anterior insula, the region in the brain that functions as the primary taste cortex (Woods et al., 2011). The experience of a product’s taste thus seems to involve cues coming from several senses, including what we hear, see, smell and touch (Spence, 2015). Several studies have indeed shown that consumers associate taste with sensory inputs such as color (Piqueras-Fiszman & Spence, 2011; Carvalho & Spence, 2019) or shape (Carvalho & Spence, 2018).

2.1.1. Color and taste expectations

The color of a food or beverage can lead to certain expectations about what sensory experience a person will have when they taste that food. For example, Gilbert, Martin and Kemp (1996) found that the smell of cinnamon corresponds to the color red, while the smell of caramel corresponds to the color brown. Koch and Koch (2003) found that color influences taste perception in such a way that red drinks taste sweet, while green drinks taste sour. Contrastingly, Piqueras-Fiszman and Spence (2012) found that not the color or smell of the food, but the color of the items on which the food was served influenced liking and taste perception. The effect of packaging color on taste expectations was further illustrated by Zellner et. al. (2018), who found strong correspondences between the color of foil wrapped around beverages and candy, and certain taste expectations, depending on the product the foil was put on. For example, when respondents saw a red foil around a bottle containing a beverage, 40% expected that beverage to taste like cherry. However, the color of the wrapper seemed to have little effect on the actual perceived taste of the candy. These studies suggest that packaging color can indeed influences taste expectations. However, Zellner et. al. (2018) do argue that these effects may be dependent on other factors, such as product type or culturally-learned expectations of consumers. In a similar study, Piqueras-Fiszman and Spence (2011) had participants taste potato crisps with ‘cheese and onion’ flavor, which usually comes in a green bag, packaged in the packaging material of ‘salt and vinegar’ flavored crisps, which come in a blue bag. Most participants misidentified the flavor of the crisps to be ‘salt and vinegar’, the flavor corresponding to the color of the package, instead of the actual flavor of the crisps. The authors note that these taste expectations are often learned through experience with the product, and based on the brand of crisps the participants usually ate (Piqueras-Fiszman & Spence, 2001). Based on this literature, it is expected that the seasonal flavors in a hot beverage will be more prominently tasted when the tea is tasted in combination with congruent seasonal colors, compared to (semi)incongruent conditions. It is thus expected that:

> **H1.** A poster containing seasonal colors that are congruent with the seasonal flavor of the tea, will result in a more positive taste evaluation, compared to an incongruent combination.

H2a. Any beverage combined with a poster containing seasonal colors will result in a higher taste perception of flavors related to the corresponding season, independent of whether the tea has that seasonal flavor.

H2b. A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a more prominent taste perception of flavors related to that season, compared to a poster with incongruent seasonal colors.

H3a. Any beverage combined with a poster containing seasonal colors will be more often described with the corresponding seasonal taste descriptions, independent of whether the tea has that seasonal flavor.

H3b. A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will be described with more seasonal taste descriptions, compared to a poster with incongruent seasonal colors.

2.2. Food packaging and congruency

Another important factor in terms of packaging design is congruency. Different sensory inputs are often categorized by the human mind as belonging together, or being congruent with each other. Congruence seemingly leads to more favorable product evaluations, which can be explained by understanding processing fluency (Reber, Schwarz & Winkielman, 2004; Van Rompay, Pruyn & Tieke, 2009). Several studies into processing fluency indicate that stimuli that can be easily processed evoke a positive effect, which is then attributed to the stimulus at hand, and subsequently results in a positive overall product evaluation (Reber et al., 2004; Van Rompay et al., 2009). Congruent stimuli are processed more fluently than incongruent stimuli, and consequently may trigger more positive automatic affective responses. For example, congruent advertisements in which text and pictures are well-matched, are processed more fluently than incongruent advertisement (De Vries & Van Rompay, 2009). Given that congruency between product elements may thus facilitate processing (Van Rompay et al., 2009), it can be expected that congruency in design elements will lead to more positive product evaluations. For example, De Droog, Buijzen and Valkenburg (2012) found that children had the highest automatic affective response (e.g. liking) to foods that were shown in

combination with a character that they perceived to be congruent with the food, in this case a carrot combined with a rabbit (congruent) instead of a rhinoceros (incongruent).

2.2.1. Hedonic evaluation

Hedonic evaluation indicates the overall acceptance of a product, as well as acceptance of each attribute of the product (Daesenso, 2005). In the context of beverages, hedonic evaluation can thus refer to the overall drinking experience of the beverage, as well as other stimuli that enhance the consumers' experience of the product as a whole. Several studies have analyzed the influence of design elements on the hedonic drinking experience. One example of such an element is the vessel in which the beverage is served, as Cloake (2012) states: ''obviously glasses cannot change the taste of a wine, but they can alter our perception of it''. Empirical support is provided by Venturi et al. (2016), who found that matching the right glassware to a corresponding wine can significantly enhance the hedonic drinking experience. During a taste test containing six differently shaped glasses, they found that a tulip-shaped, bigger glass lead participants to report higher scores on the hedonic parameter 'overall appreciation' (Venturi et al., 2016). Even though these results focus on shape rather than color, it is likely that packaging color can influence the hedonic evaluation of a beverage in a similar manner. It is thus expected that:

> **H4.** A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher hedonic evaluation of the beverage, compared to an incongruent combination.

> **H5.** A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher purchase intention of the beverage, compared to an incongruent combination.

2.2.2. Seasonal congruency

As mentioned before, congruency between packaging material and product may facilitate processing, resulting in a more positive evaluation of the product. In the context of seasonal congruency, Morris (2018) found that a product with the same name and flavor, but consumed in a different seasonal context, can be perceived to taste differently. However, Morris (2018) argues that this difference in taste perception could be explained by consumers' past experiences and appropriation of their own cultural expectations that surround the seasons.

This suggests that sensory perceptions that stem from seasonal stimuli may actually be learned and actively directed responses, rather than the sole result of the external stimuli only (Morris, 2018), which is in line with conclusions drawn by Piqueras-Fiszman and Spence (2011).

However, Gilbert, Seo and Hummel (2011) found that cues related to seasons can unconsciously affect sensory evaluation, by demonstrating that the smell of cinnamon is rated as more pleasant when it is experienced together with Christmas carols. Similarly, the smell of cinnamon was rated higher on familiarity and pleasantness during the Christmas season, compared to other seasons (Seo, Busschüter & Hummel, 2009). Furthermore, Seo et al., (2009) found that the smell of cinnamon was regularly shown to be associated more closely to Christmas, compared to other seasonal themes. Based on these findings, it is expected that a beverage that is combined with a seasonally congruent poster will receive a higher hedonic evaluation, compared to a situation in which poster color and tea flavor are incongruent. It is thus expected that:

> **H6.** A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher perceived poster-tea congruency, compared to an incongruent combination.
>
> **H7.** A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will be more easily recognized as being a seasonal product, compared to an incongruent combination.
>
> **H8.** A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will be more easily recognized as being a winter or summer tea, compared to an incongruent combination.

To test these hypotheses, a 3 (poster color: summer colors versus winter colors versus mixed colors) x 2 (tea flavor: summer flavor versus winter flavor) independent between-groups design was employed (see Fig. 4). An overview of the aforementioned hypotheses can be found in table 1.

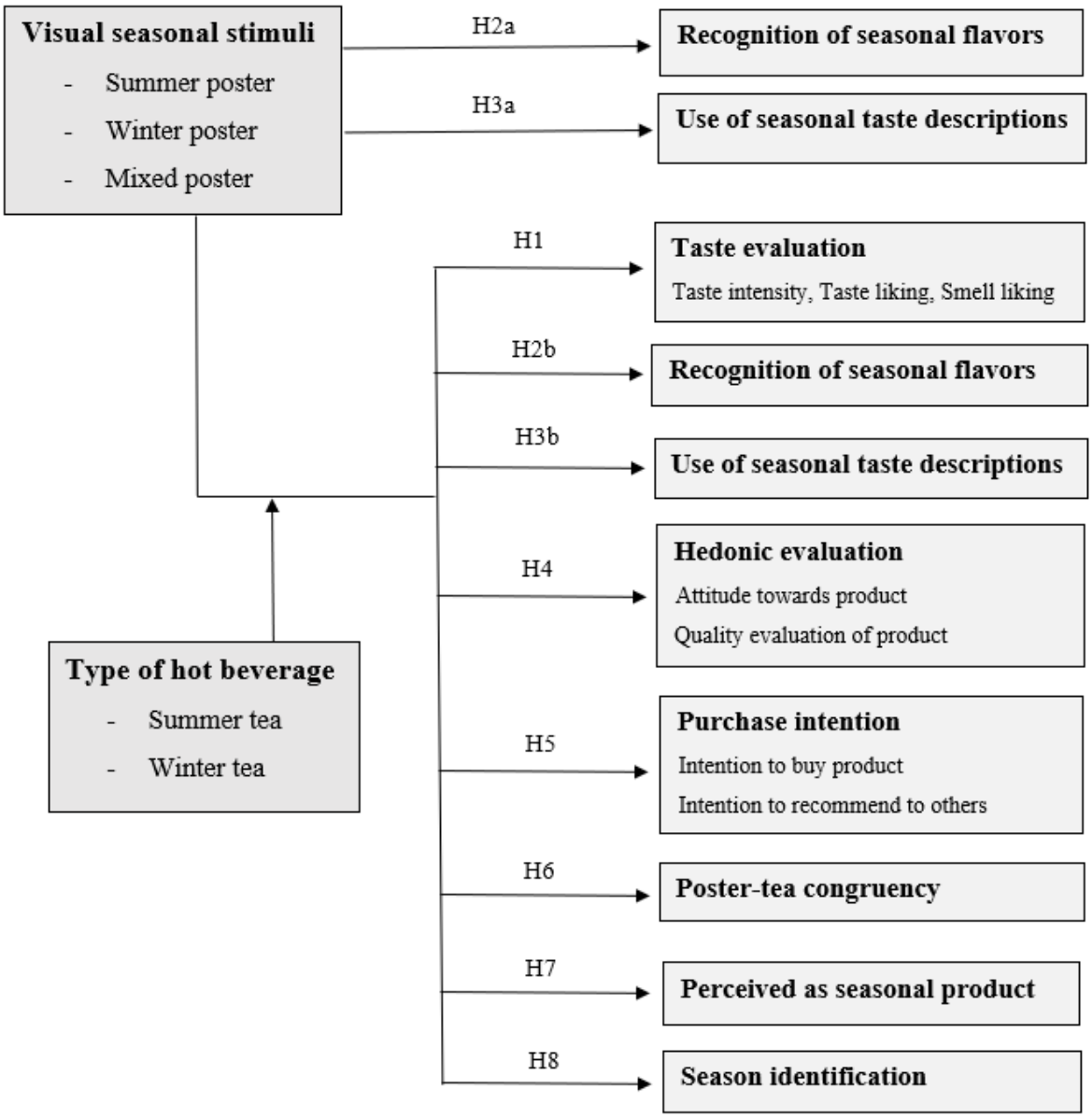

Fig. 4. Conceptual model 3 x 2 experimental design.

Table 1

Overview of hypotheses

Hypothesis	**Expected**
H1: Taste evaluation	A poster containing seasonal colors that are congruent with the seasonal flavor of the tea, will result in a more positive taste evaluation, compared to an incongruent combination.
H2a: Recognition of seasonal flavors *Main effect*	Any beverage combined with a poster containing seasonal colors will result in a higher taste perception of flavors related to the corresponding season, independent of whether the tea has that seasonal flavor.
H2b: Recognition of seasonal flavors *Interaction effect*	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a more prominent taste perception of flavors related to that season, compared to a poster with incongruent seasonal colors.
H3a: Use of seasonal taste descriptions *Main effect*	Any beverage combined with a poster containing seasonal colors will be more often described with the corresponding seasonal taste descriptions, independent of whether the tea has that seasonal flavor.
H3b: Use of seasonal taste descriptions *Interaction effect*	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will be described with more seasonal taste descriptions, compared to a poster with incongruent seasonal colors.
H4: Hedonic evaluation	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher hedonic evaluation of the beverage, compared to an incongruent combination.
H5: Purchase intention	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher purchase intention of the beverage, compared to an incongruent combination.
H6: Poster-tea congruency	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will result in a higher perceived poster-tea congruency, compared to an incongruent combination.

H7: Perceived as being a seasonal product	A poster containing seasonal colors that are congruent with the flavor of the seasonal tea, will be more easily recognized as being a seasonal product, compared to an incongruent combination.
H8: Season identification	A poster presenting seasonal colors that are congruent with the flavor of the seasonal tea, will be more easily recognized as being a winter or summer tea, compared to an incongruent combination.

3. Method

The aim of this study is to infer to what extent using (in)congruent seasonal colors in a product's packaging design influences taste evaluation, hedonic judgement and purchase intention of a seasonally flavored hot beverage.

3.1. Pretest: design of stimuli

Before conducting the main experiment, an extensive pretest was conducted. The first pretest was used to determine colors with a high seasonal association. To this end, 110 paint swatches were acquired at a local construction store ('GAMMA' & 'PRAXIS'), after which a selection of 44 different color shades was made, divided over 9 main color categories (see appendix 1). Next, a final selection of 30 different colors was made, divided over 9 color categories (brands: 'HISTOR' 'GAMMA', 'KARWEI'; see also appendix. 1). During the pretest, 20 participants (8 male, 12 female; mean age: 33.1 years) assessed their seasonal associations with the 30 colors by answering the question 'Which season does this color belong to, according to you?'. The participants' response was recorded by tapping a specific point in a four-tiered square grid in Qualtrics (see Fig. 5). Based on these results, three colors were selected that were most strongly associated with summer/spring, and 3 colors were selected that scored highest on association with winter/fall. These six colors were then used to develop the summer and winter posters used in the main experiment (see Fig. 6). The mixed poster consist of a combination of 3 of the 6 colors (see Fig. 6).

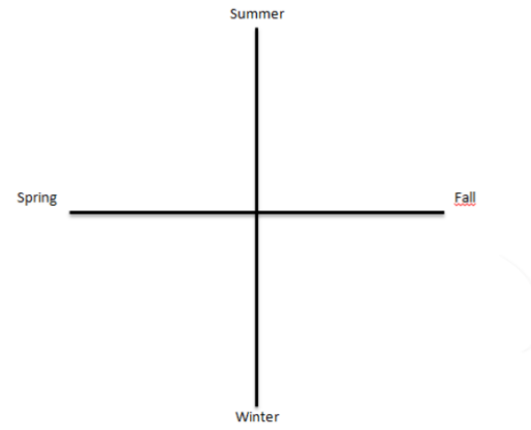

Fig. 5. Grid used in the pretest.

Fig. 6. Seasonal posters used in the main study.
From left to right: winter poster, summer poster and mixed poster.

Similarly, a pretest was conducted for the selection of the seasonal tea flavor variants. Advantages of using tea as the hot beverage is that participants are more likely to expect an additional taste when drinking tea, and these additional flavors may be more accurately and easily recognized. The strong and prominent taste of coffee, for example, could overrule additional seasonal flavors. Furthermore, tea is a beverage that is consumed throughout the year in The Netherlands. A detailed description of this pretest and materials can be found in appendix 2. For the pretest, 20 participants (9 male, 11 female; mean age: 29.4 years) rated six different tea varieties (brands: 'PICWICK'; 'MISS-TEA') on their association with a specific season by answering the question 'Which season does this tea belong to, according to you?'. Their responses were recorded by tapping a four-tiered grid (see fig. 5). Based on the results, we chose *'PICKWICK Joy of Tea: Berry Dreams'* as the summer tea, and *'MISS-TEA Christmas Spirit'* as the winter tea. Fig. 7 shows the heat-map results from the summer and

winter teas that were eventually selected to be used in the main study. This pretest also guaranteed that the flavors were strongly present, so they will be noticed during the main study. Furthermore, participants were asked to choose which taste descriptions (e.g. bitter, sweet, fruity) and flavors (e.g. cinnamon, pineapple) best described the tea they tasted. This information was then used for forming the questionnaire to be used in the main study.

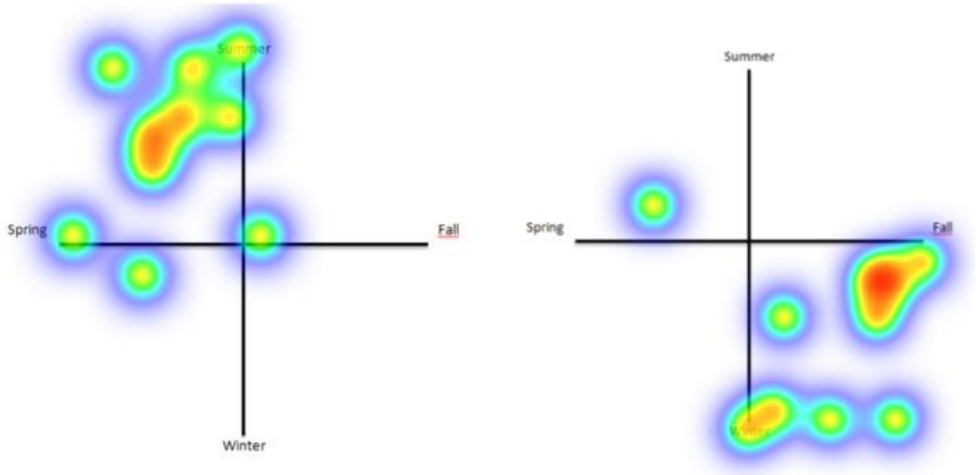

Fig. 7. Heat-map results of summer tea (left) and winter tea (right)

3.2. Participants and procedure main study

Permission to conduct this study was obtained from the University of Twente ethics committee. The experiment was held at a workplace cafeteria in a Dutch city on four consecutive days between 13:00 - 16:00, so as to minimize interference of external influences such as outside temperature or amount of daylight. 68 participants took place in the experiment (27 males, 37 females; mean age: 32.69 years; age range: 18-65 years; see also table 2). Given the large age range, the covariate ‘age’ was used to control for the effect of age, showing no significant influence on the dependent measures in this study. Unfortunately, with a total of 68 participants, the current study could suffer from an inadequate sample size. The small sample size is due to the COVID-19 measures that were implemented in The Netherlands during the data collection period, which made it impossible to gather additional participants to exceed the current number.

Participants were approached in the cafeteria and asked to read an informed consent form before participating. Participants were required to be able to see color and be able to distinguish taste. Participants were randomly assigned to an experimental condition (see table 3). Next, participants were told that they would be participating in a tea tasting to record consumers’ reactions to a new tea flavor that was being developed to be sold in supermarkets

throughout The Netherlands. The color on the posters was explained to be a preliminary design for the tea's packaging. Participants were explicitly told to take a good look at the poster before and during the tasting of the tea, and take it into consideration when rating the tea. The set-up allowed for two participants to partake in the experiment simultaneously (see appendix 3). Participants were allowed to cleanse their palate with cold water during the tasting. During and after tasting, participants filled out a questionnaire comprising the dependent measures.

Table 2

Participant demographics as a function of experimental condition.

	Male	Female	Age	
Condition	n	n	M	SD
winter poster / winter tea	4	7	38.27	11.46
winter poster / summer tea	4	7	22.64	2.58
summer poster / winter tea	6	5	48.18	12.03
summer poster / summer tea	7	4	24.18	3.43
mixed poster / winter tea	3	7	35.40	13.91
mixed poster / summer tea	3	7	27.20	9.86

Table 3

Distribution of participants (n = 64) over the 3 posters and the 2 tea flavors

Poster distribution	n	%
Winter poster	22	34.4
Summer poster	22	34.4
Mixed poster	20	31.3
Total	64	100.0
Tea distribution	n	%
Winter tea	32	50.0
Summer tea	32	50.0
Total	64	100.0

Note. The percentages refer to the proportions of individuals assigned to each poster and each tea flavor

3.3. Dependent measures

A questionnaire comprising the dependent measures was used to record participants responses. Responses were recorded using the online questionnaire platform Qualtrics. All responses were recorded using a 7-point Likert scale. The construct measures were tested for reliability using Cronbach's alpha (Cronbach, 1951).

3.3.1. Taste evaluation measures

To measure *taste intensity,* participants indicated to what extent they agreed with the statement 'This tea has a strong taste'.

To measure *taste liking,* participants indicated to what extent they agreed with the statement 'This tea tastes good'.

Smell liking was measured with the item 'This tea smells nice'.

3.3.2. Recognition of seasonal flavors

Recognition of seasonal flavors was measured using the constructs *recognition summer flavors* and *recognition winter flavors.* Participants indicated to what extent they perceived certain seasonal flavors such as '*cinnamon*' or '*pineapple*' (scale anchors: very weak, very strong). These seasonal flavors were selected by participants during the pretest.

The construct *recognition summer flavors* (alpha= 0.71) contained 4 summer flavors as items: *red fruits, coconut, citrus* and *pineapple.*

The construct *recognition winter flavors* (alpha = 0.64) contained 5 winter flavors as items: *cinnamon, clove, orange, ginger* and *caramel.*

3.3.3. Use of seasonal taste descriptions

Participants then rated the taste of the tea on *seasonal taste descriptions* by indicating to what extent they perceived the tea to match a certain seasonal taste description, such as 'bitter' (winter) or 'fresh' (summer) (scale anchors: very weak, very strong). These taste descriptions were selected by participants during the pre-test.

The construct *seasonal description summer* ($\alpha = 0.84$) included 5 summer tastes: *sweet, flowery, fruity, fresh* and *light.*

The construct *seasonal description winter* ($\alpha = 0.76$) included 4 winter tastes: *bitter, herbal, warm, full*.

3.3.4. Hedonic evaluation

Hedonic evaluation was measured using the construct *overall liking* (alpha = 0.91) containing 4 items such as '*I am positive about this product'* and *'This product makes me happy'*. This construct indicates respondents' evaluation of the complete product. It shows overall liking of the product, as well as acceptance of each attribute of the product (Daesenso, 2005).

3.3.5. Purchase intention

The construct *purchase intention* (alpha = 0.80) consists of 4 items such as '*I would recommend this tea to my friends or family'* and '*I would buy this tea myself'*.

3.3.6. Poster-tea congruency

The construct *poster-tea congruency* (alpha = 0.84) was measured using 2 items, and indicates whether the colors on the poster and the flavor of the tea were seen as congruent by participants. Example items are *'to what extent do the poster and (the flavor of) the tea match?*' and '*to what extent do the colors on the poster and (the flavor of) the tea match?*.

3.3.7. Perceived as being a seasonal product

The single item *'to what extent do you see this tea as a seasonal tea?'* was used to infer to what extent the participants perceived the beverage as being a seasonal product.

3.3.8. Season identification

Season identification was measured using the single item '*which season does this tea belong to, according to you?'.* Participants were asked to classify the tea as being either a winter tea or a summer tea by sliding a cursor on a scale.

4. Results

The current study suffers from an inadequate sample size due to the COVID-19 measures that were implemented by the Dutch government during the data collection period, which made it impossible to gather more respondents than the current number. Therefore, these results must be interpreted with caution. Due to the small sample size, effects that approach marginal significance (significance level between 0.05 and 0.10) will also be discussed in this section, as these effects may reach significance when the study is replicated with a bigger sample size.

4.1. Taste evaluation

4.1.1. Taste intensity

An ANOVA with *color poster* and *tea flavor* as fixed factors and *taste intensity* as dependent variable yielded no significant main effect of poster color on taste intensity ($F(2, 58) = 0.49$, $p = 0.618$).

The main effect of tea flavor on taste intensity was significant ($F(1, 58) = 9.33$, $p = 0{,}003$). Indicating that the taste intensity of winter tea ($M = 5.75$, $SD = 0.95$) is stronger that the taste intensity of summer tea ($M = 4.78$, $SD = 1.33$).

The interaction effect between poster color and tea flavor on taste intensity approached marginal significance[1] ($F(2, 58) = 2.30$, $p = 0.109$), which is in line with H1. Inspection of Fig. 8. suggests that the (semi)incongruent combination of a mixed poster and winter tea resulted in the highest taste intensity. The second highest taste intensity was measured in the congruent combination of a winter poster and a winter tea. The summer tea had relatively stable taste intensity with either of the three poster colors, but scored highest on taste intensity in the congruent combination of a summer tea and a summer poster (see Fig. 8).

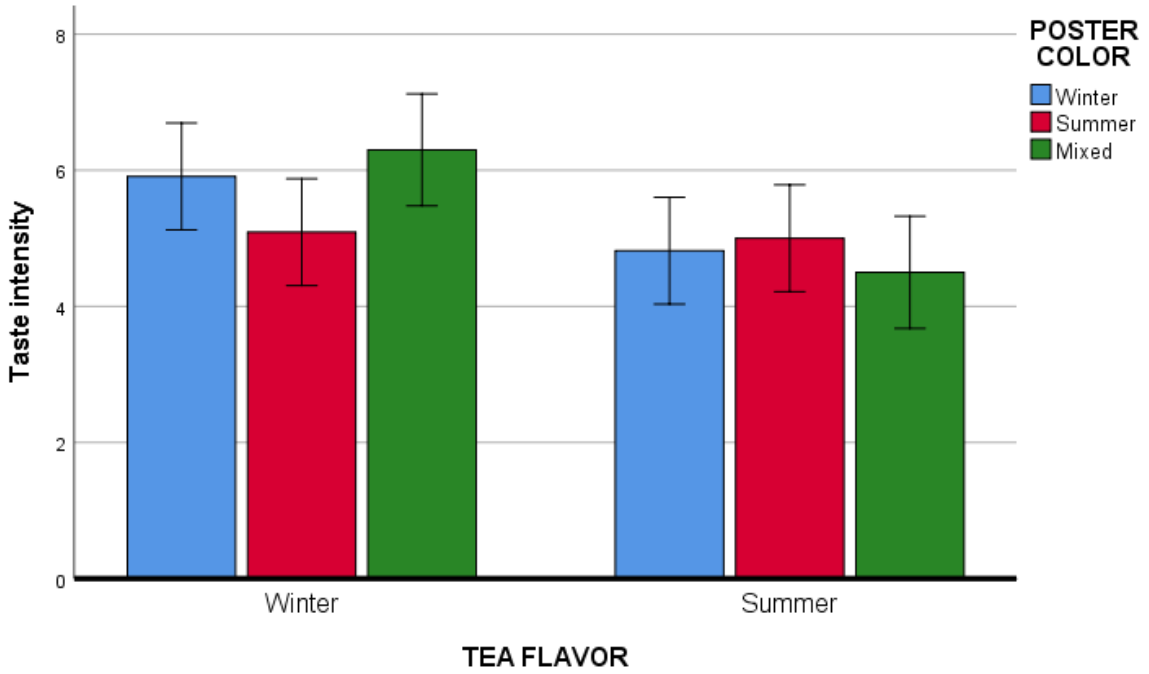

Fig. 8. Interaction between poster color and tea flavor on taste intensity

[1] Effects that reached marginal significance (significance between 0.05 and 0.10) were included in the results, due to the study's inadequate sample size as a result of the COVID-19 regulations implemented during data collection

4.1.2. Taste liking

The main effect of poster color on taste liking was not significant (F (2, 58) = 0.40, p = 0.672). The main effect of tea flavor on taste liking was also not significant (F (1, 58) = 3.83, p = 0.538). The interaction effect between poster color and tea flavor on taste liking approached marginal significance[2] (F (2) = 2.33, p = 0.107), which is in line with H1. Inspection of Fig. 9 suggests that the incongruent combination of a winter poster and a summer tea results in the highest taste liking. The (semi)incongruent combination of a mixed poster and a summer tea also has a higher score on taste liking compared to the congruent combination of a summer poster and a summer tea. Similarly, the winter tea received the highest taste liking score when combined with an incongruent summer poster or a (semi)incongruent mixed poster (see Fig. 9).

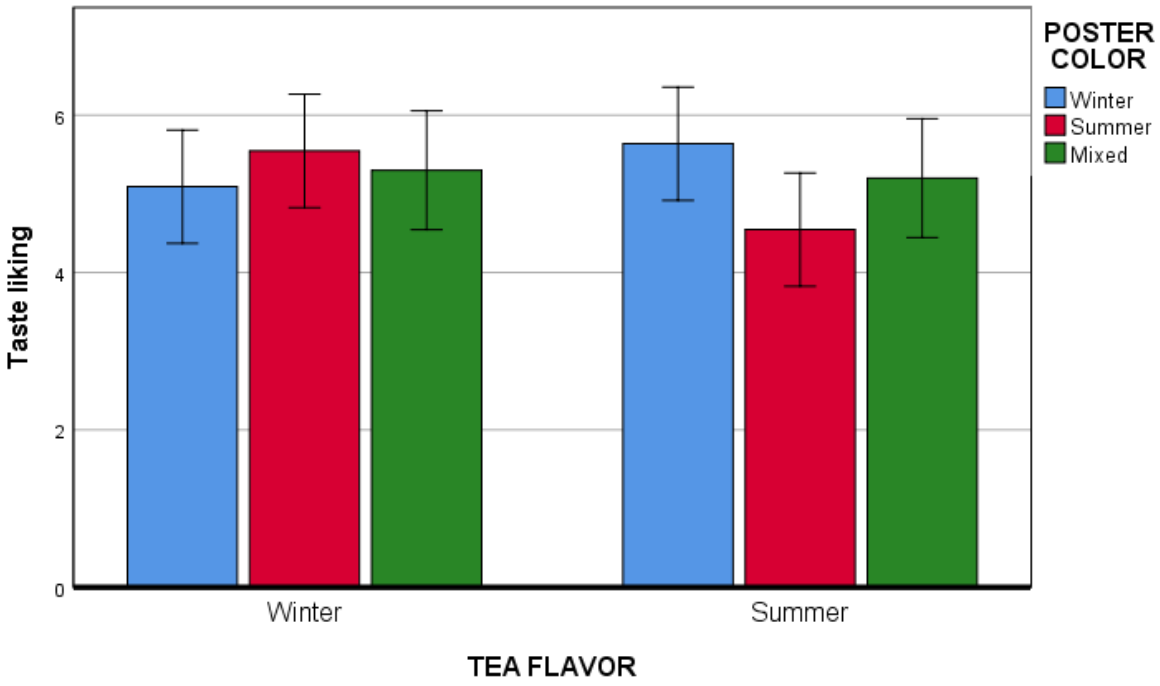

Fig. 9. Interaction between poster color and tea flavor on taste liking

4.1.3. Smell liking

The main effect of poster color on smell liking was not significant (F (2, 58) = 0.61, p = 0.55). The main effect of tea flavor on smell liking was significant (F (1, 58) = 10.63, p = 0.002), indicating that the smell of winter tea (M = 5.56, SD = 1.13) was rated as more pleasant than

[2] Effects that reached marginal significance (significance between 0.05 and 0.10) were included in the results, due to the study's inadequate sample size as a result of the COVID-19 regulations implemented during data collection

the smell of the summer tea (M = 4.53, SD = 1.37). The interaction effect between poster color and tea flavor on smell liking was not significant (F (2) = 0.37, p = 0.70).

4.2. Recognition of seasonal flavors

4.2.1. Recognition of summer flavors

An ANOVA with *color poster* and *tea flavor* as fixed factors and *summer flavors* as dependent variable yielded a significant main effect of poster color on recognition of summer flavors (F (2, 56) = 8.67, p = 0.001). This result shows that the three posters significantly differ in terms of recognition of summer flavors. Post hoc comparisons using the Bonferroni correction indicated that the mean score for the mixed poster (M = 3.2, SD = 1.15) was significantly different from both the winter poster (M = 2.47, SD = 1.05) and the summer poster (M = 2.51, SD = 1.19). However, the summer poster (M = 2.51, SD = 1.19) did not significantly differ from the winter poster (M = 2.47, SD = 1.15). Contrary to H2a, these results suggest that recognition of summer flavors is highest when presented with a (semi)congruent mixed poster, compared to either a summer or winter poster.

The main effect of tea flavor on recognition of summer flavors was also significant (F (1, 56) = 111.68, p = 0.000), indicating that summer flavors are more likely to be recognized in summer tea (M = 3.58, SD = 0.84), compared to winter tea (M = 1.80, SD = 0.63).

Contrary to H2b, the interaction effect of poster color and tea flavor was not significant (F (2, 56) = 0.32, p = 0.73).

4.2.2. Recognition of winter flavors

An ANOVA with *color poster* and *tea flavor* as fixed factors, and *winter flavors* as dependent variable yielded, as expected in H2a, a significant main effect of poster color on recognition of winter flavors (F (2, 58) = 22.11, p = 0.000), confirming that the three posters significantly differ in terms of recognition of winter flavors (all multiple comparisons, $p < 0.001$). This suggests that winter flavors are more likely to be recognized in a situation with a mixed poster (M = 4.21, SD = 0.92) or a winter poster (M = 3.47, SD = 0.81), compared to a situation with a summer poster (M = 2.63, SD = 1.07).

The main effect of tea flavor on recognition of winter flavors was also significant (F (1, 58) = 30.85, p = 0.000), indicating that winter flavors are more likely to be recognized in winter tea (M = 3.94, SD = 1.05), compared to summer tea (M = 2.88, SD = 0.95).

Contrary to expectations stated in H2b, the interaction effect of poster color and tea

flavor was not significant (F (2) = 0.951, p = 0.392).

4.3. Use of seasonal taste descriptions

4.3.1. Use of summer taste descriptions

An ANOVA with *color poster* and *tea flavor* as fixed factors, and *summer tastes* as dependent variable yielded no significant main effect of poster color on use of summer taste descriptions (F (2, 56) = 2.38, p = 0.102), however, the effect approached marginal significance[3]. Fig. 10 shows that the (semi)incongruent mixed poster resulted in the highest usage of summer taste descriptions independent of tea type, which is contrary to expectations formulated in H3a.

The main effect of tea flavor on use of summer taste descriptions was significant (F (1, 56) = 66.89, p = 0.000), indicating that summer taste descriptions are more often used for the summer tea (M = 4.60, SD = 0.93), compared to the winter tea (M = 2.69, SD = 0.99). Contrary to expectations stated in H3b, the interaction effect of poster color and tea flavor was not significant (F (2, 56) = 1.62, p = 0.208)

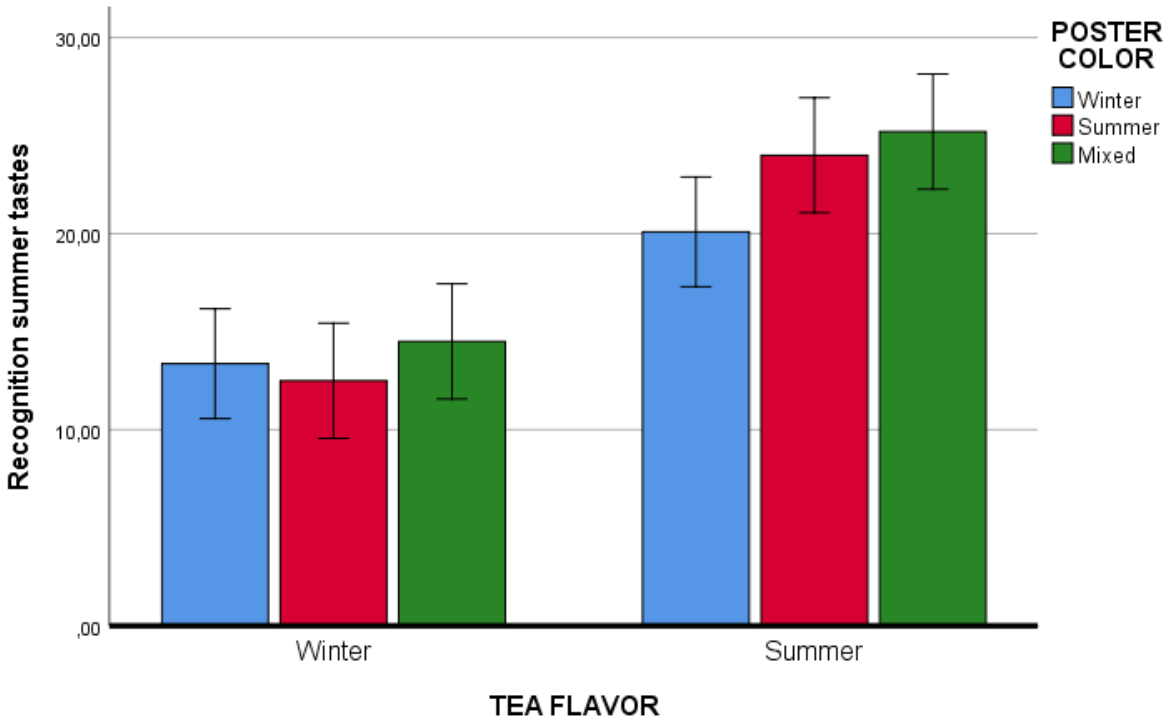

Fig. 10. Main effect of poster color on use of summer taste descriptions

[3] Effects that reached marginal significance (significance between 0.05 and 0.10) were included in the results, due to the study's inadequate sample size as a result of the COVID-19 regulations implemented during data collection

4.3.2. Use of winter taste descriptions

An ANOVA with *poster color* and *tea flavor* as fixed factors, and *winter tastes* as dependent variable yielded a significant main effect of poster color on use of winter taste descriptions ($F(2, 57) = 10.10$, $p = 0.000$), confirming that the three posters are significantly different in terms of use of winter taste descriptions. Post hoc comparisons using the Bonferroni correction indicated that the mean score for the winter poster ($M = 4.81$, $SD = 0.96$) and mixed poster ($M = 4.79$, $SD = 1.50$) were significantly different from the summer poster ($M = 3.61$, $SD = 1.03$). Indicating that, contrary to H3a, specific winter tastes are most often used to describe the tea in a situation with a (semi)congruent mixed poster, compared to a congruent winter poster.

The main effect of tea flavor on use of winter tase descriptions was also significant ($F(1, 57) = 34.42$, $p = 0.000$), indicating that winter taste descriptions are more likely to be used for the winter tea ($M = 4.11$, $SD = 1.23$), compared to summer tea ($M = 3.69$, $SD = 1.09$).

Most importantly, the interaction effect of poster color and tea flavor on use of winter taste descriptions was also significant ($F(2, 57) = 4.53$, $p = 0.015$).

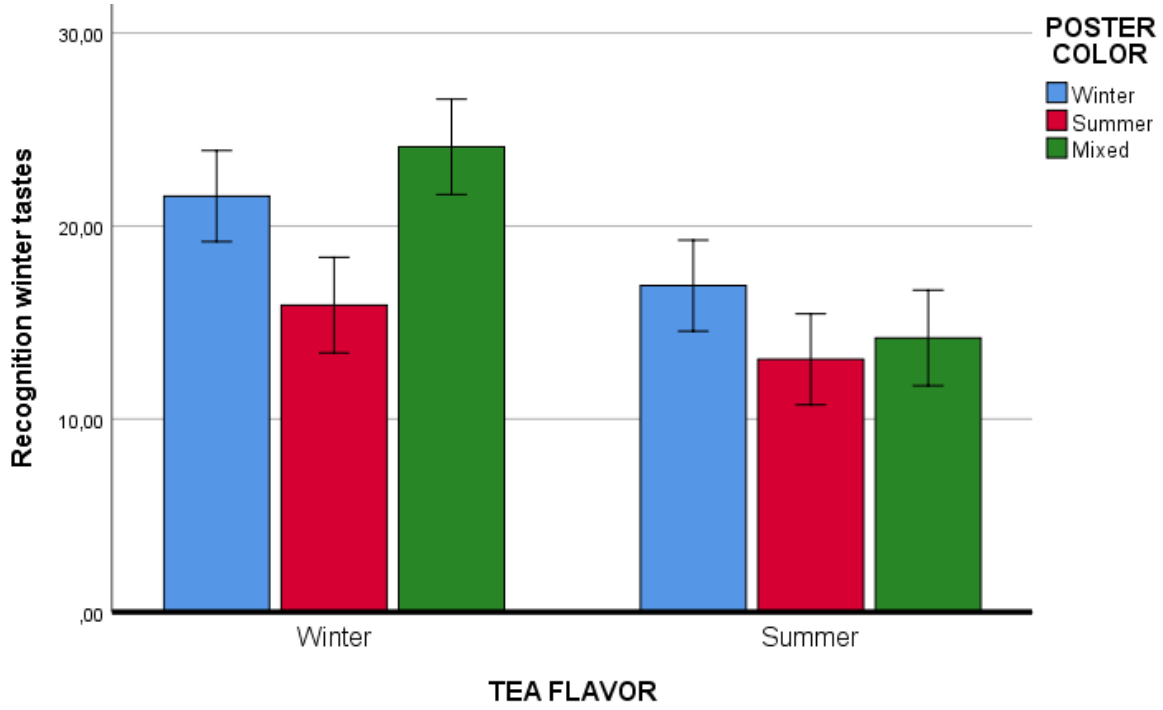

Fig. 11. Interaction between poster color and tea flavor on use of winter taste descriptions

Inspection of Fig. 11 suggests that a (semi)incongruent combination of a mixed poster and a winter tea results in the highest recognition of winter tastes in a winter tea, compared to the

congruent winter x winter condition, which is contrary to expectation formulated in H3b. The results also show that the summer tea received more winter taste descriptions when paired with an incongruent winter poster or a (semi)incongruent mixed poster, which indicates that packaging color may prime certain seasonal taste descriptions in the mind of consumers.

4.4. Hedonic evaluation

Contrary to expectations stated in H4, none of the main and interaction effects for hedonic evaluation were significant (all $F < 1$).

4.5. Purchase intention

Contrary to expectations stated in H5, none of the main and interaction effects for purchase intention were significant (all $F < 1$).

4.6. Poster-tea congruency

The main effect of poster color on poster-tea congruency was significant ($F (2, 57) = 8.02$, $p = 0.001$). Post hoc comparisons using the Bonferroni correction indicated that the mean score for the winter poster ($M = 5.34$, $SD = 1.26$) was significantly different from the summer poster ($M = 3.86$, $SD = 1.48$). However, the difference between the mixed poster ($M = 4.98$, $SD = 1.22$) and the summer poster ($M = 2.78$, $SD = 1.48$) was also significant. This indicates that the winter poster is seen as more congruent to its respective season compared to the summer poster. The main effect of tea flavor on poster-tea congruency, however, was not significant ($F (1, 57) = 0.049$, $p = 0.826$).

Most importantly, the interaction effect of poster color and tea flavor on poster-tea congruency was significant ($F (2, 57) = 3.37$, $p = 0.041$). The results show, in line with H6, that the congruent combination of a winter poster and winter tea ($M = 5.92$, $SD = 0.98$; see Fig. 12) was most often perceived as belonging together, compared to the incongruent combination of a summer poster and winter tea ($M = 3.40$, $SD = 1.24$; see Fig. 12). However, the (semi)incongruent combination of the mixed poster and winter tea ($M = 5,68$, $SD = 1.22$) also scored high on poster-tea congruency, indicating that respondents see the (semi)incongruent mixed poster as belonging to the winter tea as well, which runs contrary to H6.

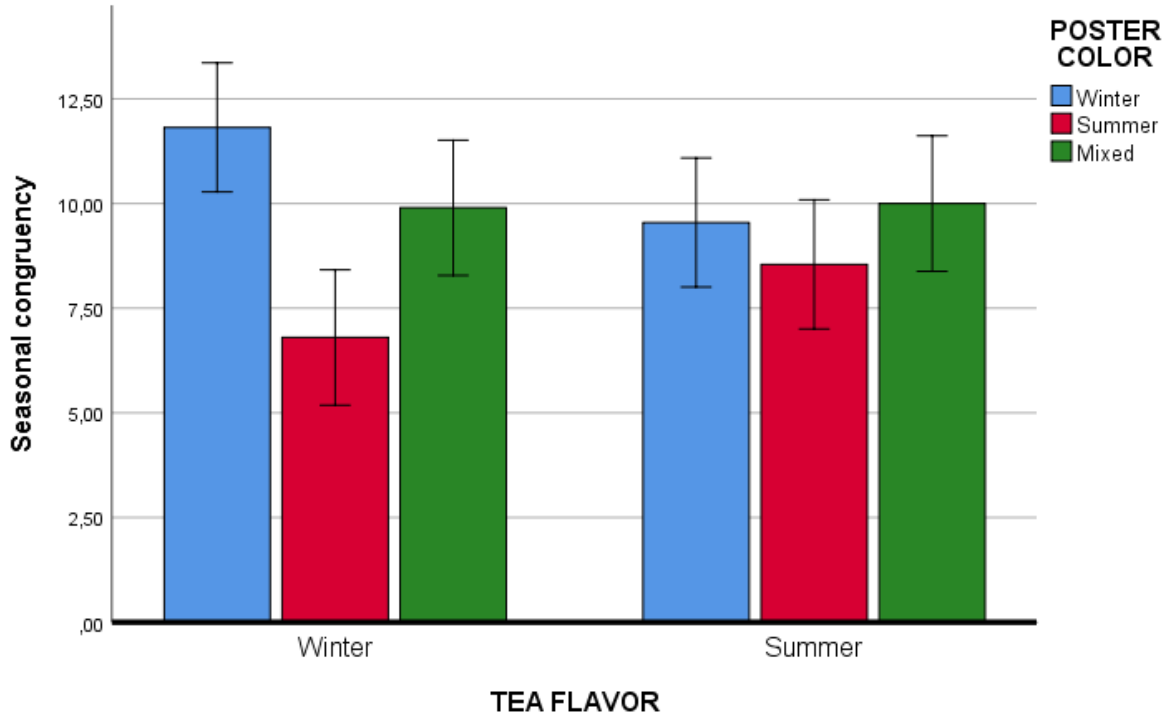

Fig. 12. Interaction between poster color and tea flavor on poster-tea congruency.

Most surprisingly, the congruent combination of a summer poster and summer tea (M = 4.28, SD = 1.60) was less often perceived as belonging together (see Fig. 12), especially compared to the incongruent combinations of the winter poster and summer tea (M = 4.78, SD = 1.28) and the mixed poster and summer tea (M = 5.00, SD = 1.28) that scored higher on poster-tea congruency despite being (semi)incongruent.

4.7. Perceived as seasonal product

The main effect of poster color on seasonal product was not significant ($F(2, 57) = 0.80$, $p = 0.455$). The main effect of tea flavor on seasonal product was significant ($F(1, 57) = 7.89$, $p = 0.007$), indicating that the winter tea (M = 5.84, SD = 4.97) was more often perceived as being a seasonal product, compared to the summer tea (M = 4.97, SD = 1.26).

Contrary to expectations formulated in H7, the interaction effect between poster color and tea flavor on seasonal product was not significant ($F(2, 57) = 1.27$, $p = 0.290$).

4.8. Season identification

The main effect of poster color on season identification was significant ($F(2) = 7.50$, $p = 0.001$), confirming that the three posters significantly differed in terms of season

identification. Post hoc comparisons using the Bonferroni correction indicated that the mean score for the winter poster (M = 2.18, SD = 1.47) was significantly different from both the summer poster (M = 3.59, SD = 2.24) and the mixed poster (M = 3.40, SD = 1.86). However, the summer poster (M = 3.59, SD = 2.24) did not significantly differ from the mixed poster (M = 3.40, SD = 1.86). The main effect of tea flavor was also significant (F (1) = 66.84, p = 0.000), indicating that the summer tea (M = 4.38, SD = 1.85) was more often recognized as a summer/spring tea, compared to the winter tea (M = 1.72, SD = 0.88).

In line with H8, the interaction effect between poster color and tea flavor on season identification approached marginal significance[4] (F (2) = 1.76, p = 0.108). Fig. 13 shows that the summer tea is most often identified as a summer product in the congruent combination with a summer poster (M = 3.59, SD = 2.24)[5]. The summer tea is also more often stated as being a summer product in combination with the (semi)incongruent mixed poster (M = 3.40, SD = 1.88), compared to the incongruent pairing with the winter poster (M = 2.18, SD = 1,47; see Fig. 13). The winter tea was most often identified as a summer product in the incongruent combination with a summer poster (M = 3.59, SD = 2.24; see Fig. 13), further indicating that the perception of a product as being seasonal can be primed by packaging material alone.

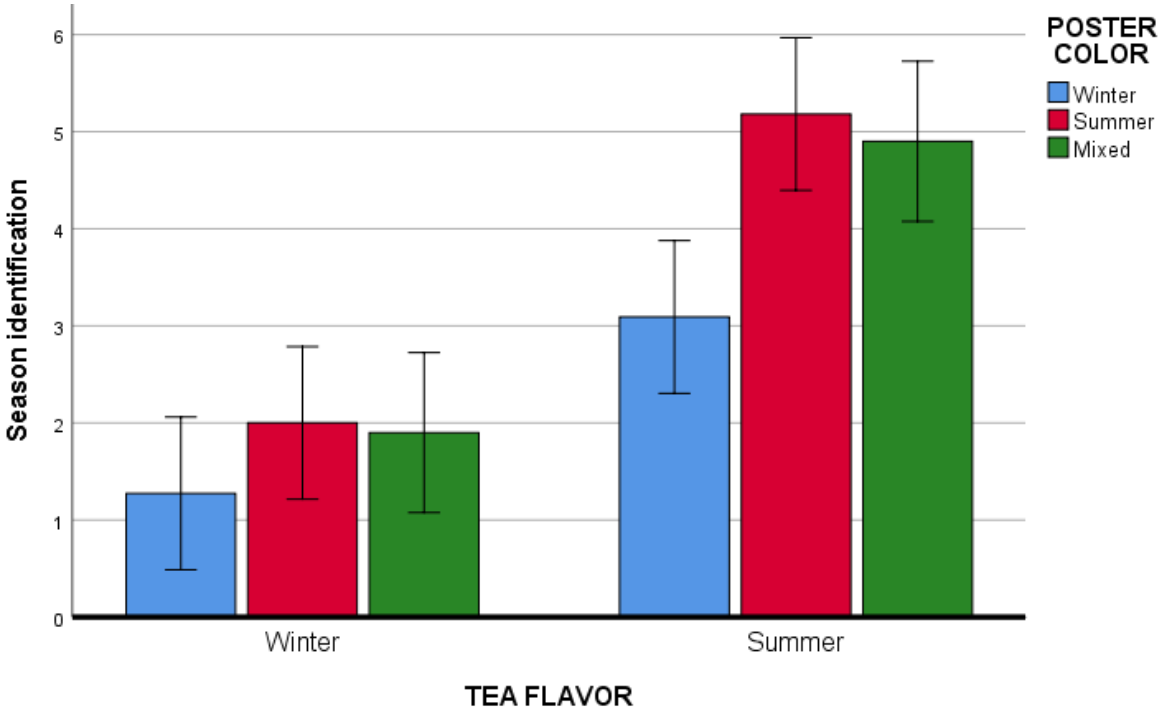

Fig. 13. Interaction between poster color and tea flavor on season identification

[4] Effects that reached marginal significance (significance between 0.05 and 0.10) were included in the results, due to the study's inadequate sample size as a result of COVID-19 regulations during data collection

[5] Due to the usage of a sliding cursor, the results show the extent to which a tea is recognized as being a summer product, in such a way that a low score (e.g. congruent winter x winter) means being recognized as a winter product.

Table 4

Summary of results

Hypothesis	Significance level	Result
H1: Taste liking		
Taste intensity	0.109	Approached marginal significance
Taste liking	0.107	Approached marginal significance
Smell liking	0.70	Not significant
H2a: Recognition of seasonal flavors		
Main effect poster color on recognition summer flavors	0.001	Significant
Main effect poster color on recognition winter flavors	0.002	Significant
H2b: Recognition of seasonal flavors		
Interaction effect poster color x tea flavor on recognition of summer flavors	0.73	Not significant
Interaction effect poster color x tea flavor on recognition of winter flavors	0.39	Not significant
H3a: Use of seasonal taste descriptions		
Main effect poster color on use of summer taste descriptions	0.102	Approached marginal significance
Main effect poster color on use of winter taste descriptions	0.000	Significant
H3b: Use of seasonal taste descriptions		
Interaction effect poster color x tea flavor on use of summer taste descriptions	0.208	Not significant
Interaction effect poster color x tea flavor on use of winter taste descriptions	0.015	Significant
H4: Hedonic evaluation	0.672	Not significant
H5: Purchase intention	0.983	Not significant

H6: Poster-tea congruency	0.041	Significant
H7: Perceived as being a seasonal product	0.290	Not significant
H8: Season identification	0.108	Approached marginal significance

5. Discussion

5.1. Congruency, expectations and taste evaluation

In terms of congruency, the current study shows that congruency between poster color and tea flavor does not necessarily lead to the most positive taste evaluation of the beverage. Contrary to H1, the results show that taste liking is highest when the seasonal tea is paired with an incongruent seasonal poster. Furthermore, in terms of taste intensity, the (semi)incongruent combination of a mixed poster and a winter tea resulted in the highest taste intensity. These findings indicate that a (semi)incongruent combination of poster color and tea flavor may lead to the most positive results in terms of overall taste evaluation, especially when compared to congruent combinations. These results are surprising, given that people tend to like foods and drinks more when they meet our expectations (Woods et al., 2011; Yeomans et al., 2008). Contrary to the findings presented in this study, Carvalho and Spence (2020) found that taste liking significantly decreased in incongruent pairings when using specialty coffee as a hot beverage, concluding that a big contrast between the expected and actual taste experience can result in a negative evaluation of the taste of the beverage.

The findings in this paper fit Carvalho and Spence (2020) description of a ‘surprise effect’, which can result in the enhancement of the unexpected sensory attributes of the beverage. This could mean that a (semi)incongruent poster primes participants to expect a certain flavor, but when the flavor of the tea does not meet this expectation, the actual flavor of the tea is enhanced by the surprise effect, resulting in a more positive taste evaluation. This is in line with conclusions drawn by Vanhamme and Snelders (2003), who found that surprise positively affects the evaluation of unexpected product attributes.

5.2. The mixed poster and a surprise effect

Further evidence of the occurrence of this surprise effect can be seen in the effects of the (semi)incongruent mixed poster, which is a combination of both seasonal summer and winter

colors. Contrary to expectations formulated in H2a and H3a, the mixed poster lead to the highest recognition of summer flavors (H2a) and the highest usage of summer taste descriptions (H3a) in both the summer and winter tea. Similarly, the mixed poster lead to the highest recognition of winter flavors (H2a) in both teas. It could thus be implied that the mixed poster leads to a more intense taste perception of seasonal flavors, while simultaneously increasing taste liking and taste intensity. These results could be ascribe to the surprise effect highlighting the unexpected flavors, thus making them more prominent. The positive product evaluations that stem from this surprise effect seem counterintuitive, as consumers usually prefer typical, standard designs that are easy to process (Spence & Carvalho, 2019). Stimuli that can be easily processed evoke a positive effect, which is attributed to the stimulus at hand and consequently results in a positive overall product evaluation (Reber et al., 2004). Usually, high levels of novelty (e.g. incongruent seasonal packaging) lead to lower levels of pleasure (Landwehr, Wentzel & Herrmann, 2013). Processing fluency that comes with congruency is hedonically marked and almost automatically leads to more favorable evaluations of the stimuli that is processed (Winkielman, Schwarz, Fazendeiro, & Reber, 2003).

However, in the current study the surprise effect leads to more favorable evaluations of the product. To understand this, we must dive deeper into what the surprise effect entails. The sensation of 'surprise' results from a schema discrepancy (Gendolla & Koller, 2001; Whittlesea & Williams, 2001). According to Rumelhart (1984), a schema is a private, unreflective theory about the nature of objects, events or situations. A schema consists of several variables and assumed connections between these variables, in such a way that individuals expect the variables to vary only within a small range of possible options (Schützwohl, 1998). It is not until an input differs from this typical range that it elicits surprise. Clearly, the (semi)incongruent mixed poster combined with either seasonal tea differed from participants expected range of variation, in such a way that it may have elicited surprise. Perhaps participants did not anticipate to see seasonal colors from different seasons combined into one stimuli, or expected a different taste based on the poster.

Furthermore, unexpected incongruent information fosters the elaboration process in an individual's mind (Houston, Childers & Heckler, 1987): when met with incongruent product elements, the consumer will attempt to integrate the incongruent elements, that are inherently linked to different pre-existing schemata in their mind. This means the consumer will have to consciously retrieve information, and thus exert more effort and experience less processing fluency. As a result of this, surprise can also make individuals more aware of the stimuli

(Niepel, Rudolph, Schützwohl & Meyer, 1994) and lead to a deeper cognitive processing of the stimuli (Meyer, Reisenzein & Schützwohl, 1997). This deeper processing could be the reason why the mixed poster seemed to elicit more seasonal flavors, as participants likely processed the taste of the tea deeper, leading to a better recognition of the seasonal flavors. This may also explain why the mixed poster scored highest on taste liking and taste intensity, as deeper processing makes stimuli more preferable (Nunoi & Yoshikawa, 2016).

However, in terms of winter taste descriptions (see H3a) the congruent winter poster resulted in the highest usage of winter taste descriptions. It could thus also be speculated that the mixed poster was harder for participants to decipher in terms of seasonal association (e.g. participants being unable to recognize it as either a winter or summer poster), thus leading to participants tasting the tea without prior taste expectations. This would mean that seasonal flavors are actually more easily recognized when the packaging material does not convey a specific taste expectation, which is an interesting avenue for further research.

5.3. Emotional mediation and individual preference

Another possible explanation for these results can be emotional mediation, which occurs especially when the color is presented, as in the current study, in the form of an abstract color patch (Spence, 2019), instead of a more realistic mock-up design. This emotional reaction could be due to, for example, personal color preferences. Interestingly, when people are asked about their favorite colors in terms of food and drinks, pinks and reds are most often mentioned (Spence, 2016). Given that the color pink was included in the mixed poster, participants may have experienced a more intense emotional reaction to the mixed poster due to an inherent preference for pink and red shades in the context of food, thus resulting in the highest ratings on our measurements (e.g. taste liking) for the mixed poster. It does, however, not explain why the summer poster, which contained the same shades of pink and red, did not elicit the same results as the mixed poster. Perhaps the simple act of using incongruent designs can already lead to a more intense emotional responses compared to congruent designs, simply because it requires more cognitive effort to process.

5.4. Seasonal flavors and identification of a seasonal beverage

Interestingly, the results show that packaging material can prime consumers to taste certain flavors that are not in fact present in the beverage, as our results show (contrary to H3b) that the summer tea received significantly more winter taste descriptions when paired with a

winter poster or a mixed poster. This is contrary to findings by Zellner et. al. (2018), who found that packaging color affected taste expectations, but had little to no effect on actual perceived taste.

Furthermore, the identification of the tea flavors as being a seasonal beverage seemed difficult for participants. The results show that the congruent combination of a winter poster and winter tea was most often recognized as a seasonal beverage, which is in line with H7. Contrary to expectations stated in H7, however, was that the congruent summer combination was less often recognized as a seasonal beverage, even though the summer tea by itself was most often described as being a seasonal beverage. This could indicate that the summer poster was not optimally designed and thus not recognized as belonging to the season. This is further underlined by the findings that indicate that the congruent combination of a summer poster and summer tea was seen as less seasonal, compared to the incongruent combination of a summer tea and a winter poster, indicating that the summer poster did not contribute to the beverage being recognized as a seasonal beverage. These findings could have several implications. First, it could be speculated that winter colors are more unconsciously related to seasonal associations than their summer counterparts, for example because winter colors may be more prominently represented in consumers unconscious schemata. Second, however, the results could also indicate a sub-optimal design of the summer poster.

This study indicates that the right combination of seasonal colors could elicit seasonal associations in consumers, even when it is not that season in real-time. Seasonal packaging design could thus possibly 'prime' customers into buying seasonal foods, even when these foods are 'out of season'.

5.5. Limitations, shortcomings and possibilities for future research

There are several factors that can influence the results of this study. The first limitation is the small sample size, which is mainly due to the spread of COVID-19. This limitation is particularly important for the effects that approached marginal significance, as they could reach significance in a follow-up study with a bigger sample size, and thus increase validity of the results. Moreover, some effects that did not reach significance in the present study may become significant, as a replication of this study with a bigger sample size may reveal similar, significant results.

Given this study's focus on seasonal associations, the time period in which the study took place may prove to be a limitation. Since the study was conducted during the summer

months, the winter tea and poster manipulations may not have reached full effect. Furthermore, the taste of the winter themed hot beverages may not be liked as much during summer, for example due to the weather that may affect the mindset of participants. This could have influenced the hedonic evaluation of the beverage as well as taste perception.

The third and perhaps biggest limitation of the current study may be the use of sub-optimal stimuli in the form of colored posters. Particularly interesting is that the findings show that the mixed poster was seen as belonging to the summer tea more often that the actual summer poster, which was not in line with expectations. Furthermore, the congruent summer combination was less often recognized as a seasonal beverage, even though the summer tea by itself was most often described as being a seasonal beverage. This may indicate that the summer poster was not optimally designed, and thus did not lead to a summer association in the minds of participants. A future study should prevent this issue by partaking in a more extensive pre-test, as to pick the right color scheme for the visual stimuli. Furthermore, more realistic mock-up packages should be used, so as to test the effects of the color combinations when applied on a realistic mock-up tea package.

Another possible interference is the environment in which the experiment took place. Several scholars have describes the effects of environmental design, such as ambient color or lighting on taste experience (Stroebele & De Castro, 2004; Kim et al., 2016; Spence, 2017). Given that the current study was conducted in a work-place cafeteria, ambient sound and food smells may have interfered with the effects of the visual stimuli. A follow-up study must thus be more discerning in terms of environment for example by executing a similar study within a more constant environment, for example a closed off room without seasonally themed decorations (Spangenberg, 2005), without ambient color (Kim et al., 2016) and with constant lighting (Stroebele & De Castro, 2004).

An interesting avenue for future research are cultural differences related to seasonal associations and cultural colors associations. The participant of the current study were mostly Dutch, which may have influenced the results. For example, Jantathai, Sungsri-in, Mukprasirt, and Duerrschmid (2014) demonstrated that food color preference differs per culture, by showing that Austrians prefer yellow desserts while Thai consumers prefer pink or green desserts. In line with this, seasonal associations behind certain colors or flavors may also differ greatly across cultures, which could affect perception of congruency, taste liking and hedonic evaluation of the same beverage in another culture. Moreover, research has shown that adapting advertising to local preferences is more effective, since cultural aspects

influence consumers perception and acceptance of advertising forms (Van den Berg & Van de Laar, 2001). Consider the colors red and green, which are often seen as ‘christmas colors’ in the western world, but will not be universally recognized as such, nor as being related to winter, all over the world. Instead, these colors are culturally learned symbols that differ per nationality (Morris, 2018). Additional research into the cultural aspects inherent to seasonal packaging should therefore be conducted by using a more diverse group of participants, for example similar to the study by Li et al. (2020) who used both Chinese and American participants in their taste tests.

6. Literature

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Appendix 1 – Pretest procedure ‘Color Associations’

Material selection

20 respondents participated in the pretest to determine which colors should be used in the main study. A total of 3 summer-spring related colors and 3 winter-fall related colors were needed to make the stimuli material to be used in the main study. To this end, a pretest was held in which participants scored a set of 30 predefined colors on their association with the seasons. A total of 110 color cards were randomly collected from a wide range of paint colors at two local construction markets (Gamma and Praxis; see also Fig. 1).

First selection round

To make a selection for the pretest we set some criteria:

1. Colors closely resembling black or white are omitted

2. Colors should be strongly present and recognizable. We thus excluded diluted colors such as pastel tints.

Second selection round

After omitting colors that did not meet these criteria, the colors were then divided in 9 main types: purple, pink, yellow, blue, red, brown, orange, green and grey. Of these 110 colors the researcher, in collaboration with a second advisor, choose a total of 44 colors (see Fig. 2). Colors that were very similar to each other in tone, or that mixed multiple core shades (such as teal; a combination of green and blue) were omitted as to avoid confusion among participants.

Third selection round

Another 14 colors were omitted to get a total of 30 colors to be ranked by participants (see Fig. 3). These 14 colors since the colors were similar to each other, and would risk the probability of mixed results. We made sure to include a minimum of 3 shades of all 9 main color types. This in order to give every main color an equal chance at being ranked.

Labeling colors

The paint swatches contained names such as ‘fall’, ‘potpourri’ or ‘summer fruit’. These names were removed from the swatches as they may cause participants to make implicit associations with a season based on the name of the swatch, rather than the color. The cards were instead marked on the back with a number to identify them (e.g. #1, #2). The researcher used a separate coding file in which the codes could be traced back to the actual name of the color on the card, so as to identify the right color to be used in the main study (see Table 1).

Procedure

Participants were presented the colors in a varying, randomized order using Qualtrics. Items included 'Color #28: Which season does this color represent most?'. Every participant had 15 colors randomly assigned to them, which they ranked using a heat map divided into 4 different regions. Each region was linked to a seasonal category: spring-summer, summer-fall, fall-winter and winter-spring. The regions that are most important for the main study are spring-summer for the summer themed poster, and winter-fall for the winter themed poster. The grid on which scored the color is a 500x500 grid. This means Qualtrics provided the exact coordinates of each participants click. These coordinates were used to determine the most clicked area using SPSS, and compare the seasonal association of the colors.

Downsides

Possible risks for the validity/reliability of this research is that a shortlist of colors was decided by the researcher and one advisor. This means that the interpretation of these two people may have a significant influence on the conclusions that can be drawn in the main study. When replicating this experiment, another researcher may choose entirely different colors which may lead to different results.

Results

A one sample t-test was used to assess whether the mean coordinates of the tested colors differed significantly from the set test values, in order to determine whether that color could be described as predominantly winter or summer. Table 2 shows the mean coordinates per color.

The colors were then divided into seasons based on their mean coordinates, as described below:
X > 251 is Fall
X < 250 is spring
Y > 251 is winter
Y < 250 is summer

After this, the following test values were then set, with p = 0,025
Spring colors X < 200
Summer colors Y < 150
Fall colors X > 350
Winter colors Y > 350

This means that the color 1 (mean of x = 263,67) is considered a fall color, and thus the X-value will be tested against the test value for fall colors, X > 251, for significance.

Fig. 1. The complete collection of color cards as collected from the store

Fig. 2. First selection of 44 colors divided over 9 categories (yellow and orange have been separated as opposed to before)

Fig. 3. Second selection of 30 colors divided over 9 categories. Every category has a minimum of 3 shades.

Table 1

Original names of the colors per code and main color type

Blauw 1- monnikskap 2 – Turquoise 3 – caribisch 4 – uitzicht
Paars 5 – geslaagd 6 – sangria 7 – zwarte bes
Groen 8 – aloe vera 9 – geluk 10 – Genesis
Bruin 11 – kokosnoot 12 – Leder 13 – Herfst
Rood 14 – tomaat 15 – Amarena 16 – Australië 17 – historisch
Geel 18 – citroen 19 – maracuja 20 – Intens geel
Oranje 21 – wortel 22 – vuurpijl 23 – Karakter
Roze 24 – collectie 25 – Radijs 26 – Fuschsia 27 – Verbondenheid
Grijs 28 – Arsenaal 29 – Concrete 30 – Source

Table 2. Mean heat map coordinates per color

Color	Mean X (spring – fall)	Mean Y (summer - winter)
1	263,67	279,78
2	159,67	294,00
3	193,50	74,00
4	185,70	259,30
5	223,00	200,82
6	327,78	221,00
7	375,78	311,22
8	137,33	140,89
9	248,86	203,14
10	296,88	243,88
11	401,40	348,60
12	411,75	254,00
13	408,83	350,33
14	318,00	153,27
15	378,14	180,29
16	401,80	223,40
17	416,75	291,50
18	188,71	94,43
19	302,33	123,67
20	289,50	189,87
21	314,83	158,50
22	395,00	178,25
23	426,00	239,25
24	201,60	170,40
25	210,90	141,30
26	207,00	135,25
27	141,86	132,71
28	289,86	389,86
29	308,67	390,44
30	282,38	398,25

Appendix 2 – Pretest procedure ‘Tea Flavors’

Materials

A total of 17 participants have pretested 8 different tea flavors. Based on this pretest we determined which tea flavors are most associated to a season, and should thus be used in the main experiment. One participant will test 4 different tea flavors in a randomized order. A total of 8 tea flavors will be tested, 4 winter related and 4 summer related. 2 of the teas are store-bought and thus may be familiar to participants. The other 2 tea flavors were ordered through a small private brewery (miss-tea.com), which results in a lesser chance of participant recognizing the tea. Another characteristic of this brewery tea is that it consists purely of natural ingredients and has no additional flavors or chemical additions that may alter the taste of the ingredients. The store-bought teas, however, do contain additives to enhance the flavor, smell or color of the tea. The tea was poured into identical tea glasses to be tasted by the participants (see Fig. 3).

Participants and method

A total of 10 participants participated. Participants were asked to test the teas in a home setting. Respondents varied in age, from 18 up to 70. Participants got four transparent glasses labeled with numbers to indicate the flavor. Two different surveys were made. Each respondent either filled in survey 1 or survey 2, each survey including 4 of the 8 teas. The different teas were randomly divided over the two surveys, but both surveys include 2 tea samples from each season, so as to spread the different flavors over all participants (see table 3). Participant had to fill in a four-tiered grid, on which they indicated how much the tea corresponds to one of the four seasons. Participants then rated the presence of predefined flavors in the teas on a Likert scale from 1 (not present at all) to 5 (definitely present). These predefined flavors were flavors already listed on the packages of the 8 different teas in the experiment. To conclude the pretest, respondents filled in their age and gender.

Table 1. Winter tea flavors

Name tea	**Flavors as listed on package**
miss-tea Winterwarmte	fenugreek, licorice, cinnamon, ginger, cardamom, clove, cocoa shells
miss-tea Christmas Spirit	cinnamon, mistletoe, orange peel, ginger, clove, goji berries, rose blossom
store-bought pickwick spices: winter glow	cinnamon, cloves, ‘flavourings’, orange peel
store-bought pickwick spices: caramel vanilla	‘flavourings’, caramel pieces, partially extracted vanilla

Table 2. Summer tea flavors

Name of tea	**Flavors as listed on package**
Miss-Tea Zomerbries	citrus peel, peppermint, cardamom, rose blossom
Miss-Tea Lentekriebels	elderflower, lemon grass, sage, marigold
store-bought Pickwick Joy of Tea: Berry Dreams	citrus peel, 'flavorings', rose petals, raspberry, blueberry, strawberry
store-bought Pickwick Joy of Tea: Green Tropical	ginger, citrus peel, 'flavorings', pineapple pieces, coconut pieces)

Fig. 1. Winter tea flavors

Fig. 2. Summer tea flavors

Table 3
Distribution of teas over the two surveys

Survey 1	Survey 2
#1 Christmas spirit	#2 Winter Warmte (‘winter warmth’)
#4 Zomerbries (‘summer breeze’)	#3 Lente Kriebels (‘spring jitters’)
#6 Berry Dreams	#5 Caramel Vanilla
#8 Winter Glow	#7 Green Tropical

Respondents tasted and rated these teas in a randomized order. They were presented with a glass tea cup that stated only the number of the tea, as labeled in table 3. Respondents were asked to rate the flavor of the tea on a four-tiered heat map grid, divided in 4 regions (summer- fall, fall-winter, winter-spring and spring-summer). In between tasting, the respondents cleansed their palate with cold unflavored water.

Results

A one sample t-test was used to assess whether the mean coordinates of the teas differed significantly from the set test values, in order to determine whether that tea could be described as predominantly winter or summer. Table 4 and 5 show the mean coordinates per tea flavor.

Table 4
Summer teas mean heat map coordinates

Tea	Mean X (spring – fall)	Mean Y (summer - winter)
1	337,40	343,70
2	376,33	319,50
5	373,71	331,43
8	320,70	289,00

Table 5
Winter teas mean heat map coordinates

Tea	Mean X (spring – fall)	Mean Y (summer - winter)
3	317,50	196,17
4	225,90	293,10
6	186,30	144,50
7	145,57	161,86

After this, the following test values were then set, with p = 0,025

X > 251 Fall

X < 250 spring

Y > 251 winter

Y < 250 summer

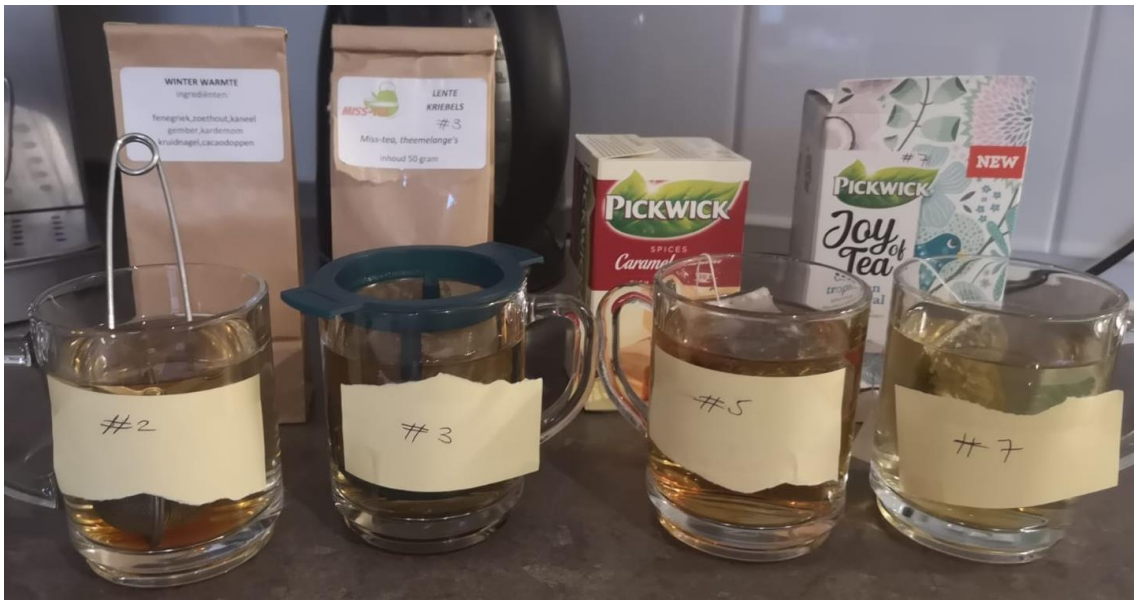

Fig. 3. Method of labeling teas prior to tasting

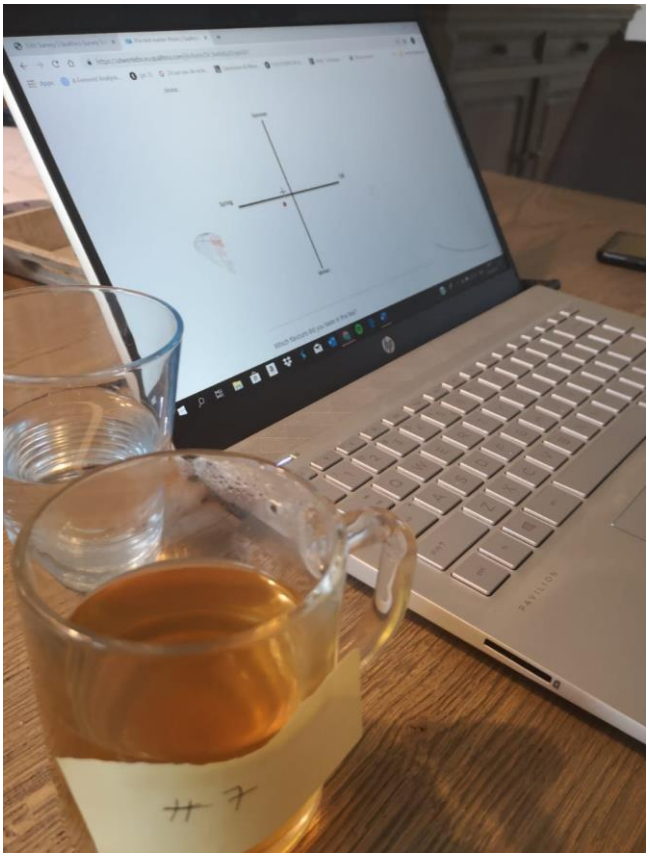

Fig. 4. Set-up pretest

Appendix 3 – Set-up experiment

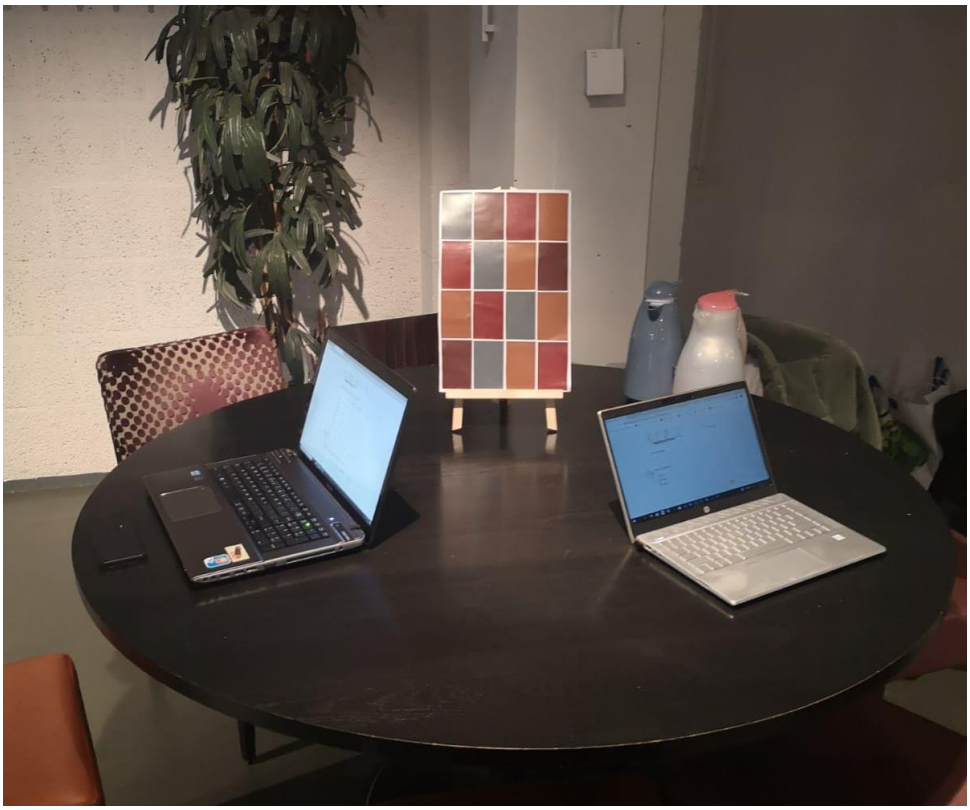

Fig. 1. Set-up of the experiment