

# Impact of the information provided to consumers on their willingness to pay for Champagne: comparison with hedonic scores

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## Abstract

This study was carried out in order to compare two mechanisms designed to reveal consumers' preferences: a Vickrey auction which measures willingness to pay, and a common hedonic test. Via these two methods, the objective was to assess the respective effects of sensory characteristics and external information on the overall evaluation of five brut non-vintage Champagnes. One hundred and twenty three consumers were randomly assigned to two groups and took part in one of the methods. Whichever the method, they evaluated the Champagnes in a blind condition, then on the basis of bottle presentation and, finally, after observing the bottle while tasting. Results revealed that the two methods performed equally in revealing the effect of external information on the overall evaluation of Champagnes. Participants are unable to discriminate Champagnes after blind tasting, while significant differences in preferences for the products appeared when labels were made known, and the preferences observed respected the hierarchy of the market. Nevertheless, some differences between the two methods were observed suggesting that these methods could be used differently according to the specific objectives of the study.

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## 1. Introduction

The value consumers put on a food product depends on the degree of product-information that is available to them. This information can be external, such as label, claims, and packaging, which are used as quality cues to infer a hedonic expectation. When a product is experienced, the sensory characteristics perceived by the consumers and expectation are combined into an overall product quality evaluation. Hedonic measurements (expected and liking evaluation) are usually performed in order to study how intrinsic and extrinsic characteristics interact in the global perception (Deliza, 1996; Lange, Rousseau, & Issanchou, 1999; Schifferstein, Kole, & Mojet, 1999; Siret & Issanchou, 2000). More and more, researchers use not only a hedonic test but also purchase intent measurements, using methods incorporating tasting into a conjoint analysis (Moskowitz, Krieger, & Barash, 1997; Solheim & Lawless, 1996; Vickers, 1993). However, there is a limit of such hedonic

or purchase intent declarative measurement which is due to the distance from real behaviour. Consumers may declare strong preferences and purchase intent for products with high perceived quality, without actually buying them once they are placed under economic constraints. Assessing consumers' willingness to pay for a product according to the information provided seems to be a promising way to overcome this limit.

In economic literature, recent studies have shown that auctions make it possible to place subjects in front of real choices where they reveal their true preferences and the values they put on different goods. A specific type of auction, the Vickrey second price auction, is commonly applied to elicit consumers' willingness to pay for real goods (Melton, Huffman, Shogren, & Fox, 1996; Menkhaus, Borden, Whipple, Hoffman, & Field, 1992) and in particular to assess the value consumers assign to food safety (Buhr, Hayes, Shogren, & Kliebenstein, 1993; Hayes, Shogren, Shin, & Kliebenstein, 1995; Noussair, Robin, & Ruffieux, 2001; Roosen, Hennessy, Fox, & Schreiber, 1998). The principle of this auction consists in asking individuals to submit a sealed bid which corresponds to the maximum price they would agree to pay for a particular product. The winner of

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such an auction is the highest bidder who actually has to pay for the product at the second highest price (Vickrey, 1961). Using this procedure gives the participants an opportunity to buy a product at a price lower than, or at the most equal to, the value they put on it, and their best strategy is to bid this value. Lecocq, Magnac, Pichery, and Visser (1999) used a Vickrey auction to assess the influence of the level of information on the value people put on wines. The authors observed that if individuals who have only tasted the wines blindly are informed about the external characteristics of the wines and opinions of experts, their willingness to pay increases substantially.

The purpose of this paper is to report results of a Vickrey auction designed to reveal the willingness to pay for Champagnes presented in different information conditions and to compare them with results obtained with a current hedonic measurement performed under the same conditions. We assumed that a procedure including a potential purchase would provide more incentive, be more involving, and would lead to better discrimination between Champagnes and between information conditions.

## 2. Materials and methods

A panel of consumers was selected and separated into two groups which participated in either a Vickrey auction or a hedonic test. Apart from the method, the two groups were placed in the same situation: they had to evaluate five Champagnes in three different information conditions.

### 2.1. Consumers

The specific protocol described by Lange et al. (1999) and Lange, Issanchou, and Combris (2000), was used in order to recruit naive consumers of all socio-economic classes. This procedure consists of random choices of phone numbers in representative districts of all socio-economic classes of the town where the study was performed (Dijon). For this specific study, individuals contacted by phone were selected if they drank Champagne at least four times per year, regularly participated in their

food purchasing, and had never taken part in any descriptive sensory analysis before. More than one hundred and twenty consumers satisfied all the conditions and agreed to participate. In accordance with their availability, they were assigned to one of the two methods. Fifty seven took part in the auction (group 1) and sixty six in the hedonic test (group 2). All participants received a letter to attend one session, and for those who participated in the auction, this letter contained a precise description of the auction procedure.

Consumers' information obtained by phone and from a questionnaire filled in during the session gave us details about individual characteristics of our subjects. Table 1 presents summary statistics for the socio-economic variables describing the two groups. Student's *t*-test revealed non-significant differences between the two groups regarding the following individual characteristics: age, number of persons in household, household monthly income, monthly income per person, purchase price of usual Champagne; and a chi-square test revealed a non significant difference for gender. It is thus possible to compare the behaviour of these two groups.

### 2.2. Product and presentation conditions

Five brut non-vintage Champagnes were chosen for this experiment, selected for their differences in the market price hierarchy. There were three "great brands" (from some of the most well-known houses of the former "Syndicat des Grandes Marques"), one Champagne from a brand with a reputation of middle-range quality (the "middle range brand") and a Champagne from an unknown brand sold at the lowest market price (for brut non-vintage Champagnes). Table 2 presents the prices of these Champagnes bought in supermarkets.

During the session, participants of the two groups had to evaluate the five Champagnes in three different information situations. They first had to evaluate each product after tasting. They were told only that they were served brut non-vintage Champagnes (condition 1: *blind*). Then, subjects evaluated their expectation after handling each bottle but without tasting the Champagnes (condition 2: *bottle*). Finally, participants had to evaluate each product seeing the bottle while tasting a

Table 1  
Characteristics of the two samples of consumers

Variable	Auction (57 participants—36 males and 21 females)				Hedonic test (66 participants— 40 males and 26 females)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Age (in years)	44.56	13.80	23	71	45.77	14.71	22	77
Number of persons in household	2.51	1.43	1	7	2.67	1.29	1	7
Household monthly income (FFr)	20 518	11 187	4000	60 000	20 757	9059	4500	50 000
Monthly income per person (FFr)	9150	4012	1429	19 000	9611	6863	2167	50 000
Purchase price of usual Champagne	91.35	23.65	55	150	93.90	19.90	50	150

Table 2  
Market prices of the five Champagnes

Champagnes	Information	Market prices (FFr/Euros)
LP	Lowest-price (unbranded)	69.90/10.67
MR	Middle range brand	129.60/19.76
B1	Great brand	134.95/20.57
B2	Great brand	144.40/22.01
B3	Great brand	151.95/23.16

glass of the corresponding Champagne (condition 3: *full information*). For the product evaluations with tasting, 15 ml of Champagne were served in a glass at a temperature of  $9 \pm 2$  °C and consumers were asked each time to drink the whole sample.

In the blind condition, presentation of the Champagnes followed a Williams Latin square balanced for order and first-order carry-over effects (MacFie, Bratchell, Greenhoff, & Vallis, 1989). In the other two conditions in which the bottles were distributed (conditions 2 and 3), the presentation order of the products was identical for all the subjects of a same session, but it was balanced between the sessions. This design was chosen to prevent participants from seeing which bottles were handed to other participants. Nevertheless, in the same session, the presentation order for condition 2 differed from the presentation order for condition 3.

For each information situation and for each Champagnes, consumers of group 1 had to submit a purchase price whereas consumers of group 2 had to give a hedonic score.

### 2.3. Procedure

For each method several sessions were organised with a maximum of 18 consumers within each session. All the sessions took place in a sensory room equipped with separated booths, where the temperature was controlled ( $20 \pm 3$  °C). The sessions were held at the end of the afternoon, which is a common consumption time for Champagnes, and lasted approximately 2 h for the auction and 1 h for the hedonic test. The longer period of time for the auction was due to the time devoted to the training at the beginning of the session and to the time devoted to the sale of the product at the end of the session.

### 2.4. Vickrey second price auction

First, participants had to read a short note explaining that they were going to evaluate different products and to submit a purchase price for each one of them while taking part in a succession of auctions. The important point was that submitting bids implied a commitment to buy the product if the participants actually won the auction. The participants who agreed and signed the consent received FFr200 in cash for their participation.

Then, the experimenter explained aloud the principle of the auction (see Appendix). In order to be sure that all participants correctly understood the rules of a second price Vickrey auction and that their best strategy was to submit their true reservation price, a training phase was performed with bars of chocolate. During this phase, the procedure was exactly the same as for the Champagne test and participants were encouraged to ask questions.

Then the actual Champagne phase began. The experimenter explained that several Champagnes would be evaluated in different information conditions. The first Champagnes would be evaluated after blind tasting. The following Champagnes would be evaluated after examination of the bottle with no tasting, and the last ones would be evaluated after examination of the bottle and tasting. Participants were informed that only one situation, randomly chosen by one of them, would become effective. This procedure was chosen to avoid endowment effects (i.e. to avoid that once a consumer has won a bottle, he gives lower prices to avoid to spend more money) and strategic behaviour leading subjects to submit a high reservation price only in the situation they preferred. Moreover, we informed subjects that if the highest price suggested in the randomly selected situation was lower than the experimenter reservation price i.e. the minimum price for a brut non vintage Champagne available in our town supermarkets (it was equal to FFr60), there would be no winner. This price, contained in an envelope, remained secret during the experiment, but subjects could know it at the end of the session.

For each situation (product  $\times$  information condition), consumers had to evaluate the Champagne and to write their reservation price on a paper. This price corresponded to the maximum price they would be willing to pay for the product. Papers were collected as soon as each product was assessed in order to prevent subjects from reconsidering their evaluation.

After the assessment, subjects answered a number of questions concerning their socio-economic characteristics and their Champagne consumption habits. Finally, one participant was asked to randomly select a situation among the 15 achieved (5 products  $\times$  3 information conditions). The bids submitted by all subjects in this selected situation were then disclosed and the experimenter announced the identification number of the participant who submitted the highest bid and the price he would have to pay at the end of the session (the second highest price). In case the highest bid was submitted by two or more subjects, the winner was randomly selected among these subjects using a die. After participants had asked all the questions they wanted, the session ended with the payment of the products bought by the winners of each phase (chocolate and Champagne).

### 2.5. Hedonic test

At their arrival, participants of the second group received instructions concerning the session. The conditions of Champagne evaluation were exactly the same as for group 1 except that subjects were required to indicate successively their appreciation of each Champagne in each information condition on a 16 cm linear scale, anchored at the left end with 'I disliked extremely' ('I would certainly dislike'<sup>1</sup>) and at the right end with 'I like extremely' ('I would certainly like'). Marks on the scales were then converted into scores from 0 to 10. At the end of the hedonic measurements, we collected the same individual characteristics (socio-economic and consumption habits) as for consumers of group 1. Finally, after participants had asked all the questions they wished, they could choose one bottle of Champagne among the five tested, as a reward for their participation.

## 3. Results

Results are based on the comparison of the evaluations of the different Champagnes obtained with the auctions and with the hedonic test.

### 3.1. Comparison of the distributions of prices and hedonic scores

Fig. 1 shows an example of the distributions of reservation prices and hedonic scores for one Champagne (B2) in the three different information conditions. Prices range from 0 to FFr136 in the blind condition, from 20 to FFr199 in the bottle condition and from 25 to FFr180 in the full information condition when consumers were placed in an auction situation. The hedonic scores range respectively from 0.09 to 8.53, from 4.58 to 10 and from 1.28 to 9.99 in the blind, bottle and the full information conditions.

Comparing the distributions obtained with the two methods shows similar shifts according to the conditions: prices and scores are at their lowest under blind tasting, they reach their highest level when only external information is provided (bottle), and have an intermediate value under the full information condition.

Comparing the distributions according to the method for each condition shows fewer high prices than high scores. The greater commitment in the case of auctions may be an explanation for this shift: it does not cost anything to give a high score, while submitting a high

price increases the participant's probability of buying the corresponding Champagnes; in the same way giving a very low price can be viewed as a guarantee of not being compelled to buy a Champagne the participant does not really want to buy.

### 3.2. Comparison of individual coefficients of variation for prices and scores

A Kolmogorov–Smirnov test was performed to compare the distributions of individual coefficients of variation between prices and scores in each information condition. Results showed a significant difference between the two distributions only when Champagnes were evaluated in the blind condition ( $K_s=0.42$ ;  $P<0.001$ ). Observation of the graphs (Fig. 2) clearly shows that the coefficients of variation were higher and presented a higher heterogeneity for hedonic scores than for prices. This result could be interpreted as a higher consumer reactivity to the sensory characteristics with a hedonic measure compared to an auction procedure when products are evaluated in the blind condition. This might also be the result of more conservative behaviour in the case of auctions, when a bottle has to be bought on the basis of sensory information only.

### 3.3. Comparison of the effect of Champagne and information condition on the level of prices and scores

A first analysis of variance was performed by method and by information condition in order to test possible effects of Champagne, presentation order and session on reservation prices and hedonic scores. A significant effect of session was observed for the consumers who were placed in an auction situation. In fact, during one session, some participants asked a lot of questions and, even after signing the consent, they appeared suspicious about the procedure during the whole session. This created an atmosphere of uncertainty which led to a decrease in the mean reservation prices by about FFr20 compared to the other sessions. Such an observation casts light on a possible bias of the reservation price measurement and the importance of giving clear information at the recruitment stage and of providing a training phase. It also reveals that consumers feel really involved in such an auction procedure. Nevertheless, an analysis performed without taking the prices of this particular session into account did not produce any changes in the conclusions about reservation prices. Moreover, the effects of Champagne and information condition were identical to those observed in the other groups.

Table 3 presents the results of a second analysis of variance performed according to a more complete model:

<sup>1</sup> The terminology in parentheses was used for the evaluation in the bottle information condition, i.e. evaluation of expectation based on external information.

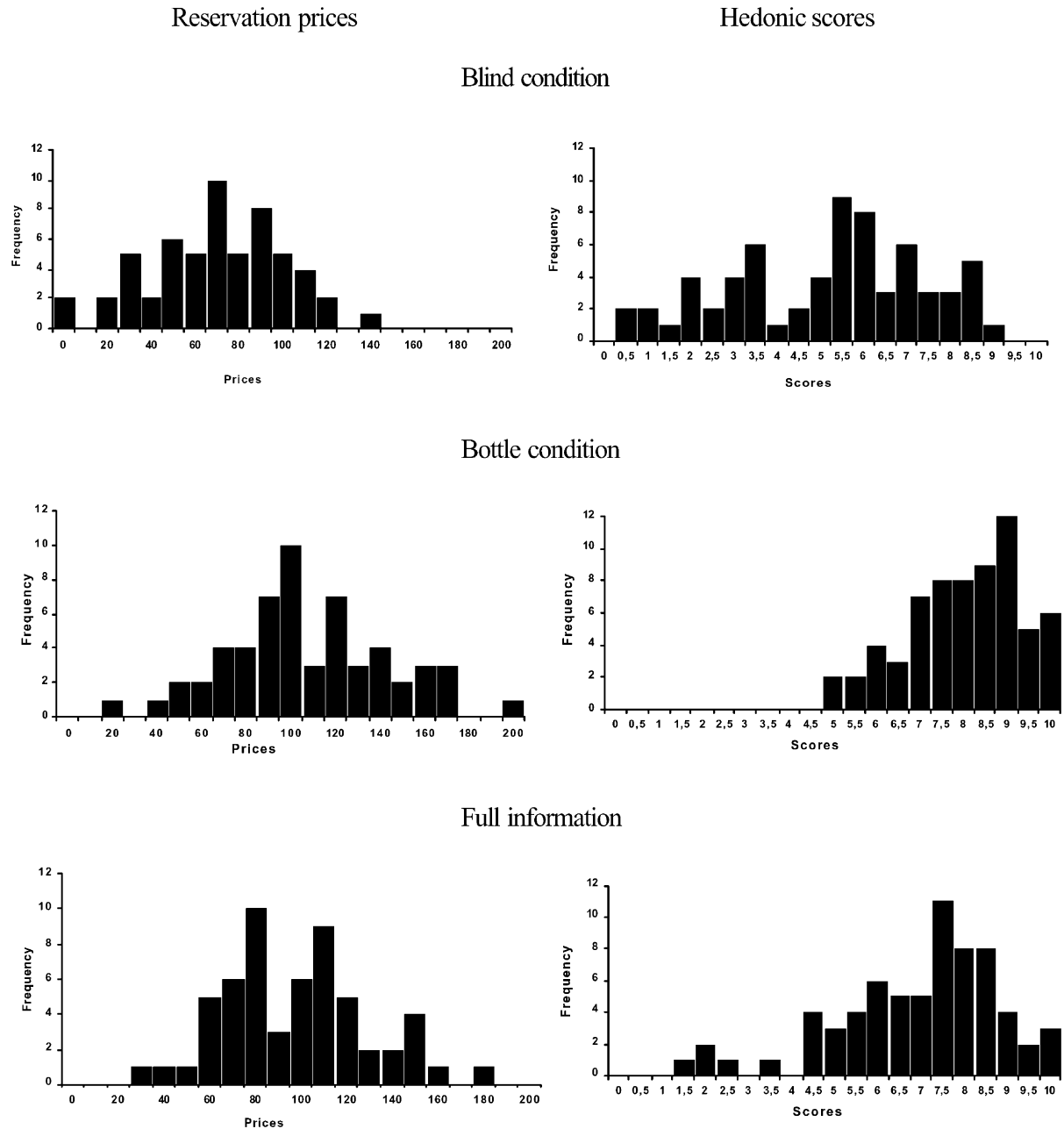


Fig. 1. Distribution of reservation prices and hedonic scores for Champagne B2.

Prices = consumer(session) + Champagne + condition + session + Champagne × condition + session × condition + Champagne × session + Champagne × consumer(session) + condition × consumer(session) + error.

An identical model was used for the hedonic scores without the terms including the session factor. Consumer effect and interactions with consumer were regarded as random effects while other effects included in the model were regarded as fixed. This analysis, which took all information conditions into account,

confirmed the effect of the session for consumers who submitted reservation prices. This effect does not depend on either products or information conditions (interactions with session were not significant).

Comparison of the results obtained by the two methods shows greater product and product × condition effects for reservation prices than for hedonic scores. Conversely, condition effect was lower for reservation prices. This was due to the fact that the interaction of consumer × condition was greater and more significant for prices than for scores. So, we also calculated the cumulated effect of information condition and consumer × condition. Results showed, conversely, a greater effect of information

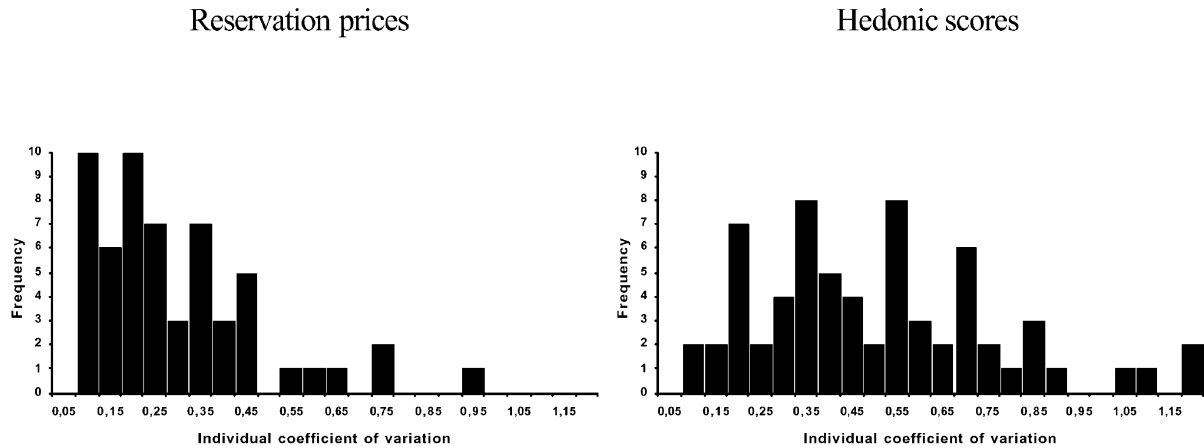


Fig. 2. Distribution of individual coefficients of variation of prices and scores in blind condition.

Table 3  
Factors influencing the level of prices and scores

	Reservation prices			Hedonic scores		
	df	F	P-values	df	F	P-values
<b>Fixed effects</b>						
Champagne	4	60.89	0.0001	4	37.67	0.0001
Condition	2	48.35	0.0001	2	61.06	0.0001
Champagne×condition <sup>a</sup>	8	33.33	0.0001	8	16.86	0.0001
Session	4	2.85	0.0330	–	–	–
Session×Champagne	16	1.39	0.1494	–	–	–
Session×condition	8	1.07	0.3930	–	–	–
<b>Random effects</b>						
Consumer <sup>b</sup>	52	7.72	0.0001	65	3.73	0.0001
Consumer×product	208	1.94	0.0001	260	1.19	0.0540
Consumer×condition	104	2.14	0.0001	130	1.11	0.2104

<sup>a</sup> Condition refers to the information condition which could be “blind”, “bottle” or “full information”.

<sup>b</sup> For reservation prices, consumer factor is nested within “session” factor.

condition for the consumers placed in an auction situation ( $F=4.05$ ) than for those participating in the hedonic test ( $F=2.13$ ).

Fig. 3 displays the means of reservation prices and hedonic scores by method, information condition and product with the corresponding 95% confidence intervals. Comparison of means shows that, whatever the method, no significant differences appeared between the Champagnes when consumers had no external information. On the contrary, external information led to higher prices and scores for the three great brands (B1, B2, B3) and the middle range brand (MR), and to significantly lower prices and scores for Champagne (LP). Except for the lowest price Champagne, full information tended to induce a decrease in evaluation compared to the bottle condition, suggesting an impact of sensory characteristics. Nevertheless, mean prices and scores

reproduced the hierarchy of market prices when the consumers were informed of the Champagne brand names; participants were clearly willing to pay more for great brands than for the middle range brand and the lowest price Champagne.

### 3.4. Impact of external information: comparison between reservation prices and hedonic scores

We studied the impact of a mismatch between the expected and the perceived evaluation on global evaluation of the Champagnes and compared results obtained with the two methods. The difference between evaluation under “full” information and “blind” information was plotted versus the difference between evaluation under “bottle” and “blind” condition. Previous studies showed that the scatter of observations can be summarised by a regression line, whose slope lies between 0 and 1. That means that evaluation under full information differed from the blind evaluation and was in the direction of the “bottle” evaluation. When the slope is equal to zero, external information has no effect on the overall evaluation while when the slope is equal to one, sensory characteristics have no effect on the overall evaluation. Sensory characteristics and external information have the same impact when the slope is equal to 0.5.

Regression analyses were performed separately for each method. We first carried out a sub-model test in order to examine the difference between slopes and intercepts according to the product. Whatever the method, no significant difference was found, and we then focused on the overall analysis which took all products into account (Fig. 4).

For the two methods, results revealed a greater impact of external information than of sensory characteristics on overall evaluation: indeed the slopes of the regression lines were higher than 0.5 (0.73 for the auction situation and 0.74 for the hedonic test). While these

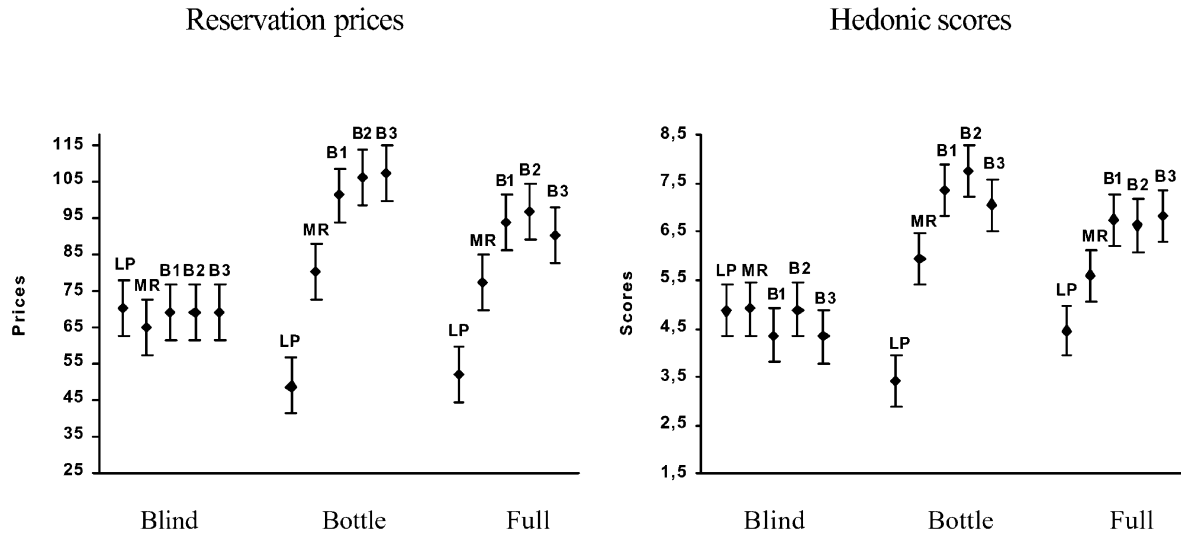


Fig. 3. 95% Confidence intervals of mean prices and scores.

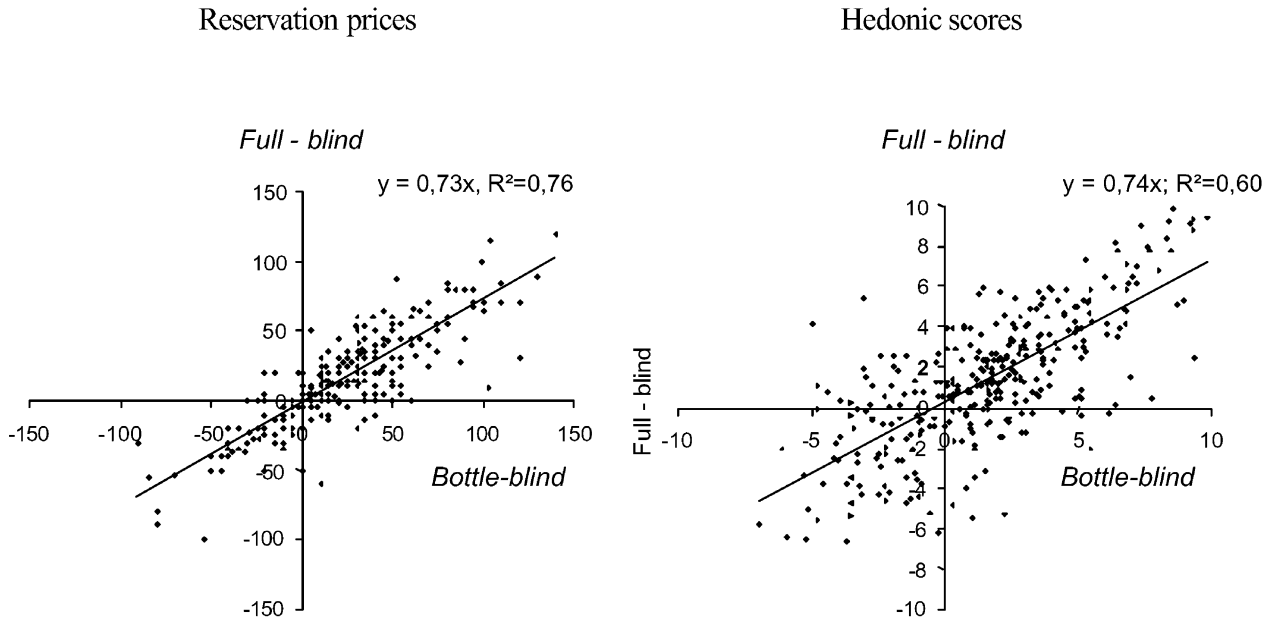


Fig. 4. Plots of the effect of external information. Equation and proportion of variance explained ( $R^2$ ) of each regression line obtained for each method.

slopes were almost the same for the two methods, the proportion of variance explained was higher with prices than with scores (respectively 0.76 and 0.60). This observation confirms the higher homogeneity of consumers' behaviour when placed in an auction situation compared with consumers who gave hedonic scores.

### 3.5. Effect of individual characteristics

After participants had evaluated the Champagnes in the different information conditions, they were asked to complete a short questionnaire (see Appendix). We

wanted to know if individual socio-economic characteristics and Champagne consumption habits influenced the variation of prices and scores. For each factor, we split the panel of consumers into two levels taking care to obtain sub-groups of similar size. The impact of these individual characteristics was tested on prices and scores in each information condition, and also on the impact of external information for the group of consumers who gave prices and for the group of consumers who gave scores. Table 4 lists the characteristics that had a significant effect on either mean values (prices or scores) or on the impact of information (prices or scores).

Table 4  
Socio-economic characteristics and Champagne habits of consumers

Factors	Level	Definition of each level	Reservation prices (%)	Hedonic scores (%)
Gender	Men		63	61
	Women		37	39
Age	Young	≤ 40 years old	47	47
	Old	> 40 years old	53	53
Brand loyalty	Loyal		36	42
	Not loyal		64	58
Frequency of consumption	Low	≤ once/2 months	51	51
	High	> once/2 months	49	49
Purchase place	At a producer's		53	50
	Not at a producer's		47	50
Maximum price paid for a very good Champagne	Low	< 150 FFr	58	39
	High	≥ 150 FFr	42	61
Household monthly income (FFr)	Low	< 20 000 FFr	51	53
	High	≥ 20 000 FFr	49	47

### 3.5.1. Effect of individual characteristics on reservation prices and hedonic scores

An analysis of variance was performed in order to evaluate the effect of each of these characteristics on the variation of prices or on the variation of scores according to the following model:

Prices (or scores) = consumer(characteristic)  
+ Champagne + characteristic + characteristic  
× Champagne + error; the characteristic effect was tested against consumer(characteristic).

The left part of Table 5 reports mean values for each level of each characteristic according to the information condition and the method (prices or scores). In the blind condition, gender had a significant effect on the hedonic evaluation of Champagnes: the scores were significantly higher for men than for women. Moreover, there was a significant gender×product interaction; women only undervalued the lowest price Champagne compared to men. In each information condition, consumers who are older than 40 years old bid significantly more (on average FFr7 more) than the youngest participants, while for hedonic scores, no significant difference was noted. Such a behaviour could be related to a higher income of the older consumers but no significant difference of income appeared between the two age sub-groups. Moreover, in the bottle condition, consumers who are loyal to a specific brand gave higher bids than those who are not loyal to a brand. In the full information condition, consumers whose Champagne consumption is the most frequent also gave higher bids. When external information was provided, another important behavioural characteristic of the participants is the maximum price they are willing to pay for a very good Champagne. Consumers for which this price was high tended to bid more in the bottle and full information condition. Such

effects could be associated with better knowledge of the brand names and would influence the reservation price which could become the purchase price. Moreover, in the bottle condition only, the significant 'maximum price they accept to pay for a very good Champagne×Champagne interaction revealed that this overestimation is mainly observed for the most expensive Champagne (B3). Curiously, consumers with the lowest income gave higher scores than the most well-off participants when the bottle was distributed; this is probably due to the image conveyed by great brands of Champagne. Interestingly, this effect was not observed when consumers had to submit a purchase price.

### 3.5.2. Effect of individual characteristics on the impact of external information

Since the slope of the regression of 'full information minus blind' versus 'bottle minus blind' measures the impact of external information, significant differences in slopes according to the different levels of individual characteristics are an indication of an effect of individual characteristics on the impact of external information. The model tested is the following:

$$(\text{Full information} - \text{blind}) = (\text{bottle} - \text{blind}) \\ + \text{characteristic} + \text{characteristic} \times (\text{bottle} - \text{blind}) + \text{error}.$$

A significant interaction of *characteristic*×(*bottle*–*blind*) means that the regression slope differs between the two levels of the characteristic studied. The right part of Table 5 gives mean slopes for sub-groups of each characteristic and the significance level of the difference between sub-groups.

Differences appear more frequently for hedonic scores than for reservation prices. Concerning hedonic scores, women appeared to be more influenced by external information than men. Consumers who mainly bought their Champagnes at a producer's were less affected by



Table 5  
Effect of socio-economic characteristics and Champagne habits on prices and scores and on the impact of external information

Factors	Level	Conditions and methods							
		Blind <sup>a</sup>		Bottle <sup>a</sup>		Full information <sup>a</sup>		Impact of information <sup>b</sup>	
		Prices	Scores	Prices	Scores	Prices	Scores	Prices	Scores
Gender	Men	72	<b>5.0**</b>	92	6.5	84	6.3	0.75	<b>0.63</b>
	Women	61	<b>4.2</b>	86	6.0	79	5.7	0.73	<b>0.83**</b>
Age	Young	<b>59</b>	4.5	<b>82</b>	6.3	<b>73</b>	5.8	0.76	0.67
	Old	<b>77**</b>	4.8	<b>96*</b>	6.3	<b>91*</b>	6.3	0.73	0.77
Brand loyalty	Loyal	70	4.8	<b>94*</b>	6.2	84	6.4	0.73	<b>0.63</b>
	Not loyal	69	4.6	<b>88</b>	6.3	81	5.8	0.76	<b>0.77</b>
Frequency of consumption	Low	61	4.7	81	6.0	<b>75</b>	5.8	<b>0.81*</b>	<b>0.63</b>
	High	76	4.7	98	5.6	<b>90*</b>	6.3	<b>0.68</b>	<b>0.77</b>
Purchase at a producer's	Yes	73	4.8	90	6.1	84	6.2	0.75	<b>0.64</b>
	No	65	4.6	89	6.5	81	6.0	0.73	<b>0.79*</b>
Maximum price paid for a very good Champagne	Low	65	4.8	<b>84</b>	6.2	<b>77</b>	6.0	0.74	0.66
	High	73	4.6	<b>96</b>	6.4	<b>89</b>	6.0	0.75	0.74
Household monthly income (FFr)	Low	65	4.8	87	<b>6.7*</b>	81	6.3	0.76	0.72
	High	72	4.6	92	<b>5.9</b>	84	5.8	0.73	0.71
Monthly income per person (FFr)	Low	63	4.8	86	6.3	78	6.0	0.71	0.73
	High	73	4.5	92	6.4	87	6.1	0.78	0.71

Values in bold reveal a significant difference between the two groups with a  $P$ -value  $< 0.01^{**}$ , with a  $P$ -value  $< 0.05^*$ , with a  $P$ -value  $< 0.10$  (no star). When values are in italics it means that there is a significant 'characteristic  $\times$  product' interaction.

<sup>a</sup> Mean prices or mean scores.

<sup>b</sup> Slope of the regression assessing the impact of external information.

bottle presentation. Moreover, consumers who are not loyal to a specific brand tended to attach a great importance to the label, certainly due to low knowledge of Champagne ( $P$ -value  $< 0.10$ ). On the other hand, infrequent consumers of Champagne who were placed in an auction situation agreed to pay more for Champagnes whose label induced a high expectation whereas the opposite tended to be significant for hedonic scores. This result suggests that for these consumers, labels of well-known brands represent a high market value rather than a high personal hedonic expectation.

#### 4. Discussion

##### 4.1. Impact of external information on the product evaluation

Many researchers have studied how extrinsic factors interact with intrinsic characteristics on the overall evaluation of a product but these studies only concerned hedonic measurements. Different models were considered (Anderson, 1973) to describe how a difference between

expected and blind evaluation influences product evaluation. Most of the studies revealed an assimilation effect, i.e. an evaluation under full information which differs from blind evaluation and which is in the direction of the external information evaluation (Cardello, & Sawyer, 1992; Deliza, 1996; Shepherd, Sparks, Bellier, & Raats, 1991/1992; Tuorila, Cardello, & Leshner, 1994). In a study concerning orange juices, Lange et al. (1999) also observed an assimilation effect with a regression slope equal to 0.50, meaning that the impact of the external information was as important as the impact of sensory characteristics. However, for a product whose image has a great impact such as a Burgundy red wine, Lange (2000) observed a regression slope of 0.68, suggesting a higher impact of the label than of intrinsic characteristics. In the present study, we also observed this phenomenon whatever the method, and as expected, the impact of external information was greater than the impact of sensory characteristics (with average slopes equal to 0.70). The type of product could also explain this result: Champagne is a festive product which is mainly consumed in specific social occasions where the image of the product is important. Consumers may

choose Champagnes according to the brand reputation, which explains the decisive influence of external information on scores and reservation prices.

Due to the choice of the Champagnes for the present study, the stimulus range was skewed toward great brands. Thus, we had a better chance to observe a negative disconfirmation than a positive one. Actually, on Fig. 4, there are more points on the positive part of axis 1 than on the negative part. One can wonder if this dissymmetry could have influenced the relative weight of the external information compared to the sensory characteristics of the product. Indeed, Deliza (1996) stated and observed that people are more likely to assimilate towards their expectation after a negative disconfirmation than a positive one. Such a tendency was also observed by Siret and Issanchou (2000) and by Lange (2000). So, it would be useful to perform other experiments with a different stimulus range. Nevertheless, we can conclude that a great brand has a positive impact on the product perception.

#### 4.2. *Comparison of reservation prices and hedonic scores*

We expected that the effects of Champagnes and information conditions would be greater with an auction mechanism, which is more involving, than with a hedonic test. Results showed that our hypothesis was confirmed. A higher product discrimination is observed with bids than with scores.

Despite this difference, the two methods lead to the same hierarchy of Champagnes in each information condition. Moreover, the respective weight of external and sensory characteristics on the global evaluation is identical when it is obtained with hedonic measurements or measurements of the willingness to pay.

Nevertheless, as there are possible influences of one individual on the behaviour of the other consumers participating in the same session in an auction procedure and not with hedonic measurements and as an auction needs more training and thus is a longer and more expensive method, one could conclude that the hedonic method is a valuable method to obtain information on the value consumers put on a food product.

However, it is clear that the auction procedure gives supplementary information, i.e. the value given to particular characteristics is expressed in a monetary unit that has a common and recognised nominal value even if its utility may differ from one individual to another depending, among other things, on income. On the contrary, a hedonic score cannot be interpreted with certainty even in terms of acceptance and the level under which the product will never be bought whatever its price is unknown whereas a reservation price equal to 0 or very low means that the consumer does not want to buy such a product.

If, from a practical point of view, the difference between the conclusions brought by the two methods is

that the auction is more discriminative, a more detailed examination of the results reveals some differences in the consumers' reaction when they are simply asked to give a hedonic score and when they are asked to give the maximum price they are ready to pay for a particular product. These differences are worth discussing as they bring a better understanding of the underlying mechanisms that are used in each method by the subjects.

The first difference concerns the evaluation in the blind condition: the individual coefficients of variation of scores are higher and more scattered than those obtained for bids. We can suppose that consumers tend to be cautious when giving a bid if they do not have the label because it is not a natural situation, and even if they like the tested samples they limit their range of bids. Concerning the higher individual coefficients of variation observed for scores, one wonders if they reflect real differences in quality perceived or, if consumers tend to react strongly to small differences and to use a larger part of the scale as there is no involvement when giving a hedonic score. However, we also observed that women gave lower scores for the lowest price Champagne in the blind condition but did not give lower bids. So, we can conclude that at least women detected a lower quality from the sensory properties of this product. Consequently it seems that hedonic measurements would be a more sensitive method to estimate the sensory value that consumers put on a food product. In order to be conclusive on this point, it would be necessary to work with another group of Champagnes which may present significant sensory differences.

The second difference concerns the interindividual heterogeneity in the relative weight of intrinsic and extrinsic characteristics which is greater for hedonic scores than for reservation prices. Such a result could be due to the fact that by giving a reservation price, consumers did not indicate only one's preference because they were influenced by the commercial value of Champagnes. As the participants were regular buyers of Champagnes, they had knowledge of the prices which prevented them from giving a very low price. We also observed that women gave lower scores than men but did not give lower reservation prices. It is possible that they are less confident in their own judgements and, thus, when they are asked to give a reservation price their answers do not only reflect the personal sensory value they gave to the product but also a common market value. The fact that the impact of external information in the global scores is higher for women than for men is consistent with this hypothesis of lower confidence for women. Older consumers gave higher reservation prices in all information conditions and this age effect did not appear to be due to an income effect. So, it means that bids do not only reflect perceived quality but also the priority given by a consumer to the studied goods. In our case, it would reveal that a festive

product such as Champagne is not a priority for the youngest consumers. This age difference, which is only observed with reservation prices, clearly demonstrates that the auction procedure gives more information than the hedonic measurement and is quite sensitive to socio-economic determinants even if it is an experimental procedure. Finally, consumers who have the lowest incomes gave higher scores but not higher bids when they evaluated the products on the basis of the bottle presentation. Once again, this result illustrates that the auction procedure provides an incentive and is an involving method in which economical constraints are as much a determining factor of consumers' behaviour as they are in real life.

In conclusion, in this study both hedonic measurement and the auction procedure lead to the same result in terms of product differences. Nevertheless, consumers do not react in a similar way in these two experimental conditions. So, one can choose one or the other method depending on the precise objective of the study. In order to get more precise information on the intrinsic value of a product, hedonic measurement in a blind condition seems to be a more sensitive method. Auction seems to be a more relevant method to obtain valid information on the perceived value of a brand or of a product tested in the presence of external information. Indeed, auction allows one to know the monetary value attributed to a given brand or product while taking into account the economical constraint faced by the consumers.

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### **Appendix. Instructions for the auctions**

Today, you will have the opportunity to evaluate several products, in different information conditions. Each product you will evaluate will be made available for purchase according an auction method, the second price Vickrey auction. The principle of this auction method is the following:

Second price Vickrey auction consists in requiring you to write on a paper, for each product evaluated, the maximum price you would accept to pay for one unit of this product; it is called the 'reservation price'. Then, the participant who submitted the highest price becomes the

winner and he (she) has to pay the product, not at the price he (she) submitted but at the second highest price i.e. the second highest submitted bid. This procedure allows one of you to buy a product at a price lower than, or equal to the price he would normally accept to pay. For example, suppose that there are four participants taking part in a Vickrey auction for a bottle of red wine. The result of bids is: participant 1: FFr95; participant 2: FFr70; participant 3: FFr110; participant 4: FFr100. Participant 3 wins the bottle and pays FFr100 for the bottle (the second highest price).

We wish to know the value that the products have for you. Their commercial value does not interest us. When you do not like a product, you can suggest a price as low as you wish, provided that it represents the price you are willing to pay for obtaining the product.

This session is divided into two stages: first a training phase then a phase with Champagnes. The training phase will be performed with 2 bars of chocolate. You will successively submit your reservation price for each of these bars, initially on the basis of brand and thereafter on the basis of observation of the packaging. At the end of this training phase, you will have submitted a price in four situations (2 products×2 information conditions). Only one situation randomly selected will become effective at this stage. In this situation, the buyer will be the person who suggested the highest price. He will pay the bar of chocolate at the second highest price.

The second stage will concern Champagnes. All the Champagnes you will evaluate today are brut non-vintage Champagnes. In the first part, you will be able to taste successively several Champagnes in a blind condition and to submit a reservation price without any other information concerning the products. Then, we will successively distribute a bottle of different Champagnes and you will submit prices on the basis of the observation of these bottles. Finally, you will have the opportunity to successively observe several bottles and for each bottle to simultaneously taste the corresponding Champagne before submitting your bid. At the end of this part, only one situation will be randomly selected and will become effective. Then the participant who gave the highest price in that situation will have to buy one bottle and will pay the price corresponding to the second highest bid.

For each product, you will indicate your price on a paper in French Francs (the centimes are not authorised). Papers will be collected after each product evaluation, you will not have the possibility to reconsider your prices.

Now, we will distribute you a paper, indicating your commitment to buy a product at the end of the session if you win an auction. If you agree, just sign the consent and you will receive FFr200 in cash for your participation.

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