

Can you taste the music?

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Introduction

For many years now, wine writers have occasionally resorted to musical metaphors when trying to describe a particular wine or style of wine-making (see Spence, 2011a, for a review). Take, for example, the following representative quote: “*Red wines need either minor key or they need music that has negative emotion. They don’t like happy music... Cabernets like angry music.*” (Gray, 2007). Or the following from Kent Bach (2007, p. 27): ‘*Taking a sip of wine, at least a wine worth talking about, is like hearing the sound of a sustained, musical chord.*’

Until recently, however, it has not been altogether clear whether such descriptions carried any useful information for the person drinking the wine. The picture is, however, slowly starting to change: Intriguingly, the latest scientific research now demonstrates that the average wine

consumer does indeed feel a natural (or spontaneous) correspondence (or match) between certain wines and specific notes, instruments, and/or pieces of music (e.g., see Anon. 2012; Crisinel & Spence, 2012; Sachse-Weinert, 2012; Spence et al., 2013).

What is more, knowledge about the crossmodal correspondences between music and wine that we all (or at least a majority of us) share is now starting to make its way into the musical recommendations used for wine tastings and a variety of other multisensory experiential events (e.g., Spence et al., 2013; see also <http://voce-divino.com/die-genuss-idee/>). Here, we present the results of a small study conducted at the 2014 Sensibus Festival (<http://sensibusfestival.blogspot.fi/p/in-english.html>) designed to investigate and illustrate the associations between music and wine (both still and sparkling), and the influence of music on the wine tasting experience.

Methods and materials

46 participants (19 female), with a mean age 42 years (SD = 10.5), ranging from 24 to 63 years took part in the study which was conducted at the 2014 Sensibus Festival held in Seinäjoki on the evening of May 13th.

Pre-tasting and education of participants

The event started with Mika Vanne guiding the members of the audience in the art of wine tasting. The idea of the pre-tasting presentation was to remind the audience about how all senses are used in wine tasting and what are the limitations. Color hue, intensity and clarity were the main sensory properties mentioned in the presentation. The audience was also notified that appearance has minor role when discussing how wine taste and smell, but the role of color can have very important but also misleading role in wine tasting (Morrot et al., 2001; Spence, 2010a,b).

Odours create expectations. Odour intensity and the characteristics of the smell (e.g. fruity, woody or oaky) are quite easy to analyze. Youthful and developed odours can also be differentiated. However, the naming of specific odours is very difficult and even professionals tend to use words which are prototypes based mainly on liking or disliking

rather than sensory properties (Brochet & Dubourdieu, 2001). In an early study Laing and Francis (1989) showed that naming more than two odours in a mixture is challenging.

Only sweetness, acidity and bitterness have a clear role as a tastes when tasting wine. It can be argued that saltiness and even umami (Hanni, 2008) can, in some cases, be detected in wine, but most often they are not present. In this presentation, sweetness, acidity, and bitterness were described and the most sensitive areas were mentioned. The tasters were encouraged to recognize different tastes independently of their own personal preferences.

Finally, chemesthesis, which is often forgotten from wine tasting vocabulary, was presented to the guests. Burning sensation of alcohol and effervescence of carbon dioxide were mentioned. Body and weight - the mouthfeel was also presented as a tactile sensation. A brief note was also made to astringency before the tasting of the wines took place. Next, the participants tasted four wines (Taittinger Brut Réserve champagne; Fernway Sauvignon Blanc 2012; Chateau Carsin Cuvée Noire 2010; and Chateau Carsin Liqueureux 2007).

Description of the wines

The characteristics of the wines were as follows:

1. Champagne: Taittinger Brut Réserve, AC Champagne, France

Balanced, fresh, and slightly toasty and brioche-style nose. Dry, high acidity and moderate intense palate with lemony fruitiness but also toasty and leesy flavours from long bottle aging. Balanced and persistent bubbles, balanced alcohol and long gentle fruit-driven finish with a touch of autolysis characters.

2. White wine: Fernway Sauvignon Blanc 2013, Marlborough, New Zealand

Fresh and youthful wine with aromas of passion fruit and ripe black currant. Dry, crisp acidity and rich, fruity, grassy and lemony taste. Light body, balanced alcohol and long fruit-driven finish similar to nose.

3. Red wine: Château Carsin Cuvée Noire 2010, AC Premières Côtes de Bordeaux, France

Aromas of earth, black currant, oak and toasty vanilla. Dry, moderate acidity and moderately high level of ripe, round and soft tannins. Medium body, moderate alcohol, layered mouthfeel and long, delicately toasty, but also fruity finish.

4. Dessert wine: Château Carsin Liqueureux 2007, AC Cadillac, France

Intense, fruity aroma, with dried apricot, honey and a hint of vanilla. Sweet honeyed taste with high level but well integrated and balanced acidity. Full body, broad, slightly oily mouthfeel, balanced alcohol and a rich, long and balanced finish.

Description of the music and the tasting procedure

The participants rated their experience of these four wines while simultaneously listening to a live classical music quartet (the Rantatie quartet; see <http://www.brq.fi/en/taiteilijat/rantatiekvartetti>) playing two pieces of music – first Mozart’s Flute Quartet (played by string quartet) in D major, K285 – Movement, and thereafter Viljami Niittykoski’s, Suvitunnelma (Summermood).¹ Musician Kreetta-Maria Kentala from Rantatie quartet described the music as follows:

Mozart: 1st Mozart’s Flute Quartet played by string quartet version in D major, K285.

Flute (in this case the first violin) plays the beautiful melancholic melody while the others accompany with a light touch (pizzicato). Due to the light accompaniment the character of the composition is airy and intangible. For a moment the meandering melody changes into major illuminating the atmosphere.

Viljami Niittykoski: Suvitunnelma (Summermood)

The melancholy, wistful melody of the song begins after the overture with unhurried, folk rhythm. The ambience grows gradually from wistful to overwhelming sense of melancholy. The melody climbs an octave higher with intensifying accompaniment.

The participants were asked to rate the wines in a variety of attributes (see Figure 1 for the scorecard that was used).

¹ Note that the nature of the public event meant that we were unable to counterbalance the order in which the two pieces of music were presented.

How much do you like the 1st piece of classical music?
(1=Not at all – 10=Very)

Wine No 1: Champagne	Answer here	Wine No 2: White	Answer here
How well does the music match the wine?	<input type="checkbox"/>	How well does the music match the wine?	<input type="checkbox"/>
How much do you like the wine?	<input type="checkbox"/>	How much do you like the wine?	<input type="checkbox"/>
How intense is the nose of the wine?	<input type="checkbox"/>	How intense is the nose of the wine?	<input type="checkbox"/>
How sweet is the taste of the wine? (1=Not at all – 10=Very much)	<input type="checkbox"/>	How sweet is the taste of the wine? (1=Not at all – 10=Very much)	<input type="checkbox"/>
Wine No 3: Red	Answer here	Wine No 4: Dessert	Answer here
How well does the music match the wine?	<input type="checkbox"/>	How well does the music match the wine?	<input type="checkbox"/>
How much do you like the wine?	<input type="checkbox"/>	How much do you like the wine?	<input type="checkbox"/>
How intense is the nose of the wine?	<input type="checkbox"/>	How intense is the nose of the wine?	<input type="checkbox"/>
How sweet is the taste of the wine? (1=Not at all – 10=Very much)	<input type="checkbox"/>	How sweet is the taste of the wine? (1=Not at all – 10=Very much)	<input type="checkbox"/>

Figure 1. Example of scorecard used to rate the different drinks while listening the music.

Next, the contemporary Finnish rock guitarists Mikko Kosonen, Sami Silén, and Teemu Vuorela who had tasted the wines earlier in the day also played their own musical improvisations designed to capture the distinctive qualities of (or differences between) the four wines. The improvisations were described by Mikko Kosonen as follows:

Improvisation 1: Chateau Carsin Cuvée Noire 2010

A and d string used a lot with distortion. Key of F# with boogie feeling. The harmony was intentionally disturbed by occasional major triads combined with blues feeling and dynamics.

Improvisation 2: Chateau Carsin Liquoreux 2007

Sound was built on light mid-tempo tremolo and reverb. D lydian soundscape. Why's that? Well because eleventh sharp characterizes the noble rot to bring some mystic to it. Softness, not too much dynamic, open d string, otherwise played by upper three strings mostly in frets three to twelve.

Improvisation 3: Fernway Sauvignon Blanc 2012

Started with single-note melody and light distortion. B minor natural used with a few visits to Dorian scale. The band ended up to chord sequence Bm F#m/A G spiced with mid-tempo guitar fills. Lots of fifths and ninths.

Improvisation 4: Taittinger Brut Réserve champagne

Fast tempo with 16th-note aesthetics. Harmonically based on A mixolydian scale, with a few bars excluded. Played in upper register with delay and shimmering chorus. Lots of melodic runs.

The participants had to try and guess which wine the musicians had been inspired by after listening to each of their improvisations (see Figure 2). Given previous results in this area, the expectation was that the participants would be better than chance at matching the wine with the music (see Spence et al., 2013).

Match the Music to the Wine!

How good are you at 'hearing' the wine in the music?
The band will play 4 musical improvisations inspired
by the wines that you have been tasting.

Circle the correct answer

Improv. 1: Champagne / White / Red / Sweet?

Improv. 2: Champagne / White / Red / Sweet?

Improv. 3: Champagne / White / Red / Sweet?

Improv. 4: Champagne / White / Red / Sweet?

Age: _____ yrs; Male/Female (Circle)?

Figure 2. Scorecard used to assess participants' guess on which wine inspired each of the four rock music improvisation.

Results

A two way repeated measures analysis of variance (ANOVA) with the factors of musical selection (Mozart Quartet in D major, K285 - Movement and Viljami Niittykoski, Summermood) and wine (Taittinger Brut Réserve, Fernway Sauvignon Blanc 2012, Chateau Carsin Cuvée Noire 2010, and Chateau Carsin Liqueureux 2007) was performed across the matching, liking, nose, and sweetness ratings. Most importantly, a significant interaction was observed in the matching ratings between the musical selection and wine (Greenhouse-Geisser corrected ANOVA, $F(2.44, 107.55) = 35.47, p = .001$, see Figure 3).

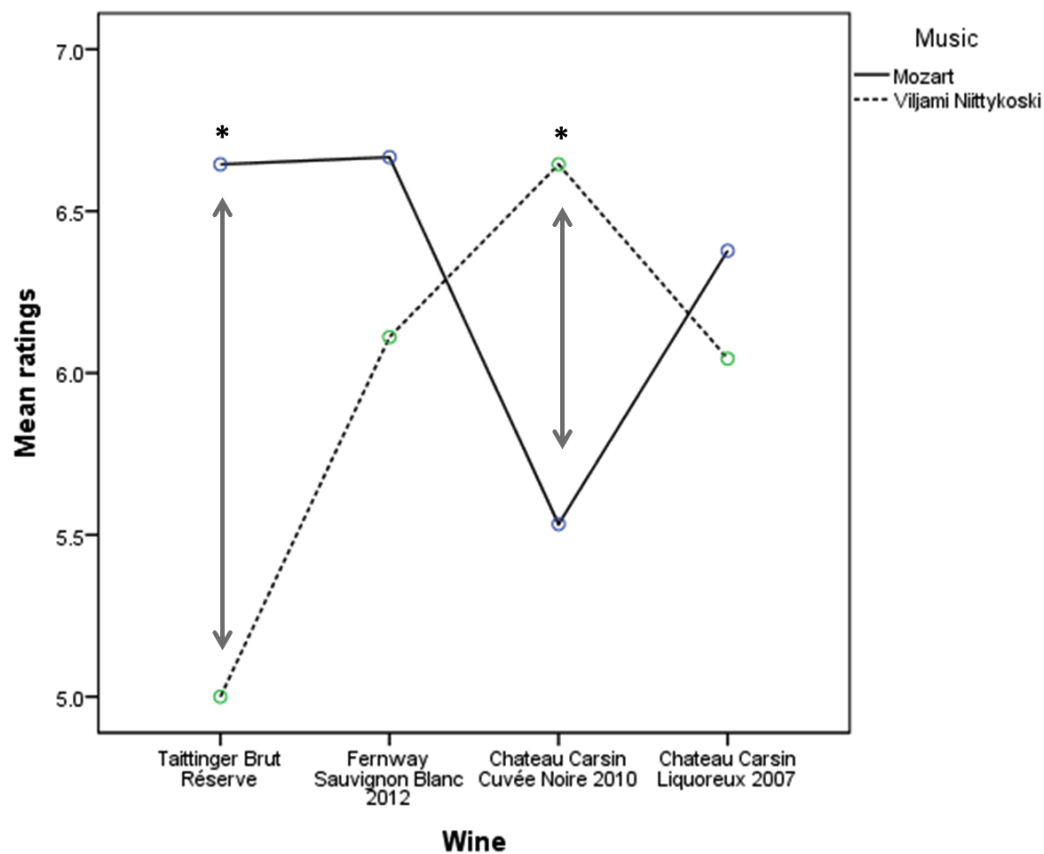


Figure 3. Mean matching ratings of wine as a function of music. The asterisks highlight those wines that were rated as matching one piece of music much better than the other.

Paired sample t-tests were performed in order to determine which matching ratings differed significantly as a function of music. A significant difference ($t(45) = 3.972$, $p < .001$) was found between the matching ratings for Taittinger Brut Réserve when accompanied by Mozart ($M = 6.69$, $SD = 2.03$) or Viljami Niittykoski ($M = 4.95$, $SD = 2.09$). The opposite pattern of results ($t(45) = -2.219$, $p = .032$)² was found for Chateau Carsin Cuvée Noire 2010, which obtained higher ratings ($M = 6.64$, $SD = 2.29$) when presented with Viljami Niittykoski, as compared to Mozart ($M = 5.53$, $SD = 2.37$).

The results of the liking ratings revealed a significant main effect of musical selection ($F(1, 44) = 4.315$, $p = .044$). Pairwise comparisons showed that the members of the audience gave the wines a higher rating overall when listening to Mozart than when listening to the other

² Note though that if one was to correct for multiple comparisons, then this term is only borderline significant since the p value for significance would be set to .0125.

piece of music ($p = .044$). The results of a Pearson correlation performed between the matching and liking ratings are summarized in Table 1. Interestingly, a significant positive correlation between the matching and liking ratings was obtained, thus suggesting the existence of a relationship between these two variables. Put simply, those who gave the wine a higher rating on one scale (matching or liking) were also likely to give it a higher rating on the other scale. One could perhaps interpret such results in terms of processing fluency (LaBroo et al., 2008) – i.e., we like things more that match, or are congruent, between their parts (hence, congruency might be expected to modulate liking).

Table 1. Pearson correlations between the matching and liking ratings in each of the wines and music condition.

Music	Wine	Pearson correlation coefficient	p value
Mozart, Flute Quartet in D major, K285 - Movement	Taittinger Brut Réserve	.670	.01
	Fernway Sauvignon Blanc 2012	.401	.01
	Chateau Carsin Cuvée Noire 2010	.502	.01
	Chateau Carsin Liqueureux 2007	.377	.05
Viljami Niittykoski, Suvitunnelma (Summermoods)	Taittinger Brut Réserve	.471	.01
	Fernway Sauvignon Blanc 2012	.711	.01
	Chateau Carsin Cuvée Noire 2010	.835	.01
	Chateau Carsin Liqueureux 2007	.617	.01

There was also a significant effect of the wine on the ratings in the intensity of the nose of the wine (Greenhouse-Geisser corrected ANOVA, $F(2.170, 95.492) = 105.409$, $p < .001$), with the Taittinger Brut Réserve receiving a lower rating than any of the other three wines ($p < .001$).

There was a significant main effect of wine ($F(3, 132) = 19.015$, $p < .001$) on the sweetness ratings. As might have been expected, the dessert wine (Chateau Carsin Liqueureux) was perceived as significantly sweeter than the other three wines (all comparisons $p < .001$). The Sauvignon Blanc was also rated as sweeter than the Taittinger ($p = .014$). This indicates that the subjects were not able to differentiate between sweetness and fruitiness (Taittinger has sugar 9 g/l, Fernway less than 4 g/l).

Finally, in terms of the participants' ability to decode which musical improvisation went with which wine, a Pearson's chi-square test was performed in order to assess the association between the different improvisations and the wine chosen by the audience members. The results revealed a significant effect ($\chi^2 = 160.311$, $df = 9$, $p < .001$). Pairwise comparisons are summarized in the crosstab presented in Table 2.

Table 2. Crosstab representing the frequencies of participants' wine selection as a function of wine-based improvisation by musicians.

Musical Improvisation	Chateau Carsin Cuvée Noire 2010	Chateau Carsin Liquoreux 2007	Sauvignon Blanc 2012	Taittinger Brut Réserve
Improvisation 1 (Chateau Carsin Cuvée Noire 2010)	4 _a	21 _b	4 _a	17 _b
Improvisation 2 (Chateau Carsin Liquoreux 2007)	4 _a	17 _b	7 _{a, b}	18 _b
Improvisation 3 (Sauvignon Blanc 2012)	38 _a	2 _b	3 _b	3 _b
Improvisation 4 (Taittinger Brut Réserve)	1 _a	6 _a	31 _b	8 _a

Note that each letter denotes a subset of the wine whose column proportions do not differ significantly from one another at the .05 level. Note that values with different letters differ significantly.

It is interesting to note that, although participants did not necessarily accurately select the wine that had actually inspired the musical improvisations, they did agree that one (or in some cases two) of the wines provided a particularly good match for the music (in other words, people did not respond in a random manner, as might have been expected to be the case if there was no meaningful match between the wine and the music). So, for example, for Improvisations 1 and 2, the audience members selected the Chateau Carsin Liquoreux 2007 and the Taittinger Brut Réserve significantly more often than either of the other wines, perhaps suggesting that they were both a good match for the music (at least in the minds of the audience members). Meanwhile, the Chateau Carsin Cuvée Noire 2010 was the overwhelming favourite match for Improvisation 3, while most people selected and Fernway Sauvignon Blanc 2012 as the most appropriate match from Improvisation 4.

Taken together, these results do indeed confirm that most people feel some kind of natural affinity between certain styles of wine and certain musical selections/styles. To return to the question with which we started this piece, the present results are therefore consistent with the view that comparing a wine to a piece of music (or musical style), can indeed potentially provide useful information about the qualities of the wine. Future research will, though, be needed in order to further improve our understanding concerning how and why these correspondences exist in the first place. Further research is also needed to assess the extent to which these correspondences are shared cross-culturally.

Discussion and conclusions

The results of the present experimental wine tasting and music performance are consistent with previous results in suggesting that the social drinker can indeed match specific wines with particular pieces of music or musical styles in a consistent manner. What is more, by ensuring a good match between the wine one is drinking and the music one is listening to, the overall experience can potentially be enhanced. Ultimately, the hope is that encouraging people to taste wine while listening to the appropriate musical accompaniment will have a beneficial effect on the overall multisensory wine drinking experience, at least for the social drinker (Spence et al., 2013). Now while this might not be something that the wine traditionalist would necessarily approve of (e.g., see Peynaud, 1987, who always preferred wine tastings to take place in silence), there is growing evidence to suggest that many social drinkers do prefer to drink wine while listening to music, rather than sitting in silence. These results, together with previous studies on the influence of music on the perception of drinks (e.g., North, 2012; Velasco et al., 2013), will hopefully help practitioners in terms of starting to provide an interesting framework (or guidelines) for multisensory experience design in the years to come.

It is important to say, though, that future research may aim to clarify what exactly the mechanism(s) that explains why certain wines and musical pieces go better together and why listening to music can change what (people think) that they taste. Here, the concept of crossmodal correspondences (Knöferle & Spence, 2012; Spence, 2011b), or the tendency to match information from one sensory modality to another modality may provide a framework. In the literature, it has been argued that people will match information across the senses through a number of mechanisms include semantically, statistically, structurally, and

affectively (see Schifferstein & Tanudjaja, 2004; Spence & Deroy, 2013, for examples). As highlighted by Deroy, Crisinel, and Spence (2013), there are many more mysteries to resolve when it comes to the wonderful world of matching flavours and aromas to music.

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