How do consumers describe wine astringency?

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ABSTRACT

Astringency is one of the most important sensory characteristics of red wine. Although a hierarchically structured vocabulary to describe the mouthfeel sensations of red wine has been proposed, research on consumers' astringency vocabulary is lacking. In this context, the aim of this work was to gain an insight on the vocabulary used by wine consumers to describe the astringency of red wine and to evaluate the influence of wine involvement on consumers' vocabulary. One hundred and twenty-five wine consumers completed and on-line survey with five tasks: an open-ended question about the definition of wine astringency, free listing the sensations perceived when drinking an astringent wine, free listing the words they would use to describe the astringency of a red wine, a CATA question with 44 terms used in the literature to describe astringency, and a wine involvement questionnaire. When thinking about wine astringency consumers freely elicited terms included in the Mouth-feel Wheel, such as dryness and harsh. The majority of the specific sub-qualities of the Mouth-feel Wheel were not included in consumer responses. Also, terms not classified as astringency descriptors were elicited (e.g. acid and bitter). Only 17 out of the 31 terms from the Mouth-feel Wheel were used by more than 10% of participants when answering the CATA question. There were no large differences in the responses of consumer segments with different wine involvement. Results from the present work suggest that most of the terms of the Mouth-feel Wheel might not be adequate to communicate the astringency characteristics of red wine to consumers.

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1. Introduction

Astringency can be defined as "the complex of sensations due to shrinking, drawing or puckering of the epithelium as a result of exposure to substances such as alums or tannins" (ASTM, 2004). Red wine astringency is mainly attributable to the phenolic compounds, particularly proanthocyanidins (tannins) (Lesschaeve & Noble, 2005), and is one of its most important sensory characteristics (Peynaud, 1987).

Astringency has been shown to be a complex perceptual phenomenon that involves several sensations that are simultaneously perceived (Green, 1993; Lee & Lawless, 1991). Therefore, the evaluation of total astringency is not enough to characterize perceived astringency when consuming red wine (Bajec & Pickering, 2008). For this reason, a standardized and well-defined vocabulary to describe wine astringency is necessary (Gawel, 1997). This type of vocabulary allows accurate description of wine and facilitate communication across different wineries or trained panels (Lawless & Civille, 2013).

Wine tasters have traditionally used descriptive terms such as *sappy*, *harsh*, *woody* and *green* to describe wine astringency (Peynaud, 1987). Several authors have proposed lexicons to describe astringency sub-qualities of wine and other alcoholic beverages. Lee and Lawless (1991) generated terms to describe solutions of allum, gallic acid and tartaric acid using focus groups: *drying*, *puckering*, *sour*, *astringent*, *bitter*

and *rough*. Similar terms were used by Lawless, Corrigan, and Lee (1994) to describe the mouthfeel sensations of several compounds. Besides, other terms such as *stickiness*, *powdery*, *sappy*, *harsh* and *gritty* have been used by different authors to describe the astringency of beer and brewing products (Langstaff, Guinard, & Lewis, 1991; Meilgaard & Muller, 1987).

Gawel, Oberholster, and Francis (2000) proposed a Mouth-feel Wheel to precisely and comprehensively characterize the astringency of red wines. It comprises a hierarchical vocabulary of 53 terms to describe the mouthfeel characteristics of red wine, including 33 astringency descriptors grouped into 7 categories (particulate, surface smoothness, complex, drying, dynamic, harsh, unripe). Although the Mouth-feel Wheel provides valuable information to describe the astringency of red wine, some of the terms include a hedonic component in their definition and are related to other flavour characteristics (e.g. *complex*, defined as "a positive hedonic grouping consisting of an amalgam of pleasing astringency sensations, flavour and balanced acidity") (Lawless & Civille, 2013). This makes it necessary to refine the vocabulary used for describing wine astringency (Kielhorn & Thorngate, 1999). Besides, one of its main drawbacks is that it was constructed considering the perception of wine experts with extensive experience in wine tasting. Therefore, the terms of the Mouthful Wheel do not necessarily include the terms consumers normally use for describing wine astringency.

One of the biggest challenges in consumer research is understanding consumer vocabulary (Lawless & Civille, 2013). Although standardized astringency vocabulary may allow an accurate description of wines

and facilitate communication across different panels and companies, they do not necessarily reflect how consumers would describe them (Lawless & Civille, 2013). Understanding consumers' astringency vocabulary can contribute to identify the most relevant characteristics for consumers' quality perception and to reduce differences with the descriptions provided by experts (Carr, Craig-Petsinger, & Hadlich, 2001). This approach can also be useful for improving communication with non-technical staff and to develop marketing and communication strategies based on sensory information (Lawless & Civille, 2013; Swahn, Öström, Larsson, & Gustafsson, 2010). Providing information about the sensory characteristics of products has been reported to improve consumers' expectations and purchase intention and has been increasingly used by food companies (Smith, Møgelvang-Hansen, & Hyldigc, 2010; Wansink & Painter, 2001).

Involvement is a motivational state that determines how relevant a person perceives a product within their personal needs, values, interests and motivations for a given situation (Marshall & Bell, 2004). People involved with a product usually invest more time and effort for making their purchase decisions (Bell & Marshall, 2003). Wine involvement has been shown to influence consumers' consumption frequency, as well as the relative importance they give to different product characteristics when making their wine purchase decisions (Hollebeek, Jaeger, Brodie, & Balemi, 2007; Lockshin, 1998; Lockshin, Quester, & Spawton, 2001; Lockshin, Spawton, & MacIntosh, 1997). High involvement has also been related to demand for knowledge and variety seeking (Dodd, Pinkelton, & Gustafson, 1996; Goldsmith & d'Hauteville, 1998). Therefore, wine involvement is expected to influence the vocabulary used for describing wine astringency: consumers involved with wine may use a higher number of concrete, technical terms than low-involved consumers. In this sense, research has shown that wine expertise affects perceived quality and the vocabulary used for communicating and describing wine (Ballester, Patris, Symoneaux, & Valentin, 2008; Hopfer & Heymann, 2014). Expertise has been reported to improve the communicative value of wine descriptions (Lehrer, 1975; Lawless, 1984; Solomon, 1990)

The aims of the present work were to: (a) gain an insight on the vocabulary used by wine consumers to describe the astringency of red wine, (b) compare consumer vocabulary with the terms included in the Mouth-feel Wheel, and (c) evaluate differences in the vocabulary of consumer groups with different wine involvement.

2. Materials and methods

2.1. Consumers

A total of one hundred and twenty-five consumers participated in the study (56% female). Their ages ranged from 21 to 69 years old (average = 40.0 years old, standard deviation = 13.3 years old). Participants were recruited from the consumer database of the Food Science and Technology Department of Universidad de la República (Uruguay), according to their wine consumption (at least once a month) and interest to participate in the study. Participants signed an informed consent form prior to completing the study.

2.2. Questionnaire

Participants were asked to complete a questionnaire that comprised five tasks. First, they were asked to provide a definition of the term "astringency" ("astringencia" in Spanish) by answering the following open-ended question: "*How would you define the astringency of red wine?*".

Then, they had to complete two free listing tasks. Free listing is a simple qualitative technique widely used in anthropology, which consist of asking participants to list all the terms that fit into a certain criterion (Rusell Bernard, 2005; Hough & Ferraris, 2010). In the present study, participants were asked to *list all the sensations they perceive*

when drinking an astringent red wine and *all the words they would use to describe the astringency of a red wine*.

After completing the free listing tasks participants were asked to answer a check-all-that-apply (CATA) question which comprised 44 terms used in the literature to describe astringency. Participants were asked to select all the terms they considered appropriate to describe the astringency of a red wine. Thirty-one of the terms were included in the Mouth-feel Wheel (*harsh, hard, aggressive, abrasive, dry, numbing, parching, pucker, chewy, adhesive, complex, soft, fleshy, mouth coating, fine emery, velvet, suede, silk, talc, powder, plaster, dusty, grainy, chalky, sawdust, unripe, resinous, sappy, green, full, viscous*) (Gawel et al., 2000). The rest of the terms were *rough, irritant, sand paper, hessian, fine grain, coarse grain, smooth, lush, long, round, even, sticky*, and *oily*. These additional terms were selected based on pilot testing with wine professionals.

Then, participants completed a wine involvement questionnaire composed of 21 statements. The items of the questionnaire (Table 1) were selected considering published literature (Lockshin et al., 1997; Mittal & Lee, 1989). Participants had to rate their degree of agreement with each of the statements using a 7-point scale ranging from "totally disagree" to "totally agree".

Finally, participants were asked to indicate their age, gender, wine frequency consumption, type and price range of wines usually consumed.

The questionnaire was implemented using a web interface (Google Doc®). Consumers were asked to answer all questions spontaneously and explained that there were no right or wrong answers. The software imposed consumers to answer the questions one at a time in the specified order.

2.3. Data analysis

2.3.1. Astringency definition

All valid words mentioned by participants were considered for data analysis. Astringency definitions were analysed following the methodology proposed by ten Kleij and Musters (2003) to analyse open–ended questions. The first step of the analysis consisted of deleting stopwords such as "a", "and" or "the", and words that were included in the proposal such as "wine" or "astringency". Frequency of mention of each word was calculated. Then, data were analysed by grouping the phrases and words mentioned by participants into categories using inductive coding (Krippendorff, 2004). In this process the categories are determined by the researchers as they read the data. Three

Table 1
Items of the questionnaire used to evaluate wine involvement.

Item	
1	I enjoy selecting the adequate wine for each occasion
2	Wine purchase is irrelevant for me
3	I am interested in wine
4	Deciding what wine to buy is an important decision for me
5	I care about what wines I buy
6	I carefully choose the wines I buy
7	It is worth investing extra time when buying wine to get discount prices
8	I think carefully about the wines I drink
9	Wine consumption gives me social status
10	I usually read wine magazines and leaflets
11	I always look at the colour of wine before trying it
12	I always evaluate the aroma of wine before drinking it
13	I usually go to wine tastings or courses
14	Drinking wine has a positive effect on my quality of life
15	I enjoy going to wine fairs or expositions
16	I enjoy drinking a good wine
17	I like my image when I drink wine
18	I indulge myself when I buy wine
19	Drinking wine is beneficial
20	Knowing what type of wine a person drinks tells you a lot about the type of person she/he is
21	Wine makes my life easier