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Omer Gokcekus, Miles Hewstone
and Huseyin Cakal

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In vino veritas? Social influence on 'private' wine evaluations at a wine social networking site

Omer Gokcekus[*]
School of Diplomacy and International Relations, Seton Hall University, USA

Miles Hewstone
Department of Experimental Psychology, University of Oxford, UK

Huseyin Cakal
Department of Psychology, University of Exeter, UK

Abstract: An archival analysis of evaluations of wines provides a unique context in which to investigate social influence in a naturalistic setting. We conducted analyses based on 6,157 notes about 106 wines posted by wine drinkers at a wine social networking site. Our findings suggest that social influence on private wine evaluations occurred by communicating a descriptive norm via written information. We provide empirical evidence that there is social influence on private wine evaluations that is greater than the effect of experts' ratings and prices combined. This influence comes mainly from the first few group members, and increases as a function of source uniformity. Together with a lack of evidence that more credible or expert members have more influence, these findings suggest that influence in this setting is normative rather than informational. Results have implications for widespread effects of social influence on consumer and other websites where we are subject to the power of others' opinions.

Keywords: Social influence, normative influence, informative influence, wine, wine ratings

[*] **Correspondence** should be addressed to Omer Gokcekus, School of Diplomacy and International Relations, Seton Hall University, South Orange, NJ 07079, USA; telephone: 973-313-6272, fax: 973-275-2519, e-mail: omer.gokcekus@shu.edu.

"I can certainly see that you know your wine. Most of the guests who stay here wouldn't know the difference between Bordeaux and Claret." *Basil Fawlty, 'Fawlty Towers'*

Evaluations of wine, like many other forms of evaluation, might sensibly be based on the views of others, especially if one is as ignorant as Basil Fawlty. Wine drinkers typically pay attention not only to prices but also to others', especially experts', ratings to determine the quality of a wine (Schamel, 2000). Yet, several studies (e.g., Ashenfelter, 1990; Hodgson, 2008) have shown that an expert's opinion regarding quality can be seriously flawed. Moreover, as Reuter (2009) explains, due to conflict of interest, a wine expert's reviews might be biased (e.g., where a magazine, such as *Wine Spectator*, is an influential rating agency, and its reliance on advertising revenues may be associated with an inflation of ratings for advertisers' wines).

While economists have studied how signals from *unfamiliar others* – wine experts and price setters – play an important role in shaping wine drinkers' opinion regarding the quality of a bottle of wine, social psychologists have extensively documented how and why people are influenced by actions and beliefs of *similar others* (Asch, 1956; Cialdini *et al*., 1990; Cialdini & Goldstein, 2004; Sherif, 1936). This research typically distinguishes influence that is 'normative' ("to conform with the positive expectations of another"; Deutch & Gerard, 1955, p. 629) versus 'informational' ("to accept information obtained from another as *evidence* about reality"; *ibid*.). Social-psychological research has also shown that social influence has a significant effect even when the actions of the other people are not directly observed (Nolan *et al*., 2008). An obvious, if relatively ignored, source of wider influence is provided by the wide reach and easy access recently provided by the internet, with consumers having even started "… abandoning traditional expert sources in favor of the perspectives of their peers" (Griskevicius *et al*., 2008, p. 84) over a wide range of issues (see Chevalier & Mayzlin, 2006; Iyengar *et al*., 2009).

In this paper we analyze the ratings posted by regular wine drinkers belonging to a web-based wine network, where wine evaluations and ratings become available to members once they are posted. Using this naturalistic data we conduct an archival analysis to ascertain the extent of the influence that prior ratings have in shaping other group members' opinions. The analysis focuses, in particular, on individuals' and the group's average ratings of a bottle of wine. By doing so, it effectively tests the validity of the argument that wine drinkers belonging to a group form their opinion, and thereafter assign a particular rating either to conform to the positive expectations of the others in their group or by accepting information obtained from the other members of the group as evidence about reality (see Festinger, 1950).

Wine ratings appear sequentially on the website we studied (i.e., after each new rating is added), allowing us to assess both the importance of 'group size' and the uniformity of opinions in this form of social influence. Asch's (1951, 1956) early studies of the numerical size of the majority showed that conformity increased quite dramatically as the number of majority members increased from one to three, but the influence of additional members was minimal. Later studies by Gerard *et al.* (1968) and by Latané and Wolf (1981) suggested, however, that adding more members to the majority will, in effect, lead to more conformity but with diminishing increments per added member (see Bond & Smith, 1996). The exact nature of the function relating majority size to conformity remains an issue of debate between those who posit a linear relationship versus those who favour one or another form of non-linear relationship (Bond & Smith, 1996). Classic studies of social influence also showed that conformity is dramatically weakened when the unanimity of the majority is broken (Asch, 1951; Allen & Levine, 1971); this would lead us to expect greater impact of prior wine ratings when they were uniform. Finally, source credibility is a key determinant of persuasion (e.g., Maheswaran &

Chaiken, 1991), and conformity is increased by factors that increase the credibility of a majority as a valid source of reality (e.g., status and expertise) (Kiesler & Kiesler, 1969), and decreased by factors that weaken its credibility (e.g., Allen & Levine, 1971). Hence we would expect more credible, expert group members to have greater influence.

A wine social networking site

Cellartracker.com is the world's largest wine social networking site, in both number of catalogued bottles and number of listed tasting notes. For instance, as of November 7th, 2012, there were 233,316 users who owned 36,445,657 bottles; and Cellartracker.com's database contained 1,369,914 different wines with 2,951,070 free wine reviews from real users, and more than 404,271 professional reviews from 23 publications. While the reviews from real users are freely available at the site, professional reviews require paid subscription to the relevant publications.

The real users of the site, i.e., social group members, are allowed to freely post their reviews either by using their iPhone app cor.kz or visiting the internet site. That is to say, group members post their evaluations *in private*. However, when a group member decides to post his or her note on a particular wine, three categories of information about this wine are available for their perusal (see Supplemental Online Materials). The first section contains information on various wine classification categories such as vintage, type, producer, variety, region, sub-region, appellation, and label. The second section is about the optimum time interval within which one should drink the wine. Finally, the third section, of most interest to the scholar of social influence, contains the community tasting history (i.e., information posted by previous drinkers from within the wine network); as the site is set up, it is not possible to avoid seeing this

information before posting an evaluation. After a summary of the previous posts, i.e., (a) number of already posted notes, (b) mean, and (c) median score from these notes, each individual note (except the ones with no text) is listed. By clicking on the username of a community member who posted a note with a text, you would learn five different things about that member: (a) how many bottles of wine are in their inventory, (b) how many bottles they had consumed over time, (c) how many tasting notes they wrote, (d) how many members of cellartracker.com follow them, and (e) how many group members they follow.

Hypotheses

We tested five hypotheses:

Hypothesis 1a: There will be a direct relationship between the wine evaluations to which visitors to the website (hereafter, respondents) are exposed and their own subsequent wine evaluations; and Hypothesis 1b: this association could be even stronger than the one between respondents' evaluations and professionals' (experts') evaluations and prices.

Hypothesis 2: There will be a direct, positive relationship between the uniformity of wine evaluations to which respondents are exposed and their own subsequent wine evaluations.

Hypothesis 3: The impact of the first 3-4 evaluations will be greatest, with diminishing increments per added wine rater.

Hypothesis 4: The respondents' wine evaluations will be more in agreement with the prior evaluations, when the prior evaluations are made by more "credible" group members.

Method

Data base: Wines and respondents

To control for the effects of numerous other factors on individual evaluations, we assembled a homogeneous sample of wines. We chose wines (a) of a particular vintage (2008); (b) of a specific variety (cabernet sauvignon), and, (c) from a specific wine region, i.e., county-region-subregion-appellation (U.S., California, Napa, Napa AVA) to yield a sufficient sample on which to test our hypotheses. From all of the available 2008 Napa Cabernet Sauvignon wines listed at Cellartracker.com, we chose 106 with at least 10 or more notes on November 17th, 2011.

In addition to collecting data on November 17th, 2011, for these 106 wines, we collected data three more times within the following year to assess stability of ratings (February 11th, 2012; April 11th, 2012; November 7th, 2012). For each wine, we tabulated the scores from community tasting history, experts' rating scores, average U.S. retail prices, and characteristics of each group member who posted a note with a score.

Table 1 presents the summary statistics for 106 wines in our sample. On November 17th, 2011, the average score (out of 100 points) was 89.60, and average price was $55.38. There were 3,227 notes submitted, in other words there were 30 notes per wine. The retail prices and experts' ratings were not subject to change over time. However, the number of notes almost doubled within a year: As of November 7th, 2012, there were 6,157 notes, 58 notes per wine. Within the same time period, however, the average community score stayed pretty much unchanged (within the range 89.52-89.60).

Results

To test Hypothesis 1a, that there is a direct relationship between the wine evaluations to which respondents are exposed and their own subsequent wine evaluations; we estimated the following regression model:

Group score$_i$ = α + β*First-j score$_i$ + υ$_i$.   (1)

Group score$_i$ is the average score for wine i, excluding the first four group members' scores;

First-j score$_i$ is the average score for the first j group members for wine i; α and β are scalars; and

υ$_i$ is a random disturbance term.

Table 2 reports the regression results; from column (1) to column (4) it shows the

estimated coefficients (α and β) and their standard errors for First-1 score, First-2 score, First-3

score, First-4 score, and, as a goodness-of-fit measure, it presents F-statistic, R^2 and adjusted-R^2.

All of the estimated coefficients were statistically significant at 0.01 level. Moreover, variations

in First-1 score explained 58% of the variations in Group score; First-2 score 64%; First-3 score

69%; and First-4 score 73%.[1]

We next tested Hypothesis 1b, whether this association could be even stronger than the

one between respondents' evaluations and experts' (opinion leaders') evaluations and prices. To

do so, first, we estimated the model above, with 36 observation points, by utilizing all 36/106

wines in our sample that experts had evaluated. The regression result is reported in Column (6)

of Table 2: Estimated coefficients were statistically significant at the 0.01 level; and variations

in First-4 score explained 81% of the variations in the Group score. Second, we modeled the

Group score as a function of (a) experts' score and (b) experts' score and price. As is reported in

Column (7) the estimated coefficient for the experts' score was statistically significant at 0.01

level; and variations in the experts' score explained 66% of the variations in the Group score.

When we utilized both the experts' score and the price as explanatory variables, Column (8)

shows that while the estimated coefficient for the experts' score was statistically significant at

0.01 level, the coefficient for the price was not; and variations in the experts' score and the prices together explained 67% of the variations in the Group score. Consequently, these results show that variations in the scores of the first four group members did a better job by 14- 15% points in explaining the variations in the Group score than either variations in the experts' score or the experts' score and the price together. To further compare experts and First-4 group members' opinion effects, we estimated the model including First-4 score, Experts' score and Price. As shown in Column (9), the estimated coefficient for First-4 score (0.540, $p < .01$) was almost twice as big as the coefficient for Experts' score (0.294, $p < 0.01$).

Next, we tested Hypothesis 2, that there is a direct relationship between the uniformity of wine evaluations to which respondents are exposed and their own subsequent wine evaluations. We assessed the strength of the linkage between the Group score (the average score per wine, excluding the first four group members' scores) and the First-4 score. In particular, we assessed whether a lack of uniformity among the First-four group members' scores, by sending mixed signals regarding the consensus among these first four members, made subsequent group members' wine ratings less likely to conform with the first four members' wine evaluations (because of a lack of a clear, consensus score to conform to). To do so, we first calculated the deviations between the Group score and the First-4 score, for each wine separately. In particular, to treat upward and downward differences of the similar magnitude in the same way, we calculated, $|$ Group score$_i$ – First-4 score$_i$ $|$. Second, we calculated the standard deviations between the first four scores, (STD-4), as our proxy for uniformity. Accordingly, the larger the standard deviation, the less uniform the wine evaluations to which respondents are exposed. Then we estimated the following model:

$$| \text{Group score}_i - \text{First-4 score}_i | = \delta_0 + \delta_1*(\text{STD-4}_i) + \nu_i, \tag{2}$$

where δ_0 and δ_1 are scalars, and ν_i is a random disturbance term. According to the regression results, $\delta_0 = 0.716$ and $\delta_1 = 0.311$, and they are statistically significant at 0.01 level. Thus, there was a direct relationship between the "uniformity" of wine evaluations to which respondents were exposed and their own subsequent wine evaluations.

To test Hypothesis 3 we ran three more regressions, with First-5, First-6 and First-7 raters, respectively, as the source of potential influence. The regression results clearly supported this hypothesis; the change in R^2 diminished with each subsequent addition of a member to the source (member 2: +0.062; member 3: +0.051; member 4: +0.042; member 5: +0.031; member 6: +0.026; and member 7: +0.013). It might not seem surprising that, e.g., adding one observation to a group of four does not change the mean by much. However, even when we look at the % change in R^2 divided by % change in group size, results are similar: each (percentage-wise normalized) additional group member adds more, first with an increasing and then with a decreasing rate (group size 2: 0.107; 3: 0.159; 4: 0.183; 5: 0.171; 6: 0.172; 7: 0.100).

Finally, we tested Hypothesis 4, that the respondents' wine evaluations would be more in agreement with the prior evaluations, when the prior evaluations came from more "credible" group members, and therefore would be seen as more informative. First, to capture the interaction effect of "credibility," we multiplied the First-4 score by different characteristics of the group members who posted the first four notes, namely (a) number of bottles of wine in their inventory, (b) number of tasting notes they wrote, (c) number of Cellartracker.com members who follow them, and (d) number of group members they follow, respectively. Second, we estimated the Group score as a function of the First-4 score and these four interaction effects. Estimation

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results are summarized in Column (10) in Table 2. These results do not yield support for hypothesis 4; there was no statistically significant interaction between First-4 score and three of the credibility indicators; the exception was the interaction effect of number of bottles in inventory ($p <0.01$); yet the estimated magnitude of this interaction effect was very small, 0.003.

Discussion

We used real data from a wine networking site to test five hypotheses about social influences on wine evaluations. The results are largely in line with the hypotheses, confirming that wine evaluations are subject to social influence that appears to be normative rather than informational in nature.

In support of Hypothesis 1a we found a significant direct relationship between the wine evaluations to which respondents were exposed and their own subsequent wine evaluations. Variations in the first four group members' ratings explained 73% of the variation in subsequent wine evaluations. Consistent with Hypothesis 1b, the first four group members' ratings, regardless of the variations among these ratings, explained the rest of the group's average rating better (by some 14-15%) than expert ratings and price combined.[2]

Confirming Hypothesis 2, we found that the more uniform the earlier evaluations were, the closer the subsequent wine evaluations were to the average rating of the earlier evaluations. This result is consistent with the idea that, for normative social influence to occur, there needs to be a clear consensus score to conform to.

As predicted by Hypothesis 3, the first 3-4 evaluations by other raters had the greatest impact, with diminishing increments for each added wine rater. Adding further raters to the first four did not greatly increase the percentage of variance explained. These findings concerning the

major impact of the first few members are consistent with Asch's (1951, 1956) classic studies of conformity, but the finding of additional (albeit diminishing) influence with added members is more in line with earlier findings of Gerard *et al.* (1968) and Latané and Wolf (1981).

Results did not, however, support Hypothesis 4, that wine evaluations would be more in agreement with prior evaluations, when those ratings were made by more "credible" group members. Notwithstanding prior evidence for source credibility (e.g. Maheswaran & Chaiken, 1991) and expertise (Kiesler & Kiesler, 1969) as determinants of influence, it appears that informational social influence was not operative in group members' wine evaluations, or that despite using four possible indicators of credibility or expertise in the wine domain, we failed to detect greater impact of more credible group members because the construct validity of our measures of expertise was low.

Taken together, these findings suggest that there is social influence on private wine evaluations; its magnitude is larger and more significant than the effect of experts and prices combined; and it is normative rather than informational influence. As was the case in earlier studies of social influence in other domains (e.g., Goldstein *et al.*, 2008; Park *et al.*, 2001; Schultz, 1999), even without direct observation, social influence occurred by communicating a descriptive norm via written information.

We acknowledge some limitations of the study, which arise from how this networking site operates. First, we cannot be sure that members of the network do consult others' views before making their own ratings. However, that information is physically present, and would be hard to ignore; and the results are entirely consistent with them being influenced by the views of others. Second, raters only rate wines once; they do not first give their own ratings, then consult others' ratings, and then re-rate the wines. Thus we can only infer the workings of social

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influence in what is, in effect, a post-test only design. However, we were studying an actual wine networking site, and so this *is* how it works, and how presumably many people's views of wines are formed and changed. Far from reducing social influence, the internet (whether we are buying wine or books, or reserving hotels) may increase a particular, normative form of influence.

Overall, the findings may surprise some readers, especially the stronger evidence for normative than informational influence in this setting. Two plausible explanations may shed light on this observation. First, it is possible that people in wine evaluation situations do not use the ratings of others as evidence about the true nature of the product, i.e., they don't view the others as mediators of fact. After all, wine is not only an 'experience good'; wine evaluations may vary depending on cultural, personal biases and differences in sense of taste (Bartoshuk, 1978) and preferences of drinkers. For instance, as Amerine and Roessler (1983, pp. 57-64) explain, both physiological and psychological factors play a role in sensory performance. Second, we should consider the nature of the setting in which wine evaluations in our study were shared. Although group members in this wine networking site wrote their notes in private, once a group member writes their note it becomes visible by the rest of the group members. There is no anonymity within the group. In particular, those members who are following you, group members who are in your inner circle, will be automatically informed about your rating. This fact about perfect visibility, combined with (a) the significant direct relationship between the wine evaluations to which respondents are exposed and their own subsequent wine evaluations, and (b) the direct relationship between the uniformity of wine evaluations to which respondents are exposed and their own subsequent wine evaluations, further supports the idea that compliance, i.e., normative influence is a significant determinant of wine evaluation in this setting.

Finally, the results of our study have clear implications for marketers and managers in the wine business. In particular, marketers need to pay attention to how wine drinkers shape their views and opinions regarding the quality of a bottle of wine, because wine drinkers' opinions in return determine which wine people will be interested in buying and how much they will be willing to pay in the future. After all, wine is a non-durable consumption good, and it is purchased frequently and on a regular basis. If indeed, as our findings suggest, social influence is more important than experts' views, and social influence is not informational but normative, then it would be wise for communicators to utilize appropriate channels for their persuasive appeal to wine drinkers.

Note

1. To deal with a potential heteroscedasticity problem, we estimated the model with Weighted Least Squares method and report the results in Column (5). The similarity between columns 4 and 5 indicates that using the OLS was appropriate.

2. It might be argued that if some wines were so good or so bad, the truth really would be in the wine, with no need for social influence. However, even though, as noted above, the average quality of wines was high, it was not maximal, and if there were no social influence, we would have detected no effect of especially the first few group members, which we did. Moreover, most of the ratings were within a narrow range: When we checked the first ten ratings for each of our 106 wines, 23 were within a range of +/- 2 points, and 91 were within a range of +/- 5 points, of the group mean.

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Declaration of Conflicting Interests

Authorship Information

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Table 1: Summary data for number of notes, average score, experts' score, and average price

	Number of notes				Average score								Experts' score	Average Price
	Nov. '11	Feb. '12	April '12	Nov '12	Nov. '11	Feb. '12	April '12	Nov. '12	First - 1 score	First – 2 score	First-3 score	First – 4 score	Nov. '11	Nov. '11
Average	30	39	44	58	89.60	89.52	89.53	89.52	89.62	89.49	89.58	89.62	90.96	$55.38
Std. Dev.	30	32	39	51	3.05	3.06	3.05	3.01	3.57	3.57	3.48	3.57	3.33	$70.24
Minimum	10	11	11	12	78.20	78.20	78.20	78.20	79.00	77.00	76.67	75.50	82.00	$3.00
Maximum	239	239	304	365	97.20	97.20	97.00	97.00	98.00	98.00	98.00	98.25	100.00	$479.00
Total	3,227	4,095	4,684	6,157									36	

Sources: Data is from cellartracker.com; except for experts' score, i.e., professional ratings, that are from wineaccess.com, winebid.com, and hdwine.com (accessed on November 17th, 2011).

Table 2: OLS regression results: Average wine scores (minus first four group members) as dependent variable

Explanatory variable	(1)	(2)	(3)	(4)	(5) (WLS)	(6)	(7)	(8)	(9)	(10)
First-1 score	0.637 (0.05)*									
First-2 score		0.670 (0.05)*								
First-3 score			0.712 (0.05)*							
First-4 score				0.712 (0.04)*	0.710 (0.04)*	0.742 (0.06)*			0.540 (0.07)*	0.662 (0.05)*
Experts' score							0.632 (0.08)*	0.543 (0.10)*	0.294 (0.08)*	
Price							0.004 (0.003)	0.001 (0.002)		
Inventory*First-4 score										0.003 (0.001)*
Tasting notes*First-4 score										0.000 (0.001)
Members they follow*First-4 score										-0.129 (0.41)
Their followers*First-4 score										-0.041 (0.42)
Constant	32.442	29.452	25.745	25.687	25.958	23.548	33.838	41.562	15.193	29.585
F-statistic	144.045	187.268	228.025	276.223	264.976	144.112	64.595	34.091	74.874	61.265
R^2	0.581	0.643	0.687	0.726	0.718	0.809	0.655	0.674	0.875	0.756
Adjusted R^2	0.577	0.640	0.684	0.724	0.715	0.803	0.654	0.654	0.864	0.743
No. of observation	106	106	106	106	106	36	36	36	36	106

Note. Numbers in parentheses are standard deviations; * indicates that the estimated coefficients are statistically significant at 0.01 level.

Supplemental Online Material

An example cellartracker.com entry for a 2008 Napa Cabernet Sauvignon

2008 ZD Wines Cabernet Sauvignon *(USA, California, Napa Valley)*	
Vintage 2008	(NOTE: Label borrowed from 2005 vintage.)
Type Red	
Producer ZD Wines (web)	
Variety Cabernet Sauvignon	
Designation n/a	
Vineyard n/a	
Country USA	
Region California	
SubRegion Napa Valley	
Appellation Napa Valley	
UPC Code 044956001155	

Drinking Windows and Values
Drinking window: Drink between 2011 and 2018 *(based on 1 user opinion)*

Community Tasting History
Community Tasting Notes *(average 90.7 pts. and median of 90 pts. in 14 notes)* **-** hiding notes with no text
Tasted by Mezzomorto on 10/16/2011 & rated 89 points: Mint on the nose, a hint of wood tannins. Blueberry and mild currant notes up front. Clear vanilla mid palate. Smooth tannins overshadow medium acidity. A reasonable contender, perhaps more complex than 07. *(1631 views)*
Tasted by wineglas on 10/1/2011 & rated 87 points: Oak, cherry, spice and vanilla. Not real complex but drinkable. Taste like a $15/$20 Cabernet from California. *(1620 views)*
Tasted by christophee on 8/28/2011 & rated 88 points: Garnet and ruby with medium viscosity in the glass. Plum, blueberry, cassis and peppermint (Ricola) on the nose. Medium/full body with mouth coating blueberry, cherry and earth on the palate. Secondary bacon and wet tobacco. Soft tannin. Long finish, which becomes oak dominated. *(1697 views)*
Tasted by ca$hflow on 8/6/2011 & rated 90 points: Soft tannins and smooth. *(1693 views)*
Tasted by jdesimone4 on 6/30/2011 & rated 88 points: tried at the vineyard; very nice. smooth and not too tannic *(1758 views)*
Tasted by SipsnTips on 4/29/2011 & rated 91 points: Nice fruit notes. Tobacco on the mid palate smooth tannins. *(1860 views)*
Tasted by Anonymous on 4/3/2011: This was better than anticipated. Fruit forward, but still dry and solidly balanced. 90ish? Not my favorite style typically, but a crowd pleaser. *(1844 views)*

User Profile for 'SipsnTips' (User #68,047, signed up 12/17/2008)
Bottles in inventory: 482
Bottles consumed: 238
Tasting notes written: 109 *(by time, by region, by producer, by varietal)*
Favorite tasters of SipsnTips: Anthony28rx, Istaples, yellowbird
These tasters list SipsnTips among THEIR favorites: flydcjets, Istaples

Source: www.cellartracker.com/wine.asp?iWine=1075044. (Accessed on November 7th, 2012.)