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COGNITION AND STYLE: AN ANALYSIS BASED ON A MEXICAN POTTERY TRADITION

by

FLORA S. KAPLAN

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ABSTRACT

COGNITION AND STYLE: AN ANALYSIS BASED ON
A MEXICAN POTTERY TRADITION

by

Flora S. Kaplan

Advisor: Professor Judith M. Treistman

The concept of style is widely used in archaeology, ethnology and art history, but it is often so vaguely defined that it is difficult to develop an empirical methodology for its study and illuminate something of the creative and cognitive processes in man. These processes underly problems of classification and typology in archaeology, group solidarity and social change in ethnology and aesthetics and creativity in art history.

The study describes a single functioning style of utilitarian folk pottery produced in Puebla, Mexico. The aims of the study are to explicate the conditions in which creative and cognitive processes take place, provide the bases for a testable methodology and lead towards a more rigorously defined concept of style.

The ethnographic and ethnohistoric description of the pottery suggest it expresses the identity and in some ways the ethos and world view of a group of people. On the one hand, its emergence following the Spanish Conquest may be seen in terms of colonialism and Crown policy which, through separatism and exploitation, heightened Indian

consciousness and induced them, apparently, to draw upon earlier elements and incorporate these elements into a new form of pottery style. On the other hand, the florescence of the style in the nineteenth century following Independence from Spain may be seen in terms of a new sense of national identity which led to the fusion of formerly separate Indian and Spanish pottery traditions. Through distribution in space, the pottery extended that sense of identity and in both periods served to define social relations between realigned groups in the region and nation.

Several methods were developed and applied to test the following notions of style that arose from the description: one, that style conveys the ideas and feelings of a group; and two, that style is not the by-product of technique and an innate creative impulse, but a system held in the mind and shared and transferred through learning and interaction in time and space. Linguistic models, especially emic analysis, were applied to the study of style in material culture. Statistical techniques, including Cluster Analysis and non-metric Multidimensional Scaling were also applied. The results support the notion of style as a system.

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TABLE OF CONTENTS

ABSTRACT iv

ACKNOWLEDGEMENTS v

INTRODUCTION 1

Chapter
I. A POTTERY TRADITION 5

The community of potters 5
Historical background 9
Distribution of pottery 30

II. THE POTTERY 35

Typological scheme 35
Analyses of materials 44
Measurements of pottery types and sizes 60

III. MAKING POTTERY 75

Patterns of interaction and learning among potters . . 75
Learning to make pottery 77
The effects of specialization 83
Firing of the pottery 90
Painting the pottery 96

IV. THE EMERGENCE OF A FOLK STYLE 101

Symbolism, past 101
Symbolism, present 112
Pottery use, present and past 123
Present pottery distribution 127

V. ANALYZING A FOLK STYLE 136

VI. CONCLUSIONS 187

Style as identity 187
Cognition and style 190
Discussion 194

APPENDIX 202

BIBLIOGRAPHY 237

LIST OF ILLUSTRATIONS

CHAPTER I

1. Detail of barrios showing location of kilns and potters, Puebla, Mexico 8
2. STILL LIFE by Agustin Arrieta (1809-1867), Puebla, Mexico 11
3. Earliest shapes of Mesoamerican pottery (after Tolstoy, 1974) 13

CHAPTER II

4. Profile of stream bank showing potter's classification of clay and non-clay layers 47
5. Potter's criteria and classification of clay used for utilitarian pottery 49
6. Potter's emic view of pottery, black-on-red glazed utilitarian pottery, Puebla, Mexico 65
7. Method used to approximate volume of cazuelas (cooking pots) 68
8. Method used to approximate volume of ollas (jars) . . . 69

CHAPTER III

9. Potter's workshop, Puebla, Mexico by Alberto Beltran . 79
10. Kneading the clay, Puebla, Mexico by Alberto Beltran . 82
11. Using the potter's wheel, Puebla, Mexico by Alberto Beltran 85
12. Smoothing leather-hard pottery, Puebla, Mexico by Alberto Beltran 87
13. Schematic diagram of kiln, Puebla, Mexico by George L. Kaplan 91
14. Firing a kiln, Puebla, Mexico by Alberto Beltran . . . 93
15. Painting fired pottery, Puebla, Mexico by Alberto Beltran 97
16. Design types, Puebla, Mexico by Elizabeth R. Kaplan . . 98

CHAPTER IV

17. Detail of The Drinkers Mural, Cholula, Mexico 105
18a. Pulque goddess with Tlazolteotl as pulque goddess, Borgia, 57 (after Goncalves de Lima 1956: 156) . . . 107
18b. Dead Sun, Borgia, 57 (after Caso 1953: 36) 107
19a. The goddess of pulque, Mayauel, Tonalamatl de Aubin II, (after Goncalbes 1956: 203) 108
19b. The god of medicine, husband of Mayauel, Patecatl, Borgia 13 (after Goncalves de Lima 1956: 150) 108
19C. The goddess of pulque, Mayauel, Borgia 16 (after Goncalves de Lima 1956: 132) 108
20. The goddess of pulque, Mayauel, Borbonicus 8 (after Goncalves de Lima 1956: 210) 109

CHAPTER IV
21a. The goddess Tlazolteotl, the filth eater, and the Moon, Vaticanus B 29 (after Goncalves de Lima 1956: 133) 111
21b. The Moon with rabbit and with sacrificial knife, Borgia 55, 50 (after Caso 1953: 50) 111
22a. The goddess of pulque, Mayauel, Vaticanus B 56 (after Goncalves de Lima 1956: 204) 115
22b. The juice of the maguey, pulque, Mendoza 29: 77 (after Goncalves de Lima 1956: 169) 115
23a. Rabbit mantle with lunar nose ornament design, Magliabecchi XII 3.4 (after Goncalves de Lima 1956: 136) 116
23b. Pulque in jar and bowl with schematic lunar nose ornament design, Mendoza 62 (after Goncalves de Lima 1956: 136) 116
24. Present distribution of Puebla black-on-red glazed pottery in Central and Southern Mexico and Guatemala 128
25. Distribution of Puebla black-on-red glazed pottery in the markets of the city of Puebla 129
26. Distribution of Puebla black-on-red glazed pottery in the markets of the city of Puebla 130

CHAPTER V
27. Taxonomy based on hierarchical clustering technique (Diameter Method) 177
28. Plot for the pottery types with the major groupings from the hierarchical clustering technique encircled 179
29. Emic analysis of black-on-red glazed utilitarian pottery, Puebla, Mexico 183
30. Emic analysis of black-on-red glazed utilitarian pottery decoration, Puebla, Mexico 184

LIST OF TABLES

CHAPTER II

1a. Shape classification of black-on-red glazed utilitarian pottery, Puebla, Mexico 38

1b. Rim classification of black-on-red glazed utilitarian pottery, Puebla, Mexico 39

1c. Ear classification of black-on-red glazed utilitarian pottery, Puebla, Mexico 40

2. Typology of black-on-red glazed utilitarian pottery, Puebla, Mexico 41

3. Typology of black-on-red glazed utilitarian pottery, Puebla, Mexico 43

4. Atomic absorption analysis 55

5. Atomic absorption analysis 56

6 X-ray diffraction analysis 58

7. Field measurements and volume calculations of cazuelas (cooking pots) 61

8. Field measurements and volume calculations of ollas (jars) 62

CHAPTER V

9. Pottery used in testing, 28 examples 152

10. Pottery originally used in testing but eliminated, 24 examples 154

11. Code for P-STAT version 3.05, Revision 2, December 14, 1973, 270 K overlay: black-on-red glazed ware, Puebla, Mexico 158

12. Key to response to pots 1 - 28, by sample tested, P-STAT version 3.05 161

13. Presence and absence of features associated with twenty-five pottery types distinguished by potters . 170

14. Results based on non-hierarchical clustering technique (Connectedness Method) 172

15. Key to twenty-five pottery types analyzed using cluster analysis and multidimensional scaling 174

APPENDIX

16 thru 47. Coded responses to pots 1 - 28, based on variables of age, status and sex 202

48. Fortran IV program by David Levine 234

INTRODUCTION

This is a study of an art style. It is based on ethnographic fieldwork among traditional potters in the city of Puebla, state of Puebla, Mexico, 1972-1973. The concept of style is widely used in archaeology, ethnology and art history, but it is often so vaguely defined that it is difficult to develop an empirical methodology for its study and illuminate something of the creative and cognitive processes in man. These processes underly problems of classification and typology in archaeology, group solidarity and social change in ethnology and aesthetics and creativity in art history. The goal of this study is to describe a single functioning style in the hope that such a description will explicate the conditions in which creative and cognitive processes take place, provide the bases for a testable methodology and lead toward a more rigorously defined concept of style.

A single class of folk art was chosen for description, a black-on-red glazed utilitarian ware. Folk art was chosen, rather than tribal or modern art, because it is a part of complex society existing in nation-states. Consequently, it is relevant in terms of ongoing change in many parts of the world today. Tribal art, in many instances, has been disrupted under the impact of outside contact and affected by tourist demand. In some instances, it appears to be in the process of being transformed into folk art as tribal peoples are incorporated into newly formed or existing nation-states. Modern art, being idiosyncratic and international in character, presents too many variables for an

initial study such as this one. In addition, traditional techniques of hand manufacture in folk art preserve a direct relationship between craftsman and medium; and group style, manifested in folk art, is relevant to problems associated with cognition and creativity since such a style is traditional by virtue of having been shared and transmitted over time.

Folk, in the sense employed here, is essentially traditional both in origin and mode of production. It exists only in the context of a state of complex society. In Glassie's terms, material folk culture is traditional in origin and "nonpopular and nonacademic" in the nature of its production (1969: 6). He uses "popular" to mean the current, normative, mass produced aspects and "academic" to mean the elite and progressive aspects of culture as well as material culture (1969: 4-5). The visual arts are defined to mean those plastic and graphic forms elaborated beyond functional necessity through the skillful control of a medium to create an affect. As a result of these definitions, the study of art is not limited to decorative and ceremonial pieces and material folk culture to the products of isolated, small scale communities. Defining folk in terms of the mode of production broadens the range of material culture that may be investigated and, as Glassie points out, it shifts attention away from both society as an entity and the system of exchange in determining what constitutes material folk culture (1969: 6-7). Likewise, defining art as I have done here, broadens the range of materials that may be investigated and includes utilitarian pottery, made and sold for a profit by urban potters, as folk art. Thus, folk art differs from tribal and modern art by the skillful and established mode of executing traditional forms and

designs in material culture, imbued with affect, in the context of a state of complex society. For these reasons, folk art is of especial interest with regard to the problems outlined in archaeology, ethnology and art history.

Pottery was chosen as the medium for study because of its importance, generally, in the reconstruction of culture history, and because its plasticity imposes few physical limitations on the expression of a style. Utilitarian pottery was chosen because it is used and thrown away without much conscious importance being attached to it. The rubbish heaps of the present and past are piled high with broken pottery that was once used to cook and store food. Being functional and expendable, such pottery is less likely to be a vehicle for an individual's creative efforts and more likely to convey a group style. Utilitarian pottery tends to be conservative, exhibiting few changes in a given time period; and it is relatively simple compared with ceremonial pottery, presenting fewer variables for consideration in developing a methodology for the analysis of style.

Among urban potters in the city of Puebla, only the famed blue and white Talavera-style glazed earthenware or majolica has been described in detail (Cervantes 1939: I and II). The black-on-red glazed cooking pottery has not been the subject of intensive study until now.[1] The description of the cooking pottery is as follows: the nature and extent of the community formed by the potters of black-on-red ware and its history (Chapter I); a detailed description and classification of the pottery and raw materials (Chapter II); an account of pottery making and the role of learning and specialization in the transmission of style

(Chapter III); patterns of present pottery distribution, the daily and ceremonial contexts of use and an analysis of symbolism in terms of form and design (Chapter IV). The ethnography suggests style in material culture is a system which embodies group identity and provides a basis for group action. A methodology was developed to test this suggestion (Chapter V). The test results are discussed in detail in the conclusions of this study (Chapter VI).

CHAPTER I

A POTTERY TRADITION

> St. Jeremiah was asked to make a washbasin. But when he tried, he found the earth too dry, and he could not work it. The Saint began to cry and as he cried, his tears fell upon the earth, wetting it. With this water, he found he could work the earth, and he made the washbasin.
>
> A legend of the origin of pottery making in the barrio of La Luz, Puebla

The Community of Potters

The potters who produce black-on-red glazed utilitarian pottery do not constitute a folk community in Redfield's sense since they have always been an integral part of a larger urban whole -- the city of Puebla. Nonetheless, they form a community in that they occupy an area that is spatially defined though not homogeneous; and the potters living within those boundaries have a sense of belonging and identity with each other. They tend to marry within the barrios and continue to live there, several generations either occupying the same house or living near each other and working together for up to fifty years and more. They belong to the same church and act together as a group for ritual observance. Unlike Redfield's classic folk community, however, they are full-time specialists producing for the market and profit. They are native Spanish speakers and most are literate, having received some education in the city school system.

The potters of black-on-red glazed pottery are concentrated in a six square block area in two barrios which date back to its founding of

the city in 1531. The area encompasses 6 to 7 Oriente, and 12 to 20 Norte (see Figure 1). Potters distinguish two centers of manufacture within the area -- La Luz and La Acocota. La Luz is centered on Avenida Maximino Avila Camacho, between 2 and 3 Oriente and 12 to 18 Norte. La Acocota extends from 2 to 6 Oriente and from 16 to 20 Norte. However, potters always refer to themselves, and are referred to by others in the city and surrounding countryside, as being from La Luz. They take their name from the Church of Our Lady of La Luz on the corner of 2 Oriente and 14 Norte.[2]

Of the seventy potters and twenty-five crewmen active in La Luz and La Acocota at the time of this study, only four were not born in the barrios: two elder men came to the city in the turbulent years following the Revolution of 1910; two younger men, from pottery making families in neighboring towns, travel to the city each workday. With these esceptions and with the exception that many young men between the ages of eighteen and twenty-five or thirty, before marriage, often do some other work or travel outside the city and state for a period of time in search of adventure, most potters are born and raised, marry and die within these barrios. There has been an increasing number of rural migrants to the city, especially in the last ten years, but they have become squatters on undeveloped private lands northwest of the barrios and have sought factory work. None of them are presently involved in pottery making.

Potters of black-on-red ware in both centers of manufacture act together as a group each May to celebrate the festival of Our Lady of La Luz. There is no formal religious organizations among them. A

month or so before the festival, one of them will be asked by a group of potters to collect money from the others. The man asked to do the collecting always has a reputation for being a sober and serious person. He collects about seventy-five pesos from each potter to pay for the rockets and fireworks and the flowers and paper streamers used to decorate the streets outside the Church of Our Lady of La Luz. This area outside the church is set aside as the potter's domain; it is the "profane" area. Before 1930 the potters used to decorate the streets with examples of their craft, and there was much food and drink sold. The area inside the church is "sacred". All the expenses incurred for flowers, candles, masses, etc. in this area are paid for by the Catholic Action Society. Participation in activities inside the church by the potters in on an individual basis.

On the day of the festival of La Luz the streets are alive with people and the noise of fireworks and rockets, music and puppet shows, races and games. Young men compete with each other for the prizes donated by local merchants -- shoes, clothes, money, etc. -- contained in a barrel at the top of a greased pole erected in the middle of the street.

According to elder potters the festival of San Jose, March 19th, used to be observed. But this was before 1930 when there were still many workshops and patrons in the barrios. Employees would be invited to hear Mass, paid for by the patron, and they did no work on that day. Many potters still have altars to San Jose in their place of work.

Potters and kilns are presently located as shown on the accompanying map (see Figure 1). Potters are recorded as units of

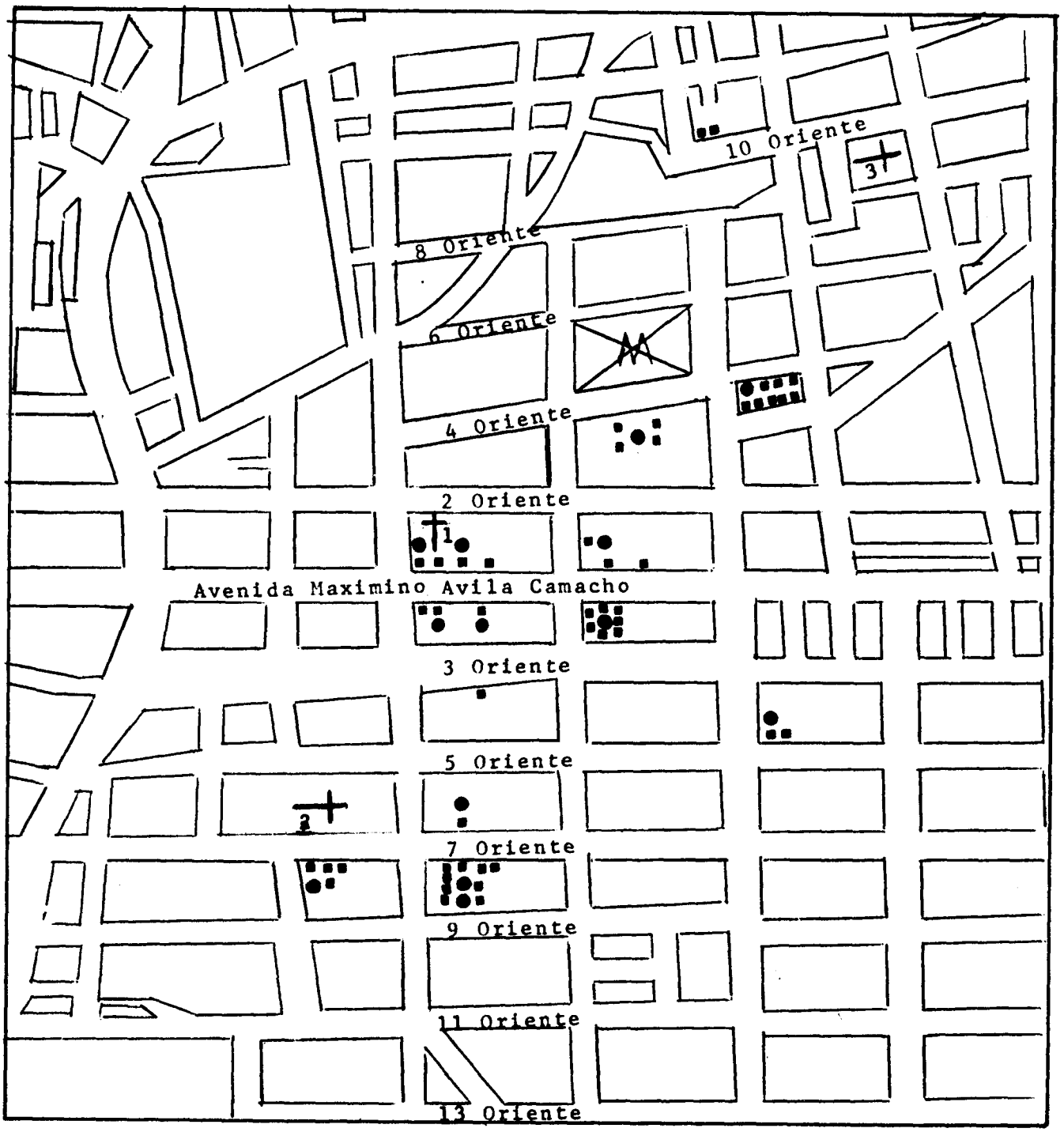


Fig. 1 . Detail of barrios showing locations of kilns and potters.

- ● Kiln
- ▪ Potter(unit of production)
- Market of La Acocota
- 1 Church of Our Lady of La Luz
- 2 Church of Analco
- 3 Church of Our Lady of Los Remedios

production: the same symbol is used for self-employed persons and for workshops that employ others. Four such workshops remain. A single unit of production is usually contained in a separate room and these room are, in turn, grouped around a courtyard with a kiln either in the center or rear courtyard. The rooms of a workshop are grouped in much the same way as single production units. Each employee constitutes a unit and occupies a separate room. Those who use molds are generally separated from those who use the wheel. Some rooms of a workshop may have more than one wheel. These are usually occupied by a potter and his employees. However, similar rooms with more than one wheel may be occupied by members of a family who are working independently of each other, i.e. as single units of production. Thus the physical layout of the rooms and kilns as well as the equipment do not reveal differences that presently exist in social and economic relationships among potters. The physical arrangement does reveal a concentration of potters within a delimited area of the city (see Figure 1), a mix of home sites amidst work sites, though not necessarily those of the potters, and a division of labor based on existing specialization in the manufacture of pottery.

Historical Background

The distinctive style of black-on-red glazed utilitarian ware which is the focus of this study is considered to be very old by both potters and people in the region and to have originated in the city of Puebla. Just when the style emerged is difficult to determine. Historic documentation is scarce and there has been no historical archaeology in the city and its immediate environs. The earliest hard evidence for the existence of the style is from the middle of the nineteenth century. Two "Still Life" paintings by Augustin Arrieta (1809-

1867), done in Puebla and now in the collection of the Museo Bello, incluse examples of black-on-red glazed pottery (see Figure 2). There is less tangible evidence that the style probably existed in the late eighteenth century.[3]

It is regrettable that possibly relevant ceramics from the fifteenth and sixteenth centuries, and later from neighboring Cholula and Tlaxcala, could not be examined at the time this study was made. These materials were crated for transport to the new Museum of Anthropology in Puebla under construction through 1975. (Castro 1973, personal communication.) There is no doubt some connections are to be made between the pottery manufactured in those well established centers and the beginnings of pottery making in Puebla. It is known that many of the first Indians who came to work and settle in the new Spanish city were from Cholula and Tlaxcala (Carrion 1972 I: 20-21). Cholula especially, was renowned for its pottery when the Spaniards came ashore in Vera Cruz in 1519. Bernal Diaz del Castillo, an eye witness to the Conquest, after recounting the events of the treachery by the Indians at Cholula on the Spanish march inland to the Aztec capital of Tenochtitlan, wrote the following:

> . . . the land is full of Magueys from which they make their wine. They make very good pottery in the city of red and black and white clay with various designs and with it supply Mexico and all the neighboring provinces. (1968: 181).

Cholula was the major center of the famed Mixteca-Puebla ceramic tradition in the Mesoamerican Central Highlands from A.D. 900 to the Spanish Conquest in 1521 (Tolstoy 1974: 58). And the black-on-red clay pottery was apparently widespread at the time of the Conquest as Bernal Diaz noted. The Cholula pottery was part of a long tradition in the

Figure 2. Still life by Agustin Arrieta(1809-1867) Puebla, Puebla, Mexico.

Central Highlands. The basic Mesoamerican pottery shapes appeared as early as 2300-2000 B.C. in the Tehuacan Valley. These consisted of a globular restricted mouth jar or tecomate, a flat based pan or dish, a simple hemispherical bowl and a neck jar or olla (Tolstoy 1974: 54) (see Figure 3).

The basic shapes, with some additions and modifications, are produced in contemporary black-on-red glazed ware and are distinguished in the potter's taxonomy of pottery (see Figure 6). This is not to suggest that the contemporary ware is simply a continuation of Pre-Columbian tradition. The Spanish tradition in the New World continued earlier metal and ceramic folk prototypes from Spain and the Near East: pitchers, flower vases, flower pots, jars for wine and milk as well as flat bottomed metal cooking pots were among the forms produced on the wheel in black-on-red ware and, to a lesser extent, in molds. Thus, it seems that Indian and Spanish traditions combined in new ways in the centuries following the Conquest as the demand for cheap cooking pottery increased with the expansion of the city of Puebla (Castro 1966).

Puebla was founded as an agricultural settlement for landless Spaniards by the second Audiencia of New Spain in 1531 (Leicht 1967: 317). The site was located outside the Indian strongholds of Cholula and Tlaxcala between three rivers: the Alseseca, the Almoloya and the Atoyac. The land was left vacant as a result of a genocidal war at the end of the fifteenth century which scattered even those few dozen heads of households who remained alive out of what had been a population of 30,000 inhabitants (Leicht 1967: 317). The new Spanish city was planned as a safehold on the main road from the seaport of Vera Cruz on the east

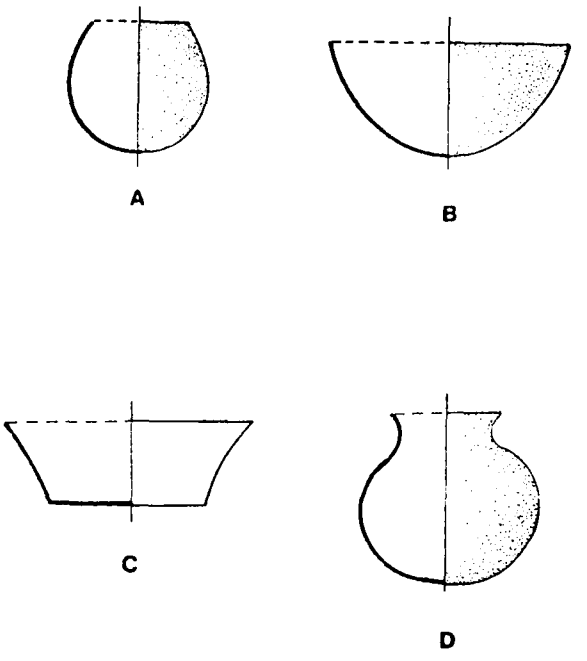


FIGURE 2.1 Earliest basic shapes of Mesoamerican pottery. *(A) Tecomate.* *(B)* Simple hemispherical bowl. *(C)* Flat-based pan or dish. *(D) Olla.*

(After Tolstoy, Mesoamerica, in Prehispanic America, 1974.)

FIGURE 3.

coast to the capital of the Viceroyalty (Mexico City) in the Central Highlands, and it was also planned as a resting place for travelers.

At first, the city was located on the east bank of the Almoloya River, renamed the San Francisco River by the friars who helped to found Puebla. However, within a few months heavy rains and flooding caused the main site to be shifted to the more elevated west bank. Here, on September 29, 1531, a central square and surrounding streets were laid out in a grid pattern and became the Spanish heart of the new city. The east bank, the source of crafts and services, became identified with the Indians. The river, the Almoloya or San Francisco, acted as a natural buffer between east and west -- between the Indian and Spanish populations in the city. Small footbridges provided the only direct access from one side to the other. This east/west division has characterized the city to the present day. The San Francisco River was not covered over until 1965 when the Boulevard of the Heroes of the Fifth of May was constructed, joining the two sides of the city.

From the beginning the city depended on Indian labor. An initial workforce of 16,000 men camped with their wives and children on the outskirts of the site for a period of service in construction. Fray Luis de Fuensalida supplied building materials and 8000 Indians from Tlaxcala, Fray Diego de la Cruz supplied 5000 Indians from Calpa and Cholula along with building materials and Fray Alonso Juarez, 3000 Indians and materials from Tepeaca (Carrion 1970: 20-21). After their service was ended, these Indians returned to their homes and they were replaced by others who continued the construction work they had begun. The pace of construction in the city increased in the seventeenth and

eighteenth centuries, during which time most of the major buildings in Puebla were completed (Castro 1966: 9-10).

It seems reasonable to assume that pottery was among the household possessions brought to Puebla by the wives of the Indian laborers and that it was used, as it always had been, to cook and serve meals. There was little reason to change. The Indian diet remained essentially the same: beans, chilis, tortillas, fish, fowl and meat cooked in sauces and stews; pulque, chocolate and atole (Gibson 1964: 322-323, 334, 348-349, 353, 356). The scarcity and high cost of metal vessels introduced by the Spanish placed them out of reach of the Indians and, no doubt, encouraged the use of pottery among the colonists themselves (Gibson 1964: 354, 561; Veytia 1780 I: 318). The continued use of Indian foods and the techniques of preparation associated with them tended to perpetuate traditional pottery forms associated with these foods. A similar tendency may be observed even today in Puebla where, for example, among people generally there is resistance to cooking Indian-style stews in a modern pressure cooker. For these stews (moles), the traditional clay cooking pot is preferred in all social classes. For drinking pulque, atole and chocolate, all of which are Indian in origin, pottery jars are still preferred. However beer and soda, more recently adopted, are never served in pottery jars. Glass, metal and plastic vessels are used.

While it seems reasonable to assume the continued use of pottery among Indians in Puebla following the Conquest, just what that pottery looked like i.e. the style or styles, is not certain at this time. It will remain uncertain until there are archaeological excavations in the

city and its immediate environs. To date, there have been no such excavations in Puebla. However, historical archaeology carried out by Thomas Charlton in the Valley of Teotihuacan has shown a florescence of Aztec IV black-on-orange ware in the sixteenth sentury (1975: 9-10) and the continued production of Aztec types into the eighteenth century, alongside Spanish and modified Spanish types (1975: 13; 1972: 110-111). Charlton's findings are consistent with what is known from historical records, i.e. that the Spanish Crown attempted to maintain separate spheres of Indian and Spanish manufacture and trade. The Crown encouraged and protected Indian crafts and markets and allowed the Indians to produce and trade freely among themselves (Gibson 1964: 334, 360, 399-400). However, the Crown was unable to keep the two spheres truly separate. Enterprising Spaniards tried from the beginning to interfere with native trade and take advantage of the lower prices of foodstuffs and goods. They would buy directly from the Indians at a low price for resale to the colonists at a high price or they would simply seize Indian goods by force (Gibson 1964: 360, 399). Other enterprising Spaniards engaged skilled Indian craftsmen to copy European products and then sold them as originals in competition with licensed Spanish producers (Gibson 1964: 400). The Indians themselves competed with the Spaniards (Gibson 1964: 399, 583-584). There were many conflicts regarding these practices from the sixteenth century on (Gibson 1964: 401).

Licensed Spanish producers in Mexico tried to meet the growing competition of unauthorized production by organizing guilds and restricting membership and/or supervisory positions to those either born in Spain or of Spanish parents (Cervantes 1939 I: 23; Gibson 1964: 399-401). In Puebla, Spanish ceramic workshops generally excluded Indians

from the use of the wheel (Cervantes 1939 I: 23), but those few who were employed or who were manual laborers had ample opportunity to observe the potter's wheel in use and the technique of glazing pottery. Both the wheel and glazing were unknown in the New World prior to their introduction by the Spaniards in the sixteenth century.

From the beginning, too, entrepreneurs who owned Spanish ceramic workshops tried to bring the Indian potters into their sphere of production and distribution. One of the earliest documents extant with regard to glazed pottery in the New World concerns Indian efforts to thwart such an attempted takeover by Spanish colonial potters. The document, dated April 23, 1583, was sent by the Viceroy in Mexico City to the Alcalde Mayor of Michoacan to tell him that supervisors (veedores) were being sent at the request of a group of Indian potters (indios olleros) to oversee the production of glazed plates and bowls in the town of Patzcuaro (Cervantes 1939 I: 18). Henceforth in Michoacan, only those skilled in the craft (oficiales) were to be allowed to carry out the duties associated with manufacture of those glazed ceramics "and not the Indian potters" (Cervantes 1939 I: 18). The Viceroy noted the request was made by Indians "who are not, nor have been, nor can be skilled workers in that craft" (Cervantes 1939 I: 18). It appears the Indians still had some collective identity at the time since they acted together as a group on behalf of the potters (indios olleros) in Patzcuaro. Clearly, the Indians wished to be left in peace to produce for their own market or they would not have sought the protection of the Viceroy in Mexico.

Presumably, Indian potters continued to produce for Indians. In Puebla from 1550 on, Spanish Talavera workshops produced yellow ware

(lo amarillo) for ordinary domestic use by the colonists and white ware and tiles (lo blanco y azulejos) for fine dinner service, display and architectural decoration (Cervantes 1939 I: 23; Leicht 1967:449). These Talavera workshops, with a single exception in the seventeenth century, were concentrated on the Spanish side of the city to the west of the San Francisco River. There is ample evidence from the municipal archives in Puebla and documents in private collections of the history of this Spanish pottery making. These data are presented along with many excellent illustrations of the styles in the detailed work by Enrique Cervantes (1939 I, II). There are some similarities in form between the ceramics illustrated by Cervantes and black-on-red pottery, e.g. cooking pots (cazuelas), flower pots (macetas), chamber pots (bacines), wine vessels (cantimploras) and pitchers (picheles). (Cervantes 1939 I:95,120,121,153,155,175,179,187,213,239,241,253). But the differences in paste, glaze and design are marked.

The search for evidence of the beginnings of black-on-red glazed utilitarian ware was concentrated on the east side of the city of Puebla and in the parish of Santo Angel in which the barrio of La Luz is located. As noted, this barrio is identified by potters and people in the region as the source of the style; and this parish, identified with the Indians, was a major source of craft production in general. Elder potters identify a hill near the barrio on the outskirts of the parish as an ancient source of clay used to make this pottery. In addition, much of the food and drink traditionally prepared and served in the pottery is Indian in origin. The search was concentrated here on the Indian side of the city because of all the foregoing reasons and because of an intuitive feeling that the style, somehow, had Indian

roots. The use of glaze and the wheel and the similarity of form between Talavera and black-on-red pottery, to which attention was called in the preceding paragraph, indicate the style had Spanish roots as well. The separation of the two roots, Indian and Spanish, which are so inextricably intertwined in the present style, awaits exposure by the archarologist's spade. To date, there have been no historical excavations in the city and its immediate environs. But subsequent delving into historical records, both published and unpublished, lend strong support to the decision to concentrate the search for evidence of the style on the east side of the city. The data uncovered make possible a tentative outline of the development of the style, though not the origin.

It is uncertain whether or not a similar style of Indian pottery was produced in the barrios in the first one hundred fifty years following the founding of Puebla in 1531. The Indians drafted for service may have acquired pottery for their needs in several ways: from nearby Indian markets, from potters and traders who brought their wares for sale to the barrios and from among the household goods they already owned and brought with them to Puebla. In fact, all of these ways may have served to supply the Indian population in the city with pottery in addition to on-site manufacture. It is certain, at least from the early church records I examined for this period, that the Indians were engaged mostly in manual labor and construction work, in service, in baking and weaving. They were also engaged in making shoes, canvas, glass, soap, charcoal, tanning hides and tending animals. These church records yield no hard evidence of pottery making in this parish before the end of the seventeenth century.

I examined church records because early municipal records were scanty with regard to Indians. The kind of data available for Spanish potters, ownership of workshops and property, last wills and testaments and contracts for purchases simply do not exist for their native counterparts; and early census data lack sufficient detail. I began by examining the Cathedral archives where the earliest records of births, deaths and marriages were kept for the entire city. These records are in separate volumes for Indians, Negros and Mulatos and Spaniards. Near the end of the seventeenth century, for those not living in the center of the city, records were kept thereafter in the local parishes.

Marriage records proved most useful in tracing a tentative outline of the historical development of style in black-on-red ware. Up to the mid-nineteenth century these records included the following information for both partners: place of birth as well as residence at the time of marriage, legitimacy of birth, age, occupation, "racial" category (casta) and previous marital status (single or widowed). For some unexplained reason all information other than age was omitted if one marriage partner had been previously widowed. In the Cathedral volumes, Spanish marriage entries lack the detail found in the Indian, Negro and Mulato entries. In the parish, all entries were made in the same volume according to year. While the outline traced here is based mostly on marriage records and cannot be considered conclusive, it is not inconsistent with what is now known of historical events in Mexico. By that I mean changes with regard to the status and activities of potters that appear in the marriage records are supported by outside data as well. This will become evident as the outline is drawn.

The general term for potter (lozero) appears in all marriage records in Spanish, Mestizo, Indian, Negro and Mulato entries. It seems to have been applied to those who used molds as well as the wheel and to those who made bricks. Therefore, the term itself reveals nothing about the ware produced except when it is qualified. For example, when there is an entry that refers to a potter of white ware (lozero de lo blanco), or to a potter of yellow ware (lozero de lo amarillo), it denotes manufacture of fine and ordinary Spanish ceramics respectively. The term for wheel potters (tornero) also denotes Spanish manufacture since the wheel was unknown in the New World prior to its introduction by the Spanish in the sixteenth century. It has been noted already that the term for jar maker (ollero) refers to Indian manufacture using molds. Only the term for those who work by hand (manero) i.e. molds, in use today, is not found in church records. However in an eighteenth century document, Indians refer to themselves as hand potters (lozeros de mano) (AMP, Document #22, 1797). Evidently the term was in use then and probably earlier. Specific terms (ollero, manero, tornero, etc.) reflect existing specialization among potters two hundred to three hundred years ago. Among present day potters of black-on-red glazed ware the existing three-fold division -- jar maker (ollero), pot maker (manero) and wheel potter (tornero) -- may be traced to the separation that existed between Indian and Spanish techniques and markets in the colonial period.

The virtual absence of entries of Indian potters before the end of the seventeenth century would seem to indicate there was little or no native pottery making in the city before that time. Of course, it is possible that the craft was not reported or that it was only

practiced on a part-time basis, and it is possible that it was being practiced in another part of the city altogether. The latter was true of brick making. It was concentrated in the northwest part of the city where the sandy clay used for its manufacture was found (Leicht 1967: 374). However as noted earlier, the hill and stream that supplied the clay, sand and other raw materials used in utilitarian pottery making in Puebla until twenty years ago are within the parish of Santo Angel. Since kilns are needed to fire pottery and they generally require some kind of installation and maintenance, it seems reasonable to expect some evidence of the existence of the craft and activities related to it in the parish records of Santo Angel, that is if pottery making had been a meaningful activity at all in the parish before the late seventeenth century.

The first entry which refers to an Indian potter in the Cathedral archives is in a volume from 1657 to 1681. The entry was made in 1681 when Diego Munoz, a skilled potter of Spanish ceramics (oficial de lo blanco), was married (Libro #1 Cassamientos de los naturales...1657-1681). In the same year another Indian potter (lozero) was married, Juan Salvador (Libro #1). Unfortunately, the use of the general term potter (lozero) in the second entry gives no indication of the kind of ware he produced. A volume of marriages of Negros and Mulatos from 1629 to 1699 includes only one potter, a Mulato slave, Augustin Melendez Ortiz. He married in 1687 (Libro #1 1629-1699). At this time, marriages in the Cathedral usually took place among those living in the center of the city on the west bank of the San Francisco River.

The first entry in the parish of Santo Angel is in 1680 and refers to an Indian potter who worked on the wheel (tornero). The term "tornero" indicates he was part of Spanish ceramic production (Libro #1: 1657-1699: 10). The next entry refers to Indian production. Juan Diego, an Indian jar maker (indio ollero), was married in 1683 (Libro #1: 1657-1699: 12). It should be recalled here that the earlier reference to Indian potters (indios olleros) in the Michoacan document of 1583 placed them in the Indian sphere of production and identified them as jar makers (Cervantes 1939 I: 18). The term "ollero" is still in use today among potters of black-on-red ware in Puebla. It refers to specialists who only make jars in two-part and sometimes three-part molds. The entry in marriage records in the parish of Santo Angel in Puebla constitutes the first historical evidence of Indian pottery making on the east bank of the San Francisco River (Libro #1, Sto. Angel 1683: 12). Prior to this date and in the absence of historical archaeology, it remains uncertain when Indian manufacture began in the city and if the style or styles first produced resembled present black-on-red ware.

From the latter part of the seventeenth century on, marriage records in the parish of Santo Angel always include potters. Between 1683 and 1699, eighteen potters and four brick makers (ladrilleros) were married beside the jar maker. They all were living in what were apparently "Indian" suburbs that made up the parish: Yancuictlalpan and Huilocaltitlan. Bakers and metal workers and those who made and sold charcoal were among the other Indian inhabitants of these suburbs. There is no further mention of Yancuictlalpan and Huilocaltitlan in parish records after the eighteenth century.

The Puebla historian, Mariano Fernandez de Echeverria y Veytia (1718-1779), mentions these suburbs as being two of the four "Tlaxilacalis" or "arrabales" that made up the parsih of Santo Angel (1780: 285). The spelling he uses for them differs somewhat from that used in the preceding paragraph. I followed the spelling used in parish records. The four tlaxilacalis listed by Veytia are: Xancuitlalpan (tierra nueva or new earth), Cuilocautlan (paloma or dove), Xochititlan (sobre flores or over flowers) and Tepetlapan (tierra firme or hard earth/solid ground). The latter, Tepetlapan, is important for this study because it was the original name of the street which was to become Avenida Maximino Avila Camacho, the present center of manufacture and distribution of black-on-red ware (Leicht 1970: 449). Veytia tells us Tepetlapan is the place where they got fine clay, well suited for cooking pots and jars for common use. This cookware was sold throughout the kingdom because nowhere else did they make it as well (1780: 285). This sounds very much like the same claims made for black-on-red cooking pottery today.

The distinctions between other clays and wares noted by Veytia in the mid to late eighteenth century closely resemble those made by potters today. He distinguishes a white clay used to make white ware or Talavera (1780: 318). He also distinguishes a sandy clay used for making bricks, kilns, roof tiles and pipes (1780: 307). Of special interest to this study is Veytia's report of a glazed buff color ware, made of fine black clay. This ware was made in factories on the east side of the city in the parish which adjoined Santo Angel. It was for everyday use, but Veytia's description of the delicacy of the clay, the fineness of the glaze and the skill with which the pieces were fashioned

would seem to indicate the use of the wheel and Spanish manufacture (1780:318). When the clay used for this pottery was exhausted, another clay produced a red ware (Veytia 1780: 262).

Veytia does not mention factories in connection with the production of common cooking pots and other needed vessels for common use (cazuelas y demas vasijas necesarias para el uso comon) (1780: 285). He refers only to Tepetlapan as the place where "they get clay" (de donde sacan el barro fino) (1780: 285). In the context of "Indian" suburbs, the reference to where "they" get clay for a presumably distinct ware suggests Indian production. His references to other wares, known to be of Spanish manufacture and in connection with factories, lend further support to this suggestion.

Red ware (loza colorada) first appears in marriage records of Santo Angel about the time Veytia reported the change in buff or yellow ware toward the end of the eighteenth century (1789: 262). These entries refer only to Mestizo and Spanish potters (locero de colorada) (Libro #5 1777-1805). They suggest red ware was made on the wheel and in Spanish workshops. This suggestion receives further confirmation in ordinances and records from 1796 to 1810 which pertain to the formation of a new guild at this time -- a guild of potters of red and yellow wares (Gremio de Lozeros de Colorado y lo Amarillo) (AMP Castillero 5, Tomo 227, Legajo 2689, fojas 51/280: 295-330). Originally, potters of yellow ware were included in the guild of potters of white ware when it was formed in 1653 (Cervantes 1939 I: 20). At that time the provisions called for a strict separation between fine (white) and ordinary (yellow) ware and those large jars, pots, vessels and small jars (red)

(Cervantes 1939 I: 23). The provisions also called for each person to be examined by guild officials only in one type of ware. (Cartas y Ordenanzas del Sr. Don Jose de Galves al Ilustre Ayontamiento, Vol. 35, Cartas de examen de algonas ordenanzas de gremios, 102, Archivo Municipal, Puebla, in: Cervantes I: 22). But it seems those who made red ware then were outside the guild since no further mention of them is made, at least in these parish records, until the end of the eighteenth century. And there is no indication of their activities in the interim.

The first Indian potter of red ware in Santo Angel records, Bernabel Antonio Romero, born in the city, appears in an entry made in 1820 (indio, locero de colorada) (Book #7 1817-1828: 41). As it happens, he is an ancestor of one of my main informants, a wheel potter of black-on-red glazed ware. This pottery is still called red ware (loza colorada) by some potters today. The same volume, 1817 to 1828, contains other entries relevant to the history of the style. In 1817 an Indian painter of pottery (indio cocolero) was married (Book #7: 1). The term used then is the same term used now for a particular black design. The design is called "cocol", and it is applied to the exterior of large jars and the interior of cooking pots. Two other entries, one in 1820 and one in 1823, refer specifically to Indians who glazed pottery (indio vidriante) (Book #7 1817-1828: 41, 55).

Between 1817 and 1828, the records show a change in the racial category of the Indian. For the first time in the parish of Santo Angel in 1823, he is called an American (Americano) (Book #7: 80). The practice continued until 1837 (Book #33 1833-1840). Thereafter, anyone making pottery is called simply a potter (locero). The change in

racial designation was accompanied by an increase in the use of the wheel by those formerly prohibited from its use.

At this point in studying these records, I came to understand a story told to me by elder potters that had puzzled me. They had told me Miguel Hidalgo taught them to use the wheel. This was unlikely. The wheel was already known and widely used in Puebla long before Hidalgo lived in the nineteenth century. To my knowledge there was no other tradition that Padre Hidalgo had ever been in Puebla. Besides, it was very unlikely the priest-hero of Independence could have taught the Indian the wheel before he was executed in 1811. It is even more unlikely that he himself ever knew how to use the wheel. But Padre Hidalgo had been deeply concerned for the welfare of the Indians. He had adopted the symbol of the Virgin of Guadalupe for his standard in battle. And he had begun a fight for freedom from Spain and equality of social classes in Mexico. When elder potters said "they" were taught to use the wheel by Miguel Hidalgo, they were really saying he set the Indian potters free to learn and ended their state of segregation.

The changes brought about by the struggle for Independence are reflected in the parish records of Santo Angel. The disappearance of the use of racial categories, first to American, then none, implies a new recognition of themselves as Mexicans. This new consciousness is accompanied by evidence in the records of the emergence of the present style of black-on-red glazed ware and the fusion of formerly Indian and non-Indian production.

The evidence for the existence of a similar style before the end of the eighteenth century among mold and wheel potters, i.e. Indian and Spanish potters, is contained in a document dated December 29, 1797. The document is a formal protest by the Indians who used molds exclusively (lozeros de mano) against an attempted takeover by guild potters who used the wheel. It is the single most important document for this study and for an understanding of the historical development of the present style of black-on-red glazed ware. It is signed by Don Andres de Molina and Jose Ramos on behalf of the other Indians who did not sign because they did not know how (los otros no firman por no saben) (Documento #22, 1797: AMP: 10).

They begin their argument against the guild of red ware potters by deprecating their own skill needed to use molds. They say that although the wheel is truly an "art" requiring a period of apprenticeship and examinations, the use of molds is only an "honest job". To require them to be apprentices would be as ridiculous as to require watersellers first to be apprentices (1797: 2-3). They declare themselves free in the manufacture and sale of moldmade pottery which has been their heritage since "time immemorial" and by the Laws of the Indies (1797: 4).

Their reply to charges of inferior workmanship among the Indian potters contains revealing insights into the reasons for the attempted takeover and the style of the pottery in question. If Indian pottery is so inferior in quality, Molina and Ramos ask, why do the guild potters buy it, fire it and sell it themselves? (1797: 8). Why has no one noticed the poor quality until now and why does it sell so well? (1797: 7). The Indians reject the guild's attempt to force them to

sell only to the guild rather than directly to the public. They also vigorously reject the attempt to restrict the use of black designs (el manchado de negro) to guild members since they have always used these designs, it having been their custom (habiendo como ha abido siempre uso de esto propio) (1797: 5). They deny the black designs are made to attract "the vulgar taste of the consumer" who cannot tell the difference between Indian moldmade pots and the guild wheelmade pots (1797: 6), and they deny the black designs hide defects of the pottery. If these accusations are true, they ask, why then do the guild potters want to use the same designs? The Indians suggest the guild should supervise those potters who now use the wheel without being examined and leave the Indians to use molds and continue in their accustomed ways in peace (1797: 10).

Evidently, the modes of production used by the Spaniards and the Indians were distinct, but the products must have looked enough alike for the public to mistake one for the other. It appears the Indian pots were outselling those of the guild, or at least they were selling to the extent that the sales of the guild potters were effected. Finally, it appears the use of black designs on red pottery was well established among the Indians as was the use of molds. These findings are relevant to the discussion of symbolism and group identity in Chapter IV and the conclusions.

Red ware, or black-on-red ware as it is referred to in this study, became increasingly popular as the nineteenth century progressed. This popularity is reflected also in a marked increase in the number of marriages recorded among potters as the century drew to a close and in

an increase in the number of workshops in the city. There were only six producing red ware in 1835 and thirteen by 1910 (Leicht 1967: 449).

The years of the "Porfiriato", the period when the dictator Porfirio Diaz controlled Mexico from 1876 until the Revolution of 1910, were the years in which black-on-red ware reached its peak of popularity. This agrees with informants' reports that the street where pottery making was concentrated, Avenida Maximino Avila Camacho, was lined with workshops and kilns around the turn of the century. Then, they say, the streets nearby were filled with carts and burros loaded with pottery and sent to all parts of the world.

Distribution of Pottery

The distribution of black-on-red glazed ware must be seen against the historical backdrop of the city of Puebla and the push-pull forces exerted on the population in the region by changing social conditions. After it was founded, the population of the city kept pace with the rapid expansion of the city itself (Castro 1966: 10). The Spanish population which totalled thirty-four in 1531, reached eight hundred in 1570 (Castro 1966: 8-9). The original Indian work force of 16,000 in 1531 increased to 25,000 in 1618. They lived in the barrios surrounding the center of the city (Castro 1966: 9). Most of the Indians had come from towns and villages within a radius of twenty-five kilometers; they came in large numbers from Tlaxcala and Cholula (Carrion 1970 I: 20), from Xonaca (Leicht 1970:) and according to church records that were examined, from the Mixteca Alta and Mixteca Baja. By 1678 the total population of Puebla reached 68,800 although it is not clear what part of that total was Indian (Castro 1966: 9).

The early and rapid growth of the city took place at a time when the Indian population of the Central Highlands was declining drastically. Nearby six-sevenths of the indigenous population declined during the sixteenth and seventeenth centuries (Wolf 1959: 195-197, 284). In this same period the southern part of the state of Puebla, including the slopes of nearby Malinche, became deforested (1973: 25, 42; Gibson 1964: 303-306). Depopulation in the region and deforestation with its attendant lack of gound water and rainfall were accompanied by drastic social and economic change as a result of the Spanish Conquest (Gibson 1964: 323-326, 334, 366). These served to redistribute the Indians over the landscape (Gibson 1964: 242-245) and exerted a strong push on the labor force in the surrounding towns toward the city. As Gibson has documented for Mexico City, the need for labor in the city exerted an equally strong pull, often bringing Spanish agricultural and non-agricultural employers into conflict over the existing labor supply (Gibson 1964: 230-231).

Toward the end of the eighteenth century disturbances in the countryside increased, and there was a movement for Independence from Spain. The fight for Independence erupted into open rebellion in 1810. Even after it was won in 1821, fighting continued sporadically through the next three decades in Puebla. There were further disturbances in the countryside both before and after the arrival of Maximillian and Carlotta in Mexico (Sierra 1969: 323-324). During the French Intervention soldiers were "recruited" by seizing men at random in the countryside. This practice plus continued fighting and increased banditry in the mid to late nineteenth century served to push people either into the cities or into the hills for safety. The relative stability of the

"Porfiriato" that followed lasted until the Revolution of 1910.

There was industry in Puebla ever since it was founded (Castro 1973: 24; Gibson 1964: 354, 361). But a marked change in production took place with the opening of the first textile mill "La Constancia" in Puebla in 1835, signalling the beginning of the industrial revolution in Mexico (Leicht 1970:115). Other mills were opened in the region through the latter part of the nineteenth century (Leicht 1970:186-187) and created several smaller urban centers within a twenty-five kilometer radius of Puebla. All of them served to attract workers. The region within this radius has continued to expand as an urban industrial area to this day (Nutini 1970: 84, 88). It also has developed an extensive highway and road system that links these urban centers together (Nutini 1970: 84).

The coming of the railroads in Puebla facilitated the distribution of pottery. From the mid to late nineteenth century, traders and potters loaded their wares, packed in bundles, onto trains and sold them at points along the train route. Pottery went to the sugar cane plantations where it was distributed to migrant workers so they could prepare their own meals. This is still done in the cane fields of Izucar de Matamoros and south (Jaën 1972, personal communication). Buses came into use for the distribution of pottery in the twentieth century. Traders and/or potters paid a fee in addition to their own fares for each bundle which was loaded on top of the bus.

Earlier, before Independence and the coming of the railroads, wheeled carts and animals were used to transport and distribute pottery. Most of the important routes to and from the Valley of Mexico that were

used were already in existence at the time of the Conquest. They were enlarged and modified later on (Gibson 1964: 361). Thus, the distribution of pottery noted by Bernal Diaz in 1519 is not unlike the pattern that can be discerned today. Puebla continued to supply "Mexico and all the neighboring provinces" (1968: 181).

NOTES

1. Sr. Alberto Beltran confirmed that the only work on La Luz to date is a brief description in a survey of Puebla pottery. (See: Alfareria Poblana. 1968. Lameiras, Palacios, Romero, Rojas & Warman. Mexico: Editorial Novaro: 92, 95-96, 100, 108, 112).

2. The Church of our Lady of La Luz was begun in 1767 and dedicated 1805.

3. A document in the Municipal Archives of Puebla (Document #22) concerns a dispute in 1797 over rights to use black designs on red pottery; it strongly suggests that the style was already well established. There is, however, no tangible evidence at the present time comparable to the paintings of Agustin Arrieta (see Figure 2).

CHAPTER II

THE POTTERY

Puebla domestic pottery is described here from the investigator's point of view. The description includes a typological scheme, an analysis of the clays using both qualitative and quantitative techniques (D.C. arc emission spectroscopy, atomic absorption spectroscopy and X-ray diffraction) and measurements of potter's types. These data are compared with the way in which potters think and organize their behavior with regard to the clays and pottery produced. Though necessarily limited in scope, the description and technical analyses provide the basis for some insights into the relationship between cognition and material culture with reference to style.

Typological Scheme

The pottery constitutes a single technical stylistic unit. The same techniques of manufacture and raw materials are utilized by potters throughout the barrios, and the same style of black-on-red glazed pottery is produced. This pottery is recognized as a single unit, not only by the potters who produce it, but by the people of the region who use it. The people believe this pottery to be superior to other types produced elsewhere in Pueba and Mexico, and they consistently pay higher prices for it wherever it is sold. The pottery is greatly valued by its users for being well fired and durable. And it is identified generally throughout the region either by the names of the barrios or city where it is produced.

The literature on the subject of typology is extensive, the problem is complex and discussion of the relative merits of proposed methodologies is ongoing and intensive. Further discussion here is unwarranted at this time. It will suffice to present one typological scheme for descriptive purposes and to detail the assumptions which underly it. The typology is assumed to reflect the consequences of observable patterns of behavior, though it may not reflect native cognitive categories. Further, the significant attributes are assumed to be morphological. The study is synchronic and structural; it is neither concerned with, nor was data collected for, a diachronic historical study.

It is expected that the attributes selected, if subjected to statistical analysis as Spaulding proposed some time ago, would yield comparable "types" based on a "consistent assemblage" of attributes (Spaulding 1953: 305). Aside from Spaulding, various statistical procedures have been utilized by anthropologists to establish the validity of typological schemes beginning with Tylor (1889), Kroeber (1940) and Krieger (1944, 1960) and continuing up to the present day (Ford 1954; Krieger 1964; Whallon 1972; Read 1974; Tekiner 1974). All investigators essentially view "types" as clusters of attributes that are significantly associated (Read 1974: 241). I would like to add that all attributes selected, in essence, must be viewed also as products of the investigator's perception and judgement, irrespective of the methods used to measure them and the objectivity of the methods employed.

The following classifications of variables (Tables 1A, 1B, 1C) form the basis of a typological scheme devised here of Puebla pottery (Table 2). The terminology used follows Shepard's general system of

shape classification based on geometric solids as reference norms for vessel description (Table 1A) and rim form (Table 1B) (1956: 228, 233-235, 245). Some additions and modifications have been made and consideration given to ear form (Table 1C).

Examination of Table 2 in which a typology of black-on-red glazed utilitarian pottery is presented reveals some overlap in variables between types 1AM, 1BW and 1CW: 1Aa. #1; 1Ca. #1; 1Cb. #1; 1Cc. #1, #3. In the first instance (1Aa. #1), the ellipsoid restricted independent composite shape occurs only in one wheelmade vessel. In the second instance (1Ca. #1; 1Cb. #1), the direction and shape of the ears common to moldmade and wheelmade jars actually are linked together though they appear as separate variables. In the third instance of overlapping, the number of ears that do not occur (1Cc. #1) and that occur most often (1Cc. #3), coincide though the technique of manufacture differs. In fact, all medium to large vessels of wheel and mold manufacture either have two ears or none. But only the largest moldmade vessels also may have four ears (1Cc. #4), and only the medium to small wheelmade vessels may have one ear.

There is less overlap in Table 2 between Types 3AM, 3BM, 3CM and 3DW, 3EW (Table 1B, Type 1Ba. #2) and Type 2AM and 3FW (Table 1C, Type 1Cc. #1). The rims of these various types are at an abrupt angle outward and horizontal to the vessels but distinct vessels are represented. Of the moldmade vessels, only Type 2AM is made without ears or handles. Of the wheelmade vessels, only Type 3FW is without ears. Both wheel and moldmade vessels occur most frequently with two ears. It is only the largest and most decorative moldmade vessels that occur with more than two handles.

TABLE 1A

SHAPE CLASSIFICATION OF BLACK-ON-RED GLAZED UTILITARIAN POTTERY. PUEBLA, MEXICO

Type 1Aa.

1. Ellipsoid restricted independent composite
   (velorio huevito: wheel; ollas: mold)

2. Sphere restricted independent composite
   (velorio: wheel; jarros: wheel; ollas: wheel)

3. Sphere restricted independent complex
   (capulixtle: wheel; jarro cachucho: wheel)

4. Ovaloid restricted independent inflected
   (jarro cantaro: wheel; jarro cantimplora: wheel)

Type 1Ab.

1. Ovaloid unrestricted-vertical
   (cazuela: mold; cajete: mold)

2. Ovaloid unrestricted dependent
   (caso: mold)

3. Ovaloid unrestricted-horizontal
   (pescadera: mold)

4. Cone unrestricted
   (tortera: mold)

5. Sphere unrestricted
   (cazuela: wheel)

6. Sphere restricted independent inflected
   (tecomate: wheel)

7. Hyperboloid unrestricted
   (maceta: wheel)

8. Cylinder unrestricted dependent
   (borcelana: wheel)

9. Cylinder unrestricted independent
   (bacin: wheel)

TABLE 1B

RIM CLASSIFICATION OF BLACK-ON-RED GLAZED
UTILITARIAN POTTERY. PUEBLA, MEXICO

Type 1Ba. Direction (in relation to vessel contour)

1. Gradual curve outward horizontal 
2. Abrupt angle outward horizontal 
3. Abrupt angle outward down 
4. Direct 

Type 1Bb. Thickness (in relation to vessel wall)

1. Exterior short thin ellipsoid rim thickened at lip 
2. Exterior short medium ellipsoid rim thickened at lip 
3. Exterior short thick ellipsoid rim thickened at lip 
4. Exterior long medium rectangle rim thickened at lip 
5. Exterior long medium rectangle rim thickened at lip, and with triangle projection 
6. Exterior short thick sphere rim thickened at lip 
7. Exterior short thin ellipsoid rim thickened at lip and with triangle projection 

TABLE 1C

EAR CLASSIFICATION OF BLACK-ON-RED GLAZED
UTILITARIAN POTTERY. PUEBLA, MEXICO

Type 1Ca. Direction (in relation to vessel contour)

1. Gradual curve inward down
2. Abrupt angle outward horizontal
3. Direct outward horizontal
4. Gradual curve inward horizontal

Type 1Cb. Shape (in relation to vessel contour)

1. Short wide rectangular S-curving ear
2. Long wide ellipsoid U-angled ear
3. Short narrow ellipsoid S-curving ear
4. Long narrow sphere U-angled ear
5. Short wide rectangular U-angled ear

Type 1Cc. Number

1. No ears
2. One ear
3. Two ears
4. Four ears
5. Eight ears

TABLE 2

TYPOLOGY OF BLACK-ON-RED GLAZED UTILITARIAN PO
POTTERY. PUEBLA, MEXICO

1. MOLD	2. WHEEL
Type 1AM	Type 1BW
1Aa. #1	1Aa. #2
1Ba. #2	1Ba. #1
b. #2	b. #1
1Ca. #1, #4	1Ca. #1
b. #1, #5	b. #1
c. #1, #3, #4	c. #1, #3
Type 2AM	Type 1CW
1Ab. #1	1Aa. #1, #2, #3
1Ba. #4	1Ba. #1
1Cc. #1	b. #1
	1Ca. #1
	b. #3
	c. #2
Type 3AM	Type 1DW
1Ab. #1, #2	1Aa. #4
1Ba. #2	1Ba. #3
b. #4	b. #5, #6, #7
1Ca. #3	1Ca. #1
b. #4	b. #1
c. #3	c. #2

TABLE 2 - Continued

1. MOLD	2. WHEEL
Type 3BM	Type 3DW
1Ab. #3	1Ab. #5, #6
1Ba. #2	1Ba. #2
b. #2	b. #3
1Ca. #3	1Ca. #2
b. #4	b. #2
c. #3, #4, #5	c. #3
Type 3CM	Type 3EW
1Ab. #4	1Ab. #8, #9
1Ba. #2	1Ba. #2
b. #4	b. #3
1Ca. #3	1Ca. #1
b. #4	b. #1
c. #3, #4, #5	c. #2, #3
	Type 3FW
	1Ab. #7
	1Ba. #3
	b. #5
	1Ca. #1
	b. #1
	c. #1, #3

TABLE 3

TYPOLOGY OF BLACK-ON-RED GLAZED UTILITARIAN POTTERY. PUEBLA, MEXICO

1. MOLD	2. WHEEL
Type 1AM	Type 1BW
1Aa. #1	1Aa. #1, #2, #3, #4
1Ba. #1	1Ba. #1, #3
b. #2	b. #1, #5
1Ca. #1, #4	1Ca. #1
b. #1, #5	b. #1, #3
c. #1, #3, #4	c. #1, #2, #3
3. MOLD	**4. WHEEL**
Type 2AM	Type 2BW
1Ab. #1, #2, #3, #4	1Ab. #5, #6, #7, #8, #9
1Ba. #2	1Ba. #2, #3
b. #4	b. #3, #5
1Ca. #3	1Ca. #1, #2
b. #4	b. #1, #2
c. #1, #3, #4, #5	c. #1, #3

Thus, the overlap in typological scheme presented here may be related to function, i.e. either two ears or handles for lifting (1Cc. #3), or none (1Cc. #1), perhaps indicating stationary vessels; and the same kind of ears to do this lifting (1Ca. #1; 1Cb. #1). This applies, too, to serviceable rims (1Ba. #2) and two handles (1Cc. #3) for Types 1AM. 3AM. 3BM, 3CM. 3DW, 3EW; and 1BW, 3FW.

It appears that vessel shape and rim direction and thickness are more significant than ears in distinguishing between kinds of vessels (Table 2: Type 1AM, 1BW, 1CW, 1DW). It appears that vessel shape rather than rim direction is significant in distinguishing the major types (Table 1A; Table 2). Rim thickness, and either a lack of ears or a multiplicity of them, serves to further distinguish kinds of vessels (Table 2: 1AM, 2AM, 3AM. 3BM, 3CM, 3DW, 3EW, 3FW). In sum, it appears that overlapping of types may be a result of functional requirements whereas specific differences in shape result from mode of manufacture as well as intended use. Manufacture is also related to rim direction and thickness which was significant here.

Analysis of Materials

Clay used in the barrios comes from several sources that are utilized by all the potters alike: Amozoc, Los Alamos, San Pablo Xochimehuacan. Several nearby hills were also utilized in the past, but these are now unavailable as sources. Some were depleted a generation ago and others are used as house sites.

Two kinds of clay are distinguished by potters from each site, a fine and coarse clay. Both are obtained close to the earth's surface from exposed and weathered banks of streams and small rivers. Some

potters dig their own clay after making an agreement with the owner of the land. Most purchase it from local merchants who deliver in sacks or truckloads. Both clays sell at the same price, and all sources command the same price.

Analytic techniques were applied to a representative sample, ranging from crude clays of known origin to fired and finsihed pieces. One purpose was to trace the changes in clay at each stage of manufacture to discover what information, if any, is being lost as a result of firing. A second purpose was to determine to what extent native categories with regard to the selection and use of clay correlated with distinctions derived from D.C. arc emission spectroscopy, atomic absorption spectroscopy and X-ray diffraction. The application of technical analyses provides a scientific description of the clays used by this community of potters and may be compared with the potter's cognitive system regarding the selection and use of these raw materials. Additionally this comparison permits us to examine the extent to which this cognitive system is manifested in, and recoverable from, the material culture.

The qualitative and quantitative spectrochemical techniques employed as part of the scientific analyses of the clays were capable of identifying accurately up to seventy elements and minor constituents, sometimes referred to also as trace elements, in the parts per million range. These techniques were selected because, as well as radio chemical techniques, they are among the latest techniques most usefully applied to problems of origin and style provenance in archaeology and are presumably, most revealing of cultural distinctions (Arnold 1971;

1967; Brill 1971; Hall 1971; Harbottle 1970; Perlman and Ansaro 1969; Sayre, Chan and Sabloff 1971; Shepard 1971; Smith 1971; Weymouth 1973). Chemical analyses generally have been concerned with questions of provenance and style distribution (Perlman and Asaro 1969: 11, 23), temper and fired sherds (Shepard 1956: 26-31, 51-54, 131-132, 156-168, 378-384). These results have bearing on these questions and some of the techniques employed.

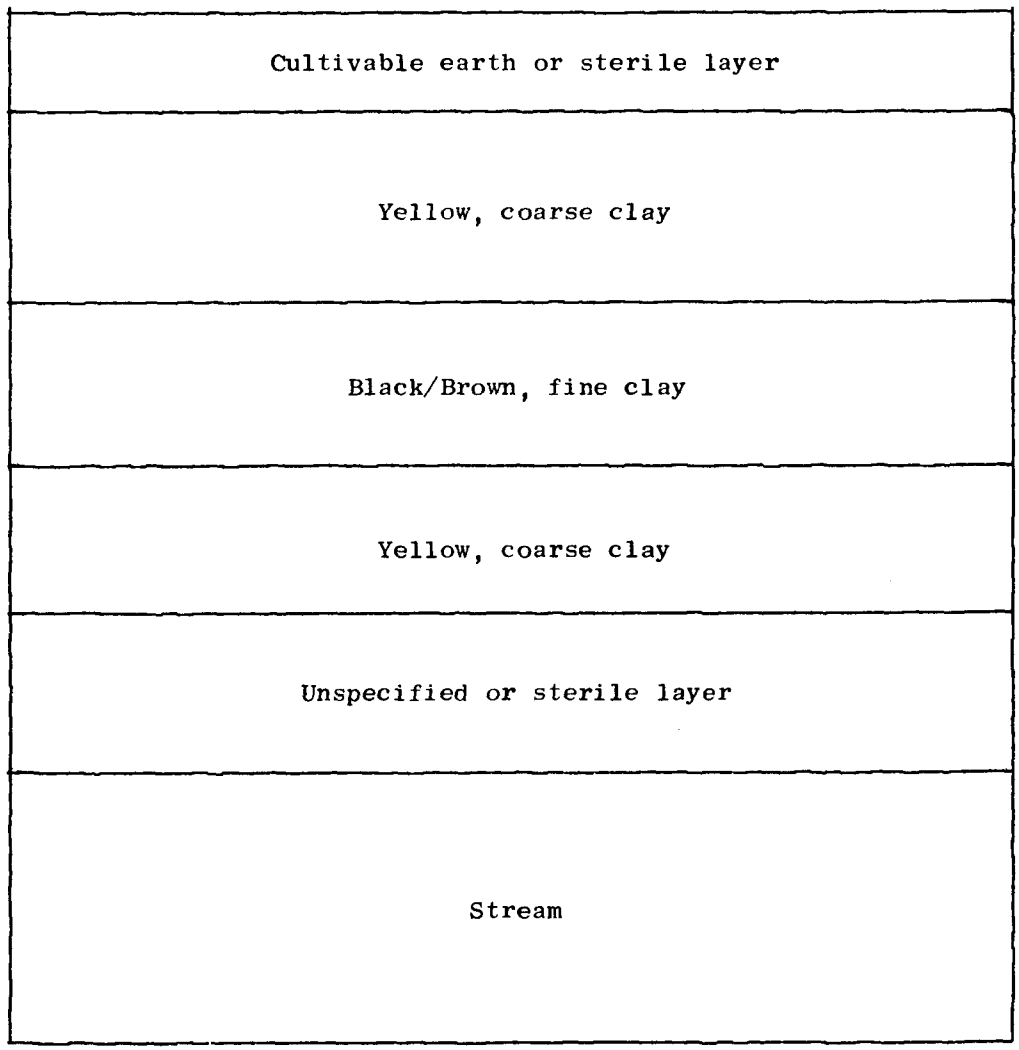
The potter's system for classifying clay is based on color categories and textures and has reference to the functional qualities of the clay. Coarse clay is identified as yellow (amarillo); fine clay is identified as brown to black in color (cafe, negro or prieto). According to the potters, yellow clay contains more sand (arena) and is removed from the top and bottom layers of earth in the stream bank. Black to brown clay, characteristically, contains less sand and is removed from the middle layer between the bands of yellow clay.

Clay is distinguished from ordinary cultivable earth (tierra) because it occurs in layers (capas) beneath the top crust of a stream bank. Especially good clays of both types are recognized by the presence of veins or streaks (vetas) within the layers. Noncultivable, hard, sterile earth (tepalcate) may occur at the top or bottom of a bank (Figure 4).

The color terminology employed by potters is associated with other cultural concepts concerning the earth and fertility, but these concepts are not elaborated here. What is relevant is that the terminology, i.e. yellow vs. black, expresses a state of contrast based on the observable qualities of the clays.

FIGURE 4

Profile of stream bank showing potter's classification of clay and non-clay layers



Potters test the working qualities of a clay at the banks by rolling a piece of clay into a ball between the fingers. The same ball of clay test for plasticity is used by western ceramicists. One master potter noted that good clays, when rolled, adhere well, forming a tight sticky ball.

At the stream banks and in the workshops (talleres), potters classify clay by sight and touch. They are equally adept at evaluating clay in a dry and hard state. They will select a piece, handle it and study it before commenting on its color and texture. Often they break the dry piece open in order to observe it more closely. They neither report nor were observed to rely on taste and smell in classifying clay. Potters appear to take great pride in their visual abilities, calling attention to the fact that they can make fine distinctions by sight alone (pura vista). A summary of the potter's view of clay based on native categories is presented in Figure 5.

X-ray diffraction analysis supports the potter's color classification of clay. Yellor or coarse clay is associated with kaolinite. Kaolinite has a relatively simple structure, and the presence of more sand and rocks as well as larger grain size contribute to a lighter color. Black to brown fine clay is associated with illite which has a more complex structure. It has a greater potential for water and metallic content, and these characteristics of illite tend to produce clay of darker color.

Clay color in crude, prepared and fired stages of production were identified in a sample collected in 1972, using the Munsell Soil Color Charts. Color varies from brown to dark brown (10YR 4/3: #16)

FIGURE 5

Potter's criteria and classification of clay used for utilitarian pottery. Puebla, Mexico.

Texture	Color	Use
Fine (barro fino)	Black/Brown (negro o prieto/cafe)	Wheel manufacture (de torno)
Coarse (barro corriente)	Yellow (amarillo)	Mold manufacture (de mano)

for coarse crude clay, to brown (7.5YR 5/4: #13) and light yellowish brown (10YR 6/4: #15) for coarse prepared clay. Crude clay refers to clay in its dry and hard state and prepared clay to its moist state after water has been added and the clay kneaded to the desired consistency. Coarse fired clay is light red (2.5YR 6/8: #1) after the first firing and red (2.5YR 5/6: #11), yellowish red (5YR 5/8: #17, 5YR 5/6: #18) after the glazing, painting and second firing of moldmade pieces of pottery.

The color of fine clay varies from reddish gray (5YR 5/2: #4) to brown (10YR 5/3: #10), pale brown (10YR 6/3: #6, #14) in the prepared stage and from reddish yellow (5YR 6/6: #5) after the first firing to yellowish red (5YR 5/8: #2) after the second and final firing of wheelmade pieces.

The unfired glaze is pale yellow (5YR 8/4: #5) on the Munsell scale and yellowish red (5YR 5/8: #11, #18), reddish yellow (5YR 6/8: #17) after the second firing. The applied black paint is black on the Munsell scale after firing (5YR 2/1: #17, #18; 7.5YR 2/0: #11).

The paste is coarse textured and untempered. That is, no nonplastic materials are added to the paste. However, potters do sometimes add coarse clay to fine clay. They say this is done to give strength to the clay and to achieve the desired working qualities for the wheel. Technically, it inhibits cracking during the drying process.[1] One potter reported adding crushed sherds to his paste on occasion, but this

practice was never observed and was not widely reported. Only water is added to the coarse clay. Occasionally, more sand is added but only to the clay coils used to form the rim and ears of the larger moldmade pieces.

Fine and coarse clay each are associated with a technique of manufacture. Fine clay is for use on the wheel. It is characterized by potters as delicate, lively clay which "breathes". But it could not be stretched over molds without breaking. The two main sources for this type of clay are Amozoc and Los Alamos. All potters agree the source of the best fine clay is Los Alamos.

Coarse clay is used for mold manufacture of vessels. The potters describe this clay as being thick, compact and strong clay that can be stretched over the mold without breaking. After a few minutes in the sun, this clay will hold its shape when the mold is removed for the remainder of the drying period indoors. This period ranged from a few hours for small vessels to several days for the large ones. In the rainy season all vessels take longer to dry.

Vessels are worked when they are leather-hard (partially dry). The tools used are hard and smooth for moldmade pieces, e.g. a water-worn pebble; for wheelmade pieces sharp-edged scrapers are used, e.g. a sherd, gourd rind or piece of metal.

The two techniques used for the production of the vessels are: the kickwheel for medium to small size cooking pots and jars of varied shape and simple convex molds for cooking pots. More complex two-part convex molds are used for jars and a mushroom-type mold for small

eating bowls. The moldmade vessels range in size from the very largest ones made (up to one meter in diameter and height) to the medium and small sizes.

All paints and glazes used in the barrios are purchased from commercial manufacturers in the northern states by three local suppliers who, in turn, sell them to the potters. The same methods of mixing and applying paint and glaze are used throughout the community.

Black paint is made by mixing copper oxide with powdered glaze, chalk, clay and water. The solution is applied to the pottery with little tin cans that have a side spout. With these cans, the firing team applies the color by allowing the paint to run down the sides of the cooking pots and jars as they slowly spin the vessel in their hand. The paint is applied after each piece has first been dipped into a yellow glaze and chalk solution and allowed to dry. The completed pottery is then restacked for the second firing. The glaze used is a lead oxide. These factory made materials were not tested. In the absence of temper or other native raw materials, the testing was confined to clays.

Qualitative chemical analysis of the clay sample was accomplished using a 1.5 M Bausch and Lomb emission spectrograph with D.C. arc source. The technique permits the accurate identification of up to seventy elements. It is the proper, logical preliminary to a quantitative analysis. Twelve elements were identified in the sample as present in detectable amounts: aluminum, magnesium, silicon, calcium, iron, sodium, chromium, copper, nickel, lead, vanadium and titanium. None are especially rare elements. It is interesting that titanium,

vanadium and nickel occur only in the coarse clay from San Pablo Xochimehuacan in this sample and that two of the four samples from this source also appear to lack aluminum. The paucity of like data from this and other regions of Mexico make it difficult to ascertain whether or not these elements may be characteristic of Puebla. Arnold's data for Ticul, Yucatan, based on an extensive sample subjected to X-ray diffraction analysis, indicates the clays there, mostly montmorillonite, are distinct from those analyzed here (1971: 22, 25). These data make further study promising.

It should be noted that the utility of the chemical approach to the problems of origin, production and trade still must be qualified despite the long established use of laboratory procedures in ceramic description in archaeology. A. O. Shepard points out the assumption, "each clay mineral has a distinct pattern of associated trace elements ... is untested as yet" (1971: 56). As E. T. Hall observes, "little attempt has been made to date to trace ceramic compositions back to their clay sources" (1971: 161). In general, much work remains to be done in amassing a body of data on clays and clay sources for comparison.

The presence or absence of elements may be significant as it was in determining the origin of Greek Late Bronze Age pottery from Knossos and Mycenae (Harbottle 1970). But in terms of the elements present in the Puebla sample, qualitative analysis by D.C. arc emission spectroscopy does not reveal either the potter's native categories of clay types or distinguish sufficiently between the sources of clays. (We know two types of clay from three sources are represented in the sample). Next, a determination was made of the percent of minor constituents in

the clays. Somestimes referred to as trace elements, minor constituents have proved to be significant in determining the origin of clays (Harbottle 1970).

Quantitative chemical analysis was accomplished using a Perkin-Elmer 303 atomic absorption spectrophotometer. The percent of six minor constituents in the sample was determined. All measurements were made in the parts per million range.

The results of the analysis are shown on Table 4 and Table 5. The major constituent of the clays is silica, SiO_2, and certainly the predominant characterizing element present is silicon, Si. Our preliminary data show all these clays to be rich in iron ore. Of the six trace elements tested, three were found in different concentrations, distinguishing the sources of the clays. But the data do not reveal the categories of clay recognized by the potters. Copper, Cu, and nickel, Ni, are apparently present in greater quantities in the clay from Amozoc. The clay tested contained ten times more copper and from two to four times more nickel than the clay from Los Alamos. Los Alamos clay contained almost ten times more calcium than the clay from Amozoc. Other research suggests that calcium contributes to the crystallization process in firing (Wertime 1973: 876). The result presumably would be harder and stronger pottery (Shaw: personal communication). It appears that calcium could prove to be the most interesting element of the minor constituents for analysis and future investigation.

While the quantitative analysis did not reveal any basis for distinguishing the potter's categories of fine and coarse clay, it does indicate the clay sources are distinguishable chemically.

TABLE 4. Atomic absorption analysis of minor constituents

	SAMPLE	SOURCE	PER CENT MINOR CONSTITUENTS		
			Iron	Magnesium	Nickel
2	Barro corriente/crude	Amozoc	4.19	.70	.026
3	Barro corriente/prepared	Amozoc	4.16	.66	.030
4	Barro corriente/crude	Amozoc	4.19	.71	.037
43	Barro corriente/crude	Los Alamos	3.98	.54	.0080
19	Barro corriente/crude	Los Alamos	8.63	1.26	.0097
6	Barro corriente/fired once, no glaze	Amozoc	4.16	.87	.017
7	Barro corriente/fired twice, glazed	Amozoc	4.13	.86	.017
5	Barro fino/crude	Amozoc	3.41	1.12	.022
1	Barro fino/crude	Los Alamos	3.94	.84	.013
20	Barro fino/crude	Los Alamos	4.35	.71	.0062
21	Barro fino/crude	Los Alamos	4.71	.84	.0075

TABLE 5. Atomic absorption analysis of minor constituents.

	SAMPLE	SOURCE	PER CENT MINOR CONSTITUENTS		
			Calcium	Chromium	Copper
2	Barro corriente/crude	Amozoc	.15	.015	.0093
3	Barro corriente/prepared	Amozoc	.12	.014	.0080
4	Barro corriente/crude	Amozoc	.15	.015	.015
43	Barro corriente/crude	Los Alamos	.022	.013	.0016
19	Barro corriente/crude	Los Alamos	.056	.025	.0033
6	Barro corriente/fired once, no glaze	Amozoc	.64	.26	.0048
7	Barro corriente/fired twice, glazed	Amozoc	.33	.31	.012
5	Barro fino/crude	Amozoc	.058	.0089	.011
1	Barro fino/crude	Los Alamos	.35	.016	.0032
20	Barro fino/crude	Los Alamos	.043	.016	.0089
21	Barro fino/crude	Los Alamos	.037	.025	.0025

No comment will be made at this time concerning chromium. Aluminum was not selected for quantitative analysis, and lead was examined in detail in a forthcoming article. Sodium was not considered to be useful for analysis because of its abundance in the sample. The quantitative analysis, therefore, was limited to six minor constituents.

The minerals in the sample were identified using X-ray diffraction equipment. The intensity of the peaks registers the relative amount of the minerals present. Each is marked S (strong), M (medium), or W (weak) on Table 6. Nine minerals were identified: illite, kaolinite, albite, calcite, hematite, magnetite, lead chromium oxide, mullite and quartz.

X-ray diffraction identified illite, a mineral with greater plasticity and bonding strength than kaolinite in fine clay that is used on the wheel (samples #1 and #5). Coarse clay that is used to make moldmade pottery either does not contain illite (sample #4) or does so only when it occurs together with kaolinite (samples #2 and #3). In the samples of fired coarse clay (samples #5 and #7), mullite presumably represents the high temperature phase of kaolinite (Shaw: personal communication). Thus, the analysis supports an important distinction maintained by the potters between fine and coarse clay.

The samples were subjected to a limited qualitative analysis. Lack of funds prevented this analysis from being extended beyond the seven samples representative of each stage in production and from two to three clay sources. Several mount techniques were applied, but the least desirable method was used due to its applicability to the samples, the time element and the machine. The samples were pulverized by hand

Table 6. X-ray diffraction analysis.

SAMPLE	STAGE	SOURCE	Illite	Kaolinite	Albite	Calcite	Hematite	Magnetite	Lead Chromium Oxide	Mullite	Quartz
1	Crude clay	Los Alamos	W	W	S	W		M			W
2	Crude clay (molds)	Amozoc	W	W	S	W		W			
3	Prepared clay	Amozoc	W	M	S	W		W			
4	Crude clay (molds)	Amozoc		W	S	W		M			W
5	Crude clay (wheel)	Amozoc	W		S	W		W		W	W
6	Fired once, no glaze	Amozoc	W		S	W	S	W		M	W
7	Fired twice, glazed	Amozoc	W		S	W		M	M	W	W

S=Strong
M=Medium
W=Weak

Illite $Al_2Si_4O_{10}(OH)_2xH_2O$ $KAl_2(AlSi_3O_{10})(OH)_2$

Kaolinite $AlSi_2O_5OH$

Albite $NaAlSi_3O_8$

Calcite $CaCO_3$

Quartz SiO_2

Hematite Fe_2O_3

Magnetite Fe_3O_4

Mullite $3Al_2O_32SiO_2$

with a porcelain mortar and pestle, then mounted in a pressed glass sample holder and finally X-rayed under the following conditions: 27 k.v., 19 m.a., range = 1000, time constant = 2.5, copper radiation, 2° 20/min., 3° medium resolution slits were used. The peaks obtained using this technique were for the most part well defined (Remz 1973: 1).

It is expected quantitative X-ray work would reveal differences in the proportions of illite and kaolinite in samples #1, #2 and #3. However, the present analysis does not permit the distinction of sources of fine and coarse clay.

To summarize the results of the technical analyses briefly: of the several analytic techniques applied here, X-ray diffraction, which identifies illite and kaolinite in the samples, most closely parallels the potter's native categories. However neither X-ray diffraction nor qualitative analysis served to distinguish the sources of clays. Quantitative analysis of the samples by atomic absorption spectroscopy revealed two sources of clay distinguishable chemically: Amozoc and Los Alamos. This result shows, as Perlman and Asaro have shown, useful quantitative analysis of minor elements does not always depend on the size of the sample tested (1969: 36-37). There is a more general problem, namely that of trying to obtain "clay fingerprints" at all (Harbottle 1970: 28). Some problems encountered in the Valley of Puebla are: the possibility the elements selected for quantitative analysis did not generate the most significant data, the lack of adequate detailed local geologic maps and the proximity of the two clay sources sampled (both are within fifteen kilometers of each other and therefore, may not be distinguishable geologically).

Qualitative analysis by D.C. arc emission spectroscopy as well as quantitative elemental analysis of clay and fired sherds show no loss in the firing process. This result resembles Hall's findings (1971: 161). Only lead and lead chromium oxide appear later as a result of glazing after firing in samples #7 (see Table 6).

Measurements of Pottery Types and Sizes

The following tables list measurements of pottery taken in 1972, 1973 and 1974. Only complete vessels were measured. It was not possible to take measurements of all types and sizes recognized by the potters as many are no longer made. However as far as possible, representative pieces were included (see Tables 7 and 8).

The conditions under which measurements were made were extremely difficult, and the size and wieght of many pieces precluded the use of instruments that might otherwise have been employed in a laboratory. Most measuring was done either in the workshop itself or in the courtyard. When pieces were too large and heavy to move, measurements were also taken in storage rooms when feasible. I was assisted in taking measurements at various times by my husband, my children and the children of potters who would write down the dimensions on sheets I had prepared in advance. No matter where we found ourselves, usually in the hot searing sun of the courtyard, we always seemed to be in the potter's way. I remained aware during the fieldwork of the extent to which I interfered with their normal activities being carried out in already cramped quarters. There was much coming and going around us, if not by the potters themselves, then by the innumerable children, neighbors and vendors who always seemed to be attracted by our

Table 7. Field measurements and volume calculations of cazuelas.

Type	Rim Dia. 1 to Ears (a)	Rim Dia. 11 to Ears (b)	Overall Ht. (c)	Ht. to Rim (d)	Rim Ht. (e)	Rim Wdt. (f)	Body Circ. Rim (g)	Body Circ. Middle (h)	Base Dia. (i)	Ht. (j)	Ears Width (k)	Ears Brth. (l)	Ears Thick (m)	Vol.(Liters) Calc.	Vol.(Liters) Liq. Meas.	Source
Cazuelas (moldmade)																
de a real	76.3	75.3	44.5	40	4.5	4.7	214.5	197.7	22	21.5	32	4.8	4.8	109.3	-	J.A.
de a medio	55	58	34	31	3.0	3.7	163	145.7	20	15.3	20	3.8	3.0	47.8	-	J.A.
" " "	60	61	32.8	27.8	5	3.9	175	154	20	17	25	4.0	3.7	51.6	48.6	P.R.
de a cuartilla	50.5	54	27.3	23.8	3.5	3.5	151	132.6	20	14.7	19	3.0	3.0	29.1	-	J.A.
de a claco	49	50	24.3	21.3	3.0	3.0	141	124.9	19	14	17.5	3.0	2.6	25.7	-	J.A.
" " "	48.3	48	24.5	21.5	3.0	3.0	139.3	123.5	18	14	16.5	2.8	2.8	25.1	22.5	P.R.
de a diez	41	41.7	20	17	3.0	3.0	118	104.5	14	11.5	14	2.3	2.3	14.4	-	J.A.
" " "	41.5	43	20.8	18	2.8	3.0	118.5	105	13	11.5	14.5	2.7	2.5	15.0	13.5	P.R.
de a ocho	36	37.4	15.3	13.8	1.5	2.0	107.8	93	14	11	12	2.0	2.0	9.1	-	J.A.
" " "	35.4	37.2	18.2	15.6	2.4	2.0	101.5	90.7	12	9.6	13	2.5	2.1	9.9	9.0	P.R.
de a ochito	33.1	33.2	13.5	12.2	1.3	2.0	96.6	84.5	11.5	11.5	10	2.0	2.0	6.9	-	J.A.
de a medio ochito	27.5	28	12.3	10.8	1.5	2.0	81.5	72.3	12	8.5	10	1.7	1.9	4.4	-	J.A.
casito molero	27	26.8	13.4	12.1	1.3	1.8	81.6	73.8	9	7.0	9.5	1.9	2.0	4.7	3.6	P.R.
" "	20.5	20.5	9.8	8.8	1.0	1.3	60.4	51.5	8.5	6.8	8.5	1.7	1.6	1.6	-	J.A.
casito molerito	16.2	16	6.5	5.6	.9	1.1	47	37	6.5	5.8	7.0	1.3	1.2	.68	-	J.A.
caso dedal	7.8	8.2	3.0	3.0	.0	.3	25.2	21.5	3.0	1.3	3.5	.5	1.0	.095	.071	P.R.
Torteros (moldmade)																
de a medio	57.2	57.5	13.6	10.9	2.7		165.5	150	39	16	21.5	3.5	3.2	23.6	19.8	P.R.
de a cuartilla	47	47.3	14.3	11.8	2.5		135.8	122	27	12	16.5	2.6	2.5	15.6	12.6	P.R.
Cazuelas (wheelmade)																
china	32.3	33.3	13.6	11.6	2.0	2.4	91.4	89	7.5	7.3	14	2.5	1.6	6.3	5.5	V.M.
arrocera	23.7	24.1	8.8	7.8	1.0	1.7	68.3	61.8	5.5	5.0	9.5	2.0	1.1	2.1	1.9	V.M.
transito grande	19.1	19.5	7.5	6.8	.7	1.4	54.1	48	4.5	3.4	6.0	1.5	.9	1.1	1.0	V.M.
media transita	13.9	13.6	4.8	4.2	.6	1.5	38	33	5.0	2.4	4.5	.8	1.2	.36	-	J.A.
de capulixtle	13.5	13.5	5.0	4.4	.6	1.2	37.3	33.7	4.5	1.5	4.5	1.1	.7	.37	.26	V.M.
" "	7.3	7.5	2.3	2.1	.2	.4	23	21	4.5	2.0	2.5	.4	.8	.07	-	J.A.
dedal	6.9	6.7	3.0	2.6	.4	.3	21	16.5	3.0	1.2	2.5	.5	.8	.06	.04	V.M.
Casuelas (moldmade)																
de a medio ochito	27.6	28.6	13	12	10	1.6	84.5	75.4	11	8.4	9.0	4.4	2.0	4.9	-	R.L.
" " " "	29.1	29	12.5	11.5	10	2.1	83.2	72.8	11	9.0	10	4.4	2.0	4.5	-	R.L.
" " " "	29.2	29	12.2	11.2	11	2.0	83.6	75	11	8.8	9.5	3.5	1.9	4.6	-	R.L.
" " " "	28.3	28	12.8	11.8	11	1.9	83.8	74.4	11	8.8	10	4.3	2.0	4.8	-	R.L.
" " " "	28	27.6	13	12.0	11	1.8	82.8	74	11	8.0	10	4.3	1.8	4.8	-	R.L.
" " " "	27.4	27.8	11.5	10.3	1.2	1.8	78	72.3	10.5	9.3	7.0	3.0	2.0	3.9	-	G.L.
" " " "	27	27.8	11.5	10.5	1.5	1.9	77	70.2	10.5	8.9	7.0	3.2	2.0	3.8	-	G.L.
" " " "	27.5	28	12.3	11.2	1.1	2.0	78.5	70.4	10	8.6	7.0	3.2	2.1	4.0	-	G.L.
" " " "	27.1	27	12	10.6	1.4	1.6	78.5	70.6	10	8.4	7.3	3.3	2.2	4.0	-	G.L.
" " " "	27	27.5	13	11.8	1.2	2.0	80	71.5	10	8.5	7.0	3.0	2.2	4.4	-	G.L.

Table 8. Field measurements and volume calculations of ollas.

	Rim Dia. (a)	Overall Ht. (b)	Neck Circ. (c)	Neck Ht. (d)	Neck Thick (e)	Body Circ. (f)	Body Ht. (g)	Base Dia. (h)	Ears Ht. (i)	Ears Wdth (j)	Ears Brt (k)	Ears Thick (l)	Volume Calcul.	Volume Liq. Meas.	Volume Potter	Source
Ollas (moldmade)																
mescalera	47.5	88	123	19	1.5	196	69	30	10	15	4	2.5	131	-	100	J.A.
de a real	42.8	76	113	24	1.5	169	52	26	9	14	4	2.5	75	-	50	J.A.
de a medio	37.5	63.2	90.8	23	1.6	133.5	40.2	23	8	12	3.3	2.0	38	-	30	J.A.
de a cuartilla	33	56	84.6	19.6	1.5	120.5	40	16	9	13	3.5	2.0	29	-	25	J.A.
de a claco	28	54	68.7	15.5	1.2	112	39	16	7.5	10	3.3	1.8	24	-	15	J.A.
de a claquito	17.6	27	46.5	6.3	.7	68.3	20.7	13.5	10	4	3.3	.9	12	5.8	5	J.A.
Ollas "Coloradas" (moldmade)																
de a tres	25	41.7	64.5	12	.5	96	30	14.5	-	-	-	-	14	-	15	J.A.
de a dos	23	36	59.4	10	.5	87.6	26	12	-	-	-	-	10	-	12	J.A.
de a trecito	21	32.5	51.5	9.5	.5	76.5	23	11	-	-	-	-	7	-	8	J.A.
de a claquito (Jalapena)	17.7	29.8	43	7.6	.5	69	22.2	10	-	-	-	-	5	-	5	J.A.
" " " "	18.3	27.5	45.5	7.6	.9	64.7	19.9	13.6	-	-	-	-	5	-	5	J.A.
de a diecito	16.5	24	38.8	7.3	.5	58	18	11.5	-	-	-	-	3	-	3	J.A.
Ollas (wheelmade)																
de a doce	15	20.5	46.5	5.2	.6	69.6	15.3	9	8.0	2.7	1.6	1	3.62	2.85	-	J.A.
" " "	15.3	24.1	41.5	5.1	.6	70.2	19	6.5	8.0	2.9	1.6	.8	4.12	-	-	V.M.
" " "	14.7	22.2	38.6	5.5	.6	58.5	16.7	8	7	2.7	1.9	.6	2.81	-	-	J.A.
" " "	14	22	37.8	6.0	.7	59	16	8	-	-	-	-	2.70	2.90	-	V.M.
Elorio "Ollito" (wheelmade)																
arrocero	9.8	16.4	26.8	3.2	.4	48.6	13.2	6	-	-	-	-	1.40	1.55	-	P.R.
transito - grande	9.3	14.8	25	3.1	.4	44.2	11.7	6	-	-	-	-	1.06	1.05	-	P.R.
medio - transito	7.2	9.4	17.5	3.0	.3	28.7	6.4	4.5	-	-	-	-	.26	.25	-	P.R.
Veloria "Hueuito" (wheelmade)																
transito - grande	9.4	14.8	26	2.7	.4	40.2	12.1	6	-	-	-	-	.97	1.05	-	P.R.
Ollas - Jarro (wheelmade)																
de a sope	12.7	20.5	34.9	4.5	.5	59.7	16	10	7.5	3.5	1.2	1.5	2.82	3.15	3	J.A.
" " "	13	20.6	35.1	4.5	.4	59.8	16.1	10	7.0	4.7	1.7	1.2	2.85	-	-	J.A.
de a arrocero	10.5	17.5	28.9	4.0	.5	49.5	13.5	7.5	7.0	3.0	1.2	1.5	1.59	1.95	2	J.A.
" " "	10.8	17.6	29	4.0	.4	49.6	13.2	7.0	6.0	3.1	1.5	.6	1.84	-	-	J.A.
de a transito	9.2	13.5	25.4	3.8	.5	39.4	9.7	6.0	6.0	2.7	.8	1.0	.75	.8	1	J.A.
" " "	9.2	13.2	26.5	3.7	.4	39.4	9.5	5.0	5.5	2.6	1.2	.5	.72	-	-	J.A.
de a medio-transito (or jarro cafeterio grande)	7.5	9.8	20.4	3.1	.4	29.5	6.7	4.0	4.5	2.5	.7	.9	.29	.29	.5	J.A.
" " " "	7.6	9.7	20.3	3.2	.3	29.5	6.5	4.0	5.0	2.3	1.0	.6	.28	-	-	J.A.
	7.5	9.4	23.2	2.4	.3	31	7.0	4.5	4.5	2.5	1.4	.6	.35	-	-	J.A.
jarro capulixtle	5.7	8.4	17.4	2.4	.3	22.3	6.0	4.0	3.5	1.5	.8	.5	.17	-	-	J.A.

de a cuartilla	33	56	84.6	19.6	1.5	.120.5	40	16	9	13	3.5	2.0	29	-	25	J.A.
de a claco	28	54	68.7	15.5	1.2	112	39	16	7.5	10	3.3	1.8	24	-	15	J.A.
de a claquito	17.6	27	46.5	6.3	.7	68.3	20.7	13.5	10	4	3.3	.9	12	5.8	5	J.A.
Ollas "Coloradas" (moldmade)																
de a tres	25	41.7	64.5	12	.5	96	30	14.5	-	-	-	-	14	-	15	J.A.
de a dos	23	36	59.4	10	.5	87.6	26	12	-	-	-	-	10	-	12	J.A.
de a trecito	21	32.5	51.5	9.5	.5	76.5	23	11	-	-	-	-	7	-	8	J.A.
de a claquito	17.7	29.8	43	7.6	.5	69	22.2	10	-	-	-	-	5	-	5	J.A.
(Jalapena)																
" " " "	18.3	27.5	45.5	7.6	.9	64.7	19.9	13.6	-	-	-	-	5	-	5	J.A.
de a diecito	16.5	24	38.8	7.3	.5	58	18	11.5	-	-	-	-	3	-	3	J.A.
Ollas (wheelmade)																
de a doce	15	20.5	46.5	5.2	.6	69.6	15.3	9	8.0	2.7	1.6	1	3.62	2.85	-	J.A.
" " "	15.3	24.1	41.5	5.1	.6	70.2	19	6.5	8.0	2.9	1.6	.8	4.12	-	-	V.M.
" " "	14.7	22.2	38.6	5.5	.6	58.5	16.7	8	7	2.7	1.9	.6	2.81	-	-	J.A.
" " "	14	22	37.8	6.0	.7	59	16	8	-	-	-	-	2.70	2.90	-	V.M.
Elorio "Ollite" (wheelmade)																
arrecero	9.8	16.4	26.8	3.2	.4	48.6	13.2	6	-	-	-	-	1.40	1.55	-	P.R.
transito - grande	9.3	14.8	25	3.1	.4	44.2	11.7	6	-	-	-	-	1.06	1.05	-	P.R.
medio - transito	7.2	9.4	17.5	3.0	.3	28.7	6.4	4.5	-	-	-	-	.26	.25	-	P.R.
Veloria "Hucuito" (wheelmade)																
transito - grande	9.4	14.8	26	2.7	.4	40.2	12.1	6	-	-	-	-	.97	1.05	-	P.R.
Ollas - Jarro (wheelmade)																
de a sope	12.7	20.5	34.9	4.5	.5	59.7	16	10	7.5	3.5	1.2	1.5	2.82	3.15	3	J.A.
" " "	13	20.6	35.1	4.5	.4	59.8	16.1	10	7.0	4.7	1.7	1.2	2.85	-	-	J.A.
de a arrocero	10.5	17.5	28.9	4.0	.5	49.5	13.5	7.5	7.0	3.0	1.2	1.5	1.59	1.95	2	J.A.
" " "	10.8	17.6	29	4.0	.4	49.6	13.2	7.0	6.0	3.1	1.5	.6	1.84	-	-	J.A.
de a transito	9.2	13.5	25.4	3.8	.5	39.4	9.7	6.0	6.0	2.7	.8	1.0	.75	.8	1	J.A.
" " "	9.2	13.2	26.5	3.7	.4	39.4	9.5	5.0	5.5	2.6	1.2	.5	.72	-	-	J.A.
de a medio-transito	7.5	9.8	20.4	3.1	.4	29.5	6.7	4.0	4.5	2.5	.7	.9	.29	.29	.5	J.A.
(or jarro cafeterio grande)	7.6	9.7	20.3	3.2	.3	29.5	6.5	4.0	5.0	2.3	1.0	.6	.28	-	-	J.A.
" " " "	7.5	9.4	23.2	2.4	.3	31	7.0	4.5	4.5	2.5	1.4	.6	.35	-	-	J.A.
jarro capulixtle	5.7	8.4	17.4	2.4	.3	22.3	6.0	4.0	3.5	1.5	.8	.5	.17	-	-	J.A.
(or jarro cafeterio chico)	5.8	8.0	18	2.4	.3	25.8	5.6	4.0	4.5	2.3	1.0	.7	.19	-	-	J.A.
jarro dedal	3.5	5.2	10	1.6	.2	15.3	3.7	2.3	2.3	1.7	.9	.5	.04	.03	toy	J.A.
" "	3.5	5.3	10	1.6	.2	15.3	3.7	2.3	2.3	1.7	.9	.5	.04	-	-	
Cantimplora (wheelmade)																
de a doce	5	26.8	13.3	6.8	.4	85.2	20	10.6	9.2	4.5	1.9	1.4	5.24	2.9	-	P.R.
Bacines (wheelmade)				Rim												
bacinitos de a doce	18.7	15.7	48.5	1.4	.7	47.7	14.3	13	7	3.3	1.7	1.0	2.43	1.8	-	P.R.
Maceta (wheelmade)			Rim	Rim												
de a doce	21	17.4	65.6	1.7	.8	48.4	15.7	13.6	-	-	-	-	3.34	2.35	-	P.R.

activities. Instruments for measurements were portable and simple: a metal metric tape and a seamstress's tape. A chemist's glass beakers were acquired from a medical supply house in the city of Puebla. These beakers were used to measure volume by pouring water into those vessels I had collected for photographs. This was carried out in the only quiet place I enjoyed during this phase of the study, namely my shower. All other volumes were calculated based on measurements taken in the field. The points and formulas are given in Tables 7 and 8. Thickness was not taken into account.

The best selection of pottery for measurements usually was to be seen after a kiln had been fired, but it was not possible to do any measuring at this time or to acquire the pieces needed. In both 1972 and 1973, there had been extremely heavy rains which prevented kilns from being fired for many weeks. I had a problem collecting types of pottery for photographs. As I had wished to acquire pottery from known sources, I did not buy any in the markets when I arrived in Puebla. After three weeks I became anxious to begin testing and went to the markets only to find they were out of stock. As a result, when a kiln was fired at last, men and women who sold pottery in the markets, on the streets and in the hills literally descended like locusts on a wheat field, and the entire contents of a kiln were carried away in less than an hour. To have attempted to measure pottery under these circumstances would have been unsuccessful and perhaps even dangerous to life and limb.

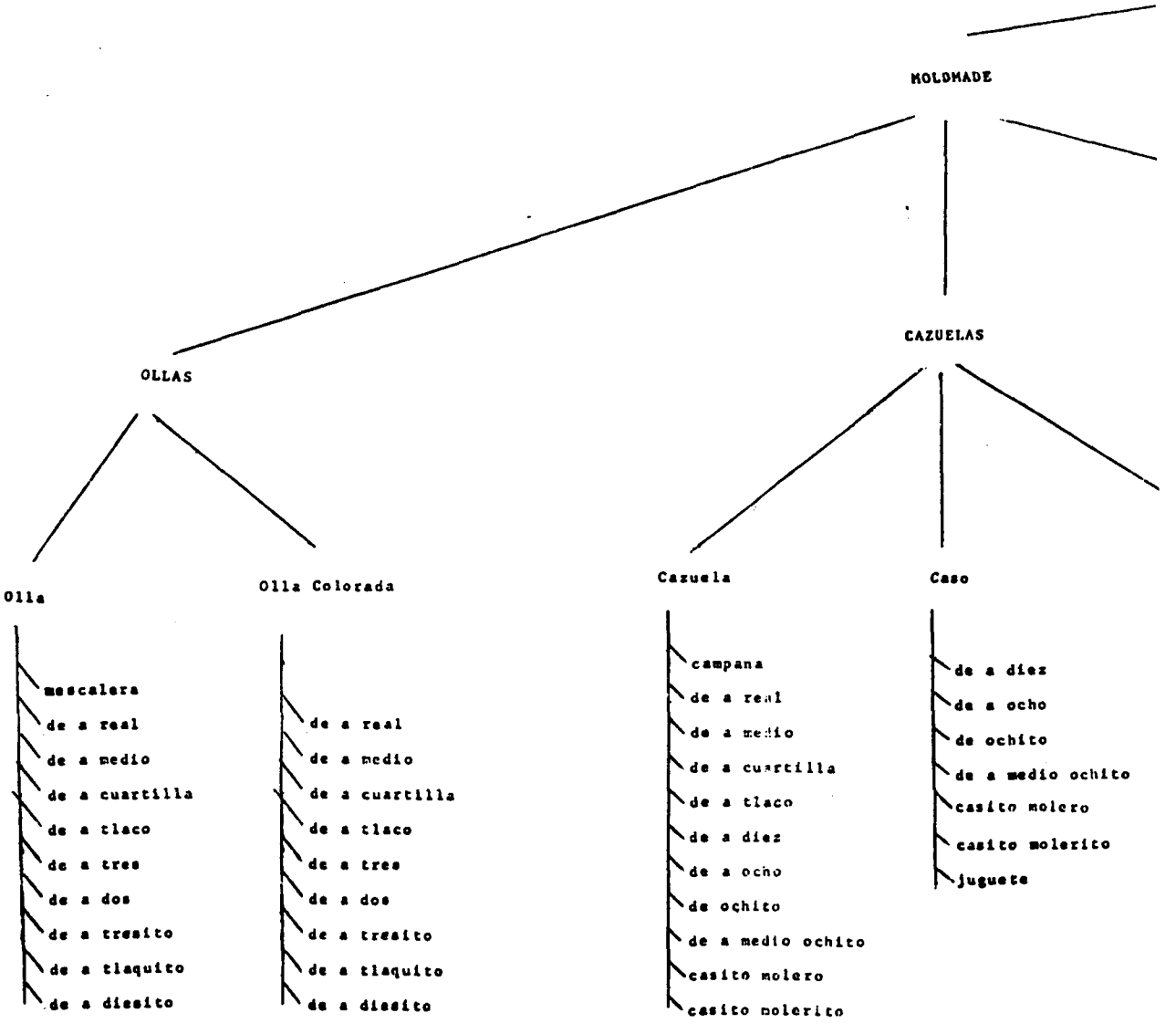
Originally in 1972, I began to take overall linear dimensions in order to account for the different sizes identified by potters. This

soon proved confusing. While potters assigned distinct labels to a range of sizes, measurements revealed only small differences, i.e. 1, 2, 5 cms. in height, width and diameter between pieces. If you considered that there was at least the same variation in the same size made by different potters, it became even more unclear what they were distinguishing. The measurements presented a picture of varying dimensions along a continuum.

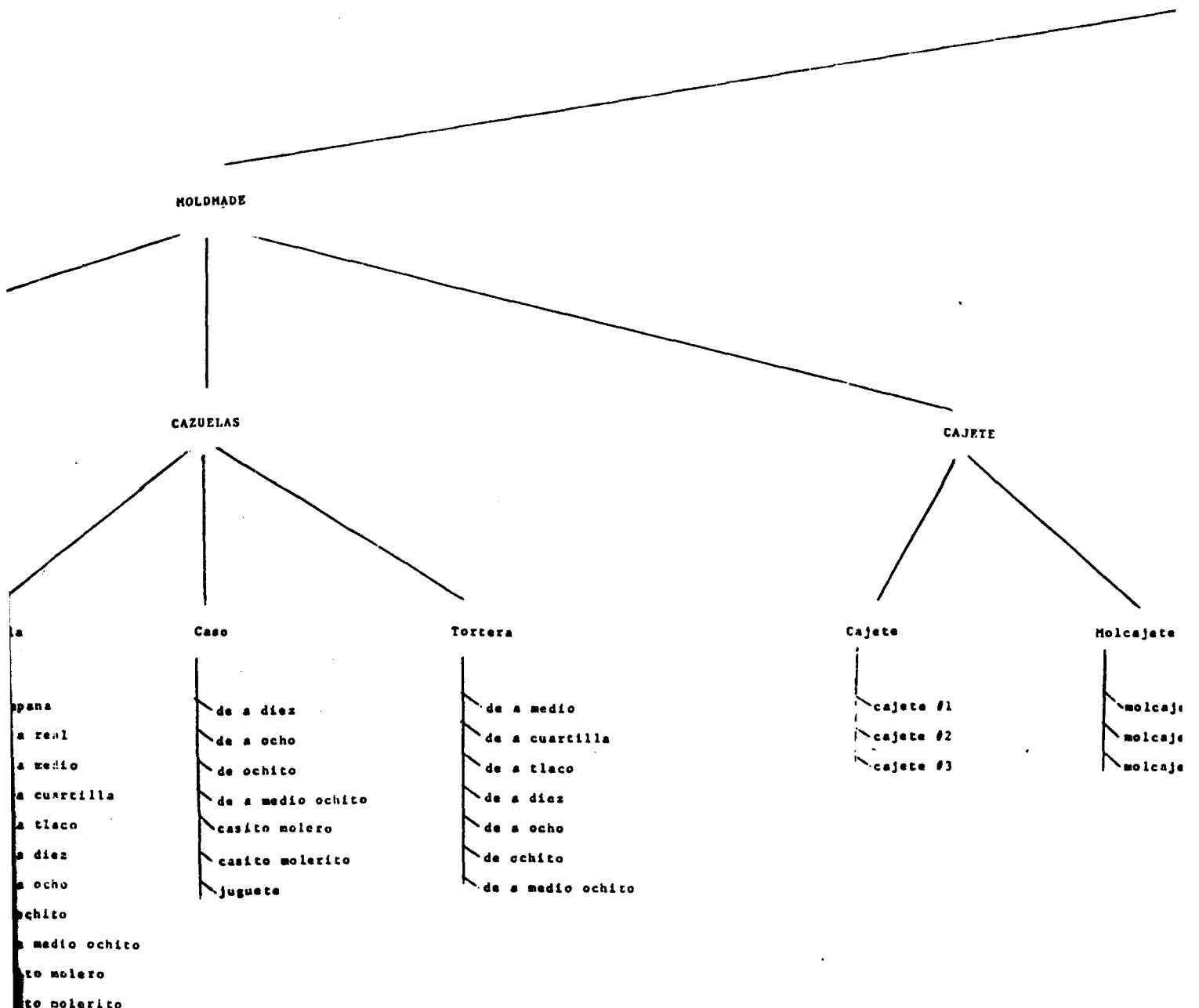
I considered the possibility that the distinct labels for presumed sizes did not represent any measurable reality. I could have, as would an archaeologist faced with a collection of sherds, made arbitrary divisions in that continuum. But I assumed the potters were distinguishing something, and I wished to discover what that something was as well as a technique for recovering it. I instinctively, subjectively and stubbornly felt such an elaborate terminological system as I was then painfully reconstructing from their bits and pieces of information had to be manifested in the material world.

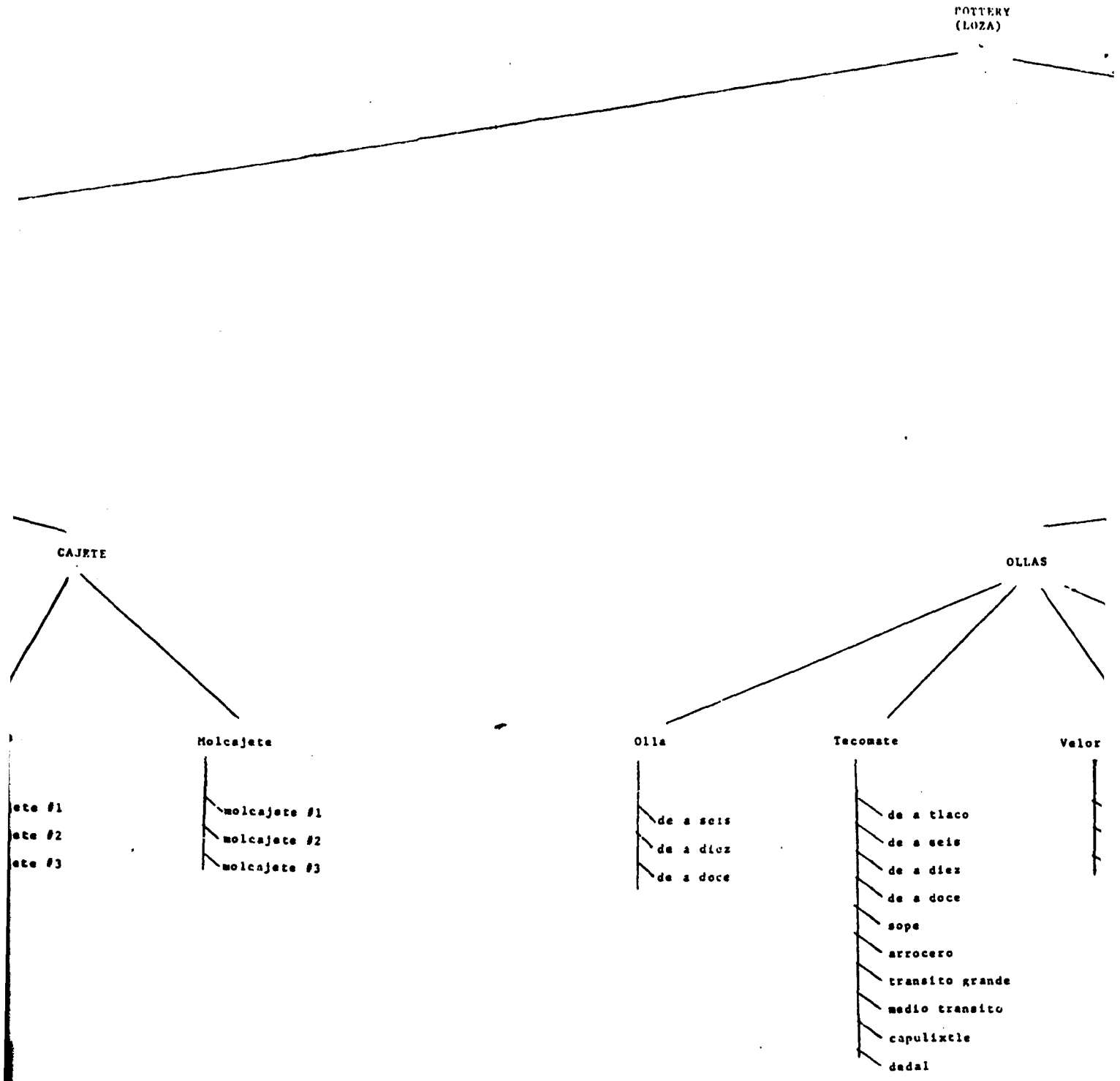
In 1973, having mastered their system of pottery types and sizes (I hoped), I prepared a diagram of their emic view of the universe of red ware (Figure 6). This diagram was then presented to four master potters and four elder potter employees for change and confirmation. Having confirmed my representation of their emic scheme, I then proceeded in 1973 to remeasure types and sizes. This time, realizing that linear measurements had been non-productive of the distinctions I was seeking, I decided to include additional measurements that would enable me to calculate volume. These were circumfrences at the mid-point and rim of a vessel body and base of neck and the vessel base calculated to the flattest, widest plane (Figures 7 and 8).

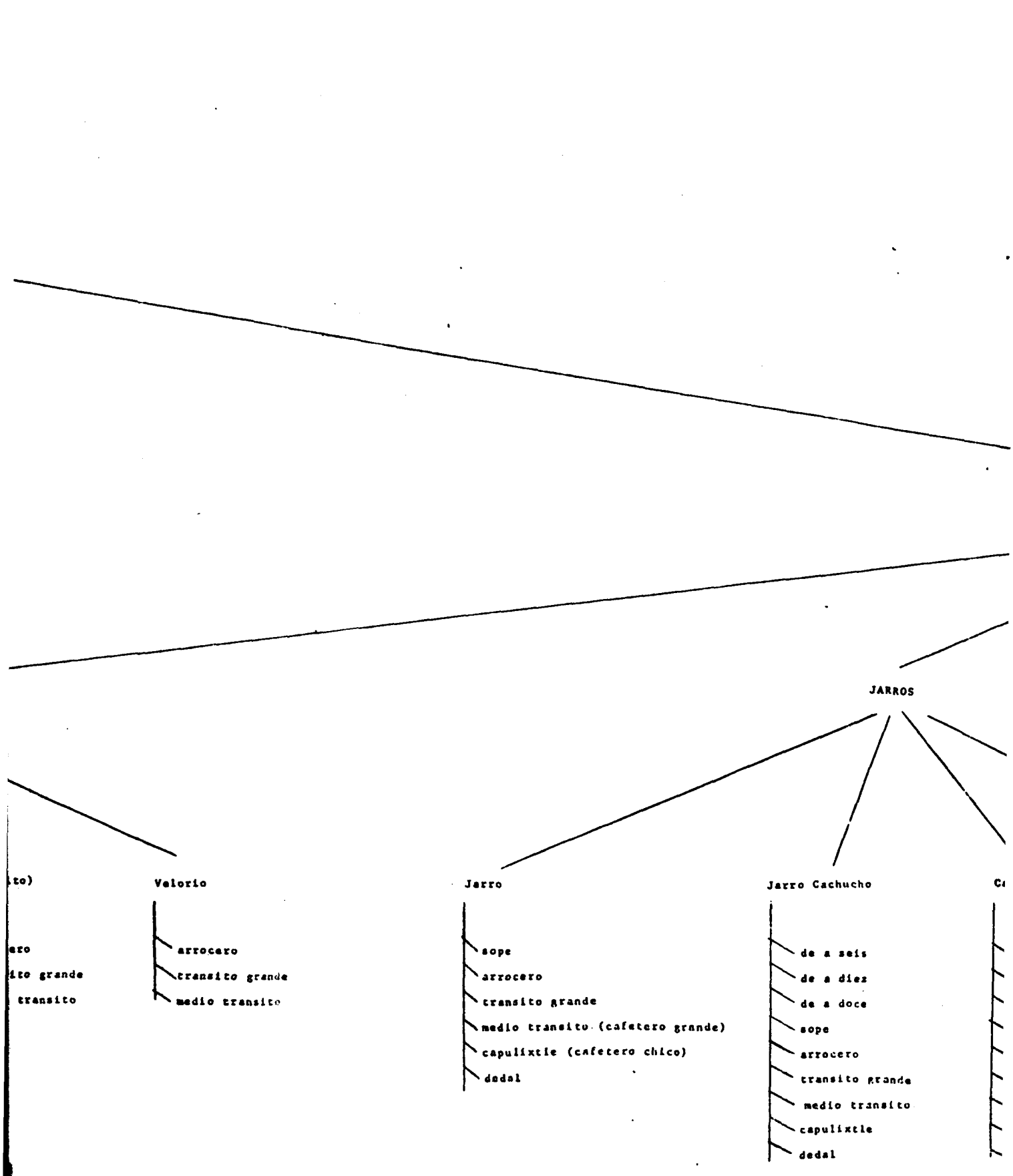
Figure 6. Potter's emic view of pottery, black-on-red glazed utilitarian pottery, Puebla, Mexico.

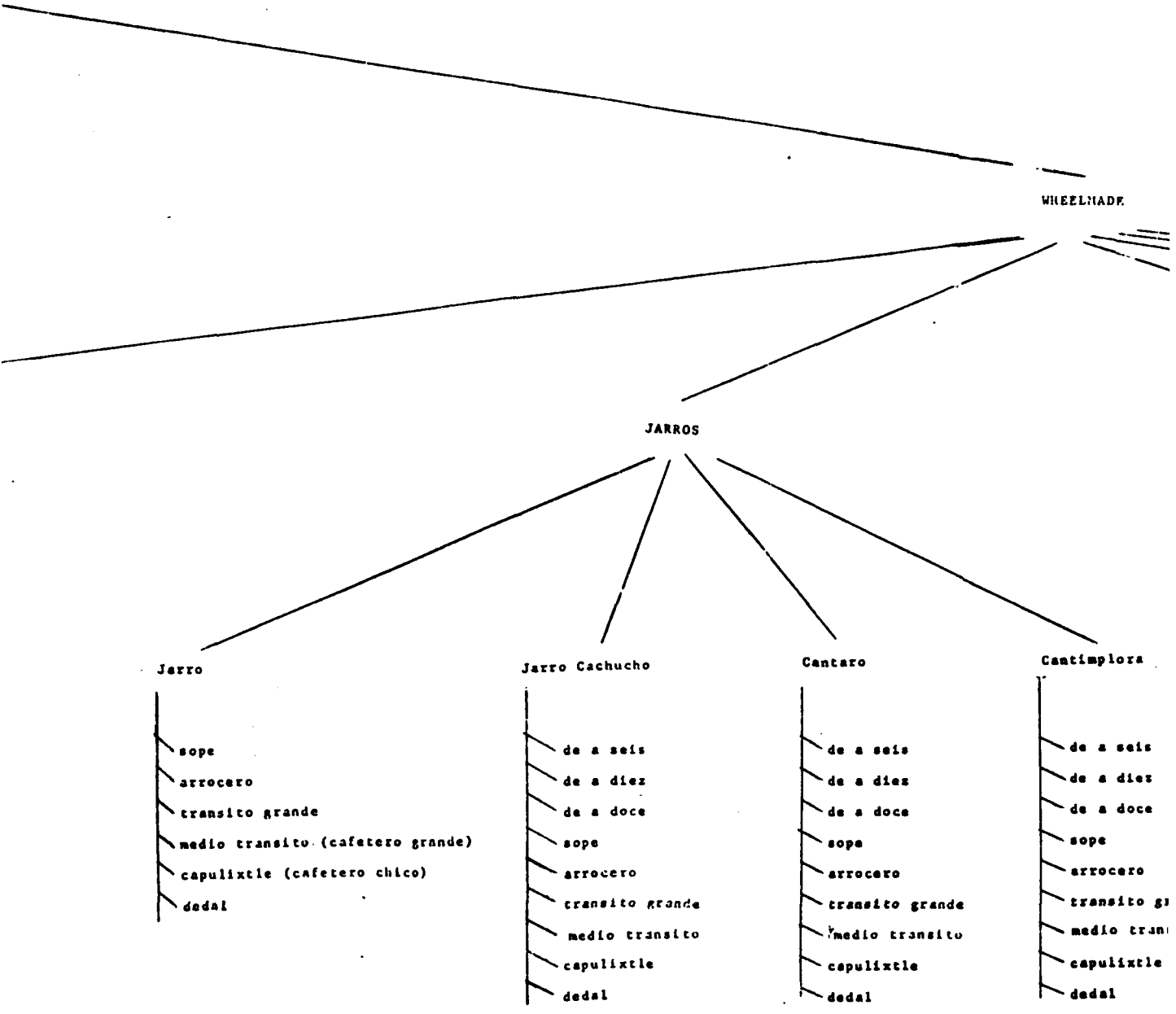


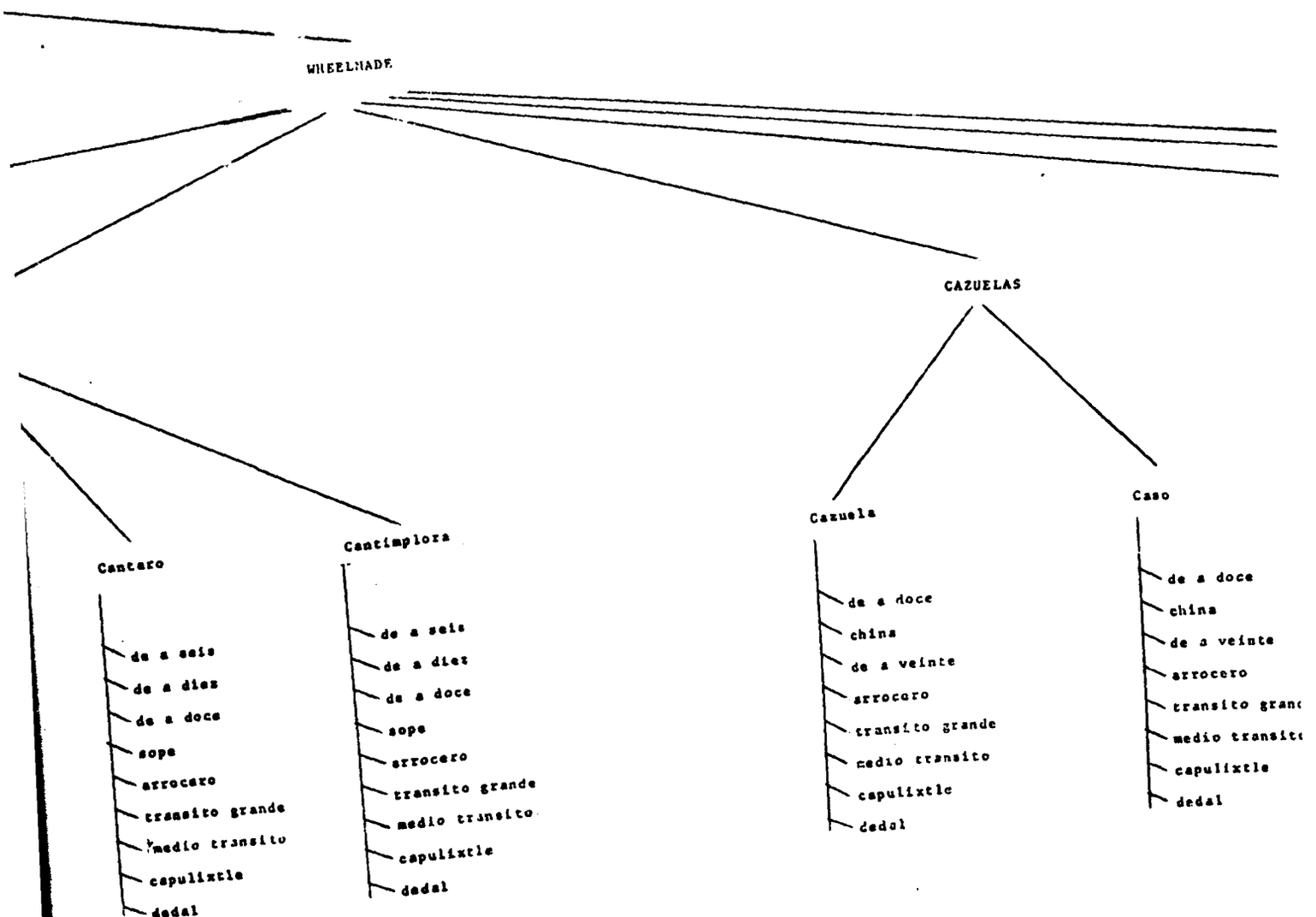
pottery, black-on-red
tery, Puebla, Mexico.




POTTERY
(LOZA)
CAJETE
OLLAS
ete #1
ete #2
ete #3
Molcajete
molcajete #1
molcajete #2
molcajete #3
Olla
de a seis
de a diez
de a doce
Tecomate
de a tlaco
de a seis
de a diez
de a doce
sope
arrocero
transito grande
medio transito
capulixtle
dadal
Valor


JARROS
to)
ero
ito grande
transito
Valorio
arrocero
transito grande
medio transito
Jarro
sope
arrocero
transito grande
medio transito (cafetero grande)
capulixtle (cafetero chico)
dedal
Jarro Cachucho
de a seis
de a diez
de a doce
sope
arrocero
transito grande
medio transito
capulixtle
dedal
C


WHEELMADE
JARROS
Jarro
sope
arrocero
transito grande
medio transito (cafetero grande)
capulixtle (cafetero chico)
dedal
Jarro Cachucho
de a seis
de a diez
de a doce
sope
arrocero
transito grande
medio transito
capulixtle
dedal
Cantaro
de a seis
de a diez
de a doce
sope
arrocero
transito grande
medio transito
capulixtle
dedal
Cantimplora
de a seis
de a diez
de a doce
sope
arrocero
capulixtle
dedal


WHEELMADE
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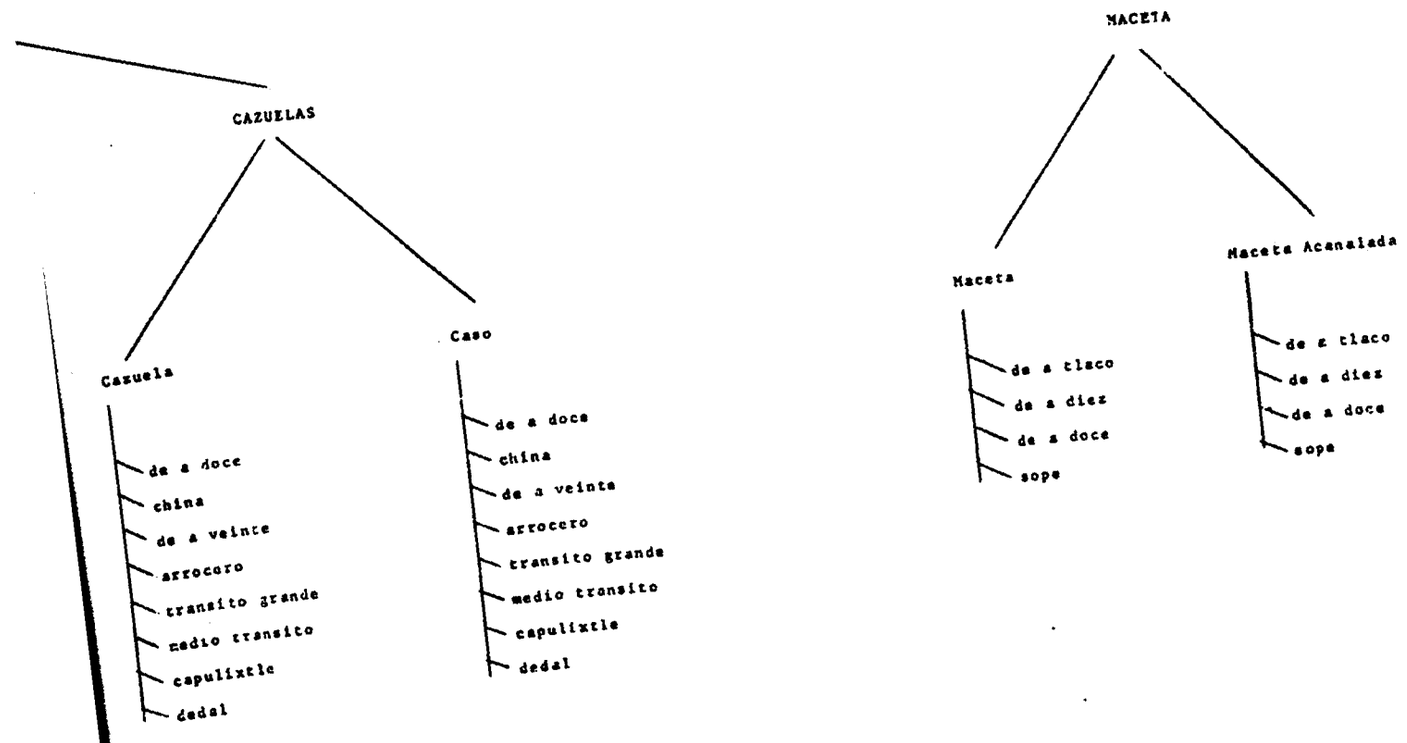
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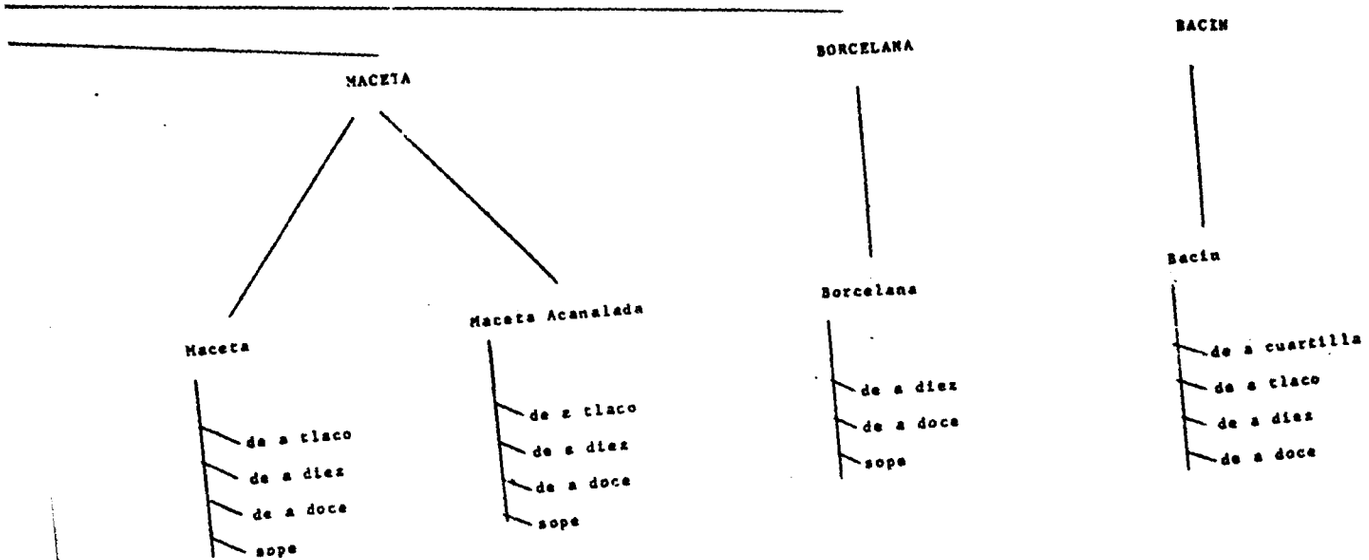
MACETA
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BORCELANA
Borcelana
de a diez
de a doce
sope
BACIN
Bacin
de a cuartilla
de a tlaco
de a diez
de a doce

Those vessels I was able to carry back to the privacy of my shower were measured by beaker for liquid volume both to the rim and to calculated use levels in cooking. These volumes were then compared with those calculated by the method devised and illustrated in Figures 7 and 8. This was a test of the accuracy of the method. It was not possible to use beakers in the field. The results appear to justify the method used to calculate volume as yielding a fairly accurate approximation of volume measured.

A further result of the measurements taken in 1973 was the discovery that volume correlated with the labels and system of classification used by the potters, and that if volume was included, then indeed the native taxonomy reflected categories discoverable in material culture and a result of observable behavior. Nonetheless for the most part, the categories reflected in the terminology remained covert among the potters.

I wished to take this discovery a step further and compare the same size of pottery among two or more potters in order to see if the same label reflected the same volume. This proved to be difficult to carry out. Potters specialize to such an extent that it is almost impossible to find two or more of them making the same sizes and especially at the same time..

In the fall of 1974, on a short visit to the barrios and with the added advantage now of compadrazgo relationships among the potters, I finally was able to obtain a series of five pots with the same label from each of two potters. It was additionally advantageous that each series was the product of a single mold. Thus, I could compare the two

series in terms of volume with regard to label and size and compare the variation exhibited by each potter in a series using the same mold. The results are given in Table 7.

It can be seen that despite the fact the same mold was used, each of five pots in a series varies in some or all of its dimensions from the others and each varies and overlaps with the pots in the comparable series. On the whole however, the pots in a given series from the same mold and the same potter resemble each other more than they resemble the pots in the other series produced in a different mold by a different potter. Further, the volumes calculated for both series, despite the apparent differences in individual measurements or dimensions, turns out to be remarkably similar.

The initial reliance on linear measurements no doubt arises from the relative absence of complete vessels in archaeology, and I certainly was influenced by this at the outset, having worked with archaeological materials and being trained in museum techniques.

Summary

The typological scheme presented here provides categories of black-on-red pottery that are mutually exclusive. The eleven types (Table 2) were determined on the basis of forty-five variables, shapes (Table 1A), rim (Table 1B) and ear (Table 1C). These were then recast according to manufacturing technique (Table 3). The variables found to be most descriptive of technique of manufacture were vessel shape, rim direction and rim thickness. The number of ears proved useful in distinguishing between kinds of jars and either a multiplicity of ears or none, in distinguishing between kinds of pots. This typology, if

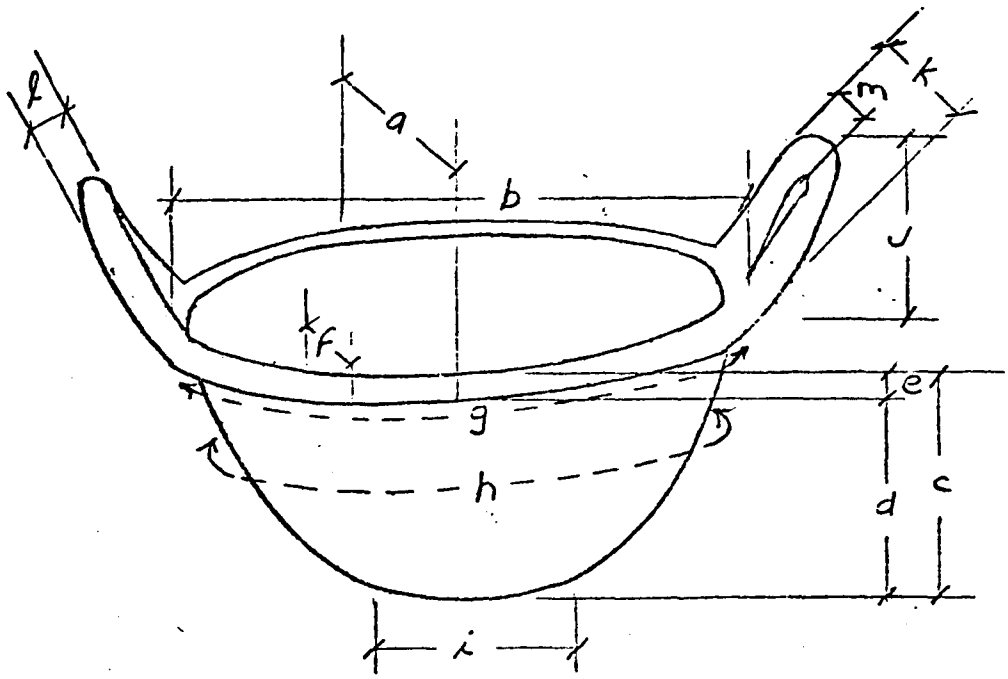


Fig. 7. Method used to approximate volume of cazuelas

1. Formula for volume of a frustum of a right circular cone

$$V = \frac{\pi a(r_1^2+r_2^2+r_1r_2)}{3}$$

Where
- V = volume
- a = altitude
- r_1 = small radius
- r_2 = large radius

2. Volume of a cazuela

$$V = \frac{\pi \frac{d}{2}(r_g^2+r_h^2+r_gr_h)}{3} + \frac{\pi \frac{d}{2}(r_h^2+r_i^2+r_hr_i)}{3}$$

Where
- V = volume of cazuela
- $\frac{d}{2}$ = ½ height from the base to rim
- r_g = radius at rim
- r_h = radius at midpoint
- r_i = radius at base

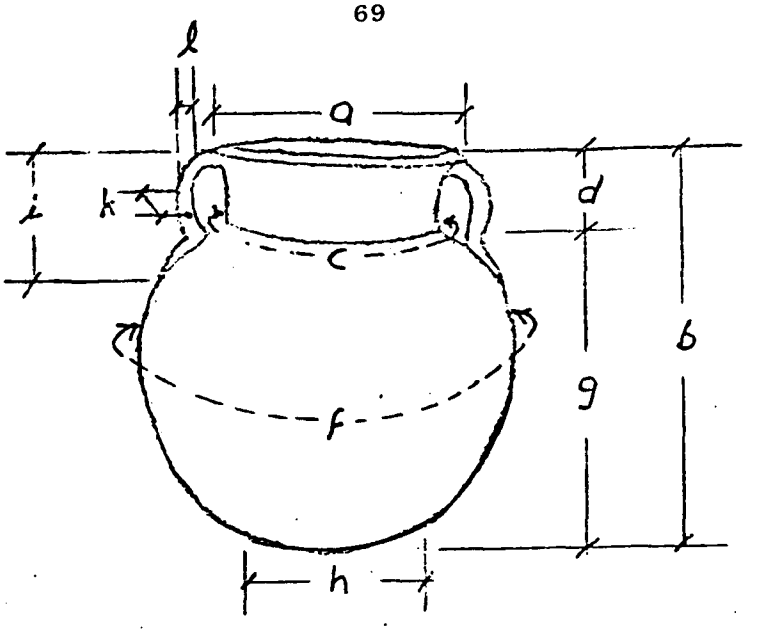


Fig. 8. Method used to approximate volume of ollas.

1. Formula for volume of a frustum of a right circular cone

$$V = \frac{\pi a(r_1^2 + r_2^2 + r_1 r_2)}{3}$$

Where
V = volume
a = altitude
r_1 = small radius
r_2 = large radius

2. Volume of an olla

$$V = \frac{\pi \frac{g}{2}(r_c^2 + r_f^2 + r_c r_f)}{3} + \frac{\pi \frac{g}{2}(r_f^2 + r_h^2 + r_f r_h)}{3}$$

Where
V = volume of olla
$\frac{g}{2}$ = $\frac{1}{2}$ the height from base to neck
r_c = radius at neck
r_f = radius at midpoint
r_h = radius at base

desired, could be subjected to statistical verification, though no attempt was made here to quantify the sample. This typology, like all other schemes devised by an outside investigator, essentially orders a profusion of material. Typologies, despite increasing methodological sophistication, do not in themselves make possible generalizations about a given culture.

The potter's taxonomy, i.e. their emic view of the universe of black-on-red glazed ware, distinguishes twenty types of which seven are moldmade and thirteen, wheel made; one hundred thirty-seven sizes and ninety-four variables which are associated with these types and five additional decorative types (see Table 13). The variables were covert categories. They had to be elicited from the potters by the methods developed and described in Chapter V.

The potters treat types based on these covert categories as part of a more comprehensive scheme, a hierarchy branching out from simple and basic forms to more complex and elaborate ones, arranged in descending size order. Their taxonomy which is tree-like conveys an historical sense of development, a relationship in time between types.

The investigator's typology provides a detailed but static scheme, albeit one which may be subjected to a statistical analysis, to establish the validity of the types created.

The type typological schemes, the investigator's and the potter's, resemble each other with regard to the types distinguished by shape. Technique of manufacture is utilized by both and reflects existing specialization among the potters. Rim variables as already

noted correlate with technique of manufacture but are not important to the potter's system of classification. Ears are utilized by the investigator in classifying contemporary pottery. (They would not, however, be available to or utilized by the archaeologist who customarily relies on such schemes.)

The investigator's typology is simpler, producing fewer types and based on fewer variables than that of the potter's. It does not include size categories. These would have to be determined arbitrarily by the investigator, and if linear measurements were used as is common practice, the result would be different and probably fewer size categories than those recognized by the potters. Whereas a tree-like diagram seems to best represent the potter's cognitive system with regard to black-on-red glazed cookware, an aggregate of types, dividing a linear spectrum of material, is the product of the investigator's efforts.

Technical analyses revealed the potter's system for the selection and use of clays was based on a sophisticated understanding of the physical properties and working qualities of his raw materials. The analyses also revealed that important cognitive and cultural distinctions were not only manifested in material objects but were retrievable using replicable scientific techniques. Quantitative analysis indicated a difference in two sources of clay, and X-ray diffraction indicated a difference in two clays recognized by potters as distinct with regard to color, type and technique of manufacture.

Measurements of pottery types and sizes were initially taken in this study as part of the descriptive data. These measurements, e.g.

height, width, diameter, etc. are the usual ones taken of pottery. The results indicated the pottery varied along a continuum. If size categories had been desired, I would have had to make the arbitrary divisions within the continuum that are made by outside investigators.

The measurements failed to provide points of reference for the numerous size categories of pottery distinguished by the potters. They varied in any one dimension, in any one size, regardless of whether or not they were produced by the same or different potters. However, I later decided to take measurements in the field that would permit me to calculate the volume of the pots (Figures 7 and 8). The method was tested by checking the calculated volume against the actual volume of liquid each pot held, and it was found to be reasonably accurate.

The results of the method employed and illustrated here (Figures 7 and 8) yielded discrete size categories based on volume which proved to correlate with the sizes labeled in the potter's taxonomy. Apparently the usual measurements, initially taken, reflected a linear conception of pottery. This conception appears to arise, at least in part, as a result of the abundance of sherds in archaeological collections. It has been the archaeologist who has been most concerned with measurements and the physical description of pottery. The potter's taxonomy reflects a three-dimensional conception based on volume. However, potters do not usually make this conception explicit. They communicate in terms of the taxonomic labels among themselves and in relative volume with consumers. The latter, almost always women, either gesture to indicate the size desired or refer to the quantity and item to be cooked, e.g. two kilos of rice, three turkeys, etc.

The potters recognized that the clays as well as the techniques employed imposed certain limitations on the expression of style. The largest pieces produced, both jars and pots, were made in molds and were of coarse yellow clay which could be stretched over molds without breaking and support its own weight when the molds are removed. Fine black clay used on the wheel is more delicate and would tend to crack when stretched over molds and to collapse when the molds are removed. The size of wheelmade pieces was limited by the technique: a potter seated at his wheel finds it difficult to control the shape, to close the vessel and to thin the clay if his arm enters the vessel above his elbow. Still, the potential for variation on the wheel within these limits is extensive and current forms therefore are a result of tradition and to some extent, function.

Obviously, function is an important consideration in the making and use of cooking pottery, but the emergence and persistance of a given style cannot be explained simply on that basis. Shape is related to function as are ears or handles for lifting pottery. The addition or absence of a separate rim is likewise related, as is the glazing of the pottery. However, the elaboration and repeated choice of some shapes versus others, the multiplicity of types of ears, the decoration of rims and the pots in general (color, designs, etc.) are not essential to function but to tradition and style. The preceding section of this chapter which dealt with style as identity focused on some of the subconscious, or perhaps preconscious, emotional and psychological needs and the political, economic and social conditions that served to create and perpetuate a given style.

NOTES

1. Personal communication from Professor Ernest L. Kastenbein and Professor Girard W. Phelps, Department of Ceramic Engineering, Rutgers University, New Brunswick, New Jersey, August 10, 1975. I am grateful for their helpful comments on the analyses of the clays.

CHAPTER III

MAKING POTTERY

Patterns of Interaction and Learning Among Potters

Pottery making in the barrios is essentially a male occupation that is passed on from father to son, but the male offspring of either a sister or daughter may also be taught to make pots. In this way, potters form a group that is linked together through kinship ties. A man may work with one or more of his sons, nephews and grandsons, his brothers and if he is still living, his father. Most potters today are self employed, some employ others -- non-relatives as well as relatives -- and some are themselves employees in workshops.

The number of workshops has decreased steadily since 1930 until there are now only four, each with four potters employed on a part-time basis. During the nineteenth century, there were between six and eight workshops in the barrios; the number increased to thirteen at the turn of the century (Leicht 1967: 449). Older informants say these workshops were owned by patrons and each of them might employ as many as ten potters. The owner of a workshop is still known as a patron. In the past he was usually a master potter. However some, especially women, were solely entrepreneurs. Of the four present patrons, one is a woman, the widow of a potter, and three are men, one of whom does not know how to make pottery. This man's father and grandfather owned a foundry in the barrios, and the family has been established in La Luz as metal workers for at least one hundred fifty years.

It appears to have been the custom before 1930 and it continues to be the practice today for potters to move from one workshop to another. They do this over a period of time in response to the supply and demand of the market for pottery and consequently for their labor. Their movement creates what I have called a pattern of circulating employment. As a result of this pattern, a worker's knowledge of his technique and specialty is constantly being honed and reinforced by different patrons. Since potters span three age categories -- young, adult and elder, from twenty to sixty or more years of age -- the transmission of style from one generation to another is effected as they circulate among the workshops. And innovations in one workshop are carried into the larger pottery making community.

Visiting patterns are related to the preceding pattern of circulating employment and to a condition of partial employment. A potter may be employed in one workshop in the morning and in another in the afternoon. Before lunch he may seek out a friend who is working elsewhere in the barrio for a visit to a favorite bar (pulqueria). If he is unemployed for one or another work periods, he may seek work during that time or relay messages between establishments. Sometimes he may simply gather with other unemployed potters in a doorway to gossip or to watch a kiln being fired. The constant visiting that goes on between them in the course of the workday contributes to the sharing and transmission of style.

Other visiting takes place as a result of the economic interdependence of potters. Some potters fire their own production, some sell their crude pottery to other potters who do the finishing and

firing and still others rent space in a kiln. These activities require visiting in order to carry out the firing and the buying and selling of pottery between them.

In addition, potters are now actively solicited for participation in city and state sponsored craft programs and fairs. These activities, too, generate discussion based on their common interests and stimulate visiting.

Learning to Make Pottery

The learning of pottery making begins very early and informally in the potter's family. Toddlers and young children explore their surroundings as they walk or are carried about by older children. They wander in and out of the workshops and near the kiln of the vecindad. They play amidst pottery stacked around the inner courtyard and along house walls. They eat and go to sleep in rooms where pots, ready for sale, are stored in neat rows near the dining table and under the beds. Their meals are cooked and served in this same pottery, and they are toileted on pottery chamber pots. Thus, most of their early childhood experience and associations take place in the context of pottery making and involved the use of pottery.

Until a child makes his first communion, usually at the age of seven, he is not considered truly a "person". He is a little angel (angelito), still innocent and pure, and no real work is expected of him. If a child should die, he is always buried in white clothes in a white coffin to symbolize his innocence. At his death there is little grief expressed by the parents, siblings and relatives since it is certain the child will go directly to heaven and live among the angels forever.

After his first communion a child is truly a "person" in the full religious and social sense. Work and responsibility can now be demanded of him by adults. Between the ages of seven to fourteen or fifteen, he is considered a child (nino) or young person (jovencito). It is in this age category that real work and formal learning begin.

Young people are first given the tasks of breaking up the dry clay with sticks and of "dancing" on the wet clay with bare feet to remove any stones and to achieve the desired consistency. From ten to fifteen years of age, young people are taught techniques of manufacture. Those learning to use molds begin earlier than those learning to use the wheel. The slow acquisition of skill continues into the next age category, young man (joven), from fifteen to thirty. As he nears the end of this age category, between twenty-five to thirty, achievement of full competence as a potter often coincides with the decision to marry. Thus social and professional coming-of-age frequently occur together.

As an adult (adulto), thirty to fifty years, a potter reaches his peak of development as a craftsman. During this period he may acquire additional skills in selecting raw materials, firing a kiln and buying and selling pottery that will win him recognition among his peers as a master potter. However, not all potters acquire these skills. As an elder (grande) fifty to seventy or more years old, a potter is in complete control of his craft though he experiences some loss in dexterity and endurance. He will continue to work as long as he is physically able. Only an elder or adult potter teaches others.

The method used by a master potter to teach an apprentice is imitation. I use the term apprentice to mean a beginning potter who

FIGURE 9

learns his craft from an experienced master, though there are no formal stages and examinations for an apprentice, journeyman and master as they would be defined by a guild (Russell 1968: 311).

In being permitted to work the wheel or use molds, the apprentice tries to imitate the movements and forms created by the master potter who serves as his model. The apprentice repeats and repeats his efforts with almost no verbal instruction given. His early efforts are not rewarded. The term used by the master to describe these efforts as worthless is "porquerias". "Porqueria" literally means a mess. And to make a mess is humiliating. Success in learning is measured by somehow attaining conformity with the model. I believe it is these efforts to copy an existing and tangible model, especially in the absence of explicit verbal direction, that contribute to the persistance of style in red ware.

The emphasis on imitation in learning does not rule out the possibility of innovation once the techniques have been mastered, and older experienced potters do experiment. The limits imposed on their innovations come from considerations of time, consumer acceptance and their own ideas of what is proper. These ideas concerning propriety are shaped by their own early learning experience and cultural values.

Other factors reinforce the method of teaching. When the efforts of an apprentice are finally accepted by the master potter, the tendency is to repeat what has been achieved rather than deviate and face rejection and humiliation again. This tendency is further reinforced by the fact that acceptance brings material rewards. Effort alone is never rewarded -- only the final product is judged. An

apprentice knows he has learned well when his pots are included for sale along with those of experienced potters, and he is paid for his production. Thus he is encouraged to repeat the efforts that brought him success rather than risk the loss of hard won income.

An apprentice is not paid to learn and a master is not paid to teach. I believe this practice, too, encourages conformity since, in order to learn, an apprentice must first convince someone he is worth teaching. This means he must be obediant and willing to perform the least desirable tasks without complaint in assisting the potter. These tasks include breaking up the crude clay with a stick, kneading the clay, fetching and carrying raw materials and pottery. In the course of his work, the apprentice tries to observe all that is going on and to learn the qualities of the raw materials as well as the names of the finished pottery. For example, he may be asked to bring a jar of medium size (olla de a doce). He learns by trial and error. He tries to select the size requested from the wide array of pottery in the courtyard or workshop. If he chooses incorrectly, the pot is rejected with some annoyance by the potter who simply repeats the request. If he chooses correctly, the pot is accepted without a word or gesture of praise. Again, it is only the final product that meets with approval.

Responsibility for learning rests with the apprentice who must try to figure out what has to be done and then do it. At no point in the learning process does the master provide an overview of the techniques and shapes of pottery to be produced by the apprentice. Verbal communication between master and pupil is minimal. Each step is learned separately by imitation and proceeds by trial and error with rewards

FIGURE 10

for the final product alone. I would suggest that the relative absence of verbal instruction and description and the reliance on a tangible model contribute to the development of covert categories rather than overt categories in the learning of style.

The Effects of Specialization

Specialization in black-on-red ware is based on technique of manufacture. Potters distinguish themselves as follows: "torneros", those who use the wheel; "maneros", those who use molds and "olleros", those who make only moldmade jars. Potters specialize in one technique, either the wheel or molds, rarely both. I know of only two cases where the potter learned one technique, then later switched to another.

At the outset a child either continues in his family's tradition if they are potters or if they are not, he finds acceptance as an apprentice by a master potter who will serve as his model. Fate, or acceptance as an apprentice, thus determines what pottery shapes and related stylistic features will be learned as these are associated with a given technique of manufacture. Later on, knowledge of other shapes and features will be increased if and when the potter learns to fire pottery. Wheelmade and moldmade pieces are usually fired together, and a master of the kiln must be able to distribute properly all the pottery to be fired. A master potter, by definition, similarly must be able to distribute pottery in a kiln. Both the master potter and the master of the kiln therefore have the most complete command of the universe of pottery.

Figure 6 shows the universe of utilitarian pottery as it was constructed based on the points of view of the masters of the kiln and

pottery. The diagram is my representation of their scheme. (The methods by which it was obtained are described in Chapter V).

Each specialty requires knowledge of a separate set of types and sizes. Within each specialty there is further specialization. For example, potters who make the large cooking pots (cazuelas) do not make the medium and small sizes. The latter are made by other specialists. As a result, each potter learns and transmits a limited portion of the total universe of black-on-red ware.

An apprentice first learns to make miniatures, i.e. complete pieces in the technique and style he eventually will master. On the wheel he begins with toy cooking pots and jars. In molds he first makes toy cooking pots and small eating bowls. Only those who specialize in moldmade jars alone do not begin with miniatures but make small eating bowls instead in mushroom-type molds.

As an apprentice matures physically, the size of the pieces he makes gradually increases until the upper limits of his specialty are reached. The greatest prestige among potters is accorded to those who make the largest moldmade cooking pots and jars. These reach one meter in diameter and in height for cooking pots and jars, respectively. Wheelmade pieces never attain great size, but it is generally conceded the technique is harder to learn than the mold technique.

The wheel technique itself is not conservative because each piece must be produced anew. The proliferation of types and sizes (Figure 6) is proof of the inherent flexibility of the technique. However, learning by imitation reinforced by economic considerations, social attitudes and values act to conserve style.

FIGURE 11

The mold technique itself is conservative and tends to preserve style. New molds are always made from existing pieces of pottery by the potter himself. Old molds continue in use for five, ten, twenty and up to fifty years or more, depending on the amount of use and care they receive. Others are kept as models and mementos, having been handed down from father to son.

The mold gives form and size to the cooking pot. A flattened circle of prepared clay called "tortilla" by potters is shaped over the mold. Since the tortilla has already been stomped and patted to the desired size on the floor of the workshop, there is practically no excess of clay to be trimmed when it is stretched over the mold. Potters were never observed to measure the tortilla but they accurately judged the size for any given mold by eye.

Medium to small molds are placed on a wheel where a thin ribbon of clay is trimmed from the rim. Large molds are trimmed on the floor of the workshop as they are usually too heavy to be lifted on to the wheel. After a few minutes outdoors, the mold is removed and the piece continues to dry to a leather-hard stage indoors. This indoor period will vary from several minutes, hours, to several days depending on the size of the piece and the weather. During the rainy season, the drying period is considerably lengthened.

The leather-hard pot is then smoothed on the inner and outer surface, first with a flattened stone and then with water and a piece of leather. The base is patted with a stone to modify its roundness. A rolled fillet of clay is attached to form the rim and the second fillet of equal length is divided in half to form the two handles. These are attached to the rim.

FIGURE 12

A potter will sometimes decorate the rim using his thumbnail and fingers to create a design they call "repulgada", translated here as "pinched". Sometimes he will leave the rim plain or undecorated. The decision to make or not to make a design on the rim is made by the potter in response to what he perceives to be consumer preference. They make two kinds of rims, potters explain, because some women prefer the decorated rim while other women prefer it plain. It is clear from their comments that the potters themselves prefer the decorated rim as being prettier. They imply that women who prefer the plain rim are lazy since plain rims are easier to clean. As with other aspects of form and design, I found the potters concerned with aesthetics. They would often comment on the appearance of the pots and express their preference for some aspect as being more pleasing to the eye. Women, the consumers, were less concerned with aesthetics and more concerned with practical considerations of the pottery such as size, price and the absence of physical flaws e.g. cracks, chips, rough surface, etc. The exception to this is the glaze or finish. It, too, has decidedly practical considerations since poor glazing will cause food to stick to the inner surface during cooking but a shiny, mirror-like glaze is highly prized for its appearance by the women and potters alike.

The three stages of production of cooking pots are the same thoughout the community: the form, the border and the ears.

Jars are made in two-part molds: the bottom is called the seat (asiento) and the top, the neck or collar (cuello o gollete). Each hals is first covered with a "tortilla" of clay that is stretched and shaped over the mold. Joining is accomplished for medium to small

sizes on the wheel. Large jars are joined and finished by hand on the floor of the workshop. The surface is smoothed with a stone and a piece of leather. No rim is added to the jar and handles are attached when the piece is partially dry later on. Olleros who make these jars employ the same techniques throughout the community of potters.

The wheelmade vessel is formed by throwing a prepared clay cone on to a revolving wheel. There is no mechanization. All power is supplied by the potter himself. After the cone is centered it is opened (lacra), then widened to the desired size (tamano) before the sides are drawn up to give the vessel its final shape (figura). Cooking pots are left "open" while jars and other containers of liquids are "closed". The latter distinction is maintained by the potters. The finished vessel is separated from the clay cone with a thin wire or string drawn across the base. The vessel is then allowed to dry indoors until it is leather-hard. At this stage it is put back on the wheel. The surface is smoothed and excess clay removed from the base in thin ribbon-like strips with a sharp metal tool. The vessel is allowed to dry completely before being fired.

The firing crew plays an important role in the circulation of information and preservation of style in black-on-red ware. A crew consists of a master of the kiln and his four assistants. The assistants are hired for each job by the master. Each master tends to have his own crew that he hires and rehires each time. None of them know how to make pottery, but it is the master and his assistants who do all the painting and glazing of the pottery in addition to loading and unloading the kiln. The potter who hires the crew may take part in this

stage of production, but it is primarily the crew's function to finish and fire all pottery. The crews circulate among the workshops as needed. Each crew decorates the work of different potters with the same traditional designs. This practice of delegating the decoration of pottery to a small group of men hired for this purpose also acts to preserve and distribute style throughout the pottery making community.

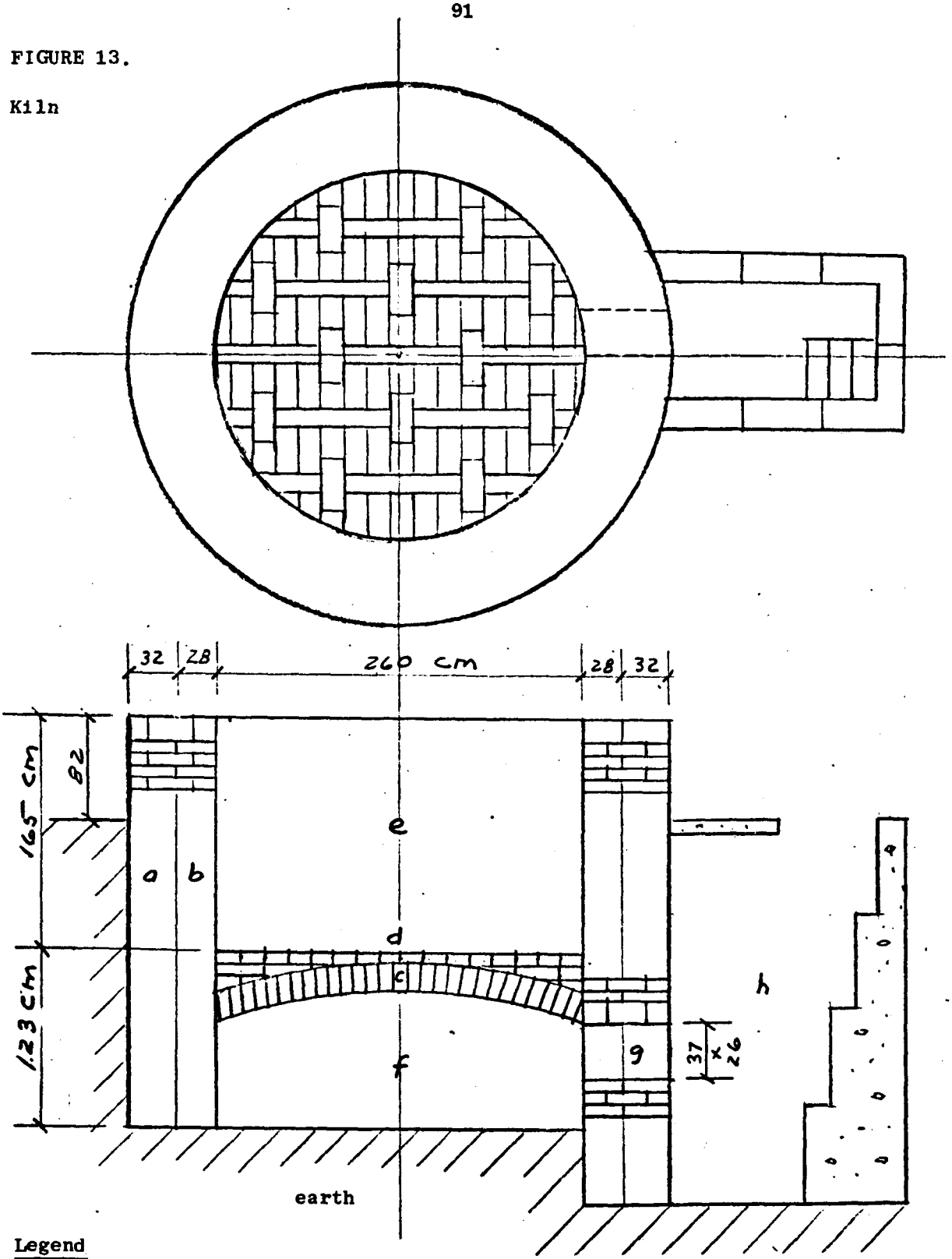
Firing of the Pottery

The vessels produced in the barrios are first fired red in an oxidizing atmosphere, painted with black designs and glazed, then fired a second time. The kiln is circular, open on top and semi-subterranean (Figure 13). Wood fuel is used to fire the kiln. Temperatures reach 600 to 750 C. in the first firing and 850 to 950 C. in the second and final firing.

The kilns vary in size as each is built to the specifications of the individual potter, but they are all alike in design and use (Figure 13). There are eleven kilns used to fire utilitarian pottery at this time. They range in size from 1.8M to 3.4M in diameter and, according to ceramicists and anthropologists with the Direccion General de Arte Popular, Secretaria de Education Publica, Mexico D.F., they are probably among the largest kilns, if not the largest, in use in Mexico (personal communication 1973). Potters are uncertain how many pieces are fired in a given kiln. It is difficult to ascertain the exact number since many sizes and shapes are fired together. However, I made two counts on two separate occasions: one thousand pieces were fired in a medium size kiln, and nearly three thousand in one of the largest.

FIGURE 13.

Kiln



Legend

a. facing (forro)
b. brick (ladrillo)
c. arch (arco)
d. table (mesa)
e. oven (horno)
f. ring (anillo)
g. firebox (caldera)
h. stairs (escalera)

The firing of a kiln is done by a crew working in a team of five men. Each team consists of a master of the kiln and his four assistants. They are responsible for the stacking of pottery and firing of the kiln and also for glazing and painting all pottery prior to the second firing. There are, at present, five such teams in the barrios. Each team is hired at a prearranged fee for the three days needed to complete the cycle of work, and a team circulates among the potters as needed.

Smoothed, dry pottery is stacked in circular rows beginning on the open brick grill-like floor of the kiln below ground level and ending in a circular mound that rises above the exterior wall of the kiln above ground. It is not uncommon to have five to six rows of unfired pottery thus stacked and delicately balanced against each other. It is important that the sides be even and the rows secure. This can be tested by pushing the stacked pottery to see if it will move. One potter who wished to demonstrate his skill in loading a kiln to me (he was acting as his own kiln master on this occasion), pushed heavily with his hands against the outer walls formed by the rows of stacked pottery in order to show that they would not move out of place. I was apprehensive but his confidence was well founded and the pottery remained securely in place.

The stacking or loading of a kiln takes from three and a half to four hours, and it is done by the master of the kiln. He stands on a clay cylinder made especially for this purpose in the center of the floor of the kiln. From this location he calls out to his helpers to bring certain pieces and he places them as they are received. All the

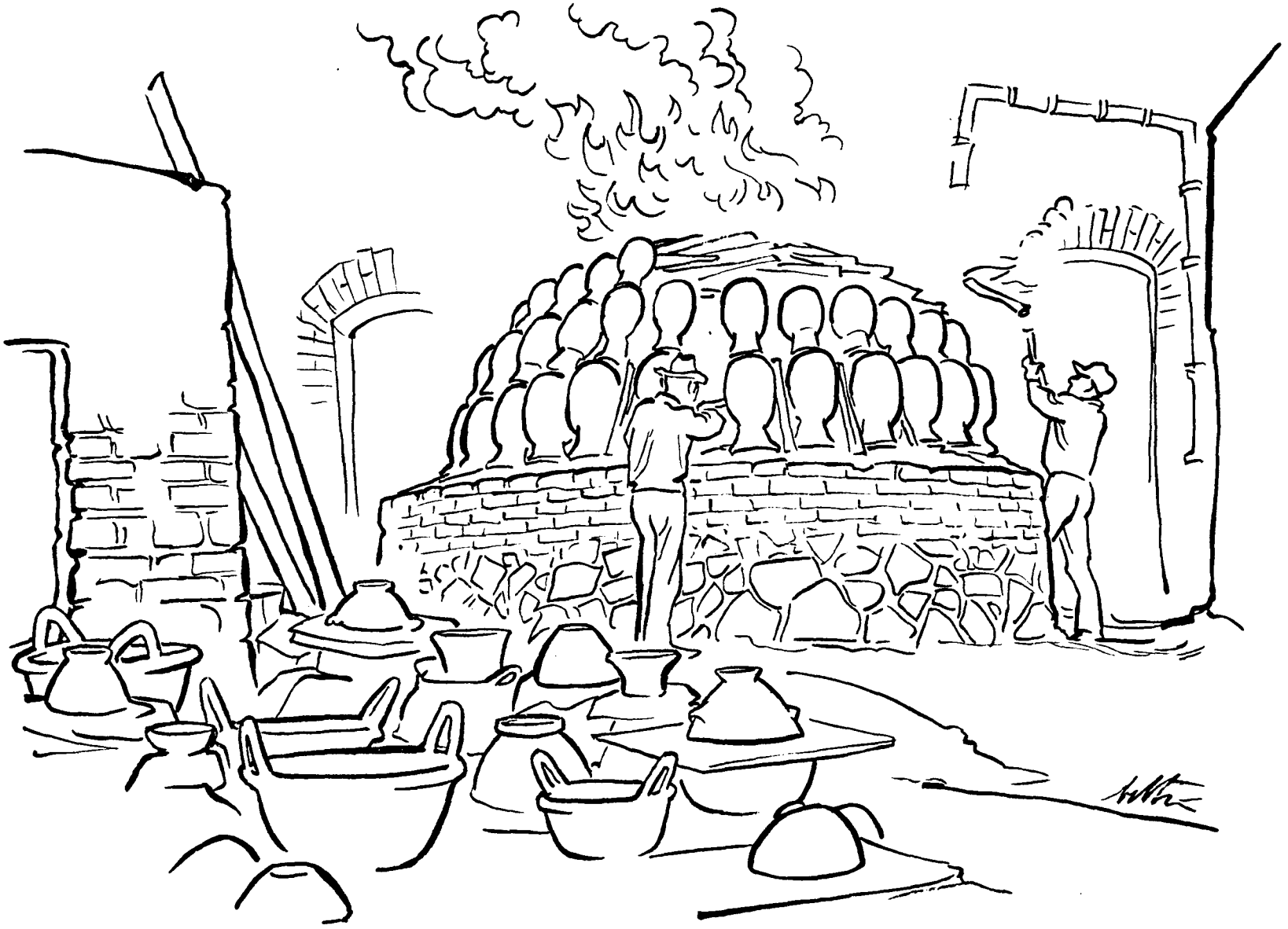


FIGURE 14

while this stacking is proceeding, grey smoke seeps through the brick grillwork of the floor on which the kiln master is standing. (The first firing is begun slowly with the start of the stacking process). When the rows reach the edge of the kiln wall, the master, usually up to his waist in pottery by now, is lifted out of the kiln with the aid of a long pole by his assistants. He is drenched in perspiration and darkened by the smoke which is now bellowing up from the kiln. The center space then is filled by lowering pieces of pottery into it on the end of a long stick. The remaining rows that rise above the kiln's edge are now stacked at the master's direction. Then large jars reserved for this purpose are placed around the edge of the kiln, one upon the other, in descending size to the top. Between these jars pieces of wood are inserted all around to aid the fire. Finally, sheets of newspaper are tucked between the columns of jars.

At the completion of this phase, clouds of black smoke swirl from the top of the kiln. Within the hour, the newspaper ignites into flames that lick out from between the rows of stacked pottery as the hottest phase in the firing process is reached. This phase is judged by the master of the kiln by sight alone. The fire peaks when the pottery itself glows bright orange-red. Until this stage is reached, the master directs his assistants to bring and place wood around the kiln as changing conditions indicate. The kiln is also constantly being fed with wood in the firebox below ground. Then the assistants begin to toss dried cornstalks and corn husks on top of the kiln along with the sticks they remove from the sides of the kiln. After an hour, this phase comes to an end and the fire is allowed to subside. The pottery cools slowly overnight. The following morning it is removed for

glazing and painting. The whole procedure, from the start of the fire to the stacking, firing, cooling and removing of pottery takes twenty-four hours.

The first firing is started slowly and is not as hot as the second firing which takes place after the pottery is decorated and finished. The second firing takes longer, up to three hours at its hottest phase, and the heat is more intense from 850 to 950 C. The second firing also lasts twenty-four hours from start to finish.

According to potters and members of the firing team, an accident or loss of pottery is not uncommon during the firing process. "Cold" pottery, pottery that is not sufficiently dry, will "pop" during the first firing, and sometimes stacked pottery will slide. I witnessed such an accident in which thirty pieces were broken. The potter and firing crew reacted quickly to stop the slide and appeared to regard the accident with fatalism. No one shouted orders or made accusations of blame for the slide. They all simply moved quickly and quietly to prevent further loss. Each person seemed to know what to do without being told. However, the next day in separate discussions, the master of the kiln and a potter who had been visiting when the kiln was being fired, each told me that the accident had occurred because the pottery had been stacked too high. They each noted that the potter firing his production had insisted on stacking to that height over the objections of the master of the kiln. From these remarks and those made later by others concerning this same event, it was apparent that there was consensus in the community that the potter had been unwise to have persisted over the objections of the kiln master. The potter

himself never spoke of this accident to me. Although potters and crewmen report it is not uncommon for some twelve to fifteen pieces to be lost in firing due to various causes, a slide such as I witnessed apprears to be rare.

Painting the Pottery

The designs used to decorate utilitarian pottery are painted, or perhaps "run" is a more accurate description, over the surface of prefired pottery in a black solution onto the dried and powdery yellow glaze mixture. The painted pieces are then fired for the second and final time. Only the interior surface, rim and handles of cooking pots are painted. Jars are painted only on the exterior surface on the upper half. The lower half of jars as well as the exterior surface of cooking pots which are exposed directly to the flames and charcoal in cooking are left undecorated.

Moldmade cooking pots are traditionally decorated with a single black slash across the handles, a swirl on the bottom and a radiating design of crisscross or lattice black lines on the interior surface. The line design is called "cocol" by the potters. It takes its name from the diamond shape formed by the intersecting black lines. It resembles a popular roll made by bakers which has the same name and shape. The design is used, too, for jars with two handles. Sometimes very large cooking pots were undecorated. Several examples of all-red glazed cooking pots, between forty and fifty years old, can still be seen in the kitchen of an old Puebla convent.

The largest moldmade jars are decorated with black spots which are splashed on the neck of these vessels. The spots are called

FIGURE 15

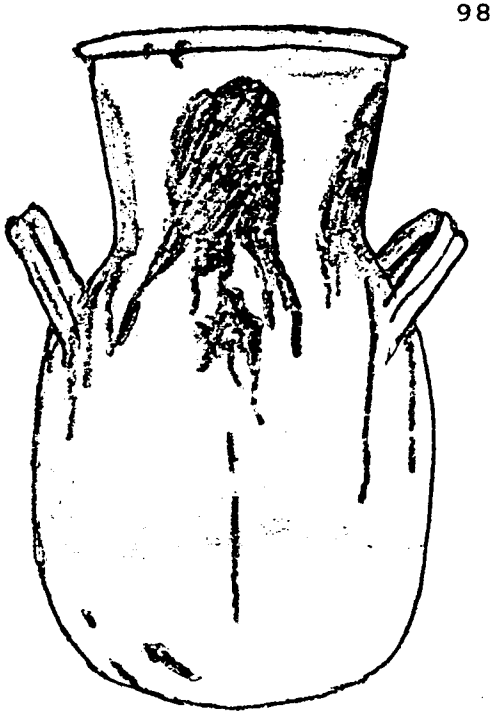
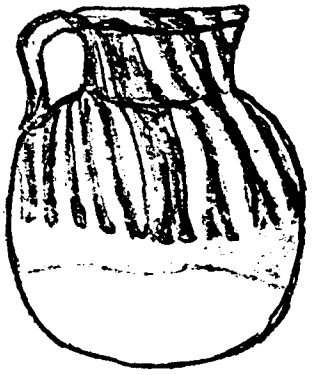


FIGURE 16

DESIGN TYPES,

BLACK-ON-RED WARE

Spot design
(Mancha o gavilan)



Stripe or ray design
(Raya)

Lattice design
(Cocol)

"manchas" and are also known to the potters as "gavilanes", black birds of prey, and "media-lunas", half-moons. Sometimes large jars are decorated with the "cocol" line design.

Wheelmade cooking pots of small to medium size are usually decorated with a slash across the handles, a swirl on the bottom and radiating design of black stripes on the interior surface. Single-handled jars of medium to small size made on the wheel are decorated with a rhythmic series of oblique black lines on the upper half of the vessel body, on the exterior surface. The line design of both the cooking pots and the jars is called "rayas", stripes or rays.

The same traditional painted designs that appear on utilitarian pottery appear on decorative ware. This pottery, made exclusively for gift giving, is always moldmade and generally resembles the types used for cooking. But is has more elaborate rims, modeled handles and elements added to basic and special forms. For example, flat bottomed cooking pots are made in the more usual round and special oval form. These are of small size and have numerous elements in the shape of stars, flowers, crescents, etc. from old buttons pressed into the exterior surface of the mold used in manufacture. In addition, small separate molds are made in the shape of a fish or an eagle with a serpent in its mouth standing on a cactus. These are sometimes combined with "sayings" that are pressed into the mold to create designs in relief on the finished pottery vessel. All the elements appear on the interior surface of cooking pots and on the exterior surface of moldmade jars.

Hand modeled figures of cowboys (charros), a young lady (catarina o china poblana) and roses are among the decorative elements sometimes added to the neck and body of large jars. Moldmade leaves, flowers and "sayings" are among the more usual elements. Effigy jars are also made: a fat man, the head of an "Indian", a fahionable lady of the turn-of-the century, a high button shoe, etc. These jars, like the decorative cooking pots, are never used for cooking; they are therefore glazed all over, inside and outside. At present there are three potter families engaged in the manufacture of decorative ware.

The design conventions of the potter community are very strong as this incident will illustrate. A master potter who had undertaken to teach me the details of his craft decided to execute a complete series of jar types on the wheel. He wished to show me the full range that used to be made (many of them are no longer produced) and, not incidently, demonstrate his own mastery of form. Later, after the series had been decorated, he was quite angry and apologized that the series was not perfect because a member of the firing crew had painted the "wrong design", as he put it, on one of the pieces. The piece, a jar, a wine carafe, should have had spots "gavilanes" instead of criss-cross lines, the "cocol" design. Whenever we discussed the series afterwards, he would recall this error. He remained annoyed about it for some time and except for this incident, I cannot remember that he ever openly expressed anger.

CHAPTER IV

THE EMERGENCE OF A FOLK STYLE

I now propose to analyze this style of traditional black-on-red glazed cooking pottery in terms of contemporary use and thought and in terms of several broad themes having considerable time depth in the Central Highlands.

The themes and style may be seen to be cognitive in that both embody ideas and values that serve to organize observable behavior and give meaning to life. This analysis will examine the continuity between the themes manifested earlier in Pre-Columbian religious beliefs and practices, myths and symbols, and this later secular pottery style. I neither view the themes simply as Pre-Columbian survivals, nor the style as a unique and recent development. In their present context, old themes have been rephrased with new meaning and expression over time as the result of profound changes wrought by the Spanish Conquest and colonialism, Independence and revolution. I think that a consideration of style in terms of these re-emerging themes will serve to deepen our understanding of the symbolism presently employed and to sharpen our historical perspective.

Symbolism, Past

One such theme concerns a cyclical world view of the universe -- a universe constantly threatened with destruction yet constantly renewed by struggle and sacrifice. This world view has been well

established in the Pre-Columbian Central Highlands as the result of extensive archaeological excavation and historical documentation. Periodic destruction and reconstruction of pyramids and associated buildings and sculptures as well as household goods were widespread in connection with recurring calendar cycles. The daily renewal of life, too, was enacted on a cosmic stage. Night, as personified by the black god Tezcatlipoca, Smoking Mirror, accompanied by myriad stars was vanquished each day in a heroic battle fought by day as personified by the great culture-bringer, the god Quetzalcoatl, Plumed Serpent.

In a related myth said to explain simultaneously the end of Toltec culture in the Central Highlands and the death of the planet Venus, Quetzalcoatl takes flight from Tula for the mythical Tlillan Tlapallan, the land of the black and the red (la tierra del negro y del rojo). He disappears in the west to where the black and red are joined, to where night and day meet, only to return again in the east, transformed into a morning star and preceding the sun (Caso 1953: 39). His promise to return in the east in the year of his name "Ce Acatl", coincided with the Spanish arrival on the east coast of Mexico. It was one of those remarkable instances in which life imitated art and facilitated the destruction of the Aztec civilization.

A second theme concerns a view of life as nourished by death. It embodies a series of oppositions: life and death, day and night, dream and reality, sleeping and waking are opposites inexorably linked in an ongoing cycle. All are parts of the whole. There is a creation myth in which Quetzalcoatl returns to the underworld to recover the bones of those who have died in order to create a new race of men. In

his haste to leave he drops the bones, breaking them, but manages to gather them up and make his escape from the underworld. For his clumsiness Quetzalcoatl is sacrificed, and his blood gives life to the old bones (Caso 1953: 38). Thereafter, the blood of this new race of men is needed to nourish the gods and to sustain the sun in his fight to defeat the moon and the night stars (Caso 1953: 24). Human sacrifice as the means to perpetuate life reached its apogee under the Aztecs. The extent of their obsession with blood and death shocked and repelled even the battle hardened Spanish Conquistadors (Diaz 1968: 213, 219-220, 223-224).

Not only life but love and beauty originated in death and returned to death inevitably. The Lady Xochiquetzal, Most Precious Flower, a symbol of life and evanescence as shown by the beauty of flowers, belonged to the underworld (Burland 1968: 91). It was she, the goddess of love and beauty, who seduced Quetzalcoatl in his form as Yappan, the virtuous, and caused the other gods to change him into a scorpion as a punishment (Caso 1953: 41).

A third theme concerns the need to attain a balance, even though it is only temporary and precarious. It is this balance that assures the continuity of the world, life and man himself. Day and night,evanescence and decay, control and excess are ongoing precisely because they balance each other, neither one gaining ascendence over the other. This third theme is manifest in the ancient and widespread pulque complex in the Central Highlands, and in the Puebla-Tlaxcala region in particular.

Pulque, the fermented juice of the maguey plant, had ritial significance. Except for warriors and old men (ancianos) who were not punished for drunkenness, it was reserved for ceremonial use among the Aztecs. An excess of pulque and the subsequent loss of control could bring about destruction. In the myth cited earlier, Quetzalcoatl was changed into a scorpion after he was seduced by Xochiquetzal. But he was seduced by her at the instigation of his arch enemy, the night god Texcatlipoca, only after she had made him drunk with pulque, i.e. only after he had lost control of himself (Caso 1953: 41). The ancient lesson is clear: a loss of control threatens the balance and life itself.

A remarkable mural was discovered in 1969 at the archaeological site of Cholula, thirteen kilometers from Puebla. It predates by many centuries the Aztec culture which dominated the highlands at the time of the Spanish arrival in 1519. Named "The Pulque Drinkers" (Los Bebedores) by the archaeologists who uncovered it, the mural depicts a series of male figures seated within horizontal bands being served and drinking a liquid presumed to be pulque. The bowls from which they drink are identical to those still used by pulque drinkers today. The surrealistic position and representation of their heads suggest they are in an unusual state, perhaps experiencing visions. The size and artful execution of the mural, its extent (it is the largest mural thus far discovered anywhere in the world, measuring 70 meters in length by 2.10 meters in height, and it is not yet fully uncovered) and its location on an early construction of the main pyramid at this major ceremonial site, indicate the age and importance of the pulque cult, known to center in this region.

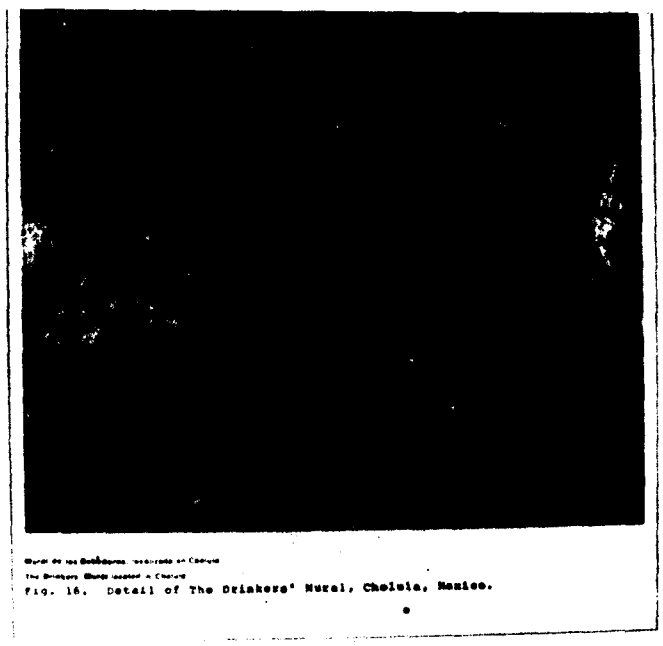


Fig. 16. Detail of The Drinkers' Mural, Cholula, Mexico.

Figure 17. Detail of The Drinkers' Mural Cholula, Puebla, Mexico.

Bands or stripes were frequently used to represent the heavens in Pre-Columbian art. At Cholula there are later murals which are composed of bands or stripes in combination with stars, further evidence of the association between bands and stripes and the heavens. The gods of pulque were identified in the Aztec pantheon by their striped black and red face paint and a semi-lunar nose ornament. As shown previously, the red and the black were identified with day and night, respectively. The god of night, Tezcatlipoca, was black and wore a spotted (manchado) jaguar skin about his shoulders. The black spots were said to resemble the clusters of night stars associated with him, and he carried an obsidian or sacrificial knife (Caso 1953: 25, 44). His idol, Tenochtitlan, worshipped in the main temple of the Aztec capital, was stained with reflective metallic paint and called "smoking mirror" by the Indians (Caso: 1953: 43). The moon, or the "dead sun", was likewise associated with him (Caso 1953: 42, 53). Not only the moon but the symbolic spots, stripes and swirls connected with the night sky and Texcatlipoca, likewise are connected with day and Quetzalcoatl. These in turn, are connected with the gods of pulque and with the present symbolic content of cooking pottery, as I will show a little later on.

The eighth day of the month in the Aztec calendar was represented by a rabbit, Tochtli, and it was dedicated to the goddess of pulque, the Lady Mayauel (Burland 1968: 89). Not unexpectedly, the rabbit is a symbol of fecundity as is the goddess herself. She was conceived as an all nourishing mother and the whitish cloudy pulque as her milk. She was said to have four hundred breasts with which to feed her four hundred children, the Centzon Totochtin, the innumerable gods of drunkenness.

Fig. 50. Borgia 57

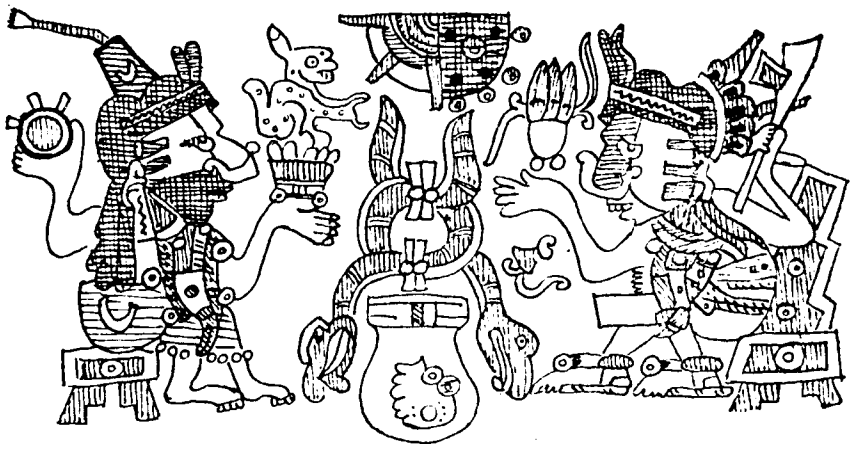


FIGURE 18a

El Sol muerto (Borgia 30)

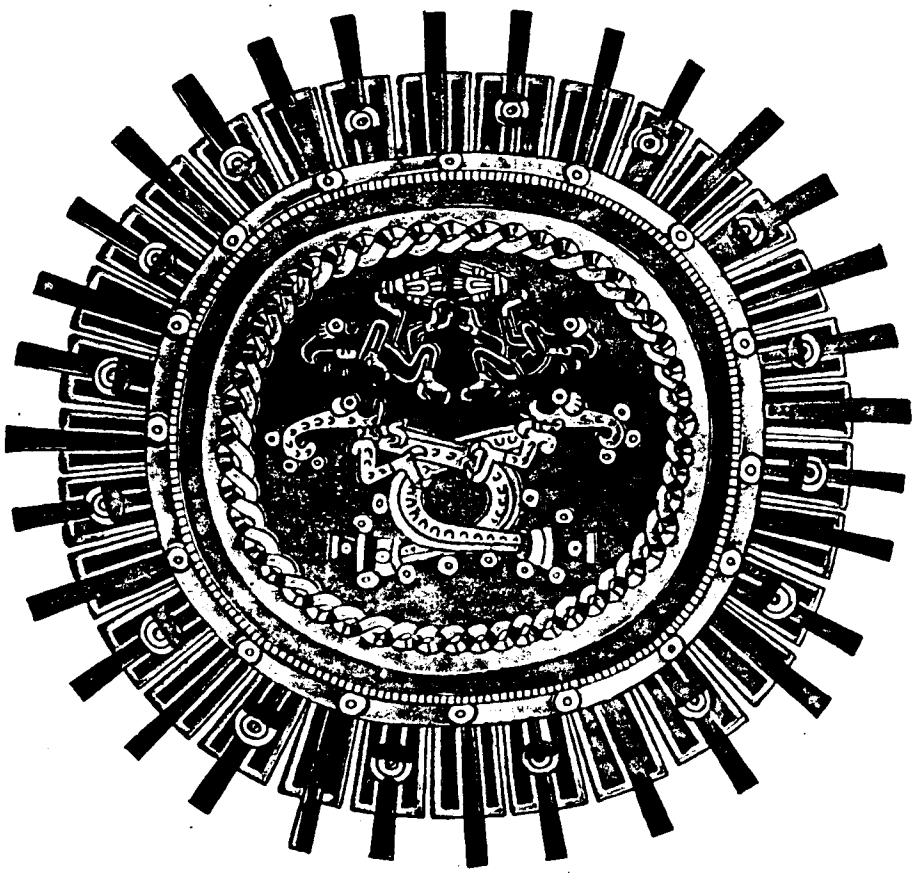


FIGURE 18b

Fig. 60. Mayáhuel (Tonalámatl de Aubin, 11)

FIGURE 19a

Fig. 44. Patécatl (Borgia 13)

FIGURE 19b

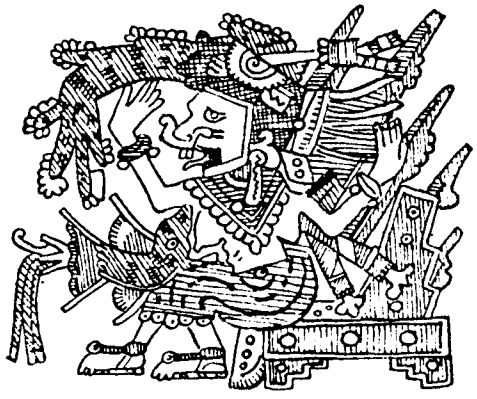


Fig. 23. Mayáhuel (Borgia 16)

FIGURE 19c

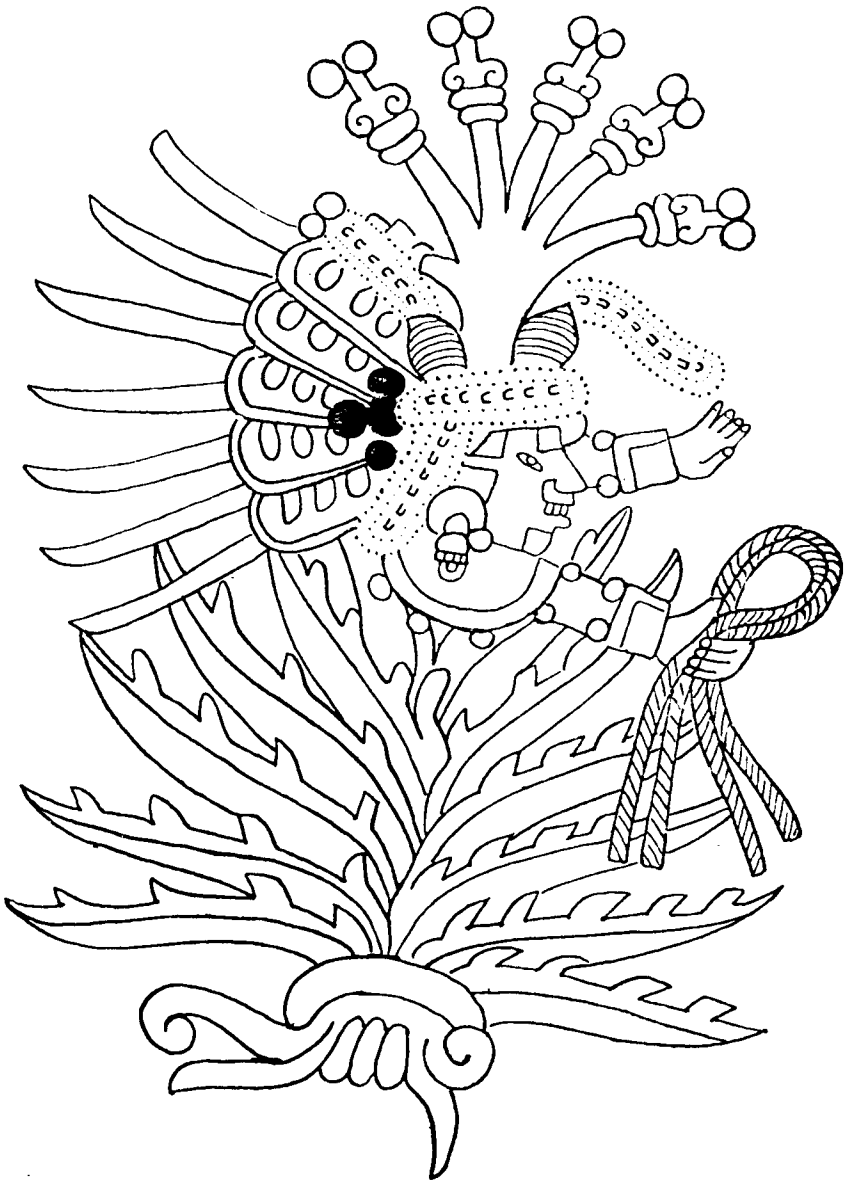


Fig. 63. Mayáhuel (Borbónico 8)

FIGURE 20

It will be recalled that these pulque gods were identified by their red and black striped face paint and their characteristic semi-lunar nose ornament.

This nose ornament was white and was probably made of bone. Its shape resembles the outline of a jar. Sometimes this nose ornament appears in the center of a representation of the moon, and sometimes a rabbit appears in its stead (Caso 1953: 53). In two representations of the moon from the Puebla-Tlaxcala region in the Codex Bergia, jars filled with water are plainly depicted encircled by the nose ornament and in the same codex, a rabbit and a sacrificial knife are also contained within the jars (Caso 1953: 50). Blue was the color of water in Pre-Columbian art and these jars in the moon are decorated with blue and black stripes. Perhaps there was some recognition of the relationship between the moon and the tides, here represented as water, by the priest-astronomers on the Central Plateau. Perhaps the blue and black striped jars in the moon are just symbolic of the rains that fall from the heavens. In any case, the symbolism employed in connection with the moon is linked to the gods of pulque.

Here in the pulque complex of the Puebla-Tlaxcala region in the Central Highlands, the major themes I have outlined coalesced: a cyclical world view of the universe -- life through death and human sacrifice and man, heaven and earth interlocked in an ongoing and delicate balance -- were all combined. Man's sacrifice nourished the gods who made life possible. His heart and blood fed the sun in the fight against darkness, and the night sky, beaten, vanished into the underworld only to re-emerge and fight again. Man's sacrifice also brought the rains which

FIG. 24. Tlaelquani (Vaticano B 29)

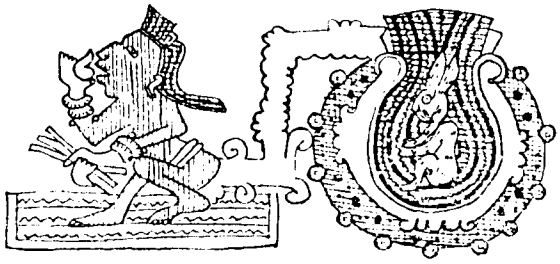
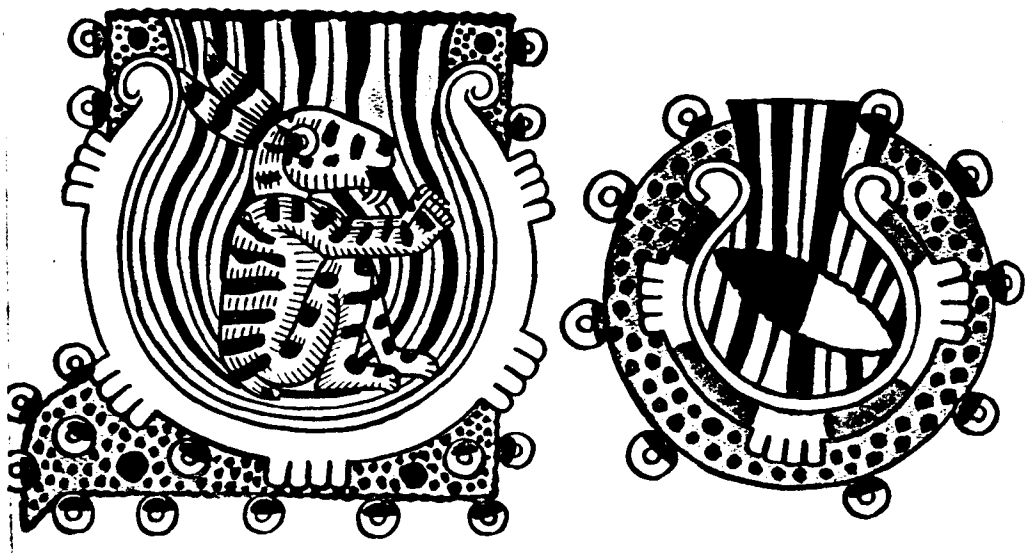


FIGURE 21a



Luna con conejo y con pedernal (Borgia 55, 50)

FIGURE 21b

in turn brought new life from the underworld in the form of growing things. These growing things, symbolized by the maguey, were sacrificed as was man himself to assure the continuity of the universe. Man's heart and blood were offered to the gods; so too was the "blood" taken from the "heart" of the maguey, i.e. pulque was offered to them. I suggest the cloudy, whitish pulque was symbolic not only of mother's milk but father's semen, both life-giving substances that renewed the cycle.[1] Hence, the importance of the cult and the reverence accorded pulque in the highlands.

Symbolism, Present

The themes combined in the ancient pulque complex persist to the present day though the modes of expression and contexts in which they may be found have changed. This symbolic analysis focusses on the present style of black-on-red pottery and the relationship of the style to the themes embodied in that ancient complex. The religion that provided an overall framework for Pre-Columbian life is long since gone. Pulque is no longer restricted to ceremonial use, drunkenness is no longer restricted to old men and drinking to warriors. The context now is secular: pulque is drunk daily by men and women at meals and in bars. Nonetheless, the old association of pulque with visions and flowers remains. It effects are no longer celebrated in murals on sacred pyramids. They are written on the walls of popular bars in the barrios: "The Happy Dream" (El Sueno Feliz), "Dreams of Bacchus" (Suenos de Baco), "The Monkeys" (Los Monos), "The Great Ones" or "The Big Ones" (Los Grandes Buenos), "The Great Flights (Los Grandes Vuelos), "The Camellia" (La Camelia), etc. It is not uncommon for a man drunk on pulque to refer to himself as "the king of flowers" (soy el rey de Xochitl).

Similarly, the concept of the nourishing nature of pulque finds expression in the current popular saying, "Pulque is only a little less nutritious than meat" (Pulque solo falta un grado para ser carne), and for poor poeple today, pulque is far more obtainable. In the not too distant past, people of all social classes in Puebla and elsewhere in Mexico drank pulque. Madame Calderon de la Barca, wife of the first Spanish ambassador to newly independent country in 1840, noted in her journal that pulque was then the universal beverage outside of Mexico City. It was served at formal dinners as well as other meals (1970: 228, 352, 353). Indian men and women drank theirs from little earthen jars, as she noted, frequently becoming drunk (19 : 183, 428, 450).

Bars called "pulquerias" still specialize in pulque, serving and selling it in small jars that are drunk individually, and in larger ones that are shared with friends and acquaintances. In these bars, glasses and gourds (xicaras o xomas) are also traditionally used. The latter, as I pointed out earlier, are identical to those shown in the mural of "The Pulque Drinkers" at Cholula. It is the custom not to drink the last drops of pulque but to fling them from the vessel onto the barroom floor and to interpret the resulting design. Men often wipe the remaining foam of the pulque from their mustaches and fling the drops away with a quick motion of the hand. These designs, too, are interpreted with the assistance of bystanders, usually friends. Those that form a "tail" (cola), either a swirl or s-shaped design, are called a scorpion (alacran) and are considered a very lucky sign. I was initially surprised because scorpion bites are responsible for a number of deaths in Puebla each year. However, I recalled that the scorpion was also associated with Quetzalcoatl, pulque, and the Milky

Way (Caso 1953:41). A similar "tail", a swirl design, is always made on the bottom of black-on-red cooking pots. It is surrounded by radiating lines that represent the heavens: the whole pot being a re-enactment of the daily celestial battle, captured for the moment, and affirming the continuity of life.

The line design on the interior of the cooking pot appears on the exterior of medium to large size jars. The design called "cocol" by the potters, as well as the jars themselves, bears a striking resemblance to the pulque jars shown in the codices where these large storage jars are encased in knotted ropes to facilitate their transport (see Figure 22). (Goncalves 1956: 132, 153, 154, 169, 204).

Spot designs, also called hawk or half-moon by the potters (mancha, gavilan, media luna) are other forms of decoration used on large jars. These designs, too, are associated with pulque, the night sky and the moon. It will be remembered that the jaguar skin worn by Tezcatlipoca was "spotted" (manchada) to represent the many stars that always accompanied him, and the moon itself was "spotted" (Caso 1953: 25; Goncalves 1956: 134). A schematic representation of the semi-lunar nose ornament of the pulque gods sometimes appears on large jars in the Pre-Columbian codices (see Figure 23) (Goncalves 1956: 136). Inverted, the ornament thus represented closely resembles the present day "spot" design, and it resembles the black birds or hawks as well (Goncalves 1956: 209, 211).

The oblique lines of medium to small jars, the bands or stripes (rayas), may be seen to represent the heavens as well as the lightening and storms controlled by the black god of the night and the north, Tezcatlipoca (Goncalves 1956: 149).

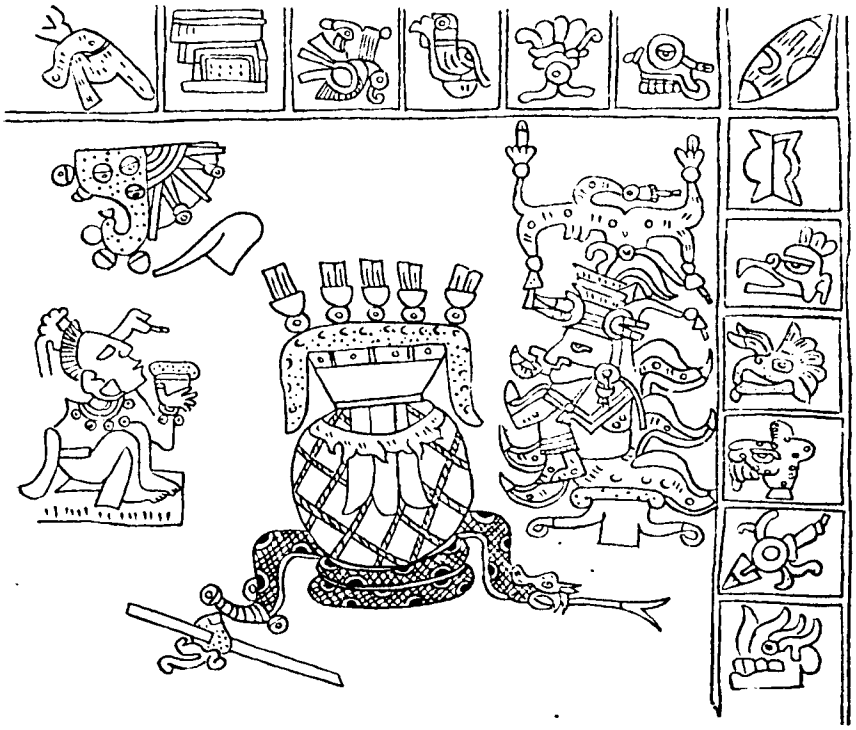


FIG. 61. Mayáhuel (Vaticano B 55)

FIGURE 22a

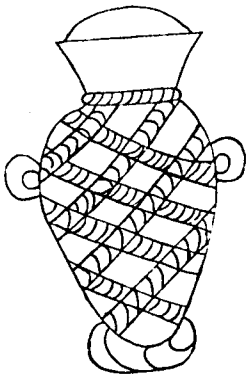


FIG. 57. Miel de maguey espesa (Mendoza 29. 77)

FIGURE 22b

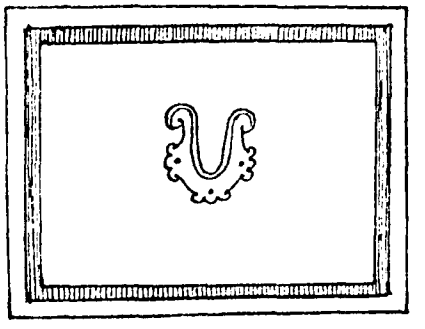
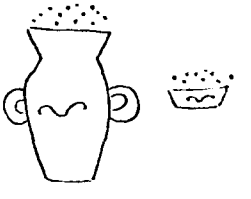


Fig. 25. Manta de conejo
(Magliabecchi XII. 3. 4 verso)

FIGURE 23a

Fig. 26. Octecómatl
(Mendoza 62)



a

FIGURE 23b

The earlier associations of designs with pulque are not unrelated to present usage. Large jars are still used to store pulque and to make the more potent mescal, and medium to small jars are still used to drink and serve pulque. However its consumption, increasingly associated with the poor and rural life, no longer provides the central focus of ideas and values for people in the region. The broad themes which formerly coalesced in the Pre-Columbian pulque complex are now diffracted through the prism of a restructured and multi-faceted contemporary society. A consideration of these themes in society seen through the medium of this pottery, it use and present distribution follows.

People acquire the pottery for use in "the struggle" (la batalla) which is to say, daily life. This trenchant phrase, widely used in Puebla and the Central Highlands, exposes their view of life as a battle for existence against the forces of death. An encounter between friends often begins with the question, "What are you doing?" (¿Que haces?) The expected answer may be translated, "the usual" or "getting along" but translated literally means "here (on earth), fighting for life" (Aqui, luchando por la vida). I prefer the latter translation, though awkward in English, because it captures the feeling tone of the exchange in Spanish.

The sense of struggle pervades pottery making. Potters do not speak of making pots, they speak of "conquering" the clay. Crewmen call to each other as they work firing a kiln, using the terminology of the bull ring. They refer to the sticks of wood they plunge into the stacked hump of pottery rising above the edge of the kiln as "banderillas".

At the same time life is seen as a dream, a conception that contains an element of resignation because the dream must end with waking, as life with death. Perhaps then, death is the only reality and this sense of its palpable existence, its closeness, may at least partially account for its acceptance by the people of this region. There is no fear expressed of the dead. The most frequent reply to my question on the subject was esentially the same among all strata of society: "We are more afraid of the living than the dead" (Tenemos mas miedo de los vivos que los muertos). It was usually said with a smile and a knowing look to those standing by who were quick to affirm the statement.

When a death does occur, it is the custom for friends and family to come and stay with the corpse through the night until burial the following day. Coffee spiked with liquor (aguardiente) is served in a distinct type of pottery jar called "velorio", made especially for the vigil.

Each year the dead are remembered and welcomed into the home with flowers, food and drink on All Saints Day (Todos Santos). A home altar is arranged with all-black glazed candlesticks, incense burners and jars for holy water and pulque. These all-black pieces, as well as the velorios, are made by the same potters who make the black-on-red glazed utilitarian pottery, but the black ware is made and sold only for the festival of the dead.

Each year during Todos Santos the entire family, including children, visits the grave sites of relatives and proceeds to weed, wash headstones and make repairs. Flowers are lavishly arranged, incense burned and candles lit. Until recently in the city, the family would

spend the night in the cemetary praying, talking and eating the food they had brought with them in black-on-red pottery. This custom of staying through the night has now been forbidden by the authorities, but it still is permitted in nearby towns and villages. Potters and others explained that since the spirits returned once each year to be with their families, they would go to the cemetary to make them happy and keep them company. As they repeatedly pointed out, "Why should we be afraid when we must all die and after all, that is life".

Acceptance and resignation in the face of death are given an ironic twist in the figures and toys made for Todos Santos. Skeletons are modeled in a fine show of life -- musicians, cowboys, newsboys, demure young girls, ladies and gentlemen, etc. It is as if people are aware of the great joke life is playing on them. All the paraphernalia of the living are hung on skeletons. One toy I purchased in the marketplace is a small black wooden coffin with a string at one end. When the string is pulled, the lid opens and a grinning white skeleton sits up suddenly. This toy and others like it are given to children. I was told of a visiting Frenchman who, invited to dinner in an elegant Mexican home during the festival of the dead, was horrified to discover his favor at the dinner table was a spun sugar skull with his name on it. To the Poblano there is nothing macabre in this. That this attitude towards death is widespread may be concluded from Octavio Paz's observation that, unlike the European, "The Mexican ... is familiar with death, jokes about it, caresses it, sleeps with it, celebrates it; it is one of his favorite toys and his most steadfast love." (Paz 1961: 57).

Life and death are opposite parts of the whole and one may quickly change to the other: "Whenever a Mexican cries Viva! he ends

up with Muera! When he says Viva! he really means Death for Somebody or Other!" (D. H. Lawrence 1955: 40). It may be, as some ethnographers have suggested, the threatening nature of the environment with its frequent earthquakes, floods, sudden storms and bolts of lightening and the unpredictability of human social relations, combine here to create a threatening atmosphere. Certainly violence and sudden death, frequent illness and a lack of resources and viable alternatives are ever present. They create a disturbing backdrop against which men struggle for life.

Men themselves are fragile, they are made of clay (Genesis 2:7). Jeremiah, patron of the potters, likens men to clay and pottery in the Bible (18:2,4,5; 19:2,3,4,10,11,12; 51:34). Potters extend the analogy. They say jars are like men, closed and erect, while cooking pots are like women, open and yielding. An aberrant vessel which combines the two forms, jar and cooking pot, is sometimes made as a joke for a prospective bridegroom; it is called "joto" which is slang for homosexual. There are many popular sayings in Puebla that compare men who are quick to anger with jars since jars, having round bottoms, are easily upset.

The association of clay with life is evident in practices related to pregnancy. Eating clay is not uncommon. Pregnant women select clay that has a certain strong, warm aroma. The importance of the aroma may be related to the idea expressed by potters that clay is not just earth but "the flower of the earth" (la flor de la tierra). The clay from Puebla is aromatic and considered very good for eating as is the clay from Guadalajara. The desire of pregnant women to eat clay is expressed in terms of "nature" or "the natural order of things" (la naturaleza): the life growing inside the woman desires to partake of

the earth. Thus the act of eating is a kind of communion, the new life being nourished by the clay.

Conversely, clay is identified with death. Death and dangerous things are "cold" (frio) and clay, too, is cold. A potter who takes part in firing a kiln will not enter his workshop for two to three days afterwards. The harm that would result from mixing hot (fire) with cold (clay) is the reason given by potters for the existing division of labor between those who make pottery (potters) and those who fire it (crewmen).

A woman who wishes to abort or prevent conception will drink the water of the clay, i.e. the water off the top of the glaze solution, if she can persuade a potter to sell her a glassful. The practice is known to be dangerous since women have become sick and some are said to have died later on. However, it is also known to cause sterility and farmers who want to fatten their animals will give them this water to drink.

Life and death are associated with colors. Black is the color of death and night, but it is also regarded as very beautiful. In much the same way, the Aztecs were apparently fascinated by black and gleaming things: Black Obsidian Butterfly, the goddess of fate, wore the symbols of death on her face, nonetheless she was considered the ultimate in beauty (Burland 1968: ix, 90); the black obsidian sacrificial knife, Iztlacoliuhqui, was another form of the night god, Tezcatlipoca, Smoking Mirror (Caso 1953: 44); and the black vulture also symbolized riches (Burland 1968: 90).

The black designs on pottery are very much admired, especially for their reflections, and all-black pottery with its mirror-like surface is most appreciated by potters and users alike. In the

context of daily life, the luster of the black designs deepens with the grease of rich foods and conveys a feeling of satisfaction and well being to the users of the pottery. Black, the color of night and the underworld is sensual, evoking thoughts of the riches hidden in the earth, of the danger and sins hidden in the night, of dark places and the underworld as the source of new life. Poblanos are as fascinated with death as were the Aztecs long ago. It is perhaps as Octavio Paz says, "We are seduced by death" (1961: 58).

Red is the color of life. It is the color of blood, the heart and love. A man who is passionately in love sends his sweetheart red roses. A mother protects her infant from the evil eye by tying a red string or ribbon around his neck or to his clothing. It is "red" rice that is served at fiestas. The curer at work always includes a red string, a red flower and "red" eggs in his fight against envy and bad spirits seeking to do harm.

The colors of the pottery as they are conceived today are the colors of life and death, counterbalanced in design. Lines, spots and swirls of black circle the red pots, a representation of the cyclical view of the universe held and verbalized by potters and users and a representation of the desired balance between the forces of life (red) and the forces of death (black). For the Aztecs red and black were symbolic of the eternal celestial battle fought each morning by day, Quetzalcoatl, Plumed Serpent, against the black god of night, Tezcatlipoca, Smoking Mirror. The balance struck, though temporary, assured the continuity of life but not without a struggle. This is how the Aztec saw his ancient world and how the Mexican sees his world today.

Pottery Use, Present and Past

The balance, so precariously maintained in daily life, explodes in the fiesta. "Life and death, joy and sorrow, music and mere noise are united, not to re-create or recognize themselves, but to swallow each other up. There is nothing so joyous as a Mexican fiesta, but there is also nothing so sorrowful. Fiesta night is also a night of mourning" (Paz 1961: 53). It is, as D. H. Lawrence observed, as if the "instant moment is forever keen with a razor-edge of oblivion, like the knife of sacrifice" (1950: 50).

Feasting accompanies all ceremonial occasions such as baptism, confirmation, communion and marriage, Christmas and Easter celebrations, the festival of a local patron saint, a birthday or saint's day, the dedication of a new house, workshop or even a car is not properly observed in Puebla without the prized turkey or chicken in chili sauce (mole) prepared in the traditional black-on-red cooking pot. The taking of such beverages as pulque, chocolate, atole, various herb teas as well as coffee and punch is associated with small pottery jars (jarros) and, as noted earlier, special ones (velorios) are made for use during the deathwatch preceding a burial. Thus, this pottery is associated with the most important and joyful occasions of life in which family and friends, worship and excess are joined together for the moment.

The daily preparation of traditional Mexican food is tedious and time consuming. Many ingredients and condiments have to be ground and blended, and the cooking process itself is slow, especially in pottery vessels. Stews made of meat, innards and fowl, soups, vegetables and

sauces are prepared with seemingly endless varieties of fresh and dried chilis and eaten with tortillas at the main meal. This meal is usually served in middle and upper class homes between two and four in the afternoon and in lower class homes, around noon.

All food is prepared and freshly cooked each day. Men and women of all classes are very sensitive to the aroma, taste and contents of each dish. It was not unusual for someone to comment, noting if the cooked chicken had been refrigerated before it was placed in the pot. This is a fine distinction, indeed, considering all chickens are fresh killed and invariably eaten the same day in Puebla. People claim that refrigeration, even for a few hours prior to cooking, changes the taste and can be discerned. Their sensitivity to, and preoccupation with, food was striking. A question concerning the uses of pottery vessels would bring forth a lengthy and enthusiastic recital of dishes and the pottery types associated with them. The recitation was always accompanied by lip smacking and other sounds that indicated the vividness of the memories of the eating. The necessary ingredients, the seasons when they ripen and become available, and the appropriate occasions to serve numerous dishes were readily supplied by those questioned, men and women alike.

At mealtime, in middle and upper class homes, the mother stands at the head of the table as she serves each course. She serves herself first, then her husband, then her children. In all other situations she is generally modest and submissive. But here at home at the dinner table, she reigns. Young brides are well aware of the importance of food. Several girls told me, "If you do not cook well, he will

continue to eat at his mother's house." And several young men, when questioned, listed first "being a good cook" among the qualities they looked for in a wife.

In lower class homes, the men are served first. They eat separately, before the rest of the family is fed. A daughter or wife will see to it that there is a continual supply of hot tortillas accompanying the beans, chillis and perhaps the egg or stew that is served at the main daily meal. If a man is unable to return home to eat, the food is brought to him by his mother, wife or a daughter. In the city where there has been rapid industrialization on the outskirts, it is still common for a wife to bring her husband's midday meal to the factory in red-on-black glazed pottery. On ceremonial occasions the traditional mole, turkey or chicken in chilli sauce that will be prepared is eagerly awaited and talked about for days in advance. Invited guests are assured mole will be served, although they surely know that already. Thus, women are the source of food and satisfaction on a daily basis; and the source of family pride on ceremonial occasions.

Before 1930 this pottery was widely used for cooking by rich and poor alike in the city, town and countryside of the region. Since then, gas stoves, refrigerators and metal cabinets have begun to replace the charcoal braziers and wall hooks of the traditional Puebla kitchen. Wealthy women were first to modernize their kitchens as they were already oriented to European and American cooking styles and menus. The "servant problem" now beginning to emerge has simply accelerated this change. In addition, many of the new rich created by rapid industrialization in Puebla in the last two decades are Europeans (mostly Spanish

and Germans) and Arabs whose food habits are not rooted in the Mexican past.

Today, more middle class women are working away from home. They and their daughters are becoming secretaries, clerical workers, saleslgirls and teachers, etc. The gas stove, the blender and pressure cooker are necessary to their new way of life. Poor women, the wives and daughters of farmers, factory workers, craftsmen and laborers continue to use the old laborious methods of food preparation: a brazier, hot plate or gas burners; stone grinders and pottery mortars and pestles. They still depend, too, on pottery vessels to do the daily cooking.

The more prosperous middle class and upper class now often purchase mole, ready-made, in the markets for use on special occasions. But they see to it that mole is prepared and served, along with other traditional dishes, in clay pottery vessels at fiestas for their workers, at political gatherings and dinners, when they entertain foreign guests, and on weekends in the country where a rustic lifestyle is adopted. On these occasions when Mexican and foreign-born owners of industry, business and land interact with other classes in society or with outsiders (non-Mexicans) they seek to express a common "Mexican" identity through the medium of pottery vessels and the food and drink intimately associated with them.

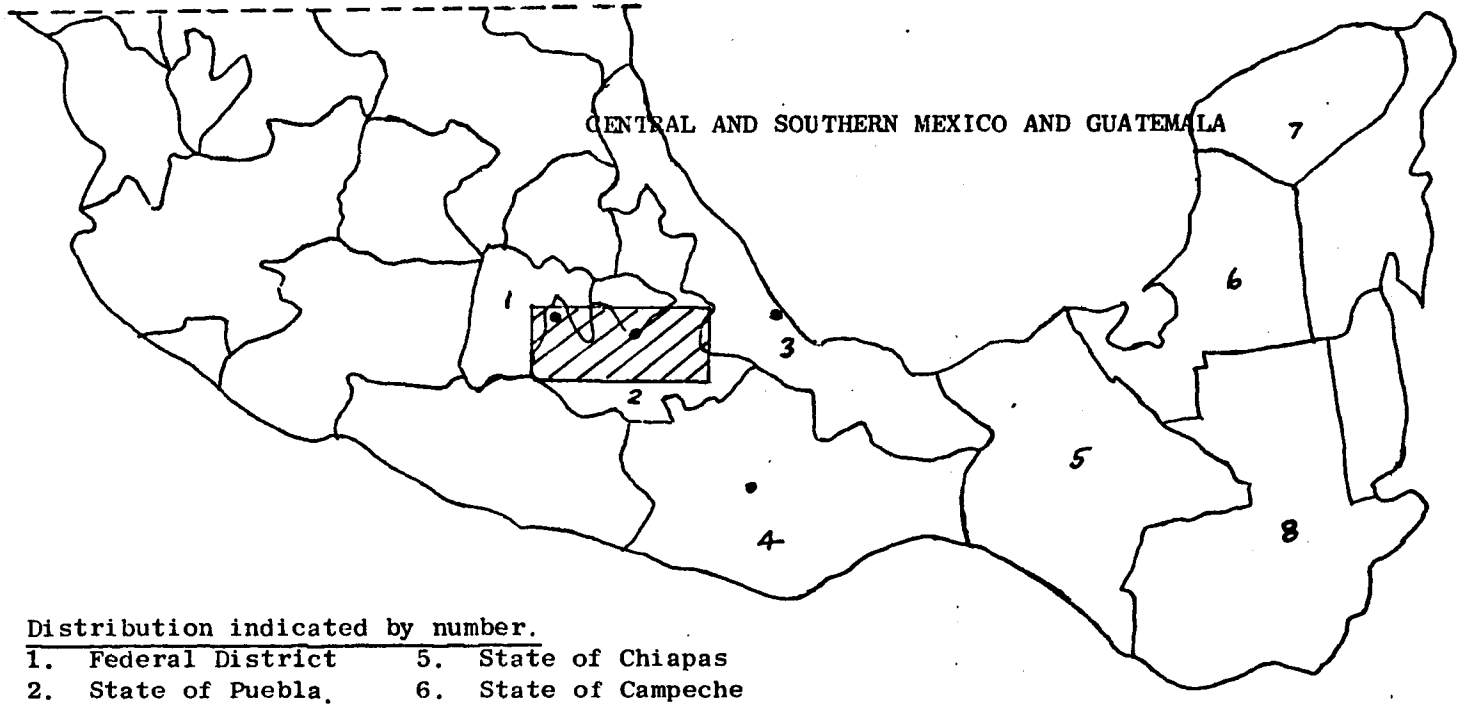
The expressed preference of President Echeverría and his wife for Mexican handicrafts is felt in the region. The wealthy, sometimes called "Malinchistas" because of their distaste for Mexican things, are beginning to follow the lead in some ways. It is now becoming fashionable

to have the husband's morning eggs cooked and served in a pottery casserole, and last year the prestigious Flower Club in the city of Puebla included a number of arrangements in black-on-red ware. When Sra. Echeverria visited Puebla last year, this same ware was used to prepare and serve the food. In elevating folk arts to the national level, the President and his wife are calling for pride of heritage and solidarity using secular symbols imbued with the traditional values of home and family, individual and nation, life and death, that have persisted in Mexico for generations.

Present Pottery Distribution

The center of production and distribution of black-on-red glazed pottery is in the city of Puebla. Most of the pottery is sold either in the city itself or in the surrounding countryside. Figure 25 shows the location of the main markets where pottery is sold in the city. Figure 24 shows the points of distribution in Puebla and in other parts of Mexico and Central America. Black-on-red cooking pottery is sold to the north and to the south and east, as far away as Guatemala. The shaded area on the map represents the area of densest distribution and includes the city and surrounding countryside of Puebla as well as the neighboring states of Mexico, Vera Cruz and Oaxaca. Within the shaded area, pottery distribution is most dense twenty-five to fifty kilometers from the city where it originates. Whereas this pottery may be found elsewhere (it is said to be sold sometimes as far north as the border), the traditional patterns of distribution are as I have indicated.

Fig. 24. Present distribution of Puebla red-and-black glazed pottery.



Distribution indicated by number.

1.	Federal District	5.	State of Chiapas
2.	State of Puebla.	6.	State of Campeche
3.	State of Vera Cruz	7.	State of Yucatan
4.	State of Oaxaca	8.	Guatemala

Area of intense pottery distribution.

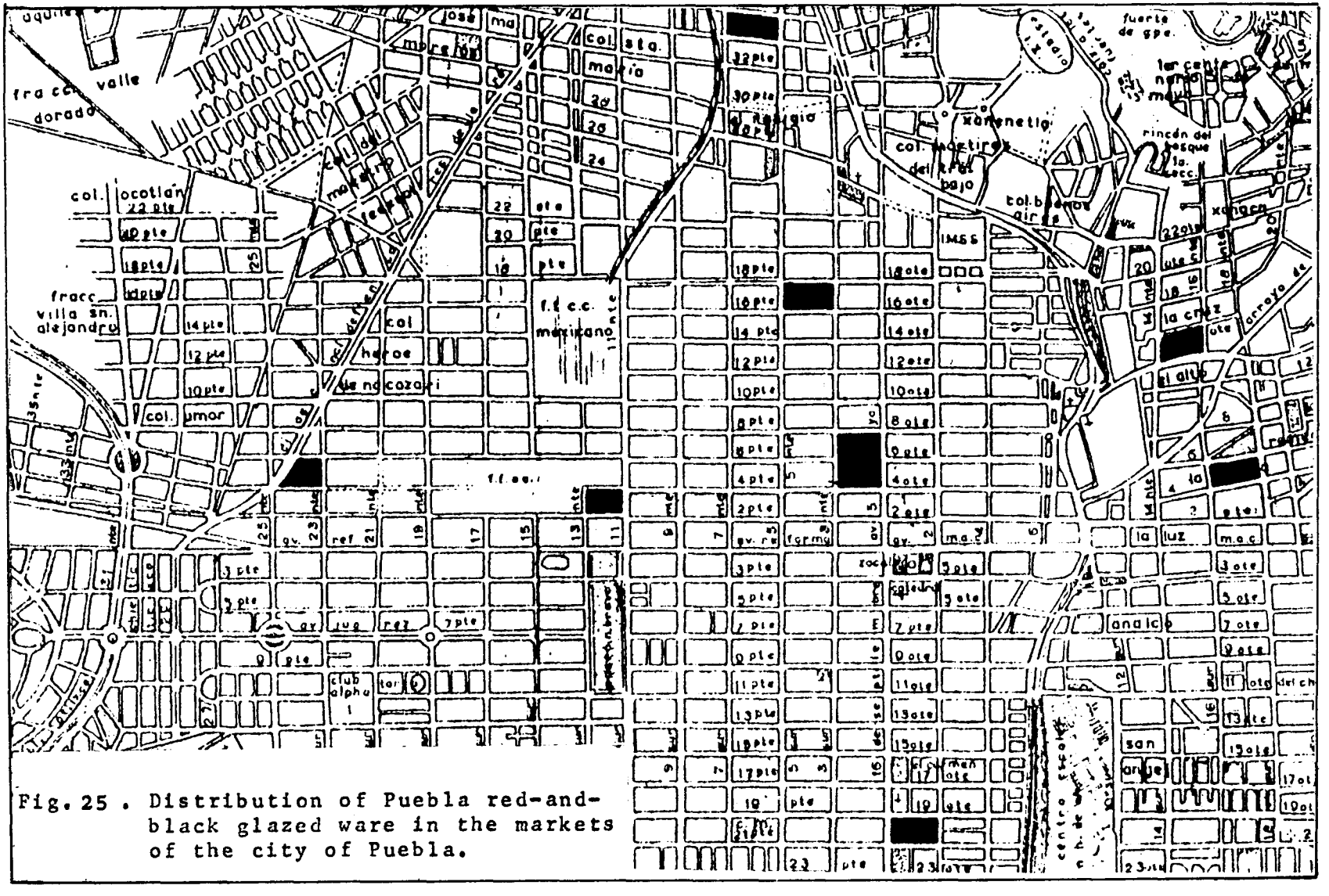


Fig. 25 . Distribution of Puebla red-and-black glazed ware in the markets of the city of Puebla.

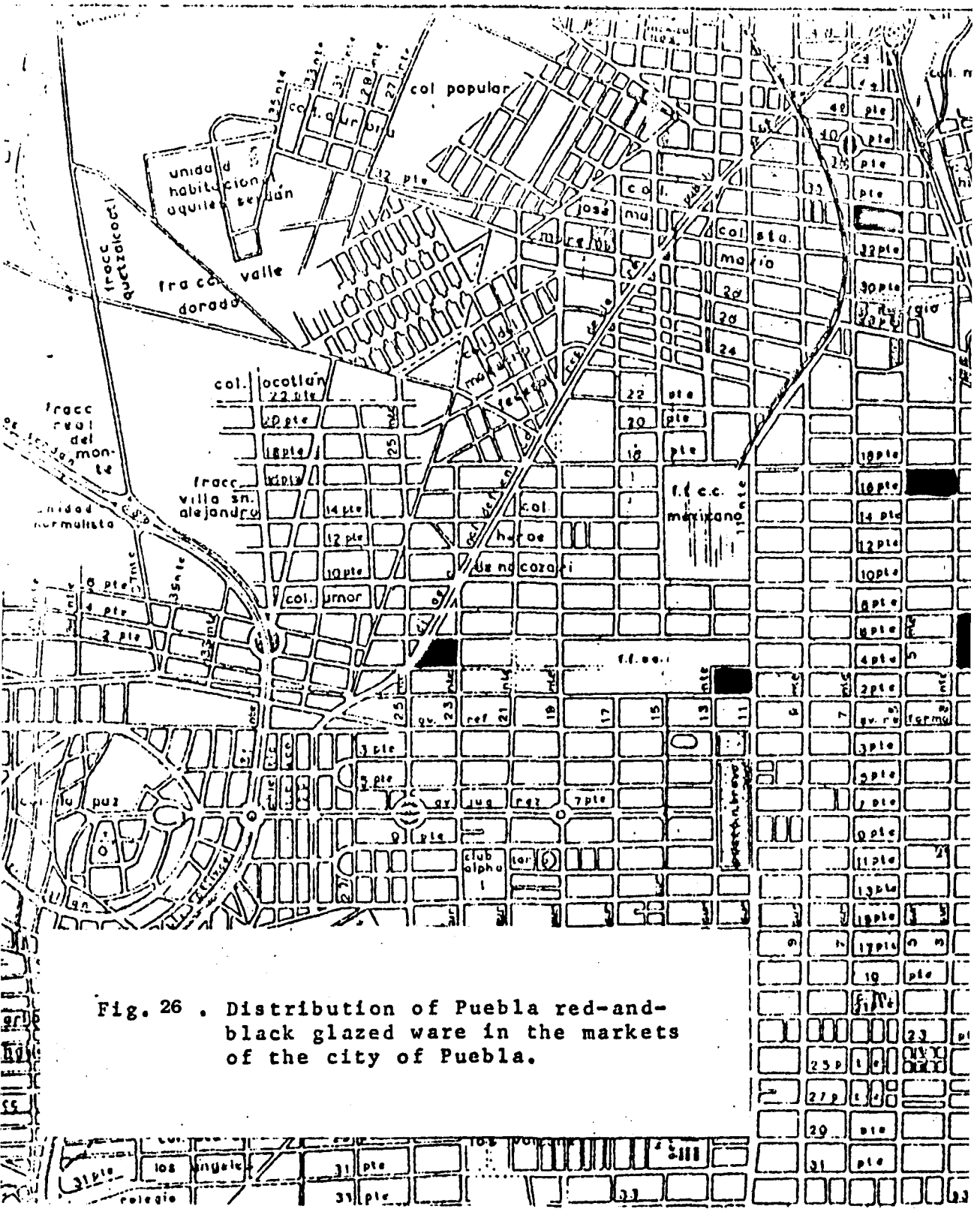
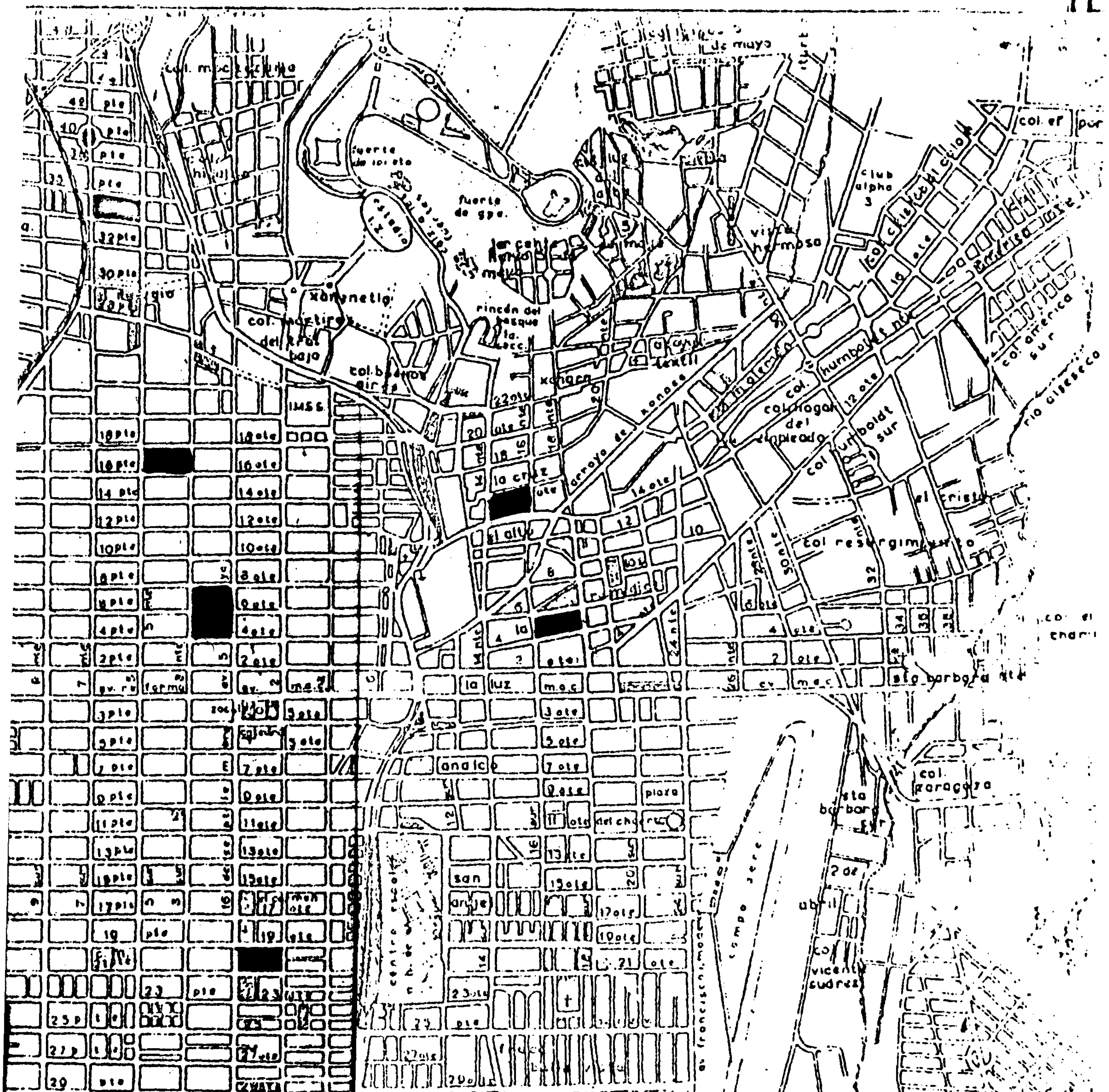


Fig. 26 . Distribution of Puebla red-and-black glazed ware in the markets of the city of Puebla.



fuerte de gpe.
estadio I.Z.
club alpha 3
col. humboldt sur
col. resurgimiento
col. zaragoza
col. america sur
rio alseseca
campo seco
centro escolar
IMSS
la luz
analco
plaza

Pottery is distributed in several ways. It is sold in retail shops owned by merchants and potters along the main street of the barrio of La Luz. It is bought by consumers, merchants, traders and vendors directly from potters in their workshops, i.e. in any of the units of production. It is sold in city markets shown on Figure 26 and outside on the streets. I use the term merchant to mean those who buy and sell pottery for cash only, and the term trader to mean those who buy pottery for cash but also accept payment in kind. The term vendor is used to designate those who have no fixed place of business or capital investment. They neither own property and equipment nor pay rent as do merchants and traders. They deal in cash, generally, in small scale transactions on an individual basis.

Vendors may be seen in or near the markets. They kneel outside on the sidewalks, perhaps a dozen medium to small pieces of pottery neatly stacked in front of them. Most local vendors are women. Some of them are the wives and relatives of potters, others are simply self-employed. Inside the markets they have no fixed selling place but wander about, offering their wares. They pay a small fee to the city each day they sell. One such vendor I know is an elderly woman, seventy-five years old. As a young child, she was taught by her mother to tie the knots of the fringe of the traditional shawl (rebozo) as a trade. Later, after she was married, she began to purchase pieces of pottery directly from the potters for resale. She has been doing this now for more than forty years.

Potters and male vendors sometimes sell in city markets, particularly those in or near the barrios. But they are more commonly

found in the regional weekly markets, e.g. the Tuesday market in San Martin Texmelucan in the State of Mexico, the Friday market in Tepeaca and the Saturday market in Izucar de Matamoros in the State of Puebla. At these markets and others, potters and vendors sell directly to the people who walk or come by bus from nearby towns and villages. Merchants who purchase pottery in the city may resell it to vendors or those with fixed market stalls at these weekly markets.

Merchants may act as wholesalers; they may own retail shops and fixed stalls in the markets. They are usually men, but women may also be owners. It is not unusual for a widow to continue the family business after her husband's death, especially with the assistance of her son, brother or son-in-law. The customers are almost always women.

From outside the city of Puebla traders make periodic trips to the workshops in the barrios to purchase pottery. They do not have a regular schedule. They may come once every three or four days or once in three to four weeks. When they do come, they make the rounds, going from potter to potter, selecting the types and sizes they want from what is then available. Potters do not know ahead of time when these traders will come or if they will come at all.

The traders collect the pottery, and with the aid of their helpers, they truck it to a further point, usually a town or village that serves as their base of operations. Some sell the pottery there, but others prefer to sell it in the more remote settlements where they expect to turn a greater profit. A trader will drive his truck to a point beyond the town, then he and his helpers will leave the road and continue on foot to reach their destination. Often they have taken

orders for particular pieces on previous trips, especially very large cooking pots and jars. When they deliver the pot ordered or make a sale in the hinterlands, they receive payment in the form of eggs, chickens, a turkey, goat, seeds, etc. Both parties to the transaction arrive at the balance by the process of haggling (regateando). The products obtained by the trader may be sold in the town at the market for cash or they may be transported all the way back to the city where they can be sold for a higher price. The money from the sale is used to purchase more pottery in the barrios and the cycle begins again.

There is yet another kind of distribution of pottery in rural areas and distant towns and cities by a special group of traders known as travellers (viajeros). They are traditionally associated with certain towns just outside the city of Puebla and with certain families living in certain barrios in those towns. Magdalena and Amozoc, both within twenty kilometers of the city of Puebla, are known as traditional centers for families of travellers. In the past they used to use carts and oxen to transport pottery and accepted payment in kind. Today they use buses and trains to reach their destinations which include rural areas and cities such as Oaxaca, and they accept payment in cash as well as kind. They usually do not own trucks but will walk about the town or city, after arriving by train or bus, offering their wares. They remain away from home for up to twenty days at a time. They do not hire helpers as traders do, but they may be accompanied by a brother or son. During the time they are away, they stay at guest houses, paying for their room and food. They do not have relatives or compadres with whom they stay and apparently make no efforts to form such relationships.

Each pattern of distribution, whether based on cash or kind, on a daily, weekly or monthly basis, may vary at any point in the transfer of pottery, produce and cash. Therefore, the potters cannot fully anticipate what the demand will be, and the sellers can neither anticipate what the supply will be nor the amount of cash and/or kind of products they will receive in the exchange with consumers. All the patterns operate simultaneously: potters, merchants, vendors, traders and travellers serve to distribute the pottery in the states of Puebla, Mexico, Vera Cruz and Oaxaca; Guerrero, Morelos, Chiapas, Campeche, Yucatan; and Guatemala.

NOTES

1. It is still customary to give sauce bowls in black-on-red ware as wedding gifts. As a joke, a bowl is often presented filled with pulque and with bananas floating in it. The symbolism is evident. Erotic drinking vessels are also made by the same potters in the form of male genitals. When the vessel is raised for drinking, the pulque emerges from a spout in the form of a penis.

CHAPTER V

ANALYZING A FOLK STYLE

The foregoing description of a folk pottery, black-on-red glazed utilitarian ware, its history, production and distribution suggest the pottery embodies the identity and in some ways the ethos and world view of a group of people. On the one hand its emergence following the Spanish Conquest may be seen in terms of colonialism and Crown policy which, through separatism and exploitation, heightened Indian consciousness and induced them, apparently, to draw upon earlier elements and incorporate these elements into a new form of pottery style. On the other hand, the florescence of the style in the nineteenth century following Independence from Spain may be seen in terms of a new sense of national identity which led to the fusion of formerly separate Indian and Spanish pottery traditions. Through distribution in space, the pottery extended that sense of identity and in both periods served to define social relations between realigned groups in the region and nation.

Before examining the social and cultural attributes of the style, I propose to elicit the system which organizes the technical and conceptual elements. The working assumptions are that style gives tangible form to the ideas and feelings of a group and that style is not the by-product of technique and innate creative impulse, but a system held in the mind and shared and transferred through learning and interaction in time and space. The first assumption arises out of the data and in

that sense, it has already been attested in the preceding chapters. The second assumption remains to be proved or disproved. I propose to do this by applying the following methods, all of them replicable, to test the nature and extent of the system assumed to exist. The methods involve the application of statistical techniques and linguistic models, especially emic analysis, to the study of style in material culture.

Emic is used in two ways: the first refers to the point of view of the culture bearer in Harris's sense (1968: 568-604) and the second to a construct, the simplification of a description of observable behavior. This is the usual linguistic sense (Langacker 1968: 29-32, 153-154, 157); and it is synchronic and structural (Langacker 1968: 6). Both views of emic are employed in this study.

I propose to look at style as if units comparable to phonemes existed in a system of contrasts from which style is created. And I consider the culture bearer's point of view, his definition and performance with regard to meaningful units, i.e. distinctive features essential to an overall structural analysis. Style is seen as analogous to language in that both form significant patterns through the conscious manipulation of symbols by their users who remain essentially unconscious of the system itself.

In view of the current interest in linguistic models, this study will provide an empirical test of the usefulness of such models for nonverbal behavior. I will also try, if feasible, in the conclusions to make some evaluation of the two models in the light of the current emic-generative controversy in linguistics (Cowan 1971; Keesing 1971; Lyons 1970a, 1970b; Muller 1971, 1966).

One method used here applies the emic model to the analysis of black-on-red glazed utilitarian pottery. Its aim is to determine the extent to which distinctive features and design motifs of the folk pottery may be grouped together into single units from the point of view of the culture bearer. Such a single unit is called a tifeme, derived from the word "motif" and pronounced ˈtēfēm (tiyfiym), and the constituent features, allotifs (based on an analogy with the phoneme-allophone, morpheme-allomorph distinction in linguistics). In my view, restrictions on allotifs as well as the rules of combinations for tifemes produce style in material culture.

To obtain the system, standardized tests and open-ended interviews were conducted with a sample of twelve potters. The potters were chosen on the basis of their skill and experience, acknowledged by their peers in the pottery making community. It was assumed that skilled potters, specialists in both the use of the wheel and molds, would have the greatest control of the system. This assumption is supported by the results of the tests and interviews; specialists were found to be in agreement with regard to the distinctive features and design motifs they identified. And their answers were treated as categorical responses. (Where they lacked a discrete label, one was supplied). The results are shown on Table 12. Twenty-five pottery types and ninety-four associated features are identified by potters; size is not included. Size is included, however, in the potters' universe of black-on-red glazed utilitarian pottery; Figure 6 shows they made the types in a wide range of sizes. Table 13 includes types of all-black ceremonial ware and decorative black-on-red ware not included in Figure 6. These wares mark boundaries of the utilitarian ware.

And it is this ware, as a system, that is being subjected to analysis. Several statistical techniques -- Cluster Analysis, both hierarchical and non-hierarchichal and Multi-Dimensional Scaling techniques -- were applied to the data contained in Table 13. An emic analysis, based on these data, is also presented in Figures 29 and 30. The method is described in detail and the results discussed later in the chapter. A further discussion of the methods applied is contained in the Conclusions, Chapter 6.

A second method used in this study aims to determine the extent to which there is agreement among a representative sample of the city population regarding style in utilitarian pottery. Based on the analogy with language and the emic model, there should be substantial agreement, i.e. a shared system; and there should be variation as a result of class, sex and age, i.e. dialect differences. For example, it is anticipated that there will be imperfect learning manifested by children since they have not yet mastered the system completely and they have been exposed to new influences in their formative stage.

Intensive interviews, closed and open ended, were conducted with a sample of one hundred twenty-five persons in the city of Puebla in 1973. The sample was subdivided on the basis of class, sex and age according to native categories. These categories were first elicited from twelve informants in open ended interviews in 1972. The informant was asked initially if there were any "classes" in the city. Then he was asked to describe the ones given. In addition to providing the names of persons who were cited as members of a given class, the informant usually volunteered data on family background or origin, occu-

pation, income, lifestyle and education, in that general order. The names were noted for possible future inclusion in a sample to be tested, and a number of those originally cited in 1972 were interviewed in 1973.

Of the twelve informants, two men and two women from each of the three classes tested - upper, middle and lower - those belonging to the upper and middle class were in general agreement with regard to class structure in the city. The three-fold division they made also agreed with my own observations. Of course, there are gradations with each division. For example, all informants made a distinction within the upper class between those who were Mexican, of noble or known lineage (los de abolengo) and those who were merely wealthy (los ricos). The latter includes the newly rich and those who are of foreign descent. The former includes those in reduced financial circumstances (vinieron a menos). Within the middle and lower classes there are gradations, but these are based mostly on occupation and income as well as education and life style. The boundary between them is not clearly marked so that at the lower end, the middle class merges with the upper lower class. The same is true of the boundary between the upper and middle class; at the lower end, the upper class merges with the upper middle class. The sharpest division is between the upper and lower classes. The middle class is identifiable but it merges at either end with the other two classes.

I did not pursue the investigation of gradations within class systematically, since to do so would have been beyond the scope of this study. The three main class divisions were sufficient for my purposes and an initial study. Nonetheless, I did try to collect informants and interviews that were representative of the gradations, and in the

conclusions I do try to take these gradations into account in evaluating the results. For example, among the upper class the sample includes men and women of distinguished families (abolengo) and of wealth alone. I created a fourth category of specialists, potters and crewmen, in order not to skew the results with regard to class. Potters and crewmen identify themselves and are identified by others as belonging to the lower class. They were primary informants, serving as a standard of knowledge about this pottery and style. They were expected to have the largest fund of such knowledge.

I was not successful in eliciting "class" categories from potters or members of the lower class who served as informants, other than an expressed two-fold division: rich and poor. Their basis for this division was simple: money and power. Power was defined either in terms of position (in government, big business, medicine, law and the military) and/or money. They lumped all wealthy and powerful people together (los ricos y los poderosos) as distinct from themselves. They referred to themselves as the poor people (los pobres) and, sometimes, as the simple people (la gente humilde). They did not use the term "class" and did not respond to the initial question in its initial form. It was rephrased to ask whether there were "differences" among the people in the city. Pursuit of this line of inquiry did produce the two-fold division of rich and poor, implied recognition of a middle class.

The upper class responded to the term "class", but they seldom employed it in discussion. They usually referred instead to "the others" and "themselves". These "others" were identified as the simple

people (la gente humilde), the same term used by the lower class for itself and as people with some means and preparation (la clase media). When pressed for details they supplied a description of three groups, distinguishing them as separate classes. I found the term "class" most commonly employed by those identified as being in the middle: intellectuals, teachers and university students in particular. They also spoke in terms of the rich (los ricos) and the poor (los pobres) with themselves as an implied point of reference in the middle.

All three classes and the specialists were in agreement with regard to age categories: elder, adult, young, child. Sex was categorized as wither male or female.

With few exceptions, all interviews were conducted in the home and/or workshop of informants. This helped to assure they would be at ease in a familiar setting, and I would be able to observe others and their response to the informant's answers. Others -- relatives, friends, visitors, tradesmen, etc. -- often nodded their agreement and occasionally jogged the memory of an informant. This convinced me of the widespread agreement, not only among potters and crewmen but among the population in general, beyond the limited sample tested.

The methods used in this study rely on verbal data, but they are not based on a view of style solely as a mental phenomenon. They include observation and the overt behavior of informants and others in daily and ceremonial activities to supplement and support the data obtained in interviews.

I originally intended to participate in the production of forms and to modify the distinctive features and design motifs in order to

determine the limits in the culture of acceptance and substitution. But this plan had to be abandoned. Pottery making in the barrios is a male occupation. Although informants said women could make pottery, in fact they rarely did. Small moldmade eating bowls and toys are made by young boys and occasionally, by women, although I never observed women potters at such work. I have seen unmarried daughters and wives sometimes take part in unloading a kiln, in breaking up raw clay with a stick and in scraping leather hard pots. In all the preceding tasks, women are classed with young boys, seven to twelve years of age, who regularly carry out this work. Whereas I observed dozens of children, I only saw two women actually assist their husbands and in both cases, the potter was extremely poor and worked alone. Evidently, few women are potters in the city of Puebla. Most are involved only peripherally and in case of need, in associated tasks.

For a woman to make pottery, even a stranger such as myself, involves a loss of prestige. Several informants, while expressing a willingness to teach me pottery making, were reminded of funny stories which still made them chuckle, of North American girls who had wanted to learn. One had donned trousers in order to sit at the wheel and apparently persisted for some days in learning. She was the star attraction in the barrio. And the potter, even though it was years later, still described with evident relish how people found excuses to pass by just to see this amazing and funny sight. I decided not to become equally ridiculous in their eyes.

There were other reasons, too, besides sex, for abandoning my plan to learn pottery making. All potters were initially very suspicious of my motives in wishing to learn about their craft; they

openly expressed the idea that I had come there to learn so that I could go back and teach my students to make pottery in the United States of America. They apparently had been visited at various times by male ceramicists, foreign and Mexican, who had wished to learn from them - and rarely succeeded. As I had no such idea, it seemed unwise to confirm their suspicions by actually making pots myself. But there was yet a third reason: it would take quite a long time before I could become proficient enough to vary existing pottery features and generate new forms. It seemed to me, my time would be better spent in establishing rapport, asking questions and observing intensely.

My husband became a reluctant apprentice during my second field season in 1973. He had previously studied ceramic sculpting and modelling with some success. It took several days of negotiations, several false starts and a good deal of patience (on both sides) before his lessons were arranged with one potter-informant. As each potter's seat and the wheel is made by a carpenter to fit the individual, my husband was none too comfortable in the potter's "cage" (juala). I would translate the potter's sparse instructions (my husband speaks very little Spanish) while my husband struggled with the resisting clay. Since potters are usually at work seven days a week, the "teacher" was often called away to negotiate a sale, prepare the glaze or solve a problem. In fact, reluctance to disturb their normal routine and interfere with their livelihood were among my other reasons for not becoming an apprentice myself. I did gain some insights into learning from the gap between the potter's minimal directions and my husband's expectations in terms of instruction. And I did gather additional information on how style is broken up in the learning process. But the experiment

in terms of manipulating style was a failure. I made an ethnographic description (in the usual sense) of how style is learned by children in pottery making families and noted the spontaneous use of clay and other related materials. The children were photographed at work and at play. My purpose was to analyze how style is broken up in the actual teaching/learning experience of children.

Although I did not have the opportunity to observe the process of learning through time in the same children due to a limited stay in the field, I did find children of different ages and sexes involved in pottery making. Based on interviews and observation of children (and adults), I was able to establish a learning sequence. This is described in Chapter III. The information collected will contribute to the data on children's expression in the visual arts before they are fully enculturated.

The following information was collected on each child observed and interviewed: name, sex, age, order of birth in the family. Additional information was also collected on the tasks assigned to children in pottery making, the ages at which they are assigned, and the order. I observed how a task is learned and corrected, i.e. by adult potters or others; by instruction, imitation, trial and error, etc. I questioned adults and children to learn what differences, if any, exist on the basis of sex and age, teachers and methods of teaching children.

Style was analyzed as follows: what potters say they do, would do, or should do to create folk pottery in appropriate style (to them); what they actually do, as can be observed by an outsider (me or anyone else), in the process of manufacture; and observable in the objects themselves. Non-potters were asked what is done, or should be done, to

produce the same folk pottery. I wished to learn how non-potters in the culture accept the objects produced, the extent to which variations and substitutions are accepted and judged appropriate.

A record was kept of each potter: his name, address, age, place of birth and other occupations, if any. His wife and children, parents, siblings and compadres were recorded as well. Dates, places and summaries of interviews and visits were included on the file card. Life histories were obtained for principal informants. A similar file was kept for non-potters.

In the first field season, the labels for the pottery itself and types were elicited by asking:

"What are these?" (pointing to a group of objects)

These are...

"Are these all the same?"

No, this is a ... this is a ... that is a ...

"How do you know this is a ... ?"

Because ... (features given)

"Is this a ... ?" (Each object offered)

Yes, this is a ... (No, this is not a ...)

The same procedure was repeated with unfinished (undecorated) ceramics. As a result, distinctive features and design motifs were obtained. Informants (potters and non-potters) were queried in order to determine whether these features contrast; whether they are in free variation or complementary distribution. I asked:

"Can I do this?"

Yes ... No, that does not belong there ...

"Would you do this?"

No, I would not. I would put it here ...

"Would anyone do this?"

Yes ... No, it is never done ...

In the second field season, having analyzed the data previously elicited, lists were compiled and arranged in the form of a tree diagram, representing the potter's universe of black-on-red ware, on large fold-out sheets. These sheets were presented to four master potters and four of their employees in two separate workshops. Some additions and deletions were made until they all agreed the tree diagram was correct and complete.

At first I was surprised by their ready acceptance of the diagram and labels. I could not repress a feeling of exasperation; if they had known this all along, why did they let me struggle so long to figure it out myself. They had earlier assumed the role of my teachers. And now they seemed pleased both with their pupil and their own ability to teach. "Yes, you have really learned well. This is the way it is." "You have done well." "Yes, that is right." It seemed to me, too, they were pleased with the sheer size of the sheets which I had opened out, accordion-fashion, to a length of six feet, and which we then checked over together. The sheets and all terminology were written in Spanish. They are literate and could check the sheets themselves.

The potter's universe of pottery was first determined through the interview techniques described, then a limited number of samples

from that universe were selected as being representative of type and size; I then photographed them. The photographs were numbered and mounted in an album (purchased in Puebla) along with photographs I had taken of pottery from other regions and from nearby towns in Puebla, the purpose being to test what was known about the ware from the city of Puebla in contrast to knowledge of both similar and distinct wares. The same album of color photographs was presented to a sample of specialists, potters and crewmen and to members of the lower, middle and upper classes in the city of Puebla. This sample was further subdivided on the basis of sex and age. Class, age and sex were based on native categories. The persons interviewed were selected according to the criteria for each category, their willingness to participate and their availability for follow-up and additional testing. In all, 125 interviews were conducted with a minimum of three persons in each category of each subdivision, a total of thirty-two categories. The tests included open-ended interviewing as well as a standardized color test that was devised.

The color test consisted of a book of colors, selected according to my best judgement from potter's samples of unfired, fired and finished clays collected in the course of fieldwork in 1972 and from clays found in other parts of the world. The colors correspond to the Munsell Soil Color Scale. Fifteen color cards were selected in all and mounted, two to a page. The book was presented to eighty-one of the one hundred twenty-five persons in the sample tested in 1973. Each person was first asked to name the colors in the book. Then they were asked if any of the colors resembled the clays or utilitarian pottery of Puebla. Finally, they were asked if any substitutions for the colors

associated with pottery where possible. I noted any additional comments and information they volunteered as well.

I seldom proceeded beyond the second question since the test seemed to generate boredom and resistance to further questioning. They seemed willing enough to name the colors in response to the first question. Fifty persons responding to the second question identified red and black (#8, 4, 5, 1, 9, 3, 2, 6 and 7) as the colors of ordinary cooking pottery in Puebla. However, they all were confused and annoyed by the question regarding substitutions. As far as they were concerned, they had already identified the "proper" colors for cooking pottery and saw no need to proceed further. To my surprise, the specialists, those who make and fire pottery, found it most difficult to judge clay and/or pottery color in the book format. One-quarter of the possible responses to the color cards went unanswered in each of the twenty-six interviews with specialists. Later, I tried giving potters pieces of broken pottery that I had picked up on the ground, sometimes from their own workshop, to compare with a color card. But they did not respond even then. It should be noted that clay color is usually judged by potters in the unfired state and that texture is also considered (see Chapter II). Other criteria involved here are possibly function and the stage of production. The work of Conklin and others with regard to color categories show this is a complicated area for analysis and should be tackled as a separate study (1955: 341-343). My judgements with regard to color were not accepted by the specialists entirely, and the test, in general, did not generate much useful information. Therefore, I discontinued it after eighty-one interviews had been completed.

The album of photographs devised as a test to elicit stylistic features, first from a sample of potters and second from a representative sample of people in the city, was composed in the following way. A selection of thirty-nine pots was made from the potters' total universe of one hundred thirty-three sizes and twenty-one types of black-on-red glazed ware in Puebla (see Figure 6). Two-thirds of the pots selected were wheelmade (26) and one-third, moldmade (13). The proportions selected corresponds to the proportion of types produced, i.e. there are twice as many wheelmade (14) as moldmade types (7) produced and recognized by potters. I selected the thirty-nine pots as representing not only the types, but the three techniques potters distinguish among themselves - jar makers who only use molds, those who use molds to make various cooking pots and those who use the wheel to make both jars and pots; and as representing further specialization into three size categories - large, medium and small.

There is a gradation of size within each of the three size categories, so I thought it best to select examples that would show a distinct difference in size when photographed. Since all the prints would be the same size (9cm x 13cm color prints), I realized that without my selecting for the medium differences in pot size might easily be lost. The results of the first series of tests using prints of all thirty-nine pots plus those of thirteen additional pieces of pottery, contrasting in time and place of manufacture with Puebla ware, showed even with my selection, informants had difficulty perceiving relative size of pottery. This was undoubtedly due to the use of photographs instead of the pots themselves; and also to the subtlety of size variation within a given category. But the advantages of using photo-

graphs by far outweighed the disadvantages. It would have been impractical to have attempted to convey such an extensive - not to mention combersome, breakable and heavy - sample around for interviews in various sections of the city. The album, 26cm by 30cm, with its mounted prints was portable, durable and light to carry; and the test the same for all informants interviewed.

In order to enable informants to judge size from photographs, I selected a common household item that would be familiar to everyone in Puebla, hence providing a reference point for the size of the vessel shown. The item selected was a metal basket with eggs. It can be seen any day of the week, being carried on the streets of the city to and from markets. It is used and known to all social classes. I also included a person's hands in the photographs; those of a man were used in some and those of a woman in others. They provided additional size referents. A metric ruler was placed near the base of the vessel along with an identifying number.

Table 9 lists the twenty-eight pots used for all testing after some forty interviews had been completed. Twenty-four prints were eliminated from the album because many of those showing gradation in size within pottery types were yielding redundant information; and because other information was being lost as the person interviewed became fatigued. Table 10 lists the twenty-four examples of pottery eliminated. The twenty-eight prints remaining in the album were those that had proved most productive. They were revealing of contrasts in the pottery sample tested and generated much additional data on family life, former customs and present changes in society.

TABLE 9

POTTERY USED IN TESTING

28 examples. (All examples are in black-on-red glazed ware or are unfired from the city of Puebla, except where noted from other towns. Listed in order of appearance in album).

1. Large jar (olla de a medio, moldmade)
2. Large jar (olla de a tlaquito, moldmade)
3. Medium jar (jarro sope, wheelmade)
4. Small jar (jarro medio transito, wheelmade)
5. Small jar (jarro capulixtle, wheelmade)
6. Large pot (tecomate de a seis, wheelmade)
7. Group assorted jars
8. Large pot (tortera de a medio, moldmade)
9. Large pot (cazuela de a medio, moldmade)
10. Small pot (casito molero, moldmade)
11. Toy pot (cazuela dedal, wheelmade)
12. Group assorted pots
13. Large pot (cazuela china, wheelmade)
14. Decorated pot (tortera pescadera labrada, moldmade)
15. Effigy jar (jarro panzon, moldmade)
16. Jar, town of Amozoc, Puebla (olla colorada, moldmade)
17. Pot, town of Ocotitlan, Puebla (cazuela, moldmade
18. Plates and bowls, town of Tzintzuntzan, Michoacan (platos y cajetes, moldmade)
19. Jar, town of Zautla, Puebla (jarro, moldmade)
20. Jar, town of Zacapoaxtla, Puebla (olla, moldmade)

TABLE 9 CONTINUED

21. Large jar, unfired (cantaro de a doce, wheelmade)
22. Large jar, unfired (cantimplora a doce, wheelmade)
23. Large jar, unfired (jarro cachucho doce, wheelmade)
24. Medium jar, unfired (olla de a doce, wheelmade)
25. Large pot, unfired (tecomate a doce, wheelmade)
26. Large pot, unfired (cazuela china de a doce, wheelmade)
27. Chamber pot, unfired (bacin de a doce, wheelmade)
28. Flower pot, unfired (maceta a doce, wheelmade)

TABLE 10

POTTERY ORIGINALLY USED IN TESTING, BUT ELIMINATED

24 examples.

1. Medium jar (jarro arrocero, wheelmade)
2. Small jar (jarro transito, wheelmade)
3. Toy jar (jarro dedal, wheelmade)
4. Large pot (cazuela de a tlaco, moldmade)
5. Medium pot (cazuela de a diez, moldmade)
6. Small pot (cazuela de ocho, moldmade)
7. Large pot (tortera de tlaco, moldmade)
8. Small pot (cazuela de medio-transito, wheelmade)
9. Small pot (cazuela de arrocero, wheelmade)
10. Small pot (cazuela capulixtle, wheelmade)
11. Large jar (olla de a doce, wheelmade)
12. Large jar, unfired (olla de a doce, wheelmade)
13. Large jar, unfired (olla de a doce, wheelmade)
14. Large jar, unfired (olla de a doce, wheelmade)
15. Large pot, unfired (caso de a doce, wheelmade)
16. Effigy jar (jarro Apache, moldmade)
17. Flowered jar, town of Patzcuaro, Michoacan (jarro, wheelmade)
18. Effigy jars (2), Collection Museo de Arte Popular, Mexico City (moldmade)
19. Assorted jars, Collection Museo Casa del Alfenique, Puebla (moldmade)
20. Assorted partially finished jars, Talavera factory, Puebla (wheelmade)
21. Eighteenth and nineteenth century Talavera plates, Collection Stak Museum of Art, Puebla (moldmade)

TABLE 10 CONTINUED

22. Assorted jar, Oaxaca (hand modeled)

23. Painted plates, town of Tzintzuntzan, Michoacan (moldmade)

24. Polychrome plates, town of Capula, Michoacan (moldmade)

I would like to note that while I anticipated difficulty with the potters' perception of the pottery in the album format of photographs, especially after the ill-fated color test described earlier, this did not prove to be the case. With few exceptions, they rarely even made an "error" on size, and when they did, they were always within one size, either next largest or smallest of the pot shown in the print. An error here refers to the misjudging of size and/or label assigned to the pot by its maker and agreed upon by other potters who judged the pot itself and not a print. There was near unanimity among adult and elder potters and crewmen with regard to pot type,size and design; and with regard to the features distinguished. (For the detailed results of the testing, see the end of this chapter and the conclusions, Chapter VI).

What I did not anticipate was the enthusiastic response to the prints themselves. They would often call over some relatives, friends or employees and exclaim over how good the pottery looked. They would remark that the photographs really did justice to their work. This was not the only occasion on which I found them to be very concerned with the aesthetics of their work. This is everyday cooking pottery, utilitarian ware that is primarily functional. Yet there is a very deep and widespread feeling among the potters for its form, finish and design; and pride in their tradition.

P-STAT Version 3.05, Revision 2, December 14, 1973, 27Ø K Overlay (Roald Buhler, 1971), was used to tabulate and correlate the variables of sex, age, status, specialty and response to pot (1,28) based on one hundred twenty-five interviews. The variables are categorical; the responses of those informants, with final determination

by the investigator. Table 11 gives the code used for the computer program.

Each of the one hundred twenty-five persons in the sample tested was assigned an identifying number (1,2,3); and each categorical response was numbered (10,11,12). The responses were categorized as follows: first, all responses to each pot were collected according to pot number on separate sheets. Second, each sheet was studied in order to subsume under one label those responses which, in my best judgement, varied only slightly from the others and conveyed essentially the same information. Distinctions were preserved when they appeared to be subject to interpretation. Finally, each categorical response was assigned a number and the number entered in the appropriate columns.

Some photographs of pottery in the test album generated more varied responses than others. For example, the two group photographs (#7,#12) which I hoped would elicit a name for the ware, produced fifty responses. I was able to reduce the total to ten for #7 and eighteen for #12 by the method described in the preceding paragraph. Responses identifying the cooking pots as being from "here", from "La Luz", "Puebla", La Luz, Puebla were classified together as La Luz, Puebla (#118); the responses "loza de La Luz", "loza del barrio de La Luz", loza corriente de La Luz, Puebla","loza Puebla, barrio de La Luz" were classified as "loza de La Luz" (#116). One response (#118) is simply geographical; the second (#116) also includes the type of pottery, a general label indicating an ordinary or common ware (loza). Both responses could have been combined, but the distinction between an implied (#118) and expressed (#116) (albeit general) label for the

TABLE 11

CODE FOR P-STAT VERSION 3.05, REVISION 2, DECEMBER 14, 1973,

27Ø K OVERLAY: BLACK-ON-RED GLAZED WARE,

PUEBLA, MEXICO

Line one: (numbers refer to columns punched in coding)

1, 2, 3 } informant's designation (numbers 1-126)

5 card number - 1

6 sex
1. male
2. female

7 specialty
1. potter (self employed)
2. potter-employee
3. member of painting and firing crew

8 age category
1. elder
2. mature adult
3. young
4. child

9 status
1. specialist
2. lower class
3. middle class
4. upper class

10, 11, 12 } response to pot

TABLE 11 CONTINUED

Line two:

1, 2, 3	informant's designation (numbers 1-126)
5	card number - 2
10, 11, 12	response to pot

ware was preserved. Both responses clearly show the extent to which this pottery is identified and even synonymous with Puebla, and the barrio of La Luz. In all, one hundred sixty-eight categorized responses to twenty-eight pots were encoded on the computer cards (5). The key to the total responses is provided in Table 12.

As Table 11 shows, specialty (7) was made a separate category of status (9), and subdivided to indicate function: potter (self-employed), potter employee, and member of a painting and firing crew. All specialists are male (6). Age categories (8) are those distinguished by informants: child (nino), young person (joven), mature adult (adulto) and elder (grande). I did not translate "grande" as old because there are other terms for an old person which are used under certain circumstances. A person is not called old (viejo, vieja) unless he or she is too old or disabled to work. The term is seldom used since it is considered somewhat of an insult. The term venerable (anciano) like the term old (viejo) indicates a person is unable to work, but there is a measure of respect attached to the term because of the extreme age attained. A person is venerable or very old (anciano, anciana) from about eighty years of age. This term, like the preceding one, is seldom used, though for a different reason - few people seem to live to be very old, that is much beyond the age of seventy. This is particularly true of the specialists. I was able to locate only one potter over eighty. He would resent being called either old or venerable because he, too, still worked every day, though hampered by poor eyesight and hand tremors. I did not attempt to include a very old age category in the sample tested since it was apparent the problems of obtaining an adequate sample exceeded the

TABLE 12

KEY TO RESPONSE TO POTS 1-28 BY SAMPLE TESTED,

P-STAT VERSION 3.05

1. No answer given
2. Cantaro
3. Jarro
4. Jarron
5. Mescalera
6. Nixtamal o nixcomal
7. Olla
8. Olla de a medio
9. Ollon
10. Tamalera
11. Tinaja
12. Jalapena
13. Jalapena tlaquito
14. Jarra
15. Jarro sope
16. Olla de a tlaquito
17. Tarro
18. Jarro arrocero
19. Jarro - olla
20. Olla jalapena de a diez
21. Olla sope

TABLE 12 CONTINUED

22. Sope
23. Jarro cafetero
24. Jarro medio-transito
25. Tazon
26. Cafetero
27. Capulixtle
28. Jarro chocolatero
29. Jarro dedal
30. Taza
31. Cacerola
32. Cajete
33. Cazo
34. Cazuela
35. Cazuela - olla
36. Gallina
37. Tecomate
38. Tecomate de a seis
39. Arrocero
40. Cazon
41. Cazuela arrocera
42. Cazuela extendida
43. Cazuela tortera
44. Olla extendida
45. Paellera
46. Tortera
47. Tortera de a medio

TABLE 12 CONTINUED

48. Cazuela de a medio
49. Cazuela molera
50. Cazuelon
51. Cazito
52. Cazito de a ochito
53. Cazuela de a ochito
54. Cazuela china
55. Cazuela ondeada
56. Olla ondulada
57. Cazuela dedal
58. Cazuela coquito
59. Cazuela juguete
60. Plato
61. Salsera
62. Salero
63. Cazuela larga
64. Charola
65. Comal
66. Ensaladera
67. Frutera
68. Palanga
69. Pescadera
70. Platon
71. Tortera labrada
72. Botellon

TABLE 12 CONTINUED

73. Cantimplora

74. Florero

75. Garrafon

76. Garrafon labrada

77. Jarro muneco

78. Jarro panzon

79. Payaso

80. Pichel

81. Vasija

82. Pocillo

83. Anfora

84. Olla colorada de a diez

85. Olla de a tlaco

86. Botijo

87. Jarro cantaro de a doce

88. Olla cantaro

89. Jarro cantimplora de a doce

90. Chimbule

91. Porron

92. Tibor

93. Chasquito

94. Jarro cachucho de a doce

95. Jarro de a doce

96. Olla de a doce

97. Olla jalapena de a dos

98. Barril

TABLE12 CONTINUED

99. Gallo

100. Olla panzona

101. Tecomate de a sope

102. Cazuela china de a doce

103. Albanal

104. Bacin

105. Bacin de a doce

106. Borcelana

107. Botes de tapadera

108. Cubeta

109. Heruidor

110. Maceta

111. Maceton

112. Maceta de a diez

113. Loza

114. Loza colorada vidriada

115. Loza de Guanajuato

116. Loza de La Luz

117. Loza poblana

118. La Luz, Puebla

119. Caseros

120. Jarros de La Luz, Puebla

121. Jarros y ollas

122. Jarros y ollas de La Luz, Puebla

123. Each piece named separately, Puebla

124. Ollas de La Luz, Puebla

TABLE 12 CONTINUED

125. Oaxaca

126. Cazuelas (no ware named)

127. Cacerolas (no ware named)

128. Cazones y caserolas (no ware named)

129. Cazuelas, La Luz, Puebla

130. Cacerolas, Guanajuato

131. Cazuelas Mexicanas

132. Cazuelas del pueblo

133. Cazuelas y torteras (arroceras) (no ware named)

134. Ollas (no ware named)

135. Loza negra, Oaxaca

136. Loza negra, Guadalajara

137. Loza negra

138. Barro de Cuetzalan

139. Acatlan

140. Michoacan

141. No es de La Luz, Puebla

142. Hehuites, Acatlan

143. Cacerolas y platos (no ware named)

144. Platones, platos, vasijas (no ware named)

145. Vajilla (no ware named)

146. Platones, platos (no ware named), no es de Puebla)

147. Platos, charolas (no ware named)

148. Platones, cajetes (no ware named)

149. Cajetes (no ware named)

150. Charolas (no ware named)

TABLE 12 CONTINUED

151. Palanganas (no ware named)

152. Platones, platos de Oaxaca

153. Cajetes, Oaxaca

154. Platones, charolas, Oaxaca

155. Platos, Monte Alban

156. Platos, Acatlan

157. Palanganas, Acatlan

158. Platones, platos, Amozoc

159. Platones, Guadalajara

160. Platos, Tabasco

161. Platones, platos, La Luz, Puebla

162. Platones y cajetes, La Luz, Puebla

163. Charolas, La Luz, Puebla

164. Comales, Guerrero o Oaxaca

165. Ollas, not Puebla, La Luz

166. Jarros, not Puebla, La Luz

167. Cazuela, San Jeronimo Ocotitlan

168. Cazuela, no es de Puebla

possible benefits to be derived from including this category. Although the results are not presented here, some very old people were interviewed. They were found to be in general agreement with elders of the same class and sex. The age categories range as follows: elder (grande), fifty to about seventy; mature adult (adulto), thirty to fifty; young (joven), fifteen to thirty; and child (nino), seven to fourteen years of age.

Tables 16-47 summarize the results of the tests based on pots 1, 28; the key to the responses is listed in Table 12 . Specialists, members of the lower class and women have the most detailed knowledge of this pottery as expressed by specific labels for types and sizes. Some labels refer to monetary units that have been in existence in Mexico since the sixteenth century; others refer to weights and measures that have comparable time depth; and still others probably refer to size series established by the Spanish guild, e.g. "de a seis", "de a diez", "de a doce" - six, ten and twelve, respectively. As early as 1524, three years after the Conquest of Mexico was completed, a series of ordinances by Cortes established the use of standard weights and measures after those in Spain (Estampa 1949:3). Many of these have persisted through the colonial period to the present day (Estampa 1949:7,9,10,14). For example, "de a cuartilla" and "de a medio" are traditional units of measure applied to sizes of black-on-red utilitarian pottery. Likewise, "de a real" and "de a tlaco" are colonial monetary units applied to pottery sizes. And these units of money, weights and measures, are intertwined in an even more complex size series of pottery types (see Figure 6 for the potters' taxonomy).

Children and members of the upper class were frequently unable to respond (response #1, Table 12), or responded using the most inclusive labels, (olla - response #7, jarro - response #3, cazuela - response #34). For example, pot #8 (tortera de a medio, Table 12), is identified by the general label, cazuela (response #34, Table 12), by most children and young people, by members of the middle and upper classes and by men; a more specific label, tortera (response #46, Table 12), is used for the same pot by most adults and elders, the lower class and women. Specialists use tortera, too, and the even more specific label, tortera de a medio (response #47, Table 12).

Differences in knowledge of pottery are more marked when less familiar types and groups of pottery, from Puebla and elsewhere, served as stimuli (pots #6,8,14,15,21,22,23,25,27; #7,12 and 18). These pots generated much information about the distinctive features used to define types and wares. These features are listed in Table 13. For example, pot #6 (tecomate de a seis, Table 9), is, according to potters, a cross between an olla (response #7) and a cazuela (response #34). The tecomate is made on the wheel. It is round (features #4, 12), it has a relatively closed mouth (features #13,14) and ears (features #31,39) just like the wheelmade olla. But it is neckless (feature #16) and its ears are placed horizontally (feature #41) on the rim (feature #44) like the cazuela, and it is used in much the same way (features #78,80). This mixture of features is reflected in the varied responses recorded for pot #6.

The results of the tests show differences in response to pot #1, 28, are related to variables of age, class and sex. Specialists, as

TABLE 13

Features:	1. Olla	2. Olla	3. Olla colorada	4. Jarro	5. Jarro cachucho	6. Jarro cantaro	7. Velorio	8. Velorio-huevito	9. Cazuela	10. Caso	11. Cazuela	12. Caso	13. Tortera	14. Tecomate	15. Borcelana	16. Bacin	17. Maceta	18. Molcajete	19. Cajete	20. Cantimplora	21. Jarro labrada	22. Olla labrada	23. Tortera labrada	24. Jarro negro	25. Olla negra
Technique/Tecnico																									
1. Wheel/Torno-		+		+	+	+	+	+	+	+				+	+	+	+			+				+	+
2. Mold/Manero											+	+	+					+	+		+		+		
3. Mold/Ollero	+		+																			+			
Shape/Forma																									
4. Round/Redonda	+	+	+											+								+			+
5. Deep/Honda									+		+				+			+	+						
6. Extended/Extendida										+		+	+										+		
7. Oval/Ovalada																							+		
8. Eggshaped/Huevito								+																	
9. Very round/Panzon				+	+	+	+													+	+			+	
10. Straightwalled/Pared va derecho										+		+	+			+	+						+		
11. Flaringwalled/Pared va tendido									+		+														
12. Arc-walled	+	+	+	+	+	+	+	+						+				+	+	+	+			+	+
Mouth/Boca																									
13. [illegible]									+	+	+	+	+			+	+	+	+				+		

3. Mold/Ollero	+		+																	+				
Shape/Forma																								
4. Round/Redonda	+	+	+										+							+				+
5. Deep/Honda								+		+				+			+	+						
6. Extended/Extendida									+		+	+										+		
7. Oval/Ovalada																						+		
8. Eggshaped/Huevito							+																	
9. Very round/Panzon				+	+	+	+												+	+			+	
10. Straightwalled/Pared va derecho									+		+	+			+	+						+		
11. Flaringwalled/Pared va tendido								+		+														
12. Arc-walled	+	+	+	+	+	+	+	+					+				+	+	+	+			+	+
Mouth/Boca																								
13. Open/Abierta Closed/Cerrada								+	+	+	+	+			+	+	+	+				+		
14. *Wide/Ancha*	+	+	+										+	+						+				+
15. Narrow/Angosta				+	+	+	+	+											+	+			+	
Neck/Gollete																								
16. No neck/Sin gollete o pesqueso o cuello								+	+	+	+	+	+	+	+	+	+					+		
17. Tall necked/Pesqueso largo	+	+	+			+													+		+			+
18. Short necked/Pesqueso corto				+	+		+	+												+			+	
Rim/Bordo																								
19. No rim added/Sin bordo	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+		+	+
20. Big rim/Bordo grande								+	+	+	+	+										+		
21. Small rim/Bordo pequeno	+	+	+	+	+	+	+	+					+	+	+	+			+	+	+		+	+
22. Spout/Pico				+		+													+	+				

18. Short necked/Pesqueso corto				+	+		+	+														+			+		
Rim/Bordo																											
19. No rim added/Sin bordo	+	+	+	+	+	+	+	+						+	+	+	+	+	+	+	+	+		+	+		
20. Big rim/Bordo grande									+	+	+	+	+											+			
21. Small rim/Bordo pequeno	+	+	+	+	+	+	+	+						+	+	+	+			+	+	+		+	+		
22. Spout/Pico				+		+														+	+						
23. Plain rim/Liso									+	+	+	+	+	+	+	+	+										
24. Incised rim/Repulgado									+	+	+	+	+											+			
25. Wavy rim/"China"	+								+													+					
Seat/Asiento																											
26. Round/Redonda Flat/Plano	+	+		+	+		+	+	+		+			+				+	+			+		+	+		
Foot/Pata																											
27. Round/Con pata																					+						
28. 3-footed/Tripods																		+									
29. No feet/Sin patas	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	+	+	+		
Ears/Orejas																											
30. Rolled type #1/Volada											+	+	+											+			
31. Flat type #2 & #3/ Oreja	+	+							+	+				+	+	+					+	+			+		
32. "Spider" type #4/ Adornada arana																					+	+					
33. "Rat" type #5/Raton		+		+	+	+														+				+	+		
34. Decorative #6/Adornada																						+					
35. Decorative #8 & #9/ Adornada																							+				
36. Flat type #10/Oreja	+	+		+	+	+									+	+				+	+	+		+	+		
37. No ears/Sin Orejas			+				+	+									+	+	+								
38. 1 ear/Una oreja				+	+	+									+					+	+			+			

35. Decorative #8 & #9/ Adornada																							+		
36. Flat type #10/Oreja	+	+		+	+	+									+	+				+	+	+		+	+
37. No ears/Sin Orejas			+				+	+									+	+	+						
38. 1 ear/Una oreja				+	+	+									+					+	+			+	
39. 2 ears/Dos Orejas	+	+							+	+	+	+	+	+		+							+	+		+
40. 4 & 8 ears/Cuatro & ocho orejas																							+		
41. Ears horizontal	+								+	+	+	+	+	+									+		
42. Ears vertical	+	+		+	+	+									+	+	+			+	+	+		+	+
43. Ears on body	+																								
44. Ears on rim									+	+	+	+	+	+									+		
45. Ears on rim, body	+	+		+	+	+									+	+	+			+	+	+		+	+
Cover/Tapa																									
46. No cover/Sin tapa	+	+	+		+	+	+	+			+	+	+				+	+	+	+			+	+	+
47. Corn cob/Elote						+																			
48. Rag/Trapo		+		+																					
49. Wood/Madera	+	+	+						+	+				+											
50. Pottery/Tapa															+	+					+	+			
51. Leaf/Hoja		+		+																					
Color/Color																									
52. Red & black/Rojo y negro	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+		
53. Red/Rojo			+						+	+	+		+				+		+						
54. Black/Negro				+		+	+	+												+	+			+	+
Glaze/Grieta																									
55. Glaze allover inside/ Grieta adentro	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+	+	+	+	+

49. Wood/Madera	+	+	+						+	+				+											
50. Pottery/Tapa															+	+						+	+		
51. Leaf/Hoja		+		+																					
Color/Color																									
52. Red & black/Rojo y negro	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+		
53. Red/Rojo			+						+	+	+		+				+		+						
54. Black/Negro				+		+	+	+												+	+			+	+
Glaze/Grieta																									
55. Glaze allover inside/ Grieta adentro	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+	+	+	+	+
56. Glaze allover outside/ Grieta afuera	+			+			+	+							+	+					+	+	+	+	+
57. Glaze ½ outside (upper half)/Grieta afuera	+	+	+	+	+	+	+	+						+						+					
58. No glaze outside									+	+	+	+	+					+	+						
59. Shiny glaze/Brilla mucho	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+
Decoration/Labrada																									
Painted/Pintado																									
60. Unpainted/Sin negro decoracion			+								+		+				+	+	+	+				+	+
61. Black stripes/Rayas negras				+																	+				
62. Black crisscross/ Cocolitos	+	+			+	+			+	+	+	+	+	+		+	+						+	+	
63. Black spots/Manchas negras o gavilanes	+						+	+							+				+						
Embossed/Moldeada																									
64. Flowers/Flores Roses/Rosas																					+	+	+		
65. Stars/Estrellas Leaves/Hojas Buttons/Botones																									

Embossed/Moldeada

64. Flowers/Flores
Roses/Rosas

65. Stars/Estrellas
Leaves/Hojas
Buttons/Botones
Birds/Pajaritos
Fish/Pesca
Eagle with snake/
Aguila con vivora

Handmodeled/Figuras

66. Lady/Muneca
Man/Charro

Grooved/

67. "Spur"/Espuela

68. Channeled/Acanalada

Effigy/Labrada

69. Lady jar/Catrina
Fatman jar/Panzon
Monkey jar/Mono

Location of design

70. Inside (allover)/
Adentro

71. None inside/Liso

72. None outside/Liso

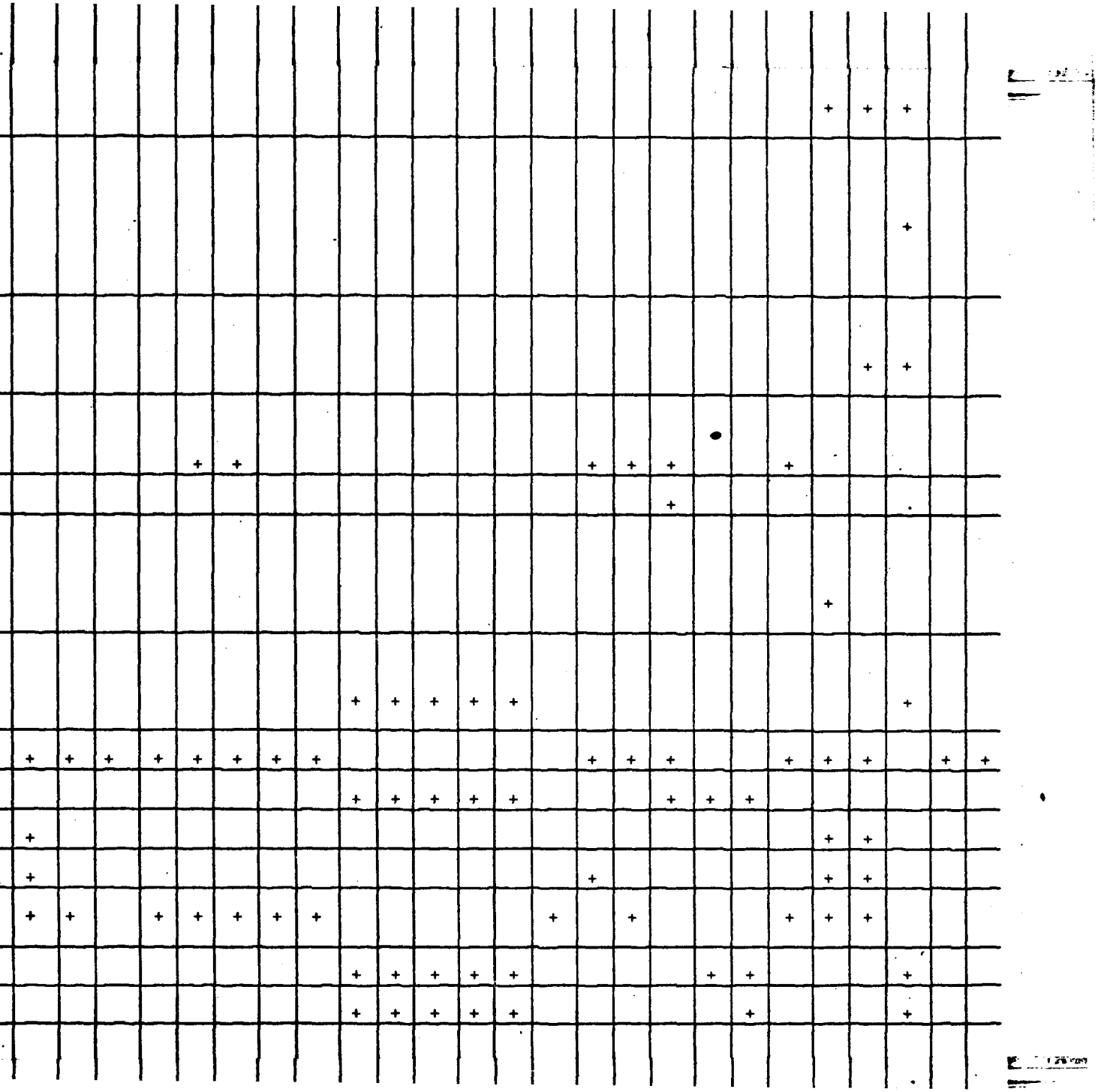
73. On neck/Pesqueso

74. On body/

75. On neck & upper half
of body/

76. On bottom (interior)/

77. On sides (interior)/



72. None outside/Liso									+	+	+	+	+					+	+	+											
73. On neck/Pesqueso	+																						+	+							
74. On body/	+														+								+	+							
75. On neck & upper half of body/	+	+		+	+	+	+	+						+		+					+	+	+								
76. On bottom (interior)/									+	+	+	+	+							+	+				+						
77. On sides (interior)/									+	+	+	+	+								+				+						
Uses/Usos																															
78. To cook(food)/Cocer										+		+		+																	
79. To boil(food & liquid)/ Hervir	+	+	+	+										+																	
80. To stew/Guisar									+	+				+																	
81. To fry/Freir													+	+																	
82. To grind/Moler																					+										
83. To pour/Echar					+	+																+	+			+					
84. To drink(non-alcoholic)/Tomar				+			+	+																							
85. To drink(alcohol)/ Beber				+																											
86. To serve in/Servir					+	+															+	+	+	+	+	+	+				
87. To store(food)/ Guardar		+	+						+	+				+																	
88. To store(water)/ Conservar	+																							+							
89. To adorn with/ Adornar (gift)	+			+					+	+			+		+	+	+						+	+	+	+	+				
90. To play with/Jugar				+					+	+																					
91. To hang up/Colgar				+					+	+													+	+	+						
92. To wash in/Lavar																+															
93. To plant in/Sembrar																	+														

Uses/Usos																										
78. To cook(food)/Cocer										+		+		+												
79. To boil(food & liquid)/ Hervir	+	+	+	+										+												
80. To stew/Guisar									+	+				+												
81. To fry/Freir													+	+												
82. To grind/Moler																				+						
83. To pour/Echar					+	+															+	+			+	
84. To drink(non-alcoholic)/Tomar				+			+	+																		
85. To drink(alcohol)/ Beber				+																						
86. To serve in/Servir					+	+														+	+	+	+	+	+	+
87. To store(food)/ Guardar		+	+						+	+				+												
88. To store(water)/ Conservar	+																						+			
89. To adorn with/ Adornar (gift)	+			+					+	+			+		+	+	+				+	+	+	+	+	
90. To play with/Jugar				+					+	+																
91. To hang up/Colgar				+					+	+											+	+	+			
92. To wash in/Lavar																+										
93. To plant in/Sembrar																	+									
94. To carry in/Llevar		+		+	+	+															+					

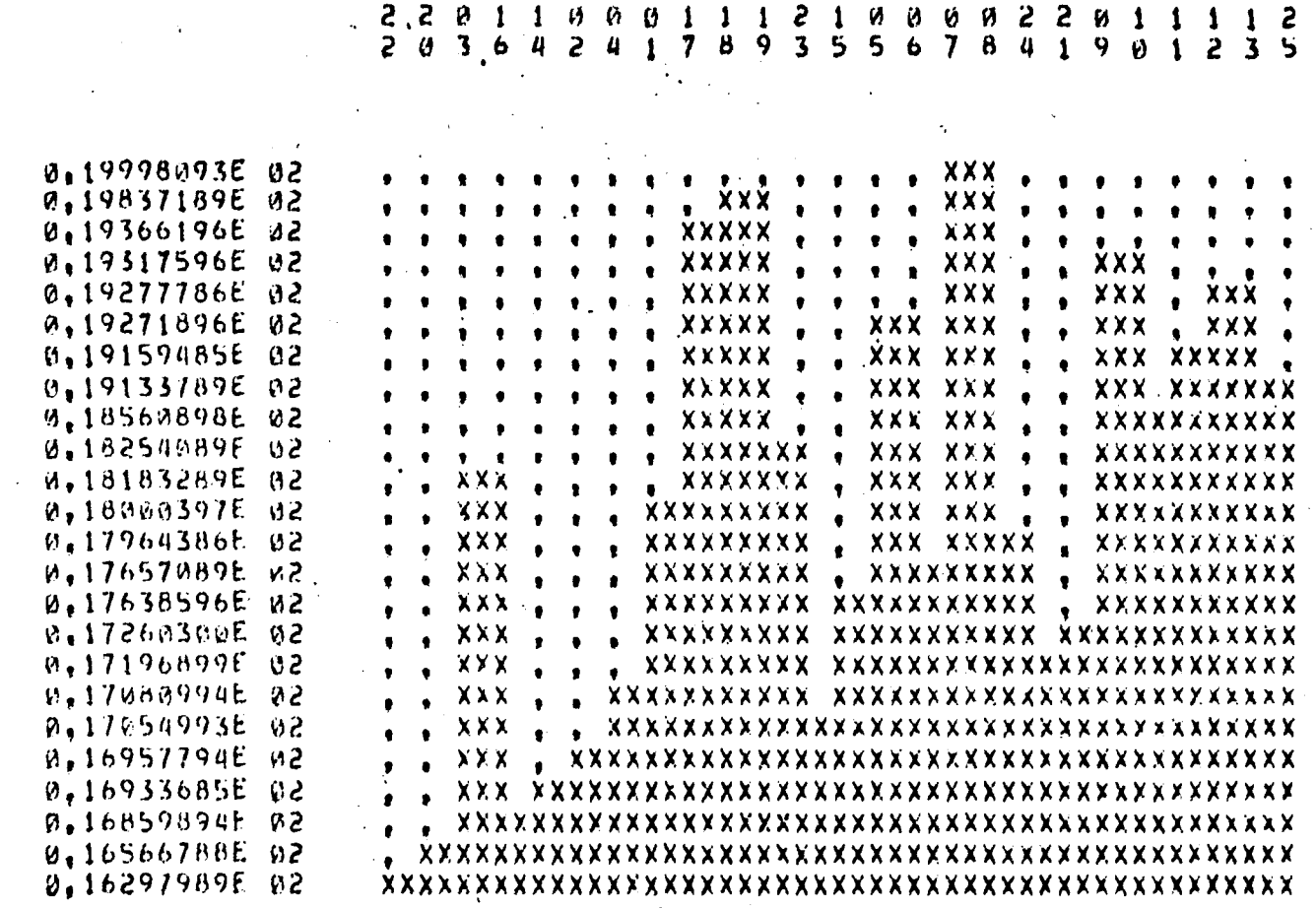
anticipated, command the most detailed knowledge of the pottery, have the largest vocabulary of labels, and exhibit the most consistent agreement in response, based on such knowledge. The assumption that style is a system analogous to language is supported by the results. An overall similarity in response to pot, shown in the summary, is consistent with this assumption. If style does indeed resemble language and functions as a system of communication, then there should be substantial agreement among those who use it. And differences in response based on age, class and sex variables, likewise, are consistent with the assumption: they reflect imperfect learning and evidence of change among children; and imperfect learning based on only limited participation in the system among members of the upper class. "Dialect" differences are reflected in further class and sex differences in response.

Quantitative methods were used to reveal the nature of structure contained in a matrix of data elicited from potters. The data collected consisted of information that indicated the absence or presence of ninety-four features on a set of twenty-five different pots (see Table 13). The presence or absence of these features was determined from a sample of twelve specialists. It was assumed, and the preceding tests supported the assumption, that specialists would have the greatest command and knowledge of pottery making.

A measure of distance between pots had to be developed in order to measure the similarity between each pair of objects (pots). The measure of similarity utilized was based on Guttman's Lambda Coefficient of Predictability as defined by Goodman and Kruskal (1954). A measure of agreement between pairs of features is computed (λ) for each pair of features. The weight of each feature indicates the association of

TABLE 14 . CLUSTER ANALYSIS, CONNECTEDNESS METHOD.

CONNECTEDNESS METHOD



END OF METHOD

that feature with all other features. The more alike that feature is to other features, the smaller the weight for that feature will be. Features that are somewhat redundant receive less weight while informative features receive greater weight. The distance measure of similarity between two pots is arrived at by adding up the weights of the features for which the two pots match, either both pots having the feature or both pots not having the feature. Therefore, this distance measure is one of similarity; the larger the value, the more alike are the two pots.

$$w_i = \frac{1}{\sum_{j=1}^{n} r_{ij}} \qquad \sum r_{ij} > 0$$

$$r_{ij} = \frac{\sum f_r + \sum f_c - (F_r + F_c)}{2n - (F_r + F_c)}$$

where

= maximum frequency for each within class row

= maximum frequency for each within class column

= maximum frequency of marginal totals - rows

= maximum frequency of marginal totals - columns

= total frequency (number of pots)

A computer program was written on the FORTRAN IV language to compute the matrix of distances between pots (see Appendix for program).

Two multivariate statistical procedures were employed to analyze the data: cluster analysis and multidimensional scaling.

The objective of the cluster analysis was to find similar groups of objects (pots). Cluster analysis attempts to reduce the number of

TABLE 15

KEY TO TWENTY-FIVE POTTERY TYPES ANALYZED USING CLUSTER ANALYSIS AND MULTIDIMENSIONAL SCALING

1. Olla (mold)
2. Olla (wheel)
3. Olla colorada
4. Jarro.
5. Jarro cachucho
6. Jarro cantimplora
7. Velorio
8. Velorio-huevito
9. Cazuela (wheel)
10. Caso (wheel)
11. Cazuela (mold)
12. Caso (mold)
13. Tortera
14. Tecomate
15. Borcelana
16. Bacin
17. Maceta
18. Molcajete
19. Cajete
20. Cantimplora
21. Jarro labrada
22. Olla labrada
23. Tortera labrada
24. Jarro negro
25. Olla negra

pots by placing them into homogenous groups. The objects (pots) are separated into groups such that each object is more similar to objects within its group than to objects outside its group. The type of cluster analysis employed was hierarchical clustering as developed by Johnson (1967). A hierarchy or tree-like structure is developed to join objects together in groups. Once two objects are joined together in a group, in hierarchical clustering these two objects could not be later separated into different groups. The method of linking objects into clusters that was utilized was the diameter method. The linkage is based on the maximum distance between objects into the cluster and attempts to develop compact clusters.

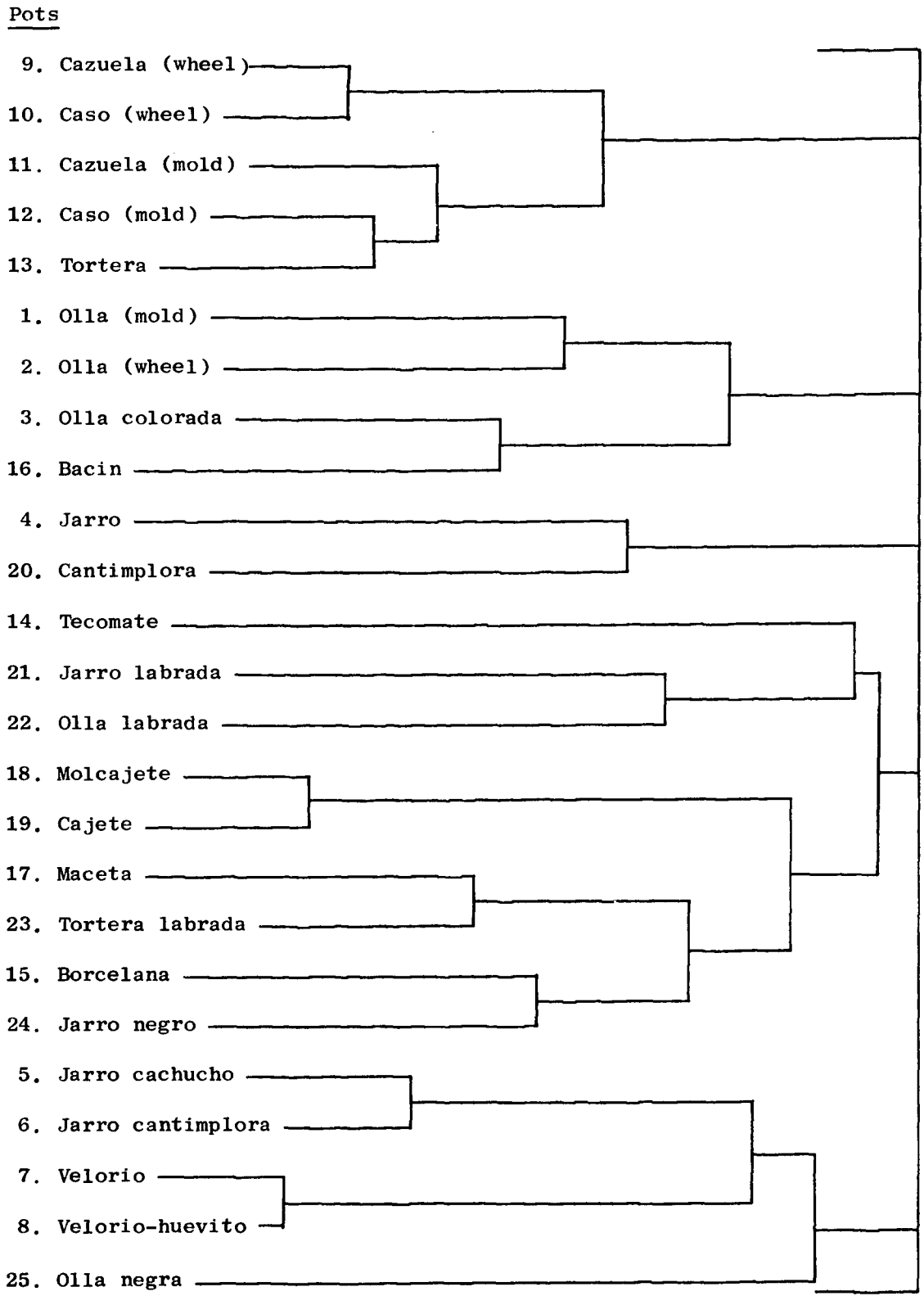
Multidimensional scaling attempts to develop a configuration of objects that best fits the actual similarities that exists between pairs of objects. Nonmetric multidimensional scaling as developed by Shepard (1962) utilizes only the rank order of the similarities to develop the configuration of objects. The configuration indicates the coordinates of each object (pots) scaled in up to six dimensions. A measure of goodness of fit (Kruskal's (1964) stress coefficient) is computed to determine how well the configuration fits the actual data. The researcher then attempts to interpret the dimensions that separate the various objects, allowing for rotation, translation, reflection and uniform stretching of the axes. A basic criterion for analysis is to interpret factors in the lowest number of possible dimensions subject to the simultaneous desire to minimize the stress coefficient.

The results of the connectedness method of cluster analysis proved unsatisfactory as they neither simplified nor ordered the data in a meaningful fashion. Sometimes connectedness results in long chains of pots linked together only by the two most similar points. The diameter method of cluster analysis yielded a hierarchy of the twenty-five pots for which a measure of similarity had been obtained. The results are shown in a taxonomy of the pottery, Figure 27. Of the twenty-five possibilities, it was possible to interpret twelve compact clusters. These are, in general order of their appearance in the hierarchy, as follows: 7 and 8 (velorio and velorio huevito); 18 and 19 (molcajete and cajete); 9 and 10 (wheelmade cazuela and cazo); 11, 12 and 13 (moldmade cazuela, cazo and tortera); 5 and 6 (jarro cachucho and jarro cantaro); 17 and 23 (maceta and tortera labrada); 3 and 16 (olla colorada and bacin); 15 and 24 (borcelana and jarro negro); 1 and 2 (moldmade olla and wheelmade olla); 4 and 20 (jarro and jarro cantimplora); 21 and 22 (jarro labrada and olla labrada) and two single clusters, 14 (tecomate) and 25 (olla negra).

I would have expected 18 and 19 to have been the first cluster to emerge in the hierarchy. The grinding and eating bowls called molcajete and cajete, respectively, are very simple in form, half-spherical, open and without ears. This simple form appears to be the basis for almost all others generated on the wheel and in molds. The bowl, the cajete, is where the size of a given vessel is determined on the wheel; and it is the base of all moldmade jars as well as cooking pots. However, the first cluster to emerge consisted of the two special drinking jars called velorios. They are more complex in form than the bowls, being closed vessels, but except for a single trait variation, 7

FIGURE 27

TAXONOMY FOR POTTERY TYPES BASED ON HIERARCHICAL CLUSTERING TECHNIQUE

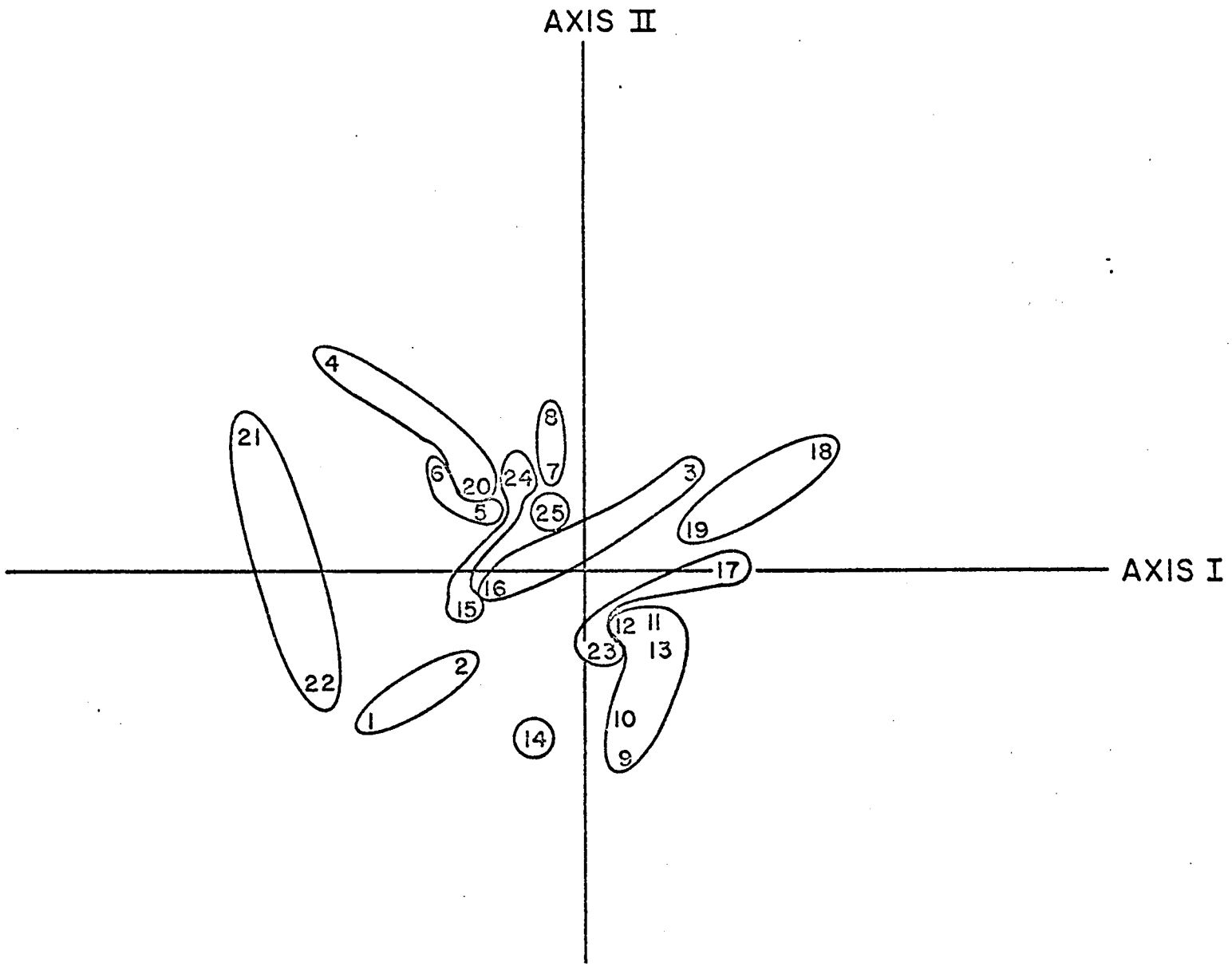


is round while 8 is egg-shaped, both vessels are identical. The bowls, 18 and 19, vary in seven of the nineteen traits by which they are distinguished. The number and relative weight of such traits account for the emergent hierarchy of pots. That fewer than twelve clusters are unintelligible, in the cultural sense of what is known and categorized by potters and myself, may be perhaps a result of other features which have not been defined either explicitly or implicitly by the potters and as a result of the method's resolution. In fact, as D'Andrade, Quinn, Nerlove and Romney have pointed out, this method assumes little about the organization of a domain, except that it is, at least in part, determined by relevant properties used to define it, and that further analysis is required to group the objects and their properties in a meaningful way (1973:11).

The second method employed here, multidimensional scaling, attempts to set up the objects, pots, in a space of a given number of dimensions and to develop coordinates. It was not possible to interpret three or more dimensions. However, two clear dimensions were obtained. They are open and closed multiple and nonmultiple ears. Figure 28 shows the plot for the pottery types with the major groupings from the hierarchical clustering technique encircled.

The stress coefficient was .5056 for the twenty-five pots scaled in two dimensions. Based on Levine (1975), this value is very significantly less than what would have been obtained if there was no structure inherent in the data. Therefore, these results clearly suggest that there are systematic factors that are being used in the perception of the similarity of the pots. This is of particular interest since no

FIGURE 28 M-D-SCAL PLOT FOR POTTERY TYPES WITH MAJOR GROUPINGS FROM THE HIERARCHICAL CLUSTERING TECHNIQUE ENCIRCLED.



structure was imposed in the collection of the original data obtained from the potters. Open-ended interviews in which no types, sizes, features or other categories were introduced or employed by the investigator until after they had first been used by each informant, were relied upon; and in a sense, the informant constructed his own intervews. Furthermore, both the clustering technique and multidimensional scaling employed in this study do not insert a pre-existing outside structure into the data. Consequently, the structure that emerges from the data lends support to the view adopted here of style as a system held in the minds of the participants. The techniques used so far serve to make this system manifest.

Of further interest is the correspondence between the dimensions obtained from multidimensional scaling and the cultural categories employed by the potters and others. The distinction between open and closed, multiple and non-multiple ears which serve to separate the pottery types (see Figure 28), likewise, most frequently serve as the basis for separating types of pottery among the culture bearers, even though a total of ninety-four features was identified. The concept of open and closed, is an important cultural distinction, representing as it does the dichotomy between male and female. This conception of the female as open, yielding and submissive, and the male as closed and aggressive shapes the roles of men and women in the culture, generally, and finds expression in their folk pottery. A more detailed analysis of this and other concepts is contained in the section on symbolism in the preceding chapter.

It is also interesting to note in Figure 28 that vessel H(17) which is on the horizontal axis that divides those vessels above with no

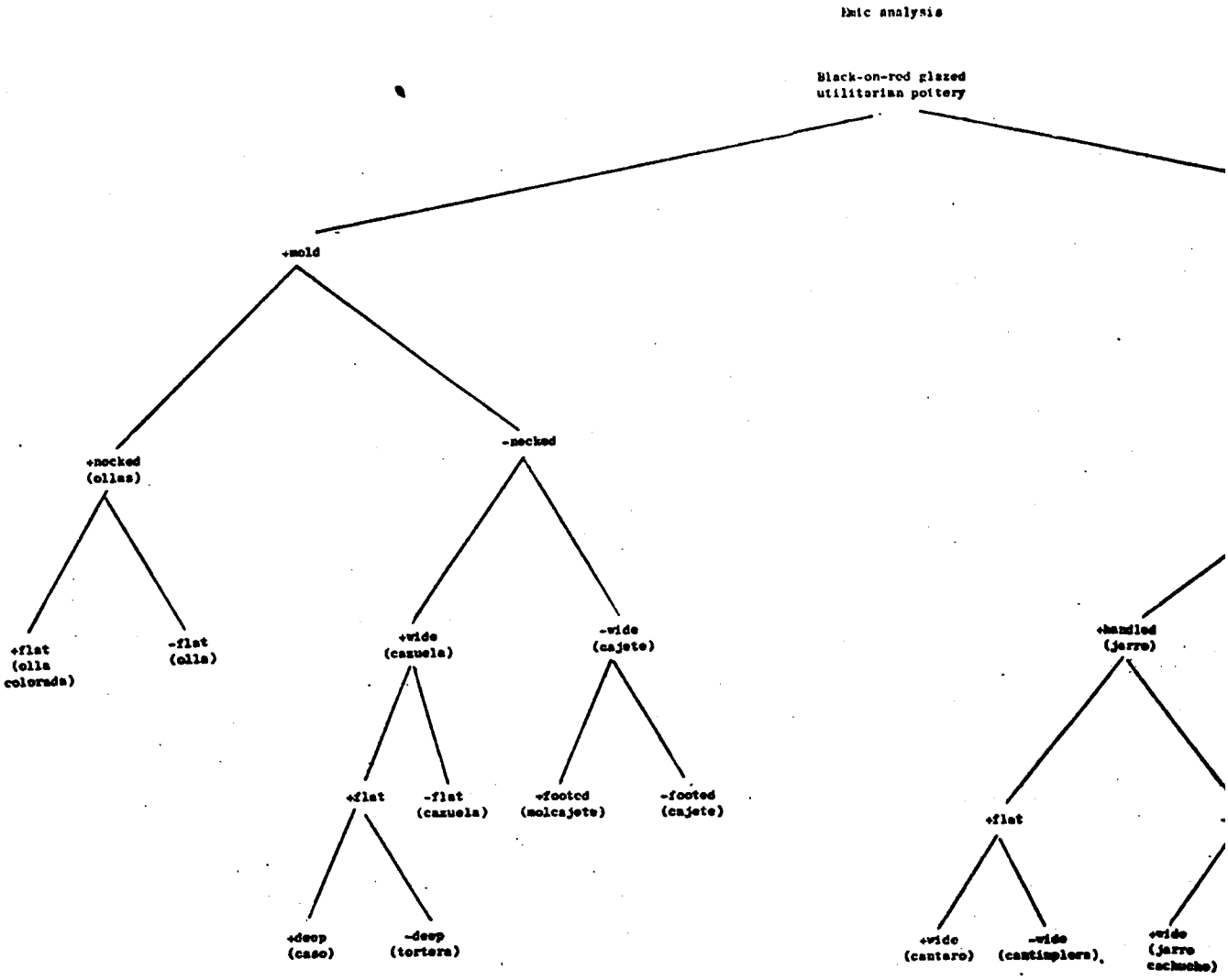
ears or one, from those with two ears or more below, truly occupies an intermediate position in that it usually has no ears although at times two ears are added. This same vessel is linked to N(23), a decorated, open vessel. Vessels F(15), G(16) and E(14), which are located close to the vertical axis that divides closed vessels to the left and open vessels to the right, truly occupy a position closer to the open vessels. In fact, E(14) is a particularly interesting type because it is ambiguous, a mixture of features associated with both the open and closed, the jar (olla) and the cooking pot (cazuela). Its position on the graph, like that of F(15) and G(16) (and like that of O(24) and 3 with which these last two pots cluster), indicate their marginality. Pots 8 and 7, and P(25), likewise, occupy a position along the vertical axis. They are relatively simple and uncommon closed types.

A third factor asserts itself to the right and left of the vertical axis dividing open and closed pots. All those to the right may be undecorated or decorated with either black-on-red designs or be all red; all those to the left may be decorated with either black-on-red designs or be all black. This, too, corresponds to basic cultural distinctions which associated red with the life force, day and hot things, and black with death, night and cold things. Black (in conjunction with being closed and male) and red (being open and female) are in opposition to each other on the graph as they are in the culture. This conflict is expressed in observable behavior and verbalized. Black-on-red represent a balance of these opposing life forces in the native cosmos. Consequently, the combined colors appear across the dividing line. Here, once again, important cultural distinctions find overt expression in a structure that emerges from that data.

A third method, emic analysis, was applied to the data. Ninety-four features elicited from potter-informants, subjected to the preceding statistical analyses and listed in Table 13, were analyzed with regard to the potter's universe of utilitarian pottery (see Figure 6). It was possible to reduce the ninety-four features to twelve distinctive features. These account for the fourteen unique terms and three marginal ones (olla colorada, velorio huevito, jarro cachucho) that make up the potter's universe of daily pottery (see Figure 6).

The twelve distinctive features are marked (+) with regard to their presence or absence: mold, flat, wide, deep, covered, footed, necked, handled (one ear), eared (more than one ear), glazed, grooved, bichrome. Thus, all vessels that are not marked for the mold technique are wheelmade (-mold); all vessels that are not marked for flat bases are round (-flat). "Wide" covers a variety of features on vessels with necks (+necked); "deep" also covers a variety of features. The realization of both deep and wide depends on the class of object. For example, the feature "deep" distinguishes the class of objects known as "caso" (+deep) from the class "tortera" (-deep), and the class "velorio huevito" (+deep) from the class "velorio" (-deep). In the latter case, the feature "deep" appears to be of no consequence because informants mention it only when pressed to explain why one pot is called "velorio huevito" and the other simply "velorio". This double term, like "olla colorada" and "jarro cachucho", is considered marginal because the distinctions separating all three double terms do not appear to be very significant to informants.

FIGURE 29


Emic analysis
Black-on-red glazed utilitarian pottery
+mold
+necked (ollas)
-necked
+flat (olla colorada)
-flat (olla)
+wide (cazuela)
-wide (cajete)
+flat
-flat (cazuela)
+footed (molcajete)
-footed (cajete)
+deep (caso)
-deep (tortera)
+handled (jarro)
+flat
+wide (cantaro)
-wide (cantimplora)
+wide (jarro cachucho)

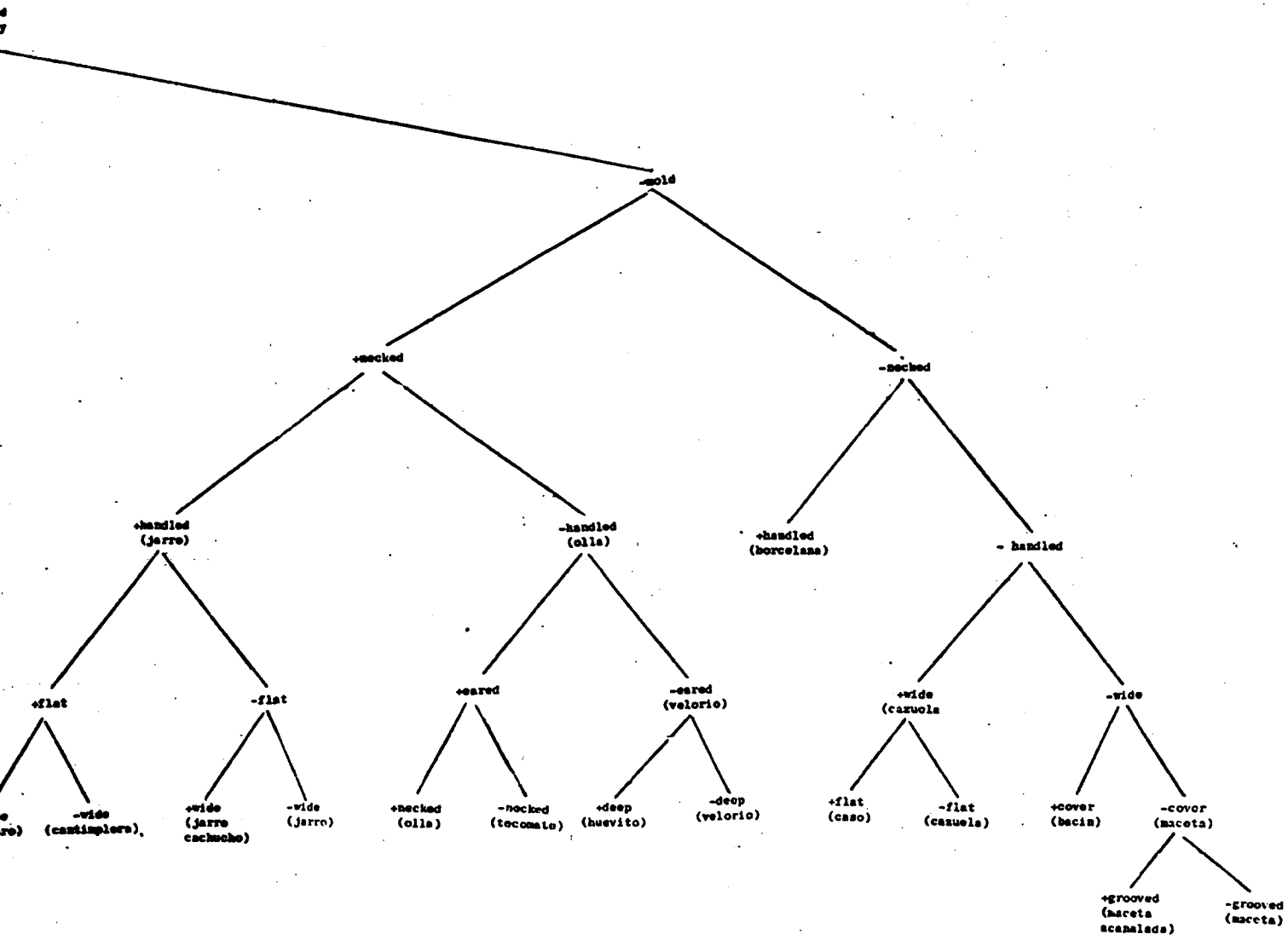
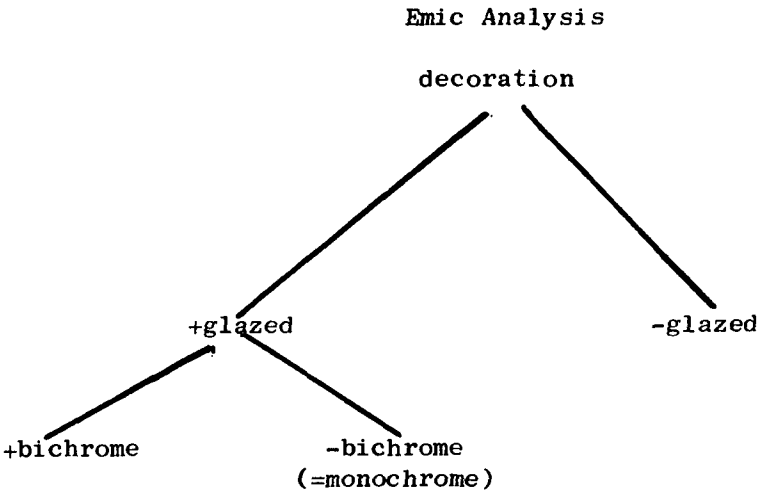

-vold
+necked
-necked
+handled (jarro)
-handled (olla)
+handled (borcelana)
- handled
+flat
-flat
+eared
-eared (velorio)
+wide (cazuola
-wide
-wide (cantimplora).
+wide (jarro cachucho)
-wide (jarro)
+necked (olla)
-necked (tecomate)
+deep (huevito)
-deep (velorio)
+flat (caso)
-flat (cazuela)
+cover (bacin)
-covor (maceta)
+grooved (maceta acanalada)
-grooved (maceta)

FIGURE 30

Emic analysis of black-on-red ware: decoration



The feature "necked" is defined as a very tall neck, and the absence of the feature (-necked) is defined as either a very short neck, like that of the jarro and jarro cachucho, or no neck. Here, too, the realization of the feature depends on the class of object. "Handled" is defined as having one ear and "eared" as more than one. A "covered" vessel is one for which a cover is normally made, and unless marked "footed", all vessels are without feet (-footed). Vessels are either decorated and glazed or they are undecorated (-glazed) and either they are painted black-on-red (+bichrome) or they are monochrome (-bichrome).

The application of the generative linguistic model to a single ceramic style such as this one is possible though questionable in terms of its usefulness. It is not possible to analyze deep structure here, but it is possible to trace the life history of a pot using this model. However, I have already observed that the cajete, the eating bowl, is probably the basis for all other forms generated on the wheel and in molds. This is not only the result of observation and analysis of potter behavior, but it is reasonable in terms of historical evidence. The cajete closely resembles the gourd bowl. Gourds are among the earliest plants used and domesticated in Mesoamerica, and they are still widely used in the dried state for eating and drinking bowls as well as vessels for storage. The traditional bowl (xoma) still used in the rural areas of Puebla today for drinking pulque is made from a dried gourd. Similar representations of bowls appear in the famous Pre-Columbian murals of the pulque drinkers at Cholula. Whether or not these bowls are gourds or made of clay is uncertain; the form is the same. In Sahagun's sixteenth century account of the lifestyle of

"The Merchants", they are said to drink chocolate from "gourds" (Sahagun 1959: 33). The literal translation of the Spanish to English, however, is actually "gourds of clay" (xicaras de barro), i.e. clay bowls. Thus, clay bowls have a long and continuous history of use in this area; and their use was preceded then paralleled by the use of gourd bowls. Jars and other vessels may be seen as variations and combinations of this basic form. This may be expressed by a generative rule which looks like this:

$$\text{Pot} \rightarrow \text{cajete} \quad \left(\begin{Bmatrix} \text{Necked (Handled)} \\ \text{Footed} \\ \text{Eared} \end{Bmatrix} \right)$$

This rule is capable of producing six pots; the remaining eight to eleven pots could be produced by modifying the features. A computer program could be constructed to generate these pots, but apart from being in fashion, the effort does not seem warranted. A further evaluation of the usefulness of linguistic models and other methods applied here is made in the concluding chapter.

CHAPTER VI

CONCLUSIONS

> How beautiful it was in the past. This black-on-red pottery went to all parts of the world, and everyone had a glimpse of what Mexico was like. Now it is ending with us.
>
> An elder potter of the barrio of La Luz, Puebla, 1974

This study was concerned with an ethnographic description of a single functioning style of folk pottery and with the identification of some of the underlying conditions that gave rise to its production, distribution and use. It was concerned, too, with the development and application of some empirical methods with which to probe the relationship between a given style and its users and to illuminate, perhaps, the phenomenon of style itself. My intention was to extend the search for more objective and replicable methodology to a concept of style.

Style as Identity

The potters who produce black-on-red pottery were found to constitute a community within a spatially defined area of the city of Puebla (population 276,000: 1970 Census). They identified themselves and were identified by others as belonging to that area, and they intermarried and interacted for ritual purposes within it. The community of potters and the history of black-on-red cookware, as it can presently be reconstructed from historic records and documents, were revealed to have considerable time depth in the city. Tangible evidence of the style's existence more than one hundred years ago was provided in two

still life paintings from Puebla by Agustin Arrieta (1809-1867). Earlier evidence of the style was uncovered in a document of 1797 which referred to a dispute between Indian and Spanish potters and to rights over black designs on red cooking pottery. Before the latter part of the eighteenth century, the evidence was scanty. City and parish records indicated there was some Indian manufacture of domestic pottery in Puebla in the seventeenth century, but the style or styles are unknown. To date there has been no historical archaeology in the city and its environs. Sixteenth century pottery manufacture, likewise, apart from Spanish workshops and blue and white glazed majolica called "Talavera", remains conjecture.

Despite urban production of black-on-red cookware for profit and wages in a money economy for some two hundred years or more, and despite much specialization and evidence of workshop organization that disclosed the presence of a kind of crude system of mass production, the community studied may be said to be comprised of folk potters and their production of a traditional ware, folk pottery.

Available evidence suggests the style emerged and flourished against a background of social, economic and political change in Puebla. Separation and exploitation of the Indians by the Spaniards during the colonial period served to heighten and perpetuate "Indian" consciousness. Pottery and native foods traditionally associated with it were at once a necessity and a subtle means of expressing an ancient heritage and, consequently, an "Indian" identity. The pottery itself became widespread as colonists adopted native foods, ingredients and techniques of preparation. With Independence after 1821 and separation

from Spain, a new awareness of a common "American" identity contributed to the formation of Mexico as a nation. Economic and social change led to a fusion of formerly separate Indian and Spanish domestic pottery manufacture. This was followed by a florescence of the black-on-red pottery style in the mid to late nineteenth century alongside capitalistic expansion, the beginnings in Puebla of the industrial revolution and the growth of a new bourgeoise. By 1930 the style was in a decline following the gradual restoration of order after the Revolution of 1910. In the last twenty-five years especially, enamel ware, aluminum pots, gas stoves, blenders and plastic containers steadily eroded the markets formerly supplied with black-on-red pottery.

Symbolic analysis of the pottery style demonstrated the continuity of several underlying and pervasive themes in the Central Highlands. The nature of the universe and man's relation to it, life and death, male and female -- all were seen to exist in complementary opposition, each menacing and evoking the appearance of the other in turn, in an ongoing cycle -- all were seen to exact a divine and human toll. For each pair, catastrophe, omnipresent, threatened to break the cycle and destroy the balance so dearly acquired and so precariously maintained.

Present distribution and use of black-on-red ware reflects political, economic and social change in Puebla and the widening gap between rich and poor, urban and rural, industrial and agricultural segments of the population. The pottery serves as a symbol of collective identity in relations between these segments and of in-group solidarity within some of the segments of the region. As a symbol it is now in the

process of being raised to the national level by President Echeverria and his wife.

Cognition and Style

Learning and methods of teaching pottery making were important ways in which style was shared and transmitted in the community and in time. The methods employed were imitation and trial and error. These methods, the techniques of manufacture and the rewards that accompanied successful performance in learning tended to perpetuate the existing style produced in the community.

The emphasis on imitation and trial and error in learning is rooted in long established and widely accepted tradition and in the value placed on conformity by members of this society. The contrast between my own expectations in terms of verbal and written instruction became evident in the abortive attempt to learn to make pottery. It made me aware of the extent to which we depend on instruction in an industrialized, capitalistic society. In such a society, technology is constantly changing and traditional ways of doing things are neither valued nor useful. Instruction is therefore essential to enable people to act and interact within systems devised for mass production. In an industrialized society a value is placed on flexibility, not conformity, with people and parts expected to be interchangeable. In such a society there is impatience with imitation and trial and error as methods wasteful of time and money. People are not expected to absorb and internalize in the learning process, thereby gaining a sense of their own mastery in performance; they are not provided with concrete models, following the movements and example of the master before them as do the

folk potters of Puebla. Instead, they are expected to follow external and abstract models (instructions, diagrams, tapes, etc.) generated by unseen specialists and frequently changed.

Specialization was found to be another way in which style was learned and transmitted. The techniques of manufacture, on which much specialization is based, were acquired gradually and perfected over a lifetime. Separation of potters and crewmen, those who produced the pottery and those who fired and decorated it, was in fact symbiotic. Continuity and interdependence within specialization acted to preserve style. These and other conditions were revealed to account for two universal characteristics of a folk style -- commonality (being shared in space) and continuity (being persistent in time). The social, economic and political conditions previously described provided the stimuli for the style's production, distribution and use.

The search here for more objective methodology assumed style to be a system. To test this notion and in the process perhaps to illuminate something of the nature of style itself, I applied both linguistic models and statistical models to the analysis of folk pottery. In particular I applied emic analysis, a structural analysis in the usual linguistic sense of a construct based on a description of observable behavior (Langacker 1968: 29-32, 153-154, 157). The application of the model to style called for the breakup of style into units, comparable to phonemes, that exist in a system of contrasts, governed by rules for their combination. The performance of the culture bearers was central to this analysis. The potters distinguished ninety-four features associated with twenty-five types of pots (see Table 13). Emic analysis

made it possible to reduce the number of features to twelve distinctive features and to account for major pottery types distinguished by unique labels in the potter's universe of black-on-red ware. The following are the distinctive features. They were marked (+) with regard to their presence or absence: mold, flat, wide, deep, covered, footed, necked, handled (one ear), eared (more than one ear), glazed, grooved, bichrome. The resultant system is represented in Figures 30 and 31.

Whereas the application of the emic model reduced a profusion of features from ninety-four to twelve and a complex native taxonomy from twenty-one types and one hundred thirty-seven sizes to some fourteen major categories uniquely labelled, the application of the generative model further reduced the system to a single rule. This rule looks like this:

$$\text{Pot} \rightarrow \text{bowl (cajete)} \left(\left\{ \begin{array}{l} \text{necked (handled)} \\ \text{footed} \\ \text{eared} \end{array} \right\} \right)$$

It is capable of producing six of the fourteen major categories of pots and if the features are modified, this rule could produce the other eight categories. However, it was not possible to analyze deep structure.

In order to test further the notion of style as a system, I proposed to subject a body of empirical data to statistical analysis by computer. The data were elicited from potters by the methods developed in this study and detailed in Chapter V, "Analyzing a Folk Style". They are emic in the usual cultural sense (Harris 1968: 568-604); they are based on the culture bearer's point of view. Indeed, as I indicated earlier, the performance of the culture bearers was considered

central to all methods applied here. I sought to interest an expert in the problem of devising appropriate statistical measures. I was fortunate in locating Dr. David Levine, Department of Statistics, Bernard Baruch College, City University of New York.[1] He became interested in the problem proposed and undertook to write the programs. Two multivariate techniques were applied, Cluster Analysis (hierarchical and non-hierarchical) and non-metric Multi-Dimensional Scaling. Both are capable of revealing the structure inherent in an empirical body of data. The data are based on a determination of the presence or absence of ninety-four features on a set of twenty-five pots from the point of view of the culture bearers (Table 13). The method did not rely solely on verbal behavior; it employed material culture in a systematic way in interviews and tests and compared the results with actual behavior in the production and use of the pottery.

The non-hierarchical or connectedness method of Cluster Analysis did not prove to be very useful in ordering the data. But the hierarchical or diameter method did yield twelve interpretable compact clusters for which a measure of similarity had been obtained. These clusters are interpretable in terms of what is known and distinguished in the culture by the potters and myself. It may be that features yet to be defined would render fewer than the twelve clusters interpretable. It may also be that the method's resolution renders fewer than twelve unintelligible. The method itself assumes little about the way in which a domain (in this case, black-on-red pottery) is organized except that the relevant properties used to define it are involved in the resultant organization and that to meaningfully group the objects and their

properties in the domain, further analysis is needed (D'Andrade, Quinn, Nerlove and Romney 1972: 11).

Cluster analysis of the ninety-four features did provide a weight for each pottery feature distinguished by the culture bearers. The number and relative weight of such features or traits account for the emergent hierarchy of pots. Analyses that depend on the identification of traits or distinctive features by an outside investigator either must assign a weight to them (Narroll 1956: 705) or leave them unweighted (Tolstoy 1966, 1963; Carneiro1974, 1970, 1969). In general, ethnoscientists who are engaged in discovering native taxonomies do not use statistical procedures.

The results of Multi-Dimensional Scaling yielded two clearly interpretable dimensions: open and closed, multiple and nonmultiple ears. The stress coefficient was .5056 for the twenty-five pots scaled in two dimensions. The value is significant of the structure inherent in the data (Levine 1975). It indicates similarity between pots is being systematically perceived in the culture.

Discussion

Archaeological studies have always relied heavily on the classification of material objects and their attributes in establishing cultural sequences in time and space (Chang 1967; Deetz 1965 Rouse 1960 Willey 1962). The underlying assumption in archaeology (and in ethnology and art history as well) is that classifications are not just useful devices but represent significant cultural categories. At present, there are three marked trends in archaeology related to this study. The first relies on detailed and quantitative analysis of

observable and measureable traits and trait complexes to confirm or deny historical relationships between cultures (Deetz 1965 Read 1974; Tolstoy 1964, 1963). The second undertakes detailed ethnographic research to illuminate existing problems in archaeology (Arnold 1971; Friederich 1970; Thompson 1958). And the third applies quantitative techniques to surveyed sites and surface materials (LeBlanc 1975; Mueller 1974). These techniques are valuable tools, but they are not themselves an assurance of either the objectivity or significance of the results attained. For example, the sophisticated use of the computer employed by Deetz in his study of Arikara ceramics (1965) is based on the limitations of the available materials for analysis and on the knowledge beforehand of the changes that took place in the culture. Since the materials subjected to analysis were sherds, the elaborate classification system coded for computer analysis relied heavily on the subtlety of rim variation and decoration (1965: 38, 45). The results obtained were then related to the changes known to have taken place in the culture. Thus, despite the methodology, Deetz really reasons by analogy.

I must note here that Deetz's study was one of the books I initially took with me to the field. But I soon discovered from my discussions with potters that rims clearly did not have the significance which he attributed to them and which I had expected. All potters agreed rims were varied to meet consumer preference and their own aesthetic tastes. The term they used to describe production captured the general sense of rim predictability in Puebla; they were made according to "capricho" -- whim. My subsequent classification of the pottery (see Chapter II) did reveal a relationship between kinds of rims and

kinds of pots with regard to the technique of manufacture and function. That this could be related to the dramatic socio-political changes in Puebla, now or in the past, seems very unlikely. Rims otherwise proved neither to be a very significant feature in the potter's taxonomy nor among the results of quantitative analyses. However, ears which Deetz found to be significant, also proved significant in terms of both the emic and quantitative analyses (Deetz 1965: 75-80). This is neither to say this feature will be found to enjoy the same cultural and statistical importance in other ceramic traditions, nor even be available for analysis to archaeologists.

The preceding discussion brings be back to some further comments on the second trend in archaeology, towards the use of ethnographic research to generate and test hypotheses of archaeological import. In addition to those studies cited earlier (Arnold 1971; Friederich 1970; Thompson 1958), the pioneering investigations of Thomas Charlton in the Valley of Teotihuacan are evidence of the knowledge and insight to be gained from combining archaeology, ethnography and ethnohistory (1975; 1972a; 1972b; 1969).

I have extended into ethnography some of the techniques associated with the two major trends in archaeology. Some related techniques, classification schemes and spectrochemical analyses already described (Chapter II) suggest objective tests are not always indicative of cultural categories.

Two multivariate statistical techniques were applied, Cluster Analysis and non-me ric Multi-Dimensional Scaling. Cluster Analysis did yield a weight for the features or traits distinguished, and a

taxonomy of the pottery based on the number and weight of these traits. Multi-Dimensional Scaling did yield dimensions that could be interpreted. As Sanday noted in her recent review of theoretical and applied papers on multidimensional scaling, the method is particularly suited to the archaeologist with a data base of material objects (AA. 77: 107). But as she also noted, "there are no contributions ... dealing specifically with these types of data and the attendant sampling problems" (AA. 77: 107). I venture to suggest, on the basis of this contribution, that the problems to be considered in application extend beyond sampling to interpretation. The uses of ethnography here rendered two dimensions interpretable and culturally significant, though the data were scaled up to five dimensions. With both cluster analysis and multidimensional scaling, ethnography gave form and meaning to the results.

Neither technique imposed a pre-existing structure on the data. Therefore, the structure that emerged supports a view of style as a system held in the minds of the culture bearers.

I also extended linguistic models into ethnography and the analysis of material culture. This study was an empirical test of the usefulness of such models for non-verbal behavior. In the light of the emic-generative controversy in linguistics and my own interest in the evolution of style, I shall try to make some evaluations here of the two models with regard to material culture.

The emic model has been seriously challenged in linguistics by Chomsky (1957, etc.) and a new and more powerful model provided by the

transformationalists reveals "the quite incredible scope of human grammar" (Keesing 1971: 16, 18; Postal n.d.). But the applicability to material culture of such concepts as "competence", "deep structure" and "transformational rules" is remote at this time. Such attempts as have been made to apply the generative model to material culture are, in reality, metaphorical (Muller 1965, 1968). Indeed the problems underlying such application are complex as Keesing makes abundantly clear (1971: 17-20, 22-24) and relate to the broader task of cognitive anthropology (Keesing 1971: 29-31, 42-45). In my view, there is no way presently to operationalize the generative model to analyze deep structure with regard to material culture unless we restrict ourselves to verbal statements about the objects and proceed to analyze the statements alone. This hardly qualifies as transformational analysis of material culture.

Emic analysis has been under attack by the transformationalists for what is considered its particularistic approach to the study of language, its reliance on a taxonomic model and its study of elements rather than relational systems of which elements are a part (Keesing 1971: 3, 5, 11, 19). Although, as Keesing himself recognizes, these are not so much the goals of emic analysis as its practical result (1971). Being aware of the criticism of the model and the use of it made by ethnoscientists and Levi-Strauss, I endeavored to make clear my meanings and reasons for using the model, in spite of its vulnerability in this study.

I employed the emic model in an extended methaphorical analogy between language and pottery as one means of determining the structure

of style. While this structure may be "surface" and perhaps even "spurious" in the transformational sense, it remains an important demonstration on an available level in material culture (Keesing 1971: 20).

Unlike the applications of the generative model to material culture mentioned earlier, the metaphor here was employed consciously. Careful attention was given to developing a replicable methodology based on features and rules as contained in the model.

It seems worthwhile here to note two fundamental differences in the study of material culture and linguistics that led me to pursue the linguistic analogy and the emic model in particular. One difference is the level of theoretical sophistication. There is a paucity of theory and appropriate concepts in the study of material culture with which to relate such studies to other cultural phenomena and with which to investigate material culture on other than a subjective, intuitive or historical basis. Rather than two competing models generating productive research, one perhaps more powerful than the other as in linguistics, the study of material culture has been inhibited by an almost total lack of operational models. (Those few exceptions and the reasons for their rejection were already noted at the beginning of this summary.) There remains a need for a useful heuristic device, and if we consider for a moment, I think we must recognize that even a transformational analysis really presupposes an existing emic analysis. Therefore I used the emic model as such as useful device and as one possible step towards the scientific analysis of material culture.

The second difference between the study of material culture proposed here and linguistics is personal and epistomological. I wished

to account for observable differences in style while transformationalists are concerned with underlying similarities. However, it is not that I am unconcerned with underlying similarities but that I think such studies are premature in material culture, given the media and the present state of theoretical sophistication.

The question around which all these analyses centered was: is style a cognitive system which serves as a means of affective communication and if it is, what are the components and how are they organized to produce the whole, i.e. style itself. The description of a given style was a necessary and preliminary step in the analysis. Cooking pottery was selected because it was traditional and functional, yet it was as meaningful in terms of symbolism and affective communication as more elaborate and self-consciously artistic ceremonial pottery. The study showed a style, even one as prosaic as cookware, does give expression to a cognitive system -- the ideas and values held by a people -- and does constitute at the same time a visual representation of that system. The methods applied and developed in this study analyzed that system several ways. And they served to simplify and to make manifest and observable that which is carried in the mind, internalized and deeply felt by the people of a given culture.

NOTES

1. I am grateful to Mr. John Luongo of the Computer Center of Herbert H. Lehman College, The City University of New York, for bringing this problem to the attention of Dr. Levine.

TABLE 16

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 1																	
	Variable	1	2	3	4	5	6	7	8	9	10	11	165					Total
Age	Elder	1	1				1	19	1			2	1					26
	Adult			1	2			19	1		2							25
	Youth			2	1			19	1	1								24
	Child	2		3	3			14		2								24
Status	Specialist	1				1		4	18	1	1							26
	Lower Class		1	2				25	3	2	2		1					36
	Middle Class			3	2			27										32
	Upper Class	3		1	4		1	19		1		2						31
Sex	Male	1	1	2	5		1	29	1	3		1	1					45
	Female	2		4	1			42	2		2	1						54
	# of samples	3	1	6	6		1	71	3	3	2	2	1					99

	Percent of coded responses to pot # 1																	
	Variable	1	2	3	4	5	6	7	8	9	10	11	165					Total
Age	Elder	4	4				4	73	4			7	4					100
	Adult			4	8			76	4		8							100
	Youth			8	4			80	4	4								100
	Child	8		13	13			58		8								100
Status	Specialist	4				4		15	69	4	4							100
	Lower Class		3	6				68	8	6	6		3					100
	Middle Class			10	6			84										100
	Upper Class	10		3	13		3	62		3		6						100
Sex	Male	2	2	5	11		2	65	2	7		2	2					100
	Female	4		7	2			77	4		4	2						100
	# of samples	3	1	6	6		1	72	3	3	2	2	1					100

TABLE 17

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 2																	
	Variable	1	2	3	4	7	8	12	13	14	15	16	17						Total
Age	Elder		1	1		24													26
	Adult			2	1	20	1					1							25
	Youth	2		3		19													24
	Child	3		1	2	15				2			1						24
Status	Specialist					7		6	5		1	7							26
	Lower Class	1	1	1		31	1					1							36
	Middle Class	2		5	1	23				1									32
	Upper Class	2		1	2	24				1			1						31
Sex	Male	2	1	2	2	34	1			2		1							45
	Female	3		5	1	44							1						54
	# of samples	5	1	7	3	78	1			2		1	1						99

	Percent of coded responses to pot # 2																	
	Variable	1	2	3	4	7	8	12	13	14	15	16	17						Total
Age	Elder		4	4		92													100
	Adult			8	4	80	4					4							100
	Youth	8		13		79													100
	Child	13		4	8	63				8			4						100
Status	Specialist					27		23	19		4	27							100
	Lower Class	3	3	3		85	3					3							100
	Middle Class	6		16	3	72				3									100
	Upper Class	7		3	7	77				3			3						100
Sex	Male	4	2	4	4	78	2			4		2							100
	Female	6		9	2	81							2						100
	# of samples	5	1	7	3	79	1			2		1	1						100

TABLE 18

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 3																		
	Variable	1	3	4	7	14	15	18	19	20	21	22	23						Total
Age	Elder	2	19		5														26
	Adult		18	1	4	1		1											25
	Youth	1	18		3	1			1										24
	Child	2	13		4	3							2						24
Status	Specialist	1	4				13	3		1	1	1	2						26
	Lower Class	1	26		8			1											36
	Middle Class	2	20		5	2			1				2						32
	Upper Class	2	22	1	3	3													31
Sex	Male	2	29	1	8	2		1	1				1						45
	Female	3	39		8	3							1						54
	# of samples	5	68	1	16	5		1	1				2						99

	Percent of coded responses to pot #3																		
	Variable	1	3	4	7	14	15	18	19	20	21	22	23						Total
Age	Elder	8	73		19														100
	Adult		72	4	16	4		4											100
	Youth	4	75		13	4			4										100
	Child	8	54		17	13							8						100
Status	Specialist	4	16				50	12		4	4	4	8						100
	Lower Class	3	72		22			3											100
	Middle Class	6	63		16	6			3				6						100
	Upper Class	6	71	3	10	10													100
Sex	Male	5	64	2	18	5		2	2				2						100
	Female	6	72		14	6							2						100
	# of samples	5	69	1	16	5		1	1				2						100

TABLE 19

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 4																	
	Variable	1	3	7	14	15	23	24	25									Total
Age	Elder	4	17	2			3											26
	Adult		19		1		5											25
	Youth		19		2		3											24
	Child		14	2	3		3		2									24
Status	Specialist		2			1	7	16										26
	Lower Class	1	25	3			7											36
	Middle Class	3	22				5		2									32
	Upper Class		22	1	6		2											31
Sex	Male	1	28	4	3		7		2									45
	Female	3	41		3		7											54
	# of samples	4	69	4	6		14		2									99

	Percent of coded responses to pot # 4																	
	Variable	1	3	7	14	15	23	24	25									Total
Age	Elder	15	65	8			12											100
	Adult		76		4		20											100
	Youth		79		8		13											100
	Child		58	8	13		13		8									100
Status	Specialist		8			4	27	61										100
	Lower Class	3	69	8			20											100
	Middle Class	9	69				16		6									100
	Upper Class		71	3	19		7											100
Sex	Male	2	62	9	7		16		4									100
	Female	6	75		6		13											100
	# of samples	4	70	4	6		14		2									100

TABLE 20

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #5																	
	Variable	1	3	7	14	23	24	26	27	28	29	30						Total
Age	Elder	3	15	1		5			1	1								26
	Adult	1	18		1	2					3							25
	Youth		21		2				1									24
	Child		16	1	3						2	2						24
Status	Specialist		5			6	3	1	9		2							26
	Lower Class	3	26	2		1			2		2							36
	Middle Class	1	24			3					2	2						32
	Upper Class		20		6	3				1	1							31
Sex	Male	3	26	2	3	4				1	4	2						45
	Female	1	44		3	3			2		1							54
	# of samples	4	70	2	6	7			2	1	5	2						99

	Percent of coded responses to pot #5																	
	Variable	1	3	7	14	23	24	26	27	28	29	30						Total
Age	Elder	12	57	4		19			4	4								100
	Adult	4	72		4	8					12							100
	Youth		88		8				4									100
	Child		67	4	13						8	8						100
Status	Specialist		19			23	11	4	35		8							100
	Lower Class	8	71	6		3			6		6							100
	Middle Class	3	76			9					6	6						100
	Upper Class		65		19	10				3	3							100
Sex	Male	7	58	4	7	9				2	9	4						100
	Female	2	80		6	6			4		2							100
	# of samples	4	71	2	6	7			2	1	5	2						100

TABLE 21

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #6																	
	Variable	1	3	7	31	33	34	35	36	37	38							Total
Age	Elder	8		12			4			2								26
	Adult	1	1	13	1		2	1		6								25
	Youth	2		10	1		6	1		4								24
	Child	2	1	11	5	1	4											24
Status	Specialist		1	1					1	9	14							26
	Lower Class	5	1	11	4		3			12								36
	Middle Class	3	1	19	3		4	2										32
	Upper Class	5		16		1	9											31
Sex	Male	7	1	21	4	1	6	1		4								45
	Female	6	1	25	3		10	1		8								54
	# of samples	13	2	46	7	1	16	2		12								99

	Percent of coded responses to pot #6																	
	Variable	1	3	7	31	33	34	35	36	37	38							Total
Age	Elder	31		46			15			8								100
	Adult	4	4	52	4		8	4		24								100
	Youth	8		42	4		25	4		17								100
	Child	8	4	46	21	4	17											100
Status	Specialist		4	4					4	34	54							100
	Lower Class	14	3	31	11		8			33								100
	Middle Class	9	3	60	9		13	6										100
	Upper Class	16		52		3	29											100
Sex	Male	16	2	47	9	2	13	2		9								100
	Female	11	2	46	6		18	2		15								100
	# of samples	13	2	47	7	1	16	2		12								100

TABLE 22

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

Number of coded responses to pot # 7

	Variable	1	113	114	115	116	117	118	119	120	121	122	123	124	125				Total
Age	Elder	2		4		3	5	2	1	1	5	2	1						26
	Adult	1		1				2		1	15	4	1						25
	Youth		2			1		1		2	14	3		1					24
	Child	4			2		2	1		3	9	1		1	1				24
Status	Specialist	4	1	2		1	5	1			5	1	6						26
	Lower Class	2		2	2	3	1				20	4		2					36
	Middle Class	4	1	1		1	3	3		1	14	3			1				32
	Upper Class	1	1	2			3	3	1	6	9	3	2						31
Sex	Male	2	1	4	2	3	1	4	1	5	13	5	1	2	1				45
	Female	5	1	1		1	6	2		2	30	5	1						54
	# of samples	7	2	5	2	4	7	6	1	7	43	10	2	2	1				99

Percent of coded responses to pot # 7

	Variable	1	113	114	115	116	117	118	119	120	121	122	123	124	125				Total
Age	Elder	8		15		11	19	8	4	4	19	8	4						100
	Adult	4		4				8		4	60	16	4						100
	Youth		8			4		4		8	59	13		4					100
	Child	17			8		8	4		13	38	4		4	4				100
Status	Specialist	15	4	8		4	19	4			19	4	23						100
	Lower Class	6		6	6	8	2				55	11		6					100
	Middle Class	13	3	3		3	9	9		3	45				3				100
	Upper Class	3	3	6			10	10	3	19	29	10	7						100
Sex	Male	4	2	9	4	7	2	9	2	12	29	12	2	4	2				100
	Female	9	2	2		2	11	4		4	55	9	2						100
	# of samples	7	2	5	2	4	7	6	1	7	44	10	2	2	1				100

TABLE 23

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 8																	
	Variable	1	7	31	34	39	40	41	42	43	44	45	46	47	51				Total
Age	Elder		1		6	1		4	1			1	12						26
	Adult	1			7	3		1	1				12						25
	Youth		1		12				2	2	1		6						24
	Child	6	2	2	10		1		1				2						24
Status	Specialist				1								5	19	1				26
	Lower Class		1	1	9	1		1	1	1			21						36
	Middle Class	3		1	15	3	1	2			1		6						32
	Upper Class	4	3		11			2	4	1		1	5						31
Sex	Male	4	3	1	20	2	1	2	2				10						45
	Female	3	1	1	15	2		3	3	2	1	1	22						54
	# of samples	7	4	2	35	4	1	5	5	2	1	1	32						99

	Percent of coded responses to pot # 8																	
	Variable	1	7	31	34	39	40	41	42	43	44	45	46	47	51				Total
Age	Elder		4		23	4		15	4			4	46						100
	Adult	4			28	12		4	4				48						100
	Youth		4		50				8	8	4		26						100
	Child	26	8	8	42		4		4				8						100
Status	Specialist				4								19	73	4				100
	Lower Class		3	3	25	3		3	3	3			57						100
	Middle Class	9		3	48	9	3	6			3		19						100
	Upper Class	13	10		36			6	13	3		3	16						100
Sex	Male	9	7	2	45	4	2	4	4				23						100
	Female	5	2	2	28	4		5	5	4	2	2	41						100
	# of samples	14	8	4	36	4	1	5	5	2	1	1	32						100

TABLE 24

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #9																	
	Variable	1	7	31	34	39	40	48	49	50	51							Total
Age	Elder		1		15				9		1							26
	Adult	2			13	1			9									25
	Youth		2		17				3	2								24
	Child	6	3	4	10		1											24
Status	Specialist				6			20										26
	Lower Class		1	3	19				13									36
	Middle Class	1	3	1	20	1	1		4	1								32
	Upper Class	7	2		16				4	1	1							31
Sex	Male	6	2	4	24	1	1		6		1							45
	Female	2	4		31				15	2								54
	# of samples	8	6	4	55	1	1		21	2	1							99

	Percent of coded responses to pot #9																	
	Variable	1	7	31	34	39	40	48	49	50	51							Total
Age	Elder		4		57				35		4							100
	Adult	8			52	4			36									100
	Youth		8		71				13	8								100
	Child	25	12	17	42		4											100
Status	Specialist				23			77										100
	Lower Class		3	8	53				36									100
	Middle Class	3	9	3	63	3	3		13	3								100
	Upper Class	23	6		52				13	3	3							100
Sex	Male	14	4	9	53	2	2		14		2							100
	Female	4	7		57				28	4								100
	# of samples	8	6	4	56	1	1		21	2	1							100

TABLE 25

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 10																		
	Variable	1	7	31	33	34	41	48	49	51	52	53							Total
Age	Elder	1	1			16			6			2							26
	Adult	2				18			4	1									25
	Youth		1		1	18	1		2			1							24
	Child	6	5	3		9					1								24
Status	Specialist					5		3	1	4	6	7							26
	Lower Class	1	1	2	1	18	1		9	1	1	1							36
	Middle Class	2	4	1		21			3			1							32
	Upper Class	6	2			22						1							31
Sex	Male	7	3	3		27			3		1	1							45
	Female	2	4		1	34	1		9	1		2							54
	# of samples	9	7	3	1	61	1		12	1	1	3							99

	Percent of coded responses to pot # 10																		
	Variable	1	7	31	33	34	41	48	49	51	52	53							Total
Age	Elder	4	4			61			23			8							100
	Adult	8				72			16	4									100
	Youth		4		4	75	4		9			4							100
	Child	25	21	13		37					4								100
Status	Specialist					19		12	4	15	23	27							100
	Lower Class	3	3	6	3	49	3		24	3	3	3							100
	Middle Class	6	13	3		66			9			3							100
	Upper Class	19	7			71						3							100
Sex	Male	15	7	7		60			7		2	2							100
	Female	4	7		2	63	2		16	2		4							100
	# of samples	9	7	3	1	62	1		12	1	1	3							100

TABLE 26

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #11																	
	Variable	1	7	31	32	34	57	58	59	60	61	62						Total
Age	Elder	3			1	19	1		1		1							26
	Adult	3				16			4		1	1						25
	Youth	1	1			18	1		2		1							24
	Child	6	3	1		11			2	1								24
Status	Specialist	1				6	14	3	2									26
	Lower Class	5				27	2		2									36
	Middle Class	4		1		21			5			1						32
	Upper Class	4	4		1	16			2	1	3							31
Sex	Male	7	3	1	1	28			4		1							45
	Female	6	1			36	2		5	1	2	1						54
	# of samples	13	4	1	1	64	2		9	1	3	1						99

	Percent of coded responses to pot #11																	
	Variable	1	7	31	32	34	57	58	59	60	61	62						Total
Age	Elder	11			4	73	4		4		4							100
	Adult	12				64			16		4	4						100
	Youth	4	4			75	4		9		4							100
	Child	25	13	4		46			8	4								100
Status	Specialist	4				23	54	11	8									100
	Lower Class	13				75	6		6									100
	Middle Class	13		3		65			16			3						100
	Upper Class	13	13		3	52			6	3	10							100
Sex	Male	16	7	2	2	62			9		2							100
	Female	11	2			66	4		9	2	4	2						100
	# of samples	13	4	1	1	65	2		9	1	3	1						100

TABLE 27

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #12																	
	Variable	1	113	114	116	117	118	123	124	126	127	128	129	130	131	133	134	145	Total
Age	Elder	2			1		1			7			10		1	3	1		26
	Adult	1					1			11	1		4			7			25
	Youth	2	1					1	1	11			5			2	1		24
	Child	3	1	1					1	11	1	1	2	1			2		24
Status	Specialist	1		2		4	3	4		6			1		2	2		1	26
	Lower Class	4			1					14			6	1		8	2		36
	Middle Class	2	1	1					1	16	1	1	5		1	2	1		32
	Upper Class	2					2	1	1	10	1		10			2	1		31
Sex	Male	2	1	1	1		2	1		18	1	1	11	1		2	3		45
	Female	6	1						2	22	1		10		1	10	1		54
	# of samples	8	2	1	1		2	1	2	40	2	1	21	1	1	12	4		99

	Percent of coded responses to pot #12																	
	Variable	1	113	114	116	117	118	123	124	126	127	128	129	130	131	133	134	145	Total
Age	Elder	8			4		4			26			38		4	12	4		100
	Adult	4					4			44	4		16			28			100
	Youth	8	4					4	4	46			20			8	4		100
	Child	14	4	4					4	46	4	4	8	4			8		100
Status	Specialist	4		8		15	12	15		22			4		8	8		4	100
	Lower Class	11			3					38			17	3		22	6		100
	Middle Class	6	3	3					3	51	3	3	16		3	6	3		100
	Upper Class	7	3				7	3	3	32	3		32			7	3		100
Sex	Male	4	2	2	2		4	2		41	2	2	25	2		4	8		100
	Female	11	2						4	41	2		18		2	18	2		100
	# of samples	8	2	1	1		2	1	2	41	2	1	21	1	1	12	4		100

TABLE 28

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #13																	
	Variable	1	7	31	33	34	49	53	54	55	56							Total
Age	Elder		1			23			2									26
	Adult	2				21	1			1								25
	Youth	2	1		1	15	1		4									24
	Child	4	2	3		14					1							24
Status	Specialist	2	1			4		1	18									26
	Lower Class		1	1		26	1		6	1								36
	Middle Class	2	2	2		25	1											32
	Upper Class	6	1		1	22					1							31
Sex	Male	6	1	2	1	30	2		2		1							45
	Female	2	3	1		43			4	1								54
	# of samples	8	4	3	1	73	2		6	1	1							99

	Percent of coded responses to pot #13																	
	Variable	1	7	31	33	34	49	53	54	55	56							Total
Age	Elder		4			88			8									100
	Adult	8				84	4			4								100
	Youth	8	4		4	63	4		17									100
	Child	17	8	13		58					4							100
Status	Specialist	8	4			15		4	69									100
	Lower Class		3	3		72	3		16	3								100
	Middle Class	6	6	6		79	3											100
	Upper Class	19	3		3	70					3							100
Sex	Male	13	2	5	2	66	5		5		2							100
	Female	3	6	2		80			7	2								100
	# of samples	8	4	3	1	74	2		6	1	1							100

TABLE 29

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #14																	
	Variable	1	31	33	34	41	42	43	46	63	64	65	66	68	69	70	71	Total
Age	Elder	2			7	1	1	1	3	3			1	1	1	2	3	26
	Adult	2		1	10		1	1	3		1		1			1	4	25
	Youth	3			8		1		3	1					3	3	2	24
	Child	10	1		5			1	1	2	1	1	1			1		24
Status	Specialist	3			2									1	18		2	26
	Lower Class	4		1	9		1	1	6	2			2	1	4	1	4	36
	Middle Class	5			11				2	3	2					5	3	32
	Upper Class	8			10	1	2	2	2	1		1	1			1	2	31
Sex	Male	12		1	13	1	1	2	3	1	2		3	1	1	2	2	45
	Female	5	1		17		2	1	7	5		1			3	5	7	54
	# of samples	16	1	1	30	1	3	3	10	6	2	1	3	1	4	7	9	99

	Percent of coded responses to pot #14																	
	Variable	1	31	33	34	41	42	43	46	63	64	65	66	68	69	70	71	Total
Age	Elder	8			27	4	4	4	11	11			4	4	4	8	11	100
	Adult	8		4	40		4	4	12		4		4			4	16	100
	Youth	13			32		4		13	4					13	13	8	100
	Child	43	4		21			4	4	8	4	4	4			4		100
Status	Specialist	12			8									4	68		8	100
	Lower Class	11		3	25		3	3	17	5			5	3	11	3	11	100
	Middle Class	16	3		35				6	9	6					16	9	100
	Upper Class	25			32	3	7	7	7	3		3	3			3	7	100
Sex	Male	28		2	30	2	2	4	7	2	4		7	2	2	4	4	100
	Female	9	2		31		4	2	13	9		2			6	9	13	100
	# of samples	16	1	1	31	1	3	3	10	6	2	1	3	1	4	7	9	100

TABLE 30

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #15 *																	
	Variable	1	2	3	4	7	14	17	33	72	73	74	75	76	77	78	79	80	Total
Age	Elder	3	3	1	2		8			1	1		2			2			
	Adult	4		6		2	7				1		2					1	
	Youth	3	1	5	1	1	8				1	1	2		1				
	Child	9	1	1	1	1	4	1	1				3						
Status	Specialist	1	1	4		1					1		1	1	10	4	1	1	
	Lower Class	6	2	6	1		7				1		8		1	1		1	
	Middle Class	6	1	6	2		11	1			1		1						
	Upper Class	7	2	1	1	4	9		1	1	1					1			
Sex	Male	12	2	7		3	11		1		1		1		1	2			
	Female	7	3	6	4	1	16	1		1	2	1	8					1	
	# of samples	19	5	13	4	4	27	1	1	1	3	1	9		1	2		1	

	Percent of coded responses to pot #15*																	
	Variable	1	2	3	4	7	14	17	33	72	73	74	75	76	77	78	79	80	Total
Age	Elder	11	11	4	8		30			4	4		8			8			
	Adult	16		24		8	28				4		8					4	
	Youth	13	4	21	4	4	34				4	4	8		4				
	Child	38	4	4	4	4	17	4	4				13						
Status	Specialist	4	4	15		4					4		4	4	38	15	4	4	
	Lower Class	17	5	17	3		19				3		22		3	3		3	
	Middle Class	19	3	19	6		35	3			3		3						
	Upper Class	23	7	3	3	13	30		3	3	3	3				3			
Sex	Male	27	4	16		7		25	2		2		2		2	4			
	Female	13	5	11	7	2	29	2		2	4	2	15					2	
	# of samples	19	5	13	4	4	28	1	1	1	3	1	9		1	2		1	

* See following page for total

TABLE 31

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 15																	
	Variable	81	87	91	166													Total
Age	Elder		1	2														26
	Adult	1			1													25
	Youth																	24
	Child				2													24
Status	Specialist																	26
	Lower Class				2													36
	Middle Class	1	1	1														32
	Upper Class			1	1													31
Sex	Male			1	3													45
	Female	1	1	1														54
	# of samples	1	1	2	3													99

	Percent of coded responses to pot #																	
	Variable	81	87	91	166													Total
Age	Elder		4	8														100
	Adult	4			4													100
	Youth																	100
	Child				8													100
Status	Specialist																	100
	Lower Class				5													100
	Middle Class	3	3	3														100
	Upper Class			3	3													100
Sex	Male			2	7													100
	Female	2	2	2														100
	# of samples	1	1	2	3													100

TABLE 32

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #16																	
	Variable	1	2	3	4	7	14	16	65	83	84	165						Total
Age	Elder	1	1			21					1	2						26
	Adult	1		3	1	13	1		1			5						25
	Youth	1		1		19				1		2						24
	Child	3	1	3		16						1						24
Status	Specialist	1				7		5			9	4						26
	Lower Class	1	1	2		24			1		1	6						36
	Middle Class	3		3		23						3						32
	Upper Class	2	1	2	1	22	1			1		1						31
Sex	Male	6	2	2	1	30	1			1	1	1						45
	Female			5		39			1			9						54
	# of samples	6	2	7	1	69	1		1	1	1	10						99

	Percent of coded responses to pot #16																	
	Variable	1	2	3	4	7	14	16	65	83	84	165						Total
Age	Elder	4	4			81					4	7						100
	Adult	4		12	4	52	4		4			20						100
	Youth	4		4		79				4		9						100
	Child	13	4	13		66						4						100
Status	Specialist	4				27		19			35	15						100
	Lower Class	3	3	6		66			3		3	16						100
	Middle Class	9		9		73						9						100
	Upper Class	7	3	7	3	71	3			3		3						100
Sex	Male	13	5	5	2	67	2			2	2	2						100
	Female			9		72				2		17						100
	# of samples	6	2	7	1	70	1		1	1	1	10						100

TABLE 33

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #17																	
	Variable	1	7	31	34	51	52	53	100	167	168							Total
Age	Elder	1	1		20					1	3							26
	Adult	1		1	13				1		9							25
	Youth	1	1		16					1	5							24
	Child	2	2	3	13						4							24
Status	Specialist	1			7	1	1	3		6	7							26
	Lower Class	1			20					2	13							36
	Middle Class		2	3	21						6							32
	Upper Class	4	2	1	21				1		2							31
Sex	Male	3	1	3	32				1		5							45
	Female	2	3	1	30					2	16							54
	# of samples	5	4	4	62				1	2	21							99

	Percent of coded responses to pot #17																	
	Variable	1	7	31	34	51	52	53	100	167	168							Total
Age	Elder	4	4		77					4	11							100
	Adult	4		4	52				4		36							100
	Youth	4	4		67					4	21							100
	Child	8	8	13	54						17							100
Status	Specialist	4			27	4	4	11		23	27							100
	Lower Class	3			55					6	36							100
	Middle Class		6	9	66						19							100
	Upper Class	13	6	3	69				3		6							100
Sex	Male	7	2	7	71				2		11							100
	Female	4	6	2	55					4	29							100
	# of samples	5	4	4	63				2	2	21							100

TABLE 34

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 18 *																	
	Variable	1	65	118	125	135	136	137	138	139	140	141	142	143	145	146	147	148	Total
Age	Elder	5			4	2		2		1	2	1	1			5			
	Adult	4			4	3		1		1		1				2		1	
	Youth	2	1			1				1		1		1	1	8			
	Child	7					1	1								9	1		
Status	Specialist	6		1	1	1		1	2	1		3				4			
	Lower Class	11	1		2	2		1		3				1		4		1	
	Middle Class	5			1	1	1	1			1	1			1	10	1		
	Upper Class	2			5	3		2			1	2	1			10			
Sex	Male	8	1		4	4	1	4			1	1	1	1		8	1		
	Female	10			4	2				3	1	2			1	16		1	
	# of samples	18	1		8	6	1	4		3	2	3	1	1	1	24	1	1	

	Percent of coded responses to pot # 18 *																	
	Variable	1	65	118	125	135	136	137	138	139	140	141	142	143	145	146	147	148	Total
Age	Elder	19			15	8		8		4	8	4	4			19			
	Adult	16			16	12		4		4		4				8		4	
	Youth	9	4			4				4		4		4	4	34			
	Child	29					4	4								38	4		
Status	Specialist	23		4	4	4		4	8	4		11				15			
	Lower Class	30	3		5	5		3		8				3		11		3	
	Middle Class	16			3	3	3	3			3	3			3	32	3		
	Upper Class	7			16	10		7			3	7	3			32			
Sex	Male	19	2		9	9	2	9			2	2	2	2		19	2		
	Female	18			7	4				5	2	4			2	29		2	
	# of samples	18	1		8	6	1	4		3	2	3	1	1	1	25	1	1	

* See following page for total

TABLE 35

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 18																	
	Variable	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	Total
Age	Elder					3												26
	Adult	1			2				1	1	1	1					1	25
	Youth	1	2				1		1				1		1	1		24
	Child		1					1						3				24
Status	Specialist		1	1	3											1		26
	Lower Class	2	1			1		1		1	1	1			1	1		36
	Middle Class		1		1	1	1		1				1	2			1	32
	Upper Class		1		1	1			1					1				31
Sex	Male		1			3		1	2		1	1				1		45
	Female	2	2		2		1			1			1	3	1		1	54
	# of samples	2	3		2	3	1	1	2	1	1	1	1	3	1	1	1	99

	Percent of coded responses to pot # 18																	
	Variable	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	Total
Age	Elder					11												100
	Adult	4			8				4	4	4	4					4	100
	Youth	4	9				4		4				4		4	4		100
	Child		4					4						13				100
Status	Specialist		4	4	11											4		100
	Lower Class	5	3			3		3		3	3	3			3	3		100
	Middle Class		3		3	3	3		3				3	7			3	100
	Upper Class		3		3	3			3					3				100
Sex	Male		2			7		2	4		2	2				2		100
	Female	4	4		4		2			2			2	5	2		2	100
	# of samples	2	3		2	3	1	1	2	1	1	1	1	3	1	1	1	100

TABLE 36

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot #19																	
	Variable	1	3	4	7	14	23	82	125	165	166							Total
Age	Elder	3	17		2	2					2							26
	Adult	1	14		1	2					7							25
	Youth		12		2	3	1	2			4							24
	Child		15	1	4	1	2		1									24
Status	Specialist		11				1			1	13							26
	Lower Class	2	19		4	1	1				9							36
	Middle Class	1	20		4	4	1		1		1							32
	Upper Class	1	20	1	1	3		2			3							31
Sex	Male	3	26		7	1	1	2	1		4							45
	Female	1	33	1	2	7	1				9							54
	# of samples	4	59	1	9	8	2	2	1		13							99

	Percent of coded responses to pot #19																	
	Variable	1	3	4	7	14	23	82	125	165	166							Total
Age	Elder	11	65		8	8					8							100
	Adult	4	56		4	8					28							100
	Youth		50		8	13	4	8			17							100
	Child		63	4	17	4	8		4									100
Status	Specialist		42				4			4	50							100
	Lower Class	6	53		11	3	3				25							100
	Middle Class	3	62		13	13	3		3		3							100
	Upper Class	3	65	3	3	10		6			10							100
Sex	Male	7	58		16	2	2	4	2		9							100
	Female	2	61	2	4	13	2				16							100
	# of samples	4	60	1	9	8	2	2	1		13							100

TABLE 37

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 20																	
	Variable	1	3	4	7	12	14	23	37	82	165	166						Total
Age	Elder	4	2		18						2							26
	Adult	1	5		9		1				7	2						25
	Youth	2	4		15						2	1						24
	Child	1	7	1	13				1	1								24
Status	Specialist				7	1		1			14	3						26
	Lower Class	2	5		19				1		7	2						36
	Middle Class	2	6		23						1							32
	Upper Class	4	7	1	13		1			1	3	1						31
Sex	Male	6	5		26		1		1		3	3						45
	Female	2	13	1	29					1	8							54
	# of samples	8	18	1	55		1		1	1	11	3						99

	Percent of coded responses to pot # 20																	
	Variable	1	3	4	7	12	14	23	37	82	165	166						Total
Age	Elder	15	8		69						8							100
	Adult	4	20		36		4				28	8						100
	Youth	8	17		63						8	4						100
	Child	4	29	4	55				4	4								100
Status	Specialist				27	4		4			54	11						100
	Lower Class	6	14		52				3		19	6						100
	Middle Class	6	19		72						3							100
	Upper Class	13	23	3	42		3			3	10	3						100
Sex	Male	13	11		58		2		2		7	7						100
	Female	4	24	2	53					2	15							100
	# of samples	8	18	1	56		1		1	1	11	3						100

TABLE 38

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 21																	
	Variable	1	2	3	4	7	14	24	74	75	81	83	86	87	88	125	141	166	Total
Age	Elder	2	8	8	2	1	1				1	1	1		1				26
	Adult	2	4	5	4	1	5									2	1	1	25
	Youth		6	6	3		4		1	1		2						1	24
	Child		2	13	5	2	1												24
Status	Specialist	2	10	3	1			1		1				8					26
	Lower Class	1	11	11	5	2	2			1						2		1	36
	Middle Class		6	11	3	2	5		1	1		1					1	1	32
	Upper Class	3	3	10	6		4				1	2	1		1				31
Sex	Male	2	5	15	10	2	3					3			1	2		2	45
	Female	2	15	17	4	2	8		1	2	1		1				1		54
	# of samples	4	20	32	14	4	11		1	2	1	3	1		1	2	1	2	99

	Percent of coded responses to pot # 21																	
	Variable	1	2	3	4	7	14	24	74	75	81	83	86	87	88	125	141	166	Total
Age	Elder	8	30	30	8	4	4				4	4	4		4				100
	Adult	8	16	20	16	4	20									8	4	4	100
	Youth		25	25	13		17		4	4		8						4	100
	Child		8	55	21	8	4			4									100
Status	Specialist	8	38	11	4			4		4				31					100
	Lower Class	3	31	31	14	5	5			3						5		3	100
	Middle Class		19	35	9	6	16		3	3		3					3	3	100
	Upper Class	10	10	32	19		13				3	7	3		3				100
Sex	Male	4	11	34	23	4	7					7			2	4		4	100
	Female	4	27	31	7	4	15		2	4	2		2				2		100
	# of samples	4	20	33	14	4	11		1	2	1	3	1		1	2	1	2	100

TABLE 39

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 22 *																	
	Variable	1	2	3	4	7	14	17	72	73	74	75	83	87	89	90	91	92	Total
Age	Elder	2	7		4	1	2		4	1		2	1	1				1	
	Adult	1	4	3	4				5	1		3					1		
	Youth	1	2	5	1		8		1	2		3				1			
	Child	5	1	5	3		2	1		1	2	4							
Status	Specialist	2		2	1					13		2			6				
	Lower Class	2	5	8	5		2		3	5		5							
	Middle Class	2	6	4	1	1	6	1	4			3	1			1			
	Upper Class	5	3	1	6		4		3		2	4		1			1	1	
Sex	Male	6	6	5	9	1	5		3	1		3	1	1		1	1		
	Female	3	8	8	3		7	1	7	4	2	9						1	
	# of samples	9	14	13	12	1	12	1	10	5	2	12	1	1		1	1	1	

	Percent of coded responses to pot # 22 *																	
	Variable	1	2	3	4	7	14	17	72	73	74	75	83	87	89	90	91	92	Total
Age	Elder	8	26		15	4	8		15	4		8	4	4				4	
	Adult	4	16	12	16				20	4		12					4		
	Youth	4	8	21	4		34		4	8		13				4			
	Child	21	4	21	13		8	4		4	8	17							
Status	Specialist	8		8	3					50		8			23				
	Lower Class	6	14	21	14		6		8	14		14							
	Middle Class	6	19	13	3	3	19	3	13			9	3			3			
	Upper Class	16	10	3	20		13		10		6	13	3				3	3	
Sex	Male	14	14	11	20	2	11		7	2		7	2	2		2	2		
	Female	5	15	15	5		13	2	13	7	4	17						2	
	# of samples	9	15	13	12	1	12	1	10	5	2	12	1	1		1	1	1	

* See following page for total

TABLE 40

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 22																		
	Variable	125	141	166															Total
Age	Elder																		26
	Adult	1	1	1															25
	Youth																		24
	Child																		24
Status	Specialist																		26
	Lower Class	1																	36
	Middle Class		1	1															32
	Upper Class																		31
Sex	Male	1		1															45
	Female		1																54
	# of samples	1	1	1															99

	Percent of coded responses to pot # 22																		
	Variable	125	141	166															Total
Age	Elder																		100
	Adult	4	4	4															100
	Youth																		100
	Child																		100
Status	Specialist																		100
	Lower Class	3																	100
	Middle Class		3	3															100
	Upper Class																		100
Sex	Male	2		2															100
	Female		2																100
	# of samples	1	1	1															100

TABLE 41

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 23																	
	Variable	1	2	3	4	7	14	15	17	18	75	93	94	95	96	141	166	Total
Age	Elder	3	5	8	2	4	3						1					26
	Adult		1	11	4	3	4									1	1	25
	Youth			13	2	2	5				1		1					24
	Child		1	14	2	4	2		1									24
Status	Specialist	1		8	1			5		1		1	5	2	1		1	26
	Lower Class	1	2	23	3	4	1						2					36
	Middle Class		3	15		5	5		1		1					1	1	32
	Upper Class	2	2	8	7	4	8											31
Sex	Male	1	3	17	7	8	8										1	45
	Female	2	4	29	3	5	6		1		1		2			1		54
	# of samples	3	7	46	10	13	14		1		1		2			1	1	99

	Percent of coded responses to pot # 23																	
	Variable	1	2	3	4	7	14	15	17	18	75	93	94	95	96	141	166	Total
Age	Elder	12	19	31	7	15	12						4					100
	Adult		4	44	16	12	16									4	4	100
	Youth			55	8	8	21				4		4					100
	Child		4	59	8	17	8		4									100
Status	Specialist	4		30	4			19		4		4	19	8	4		4	100
	Lower Class	3	6	63	8	11	3						6					100
	Middle Class		9	47		16	16		3		3					3	3	100
	Upper Class	6	6	26	23	13	26											100
Sex	Male	2	7	38	15	18	18										2	100
	Female	4	7	53	6	9	11		2		2		4			2		100
	# of samples	3	7	47	10	13	14		1		1		2			1	1	100

TABLE 42

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 24																	
	Variable	1	2	3	4	7	14	17	21	81	83	96	97	165	166				Total
Age	Elder	1	1	1	1	20				1					1				26
	Adult	1		1		21	1							1					25
	Youth	1		1		21					1								24
	Child	2	1	6		14		1											24
Status	Specialist			2		6			1			15	1	1					26
	Lower Class	1	1	6	1	27													36
	Middle Class	1		2		26		1						1	1				32
	Upper Class	3	1	1		23	1			1	1								31
Sex	Male	2	2	5	1	31	1				1			1	1				45
	Female	3		4		45		1		1									54
	# of samples	5	2	9	1	76	1	1		1	1			1	1				99

	Percent of coded responses to pot # 24																	
	Variable	1	2	3	4	7	14	17	21	81	83	96	97	165	166				Total
Age	Elder	4	4	4	4	76				4					4				100
	Adult	4		4		84	4							4					100
	Youth	4		4	88						4								100
	Child	8	4	25		59		4											100
Status	Specialist			8		23			4			57	4	4					100
	Lower Class	3	3	16	3	75													100
	Middle Class	3		6		82		3						3	3				100
	Upper Class	10	3	3		75	3			3	3								100
Sex	Male	5	5	11	2	69	2				2			2	2				100
	Female	6		7		83		2		2									100
	# of samples	5	2	9	1	77	1	1		1	1			1	1				100

TABLE 43

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 25																	
	Variable	1	2	3	7	11	31	33	34	35	37	81	96	98	99	100	101	165	Total
Age	Elder	4	1		17	1					1	1				1			26
	Adult	1			22						1							1	25
	Youth	2			14		1		1	2	4								24
	Child	1		3	15		2	1	2										24
Status	Specialist	2			1						10		5	1	2		5		26
	Lower Class	1	1	3	25						6								36
	Middle Class	1			23		3		2	2							1		32
	Upper Class	6			20	1		1	1			1				1			31
Sex	Male	4	1	3	27		2	1	1	1	3					1		1	45
	Female	4			41	1	1		2	1	3	1							54
	# of samples	8	1	3	68	1	3	1	3	2	6	1				1		1	99

	Percent of coded responses to pot # 25																	
	Variable	1	2	3	7	11	31	33	34	35	37	81	96	98	99	100	101	165	Total
Age	Elder	15	4		65	4					4	4				4			100
	Adult	4			88						4							4	100
	Youth	8			59		4		4	8	17								100
	Child	4		13	63		8	4	8										100
Status	Specialist	8			4						38		19	4	8		19		100
	Lower Class	3	3	8	69						17								100
	Middle Class	3			72		10		6	6							3		100
	Upper Class	20			65	3		3	3			3				3			100
Sex	Male	9	2	7	61		4	2	2	2	7					2		2	100
	Female	7			76	2	2		4	2	5	2							100
	# of samples	8	1	3	69	1	3	1	3	2	6	1				1		1	100

TABLE 44

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 26																	
	Variable	1	7	25	31	33	34	41	49	51	54	55	102	168					Total
Age	Elder	2	1	1			21				1								26
	Adult	3	1				18				1	1		1					25
	Youth		2				19				3								24
	Child	4	3		2	1	14												24
Status	Specialist	1					6	1	1	1	14		2						26
	Lower Class	1				1	29				4	1							36
	Middle Class	1	3	1	2		23				1			1					32
	Upper Class	7	4				20												31
Sex	Male	6	2	1	2	1	29				3			1					45
	Female	3	5				43				2	1							54
	# of samples	9	7	1	2	1	72				5	1		1					99

	Percent of coded responses to pot # 26																	
	Variable	1	7	25	31	33	34	41	49	51	54	55	102	168					Total
Age	Elder	8	4	4			81				4								100
	Adult	12	4				72				4	4		4					100
	Youth		8				79				13								100
	Child	17	13		8	4	58												100
Status	Specialist	4					23	4	4	4	54		7						100
	Lower Class	3				3	80				11	3							100
	Middle Class	3	10	3	6		72				3			3					100
	Upper Class	23	14				65												100
Sex	Male	13	5	2	5	2	64				7			2					100
	Female	5	9				80				4	2							100
	# of samples	9	7	1	2	1	73				5	1		1					100

TABLE 45

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 27 *																	
	Variable	1	3	7	25	31	33	34	65	74	103	104	105	106	107	108	109	110	Total
Age	Elder	3		2								10		1		1	1	8	
	Adult	4	1	3	1	1	1					5						7	
	Youth	3	1	4								6					1	9	
	Child	6		6		1		1	1	2							1	6	
Status	Specialist	1		1							1	14	4	2	1			2	
	Lower Class	4	1	6	1		1					8		1			1	12	
	Middle Class	6	1	5		1		1		1		4				1	2	10	
	Upper Class	6		4		1			1	1		9						8	
Sex	Male	11	1	7	1	2	1		1	1		5		1			1	13	
	Female	5	1	8				1		1		16				1	2	17	
	# of samples	16	2	15	1	2	1	1	1	2		21		1		1	3	30	

	Percent of coded responses to pot # 27 *																	
	Variable	1	3	7	25	31	33	34	65	74	103	104	105	106	107	108	109	110	Total
Age	Elder	11		8								38		4		4	4	31	
	Adult	16	4	12	4	4	4					20						28	
	Youth	13	4	17								25					4	37	
	Child	25		25		4		4	4	9							4	25	
Status	Specialist	4		4							4	53	15	8	4			8	
	Lower Class	11	3	16	3		3					22		3			3	33	
	Middle Class	19	3	16		3		3		3		13				3	6	31	
	Upper Class	20		13		3			3	3		29						26	
Sex	Male	25	2	16	2	5	2		2	2		11		2			2	29	
	Female	9	2	15				2		2		29				2	4	31	
	# of samples	16	2	15	1	2	1	1	1	2		21		1		1	3	31	

* See following page for total

TABLE 46

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 27																	
	Variable	III																Total
Age	Elder																	26
	Adult	2																25
	Youth																	24
	Child																	24
Status	Specialist																	26
	Lower Class	1																36
	Middle Class																	32
	Upper Class	1																31
Sex	Male																	45
	Female	2																54
	# of samples	2																99

	Percent of coded responses to pot # 27																	
	Variable	III																Total
Age	Elder																	100
	Adult	8																100
	Youth																	100
	Child																	100
Status	Specialist																	100
	Lower Class	3																100
	Middle Class																	100
	Upper Class	3																100
Sex	Male																	100
	Female	4																100
	# of samples	2																100

TABLE 47

CODED RESPONSES TO POTS 1-28, BASED ON VARIABLES

OF AGE, STATUS AND SEX

	Number of coded responses to pot # 28																	
	Variable	1	11	34	104	110	112											Total
Age	Elder					26												26
	Adult					25												25
	Youth		3			21												24
	Child	1				23												24
Status	Specialist			1	1	19	5											26
	Lower Class	1				35												36
	Middle Class		3			29												32
	Upper Class					31												31
Sex	Male		3			42												45
	Female	1				53												54
	# of samples	1	3			95												99

	Percent of coded responses to pot # 28																	
	Variable	1	11	34	104	110	112											Total
Age	Elder					100												100
	Adult					100												100
	Youth		13			87												100
	Child	4				96												100
Status	Specialist			4	4	73	19											100
	Lower Class	3				97												100
	Middle Class		9			91												100
	Upper Class					100												100
Sex	Male		7			93												100
	Female	2				98												100
	# of samples	1	3			96												100

TABLE 48

```
FORTRAN IV G LEVEL  21                 MAIN               DATE = 75062          15/14/40                PAGE 0001

      C        GUTTMAN LAMBDA PROGRAM FOR BINARY DATA
      C     THIS PROGRAM COMPUTES THE LAMBDA COEFFICIENT OF PREDICTABILITY AS DEFINED
      C     BY L.A. GOODMAN AND W.H. KRUSKAL IN MEASURES OF ASSOCIATION FOR CROSS
      C     CLASSIFICATIONS, JASA,49,268,DEC 1954,732-764 SEE P743
      C     THIS PROGRAM COMPUTES LAMBDA WHEN THERE ARE ONLY 2 CATEGORIES FOR EACH VAR
      C
      C     THIS PROGRAM WAS WRITTEN BY
      C
      C         DR. DAVID LEVINE
      C         DEPT OF STATISTICS, BERNARD BARUCH COLLEGE(CUNY)
            DIMENSION X(94,25)
            DIMENSION ICELL(2,2)
            DIMENSION L(94,94)
            DIMENSION SUML(94)
            DIMENSION W(94)
            DIMENSION DIST(25,25)
            REAL L
            INTEGER SROW1,SROW2,SCOL1,SCOL2
      C
      C     NUMBER OF FEATURES IS IN, THE NUMBER OF STIMULI IS JN
      C
            READ(5,100)IN,JN
        100 FORMAT(2I2)
      C
      C     READ DATA VALUES WITH ALL IN FEATURES FOR STIMULUS J ON ONE CARD
      C
            DO 8 J=1,JN
            READ(5,101)(X(I,J),I=1,IN)
        101 FORMAT(80F1.0)
          8 CONTINUE
      C
      C     COMPUTE CELL TOTALS FOR CONTINGENCY TABLE FOR EACH PAIR OF FEATURES
      C
            DO 10 I=2,IN
            IJ=I-1
            DO 11 II=1,IJ
            ICELL(1,1)=0
            ICELL(1,2)=0
            ICELL(2,1)=0
            ICELL(2,2)=0
            DO 14 J=1,JN
            IF(X(I,J)-X(II,J))15,16,17
         15 ICELL(1,2)=ICELL(1,2)+1
            GO TO 20
         17 ICELL(2,1)=ICELL(2,1)+1
            GO TO 20
         16 IF(X(I,J))500,18,19
        500 WRITE (6,501)I,J,X(I,J)
        501 FORMAT('0',5X,'X(',I2,',',I2,'EQUALS',F6.1)
            GO TO 900
         18 ICELL(2,2)=ICELL(2,2)+1
            GO TO 20
         19 ICELL(1,1)=ICELL(1,1)+1
         20 CONTINUE
         14 CONTINUE
      C
```

TABLE 48 CONTINUED

```
FORTRAN IV G LEVEL  21                MAIN              DATE = 75062         15/14/40              PAGE 0002

          C      COMPUTE MAXIMUM VALUES IN ROWS AND COLUMNS NEEDED TO COMPUTE LAMBDA
          C
                 IF(ICELL(1,1)-ICELL(1,2))21,22,22
              21 MAXR1=ICELL(1,2)
                 GO TO 23
              22 MAXR1=ICELL(1,1)
              23 CONTINUE
                 IF (ICELL(2,1)-ICELL(2,2))24,25,25
              24 MAXR2=ICELL(2,2)
                 GO TO 26
              25 MAXR2=ICELL(2,1)
              26 CONTINUE
                 IF (ICELL(1,1)-ICELL(2,1))27,28,28
              27 MAXC1=ICELL(2,1)
                 GO TO 29
              28 MAXC1=ICELL(1,1)
              29 CONTINUE
                 IF(ICELL(1,2)-ICELL(2,2))30,31,31
              30 MAXC2=ICELL(2,2)
                 GO TO 32
              31 MAXC2=ICELL(1,2)
              32 CONTINUE
                 SROW1=ICELL(1,1)+ICELL(1,2)
                 SROW2=ICELL(2,1)+ICELL(2,2)
                 SCOL1=ICELL(1,1)+ICELL(2,1)
                 SCOL2=ICELL(1,2)+ICELL(2,2)
                 IF(SROW1-SROW2)33,33,34
              33 MAXROW=SROW2
                 GO TO 35
              34 MAXROW=SROW1
              35 CONTINUE
                 IF(SCOL1-SCOL2)36,37,37
              36 MAXCOL=SCOL2
                 GO TO 38
              37 MAXCOL=SCOL1
              38 CONTINUE
                 A=MAXR1+MAXR2+MAXC1+MAXC2
                 B=MAXROW+MAXCOL
                 C=JN
                 IF((2.*C)-B) 111,110,111
             110 L(I,II)=0
                 GO TO 112
             111 L(I,II)=(A-B)/((2.*C)-B)
             112 L(II,I)=L(I,II)
              11 CONTINUE
              10 CONTINUE
          C
          C      COMPUTE WEIGHT OF EACH FEATURE
                 DO 39 I=1,IN
                 SUML(I)=0
                 DO 40 J=1,IN
                 IF(I-J)41,42,41
              41 SUML(I)=SUML(I)+L(I,J)
              42 CONTINUE
              40 CONTINUE
                 IF(SUML(I))600,600,43
```

```
FORTRAN IV G LEVEL 21          MAIN          DATE = 75062      15/14/48          PAGE 0003

0089          600 WRITE(6,601)I,SUML(I)
0090          601 FORMAT('0',5X'WEIGHT',2X,I2,'EQUALS',5X,F20.15)
0091              GO TO 900
0092           45 W(I)=(1./SUML(I))
0093              WRITE(6,44)I,W(I)
0094           44 FORMAT('0','WEIGHT OF FEATURE',5X,I2,2X,'EQUALS',F30.23)
0095           39 CONTINUE
                C
                C     COMPUTE DISTANCE BETWEEN STIMULI BY ADDING WEIGHTS OF FEATURES THAT ARE
                C     /HELD IN COLUMN BY THE TWO STIMULI
                C
0096              DO 45 J=2,JN
0097              JI=J-1
0098              DO 46 JJ=1,JI
0099              DIST(J,JJ)=0
0100              DO 47 I=1,IN
0101              IF(X(I,J)-X(I,JJ))49,48,49
0102           48 DIST(J,JJ)=DIST(J,JJ)+W(I)
0103              GO TO 49
0104           49 CONTINUE
0105           47 CONTINUE
0106           46 CONTINUE
0107           45 CONTINUE
0108              WRITE(6,102)JN
0109          102 FORMAT('0',10X,'DISTANCE MATRIX OF THE',2X,I2,2X'POTS',10X,'DISTANCE
                  /REPRESENTS SIMILARITY')
0110              DO 50 J=2,JN
0111              JI=J-1
0112              WRITE(6,103)(DIST(J,JJ),JJ=1,JI)
0113          103 FORMAT('0',12(F8.4,1X)/1X,12(F8.4,1X))
0114           50 CONTINUE
0115          900 CONTINUE
0116              STOP
0117              END
```

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