

Analysis of Reserve and Regular Bottlings: Why Pay for a Difference Only the Critics Claim to Notice?

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Abstract

I report my tests of the hypothesis that wine consumers cannot distinguish the difference between regular and reserve bottlings of otherwise-similar wines. My results suggest that only about one purchaser in five should even consider buying the reserve bottling of a wine, rather than the regular. But since I cannot tell you how to distinguish that one person out of five, we can all aspire to drinking the reserve. I have more than 800 observations of wine drinkers' who engaged in the following experiment. The drinker faces 3 glasses of wine, two of which contain identical wines [either the regular or the reserve] and the third contains a different wine [the other one]. I record whether the drinker can distinguish wines—whether he can tell the singleton from the doubleton and, if the drinker can distinguish, which wine he prefers. I find that just over 40 percent of the drinkers distinguish correctly, whereas one-third could if the process were random. Of those 40 percent who can distinguish, 52 percent prefer the more expensive, reserve wine, whereas half would if the process were random. For this data set, 52 percent does not differ significantly from the expected-if-random half. I have recorded the sex of the testers and I can find that men can distinguish the wines better than random, but women cannot. The differences are so small, even though significant, however, that the Exact F test detects no significant difference between the ability of men and women in these tests. The results span tests of wines from Bordeaux, Burgundy, the Rhone, Spain, New Zealand, Italy, California [both red and white], Oregon, and Australia; the tests include still and sparkling wines.

Introduction

The wine maker harvests the grapes, sorting the best from the ordinary. At the end of the harvest, the pile of ordinary grapes exceeds the size of the pile of the best grapes, often by a factor of more than five. The wine maker takes special care in turning those best grapes into wine, bottles it separately, labels it differently, calls it the *Reserve Bottling*, to distinguish it from the bottling of wine made from the ordinary grapes, and offers it for sale at a price from as little as 40 percent higher to as much as three times the price of the regular bottlings. The process of

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sorting ordinary from best may involve the wine maker's selecting barrels of grape juice after the press or after some aging, or from sorting wines grown on one plot differently from another plot. One way or another, the wine maker distinguishes regular wine from similar, putatively great wine, with a *reserve* designation, perhaps using a different word, but the same concept.

Here, I report my tests of wine testers' ability to distinguish reserve bottlings from regular. My results show that:

- ? just over 40 percent of my wine tester subjects can distinguish in blind testings the regular from the reserve versions of a wine, whereas one-third could if the process were random, and
- ? of those who can distinguish, half prefer the reserve and just under half prefer the regular.

Conclusion. Wine drinkers cannot distinguish much better than chance between regular and reserve versions of a wine. Those who can distinguish the difference do not prefer the more expensive reserve except at random. In only a fifth of the tests could the tester both distinguish the regular from the reserve and prefer to drink the more expensive reserve.

Methods

First, and most difficult, I located pairs of wines with the following characteristics: the testers could afford them [\$40 or less per bottle on average], the pairs have identical features² in all respects except one is a regular bottling and one is a reserve bottling. One difficulty facing experimenters who wish to buy wines simultaneously results from the fact that many wine makers release their reserve wines a year or two after their regular bottlings, so getting regular-reserve pairs matched on vintage presents more difficulty than you might imagine.³

To be clear, look at Exhibit 1, testing number 2, French Bordeaux. The pair of wines reported here are from Ch. Latour, the regular being the second wine of Latour, the La Forts de Latour [costing \$56 per bottle], and the reserve being the famed, first-growth Ch. Latour [costing \$200 per bottle].

Second, I split the wine into four containers labeled A, B, C, and D, putting each of the wines into exactly two of the four containers. I gave each tester wines from three of the four contain-

² Common features include all label items (such as shipper, vineyard, producer), retail source, and date of purchase.

³ My earlier paper based on the same experimental design, but testing whether drinkers can distinguish good from bad vintages of the same wine, suggests that vintage makes no difference. Still, for these tests I wanted to control for vintage to quiet the protests if I didn't. See R.L. Weil, "Parker v. Prial: The Death of the Vintage Chart," *Chance*, 14, 4 (Fall 2001), 27-31. In several sittings, involving a total of 40 testers, I had a pair of wines, the 1995 and 1998 Cristom Pinot Noir from Oregon, where one was a touted vintage reserve bottling and the other a bad vintage regular bottling. Of those 40 testers, only 14 could distinguish the singleton from the doubleton, and of those 14, 8 preferred the touted vintage reserve bottling—not different from random. I have not included the Cristom 40 testers in my totals where I test the reserve v. regular bottling hypothesis. Anne Taylor suggested the isolation of first-taste tests, reported in the third box of Exhibit 2.

ers.⁴ I asked each tester to say which of the three wines differed from the other two. Then, which of these did you prefer, the singleton or the doubleton? A typical tester, say one testing from containers A, B, and D, would respond something like, “wine A differs from B/D, and I prefer B/D.”

I tallied how many of the testers correctly distinguished the wines and which they preferred, although we don't later care which they say they prefer if they didn't correctly distinguish the wines.

About one-third of the way through my tests, I decided to keep data separately for men and women.

After the tally, I matched the wines to the letter labels and counted how many of the testers correctly distinguished between reserve and regular. I counted which of the wines the tester preferred if and only if that tester correctly distinguished the wines. I announced the result. Refer, for example, to the testing of the Ch Latour wines in testing number 2. I announced, “Thirteen of us tested these two wines; seven of us got the distinction right and of those seven, two preferred the reserve while five preferred the regular.”

I announced the result of each pair-wise testing before going on to the next pair. Most testers tested three pairs of wines. Exceptions were participants in Jul-01, 5-Jan-02, and Jun-02 sessions, each of whom tested two pairs, and participants in Mar-02, Apr-02, Jun-02, and Jan-03 sessions, each of whom tested only one wine. Exhibit 1 shows the order in which the subjects tested the wines on each date.

Most of the testers were either MBA students at the Graduate School of Business of the University of Chicago or its alumni, alumnae, and their companions. They are primarily upper middle-class, experienced and enthusiastic wine drinkers, but not experts. All testers paid an entry fee for the testing, which fee covered full costs of the testing, and in the case of some of the alumni, more. How often do experimenters get their subjects to pay to participate?

Basic Results

Exhibits 1 and 2 report the results, Exhibit 1 arranged by testing and Exhibit 2 by wine tested or by sex of tester or by type of wine or by timing of test within the multiple-wine tests. Each individual who tests a vintage pair has a one-third probability of correctly distinguishing the wines by chance: three glasses, one is different; one in three chance of guessing that glass. With n testers and random choices, the expected number of correct distinctions is $n/3$.⁵

⁴In the testings with 20 or more individuals, I had two bottles of each wine/vintage. I did not mix those two bottles and then split them in half, but gave the two bottles separate labels. I wonder if you'd prefer the experimenter to mix identical wines and then split into two containers, which controls somewhat for bottle variation but would not present wines the way individual buyers and drinkers face them.

⁵In the testings with experts and Conference attendees, who study wine-related issues for a living, I asked for help in generating a null hypothesis. Assume, I said, that a group of enthusiastic, experienced amateurs will attempt to distinguish between two wines, one a reserve and the other a regular bottling, with the reserve costing twice as much as the regular. What fraction of them would you expect to get the distinction correct. Estimates ranged from 1/3

Overall Results. Look at the bottom of Exhibit 1, the totals. A total of 381 testers have tested 829 pairs of wines. One-third of 829 is 276, so we'd expect 276 correct distinctions if the process is random where the testers cannot distinguish the wines. The observed number is 337, 40.7 percent. This differs from the expected relative frequency of 33.3 percent by over 4 standard deviations.

Refer to the second to last pair of columns in Exhibits 1 which reports the preferences of those who correctly distinguished the wines. Of the 337 pairs where the tester could distinguish correctly, the tester preferred the reserve in just over half [51.6% = 174/337] the pairs and the regular in just under half. The observed 51.6 percent differs from the expected-if-random 50 percent by an insignificant 0.6 of one standard deviation. So, even the testers who can distinguish reserve from regular have only an even chance of preferring the reserve.

How Much More Will the Tester Pay for the Reserve? Noted oenonomist Richard Thaler authored of the idea that investing in wine provides wonderful utility because the original purchase seems like an investment, but the actual drinking several years later, because of sunk cost fallacies of various kinds, seems costless: invest now; drink costlessly later; spend never. Thaler suggested that I track how much more the testers would pay for the wine they preferred. The last column reports for those who correctly made the distinction and preferred the reserve wine how much more the tester would pay for the reserve than for the regular. I show the price increment as a factor, so that the number 1.15 means the tester would pay 15 percent more for the preferred wine. The median excess price, reported by the testers who distinguished correctly and preferred the reserve, is about 15 percent. For only two wines was the price differential between the reserve and the regular less than 15 percent.

Detailed Results from Various Sub-sets of the Data

I have looked at the data disaggregated in various ways: by type of wine, by specific wine, by sex of the tester, and by when in the multiple-wine tests, the test occurred.

Some wonder if the results differ between *red and white* wines. No. See Exhibit 2 for the rows comparing results on red and white wines.

Some wonder if *type of wine* matters. Yes. About half the testers of the French Burgundy [Dujac] pair, the Gruaud Larose pair, and the Mondavi cabernets seem to distinguish the regular from the reserve in contrast to the overall population's 40 percent. And of those who can distinguish, more than half preferred the reserve in the case of the Burgundy and the Mondavi wines.

[the number we'd see from these tests if the process were random] to $\frac{3}{4}$. I judge the median estimate of these experts to be about 40 percent. Language difficulties prohibited gathering precise data on this question at the international conference.

Some speculate that testers' *ability to distinguish deteriorates as the number of wine pairs tested increases* above 1.⁶ No. Exhibit 2 reports that the ability to distinguish the regular from the reserve on the first test is slightly worse than the overall 40 percent.

Some wonder if *sex of tester* makes a difference. Yes and no. See the data in Exhibit 2. The percentage of men distinguishing the wines was 43.2% [= 117/271], whereas the percentage for women was 37.6% [= 70/186]. These values show that the men in my population, but not the women, perform statistically significantly better than random guessing (Z scores are 3.4 and 1.2 for men and women, respectively).

The percentages for men and women do not differ statistically significantly (Z score is 1.190 for the Fisher exact test of equality of rates). We cannot conclude that men do better in these tests than do women at conventional significance levels. These results parallel the results for the tests of men's and women's ability to both distinguish the wines and prefer the reserve (Z score of 2.9 and 0.0 for the binomial tests of men and women, respectively, and Z score of 1.756 for the Fisher exact test).

Among those who correctly distinguished between the wines, neither men nor women statistically significantly differ from expected-if-random guesses between reserve and regular, nor do they statistically significantly differ from each other. Hence, it appears that men can distinguish between wines, to a small degree, but they do not prefer the reserve wine.

Implications

What to do with these results?

- ? I recommend that you not buy cellaring quantities of reserve wines until you've tested yourself.
- ? Even if you can distinguish, check to make sure the amount by which you prefer the reserve over the regular justifies the cost differential you will have to pay for the reserve over the regular.
- ? If you serve the reserve wine, be sure to show your guests the label, because the chances are four to one against any one person's being impressed by the taste, so that any warm feelings the guest forms of your generosity will likely come from visual, not olfactory and taste, stimuli.
- ? If you serve a red wine early in the drinking session and the reserve's price exceeds the regular's by a factor of 2 or more, then one-third of the tasters may note the difference and prefer the reserve.

⁶ Thanks to Anne Taylor, who first suggested this test. She further suggests that since I arranged some of the multiple-test sessions with smallest-price-differential pairs first, I have biased the results against detecting a first-taste effect. She is correct. In the single-pair sessions, the wine pair often had a high price differential. You can examine the results of tests numbered 2, 5, 6, 10, and 13 in Exhibit 1 and see that this doesn't appear to make much difference. If we focus just on red wines with price ratio of reserve to regular greater than or equal 2, then one sees some difference, but the data samples are small.

Some experienced wine drinkers have commented that one requires practice and guidance to identify wine tastes. William Wecker [who devised the taxonomy that distinguishes wine drinkers from wine fondlers] suggests one should drink the reserve and regular knowing which is which, and use the distinction between reserve and regular wines to tell you what to expect when tasting. Then, you can learn to align your evaluations with your sensations. He says use the distinction as a teaching guide.

Maybe so, but don't expect the reserve wine designation to lead you to be able to select wines you will enjoy more from those you will enjoy less.⁷

⁷ The night after I drafted this paper, I dined with another advanced amateur and a professional restaurateur. We blind tested the Gruaud and Sarget La rose. All three of us got the distinction right. The other amateur and I preferred the regular, the Sarget. The pro preferred the reserve.

This version of Exhibit 1 suppresses names of wines; see next page for names of wines.

Exhibit 1 Raw Data, sorted by testing date and wine tested.

Testing Date	Wines [In Order Tasted]	Year of Regular Bt	Year of Reserve Bt	Price	Year of Reserve Bt	Price	Price Ratio Reserve/Regular	Number of Tasters	Getting Right	Distinction Number %	Number Getting Distinction Right Who Prefer Reserve Wine	% Both Getting Difference and Preferring Reserve	Median Ratio of Reserve to Regular	
1	Jul-01 New Zealand Sauvignon													
1	[Executives Singapore] Blanc	1999	1998	\$ 16	\$ 20	1.28	67	25	37%	11	44%	16%	--	
1	[Executives Singapore] Australian Shiraz	1997	1997	19	36	1.86	64	20	31%	7	35%	11%	--	
2	Experts	French Bordeaux	1994	56	1994	200	3.57	13	7	54%	2	29%	15%	--
2	5-Jan-02	American Cabernet	1998	26	1998	90	3.46	13	8	62%	5	63%	38%	--
3	Feb-02	Champagne	NV	38	1990	55	1.45	35	8	23%	4	50%	11%	--
3	[GSB Alums Seattle]	Spanish Tempranillo	1996	30	1996	48	1.60	42	23	55%	15	65%	36%	--
3	[GSB Alums Seattle]	Italian Tuscan	1997	40	1997	80	2.00	42	19	45%	12	63%	29%	--
4	Mar-02	California Chardonnay	1999	13	1999	26	2.00	27	13	48%	11	85%	41%	--
4	[MBA Students]	Chateaufeuf du Pape	1999	19	1999	60	3.16	27	12	44%	8	67%	30%	--
4	[MBA Students]	French Bordeaux	1994	56	1994	200	3.57	27	6	22%	1	17%	4%	--
5	Mar-02[Faculty]	Chateaufeuf du Pape	1999	19	1999	60	3.16	7	3	43%	2	67%	29%	1.4
6	Apr-02[Faculty]	French Burgundy	1999	50	1999	75	1.50	8	6	75%	2	33%	25%	1.10
7	May-02	California Chardonnay	1999	25	1999	35	1.40 W	7	1	14%	0	0%	0%	
7	[GSB Alums]	American Cabernet	1997	40	1997	45	1.13 W	7	1	14%	1	100%	14%	1.10
7	[GSB Alums]	French Bordeaux	1996	35	1996	70	2.00 W	10	5	50%	2	40%	20%	1.40
7	[GSB Alums]	French Bordeaux	1996	35	1996	70	2.00 W	19	8	42%	6	17%	32%	1.30
8	Jun-02 Decision Theorists	California Chardonnay	1999	25	1999	35	1.40 W	16	7	44%	2	29%	13%	1.10
8	[Decision Theorists]	California Chardonnay	1999	25	1999	35	1.40 W	18	10	56%	7	17%	70%	1.10
9	Jun-02	French Burgundy	1999	50	1999	75	1.50 W	13	3	23%	2	67%	15%	1.50
9	[Yale Alums]	French Burgundy	1999	50	1999	75	1.50 W	14	5	36%	3	60%	21%	1.50
9	[Yale Alums]	Chateaufeuf du Pape	1999	19	1999	60	3.16 W	12	3	25%	1	33%	8%	2.00
9	[Yale Alums]	American Cabernet	1998	26	1998	90	3.46 W	11	6	55%	5	83%	45%	1.05
9	[Yale Alums]	American Cabernet	1998	26	1998	90	3.46 W	14	7	50%	3	43%	21%	1.05
10	Jun-02	California Chardonnay	1999	13	1999	26	2.00 W	6	3	50%	2	67%	33%	
10	[MBA students & Faculty]	California Chardonnay	1999	13	1999	26	2.00 W	6	4	67%	3	75%	50%	
10	[MBA students & Faculty]	French Burgundy	1999	50	1999	75	1.50 W	5	4	80%	1	25%	20%	
10	[MBA students & Faculty]	French Burgundy	1999	50	1999	75	1.50 W	5	5	100%	1	20%	20%	
11	Jun-02	California Chardonnay	1999	25	1999	35	1.40 W	17	5	29%	4	80%	24%	1.20
11	[Alpine Tennis Club]	California Chardonnay	1999	25	1999	35	1.40 W	17	6	35%	3	50%	18%	1.20
11	[Alpine Tennis Club]	American Cabernet	1997	40	1997	45	1.13 W	16	7	44%	2	29%	13%	1.00
11	[Alpine Tennis Club]	American Cabernet	1997	40	1997	45	1.13 W	16	4	25%	2	50%	13%	1.13
11	[Alpine Tennis Club]	French Bordeaux	1996	35	1996	70	2.00 W	17	6	35%	2	33%	12%	1.10
11	[Alpine Tennis Club]	French Bordeaux	1996	35	1996	70	2.00 W	16	6	38%	3	50%	19%	1.20
12	Nov-02	Oregon Pinot Noir*	1995	34	1998	38	1.10 W	12	4	33%	2	50%	17%	1.10
12	[GSB Alumni Philadelphia]	Oregon Pinot Noir*	1995	34	1998	38	1.10 W	14	3	21%	0	0%	0%	NA
12	[GSB Alumni Philadelphia]	American Cabernet	1997	40	1997	45	1.13 W	12	5	42%	4	80%	33%	1.20
12	[GSB Alumni Philadelphia]	American Cabernet	1997	40	1997	45	1.13 W	14	3	21%	2	67%	14%	1.18
12	[GSB Alumni Philadelphia]	Chateaufeuf du Pape	1999	19	1999	60	3.16 W	10	3	30%	1	33%	10%	1.20
12	[GSB Alumni Philadelphia]	Chateaufeuf du Pape	1999	19	1999	60	3.16 W	14	6	43%	3	50%	21%	1.10
13	Jan-03 Experts	French Bordeaux	1996	35	1996	70	2.00 W	2	0	0%	0	NA	0%	NA
13	[Experts]	French Bordeaux	1996	35	1996	70	2.00 W	12	10	83%	7	70%	58%	1.15
14	Apr-03	American Cabernet	1997	40	1997	45	1.13 W	6	2	33%	1	50%	17%	1.30
14	[MBA Students UChicago Wine Club]	American Cabernet	1997	40	1997	45	1.13 W	14	5	36%	3	60%	21%	1.20
14	[MBA Students UChicago Wine Club]	French Bordeaux	1996	35	1996	70	2.00 W	7	3	43%	0	0%	0%	NA
14	[MBA Students UChicago Wine Club]	French Bordeaux	1996	35	1996	70	2.00 W	19	11	58%	6	55%	32%	1.08
14	[MBA Students UChicago Wine Club]	Chateaufeuf du Pape	1999	19	1999	60	3.16 W	7	3	43%	1	33%	14%	1.10
14	[MBA Students UChicago Wine Club]	Chateaufeuf du Pape	1999	19	1999	60	3.16 W	19	8	42%	5	63%	26%	1.15
15	Apr-03	Champagne	NV	28	1993	45	1.61 W	5	3	60%	0	0%	0%	NA
15	[Urologists]	Champagne	NV	28	1993	45	1.61 W	10	3	30%	0	0%	0%	NA
15	[Urologists]	Oregon Pinot Noir*	1995	34	1998	38	1.10 W	4	3	75%	3	100%	75%	1.20
15	[Urologists]	Oregon Pinot Noir*	1995	34	1998	38	1.10 W	10	4	40%	3	75%	30%	1.20
15	[Urologists]	Oregon Pinot Noir*	1995	34	1998	38	1.10 W	4	4	100%	3	75%	30%	1.20
Totals								829	337	41%	174	21%		
Expected Frequency if Process is Random									33.3%		50.0%	16.7%		
Observed Relative Frequency									40.7%		51.6%	21.0%		
Standard Deviation of Relative Frequency if Process is Random									1.64%	[a]	2.72%	1.29%	[b]	
Z Score: (Observed - Expected) Divided by Standard Deviation									4.5		0.6	3.3		

Note a: Square Root (1/3 x 2/3 x 1/N)
 Note b: Square Root (1/2 x 1/2 x 1/N)

* The totals exclude the Cristom '95 and '98 Pinot Noir, as this pair confounds vintage and bottling; see text.

This version of Exhibit 1 shows names of wines tested; larger print on preceding page.

Exhibit 1 Raw Data, sorted by testing date and wine tested.

Testing Date	Wines (In Order Tasted)	Year of Regular	Year of Reserve	Price	Price	Price	Price	Number of Taster	Number	Getting Distinction Right	Number Getting Distinction Right Who Prefer Reserve	% Both Getting Difference and Reserve to Regular	Median Ratio of			
		BT	BT	Reserve/Regular	Reserve/Regular	Reserve/Regular	Reserve/Regular	s	Number	%	Wine	% Preferring	Regular			
1 Jul-01	New Zealand Sauvignon Blanc (Singapore)	1999	1998	\$ 16	\$ 20	1.28	67	25	37%	11	44%	16%	--	Villa Maria Sauvignon Blanc		
1	Australian Shiraz	1997	1997	13	36	1.86	64	20	31%	7	35%	11%	--	Elderton Shiraz (and Command)		
2	French Bordeaux American Cabernet	1994	1994	56	200	3.57	13	7	54%	2	29%	15%	--	Ch Latour and LaForts deLatour 1994		
2	1998	26	1438	30	3.46	11	8	62%	5	61%	38%	--	Robert Mondavi Cabernet Sauvignon			
3	Feb-02 [GSB Alums] Chamagne Spanish Tempranillo	NV	1996	38	48	1.45	35	8	23%	4	50%	11%	--	Perez Pascuas Pedrona Ribera del Duero & Riserva		
3	Seattle Italian Tuscan	1996	1996	30	80	2.67	42	23	55%	15	65%	36%	--	Monte Vertine Riserva Chianti and Perole Torte		
3	1997	40	1997	80	2.00	42	19	45%	12	63%	28%	--				
4	Mar-02 [MBA Students] California Chateaufeuf du Pape	1999	1999	13	60	2.00	27	13	48%	11	85%	41%	--	Franciscan/Regular and Cuvee/Reserve		
4	1999	19	1999	60	3.16	27	12	44%	8	67%	30%	--	Beaucastel Coudelet and CDP			
4	French Bordeaux	1994	1994	200	3.57	27	6	22%	3	17%	4%	--	Ch Latour and LaForts deLatour 1994			
5	Mar- Chateaufeuf du	1999	1999	60	3.16	7	3	43%	2	67%	29%	1.1	Beaucastel Coudelet and CDP			
6	Apr- French Burgundy	1999	1999	50	75	1.50	8	6	75%	2	33%	25%	1.10	DuJac Morev St. Denis//Premier Cru		
7	May-02 [GSB Alums] California Chardonnay American Cabernet	1999	1999	25	35	1.40	15	7	30%	1	33%	0%	1.02	Ferrari Chardonnay Alexander Valley & Reserve		
7	1997	40	1997	45	1.13	7	1	14%	1	100%	14%	1.10	Andrew Will Cabernet (Washington State)			
7	1996	35	1996	70	2.00	10	5	50%	2	40%	20%	1.40	Sarget and Graud Larose			
7	1999	13	1999	26	2.00	6	3	50%	2	67%	33%	1.20	Ferrari Chardonnay Alexander Valley & Reserve			
8	Jun-02 Decision Theorists	1999	1999	50	75	1.50	16	10	62%	7	32%	28%	1.10	DuJac Morev St. Denis//Premier Cru		
9	[Yale Alums] French Burgundy Chateaufeuf du Pape	1999	1999	60	3.16	12	3	25%	2	67%	15%	1.50	Beaucastel Coudelet and CDP			
9	American Cabernet	1998	1998	90	3.46	11	6	55%	5	83%	45%	1.05	Robert Mondavi Cabernet Sauvignon			
9	1999	13	1999	26	2.00	6	3	50%	2	67%	33%	1.20	Franciscan/Regular and Cuvee/Reserve			
10	[MBA students & Faculty] French Burgundy	1999	1999	50	75	1.50	5	4	80%	1	25%	20%	1.20	DuJac Morev St. Denis//Premier Cru		
10	1999	50	1999	75	1.50	5	5	100%	1	20%	20%	1.20				
11	Jun-02 Alpine Tennis Club	California Chardonnay American Cabernet	1999	1999	25	35	1.40	17	5	29%	4	80%	24%	1.20	Ferrari Chardonnay Alexander Valley & Reserve	
11	1997	40	1997	45	1.13	16	7	44%	2	29%	13%	1.00	Andrew Will Cabernet (Washington State)			
11	1996	35	1996	70	2.00	17	6	35%	2	33%	12%	1.10	Sarget and Graud Larose			
11	1999	13	1999	26	2.00	6	3	50%	2	67%	33%	1.20	Ferrari Chardonnay Alexander Valley & Reserve			
12	Nov-02 [GSB Alumni] Oregon Pinot Noir*	1995	1998	34	38	1.10	12	4	33%	2	50%	17%	1.10	Cristom '95 Mariorie Vineyard		
12	American Cabernet	1997	1997	45	1.13	12	5	42%	4	80%	33%	1.20	Andrew Will Cabernet (Washington State)			
12	Philadelphia Chateaufeuf du Pape	1999	1999	60	3.16	10	3	30%	1	33%	10%	1.20	Beaucastel Coudelet and CDP			
12	1999	19	1999	60	3.16	10	3	30%	1	33%	10%	1.20	Beaucastel Coudelet and CDP			
13	Jan-03 Experts	French Bordeaux American Cabernet	1996	1996	70	2.00	2	0	0%	0	NA	0%	NA	Sarget and Graud Larose		
13	1997	40	1997	45	1.13	6	2	33%	1	50%	17%	1.30	Andrew Will Cabernet (Washington State)			
14	[MBA Students] French Bordeaux	1996	1996	70	2.00	7	3	43%	0	0%	0%	NA	Sarget and Graud Larose			
14	Chicago Wine Club Chateaufeuf du Pape	1999	1999	60	3.16	7	3	43%	1	33%	14%	1.10	Beaucastel Coudelet and CDP			
14	1999	19	1999	60	3.16	7	3	43%	1	33%	14%	1.10	Beaucastel Coudelet and CDP			
15	Apr-03 [Urologists] Chamagne Oregon Pinot Noir*	NV	1993	28	45	1.61	5	3	60%	0	0%	0%	NA	Pol Rorer NV Brut and 1993 Vintage		
15	1995	34	1998	38	1.10	4	3	75%	3	100%	75%	1.20	Cristom '95 Mariorie Vineyard			
15	1999	50	1999	75	1.50	5	5	100%	1	20%	20%	1.20	Cristom '98 Reserve			
Totals													828	337	41%	21%
Expected Frequency if Process is Random													33.3%	50.0%	16.7%	
Observed Relative Frequency													40.7%	51.6%	21.0%	
Standard Deviation of Relative Frequency if Process is Random													1.64%	2.72%	1.29%	
Z Score: (Observed - Expected) Divided by Standard Deviation													4.5	0.6	3.3	

Note a: Square Root (1/3 x 2/3 x 1/N)
 Note b: Square Root (1/2 x 1/2 x 1/N)

* The totals exclude the Cristom '95 and '98 Pinot Noir, as this pair confounds vintage and bottling; see text.

Exhibit 2 Data Sorted by Characteristics of Wine or When Tasted or Sex of Taster

Wine/Category [Price Ratio]	N	M	L	% Getting Distinction	Std. Dev. If Random	Z score	% Preferring Reserve	Std. Dev. If Random	Z score	%Both Getting Difference and Preferring Reserve	Std. Dev. If Random	Z Score
Sarget and Gruaud Larose [2.00]	102	49	26	48.0%	4.7%	3.2	53.1%	7.1%	0.4	25.5%	3.7%	2.4
Robert Mondavi Cabernet Sauvignon [3.46]	38	21	13	55.3%	7.6%	2.9	61.9%	10.9%	1.1	34.2%	6.0%	2.9
Dujac Morey St. Denis//Premier Cru [1.50]	45	23	9	51.1%	7.0%	2.5	39.1%	10.4%	-1.0	20.0%	5.6%	0.6
Franciscan and Cuvee(Reserve) [2.00]	39	20	16	51.3%	7.5%	2.4	80.0%	11.2%	2.7	41.0%	6.0%	4.1
Beaucastel Coudalet and CDP [3.16]	110	47	25	42.7%	4.5%	2.1	53.2%	7.3%	0.4	22.7%	3.6%	1.7
Ferrari Chardonnay Alexander Valley & Reserve [1.40]	68	28	16	41.2%	5.7%	1.4	57.1%	9.4%	0.8	23.5%	4.5%	1.5
Cristom '95 and '98 * [1.10]	40	14	8	35.0%	7.5%	0.2	57.1%	13.4%	0.5	20.0%	5.9%	0.6
Andrew Will Cabernet (Washington State) [1.13]	100	31	16	31.0%	4.7%	-0.5	51.6%	9.0%	0.2	16.0%	3.7%	-0.2
Red.....	583	246	126	42.2%	2.0%	4.5	51.2%	3.2%	0.4	21.6%	1.5%	3.2
White.....	196	77	44	39.3%	3.4%	1.8	57.1%	5.7%	1.3	22.4%	2.7%	2.2
Champagne	50	14	4	28.0%	6.7%	-0.8	28.6%	13.4%	-1.6	8.0%	5.3%	-1.6
1st test of multiple-wine pairs or only one pair												
All	335	132	70	39.4%	2.6%	2.4	53.0%	4.4%	0.7	20.9%	2.0%	2.1
Red Wines with Price Ratio >= 2.00	34	20	11	58.8%	8.1%	3.2	55.0%	11.2%	0.4	32.4%	6.4%	2.5
Men.....	271	117	63	43.2%	2.9%	3.4	53.8%	4.6%	0.8	23.2%	2.3%	2.9
Women.....	186	70	31	37.6%	3.5%	1.2	44.3%	6.0%	-1.0	16.7%	2.7%	0.0
All data combined.....	829	337	174	40.7%	1.6%	4.5	51.6%	2.7%	0.6	21.0%	1.3%	3.3

N = Number of testers
M = Number from N getting distinction correct
L = Number from M preferring reserve wine

* The totals exclude the Cristom '95 and '98 Pinot Noir, as this pair confounds vintage and bottling; see text.