APPENDIX G

STATISTICAL ANALYSIS OF BOTTLE DATA BY GENERAL CATEGORIES

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Bruce Owen

SUMMARY OF FINDINGS

Unskilled workers left a lower proportion of whole bottles in their glass refuse recovered on the Cypress Archaeological Project than did people of other professions, suggesting that they recycled bottles more than did better-paid workers. Ethnicity had no significant effect on recycling. Residents of Polite two-story Victorian homes may have recycled less than did residents of Informal workers' cottages, and possibly less than did residents of all other types of dwellings. Features from the West of Market neighborhood (Blocks 4-6) suggest less recycling than do those from other neighborhoods. This pattern cannot be explained by the distribution of professions among neighborhoods, but it might be due to the concentration of Polite two-story Victorian homes on blocks 4 through 6.

Alcoholic beverage bottles were present in all but two of the features analyzed, comprising about 19% of the total bottle MNI. Overall, wine and champagne bottles were the most common, at a bit under 5% of total bottle MNI, with beer and ale bottles a bit over 4%. Liquor bottles were scarcer, at under 1% of total bottle MNI.

Wine bottles were strongly correlated to better-paying professions, being most common in wealthy professionals' refuse, and becoming progressively scarcer in features from professional, skilled, and unskilled households. Conversely, but less strongly indicated, beer and/or ale bottles comprised a greater fraction of the alcoholic beverage bottles at households of skilled workers than at homes of wealthy professionals, and liquor bottles comprised more of the alcoholic beverage bottles in lower-income (skilled and unskilled) households than in higher-income (professional and wealthy professional) households. Wine bottles may have been more common in households headed by women. Liquor bottles were completely absent from Polite two-story Victorian household refuse, in significant and consistent contrast with most other dwelling types. The residents of these finest houses seem to have avoided not alcohol in general, but hard liquor specifically—at least at home. This finding, together with the greater prevalence of liquor bottles at households of lower-paid workers, suggests that hard liquor may have been associated with the lower class. Of the alcohol that they did consume, the residents of Polite two-story Victorian houses emphasized wine more than did residents of duplexes, Informal workers' cottages, or all other dwelling types combined.

Homeowners may have disposed of more alcoholic beverage bottles in general, more wine bottles, and—among residents of Informal workers' cottages—more liquor bottles than did renters. This consistent correlation of homeownership with higher alcohol consumption is a surprising reversal from ownership's lack of effect on meat purchases. Archaeological features of unknown tenancy status, presumably mostly representing short-term renters, had more alcoholic beverage bottles than did those of more stable renters, and among the alcohol bottles, a lower proportion of ale and/or beer. That is, long-term renters seem to have consumed less

alcohol than did either short-term renters or owners, and short-term renters seem to have consumed both more alcohol and less of the least-intoxicating variety than did more stable renters.

Strongly associated with higher-paid employment, finer housing, and home ownership, wine and champagne bottles appear to be an excellent index of what would generally be recognized as upper-class status. Since wine and champagne bottles are associated with these three disparate variables, it is possible that the proportion of these bottles among all alcoholic beverage bottles might prove to be a better index of overall social status than any one of the professional, residential, or tenancy variables alone.

Irish households may have disposed of more liquor bottles than did others, especially than U.S.-born white households. German households differed from others in having more food storage glassware than others, especially than U.S.-born households, more grooming and health bottles than others, and fewer writing-ink bottles than others.

Grooming and health bottles may be more common at unskilled and skilled workers' homes, and less common at professionals' and wealthy professionals' homes. Comprising about 25% of the total bottle MNI, this is a broad category that ranges from medicines to luxury cosmetics, so interpretation is difficult.

Residents of the three Simple, two-story houses probably purchased more food in glass containers than did others, and residents of the four Duplexes seem to have used more writing ink than did others. With samples this small, however, the explanation for these real but tiny patterns may reduce to peculiarities of just a few individuals.

Residents of the Oakland Point neighborhood (Blocks 19-37) differed from residents of the other two neighborhoods in discarding more commercial food bottles, and more bottles in which food had been locally preserved, either in their own homes or in local household production by others. Since Oakland Point had the lowest proportion of professional and wealthy professional households and the highest proportion of the lower-paid skilled and unskilled workers, these preferences for food purchased or preserved in glass might have an economic basis. Oakland Point residents also had fewer wine bottles as a proportion of their alcoholic-beverage-bottle refuse than did either of the other two neighborhoods, presumably due to the low proportion of households with better-paying jobs that were associated with wine consumption.

The glass data are rich and complex, and this analysis is only a first step. Future analyses of more narrowly defined categories might clarify or help to explain some of the patterns noted here, and discover others.

INTRODUCTION

This report describes results of a search for statistically significant patterning in the distribution of general categories of whole and broken glass bottles among features divided according to potentially meaningful cultural categories. The bottle categories analyzed are summarized in the table below.

Category	**Variable name**	**Category includes/rationale**
Whole bottles	whole	A reverse index of recycling. The lower the percentage of whole bottles, the more recycling is implied.
Food	food	Commercial food bottles .
Food storage	foodst	Bottles in which food was stored at the household level, such as canning jars.
Grooming/Health	groom	A wide range of hygiene, medicinal, and cosmetic products
Alcohol in general	alcohol	All alcoholic beverage bottles
Beer and Ale	Beer	Beer, Ale, and Ale/Beer bottles. Other potentially similar beverages are not included.
Wine and Champagne	wine	Wine, Champagne, and Wine/Champagne bottles. Other potentially similar beverages are not included.
Liquor	liquor	Whiskey, Bourbon, Gin, and Schnapps bottles. Other possibly similar beverages and bottles, such as brandy and flasks, are not included.
Writing	writing	Ink bottles

The cultural categories are the same as those used in the analysis of faunal remains (Appendix G). They are summarized below.

Category	**Category includes/rationale**
Ethnicity	African American, German, Irish, and U.S.-born white for most analyses. Additional less common ethnicities are included when comparing each of the above with "all others."
Occupation category	Well-off professional, Professional, Skilled, Unskilled.
Tenancy status	Owner, Tenant, Unknown (presumably short-term tenants in most cases). Tenant and Unknown are lumped in some analyses as Nonowners.
Neighborhood	East of Market Street (Blocks 1-3), West of Market Street (Blocks 4-6), Oakland Point (Blocks 19-37)
Dwelling type	Polite two-story Victorian, Almost polite, Simple two-story, Duplex, Residence over shop (excluded from many analyses), Informal workers' cottage, Butcher shop (excluded from most analyses), and Hotel (excluded from many analyses). Some analyses lump all private housing versus hotels.
Woman-headed household	Households identified as woman-headed, versus ones not so identified and presumed to be not headed by women.

APPROACH AND METHODS

This analysis follows the same methodology as the faunal analysis, and tests all the same contrasts of cultural categories. The principal difference is the nature of the variables that describe the glass. This analysis, like the faunal analysis, uses percentage data in order to look at the composition of each feature's assemblage, without considering the relative amounts of glass from each context. The assumption in using percentage data in this way is that households consumed relatively similar amounts products sold in bottle glass all told (or meat, in the faunal analysis), so comparing the proportions of specific types of bottle glass relative to the total amount recovered should bring out differences in consumption that would otherwise be masked by culturally unimportant differences in the size and artifact density of features excavated. However, while the faunal analysis was based simply on percentage data for each "analytical unit" (e.g., "15% of all identifiable bone from Feature X was beef"), the glass data are slightly more complex because of the troublesome tendency of bottles to exist in two drastically different states: intact, or broken into a large number of pieces. Most artifacts, such as bone, have a more limited and continuous gradation of degrees of breakage. Since one intact bottle was functionally equivalent to a large number of fragments of a similar bottle, characterizing a sample that contains both whole and broken bottles is not straightforward. In order to approach this problem, I created three different measures of each category of bottles to be analyzed. Each has its advantages and disadvantages. I ran the same statistical tests on all of them, and I consider all of them in interpreting the results.

First and simplest, I used counts in which each glass object, whether a whole bottle or a fragment, counts as a single item. In this approach, wine bottles, for example, are quantified as the total number of whole wine bottles and fragments of wine bottles, divided by the total of all bottle glass items (whole and fragments) in the feature. This approach has the virtue of simplicity, and it takes into account the entire assemblage, regardless of its degree of breakage. On the other had, it underrepresents any kind of bottle that is unusually prone to be found intact, since these are more often counted as a single item, equivalent to each of the many fragments of a bottle that is broken. It can also create the appearance of differences between originally identical glass assemblages that have been subjected to differing degrees of breakage for pre- or post-depositional reasons. Stronger bottles, which will tend to be intact in protected deposits, will appear to be rare in those deposits, while they will appear to be more numerous in assemblages in which they have been broken. Such differences have no simple relationship to the use of the bottles before discard, which is presumably what the analysis would ideally assess. Finally, this approach will produce skewed results if some households recycled whole bottles more than did other households. I identified these "percentage of items" variables with a terminal I (for Items), as in WineI. Second, I avoided some of these problems by excluding whole bottles, and working only with fragments. Wine bottles, for example, are quantified simply as the number of fragments of wine bottles, divided by the total number of fragments in the feature, ignoring any whole bottles. This approach should largely eliminate biases due to differential recycling. However, it only partially escapes the breakage problem, since in protected assemblages the whole bottles are not included, while in more broken-up ones, the same bottles have become fragments and are included. In practice, since most of the items

recovered were fragments, this measure usually did not differ much from the previous one. Patterns that were significant in "percentage of items" were usually also significant in "percentage of fragments," and vice versa. I identified these "percentage of fragments" variables with a terminal F (for Frags), as in WineF.

In the one case of measuring whole bottles as a category, I had to vary the "percentage of total fragments" approach. Whole bottles obviously cannot be excluded from an analysis of whole bottles. In this case, I divided the number of whole bottles by the number of fragments. This is a reasonable index of frequency of whole bottles, but is not strictly speaking a percentage, because the whole bottles are not included in the denominator. In an assemblage with many whole bottles and few fragments, this value could exceed 100%.

Finally, I used the MNI (minimum number of individual bottles) as given in the supplied data. In this approach, wine bottles were quantified as the MNI of wine bottles divided by the total MNI of bottles in the feature. This approach largely escapes the breakage problem, since in theory with a complete sample, a broken bottle would contribute exactly the same single individual to the MNI total as a whole one would. When not all fragments of every bottle are recovered, however, MNI probably underrepresents those bottles that tend to break more readily or into smaller pieces, or that have fewer individually diagnostic parts than others. That is, a collection containing some pieces of three broken bottles of the same type could well have no duplicates of diagnostic parts, producing an MNI of 1. For this reason, MNI tends to compress the variability in frequency of bottles by understating the number of multiple examples, and this effect will not be equal for bottles with different characteristics and tendencies to break. Nevertheless, the MNI approach is probably the best available approximation of the original bottle assemblage in use, and the errors it introduces are probably generally such that they reduce the differences between assemblages, rather than introducing spurious ones. That is, percentage of MNI is a relatively robust, conservative, but potentially less-sensitive measure than the other two. I identified these "percentage of MNI" variables with a terminal M (for MNI), as in WineM.

In order to better capture the variation in alcohol consumption, I also created variables in which the number of items, fragments, or MNI of wine/champagne bottles, ale/beer bottles, and liquor bottles was divided by the total items, fragments, or MNI of all alcoholic-beverage bottles. These measures should reflect preferences in types of alcohol without being obscured by variations in use of other glass containers or variations in total alcoholic-beverage consumption. A large amount of glass was identified as "alcoholic-beverage bottle" with no further detail. These bottles cannot be counted in the wine, beer, or liquor categories, but instead form an "unknown type of alcoholic beverage" category that I did not analyze separately. For this reason, the three identified categories do not sum to 100%. I identified these "percentage of alcoholic-beverage bottle" measures as winealci, winealcf, and winealcm; beeralci, beeralcf, and beeralcm; and liqalci, liqalcf, and liqalcm. In order to save space, I do not report these values in the percentage data tables, but only in the significance-test tables. The percentage data can be estimated (but not calculated exactly) from the data that I do report. For example, winealci can be estimated by dividing winei by alcholi.

My approach is to analyze all the measures of each category of interest, since no one of them is ideal. The MNI variables, as the most conservative, should carry the most weight in

interpretations. When all three measures of the same category are found to have significant patterning, the pattern seems more strongly supported. When only one or both of the non-MNI variables are significantly patterned, the pattern may be due to one or more of the confounding factors discussed above, or it may be real, but not strong enough to overcome the damping-out quality of the MNI measure.

Complete list of bottle variables analyzed:

Variablename	**Meaning**
wholei	Whole bottles / total items (whole + frags)
wholef	Whole bottles / total fragments
wholem	Whole bottles / total MNI
foodi	Food-bottles (whole + frags) / total items (whole + frags)
foodf	Food-bottle fragments / total fragments
foodm	Food-bottle MNI / total MNI
foodsti	Food-storage bottles (whole + frags) / total items (whole + frags)
foodstf	Food-storage bottle fragments / total fragments
foodstm	Food-storage bottle MNI / total MNI
groomi	Grooming/health bottles (whole + frags) / total items (whole + frags)
groomf	Grooming/health bottle fragments / total fragments
groomm	Grooming/health bottle MNI / total MNI
writingi	Writing-ink bottles (whole + frags) / total items (whole + frags)
writingf	Writing-ink bottle fragments / total fragments
writingm	Writing-ink bottle MNI / total MNI
alcoholi	Alcoholic-beverage bottles (whole + frags) / total items (whole + frags)
alcoholf	Alcoholic-beverage bottle fragments / total fragments
alcoholm	Alcoholic-beverage bottle MNI / total MNI
beeri	Beer and/or ale bottles (whole + frags) / total items (whole + frags)
beerf	Beer and/or ale bottle fragments / total fragments
beerm	Beer and/or ale bottle MNI / total MNI
winei	Wine and/or champagne bottles (whole + frags) / total items (whole + frags)
winef	Wine and/or champagne bottle fragments / total fragments
winem	Wine and/or champagne bottle MNI / total MNI
liquori	Hard liquor bottles (whole + frags) / total items (whole + frags)
liquorf	Hard liquor bottle fragments / total fragments
liquorm	Hard liquor bottle MNI / total MNI

Variablename	Meaning
beeralci	Beer and/or ale bottles (whole+frags) / alcoholic beverage bottles (whole+frags)
beeralcf	Beer and/or ale bottle fragments / alcoholic beverage bottle fragments
beeralcm	Beer and/or ale bottle MNI / alcoholic beverage bottle MNI
winealci	Wine and/or champagne bottles (whole+frags) / alc. bev. bottles (whole+frags)
winealcf	Wine and/or champagne bottle fragments / alcoholic beverage bottle fragments
winealcm	Wine and/or champagne bottle MNI / alcoholic beverage bottle MNI
liqalci	Hard liquor bottles (whole + frags) alcoholic beverage bottles (whole+frags)
liqalcf	Hard liquor bottle fragments alcoholic beverage bottle fragments
liqalcm	Hard liquor bottle MNI / alcoholic beverage bottle MNI

The rest of the methodology is essentially the same as that used in the faunal analysis (Appendix G). The methodology discussion from the faunal report is reproduced below with minor changes to correspond to the bottle analysis.

This analysis is based entirely on percentage data for each "analytical unit." These "analytical units" are single or multiple stratigraphic units taken to represent a single sample of refuse from a single residential context, such as a house or a hotel. Each such context is represented by only one analytical unit, and each is taken to represent just one residential context, although this may be a simplification in one or more cases (e.g., Feature 2007). By analyzing the percentage composition of bottle glass from each analytical unit, differences in the size of these feature or feature clusters and their depositional history are eliminated from consideration. Only the mix of bottle types is considered here; the amounts discarded are not evaluated.

The statistics used weight each feature equally. In effect, each analytical unit represents the mix of bottle types discarded by a single residential unit. This analysis is a comparison of the bottle-type mixes of these residential units.

The analysis proceeded in steps, summarized below:

1. Select features suitable for the particular analysis
2. Print a table showing the average bottle-type percentages (by items, fragments, and MNI) for each category. To save space, only types with significant patterning or other findings of interest are reported here.
3. Check to see if any variable is significantly nonrandomly distributed in the whole subsample.
4. Compare pairs of categories (i.e., Professional vs. Unskilled) to see if any variable (i.e., percentage of wine bottles) is significantly different.
5. Do similar pairwise comparisons using lumped categories (i.e., Unskilled vs. all other occupation categories).

6. Interpret the results.

First, the features to be included in any given comparison were selected to include only those for which the relevant context data were available. Additional restrictions were also applied in many cases, for example limiting the cases to residential, as opposed to commercial, properties. For some analyses, features from rare types of contexts were excluded, such as the one Italian household in most of the ethnicity analyses, or the two Widow households in the occupation analysis.

Second, the data was summarized according to the context variables (such as African American, German, Irish, U.S.-born white) and reported in a table showing the mean percentages of variables. These values average the percentages of the features, so small features count the same as large ones. They give a sense of the central tendencies of each context category. For example, one can note that features from hotel contexts average a higher proportion of liquor bottles than do features from Polite two-story Victorian houses.

These tables of mean values are useful exploratory tools, but they are deceptively difficult to interpret. The mean values may hide a great deal of variation, and especially with the small sample sizes here, the differences they suggest may not be meaningful. How large must a difference be to be considered important? How close must two percentages be to be considered effectively the same? It is even possible for the means to be identical when there is actually a real difference between the categories. Consider a hypothetical case in which all the features from Latvian households had around 10% wine bottles, while among the five Estonian households, four features had no wine bottles and one had 100% wine bottles, for an average of 20%. The mean values would suggest that Estonian households typically had a higher proportion of wine bottles than did Latvian households, when in fact the opposite was true.

The next stages of the analysis attempt to resolve these problems by evaluating the statistical significance of the differences between categories of features. The statistics used are nonparametric, that is, they do not assume a normal (bell-shaped) distribution of values. This is important, since the small sample sizes mean that the luck of the draw is likely to produce non-normal sample distributions even if the underlaying patterns are normal. Moreover, humans are complicated, and there is no reason to assume normal distributions of behavior in such historically particular, individualistic matters as food preferences. Parametric tests, such as the familiar t-test, will often find "significant" differences between small samples of archaeological data simply because they are not normal and thus fit poorly to the t-test's null hypothesis that both samples are drawn from a single normal distribution.

The statistics used here are the Wilcoxon rank-sum test (also called the Mann-Whitney-Wilcoxon Test) for cases with two classes (such as a comparison of percent wine bottles in Professional features vs. Unskilled features), and the equivalent test for more than two classes, the Kruskal-Wallis test. These are well explained in:

Gibbons, Jean D.
1993 *Nonparametric Statistics: An Introduction.* Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-090. Sage Publications, Newbury Park.

In essence, these tests arrange all the values in rank order, from smallest to largest, disregarding the size of the differences between them. If the percentage of wine bottles was greater in Victorian houses than in cottages, the values from Victorian houses would mostly be towards the high end of the list, and the values from cottages would mostly be towards the low end. If the percentage of wine bottles was the same in cottages and Victorians, then the values for each kind of house would be uniformly scattered through the whole list. The tests evaluate whether or not the list is significantly unbalanced, by calculating the odds of getting a pattern at least that unbalanced if you were to put the values in order by chance, such as by randomly drawing "Victorian" or "Cottage" from a collection of slips of paper with the appropriate number of each type. If the chance of getting a list as unevenly distributed as the observed one is low (less than 10%, or less than 5%), then the pattern is deemed to be significant, that is, probably due not to chance, but to a real difference between the two categories.

The third step applies only to analyses involving more than two categories, such as the occupation analysis. In these cases, the Kruskal-Wallis test is applied to each of the bottle variables to determine if its distribution among all the categories is significantly different from random. A significant result indicates that there is significant patterning to be explained, but does not indicate what the pattern is.

The fourth step applies to all cases. Here, the Wilcoxon rank-sum test is used to compare pairs of categories, such as Polite Victorian houses vs. Informal workers' cottages. These results are easy to interpret: a significant result means that the variable (such as percent of wine bottles) is significantly different in the two categories. Significantly different means that the difference is consistent enough that it is unlikely to be random, so it is appropriate to look for a cultural explanation. A difference with a probability of 5% has only a 5% chance of having occurred randomly, so we can consider it probably the result of some systematic process, rather than the luck of the draw. A significant result does not mean that the difference is large. A real, significant difference might nevertheless be subtle and not very important. Consider the difficulty of interpreting a finding that Latvian households consistently discarded 1% more wine bottles than Estonian ones. Significant differences indicate trends in the data that should be taken seriously, probably by examining and plotting the feature values. The pattern that appears is probably due to a real process, but the interpretation is up to the archaeologist.

The fifth step repeats the fourth, but using lumped categories such as features from Polite Victorian houses vs. all others.

The sixth and final step is statistical interpretation, in which the results are subjectively evaluated to see if they make any sort of coherent sense. I have done this in part by ordering the tables of significance tests so as to juxtapose comparisons that seem to be related, allowing me to abstract some generalizations from them. Others might notice and emphasize different patterns in the results. It is also important to look for multiple tests that confirm related trends. This is because the method used here is inductive. That is, I did not start with a hypothesis and test the data to evaluate it. Instead, I ran all the reasonable comparisons I could think of, and pulled out for discussion those that proved significant either at the 10% level (less than 10% chance that the two categories actually have identical distributions of values, that is, less than 10% chance that the difference is an illusion caused by the luck of the draw) or at the more convincing 5% level (less than 5% chance that the differences are an illusion caused by the luck

of the draw). This procedure is likely to produce some spurious "significant" results by chance. That is, out of one hundred tests of two identical distributions of values, five are expected to show differences "significant" at the 5% level, just by chance. For this reason, isolated significant results may or may not reflect real cultural processes. Where multiple significant results seem to reflect a single underlying trend, then the trend can be considered real.

Finally, the lack of statistically significant differences between most of the categories does not mean that there necessarily are no differences between the categories. It simply means that any differences present are not great enough to be detected with confidence based on the given sample size and variability.

The statistics were run on SAS software, using SAS instructions in the programs BOTGEN1.SAS and BOTALC1.SAS, bottle data from BOTFRAG.DBF, and context data from CYPCTX3.DBF. The program is a simple text file that can be viewed using any word processor, and the data files can be viewed directly by Excel or most database programs.

RESULTS

OCCUPATION

Occupation	Number of Features	wholei	holef	wholem	winei	winef	winem
P+ (wealthy professional)	3	2.9	3.0	22.3	18.5	19.1	12.0
P (professional)	13	8.2	10.1	25.5	10.2	10.8	5.6
S (skilled)	36	7.8	11.0	26.7	5.8	6.0	4.1
U (unskilled)	8	4.1	4.7	16.3	3.7	3.9	1.8
Total:	60	7.1	9.5	24.8	7.1	7.4	4.5

Occupation	Number of Features	foodsti	foodstf	foodstm	groomi	groomf	groomm
P+ (wealthy professional)	3	5.9	6.2	5.0	11.9	10.9	20.6
P (professional)	13	9.1	9.3	2.9	15.6	12.3	20.0
S (skilled)	36	12.5	13.2	5.2	20.4	18.2	27.9
U (unskilled)	8	7.4	7.8	3.8	16.3	14.1	26.4
Total:	60	10.7	11.3	4.5	18.4	16.0	25.6

Figures are percentages. Variables ending in I are "percentage of all items, whole or broken." Variables ending in F are "percentage of fragments only" (except WholeF, which is whole bottles divided by fragments). Variables ending in M are "percentage of MNI."

Comparisons:

All 4 categories together for nonrandomness

All pairs:

Wealthy (P+) vs. all others (P,S,U)

Wealthy (P+) vs. Middle (P,S)

Middle (P,S) vs. Unskilled (U)

Middle (P,S) vs. Extremes (U,P+)

Upper (P+,P) vs. Lower (S, U)

Any skill (P+,P,S) vs. Unskilled (U)

Significant Differences (comparisons that reached at least 10% significance):

Occupation Category:	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Unskilled (U) vs. Skilled (S)	wholei	Skilled	0.0883		X
Unskilled (U) vs. Skilled (S)	wholef	Skilled	0.0883		X
Unskilled (U) vs. Skilled (S)	wholem	Skilled	0.0882		X
Unskilled (U) vs. Middle (S,P)	wholei	Middle	0.0808		X
Unskilled (U) vs. Middle (S,P)	wholef	Middle	0.0808		X
Unskilled (U) vs. Middle (S,P)	wholem	Middle	0.0848		X
Unskilled (U) vs. All others	wholei	All others	0.0898		X
Unskilled (U) vs. All others	wholef	All others	0.0898		X
Unskilled (U) vs. All others	wholem	All others	0.0857		X
Extremes (P+,U) vs. Middle (S,P)	wholei	Middle	0.0382	X	X
Extremes (P+,U) vs. Middle (S,P)	wholef	Middle	0.0382	X	X
Unskilled (U) vs. Professional (P)	winem	Professional	0.0650		X
Unskilled (U) vs. Professional (P)	winealci	Professional	0.0996		X
Unskilled (U) vs. Professional (P)	winealcf	Professional	0.0996		X
Unskilled (U) vs. Professional (P)	winealcm	Professional	0.0367	X	X
Upper (P,P+) vs. Lower (S,U)	winei	High (P,P+)	0.0943		X
Upper (P,P+) vs. Lower (S,U)	winef	High (P,P+)	0.0663		X
Upper (P,P+) vs. Lower (S,U)	winealci	High (P,P+)	0.0495	X	X
Upper (P,P+) vs. Lower (S,U)	winealcf	High (P,P+)	0.0374	X	X
Upper (P,P+) vs. Lower (S,U)	winealcm	High (P,P+)	0.0322	X	X
Professional (P) vs. Skilled (S)	winealcf	Professional	0.0812		X
Unskilled (U) vs. All others	winem	All others	0.0868		X

Occupation Category:	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Unskilled (U) vs. Middle (S,P)	winem	Middle	0.0951		X
Wealthy prof. (P+) vs. Skilled (S)	beeralci	Skilled	0.0989		X
High (P,P+) vs. Low (S,U)	liqalcm	Low (S,U)	0.0936		X
Professional (P) vs. Skilled (S)	foodstm	Skilled	0.0336	X	X
Low (S,U) vs. High (P,P+)	groomm	Low (S,U)	0.0622		X

Interpretations:

Unskilled workers left a significantly smaller proportion of whole bottles in their refuse than did skilled workers, skilled workers and professionals combined, and all others combined—in every case significant for all three measures of whole bottles. None of the other categories differed significantly from each other in proportions of whole bottles. A likely interpretation is that unskilled workers recycled their whole bottles at a higher rate than did people with better-paying professions, presumably taking advantage of a small source of income that did not interest the others.

In the percentage data, the proportion of whole bottles in wealthy professional features is similar to those of the professional and skilled features by the MNI measure. However, wealthy professional features differ sharply by the "percent of items" and "percent of fragments" measures, seeming to have even fewer whole bottles than unskilled worker's features. In theory, the MNI measure is probably the most realistic of the three, and it agrees with the general pattern in the other results. Nevertheless, it might be worth pursuing why the other two measures behave so differently from MNI in this case. One possible explanation is that the deposition process in the wealthy professional households somehow led to greater breaking up of glass fragments, which would make the whole bottles seem fewer by comparison.

The percentage data suggest a consistent gradation of wine bottles by profession, with the fewest in unskilled workers' refuse, and increasing proportions in skilled, then professional, then wealthy professional households. The significance tests support this pattern, especially by the measures of wine bottles as a percentage of all alcohol bottles. Wine was clearly consumed more by those with higher-paying professions, at least for consumption at home.

Two significant comparisons suggest the reverse of this pattern in wine consumption. Beer and/or ale bottles were a greater fraction of the alcoholic beverage, bottle refuse at households of skilled workers than at wealthy professional households, albeit only by the weak "percentage of items" measure. Liquor bottles were a greater fraction of the alcoholic-beverage-bottle refuse at the lower income tier of unskilled and skilled workers, compared to the upper income tier of professionals and wealthy professionals, this time by the robust MNI measure. These patterns are easily interpretable and fit with preconceptions. While they are only weakly supported by these two barely significant statistics, there is little reason to doubt the reality of the patterns.

While one comparison involving food-storage bottles by MNI is significant at the 5% level, the percentage data do not suggest a clear pattern, and the other measures, while showing the same general pattern, do not produce any significant contrasts. This result is difficult to make

sense of, and without any other corroboration or plausible interpretation, it can probably be rejected as one of the expected occasional spurious significant results.

Finally, there is a weak suggestion in both the percentage data and one significant comparison by MNI that the lower two occupation categories have a higher proportion of grooming and health bottles than the upper two occaupation categories. While this pattern is not strongly supported by the statistics, it could make sense. The "grooming and health" category is very broad, which could tend to obscure a stronger pattern in, for example, medicinal bottles, different types of medicinals, perfumes, or hair products. It would be worthwhile to analyze subsets of the grooming and health category.

ETHNICITY

Ethnicity (all known)	**Number of Features**	**wholei**	**wholef**	**wholem**	**liquori**	**liquorf**	**liquorm**
African American	4	6.7	7.5	19.6	0.7	0.7	1.0
Canada	2	2.2	2.2	11.6	3.9	4.0	1.4
English/U.S.	1	4.2	4.4	17.0	3.2	3.4	1.0
German	8	7.7	8.7	29.2	0.2	0.2	0.5
German/English	1	8.0	8.7	32.7	0.0	0.0	0.0
Irish	17	5.9	6.8	21.6	2.8	3.0	1.3
Italian	1	0.6	0.6	3.3	0.0	0.0	0.0
Prussian	1	6.8	7.2	38.8	0.0	0.0	0.0
Scotland	1	4.9	5.1	23.6	5.6	5.9	1.8
Scots/Irish	1	4.9	5.2	16.7	0.0	0.0	0.0
U.S.-born	27	8.9	13.5	27.4	0.5	0.5	0.5
Total:	64	7.2	9.6	24.6	1.3	1.3	0.8

Ethnicity (all known)	**Number of Features**	**foodsti**	**foodstf**	**foodstm**	**groomi**	**groomf**	**groomm**
African American	4	7.8	8.1	2.6	16.8	12.2	21.1
Canada	2	36.0	36.8	6.7	11.9	11.4	16.7
English/U.S.	1	5.5	5.5	5.0	15.2	12.5	26.0
German	8	3.5	3.7	2.0	30.0	29.5	27.7
German/English	1	36.3	39.4	7.3	6.2	3.4	14.5
Irish	17	9.0	9.5	4.7	17.6	14.8	27.3

Ethnicity (all known)	Number of Features	foodsti	foodstf	foodstm	groomi	groomf	groomm
Italian	1	38.8	39.0	16.7	5.5	4.9	10.0
Prussian	1	0.0	0.0	0.0	19.9	17.4	39.8
Scotland	1	1.1	1.2	1.8	13.5	13.0	14.5
Scots/Irish	1	0.0	0.0	0.0	19.8	18.2	18.8
U.S.-born	27	10.2	10.7	4.8	15.9	13.0	25.7
Total:	64	10.0	10.5	4.4	17.8	15.3	25.3

Ethnicity (all known)	Number of Features	writingi	writingf	writingm
African American	4	1.1	1.1	0.4
Canada	2	0.6	0.4	2.4
English/U.S.	1	1.5	1.6	4.0
German	8	0.2	0.0	1.0
German/English	1	0.4	0.0	1.8
Irish	17	1.4	1.4	2.3
Italian	1	0.6	0.6	3.3
Prussian	1	0.0	0.0	0.0
Scotland	1	0.7	0.4	3.6
Scots/Irish	1	0.6	0.0	2.1
U.S.-born	27	2.1	1.5	2.5
Total:	64	1.4	1.1	2.1

Figures are percentages. Variables ending in I are "percentage of all items, whole or broken." Variables ending in F are "percentage of fragments only" (except WholeF, which is whole bottles divided by fragments). Variables ending in M are "percentage of MNI."

Comparisons:

All 4 common ethnicities together for nonrandomness

All pairs of the 4 common ethnicities

Each of the 4 common ethnicities vs. all the others lumped together, including less common ones

White from former British Empire (Canada, English/U.S., Irish, Scots, Scots/Irish, U.S.-born) vs. white from continental Europe (German, Prussian, Italian)

Significant Dfferences (Comparisons that reached at least 10% significance):

Ethnicity	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Irish vs. U.S.-born	liquori	Irish	0.0830		X
Irish vs. U.S.-born	liquorf	Irish	0.0529		X
Irish vs. U.S.-born	liqalci	Irish	0.0558		X
Irish vs. U.S.-born	liqalcf	Irish	0.0347	X	X
Irish vs. non-Irish	liquorf	Irish	0.0845		X
Irish vs. non-Irish	liqalci	Irish	0.0883		X
Irish vs. non-Irish	liqalcf	Irish	0.0678		X
US vs. non-U.S.-born	liquorf	NonU.S.	0.0865		X
US vs. non-U.S.-born	liqalcf	NonU.S.	0.0723		X
German vs. all non-German	foodsti	All non-German	0.0953		X
German vs. U.S.-born	foodsti	U.S.	0.0580		X
German vs. U.S.-born	foodstf	U.S.	0.0811		X
All major ethnicities	groomi	n/a	0.0823		X
All major ethnicities	groomf	n/a	0.0514		X
German vs. U.S.-born	groomi	German	0.0157	X	X
German vs. U.S.-born	groomf	German	0.0087	X	X
German vs. African American	groomi	German	0.0745		X
German vs. African American	groomf	German	0.0745		X
German vs. Irish	groomi	German	0.0756		X
German vs. Irish	groomf	German	0.0509		X
German vs. all non-German	groomi	German	0.0091	X	X
German vs. all non-German	groomf	German	0.0059	X	X
US vs. all non-U.S.-born	groomi	All non-U.	.0.0778		X
British white vs. non-British white	groomi	non-British white	0.0383	X	X
British white vs. non-British white	groomf	non-British white	0.0228	X	X
German vs. U.S.-born	writingf	U.S.	0.0925		X
German vs. African American	writingi	African American	0.0502		X
German vs. all non-German	writingf	All non-German	0.0578		X

Interpretations:

In general, the patterns by ethnicity are less convincing than many others, because none of them are significant using the conservative MNI measure. Many, however, are significant for both the "percentage of items" and "percentage of fragments" measures. This could be due to

the patterns being real but too weak to show up using the less-sensitive MNI measure, to differential breakage by ethnicity, or to the patterns being statistical flukes without cultural meaning.

With that caveat, there is a weak pattern of Irish features having a higher proportion of liquor bottles than U.S. features and, even more weakly, than features of all other ethnicities combined. This pattern is significant both when liquor bottles are considered as a fraction of all the bottle glass, and when they are considered as a fraction of just alcoholic-beverage bottles.

Also statistically weak, but interestingly consistent, is the tendency of German features to differ from the others. Specifically, German features may have more food storage bottles than do U.S. features, and even more weakly, than do all non-German features combined. Continuing the trend, German features have more grooming/health bottles than do U.S.-born, Irish, and African American features, and than all non-German features combined. All of these patterns in grooming/health bottles are significant by both the "percentage of items" and the "percentage of fragments" measures. Even though none of these patterns is significant by "percentage of MNI," their consistency does suggest that the German glass refuse was either different to begin with, or experienced different depositional processes than most others. It would be useful to subdivide the broad grooming/health category, since this and other patterns might be clearer if the categories were limited to medicinal products only, cosmetic products only, or even more specific kinds of bottles and associated activities. In other cases, this might bring out additional significant patterns that cannot be detected with the broad grooming/health category.

Non-U.S.-born features appear to have more grooming/health bottles than do U.S.-born features, by just one of the three measures. Non-British Empire white features similarly have more grooming/health bottles than do formerly British Empire white features, by both non-MNI measures. Both of these patterns are probably due primarily to the many German features in the non-U.S.-born and non-British Empire categories.

Finally, the German features also differ weakly, but in several different contrasts, from others in having fewer writing-ink bottles.

There was no significant patterning in recycling (whole bottles) by ethnicity.

DWELLING TYPE

By detailed dwelling categories:

Dwelling Type	Number of Features	wholei	wholef	wholem	liquori	liquorf	liquorm
P (Polite Victorian)	8	16.4	30.3	35.9	0.0	0.0	0.0
A (Almost-polite)	14	6.9	8.1	24.7	3.3	3.7	1.0
S (Simple, 2-story)	3	9.3	11.0	32.2	0.0	0.0	0.0
D (Duplex)	4	5.9	6.5	23.6	1.3	1.0	2.0
I (Informal workers' cottage)	47	5.6	6.2	23.4	2.1	2.2	0.9
R/C (Residence over shop)	1	15.8	18.8	30.0	0.0	0.0	0.0
H (Hotel)	4	15.6	21.1	47.4	3.5	3.9	2.0
B (Butcher shop)	1	3.2	3.3	12.5	0.0	0.0	0.0
NA (Unknown)	2	2.5	2.6	18.7	0.8	0.8	2.0
Total:	84	7.5	9.7	26.1	1.9	2.1	0.9

Dwelling Type	Number of Features	alcoholi	alcoholf	alcoholm	foodi	foodf	foodm
P (Polite Victorian)	8	25.1	26.6	18.8	8.1	8.9	8.4
A (Almost-polite)	14	30.8	31.9	22.6	17.1	17.7	10.4
S (Simple, 2-story)	3	29.0	31.8	20.8	25.1	22.8	22.5
D (Duplex)	4	26.1	26.2	20.6	15.6	16.1	16.1
I (Informal workers' cottage)	47	28.1	29.3	18.5	13.8	14.1	12.8
R/C (Residence over shop)	1	10.5	12.5	20.0	5.3	6.3	10.0
H (Hotel)	4	21.2	24.4	14.3	19.9	20.5	17.1
B (Butcher shop)	1	48.4	50.0	25.0	3.2	3.3	12.5
NA (Unknown)	2	12.5	12.8	16.7	35.0	35.5	20.4
Total:	84	27.5	28.8	19.2	14.8	15.2	12.8

Dwelling Type	Number of Features	writingi	writingf	writingm
P (Polite Victorian)	8	4.9	3.3	4.3
A (Almost-polite)	14	0.8	0.6	1.8
S (Simple, 2-story)	3	0.3	0.3	1.3
D (Duplex)	4	1.8	1.7	3.1
I (Informal workers' cottage)	47	1.0	0.8	1.8
R/C (Residence over shop)	1	0.0	0.0	0.0
H (Hotel)	4	1.1	0.0	3.7
B (Butcher shop)	1	3.2	0.0	12.5
NA (Unknown)	2	0.5	0.0	4.8
Total:	84	1.3	1.0	2.4

By lumped dwelling categories:

Dwelling Type	Number of Features	wholei	wholef	wholem	liquori	liquorf	liquorm
NonVict (I,D,S,A)	68	6.1	6.8	24.1	2.2	2.4	1.0
Vict (P)	8	16.4	30.3	35.9	0.0	0.0	0.0
Total:	76	7.1	9.3	25.3	1.9	2.1	0.9
Nice (P,A)	22	10.4	16.2	28.8	2.1	2.4	0.6
Simple (I,D,S)	54	5.8	6.5	23.9	1.9	2.0	1.0
Total:	76	7.1	9.3	25.3	1.9	2.1	0.9
Cottage (I)	47	5.6	6.2	23.4	2.1	2.2	0.9
House (P,A,S,D)	29	9.6	14.3	28.4	1.8	1.9	0.8
Total:	76	7.1	9.3	25.3	1.9	2.1	0.9
Dwelling (P,A,S,D,I)	78	7.0	9.1	25.2	1.9	2.1	0.9
Hotel	4	15.6	21.1	47.4	3.5	3.9	2.0
Total:	82	7.4	9.7	26.2	2.0	2.2	1.0

Dwelling Type	Number of Features	alcoholi	alcoholf	alcoholm	foodi	foodf	foodm
NonVict (I,D,S,A)	68	28.6	29.8	19.6	15.0	15.3	12.9
Vict (P)	8	25.1	26.6	18.8	8.1	8.9	8.4
Total:	76	28.2	29.4	19.5	14.3	14.7	12.4
Nice (P,A)	22	28.8	30.0	21.2	13.8	14.5	9.6
Simple (I,D,S)	54	28.0	29.2	18.8	14.5	14.7	13.6
Total:	76	28.2	29.4	19.5	14.3	14.7	12.4
Cottage (I)	47	28.1	29.3	18.5	13.8	14.1	12.8
House (P,A,S,D)	29	28.4	29.6	21.1	15.2	15.6	11.9
Total:	76	28.2	29.4	19.5	14.3	14.7	12.4
Dwelling (P,A,S,D,I)	78	27.8	29.0	19.4	14.8	15.2	12.6
Hotel	4	21.2	24.4	14.3	19.9	20.5	17.1
Total:	82	27.5	28.8	19.2	15.1	15.5	12.8

Dwelling Type	Number of Features	writingi	writingf	writingm
NonVict (I,D,S,A)	68	1.0	0.8	1.9
Vict (P)	8	4.9	3.3	4.3
Total:	76	1.4	1.1	2.1
Nice (P,A)	22	2.3	1.6	2.7
Simple (I,D,S)	54	1.0	0.9	1.9
Total:	76	1.4	1.1	2.1
Cottage (I)	47	1.0	0.8	1.8
House (P,A,S,D)	29	2.0	1.5	2.6
Total:	76	1.4	1.1	2.1
Dwelling (P,A,S,D,I)	78	1.4	1.0	2.2
Hotel	4	1.1	0.0	3.7
Total:	82	1.3	1.0	2.3

Figures are percentages. Variables ending in I are "percentage of all items, whole or broken." Variables ending in F are "percentage of fragments only" (except WholeF, which is whole bottles divided by fragments). Variables ending in M are "percentage of MNI."

Comparisons:

All 9 categories together for nonrandomness, various subsets excluding nonresidential, all commercial, etc.

All pairs:

Polite Victorian (P) vs. other homes (A,S,D,I)

Nice homes (P,A) vs. simple homes (S,D,I)

Cottages (I) vs. other homes (P,A,S,D)

Hotel vs. other dwellings except Butcher shop and Residence over shop

Significant Differences (Comparisons that reached at least 10% significance):

Dwelling types:	**Variable**	**Which has more?**	**Probability**	**Sig @ 5%**	**Sig @ 10%**
All noncommercial dwelling types	liquorm	n/a	0.0918		X
Polite Vict (P) v. Almost-polite (A)	liquori	Almost-polite	0.0699		X
Polite Vict (P) v. Almost-polite (A)	liquorf	Almost-polite	0.0699		X
Polite Vict (P) v. Almost-polite (A)	liquorm	Almost-polite	0.0699		X
Polite Vict (P) v. Almost-polite (A)	liqalci	Almost-polite	0.0897		X
Polite Vict (P) v. Almost-polite (A)	liqalcf	Almost-polite	0.0897		X
Polite Vict (P) v. Almost-polite (A)	liqalcm	Almost-polite	0.0897		X
Polite Vict (P) v. Duplex (D)	liquori	Duplex	0.0104	X	X
Polite Vict (P) v. Duplex (D)	liquorf	Duplex	0.0502		X
Polite Vict (P) v. Duplex (D)	liquorm	Duplex	0.0104	X	X
Polite Vict (P) v. Duplex (D)	liqalci	Duplex	0.0162	X	X
Polite Vict (P) v. Duplex (D)	liqalcf	Duplex	0.0685		X
Polite Vict (P) v. Duplex (D)	liqalcm	Duplex	0.0162	X	X
Polite Vict (P) v. Hotel (H)	liquori	Hotel	0.0502		X
Polite Vict (P) v. Hotel (H)	liquorf	Hotel	0.0502		X
Polite Vict (P) v. Hotel (H)	liquorm	Hotel	0.0502		X
Polite Vict (P) v. Hotel (H)	liqalci	Hotel	0.0685		X
Polite Vict (P) v. Hotel (H)	liqalcf	Hotel	0.0685		X
Polite Vict (P) v. Hotel (H)	liqalcm	Hotel	0.0685		X
Polite Vict (P) v. Inf. cottage (I)	liquori	Inf. cottage	0.0702		X
Polite Vict (P) v. Inf. cottage (I)	liquorf	Inf. cottage	0.0835		X
Polite Vict (P) v. Inf. cottage (I)	liquorm	Inf. cottage	0.0702		X
Polite Vict (P) v. Inf. cottage (I)	liqalci	Inf. cottage	0.0856		X

Dwelling types:	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Polite Vict (P) v. Inf. cottage (I)	liqalcm	Inf. cottage	0.0856		X
Polite Vict (P) v. NonVictorian	liquori	NonVictorian	0.0568		X
Polite Vict (P) v. NonVictorian	liquorf	NonVictorian	0.0729		X
Polite Vict (P) v. NonVictorian	liquorm	NonVictorian	0.0568		X
Polite Vict (P) v. NonVictorian	liqalci	NonVictorian	0.0716		X
Polite Vict (P) v. NonVictorian	liqalcf	NonVictorian	0.0900		X
Polite Vict (P) v. NonVictorian	liqalcm	NonVictorian	0.0716		X
Informal cottage (I) v. Duplex (D)	liquorm	Duplex	0.0619		X
Informal cottage (I) v. Duplex (D)	liqalcm	Duplex	0.0701		X
Polite Vict (P) vs. Duplex (D)	winealcf	Polite Vict.	0.0700		X
Polite Vict (P) v. Inf. cottage (I)	winealci	Polite Vict.	0.0757		X
Polite Vict (P) v. Inf. cottage (I)	winealcf	Polite Vict.	0.0708		X
Polite Vict (P) v. NonVictorian	winealci	Polite Vict.	0.0665		X
Polite Vict (P) v. NonVictorian	winealcf	Polite Vict.	0.0600		X
All noncommercial dwelling types	foodm	n/a	0.0979		X
Polite Vict (P) v. Hotel (H)	foodi	Hotel	0.0725		X
Simple 2-st (S) v. Polite Vict (P)	foodm	Simple 2-story	0.0305	X	X
Simple 2-st (S) v. Almost-polite (A)	foodm	Simple 2-story	0.0375	X	X
Simple 2-st (S) v. Inf. cottage (I)	foodm	Simple 2-story	0.0288	X	X
Simple (S,D,I) v. Nice (P,A)	foodm	Simple (S,D,I)	0.0610		X
Informal cottage (I) v. Duplex (D)	writingi	Duplex	0.0829		X
Informal cottage (I) v. Duplex (D)	writingm	Duplex	0.0764		X
Polite Vict (P) v. Inf. cottage (I)	wholem	Polite Vict	0.0947		X

Interpretations:

While dwelling type was a strong predictor of meat consumption behavior, its correlation to bottle-glass assemblages was surprisingly spotty.

Features from Polite Victorian homes contained no liquor bottles, whole or broken. This does not appear to be a fluke, since it differed significantly and consistently from features from Almost-polite homes, Duplexes, Informal cottages, all private residences combined, and hotels, in each case by all three measures, whether considering liquor bottles as a fraction of all bottles or as a fraction of alcoholic beverage bottles only. The absence of liquor bottles at Polite Victorian homes presumably reflects practices at these homes that might include avoidance of hard liquor, consumption of hard liquor only outside the home, or different practices of disposal of liquor bottles.

Interestingly, there was no significant patterning of alcohol bottles in general (shown in the percentage tables despite the lack of significant patterns), nor in wine/champagne bottles or ale/beer bottles. The salient issue for the inhabitants of the Polite Victorian houses seems not to have been alcohol in general, but hard liquor specifically. Residents of Polite Victorian homes certainly did consume alcohol, and of the alcoholic beverage bottles in their refuse, the proportion of wine bottles was significantly greater than at duplexes, workers' cottages, and non-Polite houses in general. This greater predominance of wine bottles at the finest houses clearly parallels the greater predominance of wine bottles at homes of people with higher-paying jobs.

No liquor bottles were recovered from features at Simple two-story houses, either, but with only three features representing this category, the pattern was not significant. Liquor bottles generally do not constitute more than a small percentage of a feature's glass assemblage, so occasional complete absences could be due to chance. They could also reflect real patterns that the sample is simply too small to prove.

Among the other types of dwellings, only one combination differed in liquor bottles in the glass refuse. Duplexes had significantly more liquor bottles than did Informal workers' cottages, by MNI only. Without any analogous significant differences to support it, this pattern is both poorly supported and difficult to interpret.

Simple two-story houses differed significantly from Polite Victorians, Almost-polite houses, and Informal workers' cottages in having a higher percentage of food bottles in their glass refuse, according to the conservative MNI measure. Although the same pattern occurs in lumping Simple two-story houses with Duplexes and Informal cottages versus the two more high-status dwelling types, the percentage data do not suggest a gradation of food bottles by dwelling quality. Instead, there was probably something idiosyncratic about some or all of the households in the three Simple two-story homes that made them differ from the others in purchasing more bottled food.

Features from the four Duplexes tended to have significantly higher proportions of writing-ink bottles than did features from Informal workers' cottages. Again, neither the percentage data, nor the comparisons of other dwelling types that produced no other significant patterns, suggest a gradation by quality of dwelling. Instead, duplexes are another category represented by a small number of features (just four), and their unusually high percentages of writing inkbottles probably have to do with peculiarities of some of those few households, rather than a larger, systemic pattern.

The households in the Simple two-story houses and in the Duplexes might reward closer scrutiny to determine why they differed from the others in food bottles and writing-ink bottles, respectively.

The percentage data suggest that hotels had relatively high percentages of whole bottles in their refuse, that is, that they did not recycle as much as did residential households, and that hotels had relatively higher proportions of hard liquor bottles in their refuse. While both of these patterns make sense, they did not rise to statistical significance, possibly due either to variation between hotels or the small sample size. Further work might clarify the standing of hotels here. Since hotels differed considerably from private households in their meat refuse, it is

reasonable to suspect that there could be comparable patterns in the glass that have yet to be recognized.

Finally, there is a weak pattern in the most reliable index of recycling (percentage of MNI), suggesting that there were more whole bottles in the refuse at Polite Victorian homes than at Informal workers' cottages. The percentage data for all three measures tends to support the impression that residents of the Polite Victorians discarded somewhat more whole bottles than did other households, that is, that they recycled less. While this is an interesting corroboration of the general pattern in recycling by occupation, it also differs. Dividing households by profession, it appears that the one, lowest-paid sector recycled more than all the others, which did not differ much. Dividing households by dwelling type, it appears that the one, best-off sector recycled less than all the others, which did not differ much. Both patterns follow general economic expectations, but they differ in finding either a small, poor segment of the population doing more recycling than the rest, or a small, wealthy segment doing less recycling than the rest. Whether this difference means anything important is not clear.

TENANCY

By detailed tenancy categories

Tenure Type	Number of Features	wholei	wholef	wholem	alcoholi	alcoholf	alcoholm
O (Owner)	30	6.6	7.8	24.2	32.5	34.1	21.1
O/T (Owner/tenant)	1	4.2	4.4	17.0	34.9	36.2	25.0
T (Tenant)	33	7.4	10.7	24.4	22.1	23.0	17.6
U (Unknown/transient)	14	7.4	8.6	29.6	30.6	31.9	19.6
Total:	78	7.0	9.1	25.2	27.8	29.0	19.4

Tenure Type	Number of Features	liquori	liquorf	liquorm	winei	winef	winem
O (Owner)	30	1.8	1.9	0.8	11.6	12.1	6.5
O/T (Owner/tenant)	1	3.2	3.4	1.0	10.0	10.4	6.0
T (Tenant)	33	0.8	0.8	0.7	5.2	5.4	3.7
U (Unknown/transient)	14	4.7	5.6	1.6	8.5	8.6	4.5
Total:	78	1.9	2.1	0.9	8.3	8.6	5.0

Tenure Type	Number of Features	beeri	beerf	beerm
O (Owner)	30	5.5	5.6	3.9
O/T (Owner/tenant)	1	9.5	9.6	6.0
T (Tenant)	33	6.6	6.8	4.7
U (Unknown/transient)	14	3.5	3.0	4.3
Total:	78	5.7	5.7	4.3

By lumped tenure categories, still excluding commercial properties and residence over shop

Tenure, Polite Vict. only	Number of Features	wholei	wholef	wholem	alcoholi	alcoholf	alcoholm
Nonowner	2	33.6	78.9	55.5	18.4	19.3	11.0
Owner	6	10.7	14.1	29.4	27.4	29.1	21.4
Total:	8	16.4	30.3	35.9	25.1	26.6	18.8
Tenure, Almost-polite only	**Number of features**	**wholei**	**wholef**	**wholem**	**alcoholi**	**alcoholf**	**alcoholm**
NonOwner	9	6.7	7.9	26.0	28.0	28.4	21.4
Owner	4	7.9	9.5	23.7	36.2	38.6	24.6
Total:	13	7.1	8.4	25.3	30.5	31.5	22.4
Tenure, Cottages only	**Number of features**	**wholei**	**wholef**	**wholem**	**alcoholi**	**alcoholf**	**Alcoholm**
Nonowner	47	7.4	10.1	25.9	24.7	25.6	18.2
Owner	30	6.6	7.8	24.2	32.5	34.1	21.1
Total:	77	7.1	9.2	25.3	27.7	28.9	19.3

Tenure, Polite Vict. only	**Number of features**	**liquori**	**liquorf**	**liquorm**	**winei**	**winef**	**winem**
NonOwner	2	0.0	0.0	0.0	7.8	8.4	2.3
Owner	6	0.0	0.0	0.0	12.2	12.9	6.3
Total:	8	0.0	0.0	0.0	11.1	11.7	5.3
Tenure, Almost-polite only	**Number of features**	**liquori**	**liquorf**	**liquorm**	**winei**	**winef**	**winem**
NonOwner	9	3.9	4.5	1.1	5.9	6.1	4.1
Owner	4	2.0	2.0	0.7	19.3	20.1	15.9
Total:	13	3.3	3.7	1.0	10.0	10.4	7.7
Tenure, Cottages only	**Number of features**	**liquori**	**liquorf**	**liquorm**	**winei**	**winef**	**Winem**
Nonowner	47	2.0	2.2	0.9	6.1	6.3	4.0
Owner	30	1.8	1.9	0.8	11.6	12.1	6.5
Total:	77	1.9	2.1	0.9	8.3	8.6	5.0

Tenure, Polite Vict. only	**Number of Features**	**beeri**	**beerf**	**beerm**
NonOwner	2	3.8	3.9	2.3
Owner	6	4.9	5.0	3.2
Total:	8	4.6	4.7	3.0
Tenure, Almost-polite only	**Number of features**	**beeri**	**beerf**	**beerm**
NonOwner	9	10.0	9.4	7.0
Owner	4	1.1	1.0	1.4
Total:	13	7.3	6.8	5.3

Tenure, cottages only	Numbe of features	beeri	beerf	Beerm
NonOwner	47	4.9	5.0	4.1
Owner	30	7.8	8.0	5.5
Total:	77	5.9	6.0	4.6

All tenure categories exclude commercial properties and residence over shop.

Comparisons:

All 4 categories together for nonrandomness

All pairs:

Owner (O) vs. Renter (T,U)

Owner (O) vs. Renter (T,U) within just a single dwelling type: Polite Victorian, Almost-polite house, or Informal workers' cottage

Significant Differences (Comparisons that reached at least 10% significance):

Tenure Status	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Owner (O) vs. Tenant (T)	alcoholi	Owner	0.0549		X
Owner (O) vs. Tenant (T)	alcoholf	Owner	0.0475	X	X
Tenant (T) vs. Unknown (U)	alcoholi	Unknown	0.0611		X
Tenant (T) vs. Unknown (U)	alcoholf	Unknown	0.0963		X
Owner vs. Nonowner, cottages only	alcoholi	Owner	0.0597		X
Owner vs. Nonowner, cottages only	alcoholf	Owner	0.0769		X
Owner vs. Nonowner, cottages only	liquorf	Owner	0.0778		X
All tenures	winei	n/a	0.0938		X
All tenures	winef	n/a	0.0707		X
Owner (O) vs. Tenant (T)	winei	Owner	0.0151	X	X
Owner (O) vs. Tenant (T)	winef	Owner	0.0103	X	X
Owner (O) vs. Tenant (T)	winem	Owner	0.0920		X
Owner (O) vs. Tenant (T)	winealci	Owner	0.0342	X	X
Owner (O) vs. Tenant (T)	winealcf	Owner	0.0249	X	X
Owner (O) vs. Tenant (T)	winealcm	Owner	0.0536		X
Owner (O) vs. Nonowner (T,U)	winei	Owner	0.0275	X	X

Tenure Status	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Owner (O) vs. Nonowner (T,U)	winef	Owner	0.0165	X	X
Owner (O) vs. Nonowner (T,U)	winealci	Owner	0.0337	X	X
Owner (O) vs. Nonowner (T,U)	winealcf	Owner	0.0221	X	X
Owner (O) vs. Nonowner (T,U)	winealcm	Owner	0.0545		X
Owner vs. Nonowner, cottages only	winei	Owner	0.0677		X
Owner vs. Nonowner, cottages only	winef	Owner	0.0618		X
Owner vs. Nonowner, almost-polite only	winealci	Owner	0.0720		X
Owner vs. Nonowner, almost-polite only	winealcf	Owner	0.0720		X
Owner vs. Nonowner, almost-polite only	winealcm	Owner	0.0347	X	X
Owner (O) vs. Tenant (T)	beeralci	Tenant	0.0714		X
Owner (O) vs. Tenant (T)	beeralcm	Tenant	0.0774		X
Tenant (T) vs. Unknown (U)	beeralci	Tenant	0.0769		X
Tenant (T) vs. Unknown (U)	beeralcf	Tenant	0.0353	X	X

All tenure comparisons exclude commercial properties and residence over shop.

Interpretations:

The patterning based on ownership versus renting was almost entirely restricted to the more sensitive, but less convincing, "percentage of items" and "percentage of fragments" measures in comparisons to the entire assemblage of bottle glass. Many of the same patterns, however, proved significant by all three measures when considering proportions of bottles among only the alcoholic-beverage bottles. This means that the differences in overall consumption of alcoholic beverages are only weakly supported, but that the differences in preferences within alcoholic beverages are well-supported.

That said, both the percentage data and the significance tests suggest that households that owned their homes disposed of more bottles of alcoholic beverages in general than did tenants. This tendency persists when the analysis is limited to just those living in Informal workers' cottages and tenants are lumped with unknown-tenure, presumably short-term residents. In this case, owners of cottages also may have discarded more liquor bottles than nonowners of cottages, although this is suggested by only one of the three measures.

Owners also disposed of more wine bottles than did tenants alone, tenants lumped with unknown-tenure residents in all dwellings, and tenants lumped with unknown-tenure residents in cottages only. The contrast in wine bottles between owners and tenants is the one comparison that is significant by all three measures in terms of the entire assemblage. Just as wine bottles were associated with higher-paid jobs and nicer houses, they also seem to be associated with

homeownership, that is, with capital wealth. Wine bottles appear to be an excellent index of what would generally be recognized as upper-class status.

Once again, the reverse pattern in wine is supported, albeit not as broadly. Beer and/or ale bottles formed a larger proportion of alcoholic-everage bottles discarded by tenants than by owners, both by percentage of items and by percentage of MNI.

The consistent pattern here is that owners discarded more bottles of alcoholic beverages in general, of wine in particular, and at least among Cottage dwellers, of liquor, than did non-owners. This is a surprising contrast to their meat consumption, which generally did not differ significantly by ownership, with one exception in which the renters appeared to eat better meat than the owners. In the meat analysis, I suggested that renters may have had more disposable income, or conversely, that owners may have had greater expenses. It is tempting to suggest that the owners' greater consumption of alcohol in general, wine, and possibly liquor could be related to those same stresses, although that would be pure speculation.

The unknown-tenancy households also had significantly higher proportions of alcohol bottles than did the tenant households. They also had lower proportions of beer and/or ale bottles. If many of these households were, in fact, short-term, transient occupants, then it seems that these least-stable households were consuming more alcohol, and of that, a lower percentage of the least intoxicating variety. Returning to the notion that alcohol consumption parallels stress, maybe this suggests that longer-term renters had less stressful lives than did either more transient households or home-owning households. Certainly these patterns could be explained in other ways, as well.

There was no clear or significant patterning in recycling (whole bottles) by tenancy.

NEIGHBORHOOD

Neighborhood	Number of Features	wholei	wholef	wholem	foodi	foodf	foodm
East of Market	26	4.5	5.0	19.1	14.5	14.7	11.2
Oakland Point	31	6.3	7.1	24.3	17.7	18.1	15.7
West of Market	21	11.2	17.4	34.0	11.1	11.6	9.9
Total:	78	7.0	9.1	25.2	14.8	15.2	12.6

Neighborhood	Number of Features	foodsti	foodstf	foodstm	writingi	writingf	writingm
East of Market	26	6.8	7.0	3.7	1.4	1.3	2.2
Oakland Point	31	12.7	13.4	5.5	0.6	0.5	1.6
West of Market	21	8.5	9.1	3.5	2.4	1.5	3.2
Total:	78	9.6	10.1	4.4	1.4	1.0	2.2

All neighborhood categories include only noncommercial properties.

Comparisons:

All 3 categories together for non-randomness

All pairs

Significant Differences (comparisons that reached at least 10% significance):

Neighborhoods	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
All neighborhoods	wholei	n/a	0.0903		X
All neighborhoods	wholef	n/a	0.0903		X
All neighborhoods	wholem	n/a	0.0302	X	X
West of Market v. East of Market	wholei	West of Market	0.0323	X	X
West of Market v. East of Market	wholef	West of Market	0.0323	X	X
West of Market v. East of Market	wholem	West of Market	0.0109	X	X
West of Market v. Oakland Point	wholem	West of Market	0.0734		X
All neighborhoods	foodm	n/a	0.0165	X	X
Oakland Point v. East of Market	foodm	Oakland Point	0.0270	X	X
Oakland Point v. West of Market	foodm	Oakland Point	0.0115	X	X
All neighborhoods	foodstm	n/a	0.0839		X
Oakland Point v. East of Market	foodsti	Oakland Point	0.0384	X	X
Oakland Point v. East of Market	foodstf	Oakland Point	0.0470	X	X
Oakland Point v. East of Market	foodstm	Oakland Point	0.0630		X
Oakland Point v. West of Market	foodstm	Oakland Point	0.0643		X
All neighborhoods	winealci	n/a	0.0436	X	X
All neighborhoods	winealcf	n/a	0.0356	X	X
Oakland Point v. East of Market	winealci	E	0.0257	X	X
Oakland Point v. East of Market	winealcf	E	0.0161	X	X

Neighborhoods	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Oakland Point v. East of Market	winealcm	E	0.0992		X
Oakland Point v. West of Market	winealci	W	0.0553		X
Oakland Point v. West of Market	winealcf	W	0.0714		X
Oakland Point v. East of Market	beeralcf	E	0.0907		X
Oakland Point v. West of Market	writingi	West of Market	0.0940		X

All neighborhood comparisons include only noncommercial properties.

Interpretations:

Recycling activity, as measured by the proportion of whole bottles in each feature assemblage, was strongly patterned by neighborhood. The West of Market neighborhood had a higher proportion of bottles, and therefore presumably less recycling, than did the East of Market neighborhood at 5% confidence on all three measures. West of Market features also suggest less recycling than do Oakland Point features, although only at the 10% confidence level and only by the most conservative MNI measure. Maybe selling recycled bottles was less convenient for West of Market residents due to a relative scarcity of buyers in the neighborhood, or the need to carry bottles farther to sell them.

The economic or ethnic composition of the West of Market neighborhood might be expected to explain this difference. However, West of Market had a distribution of occupations roughly similar to East of Market; it is the Oakland Point neighborhood that clearly differs on this score. In fact, the least recycling occurs in the West of Market neighborhood, in spite of the fact that it has an intermediate proportion of unskilled workers' households (which tend to recycle more), so the distribution of professions in the neighborhoods cannot account for the lower recycling West of Market. On the other hand, six of the eight Polite Victorian houses are in the West of Market neighborhood, and the analysis by dwelling type indicates that residents of these houses recycled less than those of other dwelling types. It is possible that the low rate of recycling West of Market reflects practices of residents of the finest houses, rather than neighborhood factors.

The Oakland Point neighborhood, with the highest proportion of unskilled and skilled workers, the lowest proportion of professionals, and no wealthy professionals, differed strongly from the other two neighborhoods in several aspects of its bottle-glass refuse. Oakland Point households had more food bottles than either of the other two neighborhoods by the conservative MNI measure at a confidence level of 5%. Similarly, features from the Oakland Point neighborhood had higher proportions of food-storage bottles than those from East of Market by all three measures, and than those from West of Market by the MNI measure. The emphasis in Oakland Point on food purchased in glass containers seems paradoxical in light of the residents' generally lower-paid jobs. Maybe it relates to more convenient access to stores that carried such items. This neighborhood's relative preference for home preservation of foods in glass seems sensible both as a labor-intensive but cost-saving measure if the food-storage bottles were purchased empty for home use, and also as a possible response to an informal or local trade in foods preserved in nearby household production, as opposed to factory products.

The Oakland Point neighborhood also differed strongly from the other two in having significantly lower proportions of wine bottles among the alcoholic beverage bottles than did both other neighborhoods. This pattern was significant by the less-convincing "percentage of items" and "percentage of fragments" measures in the case of the West of Market neighborhood, with its intermediate mix of profession categories. The pattern was stronger in comparison to the East of Market neighborhood, where all the wealthy professionals and relatively fewer skilled and unskilled workers lived. Wine bottles were a significantly higher proportion of alcoholic beverage bottles in the East of Market neighborhood by all three measures, two of which were significant at well below the 5% level. Since wine bottles are strongly associated with higher-paying jobs, the low proportion of wine bottles in Oakland Point probably reflects the low proportion of residents there with higher-paying jobs.

Finally, features from West of Market had a higher percentage of writing-ink bottles than those from Oakland Point, by the "percentage of items" measure only, and just barely squeaking under the 10% confidence cutoff. Without corroboration from other measures or an obvious interpretation, this pattern can probably be ignored.

GENDER

All noncommercial	**Number of Features**	**wholei**	**wholef**	**wholem**	**winei**	**winef**	**winem**
Not woman-headed household	70	7.1	9.3	25.7	7.2	7.4	4.5
Woman-headed household	8	6.3	7.4	20.1	18.1	18.7	9.1
Total:	78	7.0	9.1	25.2	8.3	8.6	5.0

Cottages Only	**Number of Features**	**wholei**	**wholef**	**wholem**	**winei**	**winef**	**winem**
Not woman-headed household	42	5.8	6.5	24.5	6.9	7.2	4.1
Woman–headed household	5	3.9	4.3	14.4	19.0	19.5	8.1
Total:	47	5.6	6.2	23.4	8.2	8.5	4.5

Comparisons:

All pairs, both including all noncommercial properties and limited to cottages only

Significant Differences (Comparisons that reached at least 10% significance):

Head of Household Gender	Variable	Which has more?	Probability	Sig @ 5%	Sig @ 10%
Woman-headed vs. not (cottages only)	winei	Woman	0.0745		X
Woman-headed vs. not (cottages only)	winef	Woman	0.0889		X

Interpretations:

The percentage data suggest that households headed by women might have left a lower proportion of whole bottles in their refuse, indicating more recycling, especially when the comparison is limited only to Informal workers' cottages. However, this pattern is not significant by any of the three measures. It should be considered a plausible hint rather than a demonstrated pattern.

Households headed by women may have had a higher proportion of wine bottles in their glass refuse, although this pattern appears only in the two less-conservative measures of "percentage of items" and "percentage of fragments." This could be because this tendency of woman-headed households was real, but was not a great enough difference to be detected using the less-sensitive MNI measure. This relative preference for wine in women-headed worker households could be real, but should be regarded with caution.