HOW TO MEASURE EMOTIONS WITH TASTING: IDEAL MATCHING BETWEEN CHEESE AND WINE

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Abstract

Purpose

The aim of this article is to understand how the combined taste of cheese and wine evokes emotions such as joy, excitement, and surprise. We also consider taste in terms of the ideal match between cheese and wine.

Design/methodology/approach

We organized tasting experiment with 38 people in convenience sample. The cheeses chosen for the experiment were goat, Camembert, and Chaource. We used only white wines (Sauvignon, Chardonnay and Viognier). The participants tasted the nine cheese and wine pairings blindly in the same order.

Findings

Our study distinguishes the reactions between men and women to detect the impact of this cheese and wine matching on emotions. For the women in the sample, the harmony of matching cheese and wine had an effect on emotion, especially surprise. More specifically, when you match Viognier and Chaource, women are more surprised, and they are less surprised with the combination of Sauvignon Blanc and goat cheese and Sauvignon Blanc and Camembert.

Recommendations

We can create an exciting experience in the cellar by tasting cheese with wine, especially if both come from the same area.

1. Introduction

Wine and cheese traditionally have made a great match. Several Sonoma County wineries now offer wine and cheese tasting together, giving guests a taste of the combination of the two products. Some wineries also have cheeseries, such as Gibbston in New Zealand, which also offers its products during wine tastings. In Bordeaux, Baud et Millet (a cheese restaurant) offers the experience of tasting 12 different cheeses – sheep; creamy, soft goat; or blue– together with a tasting of three Bordeaux wines: dry and sweet white wine and red wine. With these few examples, the question becomes, What is the right combination between cheese and wine?

Cheese and wine create an aesthetic experience and raise emotions when tasted together (Desmet and Schifferstein, 2008; Hoyer and Stokburger-Sauer, 2012; Gutjar et al., 2015). We consider that taste plays a pointed role in decision-making for hedonic products (wine and cheese) in terms of preference and judgement. These product provide more emotional value based on intrinsic attributes such as sensory perceptions rather than utilitarian value. These sensory attributes are perceived in a holistic manner. In fact, we can't differentiate the source of sensory attributes from the eyes, mouth, or nose. For example, visual evaluation could affect one's perception of the taste of a product (e.g., the fattiness of the cheese). Such impressions provide competing cues (Hoegg and Alba 2007). This is crucial to consider when evaluating several products through a lens of pleasant emotions (Desmet and Schifferstein, 2008; Gutjar

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et al., 2015). . We prefer to assess the emotions of retained joy, excitement, and surprise (Richins 1997), the last of which is particularly accurate when evaluating the pairing of cheese and wine and the best combination of the two.

When someone tastes several products (here, cheese and wine), the order each is provided is essential and affects the evaluation of the products in terms of discriminating sensory evaluation (Nygren et al., 2002, 2003; Biswas et al., 2014). For example, the intensity of a wine's aroma and acidity decreases after tasting cheese, showing the crucial role of sequential sensory cues in evaluating a hedonic product. Tasting wine evokes an initial combination of complex flavours but it changes with the additional flavours of a second product as cheesewine. We can apply the concept of hedonic escalation (Crolic and Janiszewski, 2016) in repeated experiences. The temporal dominance of sensation is a repeated experience of tasting because the duration of wine sensations are modified after tasting cheese (Galmarini et al., 2017). Therefore, the wine sensorial evaluation decreases more in a mixed-product tasting than during sequential tasting; for cheese there is no sense change regardless of the tasted order (Nygren et al., 2002). Therefore, we want to know which sensory cues dominate or if there is a balance between the two sensory cues. Cheese affects wine perception because there are residuals of cheese in consumers' mouths. Plus the contact of cheese and wine has an impact on the perception of the combination. Tuorila et al. (1994) show that interactions between cheese and wine exist when you are in mixed tasting. In conclusion, if we want to taste a good match between cheese and wine, we should adopt a mixed-tasting strategy.

We developed some rules to create accurate combinations of cheese and wine to ascertain emotional reactions from the pairings. These rules detail prohibited combinations to avoid hiding the taste of either the wine or cheese (Morten et al., 2014). King and Cliff (2005) and Bastian et al. (2009) analyse these combinations through an ideal matching scale between cheese and wine and note deviations from these ideal matches. For Bastian et al. (2009), Brie significantly dominates wine (here, sparkling wine, Sauvignon Blanc, wooded Chardonnay, and Gewürztraminer) more than goat cheese, Gruyere, and Chaource. Chaource dominates other wines (here, Sauvignon Blanc, wooded Chardonnay, and Gewürztraminer). King and Cliff (2005) analyse the average deviation from the ideal match for all participants of the tasting. White wine (Sauvignon Blanc, Chardonnay [unoaked], Pinot Gris, Chardonnay, Gewurztraminer, and Riesling) have a lower average of deviation from the ideal match than red wines (Pinot Noir [light], Pinot Noir [oaked], Merlot, Meritage, and Foch). However, the most powerful cheese is difficult to pair with either red or white wine. Such cheeses should be combined with the latest harvest and ice wines. This match is also suggested by Koone et al. (2014) and Harrington and Hammond (2005). For Koone et al. (2014), when you have a good match between a cheese and a wine, the consumers implicitly like the pairing. Koone et al. (2014) show that the best association with goat cheese and Brie is Sauvignon Blanc. They explain these ideal matches by the level of acidity in the wines and the level of fattiness in the Brie. An acidic wine must be coupled with a cheese that has less than or equal acidity to the wine. If the cheese is more acidic than the wine, the wine will disappear into the flavour of the cheese. Harrington and Hammond (2005) found that the sweetness of wine contrasts with the saltiness of a cheese, and the body of wine (tannins) is negatively linked with the body of cheese (fattiness). Indeed, fattiness and tannins annihilate one another, thus erasing the negative aspects that they can have in the mouth. Harrington and Hammond (2005) assess balance when you combine cheese and wine by analysing contrast and similarity in terms of components (sweetness, acidity, saltiness, and bitterness), textures (overall body and fattiness), and flavours (persistence, intensity, and spiciness). But not all of these studies make a link between perception and emotion from sensory impressions. They explain why the pairing is well

matched but not explicitly if the pairing is harmonious, such as shown in Morten et al. (2014). These authors [show that there is a high correlation between a liking score and a high level of harmony. They consider preference more than positive emotions.

The purpose of our study is to respond to this question: How does eating wine and cheese together explain emotions (joy, excitement, and surprise) as shown through assessments of harmony, cheese, and wine type?

2. Stimulus Selection and Procedure

We organized a tasting experiment with 38 people in a convenience sample of which 47.4% were women and 47.4% were less than 30 years old. Participants didn't have any specific expertise. The cheeses chosen for the experiment were goat, Camembert, and Chaource. Although there is a difference in terms of milk (cow versus goat) there are no differences in terms of fat and salt content. All the cheeses were quite young (less than 10 weeks). We selected only white wines (Sauvignon Blanc, Chardonnay, and Viognier). Sauvignon Blanc and Chardonnay are the most harvested in France and have been tested in several research experiments to determine the ideal combinations between wine and cheese (Bastian et al., 2009; Koone et al., 2014). We selected the wine from the same wineries in the Languedoc region: [the cheese comes from others regions. The subjects tasted the nine pairs in the same order (Sauvignon Blanc with goat cheese, Sauvignon Blanc with Camembert, Sauvignon Blanc with Chaource, Chardonnay with goat cheese, Chardonnay with Camembert, Chardonnay with Chaource, Viognier with goat cheese, Viognier with Camembert, Viognier with Chaource). They tasted each pair only one time. After tasting three cheese and wine pairings, they ate some bread or drank water in order to clear their palates between evaluations and had a short break. Although the wine was presented blind, the cheeses were highly recognisable by their intrinsic characteristics.

3. Measures

First, we measured the harmony evaluation between the cheese and wine through a semantic differential scale that included descriptive anchors (discordant versus harmony). Second, we conducted emotion evaluations (Richins, 1997), specifically looking for joy, excitement, and surprise as measured by a semantic differential scale (sad versus joy, unexcited versus excited, and unsurprised versus surprised). Table 1 shows the construct means by sex and age and a one-way analysis of variance's results.

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	Mean Women	Men	Total	F	Prob
Harmony Evaluation	6.093	5.278	5.664	11.897	0.001
Joy Evaluation	3.284	3.194	3.237	NA	
Excitement Evaluation	1.796	1.761	1.778	.170	0.680
Surprise Evaluation	1.728	1.572	1.646	4.108	0.043

NA: The significance of the Levene test is less than 0.05.

	Mean less than 30 years	30 years and more	Total	F	Prob
Harmony Evaluation	5.994	5.367	5.664	6.949	0.009
Joy Evaluation	3.191	3.278	3.237	NA	
Excitement Evaluation	1.833	1.728	1.778	NA	

Surprise Evaluation	1.630	1.661	1.646	0.165	0.685	NA: The significance of the Levene test is less than 0.05.

Table 1: Effect of age and sex on harmony and emotions

There is a significant difference between men and women concerning the harmony (F=11.897, p=0.001) and surprise evaluations (F=4.108, p=0.043). Women considered the evaluation more harmonious than men, and they were also more surprised. There is a significant difference between the two classes of age for the harmony evaluation (F=6.949 p=0.009). The youngest group (less than 30 years old) had a more harmonious evaluation of the pairings than the other participants.

4. Results

Table 2 displays the construct mean differences by cheese and wine and the one-way analysis of variance's results.

Evaluation	Goat	Camembert	Chaource	Total	F	Prob
Harmony	5.816	5.921	5.254	5.664	NA	
Joy	3.316	3.614	2.781	3.237	6.669	0.001
Excitement	1.754	1.825	1.754	1.778	.301	0.740
Surprise	1.605	1.702	1.632	1.646	0.554	0.575

NA: The significance of the Levene test is less than 0.05.

Evaluation	Sauvignon Blanc	Chardonnay	Viognier	Total	F	Prob
Harmony	5.465	5.465	6.061	5.664	2.782	0.063
Joy	3.158	3.105	3.447	3.237	1.230	0.294
Excitement	1.737	1.684	1.912	1.778	2.651	0.072
Surprise	1.553	1.544	1.842	1.646	6.641	0.001

Table 2: Effect of wine and cheese on harmony and emotions

The difference among cheeses is significant for the evaluation of joy: the Camembert has a higher joy evaluation and Chaource has a lesser joy evaluation. The difference among wines is significant for surprise ($p<0.01$) and for the harmony and excitement evaluations ($p<0.1$). The Viognier has the highest score for surprise, excitement, and harmony evaluations.

Now we want to explain emotion by harmony evaluation, age, sex, cheese, and wine by using MANOVA (multivariate analysis of variance). First, the joy evaluation had a Levene test less than 0.05 (Levene=2.643, p=0.000). So, this variable is omitted from this analysis. For the excitement and surprise evaluations, we tested the multivariate homogeneity of covariance matrix by Box statistics (Test de Box=118.547, F=1.024, p=.413). With $p>0.05$, we verified the homogeneity of the covariance matrix. Then, we tested the univariate homogeneity of variance through a Levene test. The homogeneousness of the excitement evaluation variance (F=1.014, p=.452) and surprise evaluation variance (F=1.102, p=.324) was verified.

The model with the dependent variable of excitement evaluation is significant (F=5.928, p=.000) and has an R^2 of 0.342. The effect of the harmony evaluation is significant (F=172.424, p=.000), as is sex (F=4.459, p=.036), sex×cheese (F=4.938, p=.008), and finally sex×age (F=5.883, p=.016).
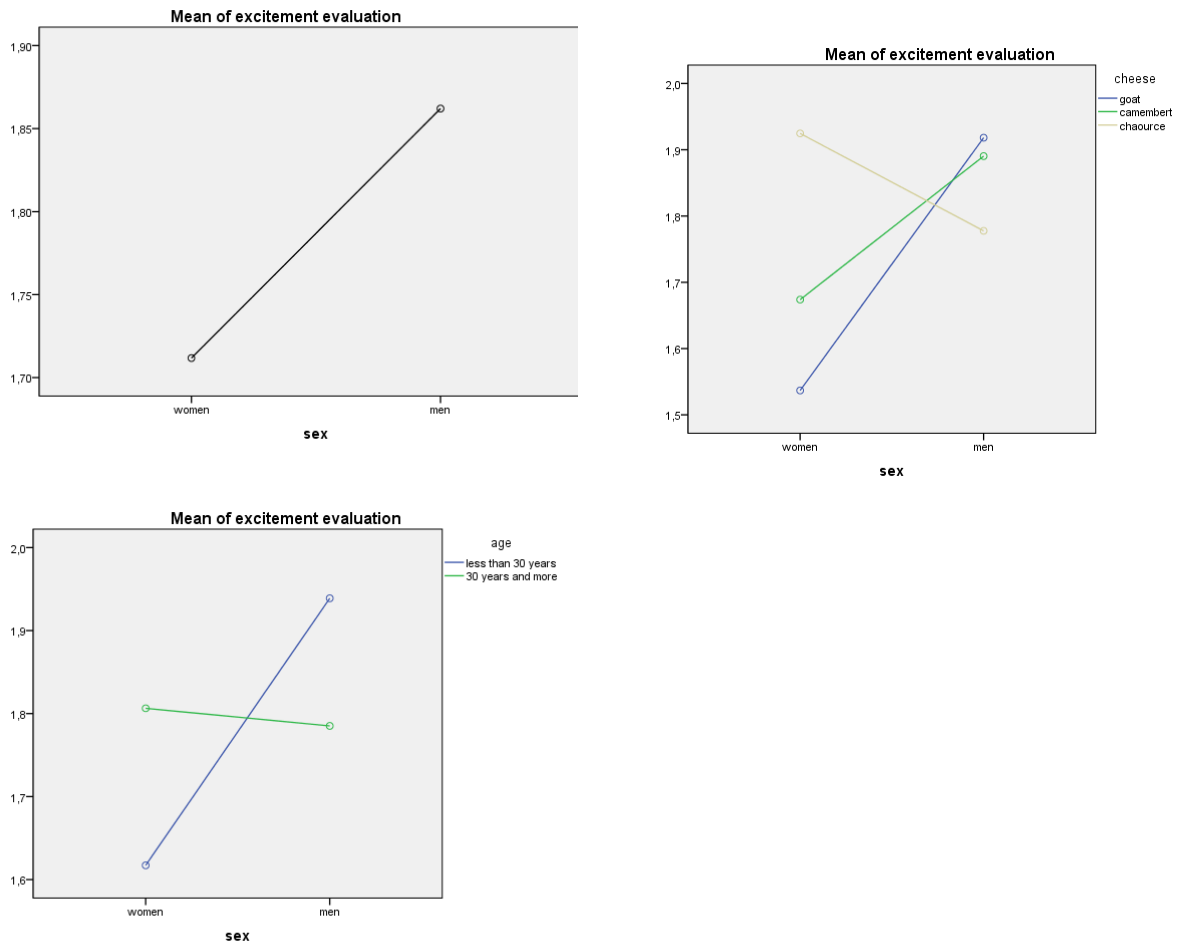
Figure 1: Mean differences of significant effects for the model with the dependent variable excitement evaluation

As shown in figure 1, the women are less excited than the men, and they prefer the Chaource, whereas the men prefer Camembert and goat cheese. However, women who are less than 30 years old are less excited than women older than 30; but this is reversed for the men. The model with the dependent variable surprise evaluation is significant (F=5.621, p=.000) and has an R² of 0.328. The effect of the harmony evaluation is significant (F=140.039, p=.000), as is wine (F= 3.467, p= .032), age (F=5.898, p=.016), sex×wine (F=3.053, p=.049), and finally sex×age (F=6.173, p=.014). Figure 2 represents the mean differences of significant effects for the model with the dependent variable surprise evaluation

Mean of surprise evaluation

Mean of surprise evaluation

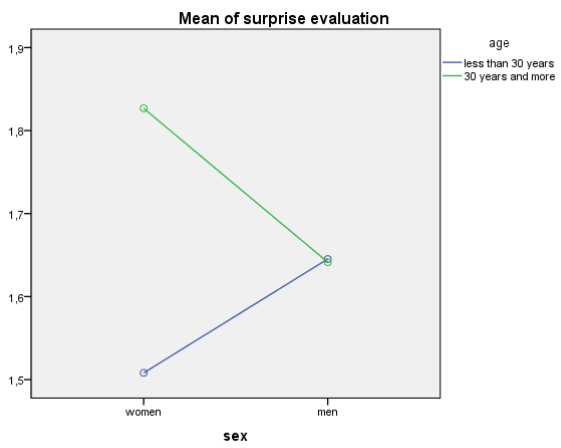
Mean of surprise evaluation

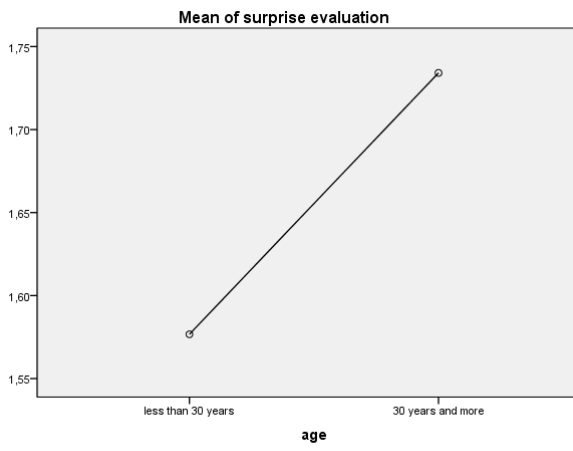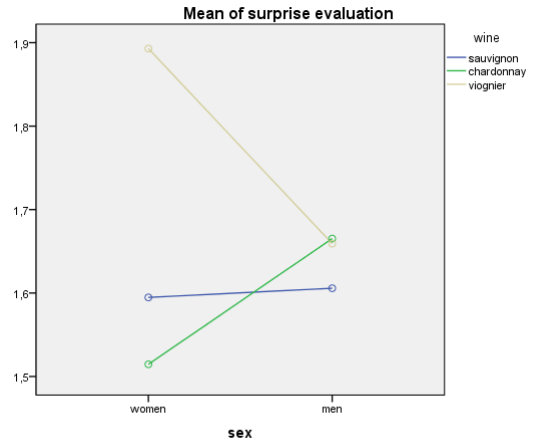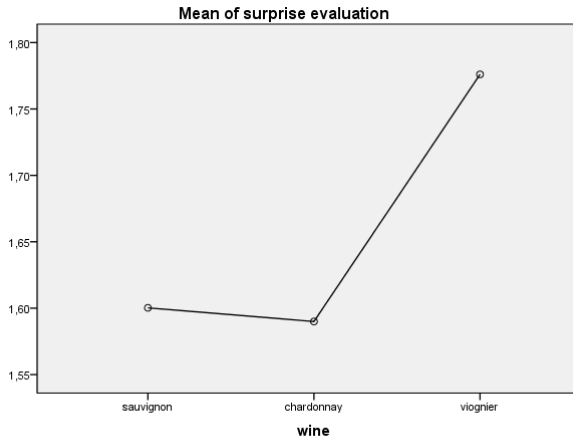

Mean of surprise evaluation

Figure 2: Mean differences of significant effects for the model with the dependent variable surprise evaluation

The Viognier is more surprising than the other two wines. The oldest participants were more surprised than the youngest when tasting white wine and cheese. The Viognier was most surprising to women than the other two wines, whereas for men, there was no difference in terms of surprise. For men, there was also no difference in reaction in terms of age, but the youngest women were more surprised than the oldest. To create excitement, cheese is more important than the wine, and it is the opposite if you want to trigger surprise. However, there was no effect of wine×cheese for the two emotions (excitement and surprise). Therefore, the combination of wine and cheese doesn't produce emotion per se. However, we did have an effect for sex×wine and sex×cheese.

Therefore, we need to differentiate women from men in this analysis. A MANOVA was used to explain emotions through harmony evaluation, age, sex, cheese, and wine for each subsample (men versus women). For the female sample, we tested the multivariate homogeneity of covariance matrix through Box statistics (Test de Box=68,410, F=1.209, p=.146). With p>0.05, we verified the homogeneity of the covariance matrix. The homogeneousness of the excitement evaluation variance (F=1,536, p=.090) and surprise evaluation variance (F=.822, p=.324) was verified. The model with the dependent variable of excitement evaluation was significant (F=5.225, p=.000) and has an R^2 of 0.415. The effect of the harmony evaluation was significant (F=84.296, p=.000), as well as the cheese evaluation (F= 3.695, p=.027). The Chaource was more exciting than the other cheeses were. Figure 3 show the mean differences of significant effects for the model with the dependent variable excitement evaluation for the female sample.
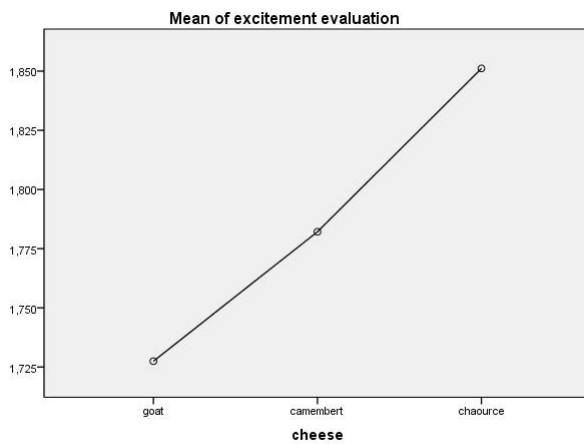

Mean of excitement evaluation

Figure 3: Mean differences of significant effects for the model with the dependent variable excitement evaluation for the female sample

The model with the dependent variable of surprise evaluation was significant (F=6.709, p=.000) and has an R^2 of 0.489. The effect of the harmony evaluation was significant (F=66.324, p=.000), as well as the wine×cheese (F=2.819, p=.027) and wine×cheese×harmony evaluations (F=3.115, p=.017). The most important deviation came from the Chaource and a less important deviation was noticed for the Camembert. Viognier is the wine grape that arouses more surprise when matched with Chaource compared with the other two wines. Perhaps it is because it has a low level of acidity and is more fruity so we can associate it with a creamy cheese (Bastian et al., 2009). Sauvignon Blanc creates less surprise when paired with Camembert and goat cheese (Harrington and Hammond, 2005) and Chardonnay is less surprising when paired with Chaource because there needs to be more acidity to counterbalance the cheese's fattiness, and

it is the same origin (AOP) as Chardonnay in Burgundy. Figure 4 represents Mean differences of significant effects for the model with the dependent variable surprise evaluation for the female sample.
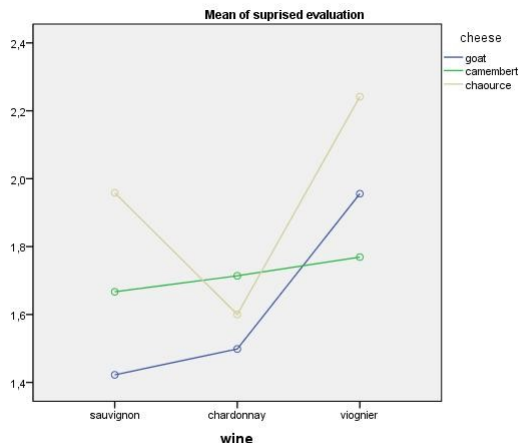

Figure 4: Mean differences of significant effects for the model with the dependent variable surprise evaluation for the female sample

5. Conclusion

The main result of this study shows the effect of the combination of cheese and wine on surprise for women. When you consider the whole sample and the male sample, the interaction between wine and cheese had no effect on emotions. For the female sample, the interaction between these combinations of wine and cheese on their level of harmony also had an effect on surprise. Specifically, when Chaource is combined with Viognier it created more surprise than other wine and cheese combinations. The Sauvignon Blanc combined with the goat cheese and the Camembert triggered less surprise. A glass of Sauvignon Blanc or Viognier should be paired with a sweet and creamy cheese with high fat content, such as Chaource. The sense of harmony can increase if the taster consumes cheese of the same region as the wine, which is why you can associate a winery with the production of cheese. We apparently don't have other emotions (joy and excitement) when pairing wine and cheese. We offer three reasons. First, we didn't provide strong differences among cheeses in terms of taste and age. None of the cheeses had a robust and pronounced flavour, so tasters couldn't discriminate their preferences. Second, a scale measures emotions after tasting, which causes doubt about when the respondent elicited these emotions. To capture affective features of facial expressions, including discrete emotions, we need to view the tasters during the tasting (Vermeulen et al., 2014) and you can detect emotions by modification of their faces. Third, the sense of harmony is perceived and we don't measure the deviation with an ideal match for the combination (Bastian et al., 2009).

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