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Beaunetheorem.com :
How to make the wine tasting axioms more understandable through the
development of a new wine tasting grid?
Academic Session-Work-in-progress

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Abstract

The purpose of the Theorem of Beaune (based on 4 axioms) is to quantify and compare the quality of wine constituents at a specific moment in a given context. This tool allows reducing the subjective or affective aspects during the sensorial analysis thanks to a quantified and visual synthesis of the constituents that composed the taste of wine. In order to develop our new tool, a wine tasting grid was improved based on the existing ones and submitted to a sample of 130 international consumers. The results underline that aromatic and gustatory dimensions are dominant compared with the appearance. The theorem of Beaune that emerged from the study, is composed of 4 sections: (1) a card including the information on the tasted wine and the context of the analysis; (2) a tasting grid allowing to quantify the quality of the different wine constituents and including a potentiality and weighting coefficient linked to the level of excellence of the wine sample tasted perceived by the grid's user (transposed onto a 100-scale); (3) a list of complementary data; and (4) a visual synthesis that illustrates the gustatory profile of the analyzed wine sample. The theorem is original in a sense it differs from other grids with 4 sections instead of 1 in most grids and within the tasting grid (section 2), it incorporates a potentiality and weighting coefficient, a quantified synthesis with a visual synthesis. The structured wine tasting grid is composed of 2 dimensions (aroma and flavours), 8 groups (of variables) and 22 variables; and takes into account new variables like a.o smoothness, vivacity, pleasantness, phenolic maturity. In terms of managerial implications, the tool will be available at beaunetheorem.com and will contribute to the creation of an interactive database allowing the wine following-up over time.

Key words: Burgundy, wine tasting, Theorem of Beaune, potentiality and weighting coefficient, pleasantness, beaunetheorem.com

1. INTRODUCTION

1.1. Reasons to propose a new method of wine tasting

The main purpose of tasting is to evaluate the quality of a wine in order to determine its economic value. Over time, transparency on the product's origins was imposed by the market and consumers in order to guarantee its specificity. That's the reason for which a ranking system and a hierarchical system of the vineyards was implemented (Baudouin, 2009) in France in the thirties and in Burgundy in 1935.

Nowadays, notably because of the emergence of new producing countries, the consumers' demand is more oriented on gustatory quality linked to the selling price. It is not necessarily linked anymore to the ranking and hierarchical system that was not able or willing to adapt itself. In this context, a specialized literature on wine (and especially on the assessment of the production) emerged whose purpose was to advice and keep inform the consumers (in 1982 in Bordeaux, Robert Parker Jr. and Michel Bettane were the only journalists to predict the quality of the vintage against the opinion of the other critics).

Due to the variability of the ratings' systems, consumers cannot get access to accurate and consistent sources allowing him to compare the quality of a wine. When you observe carefully the ratings of different wine critics, we can notice all the wines are unfortunately not evaluated in a consistent way, but often vis-à-vis their awareness, appellation, ranking, official hierarchy (see **appendix 8.1**). During the last 3 decades, those ratings have revolutionized the way of buying and consuming wines.

The objective of this research is to create a tool allowing professionals, connoisseurs and consumers to develop a methodic and comparative approach of tasting. Indeed, a literary description with a quantified rating obviously creates biases in terms of interpretation [see guides like a.o Parker's Wine Buyer Guide (2008); Bettane & Dessauve : le grand guide des vins de France 2011; Le guide de la revue du vin de France 2011; Guide Hachette 2007, Guide Fleurus des vins (2007); Guide GaultMilleau (2005); Inside Burgundy (Jasper Morris, 2010); The wines of Burgundy (Coates, 2008) or magazines like: Allen Meadows-Burghound.com, Bourgogne Aujourd'hui, Decanter, International Wine Cellar-Stephen Tanzer's, Revue du vin de France (RVF), Wine Spectator, Wine Advocate); see **appendix 8.1-8.2-8.3** that illustrates the differences between the ratings among critics].

In order to alter this previous pretentious statement, we have theorized, thought and materialized a Theorem in Beaune, the capital city of the Burgundy Wines. The theorem is therefore named the Theorem of Beaune in homage to all the men and women of this fascinating wine-producing region whose purpose is to produce the most exceptional wines. This approach illustrates how important it is to discriminate the intrinsic quality of the wines coming from the different climates that compose the Burgundy vineyards. This project is also very consistent with the candidacy of the vineyards of Burgundy to be part of UNESCO World Heritage based on the unique nature of their terroirs, locally called climates. Therefore, it is important to preserve this unique cultural inheritance focused on wine culture all over the world and especially in Burgundy. May the Theorem of Beaune contribute to this noble cause in giving priority to the quality of wine centering on pleasure and sharing.

1.2. The theorem of Beaune

The Theorem of Beaune (based on 4 axioms) is a structured and quantified tool built in order to restrict the subjective or affective aspects during the sensory analysis of a wine sample. Its purpose is to analyze and summarize (in a quantitative and visual way) the qualitative perception of the different wine constituents in order to determine its quality. In other words, the purpose of the Theorem of Beaune is to quantify and compare the wine quality at a specific moment and in a given context.

This theorem is composed of 4 sections: (1) a card including the information on the tasted wine and the context of the analysis; (2) a tasting grid allowing to quantify the quality of the different wine constituents and including a potentiality and weighting coefficient linked to the level of excellence of the wine sample tasted perceived by the grid's user (transposed onto a 100-scale); (3) a list of complementary data; and (4) a visual synthesis that illustrates the gustatory profile of the analyzed wine sample.

The tasting grid materialized through the addition of the ratings made on 8 main groups (in total 22 variables) multiplied by a potentiality and weighting coefficient linked to the level of excellence of the wine sample tasted, transposed onto a 100-scale.

1.2. Axioms of the theorem

This theorem is based on 4 axioms:

(1) Transparency and strictness are required to assess wine samples

The circumstances, the context and the methodology used by the professionals, the connoisseurs or the consumers to evaluate a wine must be exemplary since the work of winegrowers is often evaluated in several minutes. As the economists Jacquemin and Tulkens (1993) mention: a market should be characterized (in perfect competition) by a.o. transparency where suppliers and consumers know perfectly all the information of the market.

(2) A universal language is materialized by figures

Nowadays, the use of the tasting's vocabulary cannot guarantee objectivity [see, for example, **appendix 8.2** to observe the variance in terms of qualitative interpretation of the same wine among the wine critics: (1) Meursault Premier Cru Les Genevrières, 2008, Domaine Latour-Giraud & (2) Meursault Premier Cru, Les Genevrières 2008, Maison Bouchard Père et fils].

Usually, those assessments are made of a literary description with a rating (on 10, 20 or 100 points) or it could also be represented by symbols (glass, stars, etc.). Those methods have a major disadvantage: they don't represent a common scale value allowing all the stakeholders (consumers, producers and critics) to communicate clearly with each other.

As G. Steiner (2000) underlines, the literary language is not so easily understandable (or universal) as the figures' language. As an alternative, we develop (1) a wine tasting grid in order to quantify the wine constituents; (2) a potentiality and weighting coefficient in order to take into account the level of the quality perceived by the user (of the grid) and (3) a visual synthesis represented by a wheel (see **appendix 8.5**).

(3) Blind wine tasting guarantees more objectivity

It is actually important to evaluate a wine sample blindly, as recommended for example by the World Wine Symposium (also called Grand Jury Européen, see for further details: www.grandjuryeuropeen.com) since its creation in 1996. The underlying idea is to hide all the information linked to the origin, the grape variety, the awareness, the rank, the vintage or the price of the wine sample that should be evaluated. The taster may then focus only on the wine sample without being influenced by information available on the wine labels.

(4) Potentiality of a wine sample should be materialized irrespective of its price, origin or hierarchical rank

When a “blind wine taster” discovers the identity of a wine, he frequently adjusts his rating in a discreet way in taking into account among others: the hierarchical rank or the price of the wine sample. It is quite easy to do when you must only change one figure after the written comments.

In order to restrict the subjective or affective aspects perceived during the sensorial analysis of a wine sample, we have developed a tool that structures and quantifies the different constituents of a wine. Its purpose is to materialize the rank of each wine blindly tasted by clearly defined criteria. Therefore, a wine with a Grand Cru appellation may be considered as a Premier Cru appellation (or village or regional appellation) and vice versa, an outstanding Premier Cru may be considered as a Grand Cru (see **appendix 8.1** which illustrates the supremacy, or near systematic supremacy, of the hierarchy). From those assessments, two syntheses will emerge: on the one hand, a quantified one, and on the other hand, a visual one. The calculation of the potentiality and weighting coefficient is explained further.

2. LITERATURE REVIEW

Many books on wine tasting exist like: Bernardo E., (2005), Broggi-Praz M., (2008), Buffin J.-C., (2000), Fribourg G. & Sarfati C., (1989), Glatre E., (2006), Jackson R., (2002), Serber P. & Serber L., (2010), Young A., (2010) but most of them nearly adopt the same approach.

We have listed all the variables taken into account in the literature in order to build a wine tasting grid to be tested. We can observe the traditional structure with 3 dimensions: eye-nose-mouth) and the 11 groups of variables (from A to K) with a specific focus on their quality as table 1 illustrates.

Table 1. Main dimensions used in wine tasting grids (eye-nose-mouth)/Building of the theoretical grid to be tested.

| |
|--|
| 1. THE EYE/PERCEPTION OF THE VISUAL QUALITY |
| <i>A / Appearance</i> |
| <i>B / Pigmentation</i> |
| <i>C/ Fluidity</i> |
| 2. NOSE / PERCEPTION OF THE AROMATIC QUALITY |
| <i>D / Quality of <u>smell</u> by direct olfaction (gained by smelling the glass)</i> |
| <i>E / Quality of the <u>flavours</u> by retro-olfaction (breathe air in, through mouth, out through nose, while wine is in the mouth)</i> |
| 3. MOUTH / PERCEPTION OF THE GUSTATORY QUALITY |
| <i>F / Quality of the <u>mouth's</u> feel</i> |
| <i>G / Quality of vivacity</i> |
| <i>H / Quality of the <u>smoothness</u></i> |
| <i>I / Quality of <u>astringency/raspins sensation</u> (for both red and white wines)</i> |
| <i>J / Quality of the equilibrium (vivacity/smoothness/astringency)</i> |
| <i>K / Quality of the persistence</i> |
| <i>Other wine characteristics/information</i> |

NB This grid was developed based on the literature review [Bernardo E., (2005), Broggi-Praz M., (2008), Buffin J.-C., (2000), Fribourg G. & Sarfati C., (1989), Glatre E., (2006), Jackson R., (2002), Serber P. & Serber L., (2010), Young A., (2010)]. You can contact the authors to get more information on the establishment of this grid.

2.2. Deduction of hypotheses

Some dimensions seem to be much more important (aromatic and gustatory dimensions) than the visual one, especially regarding the Burgundy region. For example, if a red wine is light or dark, it doesn't mean the wine is young or old, or good or bad. Since we focus on the Burgundy region for the moment, we do think visual dimension is not important whereas aromatic and gustatory ones are. No smells and no flavors may be perceived through the visual dimensions. We've also defined all the terms of the grid to be tested and strongly believe those definitions are very clear. Therefore, we identified 3 hypotheses:

H1: Visual dimension is not important

The different winemaking methods strongly influence the appearance. Therefore, the visual dimension is very subjective since it does not contain any gustatory information.

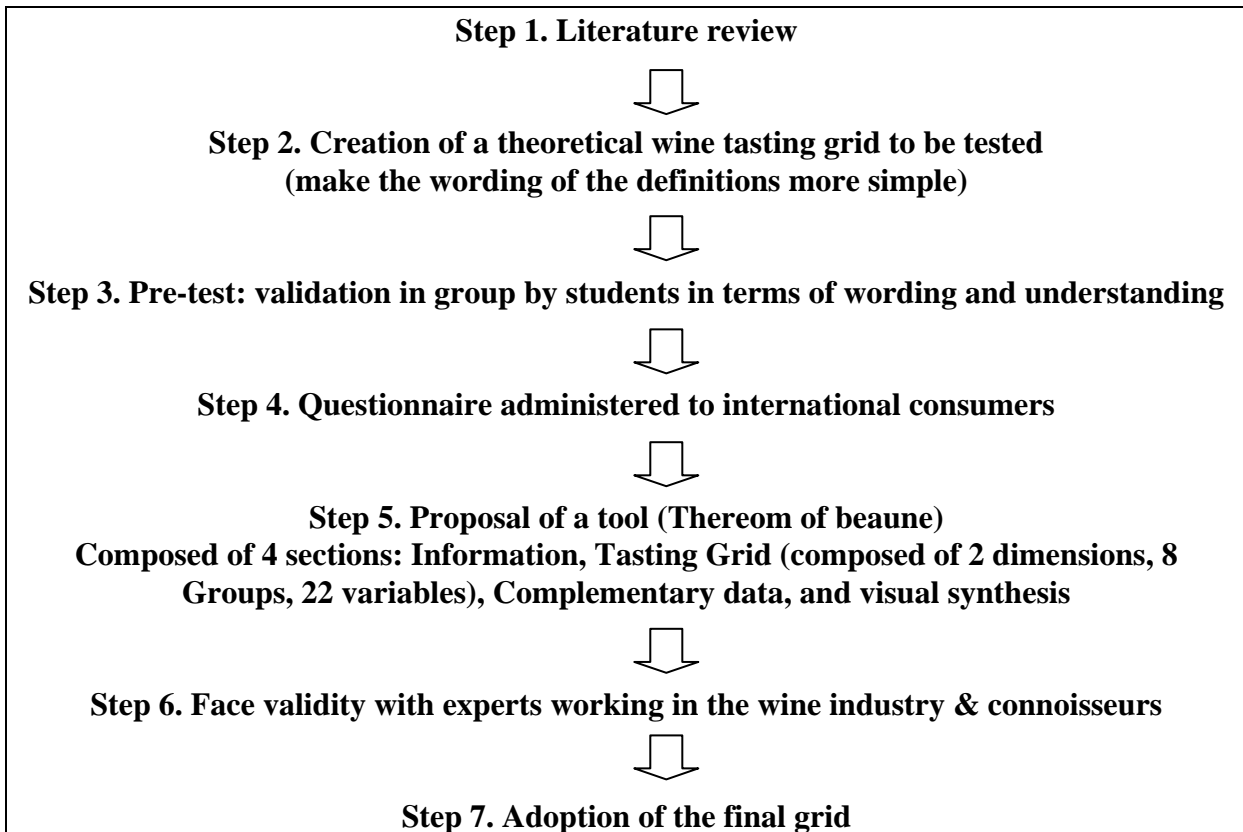
H2: Nose and taste are fundamental

H3: The definitions/wordings of each variable are clear except for the new developed variables

3. METHODOLOGY & DATA COLLECTION

The methodology is composed of the following 7 steps: step 6 and 7 will be done in further research.

Illustration 1. Methodology



In order to validate our grid, a questionnaire was administered face-to-face to international consumers between December 2010 and January 2011.

3.1. Sample's characteristics

Here are the characteristics of the sample:

- Initially, the sample size was 144 consumers and was reduced to 130 valid questionnaires;
- The survey took place in different countries: Austria at the European Wine Blogger Conference (n=24), France (mainly Dijon), Germany and in different countries like: Mexico, Spain, Turkey, Sweden, UK, China and Switzerland;
- The sample is therefore very international as you can see in table 2.
- The age of the surveyed people is quite young: 29.23% are born before 1977 and 70.77% are born after 1977;
- Regarding the gender, 61.54% are male and 38.46% are female;
- 90% of them got a university background;
- And finally, concerning the position, 38.46% are students; 19.23% employee; 13.08% are entrepreneur and 11.54% are executive.

Table 2. International composition of the sample

| Nationality | Percentage |
|-------------|------------|
| French | 23.85% |
| Chinese | 23.08% |
| American | 11.54% |
| British | 6.92% |
| German | 6.15% |
| Austrian | 5.38% |
| Turkish | 5.38% |
| Mexican | 3.85% |

As remark, we can just say the sample is small and is a bit over-represented on the following characteristics: we have 23.08% of Chinese; 70.77% are born after 1977; 61.54% are male; 90% of them got a university background; and 38.46% are students.

3.1. Wine profiles of the interviewed consumers

3.1.1. Wine purchase

- 23.08% purchase wine several times a week; 17.69% once a week and 30.77% several times a month;
- They mainly buy wine in supermarkets (45.24%) or in wine shops (30.16%);
- 51.59% buy bottles on average below than 10€;
- Most of them buy between half a bottle and 2 bottles on average per week: 15.45% (half a bottle); 31.71% (1 bottle) and 27.64% (2 bottles) ;
- 69.84% of them keep between 1 and 50 bottles in their cellar.

3.1.2. Wine consumption

- 57.36% consume per day on average one glass of wine;
- They mainly enjoy wine at home (40%) or at friends' place (30%);
- They mainly consume young/fruity wines (36.92%); premium wines (37.69%); and 25.38% don't know what they mainly consume;
- They mainly consume red wines (50.49%) and white wines (32.46%),
- Out of a score of 5, they like on average mostly old wines (3.8); young wines (3.43) and natural, organic and biodynamic wines (3.38).

3.1.3. Wine and food knowledge

- They go several at least several times a month on Internet to look for information on wine: 52.31%;
- 14.62% were able to quote (recall) a website focused on wines;
- 32.31% of them had a nice souvenir in tasting burgundy wines but also wines coming from other regions like Bordeaux (27.69%), Champagne (23.08%), Australia (13.85%), US (11.54%), Italy (10%), etc.;
- 42.98% of the sample read Wine Spectator; 28.95% Decanter and 28.07% (Wine Advocate);
- The wine critics who were mainly quoted (recall) were Robert Parker Jr (53.85%); Jancis Robinson (15.38%) and Tanzer (6.92%);

- They do trust the wine critics (3.41/5)

3.1.4. Knowledge of Burgundy

- 74.62% quote chardonnay as a grape variety and 79.23% quote pinot noir;
- But if we go in depth, we notice:
 - 66.15% quote both pinot & chardonnay but also other grapes;
 - And only 32.31% quote both pinot & chardonnay without any other grape varieties and so, are right regarding;
- Only 10.4% know the right number of appellations (100) and 20% say more than 100, which could be considered as acceptable;
- 21.6% know the right number of Grands Crus (33).

3.1.5. Expertise

- 26.92% are working in the wine sector and 18.46% were surveyed in Wine Blogger Conference in Vienna in 2010.

3.1.6. General flavors preferred by the surveyed sample

As the table 3 shows, “acidity”, “sweet and sour”, and “sweetness” are the main flavors appreciated by the consumers (average score obtained by a 5 points-Likert scale).

Table 3. General flavors mostly preferred by the consumers

| Flavors | Average Score (/5) |
|----------------|---------------------------|
| Acidity | 3.38 |
| Sweet and sour | 3.45 |
| Sweetness | 3.31 |
| Bitterness | 2.6 |
| Salted | 2.49 |

3.2. Focus on the consumers

For the moment, we’ve focused on the consumers (we’ve worked till step 5 of the methodology). As further research, we will focus on the expert of the wine industry and connoisseurs in order to implement the “face validity” step

3.3. Rating system used in the grid

After covering the different rating systems used in the main European and Northern American countries, we’ve decided to focus on the Swiss rating system (at Schools or University that is working as follows:

- Between 5.5 and 6, the wine sample is outstanding;
- Between 5 and 5.5, the wine sample is excellent;
- Between 4.5 and 5, the wine sample is very good;
- Between 4 and 4.5, the wine sample is good;

NB for the Swiss academics, a rating below 4 means a failure...

3.4. Calculation of the potentiality and weighting coefficient

As reference, we took the system that classifies and organizes the most original and complex vineyards in the world: the Burgundy one. Spread into 4 levels of excellence:

- Outstanding means Grand Cru Appellation;
- Excellent means Premier Cru Appellation;
- Very good means Village Appellation (communal in French);
- Good means Regional appellation.

After the assessment of the different variables of the aromatic and gustatory dimensions, the taster gives a potentiality and weighting coefficient to the tasted wine sample based on his perception of the quality (see levels of excellence perceived in table 4). This coefficient will allow a good wine from a lesser appellation to outscore a bad wine from a higher ranking appellation. The final rating is then, transposed onto a 100-scale.

For example, assume a regional wine (Bourgogne Aligoté Aux Chatelets, Domaine d'Auvenay) is considered in blind tasting as a premier cru wine in terms of perceive the quality. Then, the rating the wine will obtain will be based on the different variables multiplied by a coefficient of 1.2

NB the coefficients we can observe in table 4 are temporary because we must calibrate the model based on the face validity and the underlying simulations.

Table 4. Theoretical example

| Levels of excellence | Appellation | Potentiality and weighting coefficient | (For information: % of the total production in Burgundy) | Ratings gained by the level of excellence in percentage (see illustration 2) |
|----------------------|-------------------------|--|--|--|
| Exceptionnel | Grand Cru Appellation | 1.3 | 2% | 91.7 - 100% |
| Excellent | Premier Cru Appellation | 1.2 | 10% | 76.9 – 91.7% |
| Très bon | Village Appellation | 1.1 | 34% | 63.5 – 76.9 % |
| Bon | Regional Appellation | 1.0 | 54% | 51.3 – 63.5% |

If we take the example of a famous grand cru, it should have an average rating between 5.5 and 6 on the 22 variables (see further why only 22 variables are selected instead of 32 in the theoretical grid). The minimum rating for an outstanding wine should be 91.7% and the maximum 100%.

As we can notice in observing illustration 2, there is a gap between each level of excellence. It is due to the fact we consider an average “floor and ceiling” evaluation but in practice,

some wine sample might have higher ratings on several variables in remaining in the same “level of excellence” category.

Illustration 2. Average theoretical calculation

Outstanding: average rating from 5.5 à 6.0

Maximum $22 \times 6.0 = 132 \times 1.3 = 171,6 = 100\%$

Minimum $22 \times 5.5 = 121 \times 1.3 = 157,3 = 91,7\%$

Excellent: average rating from 5.0 à 5.5

Maximum $22 \times 5,5 = 121 \times 1,2 = 145,2 = 84,6\%$

Minimum $22 \times 5,0 = 110 \times 1,2 = 132,0 = 76,9\%$

Very good: average rating from 4.5 à 5.0

Maximum $22 \times 5,0 = 110 \times 1,1 = 121,0 = 70,5\%$

Minimum $22 \times 4,5 = 99 \times 1,1 = 108,9 = 63,5\%$

Good: average rating from 4.0 à 4.5

Maximum $22 \times 4,5 = 99 \times 1,0 = 99,0 = 57,7\%$

Minimum $22 \times 4,0 = 88 \times 1,0 = 88,0 = 51,3\%$

4. DATA ANALYSIS

4.1. Main results

When we observe table 5, we notice the wordings of the definitions are very clear (all of them get a score higher than 3 out of 4). However, some definitions could be improved (see score in bold) especially for the new introduced variables like intensity of tonicity of the mouth, vivacity, smoothness or phenolic maturity (unless we hope the consumer will assimilate those definitions very quickly...). When we have a look at the “importance”, we observe all the new introduced variables are considered as being less important than the other variables (except for the fullness of the mouth and the pigmentation and fluidity aspects). Finally, even if 3 variables are perceived as less important in the “other wine characteristics”, it is not really an issue since those dimensions are not quantified but just appreciated in ticking some adjectives.

Table 5. Clarity of the wording/precision of the definitions of the 32 variables (average score based on likert-scale 4 points and standardized score) & Importance of the 32 different variables (scale: not very important... very important; 4 points)

| 1. THE EYE/PERCEPTION OF THE VISUAL QUALITY | Score clarity | Standardized Score Clarity | Score Importance | Standardized Score Importance |
|--|----------------------|-----------------------------------|-------------------------|--------------------------------------|
| <i>A / Appearance</i> | | | | |
| 1. Brilliance of the appearance | 3.33 | 1.03 | 3.21 | 1.03 |
| 2. Clarity of the appearance | 3.31 | 1.02 | 3.22 | 1.03 |
| <i>B / Pigmentation</i> | | | | |
| 3. Intensity of the pigmentation | 3.19 | 0.98 | 2.78 | 0.89 |
| 4. Quality of the pigmentation | 3.22 | 0.99 | 2.95 | 0.95 |
| <i>C/ Fluidity</i> | | | | |
| 5. Fluidity | 3.28 | 1.01 | 3.02 | 0.97 |
| 2. NOSE / PERCEPTION OF THE AROMATIC QUALITY | | | | |
| <i>D / Quality of smell by direct olfaction (gained by smelling the glass)</i> | | | | |
| 6. Expressiveness of the smell | 3.41 | 1.05 | 3.28 | 1.05 |
| 7. Elegance of the smell | 3.31 | 1.02 | 3.18 | 1.02 |
| 8. Complexity of the smell | 3.37 | 1.04 | 3.22 | 1.03 |
| 9. Pleasantness of the smell | 3.36 | 1.04 | 3.36 | 1.08 |
| <i>E / Quality of the flavours by retro-olfaction</i> | | | | |
| 10. Expressiveness of the flavours | 3.25 | 1.00 | 3.19 | 1.02 |
| 11. Elegance of the flavours | 3.26 | 1.01 | 3.18 | 1.02 |
| 12. Complexity of the flavours | 3.31 | 1.02 | 3.18 | 1.02 |
| 13. Pleasantness of the flavours | 3.37 | 1.04 | 3.34 | 1.07 |
| 3. MOUTH / PERCEPTION OF THE GUSTATORY QUALITY | | | | |
| <i>F / Quality of the mouth's feel</i> | | | | |
| 14. Fullness of the mouth | 3.11 | 0.96 | 3.21 | 1.03 |
| 15. Character/tonicity of the mouth | 3.02 | 0.93 | 2.95 | 0.94 |
| 16. Pleasantness of the mouth | 3.25 | 1.00 | 3.38 | 1.08 |
| <i>G / Quality of vivacity</i> | | | | |
| 17. Intensity of vivacity | 3.08 | 0.95 | 2.92 | 0.93 |
| 18. Pleasantness of vivacity | 3.37 | 1.04 | 3.18 | 1.02 |
| <i>H / Quality of the smoothness</i> | | | | |
| 19. Viscosity of the smoothness | 3.18 | 0.98 | 2.97 | 0.95 |
| 20. Silkiness of the smoothness | 3.30 | 1.02 | 3.12 | 1.00 |
| 21. Pleasantness of the smoothness | 3.34 | 1.03 | 3.35 | 1.07 |
| <i>I / Quality of astringency/raspins sensation (for both red and white wines)</i> | | | | |
| 22. Quality of phenolic maturity and sharpness of the grain | 3.08 | 0.95 | 2.89 | 0.93 |
| 23. Intensity of the astringency | 3.10 | 0.95 | 2.87 | 0.92 |
| 24. Pleasantness of astringency | 3.32 | 1.02 | 3.07 | 0.98 |
| <i>J / Quality of the equilibrium (vivacity/smoothness/astringency)</i> | | | | |
| 25. Harmony of the equilibrium | 3.22 | 0.99 | 3.20 | 1.02 |
| <i>K / Quality of the persistence (smells and flavours)</i> | | | | |
| 26. Length of the persistence | 3.35 | 1.03 | 3.25 | 1.04 |
| 27. Pleasantness of the persistence | 3.28 | 1.01 | 3.22 | 1.03 |
| <i>Other wine characteristics</i> | | | | |
| 28. Effervescence | 3.04 | 0.94 | 3.01 | 0.96 |
| 29. Residual sugars | 3.01 | 0.93 | 2.75 | 0.88 |
| 30. Drinkability/Digestability | 3.31 | 1.02 | 3.37 | 1.08 |
| 31. Ageing capacity | 3.31 | 1.02 | 3.14 | 1.01 |
| 32. Potentiality | 3.19 | 0.98 | 2.95 | 0.94 |

4.2. Validation of hypotheses

4.2.1. H1: Visual dimension is not important anymore

The appearance is influenced by the winemaking methods and is also subjective. The previous table shows that 3 variables out of 5 in the dimension “visual quality” are considered as being less important (Variables’ group “pigmentation” composed of the variables intensity and the quality and variable fluidity). In order to restrict the perception’s biases generated by the visual aspect of the wine, we’ve decided not to quantify it but to consider it as complementary information (appreciation).

4.2.2. H2: Nose and taste are fundamental

Regarding the nose, all the variables are considered as important (see table 5). Regarding the mouth, only the new introduced variables are not considered as being as important as the other ones (Variable 15. Character/tonicity of the mouth; 17. Intensity of vivacity; 19. Viscosity of the smoothness; 22. Quality of phenolic maturity and sharpness of the grain; 23. Intensity of the astringency). So, we should work on the improvement of the wording and maybe we should use the definitions of those variables in the grid and not only in the glossary that we will propose before using the grid.

4.2.3. H3: The definitions/wordings of each variable are clear except for the new developed variables (see appendix 8.4)

All the definitions got a score higher than 3.

5. DISCUSSIONS, PROPOSITIONS, IMPLICATIONS & CONCLUSIONS

5.1. Discussions on the main dimensions of the grid and proposal of a new tool “The Theorem of Beaune” including a new grid (rating), a wheel (illustration) and two sections on information and complementary data

Initially, the tested grid was composed of 3 classic dimensions (see table 1: visual, aromatic and gustatory dimensions or eye, nose, mouth see also **table 1**). The new proposed grid (see **appendix 8.4**) is composed of 2 dimensions (aromatic and gustatory dimensions), 8 groups of variables and 22 variables.

The Theorem of Beaune includes 4 sections: Information, Tasting Grid (composed of 2 dimensions, 8 Groups, 22 variables), Complementary data, and visual synthesis:

- **Section 1 linked to INFORMATION (non-quantified and appreciated)**

Most critics, except some like Michael Broadbent (1993, 2007), never mention the place and the time where the tasting happens.

*Example of Broadbent’s strictness: Vintage 1971 (*****), Clos de Vougeot, Hudelot, provided by Becky Wasserman for the Burgundy party at Hollywood Wine Society, January 1990 (*****).*

Therefore, we propose to use in our grid 28 items linked to the wine sample or the circumstances of the assessment.

- **Section 2 (see also H1 & H2) linked to AROMATIC AND GUSTATORY DIMENSIONS does represent the TASTING GRID**
8 groups of variables or 22 variables will be rated from 1 to 6 and then, weighted by a coefficient reflecting the level of excellence. The specificity of this grid will be visual illustration (wheel), see also **appendix 8.4, section 4**
- **Section 3 linked to the COMPLEMENTARY DATA (appreciated and non-quantified) including the visual dimension.**
- **Section 4 linked to the VISUAL SYNTHESIS**

5.2 Implications: proposal of a wine tasting protocol: the Theorem of Beaune

Illustration 3. Protocol of the Theorem of Beaune

Step 1. We do recommend blind tasting

Step 2. Use of the Theorem of Beaune composed of 4 sections

Step 2.1 Fill in section 1 linked to INFORMATION (non-quantified and appreciated)

**Step 2.2. Fill in section 2 linked to AROMATIC AND GUSTATORY DIMENSIONS
Quantified Synthesis**

We sum up the ratings made on the 8 main dimensions (in total 22 variables of the tasting grid) multiplied by a potentiality and weighting coefficient linked to the level of excellence of the wine sample tasted, transposed to a 100-scale. The more important the score, the more excellent the wine will be perceived. On the other hand, a weak score will reflect a mediocre quality wine.

Step 2.3. Fill in section 3 linked to the COMPLEMENTARY DATA (appreciated and non-quantified) including the visual dimension.

Step 2.4. Section 4 represents a wheel generated from the results obtained by section 2 (tasting grid)

Visual Synthesis/wheel

The graphic linking of the points located on each of the variables of the aromatic and gustatory dimensions creates a diagram. This image may materialize the absolute perfection of a wine sample when it visually represents a full circle.

Step 3. Creation of an interactive database allowing the following-up over time

An interactive database is necessary in order to better assess the ageing capacity of wine tasted by the users of the theorem. This interactive database will have two purposes:

- A free assessment tool whose purpose is to evolve thanks to the contribution of the users. Each user may register and get an ID. Then, once he filled his grid, he can send it directly to the platform.
- Following-up over time to assess the ageing capacity. Since it is difficult to predict the potentiality of a wine, our tool may allow a following-up over time in listing all the wines tasted by the users. Therefore, the user can check anytime the evolution of the wine.

For more information, go to WWW.BEAUNETHEOREM.COM

5.3. Conclusions and contributions

The purpose of the Theorem of Beaune is to quantify the wine quality at a specific moment and in a given context. Based on our survey, we notice the score of the trust vis-à-vis wine critics was 3.41/5, which means a lot of consumers might be interested in using our grid. Furthermore, the surveyed consumers mainly enjoy consuming their wine at home (40%) or at friends' place (30%), which could be much more convenient to use the grid.

Regarding the contributions, we can say the Theorem of Beaune is original for the following reasons:

- Proposition of quantified Synthesis and visual Synthesis
- The use of a tool with 4 sections:
 - (1) a card including the information on the tasted wine and the context of the analysis;
 - (2) a tasting grid allowing to quantify the quality of the different wine constituents and including a potentiality and weighting : the grid is composed of 8 groups of variables (in total 22 variables);
 - (3) a list of complementary data;
 - (4) a visual synthesis that illustrates the gustatory profile of the analyzed wine sample.
- The use of a potentiality and weighting coefficient
- Proposition of a protocol
- Incorporation of new variables like a.o smoothness, vivacity, pleasantness, phenolic maturity
- Creation of an interactive database allowing the following-up over time

6. LIMITS AND FURTHER RESEARCH

Here are the limits of this study:

- the sample size is small;
- some groups are over-represented;

Regarding the further research, we can:

- do face validity with experts and connoisseurs (step 6 and 7 of the methodology)
- establish on an inventory of the aromas
- calibrate the model in order to identify the appropriate coefficient reflecting the level of excellence
- improve the definitions/wording of new variables
- exploit more in-depth the data obtained through questionnaire in running a factor analysis or a cluster analysis in order to check if the variables differ from each other
- segment the sample in using the following criteria in order to determine how important the scores (linked to the definitions and the importance of the variables) are for those segments:
 - The place of purchase, the average price of purchase and the kind of consumed wine can be used as criteria of segmentation in terms of wine purchase and consumption;
 - The expertise could be a criterion of segmentation like for example in taking into account: the number of bottles in the cellar, the frequency of going to Internet to look for information on wine, the recall of a website focused on

wines, the readers of wine magazines, the number of wine critics quoted (recall), the 26.92% working in the wine sector.

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8. APPENDICES

8.1. Illustration of the supremacy of the appellation system

8.1.1. Domaine Georges Roumier, Chambolle-Musigny (Parker, 2008)

Vintage 2005

- Regional
 - Bourgogne, 89/100
- Village
 - Chambolle-Musigny, 89/100
- Premier Cru
 - Chambolle-Musigny premier cru, Les Combottes, 89/100
 - Chambolle-Musigny premier cru, Les Cras, 93-94/100
 - Chambolle-Musigny premier cru, Les Amoureuses, 93-94/100
- Grand Cru
 - Charmes-Chambertin, grand cru, 91-92/100
 - Ruchottes-Chambertin, grand cru, 94-95/100
 - Bonnes-Mares, grand cru, 96-97/100
 - Musigny, grand cru, 97-98/100

8.1.2. Domaine Claude Dugat, Gevrey-Chambertin (Parker 2008)

Vintage 2005

- Regional
 - Bourgogne, 87/100
- Village (communal in French)
 - Gevrey-Chambertin, 89/100
- Premier Cru
 - Gevrey-Chambertin premier cru, 91/100
 - Gevrey-Chambertin premier cru, Lavaux Saint-Jacques 94/100
- Grand Cru
 - Charmes-Chambertin, grand cru, 93/100
 - Griottes-Chambertin, grand cru, 95/100
 - Chapelle-Chambertin, grand cru, 93/100

8.2. Variance between critics on comments & ratings

8.2.1. Domaine Latour-Giraud, Meursault premier cru, Les Genevrières 2008

(1) Source : Bourgogne Aujourd'hui / no 96 / Octobre-Novembre 2010

Cuvée phare du domaine, le Genevrières est en 2008 un grand vin à la bouche croquante, pure, distinguée, avec une belle longueur et une finale juteuse et saline. Grand vin de garde !
17/20

(2) Source : International Wine Cellar - Stephen Tanzer's / 15 sept 2010

Belle couleur pâle; du thé et de la peau d'orange sur le nez. Gras et plein, démontrant un volume plus grand mais pas autant de précision et de classe que le Charmes. Il finit longuement mais est un peu agressif de par sa jeunesse. Il a un alcool naturel de 13.8° et une

valeur ph élevée, d'un rendement de 30 hl/ha seulement et fut le premier vin à avoir terminé sa fermentation alcoolique. 88-91/100

(3) Source : Allen Meadows, 3rd Quarter 2010, Issue 39, Burghound.com

(Issu de plants âgés de plus de 40 ans, provenant d'une parcelle énorme de 2,5 ha, situé à Genevrières Dessus). Ce vin à moins d'expression que le Charmes mais sa pureté d'expression n'en demeure pas moins superbe. Arômes de zeste de citron et de poire blanche délicatement épicée, en harmonie avec des saveurs moyennement lourdes, serrées, soutenues par une minéralité délicate débouchant sur une finale pleine de détails et persistante. J'ai beaucoup aimé ce vin, et bien que la finale soit décidément linéaire à ce jour, l'équilibre allié à la matière sous-jacente s'épanouiront dans le temps. 91-93/100 2016+

8.2.2. Maison Bouchard Père et fils, Meursault premier cru, Les Genevrières 2008

Source : Bourgogne Aujourd'hui / no 96 / Octobre-Novembre 2010

Le nez est frais et élégant avec des notes d'agrumes. En bouche, le grain est raffiné avec une belle attaque, de la tonicité et une finale précise et longue. 16.5/20

Source : International Wine Cellar - Stephen Tanzer's / 15 sept 2010

Pale, bright yellow. Deep peach, nutmeg, jasmine and orange blossom on the sexy nose. Rich, supple and sweet, with expansive flavors of stone fruits and spicy oak. Not the last word in complexity, but this big, sexy Meursault is impressively thick and long. Today, this comes across as the California-style wine in this line-up. 92/100

Source : Allen Meadows, 3rd Quarter 2010, Issue 39, Burghound.com

(Bouchard now owns an incredible 2.7 ha, which would make Bouchard the largest owner, surpassing the 2.5 ha of Latour-Giraud). As it almost always is, here the nose is spicier still and more refined as well with striking complexity adding compelling interest to the floral, citrus and white fruit aromas. The rich, concentrated and classy flavors possess plenty of extract that confers a seductive texture that carries over to the impressively long and harmonious finish. This is unmistakably at another level, at least at this early juncture. 92/100/2015+

Source : Guide Bettane-Desseauve 2011

Beaucoup de tendresse et de finesse, de pureté, de glissant, l'art cachant l'art. La petite touche de risque supplémentaire a fonctionné parfaitement. Vin de grand style à défaut d'immense constitution. 17.5/20 / 2013 à 2023

Source : GaultMilleau. Les meilleurs vins de France 2011

Un vrai classique avec des amandes, de la pomme, des noisettes, une touche beurrée, des agrumes et une corbeille de fleur blanches. La matière est tendre et chaleureuse, en bel équilibre avec la minéralité « crissante ». 17/20

8.3. Illustration of the rating's difference between critics

8.3.1. Richebourg, grand cru, 1993, Domaine de la Romanée-Conti, Vosne Romanée

19/20 Coates

90/100 Parker

90/100 Wine Spectator

94/100 Tanzer

Reference: Vinfox. 2010, p.232

8.3.2. Batard-Montrachet, grand cru, 1999, Domaine Leflaive, Puligny

8.5/10 Bettane & Dessauve

18.5/20 Coates

90-91/100 Parker

94+/100 Tanzer

Reference: Vinfox. 2010, p.232

8.4. Theorem of Beaune (grid proposed based on the results of the survey; it includes 4 sections: Information, Tasting Grid (composed of 2 dimensions, 8 Groups, 22 variables), Complementary data, and visual synthesis

| Section 1. INFORMATION | <i>Appreciation</i> |
|--|---------------------|
| 1. Code/ Surname, First Name of the taster | |
| 2. (tasting) serial number | |
| 3. Glass number (in the serial) | |
| 4. Day of geo-sensorial analysis/tasting | |
| 5. Time | |
| 6. Lunar Calendar a) Going up moon b) Going down moon c) Lunar knot d) Root day e) Flower day f) Fruit day | |
| 7. Place a) Wine Storehouse/cellar b) Laboratory c) Wine fair d) Restaurant e) At home f) Other | |
| 8. Characteristics of the sample a) Final bottled b) In the process of maturing c) Extracted from the blending tank d) From the barrel/tank e) Blending of several barrels f) Other | |
| 9. Origin of the sample a) Estate b) Wine shop c) Auction d) Export f) Other | |
| 10. Storage conditions of the sample a) Estate b) Natural cellar with natural temperature variation and hygrometry c) Natural cellar with constant temperature 10-14° d) Natural cellar with constant temperature 14-20° e) Fridge f) Other | |
| 11. Size of the bottle a) 37, 5 cl | |

| | |
|--|--|
| b) 50 cl c) 75 cl d) 150 cl e) Other | |
| 12. Condition of the bottle a) Perfect b) Drip appearing outside the bottle due to a closure problem (coultre in French) c) Condition of the cork: good-damaged d) Condition of the cap: good-damaged e) Condition of the label: good-damaged f) Level: below 2 cm g) Level: between 2-4 cm h) Level: between 4-6 cm i) Level: above 6 cm j) Bottle number k) Serial number l) Thermal indicator m) Visible authentication n) Other | |
| 13. Types of glass a) Brand and model b) Transparent or opaque | |
| 14. Quantity poured in the glass a) 5 cl b) 5-10 cl c) Other | |
| 15. Repouring a) Once b) Twice c) Other | |
| 16. Service's temperature a) Ideal b) Too cold c) Too hot | |
| 17. Mode of tasting Blind tasting (where any distinctive sign, label or cap is hidden) a) Yes b) No | |
| 18. Color of the wine a) white b) rouge c) rosé d) autre | |
| 19. Kind of wine a) Still b) Sparkling c) Dry d) Sweet e) Fortified wine f) Oxidative g) Other | |
| 20. Country/region | |
| 21. Appellation | |
| 22. Vintage | |
| 23. Grape Variety | |
| 24. Estate a) Traditional b) Industrial | |
| 25. Wine-grower a) Traditional b) Oenologist/winemaker | |
| 26. Cultural Method a) Use of chemical products b) Control (lutte raisonnée, in French) c) Organic/ certified /in the process of certification d) Biodynamic / certified /in the process of certification e) Other | |
| 27. Price VAT inc. estate | |
| 28. Price VAT inc. wine shop | |

| SECTION 2. PERCEPTION OF THE AROMATIC (A-B) & GUSTATORY QUALITY (C-H) | Rating from 1 to 6 |
|---|---------------------------|
| <i>A / Quality of smell by direct olfaction (gained by smelling the glass)</i> | |
| 1. Expressiveness of the smell | |
| It means the smell tends to be rich, concentrated and generous. | |
| 2. Elegance of the smell | |
| It means the smell tends to be subtle and distinguished. | |
| 3. Complexity of the smell | |
| It means the smell is various and diverse | |
| 4. Pleasantness of the smell | |
| It means the smell is nice, balanced. | |
| <i>B / Quality of the flavours by retro-olfaction (breathe air in, through mouth, out through nose, while wine is in the mouth)</i> | |
| 5. Expressiveness of the flavours | |
| It means the smell tends to be rich, concentrated and generous. | |
| 6. Elegance of the flavours | |
| It means the smell tends to be subtle, distinguished. | |
| 7. Complexity of the flavours | |
| It means the smell is various and diverse | |
| 8. Pleasantness of the flavours | |
| It means the smell is nice, balanced. | |
| <i>C / Quality of the mouth's feel</i> | |
| 9. Fullness of the mouth | |
| It means the mouth is fleshy, dense and rounded | |
| 10. Character/tonicity of the mouth | |
| It means the mouth is dynamic and energetic. | |
| 11. Pleasantness of the mouth | |
| It means the mouth is nice, balanced. | |
| <i>D / Quality of vivacity</i> | |
| 12. Intensity of vivacity | |
| It means vivacity is ideal and balanced | |
| 13. Pleasantness of vivacity | |
| WHITE WINE | |
| It might be either positive (vivacity is fresh, nervous, pleasant, balanced) or negative (vivacity is aggressive, insipid and weak) | |
| RED WINE | |
| It might be either positive (vivacity is pleasant and balanced) or negative (vivacity is aggressive, insipid and weak) | |
| <i>E / Quality of the smoothness</i> | |
| 14. Viscosity of the smoothness | |
| It means the smoothness is substantially rich in alcohol (ethanol, glycerol, residual sugars, etc.). It might be either positive (the smoothness is rich) or negative (the smoothness is syrupy and oily) | |
| 15. Silkiness of the smoothness | |
| It means the smoothness is supple, velvety and satiny. | |
| 16. Pleasantness of the smoothness | |
| It means the smoothness is nice, balanced. | |
| <i>F / Quality of astringency/raspins sensation (for both red and white wines)</i> | |
| 17. Quality of phenolic maturity and sharpness of the grain | |
| It means the quality of phenolic matter (tannins, anthocyn and flavones) dissolved in the wine is linked to the optimal physiological maturity of the grape, especially skins, grape seed and stem. This matter, once extracted by fermentation forms the skeleton of the wine. If the fruit is ripe, we get a grain with a thin and dense texture. | |
| WHITE WINE | |
| It might be either positive (astringency is fresh, nervous, pleasant, balanced) or negative (astringency is aggressive, insipid and weak) | |
| RED WINE | |
| It might be either positive (astringency is pleasant and balanced) or negative (astringency is aggressive, insipid and weak) | |
| 18. Intensity of the astringency | |
| It means astringency is powerful and concentrated | |
| 19. Pleasantness of astringency | |
| It means the astringency is nice, balanced. | |
| <i>G / Quality of the equilibrium (vivacity/smoothness/astringency)</i> | |
| 20. Harmony of the equilibrium | |
| It might be low (heterogeneous) or high (homogeneous). | |
| <i>H/ Quality of of the persistence (smells and flavours)</i> | |
| 21. Length of the persistence | |
| It might be short or long. | |
| 22. Pleasantness of the persistence | |
| It might be bad or great. | |
| <i>Sub-total</i> | _____ |
| <i>Potentiality</i> | |
| In blind test or not (which is more subjective), if we consider the wine as being a grand cru, or a premier cru, or a village or a regional one (Burgundy standards), we give a different weight | |
| Outstanding / Grand Cru Appellation → multiplied by 1.3 | |
| Excellent / Premier Cru Appellation → multiplied by 1.2 | |
| Very Good / Village Appellation → multiplied by 1.1 | |
| Good / Regional Appellation → multiplied by 1 | |
| Total | _____ |
| divided by 1.716 → rating in % | _____ |

| | |
|--|--|
| SECTION 3. COMPLEMENTARY DATA | |
| 1. Brilliance of the appearance a) Limpid b) Cloudy | |
| 2. Pigmentation a) Not bright b) Bright | |
| 3. Fluidity a) Weak viscosity b) Strong viscosity | |
| 4. Effervescence a) Slightly effervescent b) Not effervescent | |
| 5. Residual sugars a) Weakly perceptible b) Moderately perceptible c) Strongly perceptible | |
| 6. Drinkability/Digestability a) Weakly b) Moderately c) Strongly | |
| 7. Ageing capacity a) Fast b) Moderately c) Slow | |
| 8. Comments, remarks | |

SECTION 4. VISUAL SYNTHESIS OF BEAUNE THEOREM IN FRENCH