The Dollarware Project Sample
Questioning the Representative Value of Our Artefacts

Lisa Zimanyi
Department of Anthropology, McGill University

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Abstract: The methodological foundation of the Dollarware project is the collection of a sample of ceramic drinking vessels from various dollar stores across Montreal. Whether or not this sample assemblage is representative of the larger population of dollarware from whence it was drawn can be determined through a series of comparisons of the relative frequencies of select artefact variables. This study reveals that the assemblage of purchased dollarware is to some extent a non-random sample. The various factors contributing to this sampling bias are investigated and their potential influence on the Dollarware project as a whole discussed.

Introduction

The Dollarware project is an archaeological investigation into the properties and distribution of discount ceramic drinking vessels throughout Montreal. The various questions being asked by the students in ANTH-357 are designed to explore the uncharted academic territory of dollarware with the hope of providing insight into the behaviour of the dollarware consumer. To undertake this research properly, it is important that the dollarware purchased be adequately representative of the larger population of dollarware to be found in the stores themselves. This study assesses the degree to which the sample assemblage of dollarware purchased by the class, the primary focus of study, is in fact a random cross-section of dollarware to be found on the shelves of the dollar stores scattered throughout Montreal. By counting and classifying all dollarware present at these sites of purchase, an analysis of the relative frequencies of select variables will serve either to establish or undermine confidence in data drawn from our sample assemblage intended to apply to all dollarware in contemporary Montreal.

Methods

In order to evaluate the character of a sample composed primarily of unique artefacts, some criteria must be laid down through which a system of classification may be generated. Dollarware comprises a vast number of very diverse objects, so a fair amount of simplification is necessary to transform the heterogenous mass of ceramics into manageable sets of attributes. To approximate the experience of a potential buyer of dollarware, the characteristics considered here are all aesthetic and solely visual in nature. Shape is the primary classifier, divided into four mutually exclusive categories: cylindrical, bowl-shaped, straight-sided frustums, and convex-sided frustums, where a frustum is defined as a truncated cone; the "straight-sided frustums" are true frustums, whereas the convex-sided frustums are conical in that the top diameter is perceptibly greater than the bottom diameter, but the sides are rounded. A raw count of the number of mugs with flared rims was also noted.

Colour and iconographic aspects are further key traits of any artefact that could be used to produce a wealth of different classification systems. For this study, however, given the sheer quantity of ceramic drinking vessels to be classified, a generous degree of trait reduction is necessary and further facilitates unambiguous statistical analysis of the results. Although classifying artefacts under broad

thematic headings, such as holiday or geometric pattern, is not well-suited to the general purpose of this study, a count of the number of colours present on each artefact is designed to approximate the iconographic complexity of the artefact. To this end, all dollarware has been divided into two colour categories: those with 1-2 colours, and those with 3 or more. A qualitative assignation of colours is unwieldy and introduces too great an element of subjectivity for the purpose of this study. A final feature focussed on was the colour of the interior of the artefacts, as a brief survey of the collected sample reveals the preponderance of artefacts with white interiors, which are aesthetically differentiable from artefacts with non-white interiors (see Appendix A).

Once all artefacts from the sample assemblage were classified and tabulated according to these three variables (Appendix B), the ease with which the classification system could be used on site was tested on Assemblage N, the comparative collection from Village des Valeurs. The major points of difference between classifying each artefact individually in the lab and the classification of artefacts during the restudy are (a) the need for efficiency, for reasons of practicality and time constraints owing to the great volume of artefacts, and (b) the distance from the artefact; in the lab, notes were taken by physically holding each vessel for inspection, whereas in the dollar stores, many artefacts were not easily accessible and the classifications thus unavoidably include a margin of error in both the number of artefacts, in particular for dollarware stacked on higher shelves, and the number of colours, as it is neither feasible nor desirable to precisely mark down the colours present on each individual mug. The outcome of this test classification was the discard of an original fourth variable, height categories, which proved difficult to objectively ascertain without taking measurements and could furthermore burden the classification system with an added layer of unnecessary detail.

The principal stage of data collection consisted in revisiting all sites of purchase, with three exceptions. Sites G and H yielded small sample sizes that comprised too large a proportion of available dollarware to make a restudy useful, compounded by the lessened likelihood of efficient re-stock at these sites. Site M was mysteriously closed at the intended time of restudy and therefore regrettably left out of the analysis as well. Any references made hereafter to the "sample assemblage" will thus solely refer to the collections from sites A, B, C, D, E, F, I, J, K, and L, which comprise a total of 198 artefacts, or 86.5% of the class' complete sample of 229 dollarware specimens. The total population of dollarware at these sites was counted, classified, and tabulated in the same manner as the sample assemblages. Given the large number of artefacts present at the sites, some of the numbers provided are estimates, rather than perfectly accurate counts. This imprecision should not significantly affect the results obtained, as a single observer counted and classified all mugs, and as such any systematic bias, whether under- or over-estimation, would not affect the calculation of relative frequencies that is the main objective of these counts.

Results

A full classification of all dollarware found on the store shelves at the time of revisit reveals that the composition of the sample assemblage does indeed differ from the total in-stock dollarware population in certain respects. The raw data generated from complete classification of the sample assemblage and the total artefact collections at revisited sites can be found in Appendices C and D, respectively.

The relative frequencies of the varying classes of dollarware have likewise been tabulated for both the sample collection and the site restudy assemblages, illustrated below (Figure 1).

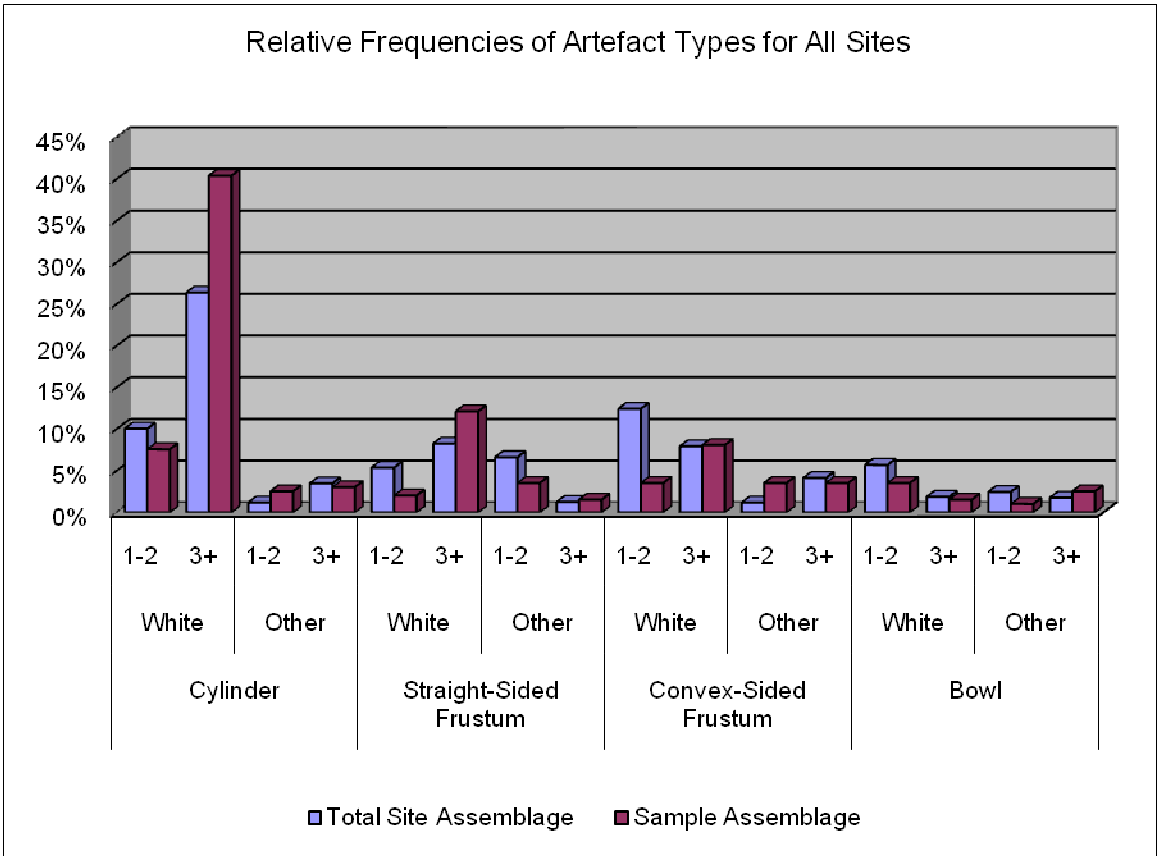

Figure 1: A comparison of the dollarware in stock at revisited sites and their corresponding sample assemblage

For the clearest possible demonstration of statistical differences, this analysis will primarily focus on the shape variable simply to avoid the obfuscation of results by overwhelming amounts of data. This reduction of classes by no means disregards the equally significant colour-related variables, whose relative frequencies demonstrate a comparable degree of deviation when calculated. The relative frequencies of the four shape categories differ significantly between the sample assemblage (Figure 2) and the total artefact counts generated by site revisits (Figure 3).

	Cylinder	Straight-Sided Frustum	Convex-Sided Frustum	Bowl	Total
Site A	57.1%	19.0%	19.0%	4.8%	21
Site B	40.0%	15.0%	35.0%	10.0%	20
Site C	40.0%	40.0%	10.0%	10.0%	20
Site D	60.0%	20.0%	10.0%	10.0%	20
Site E	55.0%	45.0%			20
Site F	33.3%	9.5%	47.6%	9.5%	21
Site I	75.0%	5.0%	10.0%	10.0%	20
Site J	40.0%	20.0%	15.0%	25.0%	20
Site K	55.0%	15.0%	25.0%	5.0%	20
Site L	87.5%		12.5%		16
Total	**53.5%**	**19.2%**	**18.7%**	**8.6%**	**198**

Figure 2: Relative frequencies of shape categories within the sample assemblage

	Cylinder	Straight-Sided Frustum	Convex-Sided Frustum	Bowl	Total
Site A	63.2%	13.4%	16.9%	6.5%	372
Site B	47.2%		48.6%	4.2%	144
Site C	32.3%	45.3%	2.2%	20.2%	589
Site D	38.1%	19.6%	28.7%	13.5%	443
Site E	47.7%	50.3%	1.9%		155
Site F	24.3%	17.7%	54.6%	3.4%	1160
Site I	69.1%	9.3%	2.5%	19.1%	236
Site J	30.1%	14.8%	9.9%	45.2%	392
Site K	54.4%	23.4%	21.3%	0.9%	342
Site L	88.4%	9.0%	2.6%		189
Total	**41.1%**	**21.5%**	**25.7%**	**11.8%**	**4022**

Figure 3: Relative frequencies of shape categories found at revisited sites

Some degree of difference *is* to be expected, diminishing with increasing sample size. However, the discrepancy between the relative frequencies of the entire sample assemblage, compared to the to the total population from which these sample artefacts were drawn, is much higher than expected given the sizable sample of 198 artefacts, or 4.9% of the artefacts in stock upon revisiting the sites. The over-representation of cylinders by 12.4% of the sample assemblage, for instance, can hardly be attributed to chance alone. The sample as a whole is thus non-random and does not accurately reflect the relative frequencies of dollarware types found at the sites of purchase. However, this difference is in part attributable to the large differences in the total artefact counts of the site revisits, which range from 144 to 1160 artefacts, whereas all sample assemblages under study contain between 16 and 21 artefacts. The variation between sites vastly overshadows the internal differences between a site's sample assemblage and the total dollarware population in stock at the time of site revisit, as can be illustrated by an examination of the relative frequencies of cylinders at various revisited sites compared to their sample assemblages (Figure 4).

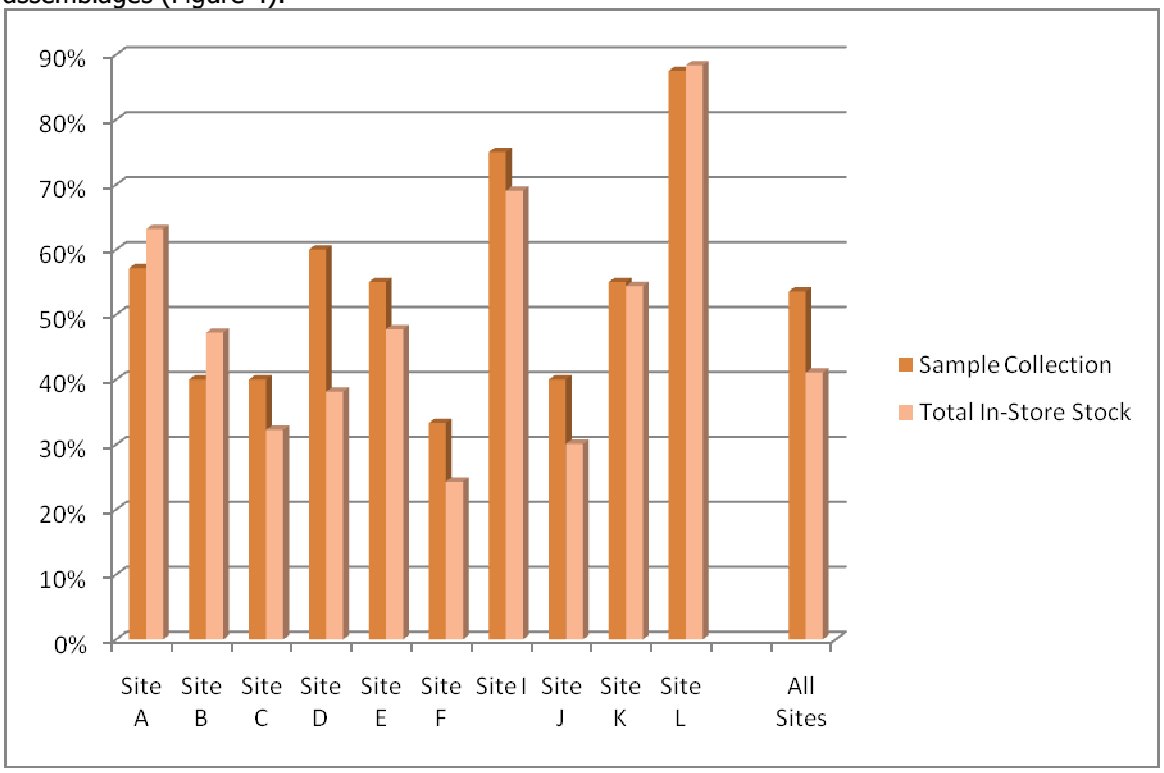

Figure 4: Relative frequencies of cylindrical artefacts calculated by site

A closer correspondence of the percentage values presented in Figures 2 and 3 could therefore be obtained through assigning varying weights to each site, by total assemblage size, and calculating the relative frequencies accordingly.

Following the logic that larger sample sizes increase the representative value of a sample, the variation in frequencies of the shape categories yields further grounds for comparison. Cylinders being the most frequent shape, any inconsistencies caused by sample size are least detrimental to the sample's representative value. Isolating the relative frequencies of bowl-shaped vessels, by contrast, which occur in significantly smaller proportion to the total sample, yields much higher discrepancies in relative frequencies within each site as well as among sites (Figure 5).

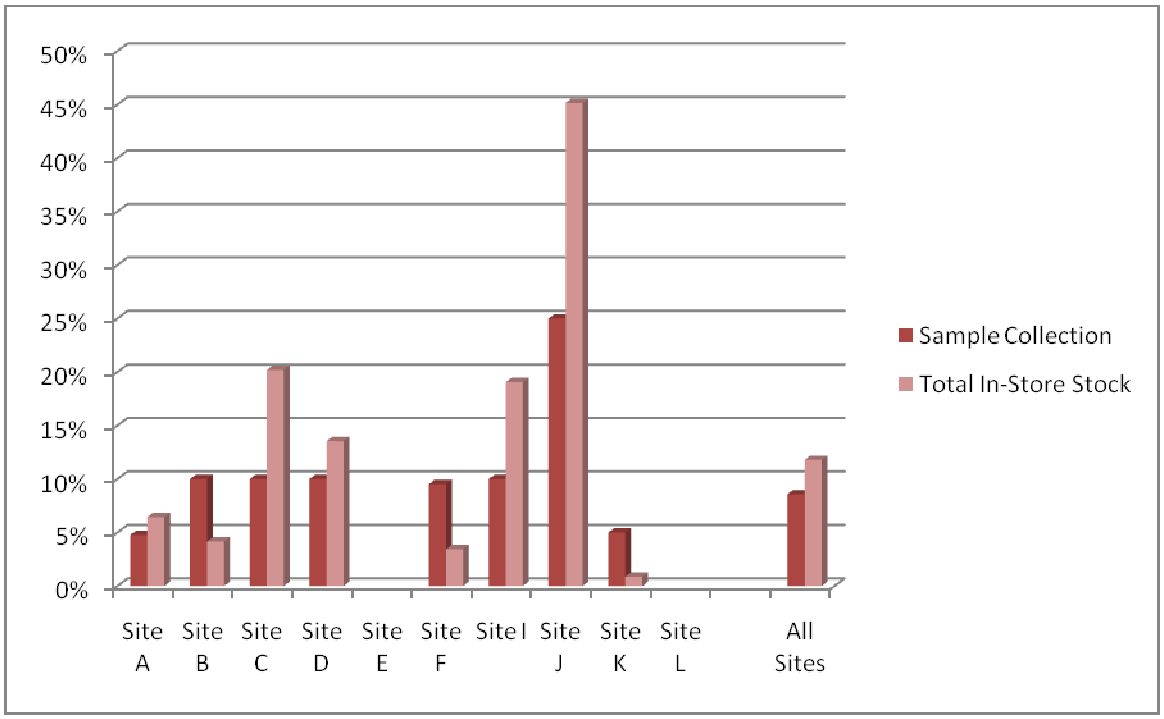

Figure 5: Relative frequencies of bowl-shaped artefacts calculated by site

The portion of the discrepancies of relative frequencies caused by small or varying sample size, therefore, does not pose a real problem as further research or statistical manipulation would reduce the gap significantly. What remains to be determined is what other factors besides sample size have influenced the sample composition to render it worthy of the label "non-random".

In order to analyse the sampling process, it may be illuminating to study the trends exhibited by one site in isolation. Site F has the largest stock of ceramic drinking vessels, with 1160 artefacts present at the time of restudy (Figure 6).

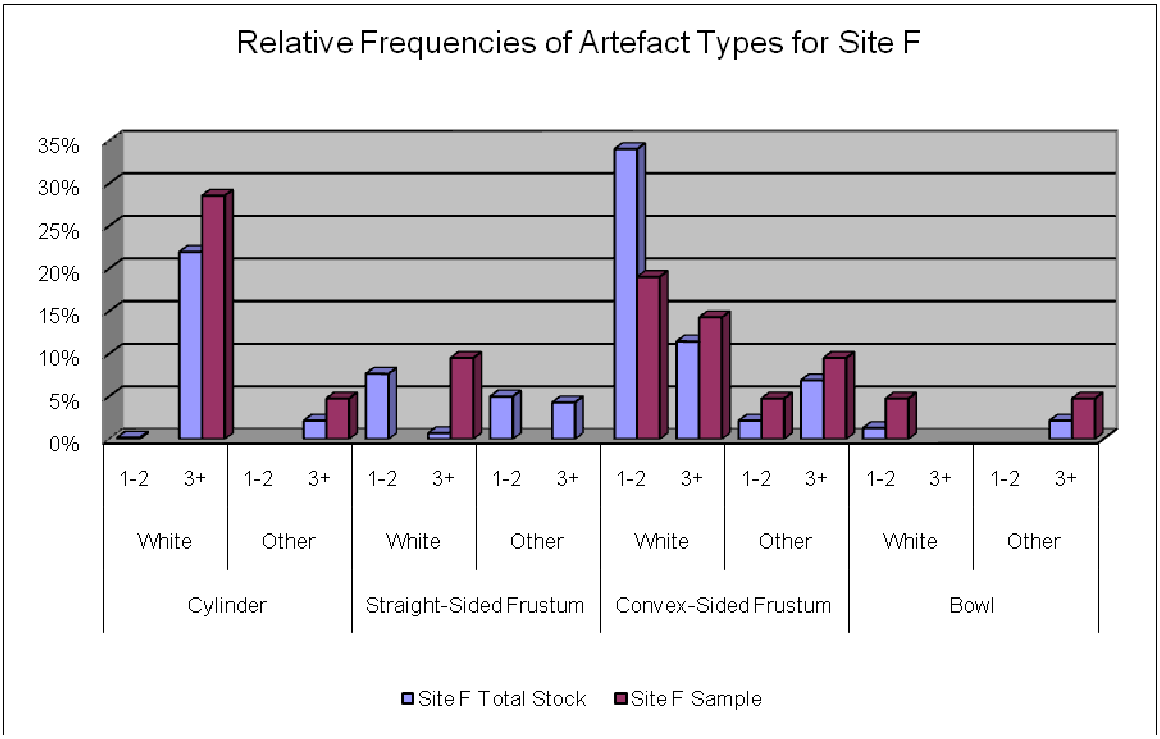

Figure 6: A comparison of the dollarware in stock at Site F and the corresponding sample assemblage

This large dollarware population from which to select artefacts for the sample assemblage affects the representative nature of the sample in multiple ways. Many of the artefacts exist in the store in duplicate, and given a wide selection of dollarware to choose from, the purchaser is unlikely to select two identical artefacts regardless of the proportion of the total population they represent. The sample assemblage's under-representation of convex-sided frustums with white interiors and 1-2 colours, for instance, might be due to the tendency of this category to contain duplicate artefacts. By the same token, cylindrical vessels with white interiors and 3 or more colours are likely over-represented owing to more varied iconographic differences between the artefacts of this category. These explanations are subjective in nature as they rely on the qualitative assessment of the different categories; any number of similar rationalisations could be proposed and proven only through a far more in-depth study than is within the scope of this paper.

Discussion

The ultimate goal of this project is to derive some meaning from the mass of percentages generated by analysis of the sample assemblages and broader site surveys. What degree of similarity between the sample assemblages gathered from various sites and the total assemblage on-site is necessary to consider a sample adequately representative? The answer to this query is relative to the nature of the particular research project under consideration. As a meta-question, this study is designed to reflect on the other individual and group Dollarware projects that have been conducted, and the need for a representative sample applies to each differently. Any study that relies heavily on relative frequencies will depend on the representative nature of the sample assemblage to yield data approaching that which applies to dollarware everywhere, or at the very least, from the sites of purchase. A project that focuses on a particular subset of dollarware, such as holiday-themed artefacts, will be substantially less injured by the discovery that the sample assemblage is not fully representative. Thus the label "non-random" is not an invalidation of all research projects based on the sample assemblage; it is, however, a factor to be borne in mind when drawing conclusions from the data. It must be noted that although only a few specific characteristics of each artefact were considered for this study, it is fair to assume that a comparable

degree of deviation would be revealed through any characteristic selected, allowing for the wide application of the results of this study to all projects using the same sample assemblage.

This study investigates the representative nature of the sample assemblage relative to the original sites of purchase. The dollarware assemblages at these sites in turn differ significantly from one another. If the true purpose of the Dollarware project is to comment on the specific material culture of discount ceramic drinking vessels as an aspect of North American urban consumer behaviour, a broader survey of more sites would serve to further augment the significance of the data. One avenue for future research of dollarware is a related study of non-purchase sites to determine the degree to which the sites excavated by the students in ANTH-357 are representative of the dollarware collections at dollar stores more generally.

Furthermore, a consideration of different or more artefact characteristics, such as height or iconographic aspects, could be fruitful in revealing further areas of discrepancy. While a narrower classification system is more statistically manageable, the reduction of artefacts to fewer types does increase the danger of forcing outliers into ill-fitted categories that could skew the results. For instance, the removal of height from the classification criteria lumped cylindrical espresso cups into the same category as cylindrical mugs of average dimensions, creating a diverse category that blurs meaningful interpretation.

The chief theoretical issue encountered through this research question will ultimately remain unanswered: What degree of exactitude can we reasonably expect to achieve from a project of this nature? Lest we resort to generating an artificially precise statistical cut-off point for adequate representation, it must be noted that the very definition of "sample" already has a minimal degree of error encased in its differentiation from total population. Perfect correspondence between relative frequencies of a sample and its source population is virtually impossible; no correspondence is equally unlikely. Our dollarware sample assemblage resides somewhere along a continuum of representative value that both partially validates any study issuing from it while simultaneously advising the researcher to exercise caution in drawing hasty conclusions about dollarware more generally.

Appendix A: Correlation between White Interiors and Cylindrical Artefacts

A chi-square test conducted using the class' sample assemblage of artefacts can be used to demonstrate the strength of the correlation between cylinders and white interiors. A p value approaching zero indicates that the correlation is in fact very significant. As such, it is important that the classification system reflect the relation between colour and shape characteristics rather than treating them as independent variables.

Actual		White Interior		
		Y	N	
Cylindrical	Y	108	14	122
	N	70	36	106
		178	50	228
Expected				
		Y	N	
	Y	95.245614	26.754386	
	N	82.754386	23.245614	
chi-square	**p=**	**4.2596E-05**		

Note: Appendices B, C, and D are located in a separate Microsoft Excel file.