Ithaca 2018 Abstract Submission

Title
The influence of music on the perception of oaked wines – A tasting room case study in the Finger Lakes Region

I want to submit an abstract for:
Conference Presentation

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Keywords
Wine flavour, Music, Crossmodal correspondences, Sonic Seasoning, Consumer Behaviour

Research Question
Can customised music enhance a VIP wine tasting experience in terms of wine sensory attributes as well as purchase behaviour?

Methods
Participants (N=46) at a VIP tasting room experience tasted a flight of oaked wines in two auditory conditions (customised music, silence) while rating the wine's fruitiness, smoothness, and spiciness.

Results
Wines tasted while listening to the customised music were reported as fruitier and smoother compared to the silence condition. Wines tasted during VIP experience were also purchased more than others.

Abstract
The influence of music on the perception of oaked wines – A tasting room case study in the Finger Lakes Region

1. Motivation
Several recent studies have demonstrated that music can significantly influence the wine tasting experience, in terms of perceived fruitiness, acidity, length, balance, and liking. What has yet to be examined is the influence of music on the perception of oak in wines.

We conducted an in situ study as part of a VIP tasting room experience at a family-owned Finger Lakes winery. What we were interested in, in the present study, is the effect of presenting music as an unique aspect of a wine tasting experience in an actual winery. This way, we could study the influence of music presented to compliment the experience. In addition, we took into account sales data from the winery to better understand the value of such multisensory experiences.

2. Methods and materials

2.1 Participants

46 participants signed-up and paid to participate in a special tasting and tour experience at a family-owned winery. The participants would be considered "wine enthusiasts" with many belonging to the wine club and/or having great interest in wine exhibited through their wine tourism destination and leisure choices. The age span was 25-70 years old, and the sample was roughly gender split (24 female, 22 male). The participants signed their consent forms at the start of their experience.

2.2 Auditory stimuli

A soundtrack was created by Ben Houge to reflect the flavour qualities of oak ageing. It was originally intended to showcase bitter/woody elements in a whisky tasting event (Chivas Regal). The instruments were cello, woodblocks, temple bells, some low percussion, a pad made from some woodwind samples, and a low drone comprised of several elements (including voice and string instruments). The low frequencies were emphasized to reflect bitterness (see Knöferle & Spence, 2012, for a review) by using the cello and low drone, while the sounds of woodblocks were used to bring to mind the oaky quality in a wine/whisky.

2.3 Wines

Four wines with various levels of oak treatment were used in the study. The Dr. Frank 2015 Chardonnay, the 2014 Hilda Chardonnay, the 2014 Pinot Noir, and the 2014 Cabernet Sauvignon. The alcohol, total acid, residual sugar, and oak maturation information are shown in Table 1.

Alcohol (%) Total acidity (g/L) Residual sugar (g/L) Maturation
2015 Chardonnay 12 7.2 2.1 30% - 10 months aging in European oak
70% - aged in stainless steel
2014 Hilda Chardonnay 12 7.9 8.0 12 months aging in European oak
2015 Pinot Noir 13 7.6 < 1 18 months aging in European oak
2014 Cabernet Sauvignon 12 6.4 < 1 18 months aging in European oak
Table 1. Technical information of the four wines used in the study. All wines were produced by Dr. Konstantin Frank winery.

For each wine, participants were asked to rate its fruitiness, spiciness, and smoothness. We chose these dimensions because they are commonly encountered and spiciness and smoothness are related to oak treatment (Bird, 2011). An online study was conducted (N=147, 83 women, M_{age}=36.45, SD_{age}=9.54) to evaluate people's attitude towards these wine attributes (see Figure 1). Each attribute was rated on a 9 point hedonic scale (1 = hate it, 9 = love it). We found a significant difference between all three attributes ($F(2,292) = 33.98$, $p < .0005$, $\eta p2=0.19$), with smoothness liked the most and spiciness liked the least.

Figure 1. Participants' average hedonic ratings of fruitiness, spiciness, and smoothness (on 1-9 scales) in the online pre-study. Error bars indicate standard errors. Asterisks denote statistical significance (* p<.05).

2.4 Procedure

The winery special experiences were offered on the weekends during the high tourism season and served as a means of attracting the more involved consumer (as the session involved a much higher fee than their regular tasting room). The sessions were designed to be both fun and informative with each month featuring a different theme. "Oak ageing" was the theme in the target month and participants visited the barrel room, learned about the oak regime at the winery, and tasted samples from the barrels during the tour.

Afterwards, they went to the VIP tasting room which is where and when this study was conducted. There they were presented with four wines on a placemat, two white (Chardonnay) and two red (Pinot Noir and Cabernet Sauvignon). As our interest was whether the music would influence their taste experience, we had the participants rate the wines both with the music and without. In one group (N=24), they were directed to smell and taste through the wines without music, rating each wine on three characteristics: Fruit (1= not at all fruity, 7 = extremely fruity); Spice (1 = not at all spicy, 7= extremely spicy) and Mouthfeel (1 = not at all smooth, 7 =

extremely smooth). Then they were asked to turn over their survey and to rate the wines again as the music played and were specifically instructed not to view their ratings on the previous side. In the other group (N=22) the order was reversed so that they tasted and evaluated the wines with the music first, and then without the music. Participants were told that the music had been selected to complement the flight of wines, but no other information about the music (for instance, that it was produced to evoke oak flavours) was disclosed. Our dependent measure was the difference between the evaluation of the wines on each measure with and without the music.

The study lasted for around 10 minutes and the participants were debriefed afterwards.

3. Data Analysis

Data from all 46 participants were included in the analyses, with no missing data. A repeated-measures multivariate analysis of variance (RM-MANOVA) was conducted with sound condition (with or without music) and wine type (2015 Chardonnay, 2014 Hilda Chardonnay, 2014 Pinot Noir, 2014 Cabernet Sauvignon) as within-participant factors, order (silence first or music first) as the between-participant factor, and fruitiness, spiciness, and smoothness as measures. Post-hoc comparisons were performed with Bonferroni corrections.

In addition to sensory attribute data, we collected sales data from the winery over the month in which the special tasting experience was conducted.

4. Results

Overall, there was a significant main effect of sound condition ($F_{(3,42)}=11.85$, $p<.0005$, Wilks' Lambda=0.54), and wine type ($F_{(9,36)}=14.02$, $p<.0005$, Wilks' Lambda=0.22), but not of sound order ($F_{(3,42)}<1$, n.s.). There was no significant interaction between music and wine ($F_{(9,36)}=1.19$, $p=.33$).

Further univariate ANOVAs revealed that the sound condition had a significant effect on both ratings of fruitiness ($F_{(1,44)}=31.15$, $p<.0005$, $\eta p2=0.41$) and smoothness ($F_{(1,44)}=15.63$, $p<.0005$, $\eta p2=0.26$), where tasting the wines with music was associated with both higher fruitiness ($M_{music}=4.34$, SE=.14 $M_{silence}=3.66$, SE=.14, $p<.0005$) and smoothness ratings ($M_{music}=4.85$, SE=.15, $M_{silence}=4.38$, SE=.15, $p<.0005$; see Figure 2).

Figure 2. Participants' average rating scores of fruitiness, spiciness, and smoothness (on 1-7 scales) for all four wines in the silent condition and music condition. Error bars indicate standard errors. Asterisks denote statistical significance (* $p<.05$).

Wine type had a significant effect on ratings of fruitiness ($F_{(3,132)}=16.24$, $p<.0005$, $\eta p2=0.18$), spiciness($F_{(3,132)}=32.99$, $p<.0005$, $\eta p2=0.43$), and smoothness ($F_{(3,132)}=6.57$, $p<.0005$, $\eta p2=0.13$). Overall, the 2015 Chardonnay was significantly more fruity than the other wines, the red wines were spicier than the white wines, and the 2015 Chardonnay was smoother than either of the red wines (see Table 2 for comparisons).

		Mean	Std error	Comparison
Fruity	2015 Chardonnay	4.56	.15	a
	2014 Hilda	3.99	.17	b
	2014 Pinot Noir	3.91	.18	b
	2014 Cabernet Sauvignon	3.54	.19	b
Spicy	2015 Chardonnay	3.18	.17	a
	2014 Hilda	3.47	.19	a
	2014 Pinot Noir	4.51	.18	b
	2014 Cabernet Sauvignon	4.77	.18	b
Smooth	2015 Chardonnay	5.03	.14	a
	2014 Hilda	4.68	.18	ab
	2014 Pinot Noir	4.37	.17	b
	2014 Cabernet Sauvignon	4.39	.19	b

Table 2. Average ratings and standard errors of all four wines used in the study. Within each rating group (fruity, spicy, smooth), wines that do not share a letter are significantly different from each other ($p<.05$).

Table 3 shows the effect of music on each of the four wines. While the presence of music influenced fruitiness of all four wines, it only influenced smoothness rating of the first three wines (and not for the Cabernet Sauvignon). This is possibly because the Cabernet Sauvignon is fairly tannic and concentrated; therefore it is more difficult for the background soundtrack to make a difference.

		No music	Music	Sig
Fruity	2015 Chardonnay	4.08	5.04	<.0005

2014 Hilda 3.65 4.33 **.002**
2014 Pinot Noir 3.58 4.25 **.003**
2014 Cabernet Sauvignon 3.34 3.74 **.04**
Spicy 2015 Chardonnay 3.14 3.22 .72
2014 Hilda 3.29 3.66 .10
2014 Pinot Noir 4.46 4.55 .69
2014 Cabernet Sauvignon 4.86 4.68 .36
Smooth 2015 Chardonnay 4.74 5.31 **.006**
2014 Hilda 4.35 5.00 **.001**
2014 Pinot Noir 4.15 4.59 **.02**
2014 Cabernet Sauvignon 4.28 4.50 .26

Table 3. Average ratings and standard errors of all four wines, in both sound conditions. Pairwise comparisons with Bonferroni corrections were applied for each wine and each rating type, with significance (p<.05) indicated in bold.

5. Discussion
Overall, the present study illustrates the influence of music on the wine tasting experience and demonstrates the viability of studies conducted in an ecologically valid setting. In general, wines tasted while background music was playing in the background were rated as significantly fruitier and smoother than the same wines tasted in silence, regardless of the order of the auditory condition presented.
It is possible that the wines were rated as fruitier and smoother (positive attributes) with the music because participants were told that the music was especially selected to complement the wines. It's been demonstrated that customers enjoy the tasting experience more and are willing to pay more for novel chocolates when a matching soundtrack was presented as part of the chocolate's identity (Reinoso Carvalho et al., 2015).
It should be noted that spiciness in wines did not vary significantly with music; possibly because spiciness is a more ambiguous concept for novice wine tasters to pick up in a wine, compared to the more widely used concepts of "fruitiness" and "smoothness". Furthermore, the online pre-study showed that fruitiness and smoothness are more positive traits compared to spiciness, especially amongst relative wine novices. Therefore, it is possible that complimentary music served to highlight the more positively perceived attributes in the wine. Further testing is required to validate this theory – for instance, by varying the information communicated to the tasters so that only some of the tasters are told the music is complimentary.

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The influence of music on the perception of oaked wines – A tasting room case study in the Finger Lakes Region

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[4] School of Hotel Administration, Cornell University, Ithaca, NY, USA

1. Motivation

Several recent studies have demonstrated that music can significantly influence the wine tasting experience, in terms of perceived fruitiness, acidity, length, balance, and liking. What has yet to be examined is the influence of music on the perception of oak in wines.

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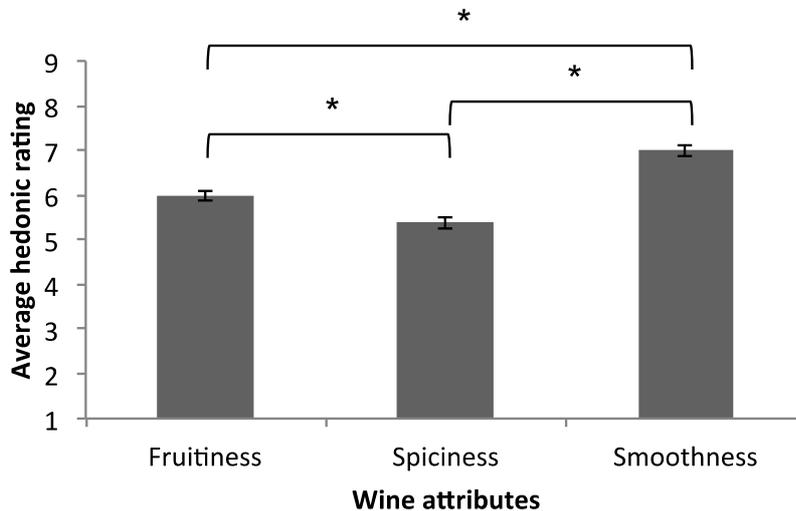
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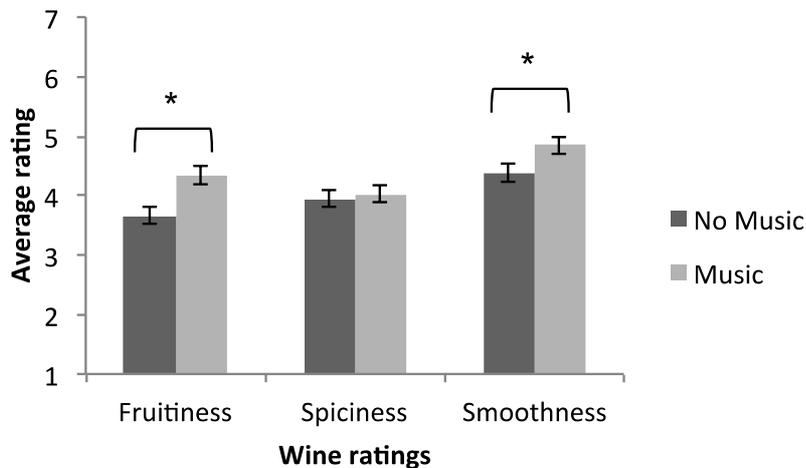
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	2014 Pinot Noir	4.46	4.55	.69
	2014 Cabernet Sauvignon	4.86	4.68	.36
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