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The effect of price on gustatory perception of fermented malt beverages

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Abstract

In three experiments with 103 subjects and six beers we tested whether the price of beer was a good indication of perceived quality. By not being so rude as to fail to reject, but outright embracing the null hypothesis, we show that for lager and dark beer available in America, price is not a reliable indicator of quality. In England, cheap bitter (ale) tasted reliably better than expensive bitter. More work is required in this area, which we look forward to performing.

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Ingestive behavior is something that affects us all of our lives, that we often enjoy, and that some people develop taste in. Recent work in the area of whisky (Lapointe & Legendre, 1994) has attempted to classify some of the beverages that can be consumed, but this work was a bit dry, like its subject matter, because it lacked empirical data. Later work showed that while subjects could tell the difference in whiskey, they often preferred inexpensive implementations (Association, 1994). In a temporally odd causal relationship, this work was later found to have inspired us to start looking at consumer preference's in beer several years previously.

An area that might be more approachable, since psychologists do not typically drink whisky every night, would be fermented but undistilled malt beverages. That is, many people claim to be able to tell quality beer from cheap beer. But can they really? Perhaps wiser people argue that most American beer tastes the same (particularly American lager), and that even beer imported into the US is boiled, then watered down, and is not good value for money. The testable hypothesis that follows from this, is, in scientific terms, that "only slightly dim people mislead by advertising can note a difference between most beers, and only when such beers are labelled".

This more erudite position does not maintain that there are *no* noticeable differences between all beers, just not between the rather similar beers that make up the bulk of the American popular beer market. To test this hypothesis we invited some close personal friends over (N =103), both in the US and the UK, and sampled some beers.

Experiment 1

In this experiment, subjects were asked to note which of two beers they thought was the expensive and to be preferred beer after tasting them blind.

Method

Design and procedure. As the guests (err, subjects) arrived, the experiment was explained to them, their permission was requested, and a ballot was placed in their hands. They were invited to sample each beer (but not to excess), and when they thought they could tell them apart, to mark their ballot and return it to the experimenter.

Subjects. The 48 subjects were recruited by a bulletin board post, electronic mail, and personal invitations. The majority were Americans, the rest Germans and other foreigners, all with extensive drinking experience.

Materials. A keg of Rolling Rock (Beer World, Pittsburgh, 1991: $21) and a keg of Michelob (Beer World, Pittsburgh, 1991: $26) were purchased at the same time at Beer World and iced down for four hours in similar black plastic garbage cans. Their labels were covered with ice and then plastic, leaving only their identical taps exposed. In order to avoid "A-B" effects, one keg was labelled "A" and the other "1". The order of the names and labels on the ballots were presented in some sort of random order.

Results and Discussion

Only 34 valid ballots were returned. One subject (LS)[1] refused because he was afraiiiiid[2] we would make fun of his choice, 1 ballot (and S) was incoherent, 3 subjects were not drinking that evening, 9 ballots were later found inserted into a garbage can that must have appeared to some in the dim light as a ballot box; 3 people thought they were both Rolling Rock (these were included), and one person thought beer 1 was Miller Light (this ballot was discarded and the subject vociferously argued with). No beer or subjects were discarded.

The cumulative results of subjects choices are shown in Table 1. Oddly enough, subjects appeared to believe that Rolling Rock tasted more like Michelob, and that Michelob tasted more like Rolling Rock.

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[1]We would like to thank Dr. Lael Schooler for the terribly clever suggestion that we say that we changed all the S's initials in order to save our subject's potential embarrassment, but don't actually bother doing it in order to save ourselves the work.

[2] Note: typesetter please use sing-song font.

Table 1. Subjects preferences for lager. (Note that we know that rows and columns are not balanced, neither were our subjects, and that you are not all that clever to figure it out.)

Subjects' Preferences

Actual	Rolling rock	Michelob
Beer "1" (Michelob)	19	15
Beer "A" (Rolling Rock)	16	18

HOWEVER, this effect was not significant ($C^2(1,34) = 0.59$, $p > 0.5$); there was also not a significant correlation between price and choice (and because these computations were done that evening, it is not reliable either.)

Experiment 2

Some reviewers we wish were anonymous (happily they have gone on to post-docs else where in different fields, and, no, really, that's not really psychology) suggested that the differences were too small to detect between the beers we compared. In order to explore this possibility, we choose two materials that differed substantially more in price, and we used a 5000 point scale to detect very small tiny little differences.

Method

Design and procedure. The design and procedure was followed as in Experiment One with the following difference: Instead of asking which beer they preferred, we asked subjects to rate each beer on a 5000 point scale. Their preference was judged as being the greater of the two. Inter-judge correlation on this comparison (the first and fourth authors served as judges) nearly approached 100%. In order to present each beer's label at the top of the ballot equally often, half were handed to the subjects after being transformed by 180 degrees.

Subjects. The 42 subjects were recruited by a bulletin board post, electronic mail, and personal invitations. The majority were Americans, the rest Germans, other foreigners and business school students, all with extensive experience in this area.

Materials. A 1/2 barrel keg of imported dark beer (Becks, 1991) for $80 and a 1/2 barrel keg of domestic dark beer (Yuengling, 1991) for $36.95 were purchased at the same time and iced down for four hours in similar plastic garbage cans. Their labels were covered with ice, and then plastic, leaving only their similar taps exposed. In order to avoid "A-B" effects and balance the labels of the first experiment, one keg was labelled "2" and the other "B".

Results and Discussion

Only 38 valid ballots were returned. Retrospective verbal reports (Ericsson & Simon, 1993) indicated that no subject identified the beer by their taps. One subject (LS) again refused because he was still afraid we would make fun of his choice, even after reading a draft of the first experiment's results. One subject was a not drinking that day, and two subjects gave negative numbers or answered with prose or unryhming unmetered verse.

The cumulative results of subjects choices are shown in Table 2. Subjects preferred the imported beer, but not by an important amount (4% of the scale), or by a reliable amount ($t(37)=0.42$, n.s.)[3]

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[3] Because these computations were done that evening, the computations, in addition to the difference, is not reliable either. It is one of the first times (to our knowledge) that Student's t-test was used in the way Student intended, seeing as how he worked for Guineas and all.

Table 2. Subject's ratings and preferences for dark beer.

Actual	Subjects' preferences	Average rating
Beer "2" (Becks)	20	2946
Beer "B" (Yuengling)	18	2745

A difference in quantity in the two kegs makes the difference in price larger. The imported beer was $80 for 13.5 gallons, or $5.93/gallon, and the domestic beer was $36.95 for 14.4 gallons, or $2.57/gallon.

Experiment 3

Perhaps just American beers are the same, or perhaps just lager. In order to not only accept the null hypothesis, but embrace it (less we and our results fail to stand), we wanted more proof, particular proof showing that we could find differences in preferences for beer. After all, maybe we just didn't run enough subjects (Grant, 1962), or that subjects might have needed more than eight glasses of each type to distinguish them. In order to remove such doubts, we ran the experiment again, removing the Germans, adding some British subjects, and changed the type of beer. This was done at considerable expense, if the move to England is included.

Method

Design and procedure. The design and procedure was followed as in Experiment One with the following difference: In order to avoid position effects on the ballot, each subject was asked verbally to note which beer they preferred.

Subjects. The 24 subjects were recruited by an electronic bulletin board post, electronic mail, and personal invitations. A majority were English, the rest British and other foreigners, all with really quite extensive drinking experience.

Materials. A half case of Boddington's ("The Cream of Manchester") Draught Northern Bitter (The Whitbread Beer Company, 1993, at 129 pence/Imperial pint and 3.8 % alcohol by volume) and a half case of Sainsbury's Bitter (Sainsbury, 1993, at 58 pence/Imperial pint and 3.0% alcohol by volume) were purchased at the same time and served "warm" (actually, rather cold, at English room temperature of approximately 60 degrees Fahrenheit) in similar plastic glasses. In order to really steer clear of "A-B" effects, avoid criticism in the hall, and balance the labels of the previous experiments, one glass was labelled "X" and the other "O", which both could be read as a number and a digit (clever, huh? We stand ready with "i" and "v" for the next experiment).

Results and Discussion

As shown in Table 3, subjects rather solidly preferred the cheaper beer (estimated-in-the-hallway-by-a-Chartered-Psychologist $C^2(20)$ 30, $p < .05$)[4]. One must keep in mind that Sainsbury's Bitter is very nearly the cheapest beer that one can purchase in England.

[4] We have been assured by a characterful psychologist that this is an acceptable practice and often used statistical computation in the UK.

Table 3. Subject's preferences for bitter.

	Subjects preferences
Beer X or X (Boddington's)	3
Beer "O" or "0" (Sainsbury's)	18

General Discussion and Conclusions

Clearly, if one is purchasing beer for the taste of it alone, one can satisfice (Simon, 1985) by buying cheap beer, at least when choosing in the $20-$80 per keg range, or if you really press us, at least when choosing between American beers. (One contentious subject (JK) argued that Rolling Rock was a premium beer because "the label said so". Please refer to the fifth sentence, second clause in the second paragraph for our analysis of such behavior.)

One reviewer questioned what this work had to do "with the price of tea in China". It seems quite clear to us: At 44 US cents/imperial pint, the least expensive beer tested in America is cheaper than the most expensive US beer (93 US cents/imperial pint), and considerably cheaper than most beer in England (1.5 US cents is approximately equal 1 pence). So the astute psychologist will get most value for money when drinking cheap beer in the US.

As an interesting aside, one subject attracted another subject (and repelled others) during the first experiment by stating "You know, I can make words come out as I burp." As another interesting aside, the subject in the first study with attractive/repulsive behavior was no longer seeing the second subject by the time of the second study. But this worked out surprisingly well for a while, and we plan a separate experiment to explore this phenomena, if our partners let us.

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