“CRAFTING” HONGSHAN COMMUNITIES?
HOUSEHOLD ARCHAEOLOGY IN THE CHIFENG REGION OF EASTERN INNER MONGOLIA, PRC

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The focus of this research is the Hongshan period (ca. 4500–3000 BCE) chiefly community of Fushanzhuang, centered on a group of elite burial mounds and other monuments, located in the Chifeng region of eastern Inner Mongolia. Our purpose was to determine to what degree, if any, inter-household economic specialization (as opposed to ritual specialization) underwrote the emergence of social hierarchy at Fushanzhuang, and perhaps more generally during the Hongshan period. Fieldwork began with an intensive systematic survey for, and the intensive surface artifact collection of, a large sample of the core community’s constituent households. These data, along with those collected during subsequent “micro-regional” surface survey for additional outlying settlement, were used to estimate Fushanzhuang’s duration of occupation, and its areal and demographic parameters.

From analysis of surface-collected lithic artifacts we identified five distinct economic emphases—or “specializations”—among households at Fushanzhuang. These emphases include initial tool production, tool finishing, tertiary tool production/maintenance, agricultural production, and “generalism”. Additional analyses of lithic reduction provided corroboration for these different activities. From analyses of ceramic decoration, paste, and vessel type, as well as information on personal ornaments, we inferred the presence of differences in both status and wealth accumulation between households, two dimensions of social ranking that did not correlate with one another. We also found that economic specialization did not co-vary with higher status at Fushanzhuang. Most of Fushanzhuang’s higher status households were among its least specialized in terms of their activities. Nearly all higher status households were also among its least wealthy. In contrast, its most specialized households—especially those engaged in stone tool production—tended to be among the community’s wealthiest. Only a very few of these, however, also appear to have enjoyed higher than average social standing.

These findings suggest two separate but co-extant social hierarchies in Hongshan society: one based on the accumulation of wealth via economic specialization, the other based on something else—perhaps ritual authority. Thus, although economic specialization contributed to community coalescence, and to the creation of wealth differentials at Fushanzhuang, it cannot be said to have exclusively underwritten the development of social hierarchy there.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS xi
1. NORTHEASTERN CHINA'S EARLIEST CHIEFDOMS 1
  1.1. A COMMUNITY-LEVEL APPROACH TO CHIEFDOM FORMATION 2
    1.1.1. Hongshan Ceremonialism and Community Integration 4
    1.1.2. Hongshan Economic Specialization and Household Interdependence 6
  1.2. STRATEGIES FOR CREATING INTER-HOUSEHOLD INEQUALITIES 7
    1.2.1. Resource Control 8
    1.2.2. Labor Pool Enlargement 8
    1.2.3. Craft Production 9
  1.3. HONGSHAN COMMUNITY ECONOMIC ORGANIZATION 9
    1.3.1. Hongshan Household Resources 11
    1.3.2. Hongshan Household Labor Pools 11
    1.3.3. Hongshan Household Craft Production 12
  1.4. COMPARING STRATEGIES, STRUCTURES, AND SCALES OF COMPLEXITY 12
  1.5. EVALUATING STRATEGIES AND PROCESSES OF CHANGE 13
2. IDENTIFICATION OF THE FUSHANZHUANG COMMUNITY THROUGH SURFACE SURVEY 21
  2.1. PEDESTRIAN SURVEY AND INTENSIVE SURFACE COLLECTION OF HOUSEHOLDS 21
    2.1.1. Pedestrian Surface Survey 23
    2.1.2. Intensive Surface Collection 23
  2.2. MICRO-REGIONAL SETTLEMENT SURVEY FOR OUTLYING OCCUPATION 29
    2.2.1. Micro-regional Settlement Survey Around Fushanzhuang 29
    2.2.2. The Distribution of Hongshan Period Occupation Within the Survey Area 30
3. PHASING THE HONGSHAN PERIOD OCCUPATION AT FUSHANZHUANG 41
  3.1. CERAMIC PERIODIZATION 41
    3.1.1. A Multivariate Approach to Relative Dating 43
    3.1.2. Hongshan Ceramic Datasets Suitable For Multivariate Analysis 43
  3.2. TIME CURVE CREATION BY MULTIDIMENSIONAL SCALING OF CERAMIC ASSEMBLAGES 45
    3.2.1. Plotting the Fitted Time Curve 48
    3.2.2. Ceramic Frequency Breakpoints and Phasing of the Hongshan Period 49
    3.2.3. The Early Phase 51
    3.2.4. The Middle Phase 52
    3.2.5. The Late Phase 53
    3.2.6. Relative Dissimilarity, Not Measurable Temporal Distance 53
    3.2.7. Fitting Fushanzhuang to the Time Curve 54
  3.3. CONTEMPORANEITY OF THE FUSHANZHUANG COMMUNITY 55
4. AREAL AND DEMOGRAPHIC PARAMETERS OF THE FUSHANZHUANG COMMUNITY 70
  4.1. ESTIMATES OF RESIDENTIAL DENSITY AND CENTRAL PLACE POPULATION 71
    4.1.1. Population Estimation From House Floor Area 71
    4.1.2. Residential Density and Central Place Population 73
  4.2. OUTLYING OCCUPATION AND SUPRA-LOCAL COMMUNITY STRUCTURE 75
    4.2.1. Application of the Density-Area Index (DAI) 76
    4.2.2. Using Occupation Surfaces to Delineate Community Structure 78
    4.2.3. Local Community Structure and Population 79
    4.2.4. Higher-Order Community Structure and Population 81
5. ANALYSES OF ECONOMIC ACTIVITIES WITHIN THE FUSHANZHUANG COMMUNITY 94
  5.1. HONGSHAN PERIOD LITHIC ARTIFACTS FROM FUSHANZHUANG 94

5.2. LITHIC ARTIFACT ANALYSIS AND DATA TRANSFORMATION 97
5.2.1. Comparability of Systematic Collections 97
5.2.2. Differences in Lithic Artifact Recovery by Systematic Collection Phase 99
5.2.3. Standardization of Systematically Collected Lithic Artifact Frequencies 101
5.2.4. Lithic Artifacts from General Collections 102
5.3. MULTIDIMENSIONAL SCALING OF HOUSEHOLD LITHIC ASSEMBLAGES 102
5.4. EVIDENCE FOR INTER-HOUSEHOLD ECONOMIC SPECIALIZATION 104
5.4.1. Activity Emphases Based on Proportional Variation in Tool Type Composition 104
5.4.2. Mass Debitage and Technological Analyses of Reduction Stages 108
5.4.3. Multivariate Discriminant Analysis of Mass Debitage Proportions 109
5.4.4. Typological Analysis of Reduction Technology 114
5.4.5. Lithic Artifacts From Mound and Non-Mound Graves and Altars 116
5.4.6. Lithic Spot Finds 117
5.5. THE NON-LITHIC ARTIFACTS 118
5.6. SPATIAL DISTRIBUTION OF ECONOMIC ACTIVITIES 119
5.7. SUMMARY OF ECONOMIC ANALYSES 119
6. EVIDENCE FOR STATUS HIERARCHY AT FUSHANZHUANG 152
6.1. MORTUARY AND OTHER MONUMENTAL EVIDENCE 152
6.1.1. The Large and Mid-Sized Burial Mounds: Z1, Z3, and Z4 153
6.1.2. The Smaller Burial Mounds: Z5, Z6, and Z7 156
6.1.3. Non-mound Graves: M1 156
6.2. SURFACE-COLLECTED HOUSEHOLD CERAMIC ASSEMBLAGES 158
6.2.1. Standardization of Ceramic Attribute/Artifact Frequencies 161
6.2.2. Multidimensional Scaling of the Standardized Ceramics Dataset 162
6.3. PERSONAL ORNAMENTS FROM HOUSEHOLD ASSEMBLAGES 165
6.4. RESIDENTIAL LOCATION WITHIN THE FUSHANZHUANG COMMUNITY 167
7. CONCLUSIONS: CRAFTING HONGSHAN COMMUNITIES? 195
7.1. PRODUCTIVE SPECIALIZATION AND WEALTH ACCUMULATION 196
7.2. RESOURCE CONTROL AND LABOR POOL ENLARGEMENT 199
7.3. RITUAL AUTHORITY 200
7.4. CONCLUSIONS 201
APPENDIX A 205
Identification and Analysis of Hongshan Period Ceramic Artifacts From Fushanzhuang 205
APPENDIX B 212
Identification and Analysis of Hongshan Period Lithic Artifacts From Fushanzhuang 212
CHINESE GLOSSARY 216
BIBLIOGRAPHY 218

LIST OF TABLES

Table 2.1. Quantities and proportions of Hongshan sherds recovered per intensive surface collection unit at Fushanzhuang.......... 33
Table 3.1. Radiocarbon dates for eight Hongshan period sites or components (modified from Li 2003:133, table 5.3). 57
Table 3.2. Various periodizations of the Hongshan ceramic assemblages discussed (E= Early; M= Middle; L= Late).......... 57
Table 3.3. Mixed dataset for all 10 Hongshan period ceramic assemblages used to relatively date Fushanzhuang (99999= missing data; Pres.= presentation; TXQ= tongxingqi). 58
Table 4.1. Areas of excavated Hongshan period house floors. 84
Table 5.1. Artifact types identified in the large fraction sample of lithics from Fushanzhuang. 121
Table 5.2. Small fraction debitage by household (<10 mm maximum dimension). 122
Table 5.3. Medium fraction debitage by household (>10 mm <25 mm maximum dimension). 123
Table 5.4. Comparison of collection phase I and II lithic recovery at F08 by constituent grid. 124
Table 5.5. Comparison of collection phases I/II (collapsed) and III (G) at F08.......... 124
Table 5.6. Large fraction lithic artifacts from grid-based and general collections. 125
Table 5.7. Differences in surface conditions and number of associated surface features per household at Fushanzhuang. 126
Table 5.8. Raw counts of 19 lithic tool types for 22 households at Fushanzhuang. 127
Table 5.9. Percentage of standardized counts of 19 lithic tool types for 22 households at Fushanzhuang. 129
Table 5.10. Information on stone tools from JG, SGC2, and SGC3 used in MDS and typological debitage analyses. 130
Table 5.11. Production of the nine variable dataset used in our mass debitage/discriminant analysis of lithic reduction stages by household. (Cortex counts from large fraction tools only.).......... 131
Table 5.12. Raw counts of four debitage types for 22 households used in technological analysis of lithic reduction at Fushanzhuang (1=complete flake; 2= prox. flake; 3= med./dist. flake; 4= shatter). 132
Table 5.13. Percentages of standardized counts of four debitage types for 22 households used in technological analysis of lithic reduction at Fushanzhuang. 133
Table 5.14. Lithic artifacts recovered from funerary/monumental contexts at Fushanzhuang. 133
Table 5.15. Lithic spot finds made at Fushanzhuang. 134
Table 6.1. Ceramics recovered per monumental context at Fushanzhuang (C0.= coarse; Fi.= fine; XKQ= xiekouqi; TXQ= tongxingqi). 170
Table 6.2. Large fraction ceramic artifacts by collection phase for all 19 grids.......... 170
Table 6.3. Differences in proportional recovery of ceramic artifacts by collection grid. 171
Table 6.4. Unmodified ceramic attribute/artifact frequencies by household collection. 172
Table 6.5. Standardized ceramic attribute/artifact frequencies by household collection. 174
Table 6.6. Collapsed five variable ceramic dataset for MDS analysis.......... 175
Table 6.7. Standardized personal ornaments per household collection. 176

LIST OF FIGURES

Figure 1.1. Location of the Chifeng region in northeastern China. 16
Figure 1.2. Periodization of the cultural chronology in the Chifeng region from the beginnings of sedentary agricultural life through the Liao Dynasty. 16
Figure 1.3. The arrangement of Hongshan period platform burials at Niuheliang Locality 2, Liaoning Province (redrawn with modification from Liaoning 1997:20–21, figure 18). Each square is 5 by 5 m. 17
Figure 1.4. Plan of a Hongshan period burial mound at Hutougou, Liaoning Province (redrawn with modification from Fang and Liu 1984:1, figure 2). 17
Figure 1.5.Jade artifacts recovered from Hongshan period platform burials (redrawn with modification from Fang and Liu 1984:3, figure 9; Guo and Zhang 1984:9, figure 19; Liaoning 1987:9, 11, and 12, figures 11, 14, and 18). 18
Figure 1.6. The “Goddess Temple” of Niuheliang Locality 1, Liaoning Province (redrawn with modification from Liaoning 1987:2, figure 2). 18
Figure 1.7. Examples of Hongshan period female statuary: a life-sized female face from the “Goddess Temple” at Niuheliang Locality 1 (left), and nude female figurines from Dongshanzui (center) and Niuheliang Locality 5 (right) (redrawn with modification from Guo 2005:111, figure 42; Liaoning 1997:34, figure 25, and 2001:29, figure 24). 19
Figure 1.8. Surface remains of Hongshan households at site 3864 in the Lower Bang River valley (redrawn with modification from Li 2003:139, figure 5.9). 19
Figure 1.9. Arrangement of excavated Hongshan houses at Baiyinchanghan (redrawn from Neimenggu 2004, figure 294). Not all houses may be contemporaneous. 20
Figure 1.10. Examples of excavated Hongshan period households floor plans listed in Chapter 4, Table 4.1. See Table 4.1 for references. 20
Figure 2.1. Staking an intensive systematic collection grid at Fushanzhuang. 34
Figure 2.2. Intensive Phase I surface collection at Fushanzhuang by 1 x 1 m grid squares. 34
Figure 2.3. Raking the surface of the grid square to remove vegetation and turn the soil prior to Phase II collection. 35
Figure 2.4. Flagging newly visible artifacts prior to Phase II collection. 35
Figure 2.5. Intensive Phase II surface collection at Fushanzhuang by 1 x 1 m grid squares. 36
Figure 2.6. Using handheld “rakes” to comb the plowzone for additional artifacts in each 1 x 1 m grid square during Phase II collection. 36
Figure 2.7. Topographic context of all surface collections made at Fushanzhuang in 2004 (contour interval=1 m). (Key: F= systematic grid-based collections; BG, HG, JG, KG= general collections; SGC= special general collections.) 37
Figure 2.8.Location of the HICARP survey area (hatched) in relation to those of Shelach (1999) and the CICARP (Chifeng 2003a). 38
Figure 2.9. Location of collection units containing sherds of all periods recovered during micro-regional survey, relative to the Fushanzhuang intensive survey area (hatched). 39
Figure 2.10. Location of collection units containing Hongshan period sherds recovered during micro-regional survey, relative to the Fushanzhuang intensive survey area (hatched). 40
Figure 3.1. Hypothetical Hongshan period ceramic assemblage incorporating vessels drawn from all three phases (redrawn with modification from Yang 1989:218 and 220, figures 2 and 3; Zhang 1991:731, figure 6; Zhongguo 1982:192–194, figures 7, 8, and 9). 59
Figure 3.2. Examples of Hongshan period incised ceramic decoration (redrawn with modification from Liaoning 1986:15, figure 23; Zhongguo 1982:193–194, figures 8 and 9). 59

Figure 3.3. Temporal variability in Hongshan period painted pottery design (redrawn with modification from Zhang 1991, figure 7). (Not all designs drawn to the same scale.) 60
Figure 3.4. Zhang's (1991) Hongshan period vessel typology (redrawn with modification from Zhang 1991, figure 6). 60
Figure 3.5. Yang's (1989) Hongshan period ceramic typology (Middle and Late Phases redrawn with modification from Yang 1989, figures 2 and 3 [Middle Phase modified to include xiekouqi pots, cf. Li 2003]; Early Phase redrawn with modification from Li 2003, figure 5.2). 61
Figure 3.6. Graph of Kruskal stress values for each of five different MDS analyses using different numbers of dimensions. 61
Figure 3.7. MDS plot of dimension 1 against dimension 2. (NTZ= Nantaizi; HSH= Hongshanhou; ZZS= Zhizhushan; NST= Nasitai; EDL= Erdaoliang; XSQ= Xishuiquan; NHL_5_L= Niuheliang Locality 5, Lower Layer; DSZ= Dongshanzui; CZS= Chengzishan [NHL Locality 16].) 62
Figure 3.8. Time curve "fitted" to points in Figure 3.7. 62
Figure 3.9. Plot of changes in proportion representation of bo bowls over time in our sample of Hongshan assemblages. 63
Figure 3.10. Plot of changes in proportion representation of vertical Z shuzhiziwen decoration over time in our sample of Hongshan assemblages. 63
Figure 3.11. Plot of changes in proportion representation of guan pots/jars over time in our sample of Hongshan assemblages. 64
Figure 3.12. Plot of changes in proportion representation of caitao/cailiang painted/burnished pottery decoration over time in our sample of Hongshan assemblages. 64
Figure 3.13. Plot of changes in proportion representation of pen basins over time in our sample of Hongshan assemblages. 65
Figure 3.14. Plot of changes in proportion representation of weng urns over time in our sample of Hongshan assemblages. 65
Figure 3.15. Plot of changes in proportion representation of vessels made of fine nizhi tao clay over time in our sample of Hongshan assemblages. 66
Figure 3.16. Plot of changes in proportion representation of undecorated sumian sherds over time in our sample of Hongshan assemblages. 66
Figure 3.17. Plot of changes in proportion representation of other incised decoration over time in our sample of Hongshan assemblages. 67
Figure 3.18. Plot of changes in proportion representation of hu jugs over time in our sample of Hongshan assemblages. 67
Figure 3.19. Plot of changes in proportion representation of other presentation vessels over time in our sample of Hongshan assemblages. 68
Figure 3.20. Plot of changes in proportion representation of tongxingqi funerary cylinders over time in our sample of Hongshan assemblages. 68
Figure 3.21. MDS plot with fitted time curve and phases based on attribute "breakpoints" marked. 69
Figure 3.22. MDS plot presented as Figure 3.21 with Fushanzhuang (FSZ, unfilled) inserted at location prescribed by dissimilarity configuration coordinates of second analysis, then "fit" to the existing time curve. 69
Figure 4.1. Box-and-dot plot of excavated Hongshan house floor areas (n=23). Data from Table 4.1. ... 85
Figure 4.2. Correspondence between intensive collection units and other features at Fushanzhuang (top), and mock micro-regional collection units (bottom). 85
Figure 4.3. All regional-scale collection units containing Hongshan period ceramic sherds in the HICARP survey area (including both "real" and "mock" collections). 86
Figure 4.4. All Hongshan occupation in the composite HICARP/CICARP (1998–2001) survey area. 87
Figure 4.5. Hongshan power 8 occupation surface for the composite HICARP/CICARP (1998–2001) survey area (following Peterson and Drennan 2005). 88
Figure 4.6. Contour map of the Hongshan power 8 occupation surface for the composite HICARP/CICARP (1998–2001) survey area. 89
Figure 4.7. Hongshan power 1 occupation surface (following Peterson and Drennan 2005) for the composite HICARP/CICARP (1998–2001) survey area. 90

Figure 4.8. Contour map of the Hongshan power 1 occupation surface for the composite HICARP/CICARP (1998–2001) survey area. Contour cutoff delineates higher-order communities in the north-central and northwestern portions of the survey area. ... 91
Figure 4.9. Delineation of power 1 “districts” in the southeastern portion of the survey area by dividing along the “topographic valleys” between higher-order community peaks. ... 92
Figure 4.10. Locations of Hongshan archaeological sites west of the Fushanzhuang survey area as recorded by Shelach (1996, 1997, 1999). ... 93
Figure 5.1. Large Hongshan period agricultural tools (redrawn with modification from Balinyou 1987:511, figure 6; Hamada and Mizuno 1938:80, figure 60, and figures 49 and 50; Neimenggu 1994a:104, 109, figures 8 and 11; Zhongguo 1982:185, 187, figures 3 and 4). ... 135
Figure 5.2. Examples of stone shovel/hoe/plow fragments from Fushanzhuang. ... 136
Figure 5.3. Examples of ground stone slabs (left) and rollers (right) from Fushanzhuang. ... 137
Figure 5.4. Examples of stone axes/adzes bits from Fushanzhuang. ... 138
Figure 5.5. Stone tool “blanks” or preforms from Fushanzhuang. ... 138
Figure 5.6. A large grooved abrader from Fushanzhuang. ... 139
Figure 5.7. Small Hongshan period agricultural and other subsistence-related tools (redrawn with modification from Balinyou 1987:511–513, figures 6, 7, and 9; Hamada and Mizuno 1938, figures 48–50; Liaoning 2001:19, figure 6; Neimenggu 1994a:104, 106, figures 8 and 9; Zhongguo 1982:189, figure 5). ... 139
Figure 5.8. Examples of ovate stone knives from Fushanzhuang. ... 140
Figure 5.9. Examples of stone choppers (left) and scrapers (right) from Fushanzhuang. ... 141
Figure 5.10. Examples of stone projectile points from Fushanzhuang. ... 142
Figure 5.11. Hongshan period “microlithic” tools (redrawn with modification from Balinyou 1987:511, 513, figures 6 and 9; Hamada and Mizuno 1938:53, figure 45; Liaoning 2001:19, figure 6; Neimenggu 1994a:110, figure 12; Zhongguo 1982:189, figure 5). ... 142
Figure 5.12. Examples of blades (top left), blade cores (top right), and flake cores (bottom) from Fushanzhuang. ... 143
Figure 5.13. Examples of hammerstones from Fushanzhuang. ... 144
Figure 5.14. Examples of awls (top) and gravers (bottom) from Fushanzhuang. ... 145
Figure 5.15. Graph of Kruskal stress values associated with MDS solutions of differing dimensions for lithic artifacts from 19 grid-based and 3 general surface collections. ... 146
Figure 5.16. MDS plot of dimension 2 against dimension 3 for a four-dimensional solution of lithic artifacts from 19 grid-based and 3 general surface collections. ... 147
Figure 5.17. Illustration of five household economic emphases at Fushanzhuang as determined through MDS analysis of surface-collected lithic artifact assemblages. ... 147
Figure 5.18. Canonical plot of discriminant function 1 against function 2 based on aggregate debitage for 18 households at Fushanzhuang. Discriminant ellipses not shown. Symbols indicate a priori groups based on previous MDS analysis. Misclassified households are shown with solid symbols (F04 and F05). ... 148
Figure 5.19. Canonical plot of discriminant function 1 against function 3 based on aggregate debitage for 18 households at Fushanzhuang. See Figure 5.19 caption for key to symbols. ... 148
Figure 5.20. Profile plots of difference in the standardized proportions of debitage types for 22 households at Fushanzhuang (C= “core reduction”; T= “tool production”). ... 149
Figure 5.21. Locations of lithic spot finds (SFs) made at Fushanzhuang. ... 150
Figure 5.22. Non-lithic Hongshan period tools (redrawn with modification from Balinyou 1987:513, figure 9; Hamada and Mizuno 1938, figure 50; Li 1984:20, figure 6; Liaoning 2001:19, figure 6; Neimenggu 1994a:104, 110, figures 8 and 12; Zhongguo 1982:185, 187, figures 3 and 4). ... 151
Figure 5.23. An example of a ceramic spindle whorl from Fushanzhuang. ... 151
Figure 6.1. Locations of monuments within the core area of the core area of the Fushanzhuang community. ... 177
Figure 6.2. Photo of the Z2 “altar” at Fushanzhuang. ... 177
Figure 6.3. Photo of the Z1 mound at Fushanzhuang. ... 178
Figure 6.4. Photo of the Z3 mound at Fushanzhuang. ... 178

Figure 6.5. Photo of the Z4 mound at Fushanzhuang. 179
Figure 6.6. Tongxingqi ceramics from the Z1 and Z3 mounds at Fushanzhuang (including painted examples with designs similar to those from Niuheliang Locality 2 and Chengzishan—bottom row). 179
Figure 6.7. Photo of the M1 non-mound grave at Fushanzhuang. 180
Figure 6.8. Three non-mound graves from Nantaizi showing a range of investment in construction and offerings (Top= pit grave, no offerings; Middle= stone slab grave with 3 small ornaments and 1 stone tool; Bottom= 2 person pit grave with 10–11 stone tools or ceramic vessels) (redrawn with modification from Neimenggu 1997:72–73, figures 22–24). 181
Figure 6.9. Photo of vertical z-decorated ceramics. 182
Figure 6.10. Rubbings of vertical Z-decorated ceramics. 183
Figure 6.11. Photo of horizontal Z-decorated ceramics. 184
Figure 6.12. Rubbings of horizontal Z-decorated ceramics. 185
Figure 6.13. Photo of other (non-Z) incised ceramics.. 186
Figure 6.14. Rubbings of other incised ceramics. 187
Figure 6.15. Photo of duiwen-decorated ceramics. 188
Figure 6.16. Rubbings of duiwen-decorated ceramics. 189
Figure 6.17. Photo of painted and burnished ceramics... 190
Figure 6.18. Photo of burnished sumian ceramics. 191
Figure 6.19. Line graph of Kruskal stress values associated with MDS solutions of differing dimensions for five ceramic variables by household. 191
Figure 6.20. Scatterplot of dimension 1 against dimension 2 for MDS analysis of five ceramic variables by household. 192
Figure 6.21. Determination of higher household status and wealth from Figure 6.21. 192
Figure 6.22. Photo of jade tube and earring fragments (left and center, respectively), and a fragment of stone bracelet (right) from Fushanzhuang. 193
Figure 6.23. Photo of ceramic beads from Fushanzhuang. 193
Figure 6.24. Households with ornaments (solid dots) superimposed on Figure 6.21. 194
Figure 6.25. Location of higher status and wealthier households within the core area of the Fushanzhuang community.. 194
Figure 7.1. The distribution of higher status households (solid dots) as defined on the basis of high proportions of total ceramic decoration with respect to economic specialization. 203
Figure 7.2. The distribution of higher and moderately-high status households (solid dots) as defined on the basis of total ceramic decoration, high ratios of bowls to jars, and/or the presence of personal ornaments, with respect to economic specialization. 203
Figure 7.3. The distribution of more affluent (solid dots) and less affluent households at Fushanzhuang with respect to economic specialization. 204

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1. NORTHEASTERN CHINA'S EARLIEST CHIEFDOMS

During Xinglongwa and Zhaobaogou times (6000–4500 BCE), portions of present day eastern Inner Mongolia and western Liaoning Province were populated by sedentary agriculturists living in widely separated, yet densely inhabited villages (Figures 1.1 and 1.2; Guo 1995; Linduff, Drennan, and Shelach 2004; Neimenggu 1993, 2004; Shelach 2000; Teng et al. 2003; Zhongguo 1997; Zhongguo 2004). These small, largely egalitarian populations gave way to clusters of much larger settlements during the subsequent Hongshan period (4500–3000 BCE), reflecting not only population growth (Drennan et al. 2003b; Shao 1995), but also the formation of supra-local communities within which inter-household interaction and inequality had assumed a greater importance than ever before (Drennan and Peterson 2004; Linduff, Drennan, and Shelach 2004; Teng et al. 2003; Peterson and Drennan 2005).

Systematic settlement survey of 765 km^2 in the Chifeng region of eastern Inner Mongolia—only a small portion of the entire Hongshan period occupational distribution—has identified 171 Hongshan settlements (Chifeng 2003a; 2003b; Linduff, Drennan, and Shelach 2004; Shelach 1997, 1999; Zhong–Mei 2002). These tend to be located along bluffs and in the uplands overlooking the most productive zones of the survey area today, even through the region's estimated farming population of 4000–8000 could have easily been supported using only a fraction of its arable land (Drennan et al. 2003b). Settlement clustering suggests that region-wide interaction was only of modest intensity. These clusters, or "small local communities" are less than 900 m long, so their inhabitants were surely in near daily communication with each other (Drennan and Peterson 2004, 2005, 2006; Peterson and Drennan 2005). Each small local community consisted of about 10–12 households, related through kinship, and engaged in similar or related activities. Whatever the nature of the interactions between them, they appear to have been important enough that households chose to locate near one another rather than situate themselves on individual landholdings. Over three-fourths of the Chifeng regional Hongshan population living in these small local communities were incorporated into 14 larger higher-order or territorial "districts" (Drennan and Peterson 2004, 2005, 2006; Peterson and Drennan 2005). These higher-order communities are analogous to social and political units often described as "chiefdoms" in the ethnographic and archaeological literature (e.g., Earle 1987; Feinman and Neitzel 1984). Organizing populations of 150–1000, they are spread across areas of more than 3 km in the Chifeng region, too far for everyone to have been in daily face-to-face interaction—yet they indicate greater interaction between small local communities within districts, than between districts. East of Chifeng, in the Lower Bang River Valley, Li (2003) has also identified through surface survey two independent Hongshan polities separated by a distance of more than 3 km, each with a possible two-tier settlement hierarchy. While in Aohan Banner, northwest of Chifeng, as many as 20 clusters of Hongshan settlements can be identified in less systematically collected survey data (Li 2003:165; Shao 1995).

While the term “state” has been used to describe the entire Hongshan occupational distribution as if it were a single polity (Guo 1995; Nelson 1994:4, 1996), regional scale data from Chifeng, the Lower Bang River Valley, and Aohan Banner clearly show that this archaeological “culture” consists of a great many smaller-scale polities more properly described as “chiefdoms” (Drennan and Peterson 2004, 2005, 2006; Peterson and Drennan 2005).

1.1. A COMMUNITY-LEVEL APPROACH TO CHIEFDOM FORMATION

Building upon the cultural evolutionary schemes of Service (1962), and Fried (1967), numerous models have been advanced to account for the development of relatively egalitarian societies into more hierarchical ones we often describe as chiefdoms. A number of scholars consider chiefdoms to be the products of ambitious individuals striving to create and hold positions of privilege, power, and authority under cultural conditions of egalitarianism (e.g., Clark and Blake 1994; Hayden 1995; Hayden and Gargett 1990). By what means, and under what sets of conditions this widespread societal transformation has recurred throughout prehistory, however, remains poorly understood (Drennan 2000; Feinman 1995; Sahlins 1963). Clark and Blake (1994) suggest that the ability of local economies to generate surpluses available for would-be elite mobilization is an important causal condition in the emergence of chiefdoms; Spencer (1993, 1994), on the other hand, considers circumstances of resource scarcity and/or risk ripe with opportunities for aspiring elites to cement nascent inequalities. Others suggest population growth promotes the intensification of production (Boserup 1965; Cohen 1977), or increased competition over scarce resources (Carneiro 1981; Earle 1991; Gilman 1981, 1991), either culminating eventually in more efficient managerial systems of social organization. Demographic increase is known to be a consequence of emergent social stratification (Cowgill 1975), and many consider control over this newly available labor central to the development of chiefdoms (Arnold 1996; Drennan 1987; Earle 1991; Feinman 1991; Webster 1990). Yet still others see control over the production and distribution of foodstuffs, utilitarian and/or prestige goods and associated technologies as largely responsible for the development of chiefdoms (D’Altroy and Earle 1985; Hayden 1998; Helms 1979; Underhill 1991, 1996, 2002).

Archaeologists have advocated testing these and other models not only against regional trajectories of long-term change (e.g., Drennan 1991, 1996; Earle 1991; Feinman 1991; Gilman 1991; Steponaitis 1991), but applying them also at smaller scales of analysis (Drennan 2000; Feinman 1995; Flannery, ed. 1976; Kolb and Snead 1997). One such smaller scale of analysis is that of the community.

As a potentially intermediate level of organization between the household and the region (Peterson and Drennan 2005), the community has long been the subject of archaeological research (e.g., Canuto and Yaeger, eds. 2000; Flannery, ed. 1976; Johnson and Earle 2000; Kolb and Snead 1997; Kowalewski 2003; Kuijt, ed. 2000; MacEachern, Archer, and Garvin, eds. 1989; Rogers and Smith, eds. 1995; Schwartz and Falconer, eds. 1994; Trigger 1968; Wilk and Ashmore, eds. 1988). The systematic use of communities, however, for evaluating models of sociocultural change (as opposed to their use in social reconstruction) has received comparatively little attention (although see Gonzalez 1998; Drennan and Peterson 2004, 2005, 2006).

Complex patterns of social organization, such as chiefdoms, have their origins in the supra-family relationships that produce and sustain small-scale, co-resident groups of agrarian households in (near) daily face-to-face interaction (Peterson and Drennan 2005). These inter-household interactions are responsible for change in the structural fabric of their respective communities over time, which, under certain conditions, may result in the formation of even larger-scale hierarchical communities—societies we are accustomed to thinking about in more regional terms.

A community-level approach takes households to be the principal (if sometimes unwitting) actors in the establishment of local social hierarchies. Situated within the context of the community, households serve as the basic recoverable units of self-aggrandizement and social differentiation available to archaeologists. Households are elastic units of socioeconomic adaptation, organized not only to provision themselves, but also to realize any additional ambitions of their membership (Hirth 1993a:22; Wilk 1989; Wilk and Netting 1984). Some households choose to meet only their minimum caloric and material needs, while others opt to engage in surplus staple or craft production (Chayanov 1986; Netting 1993:295–319; Sahlins 1972). Beyond simple capital accumulation, these surpluses serve as a kind of social currency (Wolf 1966) essential for increasing household prestige, and may help to underwrite permanent inter-household social inequalities.

The economic behavior of households, however, cannot be understood without reference to the larger community context(s) they helped to create and within which they are embedded. Intra-community institutions (kin groups, corporate groups, moieties, sodalities, factions, etc.) that determine patterns of relatedness, cooperation, and identity, provide linkages with households in other communities via kinship, ceremonialism, and/or exchange. These larger-scale interaction networks act to balance complex relationships of competition and cooperation, but, in some cases, may acquire a centripetal dimension characteristic of more formalized leadership.

Because the matrix of interactions generated by households is central to the emergence of social hierarchies, analyses of the patterned archaeological evidence produced as a consequence of these interactions provides one means by which to evaluate the relative contributions of various factors to the development of chiefly societies. The two categories of causal factors that we consider to be of most importance for understanding the development of social hierarchy during the Hongshan period are (1) ritual and (2) economic specialization.

1.1.1. Hongshan Ceremonialism and Community Integration

A relatively few individuals buried in elaborate Hongshan period burial mounds with ritualistic jade artifacts and painted pottery have suggested to many authors a prestige-based social hierarchy tied to ceremonial activities (Barnes and Guo 1996; Childs-Johnson 1991; Chiou-Peng 1994; Fang and Liu 1984; Li 1986; Li 2003; Guo 1995, 1997a, 1997b; Guo and Zhang 1984; Hua 1994; Hua and Yang 1998; Liaoning 1986, 1997; Nelson 1994, 1997, 2002; Shelach 1999). These graves and the specialist-produced paraphernalia they incorporate attest to the mobilization of surpluses and to supra-household-level decision making. In some cases, groups of these burial mounds are spread over areas as large as 50 km^2, and are often associated with platform altars, non-mound graves, sacrificial pits, and other non-domestic architecture (Barnes and Guo 1996; Chaoyang and Liaoning 2004; Fang and Liu 1984; Guo and Zhang 1984; Guo 1995; Li 1986; Liaoning 1986, 1997; Shelach 1999).

The most extensively investigated these ceremonial complexes are Niuheliang (including Chengzishan), Dongshanzui, and Hutougou, all in western Liaoning Province (Chaoyang and Liaoning 2004; Fang and Liu 1984; Guo 1995; Guo and Zhang 1984; Li 1986; Liaoning 1986, 1997). Unfortunately, information on the distribution of residential occupation in relation to these three groups of monuments is lacking (although see Li 1984). The presence and spacing of these clusters of monuments suggest that they may have functioned as the central places of higher-order chiefly communities like those identified for the Chifeng region from settlement survey data, but for which comparable evidence of public works has not been recovered. Systematic settlement survey within and around the ceremonial precincts at Niuheliang, Dongshanzui, Hutougou, and elsewhere, will be needed to assess the scale and residential populations of these polities for comparison with those identified for Chifeng. While it is likely that some chiefdoms in western Liaoning were larger than those most of those identified thus far in eastern Inner Mongolia, we suspect that they were not but a few times larger. In the Aohan region, northwest of Chifeng, perhaps 20 such clusters of Hongshan sites (or chiefdoms) can be identified on the basis of purposive survey (Li 2003:165; Shao 1995). This number increases to about 35 if we add those clusters identified systematically for Chifeng and the Lower Bang River Valley (Chifeng 2003a, 2003b; Linduff, Drennan, and Shelach 2004; Shelach 1999; Zhong–Mei 2002), and higher still if Niuheliang, Dongshanzui, and Hutougou, among others, are included. Because such a small proportion of the areal distribution of Hongshan occupation in northeastern China has been surveyed, it is likely that many times this number of chiefly polities flourished during the period—perhaps on the order of a few hundreds (Li 2003:165).

Hongshan central place burial mounds take the form of circular or square earthen stone-faced platform mounds of variable dimension, but usually less than 3 m high and no more than 25 m across, although examples of upwards of 35 m in diameter are known (Figures 1.3 and 1.4). Frequently hundreds of bottomless pottery cylinders were erected around the circumference of these facilities, into which lamps may have been placed during funerary services for the deceased (Chaoyang and Liaoning 2004; Li 2003:161, table 5.11; Fang and Liu 1984; Guo 1995:21–22; Hua 1994; Li 1986; Liaoning 1986, 1997). Most mounds have one or more stone slab tombs in their centers, and up to several dozens of other non-mound graves arranged around them. Typically all of these burials contain elaborate jade carvings of animals, and/or monstrous and supernatural themes, as well as some objects that might have functioned as jewelry (Figure 1.5). The square and circular shapes used in these constructions come to symbolize heaven and earth in later dynastic China, and may also have had religious significance during Hongshan times. In at least one instance, a shallow immolation in a non-burial platform altar has been interpreted as human sacrifice (Guo 1995:38). Nearby votive pits might contain scores of intentionally broken pottery cylinders and other artifacts, or layers of burned earth (Guo 1995; Hua 1994; Liaoning 1987, 2001). A unique non-mortuary Hongshan ritual construction incorporated into the central place complex at Niuheliang is the so-called “Goddess Temple” (nushenmiao) (Figure 1.6; Guo 1995; Liaoning 1986; Nelson 1991). This multi-lobed adobe structure derives its name from the ceramic fragments of life-sized female statuary found inside, although animal sculpture was also found there (Figure 1.7). Other smaller female figurines of unbaked clay, and usually pregnant, have be found strewn atop or incorporated into the fill of Hongshan platform altars (Figure 1.7; Guo 1995; Guo and Zhang 1984). They have also occasionally been recovered from settlements lacking monumental architecture (Balinyou 1987; Zhongguo 1982). In most cases the heads of these figurines are missing, and appear to have been intentionally removed.

In contrast to elaborate cairn burials—although the monumentality of these constructions has typically been overstated when compared to the public works of chiefdoms elsewhere (Drennan 2005)—most members of Hongshan communities were buried without offerings in nondescript cemeteries. While some other “ordinary” graves were lined with stone slabs and contained small numbers of stone tools, decorated pottery, and ornaments, the large jade carvings, typical of mound and platform burials, are never included as grave goods (Guo 1997a, 1997b; Hua and Yang 1998). This difference in burial treatment has lead Drennan and Peterson (2006) to posit the co-existence of two separate, but not necessarily unrelated, social hierarchies in Hongshan society. Whereas jade-bearing tombs and their associated architecture are symbolic representations of the supernatural, ordinary pit burials, with their differing numbers of domestic artifacts and ornaments, seem rather to reflect differences in the material conditions of the daily lives of their occupants.

Those few individuals interred in Hongshan cairn and platform tombs thus clearly represent a special subset of the population within their respective communities—differentiated from other residents through their connection to the supernatural. They do not appear to have been the wealthiest residents of their communities, but rather individuals who possessed some kind of spiritual power (Childs-Johnson

1991; Li 2003; Guo 1997a, 1997b; Nelson 1991, 1994, 1995, 1996, 1997, 2002). In the ethnographic literature, chiefship has often been associated with mysticism and sacred authority (Earle 1987, 1997), so it is not unreasonable to assume that these people were leaders within their respective communities. The open spaces between and around Hongshan monuments, are large enough for the entire populations of most Hongshan communities to congregate, view and/or participate in the ceremonies conducted from atop them. Whatever the specific nature of these activities—but perhaps including ritual appeals to fertility deities in order to ensure a bountiful harvest, the procreation of community residents and livestock, or the veneration of ancestors (e.g., Childs-Johnson 1991)—these were clearly important enough to warrant the construction of special spaces for their performance, and may have been the means through which Hongshan communities and chiefdoms coalesced.

1.1.2. Hongshan Economic Specialization and Household Interdependence

While the symbolic expressions of Hongshan society have been the subject of much study (and much speculation), its economic underpinnings have received comparatively little attention. The study of economic specialization, however, can provide a complementary approach to understanding the origins of institutionalized inequality during the Hongshan period. Chiefdoms might have emerged as households became both economically specialized and interdependent, and increasingly integrated through the ceremonial activities for which monumental public architecture was built and ritual paraphernalia produced. Elaborately carved Hongshan jades clearly required a substantial investment of skilled labor, as well as specialized tools to manufacture. The jade material itself may have been procured at long distance, with difficulty, or at considerable expense. Painted pottery—especially the hundreds of large funerary cylinders incorporated into platform graves—may have required the coordinated labor of many craftspeople and the use of specialized kilns to fire them. Yet other kinds of specialized utilitarian craft goods production and exchange may have been of equal or greater importance in drawing households together than systems of shared beliefs. Once brought together into economically interdependent communities, some households might have learned to co-opt belief and ritual, and subsequently elevated their social status.

Some authors have suggested that in small scale societies, it is the emergent elites themselves—possessed of esoteric knowledge they wish kept secret—that manufacture the sacred symbols of their authority (Ames 1995; Costin 2001; Spielmann 1998). In the Hongshan case, this could have entailed the establishment and control over long-distance networks for the acquisition of raw materials. If, on the other hand, non-elite crafts producers were charged with the manufacture of ritual paraphernalia, then the control over land and labor used to generate agricultural surpluses in support of this production might have been a complementary strategy to that of ritual specialization. Or, it could be that symbolic elites finally had no hand in, or control over, the economic infrastructure of their communities—instead deriving their status and authority directly from their roles as supernatural intermediaries.

While ritual specialization as a leadership strategy might have entailed the control over land, labor, and specific raw materials—or none at all—most researchers agree that it did not permit the accumulation of personal wealth (e.g., Chaoyang and Liaoning 2004; Guo 1995, 1997a, 1997b, 2005; Li 2003). Were this otherwise, those individuals interred in Hongshan cairns would likely have been accompanied not only by ritualistic jade objects, but likely also by large numbers of goods used in the course of daily life. This would not, of course, preclude the accumulation of wealth on the part of crafts-producing households specializing in the manufacture of utilitarian goods. Although these latter households might have lacked the social standing of the more spiritually inclined, they may actually have lived more comfortable lives than either community leaders or their less specialized neighbors. Clearly, differences in economic activities between households could have been the basis of inequality and social hierarchy within Hongshan society.

1.2. STRATEGIES FOR CREATING INTER-HOUSEHOLD INEQUALITIES

Any human collective will have its share of “ambitious, enterprising, aggressive, [and] accumulative individuals” (Hayden 1995:18) who seek to elevate their social position and to dominate others. These “self-aggrandizers” rise to prominence and power through their ability to induce and expropriate the productive surpluses of others. The expenditure of accumulated surpluses (through feasting, gift-giving, public works projects, etc.) converts these resources into social prestige, creating asymmetries between “haves” and “have-nots” (e.g., Gosden 1989; Hayden 1995). Specific households stand to increase their status within their respective communities to the degree that ambitious individuals among their members are able to mobilize both goods and labor toward these ends (Arnold 1996; Brumfiel 1992, 1994; Hayden 1995). Aggrandizers will succeed in this endeavor to the extent that other members of the community derive some benefit that balances the cost of supporting another’s accumulation, or the cost of non-participation is greater (e.g., forced relocation, social sanction, violence, etc.). Although households may pursue various strategies toward surplus accumulation, we focus here on three facets of economic specialization commonly cited in the archeological literature: (1) resource control, (2) labor pool enlargement, and (3) craft production.

1.2.1. Resource Control

Strategies aimed at increasing household access to land (the most basic agrarian resource) could lead to the development of a system of property rights (e.g., Earle 1991, 1998, 2000). Under conditions of population pressure associated with community coalescence (high, localized population densities), increasing the size and/or number of agricultural plots under the control of a single household raises its productive potential, while simultaneously limiting that of others by reducing the total farmland available. All things being equal, larger households require more land than smaller households to sustain themselves. If land were differentially controlled, some households would have more or less land than predicted for their size. Households smaller than predicted might have been able to co-opt labor from other households to put surplus land under cultivation, or to lease these surpluses to land-impoverished families. (The former possibility might be distinguished from the latter by significant differentials in household storage capacity.) Households larger than expected may have had to obtain access to others' excess landholdings, perhaps in exchange for labor, "first fruits" or a portion of their total harvest.

1.2.2. Labor Pool Enlargement

Agrarian households will vary in size and composition according to their available resources, the range of productive activities pursued (Hirth 1993a), and their position in the "domestic cycle" (Goody, ed. 1958). Because household size places limits on the accumulation of household productive surpluses and prestige, aggrandizing households might attempt to increase their available labor pool (through adoption, polygynous marriage, clientage, etc.) in pursuit of higher levels of production and accumulation (Brumfiel and Earle 1987; Hirth 1993b; Netting 1982; Wilk and Netting 1984; Wilk and Rathje 1982). Under certain conditions, increasing the size of one's household might prove a complementary strategy to extending one's control over resources, or producing specialized craft goods. In addition to increasing productive output in specialized goods on a part-time basis, enlarging family size also increases the amount of land that can (and in some cases must) be put under cultivation at other times throughout the year. Agricultural surpluses from these enlarged land holdings could be mobilized directly to host potential political allies, hold community-wide feasts, and/or to force non-specialist consumers into contractual obligations in times of scarcity (Gosden 1989). Households able to appropriate the labor necessary to exploit these resources could emerge as social elites (e.g., Arnold 1996; Cowgill 1975; Drennan 1987; Feinman 1991; Webster 1990).

1.2.3. Craft Production

Aggrandizing households may seek to control the production and distribution of utilitarian goods (stone tools, pottery vessels, a few secondary animal products, etc.) within their communities (Arnold 1984; Brumfiel and Earle 1987; Clark and Parry 1990; Costin 1991; Crabtree 1990; Hirth 1993b; Service 1962; Smith 1987), and in so doing may back non-specialist farming families into relationships of economic dependency. The by-products of specialization (standardization, higher quality, and economies of scale) allow craft-producers to profit from the desirability of their goods. In agrarian societies, part-time specialized craft-producers may be better able than full-time farmers to accrue capital for conversion into social prestige. The accumulation and increasing political use of capital on the part of some households may invite inter-household competition over the creation and control of monopolies in particular commodities. Monopoly over essential or desirable utilitarian commodities could engender basic economic inequalities between households. Alternatively, would-be-elite households might (also) produce and manipulate luxury, symbolic, and/or prestige goods (as opposed to utilitarian crafts) in furtherance of their social and political aims (e.g., Ames 1995; Brumfiel and Earle 1987; D'Altroy and Earle 1985). Particularly desirable products might be differentially distributed in return for support of the gifting households in the emergent political arena. This mode of specialization may well involve the importation of exotic raw materials and/or technologies used in their manufacture. It relies less on creating a demand for superior goods among non-specialist farmers within the community, than on the "smoke-and-mirrors" manipulation of the scarce commodities themselves (DeMarrais, Castillo, and Earle 1996). The ostentatious use and/or differential distribution of these prestige goods could signal and perhaps even legitimate nascent socioeconomic differences between households. The increased labor required for specialized activities may demand aggrandizing households pursue complementary strategies of labor pool enlargement, and/or increased control over agricultural resources. Land-impoverished households may be enticed to attach themselves to those of landholding aggrandizers as part-time craft producers in exchange for access to this resource (Brumfiel and Earle 1987; Service 1962).

1.3. HONGSHAN COMMUNITY ECONOMIC ORGANIZATION

Nearly 700 Hongshan period settlements have been discovered through survey of various kinds (e.g., Liu and Dong 1997; Shao 1995; Shelach 1997, 1999; Chifeng 2003), yet the residential components of only 14 have been surface-collected or partially excavated (Baiyinchanghan, Erdaoliang, Hongshanhou, Nasitai, Nantaizi, Xinglonggou, Xishuiquan, Xitai, Zhizhushan, and five sites in Jianping county, Liaoning Province). Of these, almost nothing is known about their internal organization, or about the activities of their constituent households. Surface survey in both the Chifeng region and the Lower Bang River Valley has located parallel rows of closely spaced, dark ashy semi-subterranean house circles (3–6 m in diameter, or 7–28 m^2 in area) in association with Hongshan domestic refuse (Li 2003:138, figure 5.9; Shelach 1999:76; Teng et al. 2003). At site 6384, within an area of approximately 1 ha, Li (2003:139, figure 5.9) identified and mapped the locations of 51 such house circles organized into five rows, each row occupying a descending terrace of the settlement's slope (Figure 1.8). The distances between houses in any row are uneven, although generally not more than about 5 m. Li (2003:138) has suggested that a few larger breaks within rows at site 6384 might be used to demarcate house or lineage groups. At the only extensively excavated Hongshan settlement of Baiyinchanghan, houses also appear to form groups, in this case arranged around an open plaza (Figure 1.9) (Neimenggu 2004, figure 294). At least two Hongshan periods settlements (Xitai and Xinglonggou) were encircled by ditches, a practice carried over from earlier periods (Liu and Dong 1997; Tian 1992:4; Zhongguo 2004; Zhu 1991).

At least 23 Hongshan semi-subterranean domestic structures have been excavated (most from Baiyinchanghan, but some also from Erdaoliang, Xishuiquan, and Nantaizi). These dwellings are round or square in plan, with floor areas ranging from 9 to 108 m^2 (Figure 1.10; Guo 1995; Li 1986; Neimenggu 1994a, 1994b, 1997, 2004; Zhongguo 1979, 1982; Zhu 1991). Each contained a single circular or "gourd-shaped" hearth dug into the center of the floor. Storage pits were located outside houses at Baiyinchanghan and Erdaoliang (Neimenggu 1994b, 1997; Neimenggu 2004), and inside the largest at Xishuiquan (Zhongguo 1982).

Millet appears to have been the principal cultivar during the Hongshan period—carbonized macrobotanical remains have been recovered from Zhizhushan (Ren 1986) and Sifendi (An 1989) near Chifeng City, and from Xinglonggou in Aohan Banner (Li 2003:134). Typical domestic artifacts of the Hongshan period include flaked, ground, and microlithic stone tools (e.g., axes/adzes, plowshares, hoes, sickles, grinding slabs, rollers, projectile points, knives/sickles, scrapers, and choppers) associated with agriculture, hunting, and animal husbandry, ceramic spindle whorls, bone awls and needles related to leatherworking, wool yarn and/or textile production, and ceramic vessels for storage, cooking, and ritual use (Balinyou 1987; Guo 1995; Hamada and Mizuno 1938; Li 1984; Neimenggu 1994a, 1994b, 1997; Nelson 2001; Zhongguo 1979, 1982). Coarse-tempered utilitarian wares are incised with Z motifs and mat or fabric impressed bases, whereas painted and/or burnished serving wares are made of finer clay. Decorated pottery is usually recovered from ceremonial or elite mortuary contexts in very large numbers suggesting its use as a ritual or prestige item (platform burials at Niuheliang each contain several hundred large painted pottery cylinders; see Li 2003:161, table 5.11). Six pottery kilns excavated at the residential site of Silengshan [Xiaoheyan] (Guo 1995; Liaoning 1977), four dating to the earlier, and two the later part of the Hongshan period, show an increase in technological sophistication over time that may be the result of specialization, and/or inter-settlement exchange (Li 2003). Shell armlets, both finished and unfinished jade artifacts, jade debitage, and small female figurines have been excavated or surface-collected from a few small settlements (e.g., Dongjiayingzi, Hongshanhou, Nasitai, and Xishuiquan) suggesting a household mode of production (Balinyou 1987; Guo 1995; Hamada and Mizuno 1938; Liu and Dong 1997; Nelson 2001; Shao 1995; Zhongguo 1982).

1.3.1. Hongshan Household Resources

Hongshan settlements are commonly situated on bluffs overlooking what are fertile valley bottoms today (Guo 1995; Linduff, Drennan, and Shelach 2000–2004; Nelson 1994, 1997, 2001; Teng et al. 2003:113). During the Hongshan period, these alluvial lowlands may have been wetter than at present, perhaps prone to frequent flooding (Hong et al. 2000, 2001; Kong and Du 1982; Kong et al. 1991; Shelach 1999:79). Upland locations with slopes of 0–10 degrees would have probably been preferred for the dryland cultivation of millets (Li 2003:187; Shelach 1999:128), although even steeper slopes could have been farmed without difficulty. Irrigation agriculture does not appear to have been practiced. The close linear spacing (or other clustering) of house remains at Hongshan settlements (Shelach 1999:79; Li 2003:138; Neimenggu 2004) implies that most households did not directly occupy the lands they cultivated, but rather that these fields were located in the areas between settlements. The recovery of stone tools used for plowing, planting, tilling, and harvesting reflects a sophisticated, but extensive, form of cultivation. According to Li's (2003:166) calculations, 2.56 ha of arable land (with half left fallow at any one time) was required to provision one person with enough millet to subsist for one year during the Hongshan period. This is probably an overestimate, especially if one considers that both domestic livestock (e.g., pigs, sheep), and hunted game (e.g., deer), contributed to a substantial portion of Hongshan diet (Guo 1995:30; Hamada and Mizuno 1938; Nelson 1994, 1997, 2001).

1.3.2. Hongshan Household Labor Pools

Excavated Hongshan house floor areas vary in size from 9 to 108 m^2 (Guo 1995; Li 1986; Zhongguo 1979, 1982; Zhu 1991; see Chapter 4, Table 4.1). All known dwellings are single-hearthed, but duplicate sets of ceramic vessels and utensils recovered from the largest of these structures suggest the possibility of multifamily residences (Guo 1995:33). Assuming an equivalence between houses and households, estimates of household population based on excavated floor areas range between 2 and 27 persons (using 4 m^2/person as suggested by Peterson and Shelach n.d., and Shelach 1999:128–129). This range is large enough to suggest significant differentials in resource control and productive output between households.

1.3.3. Hongshan Household Craft Production

Facilities and artifactual evidence for the production of utilitarian commodities and prestige goods have been extensively recovered from the few Hongshan residential sites investigated in detail (Balinyou 1987; Guo 1995; Hamada and Mizuno 1938; Li 2003; Liu and Dong 1997; Neimenggu 1994b, 1997, 2004; Nelson 2001; Shao 1995; Zhongguo 1982). Based on our current understanding of Hongshan economy, several kinds of non-agricultural activities suggest themselves as possibilities for productive specialization at the household level: (1) flaked and/or ground stone tool production; (2) utilitarian and/or decorative pottery production; (3) animal husbandry; (4) leatherworking and/or textile production; (5) shell ornament, and/or (6) jade artifact production.

1.4. COMPARING STRATEGIES, STRUCTURES, AND SCALES OF COMPLEXITY

Through the identification of these and other potential patterns of variability between households, we can evaluate sets of causal economic factors (and the conditions favoring certain kinds of household interaction) that result in the emergence of chiefdoms. By comparing multiple cases of community formation we can determine whether early communities coalesced in different ways. That is, do the forms these communities take depend upon the particular combination(s) of leadership strategies (e.g., the ideological and/or economic strategies) implemented by their aggrandizers (Drennan 2000; Feinman 1995)? Are there a limited number of such forms? Are some strategies antagonistic or mutually exclusive? Are others complementary? The dynamics of small communities are very similar to those of larger chiefdoms. Just as there can arise many different kinds of chiefdoms or states (e.g., Drennan 1995, 1996a; Earle 1997; Feinman and Marcus 1998:xiii; Feinman and Neitzel 1984), so too can the developmental and structural character of communities differ. What variety in the kind and degree of social differentiation, hierarchy, and centralization is observable in the archeological record of communities? If this variety in the shape of complexity can be traced to the kinds of strategies aggrandizers used to further their aims, then we ought to have learned something about the causal dynamics underlying the emergence of chiefdoms as well. Do different strategies lead to important differences in the kinds of chiefdoms we observe archeologically? If we examine several trajectories of long-term change, do these same strategies also figure prominently in other social transformations? Or are some strategies better suited to certain forms of social integration and complexity than are others?

The collection, analysis, and interpretation of direct evidence for the social and economic organization of a single Hongshan central place community in the Chifeng region is the subject of this monograph, and provides a case study amenable to these kinds of comparisons.

1.5. EVALUATING STRATEGIES AND PROCESSES OF CHANGE

Hongshan central place communities (the focal ceremonial sites of Hongshan chiefdoms and their resident populations) were probably a middle-to-late period phenomenon that followed nearly 1000 years of social and cultural stability in northeastern China. The final, time-averaged picture of their formation and decline ought to capture the relative importance of different agent-based strategies of accumulation in the dynamic of their short development, if such evidence is there to be found.

To evaluate the relative importance of inter-household differences in productive specialization in the development of community-level inequalities during the Hongshan period, we needed to make use of several different kinds of information. One such set of information is which households (if any) were engaged in productive specialization? More specifically, which of these households were producing utilitarian craft goods and which were producing wealth and/or prestige goods? We expected that households specializing in either kind of production ought to yield high proportions of production waste, manufacturing tools, and/or special purpose activity areas (Arnold 1984; Brumfiel and Earle 1987; Costin 1991, 2001; Crabtree 1990; Hirth 1993b; Smith 1987) by which they could be identified. For utilitarian craft goods production, this evidence could take the form of (1) anvils, percussors, lithic debitage and broken or unfinished lithic artifacts (stone tool production); (2) kilns, potters' tools, and coarse-tempered kiln wasters incised with Z motifs and mat or fabric impressed bases (utilitarian ceramic production); (3) low utility animal remains, butchery tools, and/or hide scrapers (animal husbandry); and (4) spindle whorls, bone and antler needles, awls, and shuttles (wool yarn and/or textile production). Whereas we figured it likely that households specializing in elite goods would be associated with (5) kilns, potter's tools, and kiln wasters of finer paste (prestige pottery production); (6) broken or unfinished (female) figurines (used in fertility rituals); (7) raw seashell, shell debitage, and broken or unfinished shell items (shell ornament production); and (8) raw jade, jade spalls, preforms, drills and/or abrasives (jade ornament production).

Another important class of information was needed to distinguish between households of different status (if there existed differences in status) within these communities. Higher status households ought to be recognizable as such on the basis of high proportions of certain classes of finished artifacts (as opposed to high proportions of manufacturing debris; e.g., Crabtree 1990; Hirth 1993b; Smith 1987). This includes decorated and/or more finely made pottery, high utility faunal remains and/or the remains of rare animal taxa, and shell and/or jade ornaments. (One must consider each of these categories carefully, however, as some might indicative of wealth rather than status.) Once we had identified which households engaged in productive specialization (if any), and which households were of higher status (if any), we would be able to begin examining instances of co-occurrence. If we were to discover that higher status households were consistently associated with one or more kinds of specialized activities, then specialized craft production could have figured prominently in the development of social inequalities within these Hongshan communities.

This could take one of many forms, however. Higher status households may have produced and consumed elite goods, but not controlled the production and distribution of utilitarian commodities. It is also possible that only lower status households specialized in the production of utilitarian goods, or that there existed no community-wide economy in these products at all, each household individually producing what utilitarian articles it required to survive. Perhaps elite households were engaged in both kinds of specialization. Or perhaps local elites sponsored the production of prestige goods rather than having engaged in this themselves (low status prestige goods-producing households might signal the presence of such patron-client relationships). We might find that although differences in status were evidenced between households, none of the higher status households appeared to have engaged in greater amounts of specialized production than did lower status households, or were found to have patronized lower status craft-producing households. This would suggest that community leaders during the Hongshan period had achieved their positions via strategies other than productive specialization.

It might also be the case that we observe no significant differences in status between households at all (regardless of potential differentials in productive specialization). Such a result could indicate that the character of hierarchy and centralization in Hongshan society (community formation and the rise of ritual centers) was anchored not to the accumulation of wealth (via productive specialization) as predicted by most agent-based models of chiefly development, but rather, perhaps, to belief, ritual, and the manipulation of esoteric knowledge, as suggested by the majority of researchers (Chaoyang and Liaoning 2004; Childs-Johnson 1091; Liaoning 1997; Guo 1995, 1997a, 1997b, 2005; Li 2003; Nelson 1991, 1995, 1996, 1997, 2002). In this scenario, community leaders parlay ritual authority into social prestige, but accumulate little wealth and have little political power (e.g., Guo 1997a, 1997b; Li 2003). However, if we were to find associations between productive specialization and higher status households, we might be able to suggest how this strategy developed. For example, specialist households could have enlarged the size of their families to achieve higher levels of productive output to satisfy their own ambitions or the demands of the market or their patrons. Were craft-producing households regularly found to have incorporated more members than their non-specialist counterparts, then we might conclude that enlarging household labor pools was an effective complementary means of increasing household productive surpluses.

Yet a third possibility is that wealth accumulation and appeals to the supernatural were both means by which households' social standing was improved within Hongshan communities (Drennan and Peterson 2006). Without clear and specific differences in the artifactual indicators of wealth-based and ritual-based status at the household level (e.g., ritualistic jades, or figurines), however, it would be very difficult to differentiate archaeologically the lowest status households in an economic hierarchy from the highest status ones in a symbolic or ritual hierarchy. Given the association drawn between the ritual regulation of fertility and the practice of agriculture by some Hongshan scholars, one possible indirect indicator of the latter hierarchy might be an emphasis on agricultural production by higher status, non-crafts-producing households. If this were the case, then the control of land and labor might be a complementary strategy better suited to ritual specialization than to craft production.

In order to identify and evaluate these possibilities then, we needed to: (1) locate and map the distribution of households within a well defined community; (2) determine the relative age of the community by some means; (3) estimate the number of occupants per household and the community at large; and (4) collect a robust sample of domestic artifacts from each of a large number of households for comparison of their activities. The information we finally collected permits us to strike most directly at questions that concern the relationship between specialized craft production and socioeconomic inequality, so it is given priority in the discussions that follow.

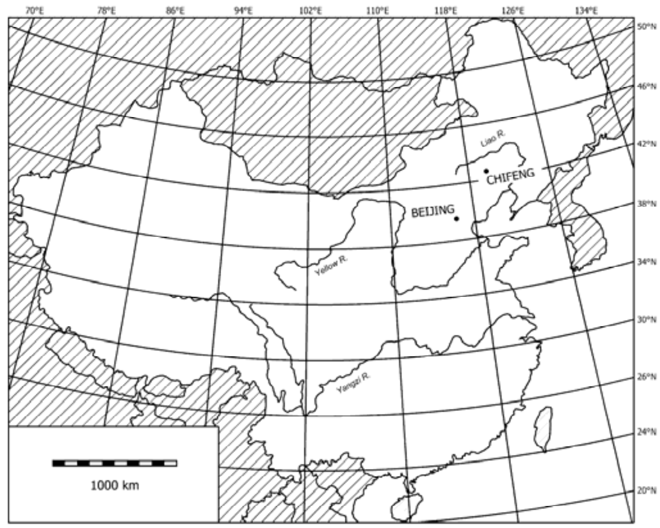


Figure 1.1. Location of the Chifeng region in northeastern China.

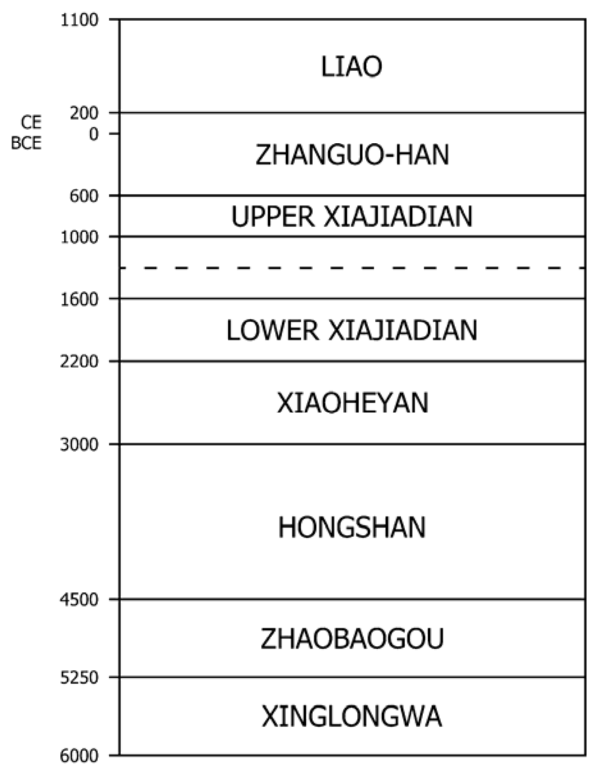


Figure 1.2. Periodization of the cultural chronology in the Chifeng region from the beginnings of sedentary agricultural life through the Liao Dynasty.

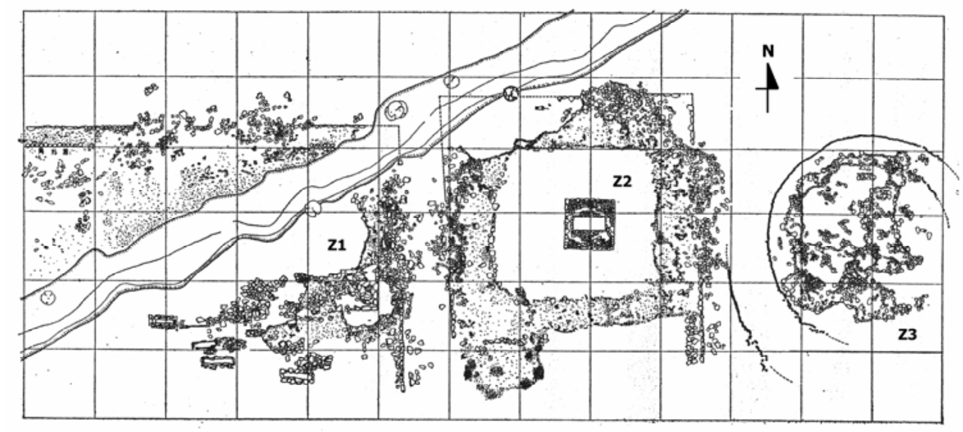


Figure 1.3. The arrangement of Hongshan period platform burials at Niuheliang Locality 2, Liaoning Province (redrawn with modification from Liaoning 1997:20–21, figure 18). Each square is 5 by 5 m.

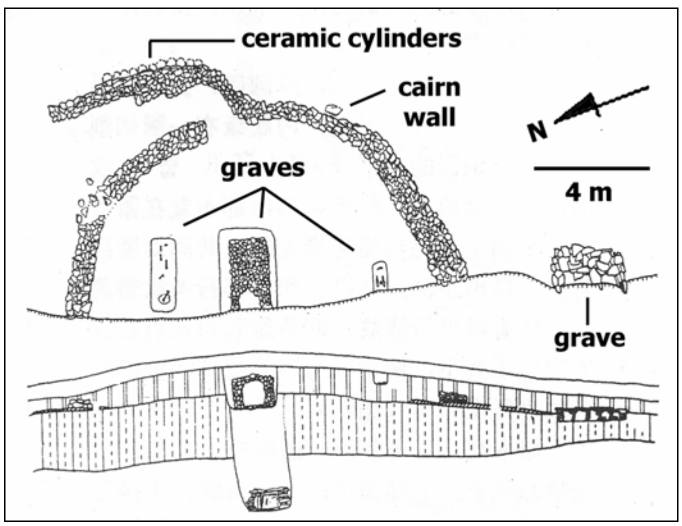


Figure 1.4. Plan of a Hongshan period burial mound at Hutougou, Liaoning Province (redrawn with modification from Fang and Liu 1984:1, figure 2).

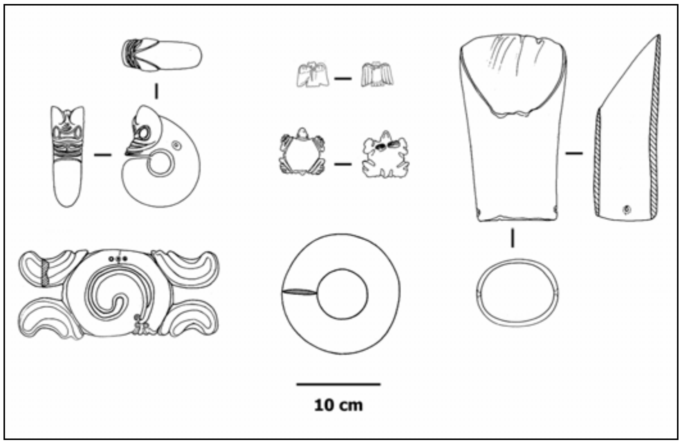


Figure 1.5.Jade artifacts recovered from Hongshan period platform burials (redrawn with modification from Fang and Liu 1984:3, figure 9; Guo and Zhang 1984:9, figure 19; Liaoning 1987:9, 11, and 12, figures 11, 14, and 18).

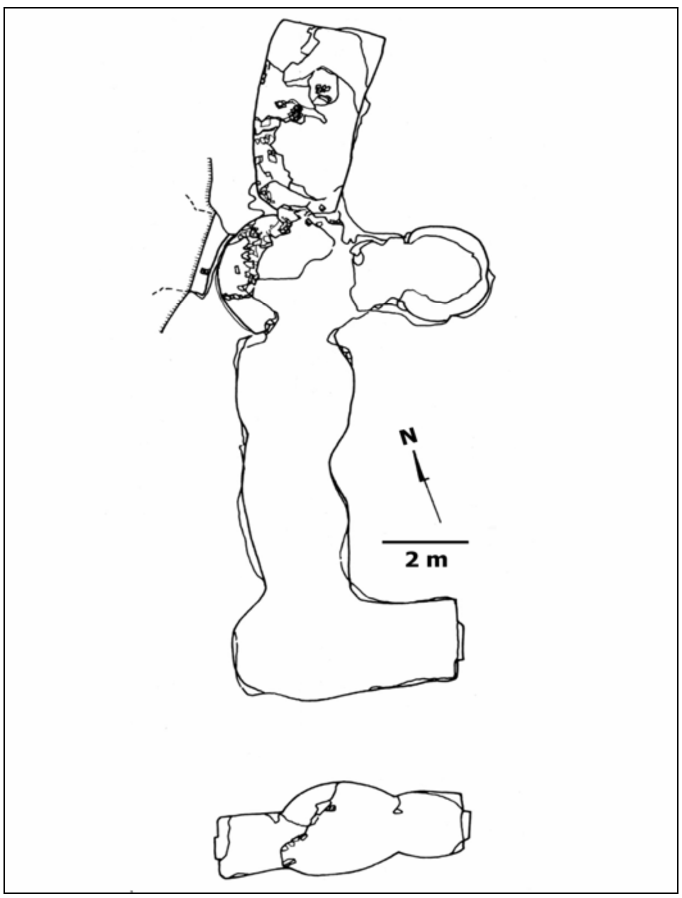


Figure 1.6. The “Goddess Temple” of Niuheliang Locality 1, Liaoning Province (redrawn with modification from Liaoning 1987:2, figure 2).

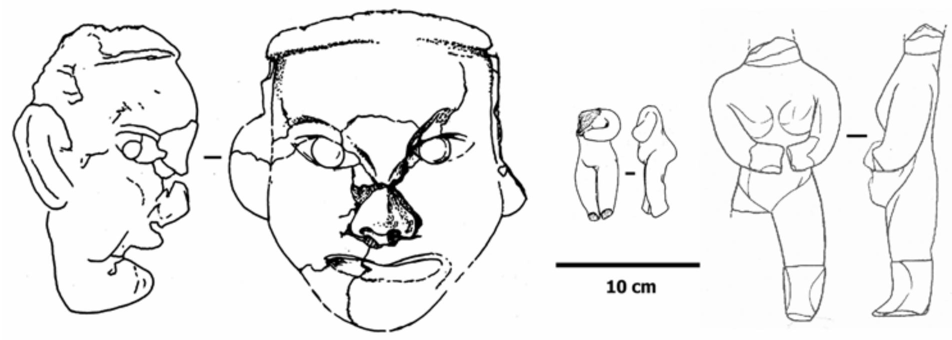


Figure 1.7. Examples of Hongshan period female statuary: a life-sized female face from the “Goddess Temple” at Niuheliang Locality 1 (left), and nude female figurines from Dongshanzui (center) and Niuheliang Locality 5 (right) (redrawn with modification from Guo 2005:111, figure 42; Liaoning 1997:34, figure 25, and 2001:29, figure 24).

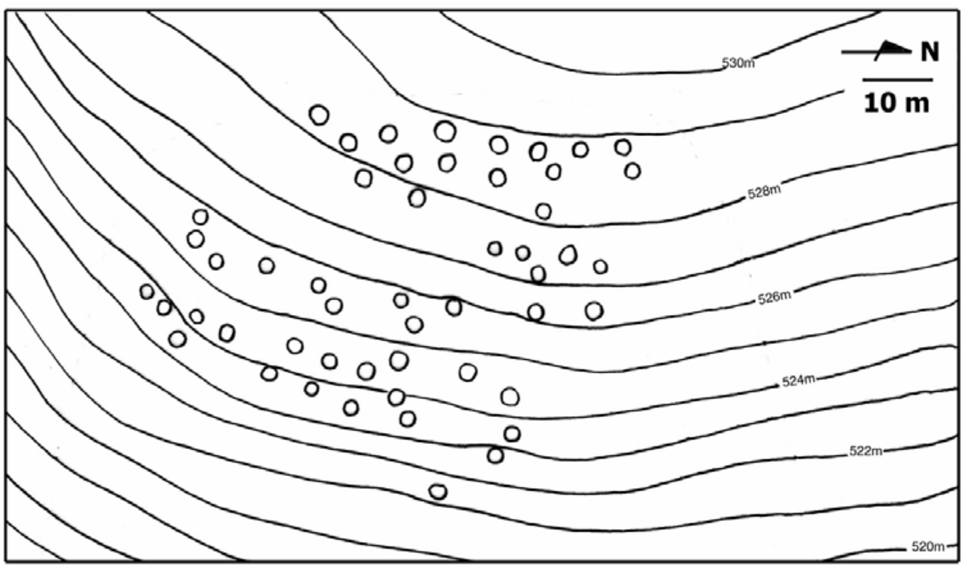


Figure 1.8. Surface remains of Hongshan households at site 3864 in the Lower Bang River valley (redrawn with modification from Li 2003:139, figure 5.9).

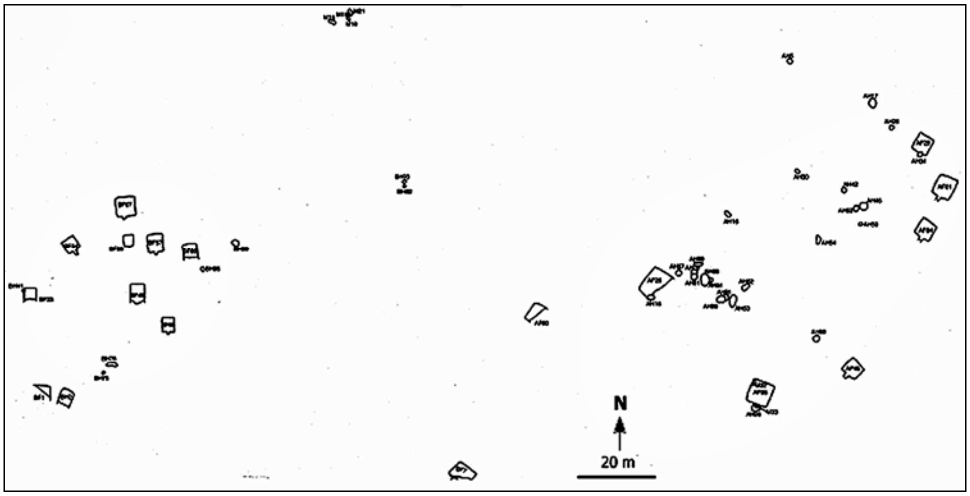


Figure 1.9. Arrangement of excavated Hongshan houses at Baiyinchanghan (redrawn from Neimenggu 2004, figure 294). Not all houses may be contemporaneous.

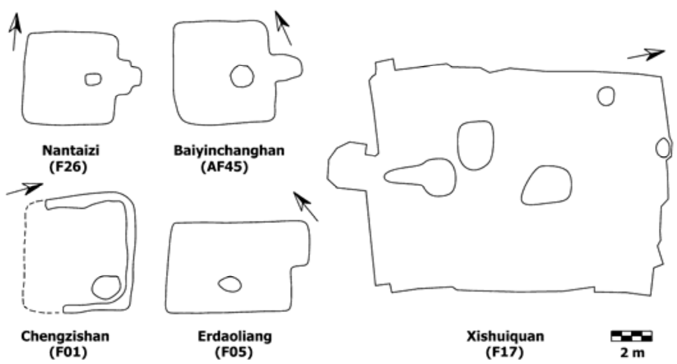


Figure 1.10. Examples of excavated Hongshan period households floor plans listed in Chapter 4, Table 4.1. See Table 4.1 for references.

2. IDENTIFICATION OF THE FUSHANZHUANG COMMUNITY THROUGH SURFACE SURVEY

The focus of this research is the Middle Neolithic Hongshan period (4500–3000 BCE) central place community of Fushanzhuang, located in an area of gradually sloping uplands overlooking a relatively straight section of the Yin River, 25 km west of Chifeng City in eastern Inner Mongolia. First identified and recorded as adjacent sites 18 and 19 by Gideon Shelach (1996:352–353) during his 1995 survey of the valley, Fushanzhuang (as we named it later) was initially thought to only consist of two pairs of Hongshan period stone and earthen burial mounds (2–3 m high, and 10–30 m in diameter). Although modest in comparison to examples from outside the Chifeng region (e.g., at Niuheliang or Hutougou), these mounds were nonetheless indicators of Hongshan period elite activity within the region, and therefore likely represented the location of a central place "chiefly" community. A brief, but more detailed inspection of the site by Christian Peterson, Gideon Shelach, Robert Drennan, and Zhu Yanping in the summer of 2002 not only reconfirmed the relative age of these mounds (based on the presence of painted tongxingqi sherds eroding from them; see Chapter 6) but also identified scatters of Hongshan period domestic artifacts away from them that could only represent the remains of habitation. Convinced that a more systematic and intensive survey of Fushanzhuang and its immediate surroundings for surficial remains of Hongshan occupation would yield evidence for a large dispersed community of households for investigation and comparison, the Hongshan Intra-community Archaeological Research Project (HICARP) was organized and undertook the following program of research from late April through to the end of August 2004.

2.1. PEDESTRIAN SURVEY AND INTENSIVE SURFACE COLLECTION OF HOUSEHOLDS

Preliminary radial survey transects outward from the primary mound group at Fushanzhuang were made to gauge the linear extents and overall degree of dispersion of the community. Contrary to our expectations based on observations made in 2002, a pattern of dense and near continuous Hongshan occupation extending for several hundred meters north and west of these mounds was quickly revealed, suggesting that the Hongshan components of sites 18 and 19 ought to be combined into a single settlement unit. This core area of Hongshan occupation (for we fully expected to encounter additional, related outlying occupation upon survey of a larger surrounding area), was situated atop a bluff overlooking the Yin River and a large pocket of alluvial bottomlands to the south. More than a 60 m gradient separated the uppermost and most densely occupied portion of the community, situated on a largely level strip of tableland, from less densely occupied sets of successively lower terraces down into the valley below. Overall, the portion of the core area of the community we were able to study (which we believe represents between 80 and 90% of its original extents), measured 700 m east-west by 500 m north-south, for a total area of about 35,000 m^2 (or 35 ha).

This roughly rectangular area was naturally delineated to the east and west by erosional arroyos of some antiquity, and to the south by a largely gradual slope leading down into the valley. Only at the southwestern corner of the site did the slope steepen to become a (traversable) cliff face. We later learned from conversations with local villagers that mining of basalt boulders from this southern face over the past 20 years for the construction of house foundations was largely responsible for its present morphology. Prior to that time, this portion of the front of the site also sloped gently down to the valley floor. We later surmised that much of the soil deflation observed for lower terraces of this southwestern corner of the site was attributable to this removal of the original slope. A northern boundary to our community-scale research area was provided by a roughly east-west leading edge of pine saplings, denoting the most southerly extent of an area of recent reforestation efforts aimed at reducing erosion. The density with which these saplings were planted meant that surface visibility (compared with the more open terraces below) was low in this area and therefore of less immediate interest to us (although unsystematic reconnaissance did note the presence of Hongshan period artifacts among the trees). Even had surface visibility been higher, however, we would not have extended our activities into this area, for we had been instructed by both the Chifeng Songcheng Qu Wenwuguan Lisuo and the local Chutoulang town government to refrain from activities that could potentially damage the trees. In fact, so strict are these regulations at present, that sheep and goat herders are prohibited from grazing their animals along the slopes of the entire Yin River Valley until such time as the saplings are mature enough to withstand the culinary predilections of these animals.

In addition to the tree line, archaeological evidence for later occupation (during the Lower Xiajiadian, Upper Xiajiadian, Zhanguo-Han and Liao periods) of the piedmont to the immediate north and northeast of the survey area (including Shelach's 1996 sites 20 and 25), in the form of stone slab graves and high density scatters of surface artifacts, as well as later micro-regional survey around Fushanzhuang, provided additional confirmation that whatever small amount of Hongshan material lay within the tree line, it could not possibly have represented very many households, as the amount of area along this border not occupied with later remains was minimal. Within the 35 ha study area itself, however, the remains we observed and recovered were overwhelmingly single component (see discussion below).

2.1.1. Pedestrian Surface Survey

Once the general extents of the community were known, we set out to intensively survey the area. At its most basic, the community-scale survey was conceived of as a series of six roughly equally-sized contiguous rectangular blocks, organized as two rows of three blocks each. The boundaries of each block corresponded roughly to some feature or features observable on the ground. For reasons discussed below, only five of these six blocks were surveyed for evidence of Hongshan households, and of these all but one yielded positive results. Our team of five or six persons (depending on the labor demands of analysis, and hence the number of available crew members at any one time) walked slowly back and forth across the site at 5 m intervals, always west to east or east to west, in north-south steps of two or three terraces down the prevailing slope of each block. As encountered on the surface, individual ceramic and lithic artifacts were marked with fluorescent orange flags attached to 30 cm tall aluminum stakes that were easily seen above the vegetation. If, within any 30 x 30 m segment of any survey block belonging to the southernmost row, 20 or more flagged artifacts were observed, we returned to that location to search for, and mark, additional artifacts on the surface. In this fashion, the locations of individual Hongshan period households were identified as high density, relatively discrete concentrations of surface artifacts separated from other such concentrations, within a very low but mostly continuous distribution of artifacts. For the more northerly row of survey blocks, survey proceeded in exactly the same manner, but the higher and more continuous densities of material encountered meant that the identification there of discrete concentrations was more problematic. Fortunately, in the course of our wanderings we came to realize that even on the flatter, upper portion of the site, we could discern low, level terraces or mounds, with wide, albeit shallow, depressions or "valleys" between them, that appeared likely candidates to have once supported structures. Resurvey of this upper area did indeed confirm that surface artifacts were distributed more densely atop terraces and their flanking slopes than at the midpoints of the valleys separating them. Thus, both densities of surface artifacts and local topography were taken into account when delineating households in the northern part of the central place community.

2.1.2. Intensive Surface Collection

As each survey block was completed, 2–3 concentrations of artifacts were initially selected for systematic collection. Selection was based both on the relative density of materials (in particular stone tools) and physical location within the block (relative to other households and known features, such as burial mounds, already revealed through survey), such that, once finished, our sample of households would encompass the entire range of observable densities and locations within the community (upper or lower community, distance from burial mounds, etc.). In total, 16 households were selected for systematic collection.

We pursued a three-phase collection strategy. We knew, based on our previous inspection of Fushanzhuang, that tree planting pits were present along at least a portion of the lower slopes. These pits are quite uniform in both size (approximately 1 x 0.5 x 0.5 m) and spacing (about 1 m apart within rows, with rows spaced every 2–5 m), being very similar in both respects to a program of large shovel tests. The excavation of these pits brought numerous shallowly-buried Hongshan artifacts to the surface (although even more lay buried in backdirt piles), which ultimately contributed to our ability to identify lower density households on the lower slopes (although these would still have been recognizable as such even without the tree planting), and probably also to an increase in the size of the artifact samples collected for each. (The issue of possible bias introduced as a consequence of differing intra-community conditions of surface collection is discussed in chapters 5 and 6.) Before commencing work at Fushanzhuang, however, we had no idea how numerous tree pits were, how extensive was their distribution, and therefore what their impact on collection might be. We also did not know that the remains of the upper community would turn out to be as numerous as they were. Accordingly, the collection strategy adopted was designed to replicate, to the greatest extent possible, the advantages of shovel testing (including expeditiousness and volumetric properties), without being as time-consuming, for increasing the size of household artifact samples.

Two 50 m tapes, oriented north-south and east-west were laid across one another at right angles over the center (or densest area) of each artifact concentration to be collected (being careful to include features such as ash pits, visible on the surface, within the grid boundaries if possible), and staked at 10 m from each center point (Figure 2.1). The result was an impromptu 20 x 20 m grid. During the first phase of collection, surface artifacts were collected by 1 m x 1 m squares; two crew members to a square, with two squares being collected at any one time, and one individual recording what was recovered from each. Because we did not need, nor did we want, to take the extra time involved to stake out all 400 squares in each grid, we used 1 x 1 m "rope squares" for collection. These foldable grid squares were easily packed and carried about in the field. Simply pulling the corner knots of two opposing sides taut (those held by each crew member) when collecting kept units relatively standardized in size. During the first phase of collection, we found that pairs of individuals could stand, holding squares at about the level of their waists or knees, which, since the majority of squares were usually without artifacts during the first collection phase, allowed them to call out results to whoever was recording, and quickly move to the next position in the grid (Figure 2.2). The alternative was to move from one to another on our hands and knees. Due to the horizontal shifting of artifacts on or near the surface as a result of millennia of cultivation, it was not necessary to maintain a high level of precision with respect to the placement of individual grid squares; the general patterning of artifact densities within each grid is less likely to be effected by this distortion than the location of individual artifacts with respect to specific arbitrarily-imposed squares. Nevertheless, we attempted to be as consistent as possible in our grid-based collections without recourse to staking out and stringing off each one beforehand. This was achieved by progressively scoring the earth along the edge of the leading row of grid squares as a guide to the next row's placement, and by frequently rechecking the orientation of rows with the aid of a compass. We found it easiest to record pairs who were working in different, but adjacent quadrants of the of grid. The result of this process was that usually within 30 to 90 min (depending on artifact density) we could collect all artifacts visible on the surface within the confines of the grid. The artifacts from our 1 x 1 m grid squares were later collapsed for purposes of inter-household comparison, although future analyses may yet make use of this 1 x 1 m data (see Chapter 7).

This first phase of collection was followed by the removal of most vegetation and the turning of the uppermost (5–10 cm) layer of soil through intensive agricultural raking of the ground surface within the grid (Figure 2.3). Raking proceeded in shifts of four crew members, with a fifth rotating in or out as individuals tired. We raked using short strokes so as not to transport buried material far from its last locus of deposition. The confines of the grid were then slowly walked in 1 m rows by all crew members to maximize the identification of newly exposed artifacts, which were then flagged, but otherwise left in place (Figure 2.4). We then proceeded to collect all new artifacts by 1 x 1 m squares in the same manner as previously described, although this time on our hands and knees (Figure 2.5). Once all the flagged artifacts per square had been collected, crew members used smaller hand rakes (actually handled wool combs) to turn over the loose soil in search of other artifacts that the previous raking had not brought completely to the surface (Figure 2.6). These were then combined with the flagged artifacts for collection.

As recovered, artifacts from each grid square were bagged as a unit with the name of the grid and individual square from which they were recovered recorded on the outside in indelible ink. The appropriate grid square was labeled on a collection form with a pre-printed 20 x 20 unit grid. Squares without artifacts were crossed out. Numbers were not assigned to each grid square a priori, rather, we simply assigned successive numbers to each positive square as encountered, and continued this particular sequence from Phase I into Phase II. Were we to utilize this methodology again, we think it would be better to assign numbers to each square beforehand, so that the locations of squares with the same numbers are consistent from grid to grid and collection phase to collection phase. As was already mentioned, we made no further use of these individual grid square proveniences in the analyses that follow—instead collapsing artifactual data from all grid squares from a particular context together for comparison—although this information may prove useful as we continue to work at Fushanzhuang and elsewhere in the region.

Grids were labeled consecutively in order of their collection. The prefix "F" was used prior to each two-digit numeric identifier, e.g., F01, where the letter F simply stands for fang, or "square" in Chinese. When single 400 m^2 grids were not large enough to capture at least 50% of the Phase I artifacts visible on the surface for a given concentration, additional whole or partial grids were placed contiguous to the first in such a way as to best maximize capture. These additional grids retained the same identifier as the original grid, but a different alphabetic suffix was added both to the original and each successive contiguous grid (i.e., F09A, F09B, etc.). In some cases we were unsure as to whether these sets of contiguous grids represented the remains of only one, or more than one household. In fact, even isolated individual 20 x 20 m grids could represent the remains of more than one household, as each grid is large enough to have enclosed 2–4 very closely spaced Hongshan period dwellings of average size and their associated features—such close packing of residences is reported at both site 3864 and Baiyinchanghan (Li 2003; Neimenggu 2004; see Chapter 1, Figures 1.3–1.5, and Chapter 4). It was decided that a number of later analyses could be performed to differentiate separate but closely spaced households if deemed necessary, as if, for example, the artifact assemblages collected from contiguous grids proved to be significantly different from one grid to another to suggest differences in the kinds of activities performed. (As it turns out, only one set of contiguous grids proved very different from one another—see Chapter 5—and therefore we never undertook such an analysis). Spatial analyses of the artifacts collected by 1 m x 1 m units could be used to plot the distribution of artifact densities (from either Phase I, Phase II, or both), looking for portions of high-density rings around lower density centers representing house interiors and surrounding middens (Gonzalez 1998; see also Killion 1992 for complementary ethnoarchaeological observations of domestic refuse disposal). Our identification of surface artifact "concentrations" rather than discrete rings is due largely to the erosion of midden deposits into the plowzone, and their horizontal movement through millennia of cultivation, into areas above the remains of Hongshan house floors, or into the open spaces between adjacent houses. Using this method, we ought to be able to determine the number, approximate size, and location of one or more households using plots of artifact density. Or, one could search for the presence of discrete activity areas, if we thought some households or groups of households were organizing their activities differently. In practice, however, in would be very difficult to analyze separately the activities of multiple households revealed through density plots of artifacts by individual or contiguous grids, because of the horizontal shifting of surface artifacts. Moreover, although closely spaced dwellings might not be contemporaneous, they might also represent "corporate groups", whose activities are more meaningfully analyzed in the aggregate anyway (e.g., Hayden and Cannon 1982). Five of the households we identified consisted of more than a single collection grid: F08 consisted of four elements, A, B, C, and D; F09 had two, A and B; F10 had two, A and B; F13 had two, A and B; as did F16. A total of 23 whole or partial 20 m x 20 m grids (some placed adjacent to one another) were surface collected, representing, we believe, the remains of at least 19 Hongshan households.

Additional artifacts deemed part of the originally defined concentration based on survey, but which lay outside one or more contiguous collection grids, we quickly collected as single lots, or "general" collections, representing the third and final phase of grid-based collection. In all but one case (F08), separate Phase III general collections were made for each corresponding grid with the same F number. Phase III collections were generally made a week or more after initial Phase I and II collections, preferably after a period of high winds, or a heavy rain followed by time for the ground to dry. We found that both these natural processes exposed numerous new artifacts, even in areas we had raked and collected twice (newly exposed artifacts within grids were also collected as part of general collections, see below). Very early on we noticed that larger artifacts (such as grinding rollers, shovel/plows, etc.) tended to be collected during this third phase. We surmised that this was due to two factors: (1) larger objects being tossed aside (often off of house terraces in the upper part of the community) as encountered by modern farmers plowing or tending fields planted on the modern surface; and (2) the natural movement of these larger objects downslope.

Based on the average percentages of materials collected by phase (as presented in Chapters 5 and 6), twice the number of artifacts were collected during Phase II operations as Phase I, with Phase III yielding only one-third the number of that recovered during Phase I.

Upon completion of the collection of each grid, GPS coordinates of their center points were recorded, and a stake, large stone, etc. placed there for future reference. A topographic contour map of the community was later produced on which the center points and extents of each collection grid were plotted, as well as the locations of other visible features (mounds, graves, ash pits), general and special general collections. Mapping the community's 35 ha area required three days of work using a combination of portable plane table, paper, pencil, compass, tape measure, and an electronic laser distance measuring device (EDM) modified especially for that purpose.

In addition to the 23 whole or partial 20 x 20 m grids discussed above, we located another 10 concentrations that, due to time limitations, were collected as individual general collections without the benefit of raking. We believe each of these 10 collections represents at least one additional Hongshan household. Six of these, all located in the upper part of the community, we have labeled "special general collections" (or SGCs) because determination of their boundaries conformed largely topographic markers (such as the "valleys" between house terraces) rather than to any visible fall off in artifact density. The other four general collections made (labeled BG, HG, JG, and KG) were considerably less dense, on the order of 20–30 artifacts; three clusters were located in the lower community, and only one in the upper. An increase in the growth of vegetation near the end of our field season may be partly responsible for the low yields of artifacts from our low density collections. Although all four low density general collections were identified early on during survey, we recognized that they were not the best prospects for immediate grid-based collection (both because of their small samples, but also because similar collections had already been made nearby), leaving off their collection until very late in the season. As a consequence, the growth of vegetation and the accompanying reduction in surface visibility meant that we were unable to locate all, let alone most, of the artifacts we had originally identified in these locations.

Occasionally we also encountered isolated, but relatively intact lithics artifacts on the surface whose attributes were similar enough to those we had been systematically collecting to suggest they dated to the same period (although these identifications did not always stand up to later scrutiny in the lab). These we collected as "spot finds" (or SF artifacts), recording only their GPS coordinates, and basic information as to their context of discovery, including the nearest artifact concentration with which we thought they were most likely to have been associated. We later combined these SFs with nearby general or systematic collections, if present. Those that could not later be assigned to a larger collection are discussed in Chapter 5.

In addition to Hongshan domestic remains, we also endeavored to collect materials from each of the burial mounds present. Because all had been disturbed and badly damaged in the past, materials (largely painted ceramics) were scattered around or actively eroding from them. We simply collected these materials as a single lot for each mound. Each of these mounds was labeled with the prefix Z, for zang, or "burial ground" in Chinese (although we usually referred to them as shidui, or "stone piles"). One mound (Z4) is actually a composite of three different mounds, a central tomb and two satellites, but these were collected as a single unit as well because their proximity meant that their contents, when scattered over the surface, were largely overlapping. Yet another is probably not a burial at all, but rather an "altar". One non-mound grave that had been exposed by tree pitting was collected as a single lot in two phases, including general collection, followed by raking and recollection. To differentiate it from mound burials, it is identified as M1 in the following discussions; where the prefix M stands for mu, or "grave". Aspects of these monuments and burials are discussed at greater length in Chapters 5 and 6.

In total, 17582 ceramic and 4329 lithic artifacts were recovered from 19 grid-based collections, 4 general collections, 6 SGCs, 7 isolated spot finds, and 8 mounds and/or graves at Fushanzhuang (Figure 2.7). A ninth mound, discussed in Chapter 6, is located in the periphery of the settlement and does not date to the Hongshan period. Between 86 and 95% of the ceramics recovered from each grid, GC, SGC, or mound/grave were datable to the Hongshan period (Table 2.1). This suggests a largely single component occupation. The largest non-Hongshan components belong to the succeeding Zhanguo–Han and Xiaoheyan periods, although Zhaobaogou, Lower Xiajiadian, Upper Xiajiadian, and Liao periods are also represented in smaller amounts. Because the Hongshan period is 1500 years long, however, issues of contemporaneity loom large in terms of comparative, inter-household analyses. The ceramic assemblages recovered from Fushanzhuang are relatively homogeneous, however, both in terms of stylistic elements and vessel types, that suggest a fairly similar, and therefore limited duration of manufacture and use. Based on the chronologies developed by Yang (1989), Zhang (1991), Guo (2005:25–29), and Li (2003), these ceramics appear to date to the late Middle (4000–3500 BCE), or early Late phase (3500–3000 BCE) of the Hongshan period, a window probably representing no more than 500 years. In fact, there are several reasons why we feel confident that an even narrower time frame is represented—perhaps on the order of only a dozen generations. In Chapter 3 we discuss the issues of periodization and contemporaneous occupation in greater detail.

2.2. MICRO-REGIONAL SETTLEMENT SURVEY FOR OUTLYING OCCUPATION

The second phase of research conducted by the HICARP was an approximately 18 km^2 micro-regional settlement survey surrounding Fushanzhuang, the purpose of which was to locate additional and related outlying areas of Hongshan period occupation. Although the remains of other periods were also documented, these data are not included in the present monograph. The boundaries of the survey area included the Yin River to the south (or at least those parts of the alluvial bottomlands without crops at the time of survey), a dry tributary of the Yin River to the west, and the western boundary of the CICARP survey area to the north and east. The entire HICARP survey area is contained within the easternmost portion of a roughly 200 km^2 area surveyed by Gideon Shelach in 1995 (Figure 2.8) as part of dissertation research (Shelach 1996, 1997, 1999).

2.2.1. Micro-regional Settlement Survey Around Fushanzhuang

The settlement survey methodology we used was adopted without modification from that employed by the CICARP in their ongoing survey of the Chifeng region. Published in Drennan et al. (2003a), this methodology can be summarized briefly as follows. Two teams of 3–4 people walked systematically across the landscape maintaining distances of 50 m or less between members. Areas of occupation were identified primarily on the basis of surface scatters of chronologically diagnostic ceramic artifacts. Samples of surface artifacts (including lithics as encountered) were collected as individual units of no more than 1 ha. Archaeological remains spread over an area larger than 1 ha are collected as multiple units, making it possible to estimate artifact densities and areas of occupation by period within sites at a resolution of approximately 1 ha. General collections of up to about 20 artifacts were made opportunistically across the entire hectare where artifact densities were less than one per square meter, while systematic collections were made where these densities were uniformly higher across the surface of the hectare being collected. For systematic collections, a location within the 1 ha unit to be characterized was selected at random, and all visible artifacts within a 3 m diameter (or 7.065 m^2) circle were collected using the so-called "dog leash" method. If fewer than 20 artifacts were collected from a single circle, additional circles were made until 20 or more artifacts were collected. Because the density of surface materials encountered was usually quite low, few such systematic collections were made (see below). As a rule, surface visibility in the Yin River Valley was lower that for other parts of the Chifeng region where members of the HICARP team had previously participated in survey, perhaps owing to its distance from Chifeng City, its lower population, and relative economic underdevelopment. Nevertheless, as for the site of Fushanzhuang itself, visibility was on average good, and we are confident that differences in surface visibility contributed little, if at all, to collection bias at this larger scale. Collection units were located on satellite photo enlargements according to topographic markers and GPS coordinates while in the field. These were later traced onto master composite transparencies to serve as permanent records. Upon return to the University of Pittsburgh, these transparencies were digitized into electronic maps and linked to our project database, enabling us to query and display all collection units containing ceramics datable to the Hongshan or other periods. Final determinations as to the age of the sherds collected were made in the laboratory by Christian Peterson and Guo Zhizhong (CICARP ceramist), with reference to a comparative collection.

2.2.2. The Distribution of Hongshan Period Occupation Within the Survey Area

Our micro-regional surface survey located 72 archaeological “sites,” comprised of one or more contiguous collection units (for a total of 143 collections) within the 18 km^2 surrounding Fushanzhuang (Figure 2.9). The artifactual remains and other materials collected from the surfaces of these sites clearly indicate their residential function. Four other non-ceramic sites were also recorded, and although the outlines of mock collections were drawn, no artifacts were recovered; each is the location of one or more graves indeterminate as to archaeological period. Usually these 76 sites were labeled sequentially as encountered on survey, beginning with site 1337 (the next unused number in the set of CICARP site numbers), and ending with 1403. If, however, sites could be field determined with some confidence to correspond to those recorded earlier by Shelach, we instead assigned his site numbers to these collections; if this correspondence was not established until later (when comparing maps and field notes), we retained the site numbers originally assigned, and made note of probable matches (see below). In total, 12 of Shelach’s (1996, 1999) site numbers were used: 1, 7, 9, 14, 16, 17, 20, 24, 25, 26, 27, and 28. In some cases the chronologically-sensitive ceramic components of our field collections indicate that these sites were built or occupied during different archaeological periods that those to which Shelach assigned them, while in others we recognized the presence of additional periods of occupation or use.

We also combined Shelach’s site numbers if resurvey revealed evidence for contiguous occupation. We consider, for example, site 23 to be part of site 24, and we use the designation “site 24” to refer to both (as this was the first of the two sites we encountered). In this fashion, we also lumped his site 8 with site 7, and combined his sites 12 and 13 (but refer to these as site 1382). Site 15 was combined with site 14, and site 188 is in all likelihood a component of site 16. Site 21 falls within the more intensively surveyed boundaries of Fushanzhuang, and consists of graves and stone structures probably dating to the Lower Xiajiadian period. Site 22, an Upper Xiajiadian graveyard, lies just along the northern boundary of Fushanzhuang, but no evidence for habitation was observed, and no collections were made. Six of the sites previously identified by Shelach that fell within the area we resurveyed could not be located by our teams. These include sites 2, 10, 11, 29, 30, and 31. It is possible that some of these sites were destroyed in the nine year interval between Shelach's survey and our own—this is especially likely for site 30 which is near a modern village (Dahedong) that has undergone recent expansion (although it is also possible that our site 1402 is what Shelach labeled site 30). Four of the other five sites were originally described by Shelach as being very small scatters of sherds or small clusters of graves that might easily have fallen within the 50 m separating surveyors in the field, or surface visibility may have been reduced due to changes in cultivation practices or recent earth moving. The remaining site, site 29, described as a dense 100 m by 200 m concentration of Liao Dynasty ceramics and stone piles, may be the site we have labeled 1344, as we find it difficult to believe we could have overlooked a 2 ha site given our survey resolution. In contrast to our failure to find these seven small sites, we located an additional 59 sites not originally identified by Shelach (1996, 1997, 1999), comprising some of 96 collections totaling 445 ha in area.

This difference in recovery between surveys is attributable to at least three factors. First is the different survey methodology employed by Shelach, on one hand, and by the CICARP and ourselves on the other. Specifically, Shelach documented the position and rough areal extent of surface evidence of occupation encountered on survey, but did not record these locations or boundaries on topographic maps or aerial photographs, both of which were unavailable (due to governmental restrictions) at the time of his survey. Rather, he recorded GPS coordinates (longitude and latitude) at the approximate centers of every site, and made rough estimates of site size following inspections. Many of these "sites" were graves and fortifications of the Lower and Upper Xiajiadian periods, without (or with only scanty) evidence of utilitarian ceramics and stone tools representative of residential occupation. Without adequate maps, the locations of some sites may have been misidentified by Shelach, and some small portions of his survey area may have unintentionally been skipped. The largest component of difference between survey results is, however, simply one of resolution and definition. Both the CICARP and the HICARP surveys utilized a higher level of resolution during walkover (50 m intervals), as well as a substantially lower threshold value of surface ceramics (three or more) when designating "sites" and making collections, than did Shelach in 1995. Many of our sites are actually single collection units of 1 ha or less. This should not be taken as a criticism of Shelach's methodology, but rather, only as a recognition of the contribution of these factors to differences in settlement recovery between surveys.

Secondly, only in cases when surface materials could not be field-dated to period did Shelach (1996, 1997, 1999) make surface collections of ceramics for subsequent laboratory identification with the aid of comparative collections. Thus, some ceramics, and therefore settlements, may have been misrepresented as to period of occupation, although the number of such instances is likely very small. Since 1995 the ceramic chronology of the region has been substantially refined and elaborated upon (especially with respect to the earliest Xinglongwa and Zhaobaogou periods), which may account for the underrepresentation of some periods in Shelach's sample of sites, as compared to our own. On the whole, however, and especially with respect to occupation during the Lower and Upper Xiajiadian periods, Shelach's (1996, 1997, 1999) principal archaeological periods of interest, the results of both our surveys are in general agreement.

Thirdly, a mathematical transformation of Shelach's GPS coordinates from longitude and latitude into the Universal Transverse Mercator (UTM) system employed by the CICARP and HICARP was required plot and overlay Shelach's sites on our maps of settlement distribution for comparison. This transformation introduced error, and certainly contributed to a lack of one-to-one correspondence between surveys. Yet further error was introduced by both the CICARP and HICARP survey projects when: (1) marking site boundaries on topographic maps and other imagery; and (2) tracing and digitizing of these boundaries into electronic format, on the other. In total, the positional error introduced through the latter is probably at least 300 m, and quite possibly much more, although the effects and directionality of this bias are largely systemic and predictable.

Not including Fushanzhuang itself, Hongshan period sherds were identified in 15 of our micro-regional survey collection units. In all cases but one these collections are separated from one another by at least 100 m, forming individual "sites"—one "site," however, comprised of five contiguous collection units, is located immediately to the south, and downslope, of Fushanzhuang (Figure 2.10). Each of these collections contained a minimum of one Hongshan period sherd (although other archaeological periods may also have been represented). The remaining 71 sites (totaling 130 individual collection units) contained ceramics datable to one or more of the other seven archaeological periods currently recognized in the region, as did some of those from which Hongshan sherds were also collected (Chapter 1, Figure 1.2; Chifeng 2003b; Linduff, Drennan, and Shelach 2004; Teng et al. 2003; Zhong–Mei 2002), representing the entire sequence of prehistoric and early pre-modern post-sedentary occupation. The only periods for which evidence of occupation was particularly sparse were the Xinglongwa (6000–5250 BCE) and Zhaobaogou (5250–4500 BCE), that immediately precede the Hongshan period. This is hardly surprising however, given the similarly sparse and widely-distributed nature of these occupations immediately to the east as noted by the CICARP (Chifeng 2003a; Chifeng 2003b; Zhong–Mei 2002), and the relatively small size of our survey area. The remains of this, and other non-Hongshan period occupation in the middle Yin River Valley area are not discussed further in this monograph, however. These data pertaining to other periods are not relevant to the present study, and are being prepared for publication elsewhere.

Table 2.1. Quantities and proportions of Hongshan sherds recovered per intensive surface collection unit at Fushanzhuang.

Surface Collection	Total Sherds	Hongshan Sherds	% Hongshan Sherds
F01	522	516	98.9
F02	470	464	98.7
F03	219	215	98.2
F04	383	373	97.4
F05	278	277	99.6
F06	866	859	99.2
F07	425	398	93.6
F08A-D	5896	5746	97.5
F09A	853	794	93.1
F09B	1199	1186	98.9
F10A	530	525	99.1
F10B	491	482	98.2
F11	760	749	98.6
F12	501	498	99.4
F13A	223	222	99.6
F13B	256	256	100.0
F14	577	575	99.7
F15	800	800	100.0
F16A/B	371	366	98.7
BG	56	54	96.4
HG	48	47	97.9
JG	69	55	79.7
KG	21	19	90.5
SGC1	53	51	96.2
SGC2	182	158	86.8
SGC3	91	83	91.2
SGC4	79	61	77.2
SGC5	50	40	80.0
SGC6	38	33	86.8
M1	182	182	100.0
Z1	275	275	100.0
Z2	6	6	100.0
Z3	490	490	100.0
Z4	136	133	97.8
Z5	16	16	100.0
Z6	3	3	100.0
Z7	2	2	100.0
Z8	274	21	7.7
Total	**17691**	**17030**	**96.3**

Figure 2.1. Staking an intensive systematic collection grid at Fushanzhuang.

Figure 2.2. Intensive Phase I surface collection at Fushanzhuang by 1 x 1 m grid squares.

Figure 2.3. Raking the surface of the grid square to remove vegetation and turn the soil prior to Phase II collection.

Figure 2.4. Flagging newly visible artifacts prior to Phase II collection.

Figure 2.5. Intensive Phase II surface collection at Fushanzhuang by 1 x 1 m grid squares.

Figure 2.6. Using handheld “rakes” to comb the plowzone for additional artifacts in each 1 x 1 m grid square during Phase II collection.

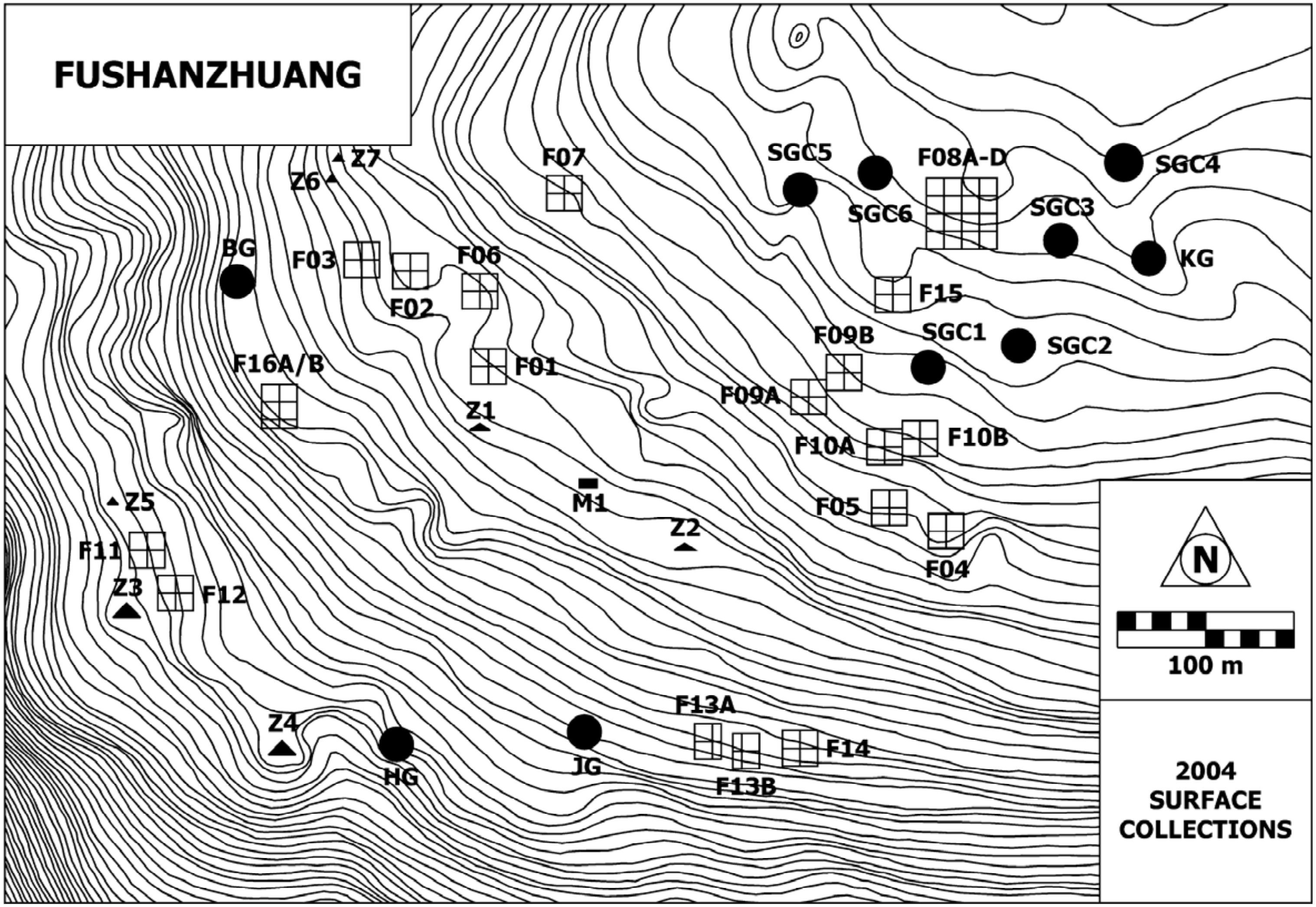


Figure 2.7. Topographic context of all surface collections made at Fushanzhuang in 2004 (contour interval=1 m). (Key: F= systematic grid-based collections; BG, HG, JG, KG= general collections; SGC= special general collections.)

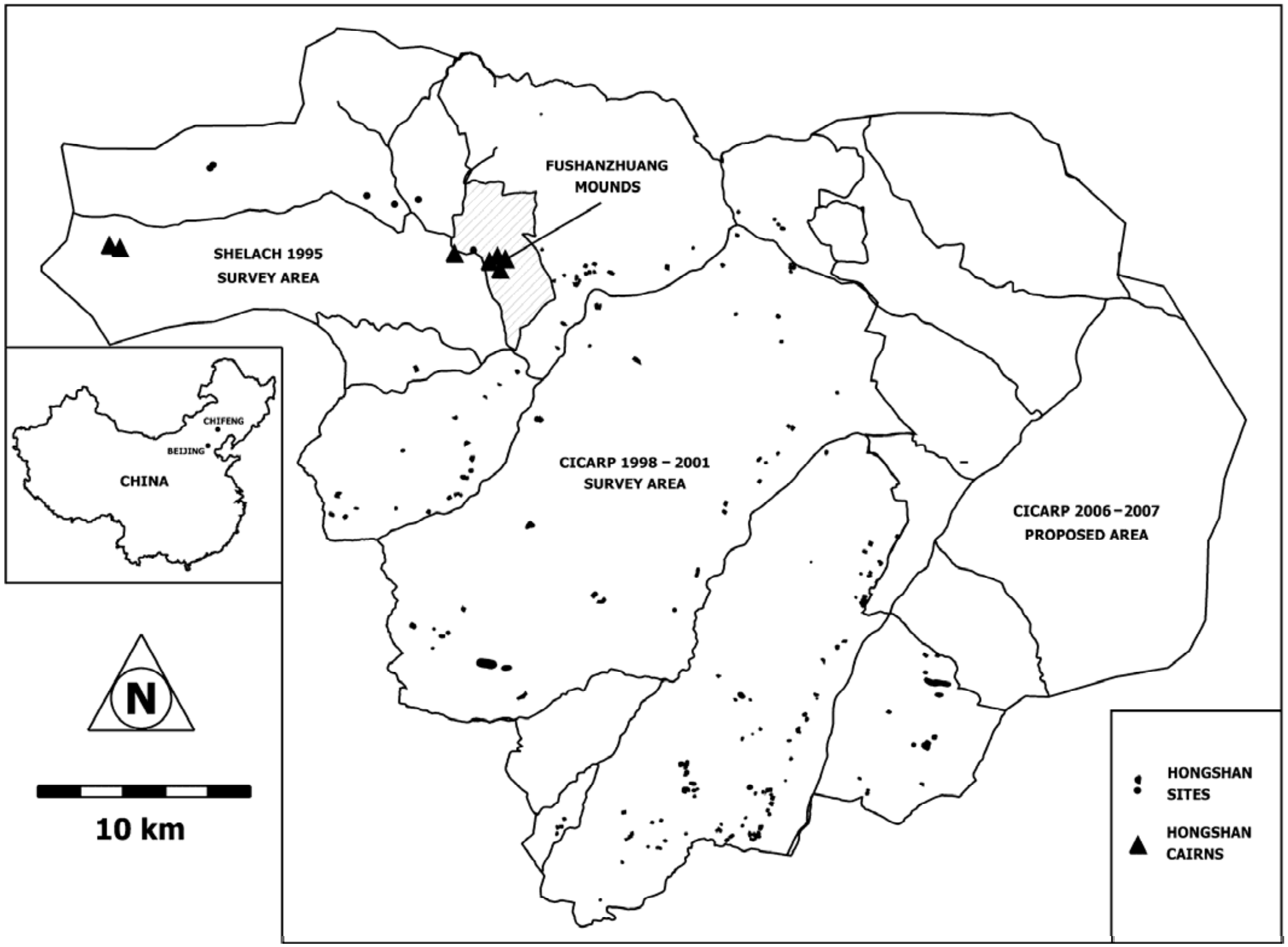


Figure 2.8.Location of the HICARP survey area (hatched) in relation to those of Shelach (1999) and the CICARP (Chifeng 2003a).

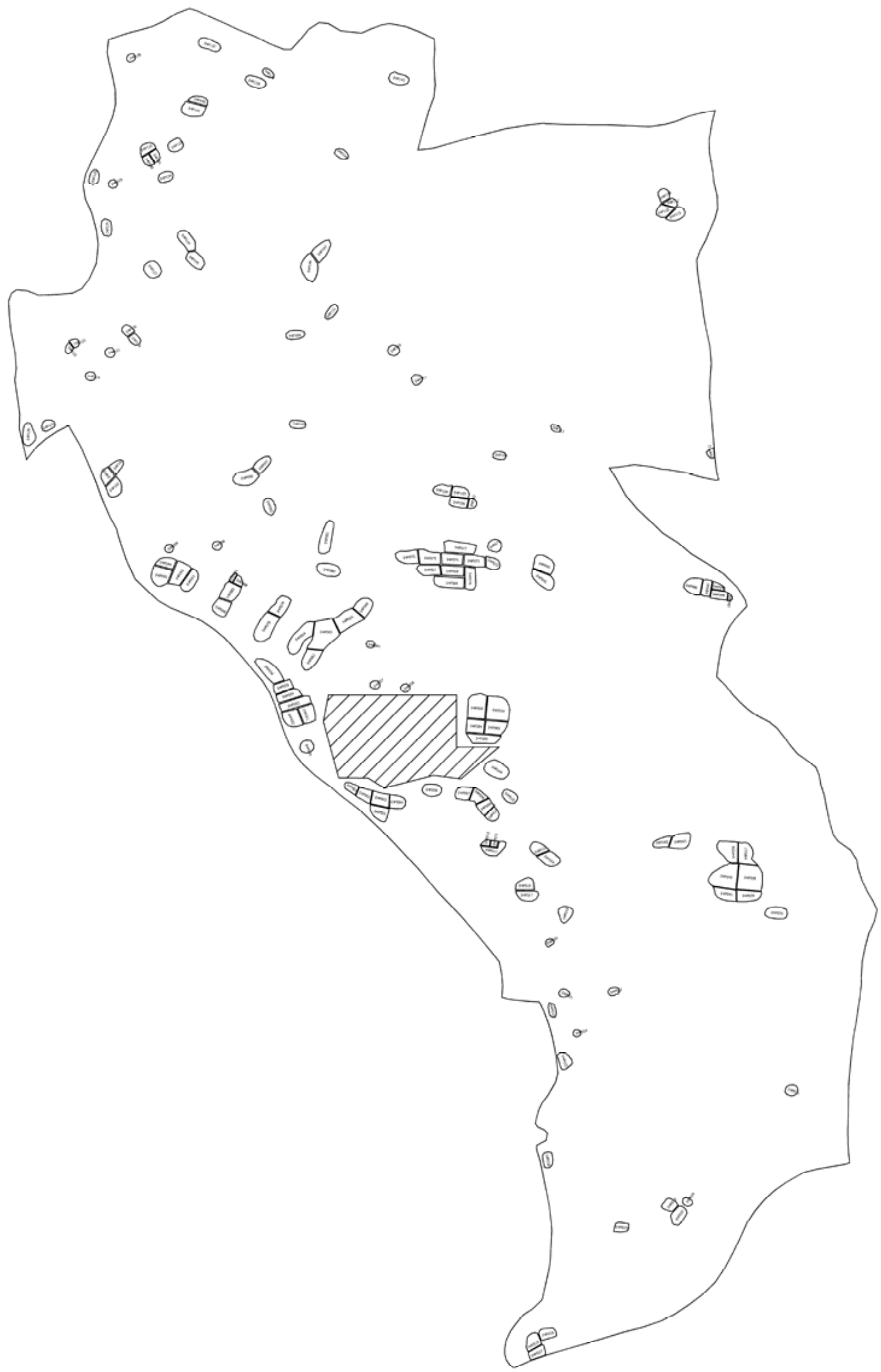


Figure 2.9. Location of collection units containing sherds of all periods recovered during micro-regional survey, relative to the Fushanzhuang intensive survey area (hatched).

Figure 2.10. Location of collection units containing Hongshan period sherds recovered during micro-regional survey, relative to the Fushanzhuang intensive survey area (hatched).

3. PHASING THE HONGSHAN PERIOD OCCUPATION AT FUSHANZHUANG

Eight radiocarbon dates from only four archaeological sites bracket the Hongshan period to between 4700–2900 BCE (Table 3.1). The earliest date comes from the Hongshan component at Xinglongwa, and has been calibrated to between 4700–4300 BCE. The occupation of the much later Niuheliang site spans about 800 years, or from about 3800–3000 calibrated BCE. Dongshanzui and Wudaowan overlap with the earlier and later occupations of Niuheliang respectively, with dates ranging from about 3600–3400 calibrated BCE in the case of the former, and from 3000–2900 calibrated BCE in the case of the latter. Because the radiocarbon date from the Hongshan component at Xinglongwa overlaps with those for the earlier Zhaobaogou period, and there is a gap between Hongshan and the later Xiaoheyan period, this range has usually been adjusted upward to 4500–3000 uncalibrated BCE (see Chapter 1, Figure 1.1). Phasing of the Hongshan period is still under debate (e.g., Guo 1995, 2005; Li 2003; Nelson 2001; Yang 1989; Zhang 1991), but most scholars partition the Hongshan period into three roughly equal intervals of 500 years: Early (4500–4000 BCE), Middle (4000–3500 BCE), and Late (3500–3000 BCE). Given the paucity of absolute dates, this three phase periodization is based almost entirely on typological analyses of ceramic change over time.

3.1. CERAMIC PERIODIZATION

Many Hongshan ceramic vessel forms were carried over from the preceding Zhaobaogou period, predominately the coarse-bodied guan jar, with its "bucket-like" profile. Other forms were innovations of the period, including xiekouqi slanted-mouthed vessels, lidded guan, vessel stands, bei cups, and tongxingqi cylinders (Figure 3.1). Other forms, including bo bowls, weng urns, hu jugs, pen basins, and dou stemmed plates are thought to have been adopted with modification from Yangshao period societies in the Middle Yellow River Valley region (e.g., Li 2003:125, figure 5.3). While there are a large number of formal and stylistic similarities among the ceramic assemblages of both regions, it is inconsistent with the well documented in situ development of societies in the Liao River drainage to attach much importance to such far-flung and infrequent connections. Moreover, as Zhu (1991) has shown, many incised and painted ceramic motifs of the Hongshan period have clear and direct precursors among earlier Zhaobaogou assemblages. The most prominent decoration of the Hongshan period, a rocker-stamped, incised, or comb-impressed Z motif, is also a carry-over from the Zhaobaogou period, although the impressions are more arc-shaped than before, and designs display a greater density of lines (Figure 3.2). These zigzags often occurs in bands, or successive registers of lines, oriented either vertically or horizontally. The geometric designs of the Zhaobaogou persist in less stylized form into the earlier part of the Hongshan, but all but disappear by period's end. Painted pottery, which appears during the Zhaobaogou period in very limited quantities, becomes increasingly common throughout the Hongshan (Figure 3.3). Black, red, and violet pigments were used for decorating finer paste vessels. Standard painted motifs include zigzags, solid banding, parallel horizontal lines, triangles, diamonds, hooks, and fish "scales," among others.

Among the general features considered diagnostic of Early Phase assemblages are a sparseness of zigzag or Z-motifs (mostly of the vertical type), but a preponderance of decorated vessel rims, especially of the nail impressed or braided duiwen variety. Geometric and cross-hatched patterns of incised decoration are not uncommon. Painted and/or burnished pottery occur only in limited quantities, and guan bo, and xiekouqi are considered characteristic vessels of the phase (although see our discussion of xiekouqi below). Nantaizi and Zhizhushan, as well as Hongshan components at Xinglongwa, are considered exemplar Early Phase sites. Some consider Baiyinchanghan to also be an Early Phase site (e.g., Li 2003), although its excavators, and others (e.g., Suo and Guo 2004), assign it to the Middle and/or Late phases.

During the Middle Phase fine painted pottery becomes more common, with parallel lines, triangles, diamonds, scales, and wide banding the predominant patterns. Coarser pottery was decorated mostly with horizontal zigzags and nail impressed rims. Restricted-mouthed vessels such as hu and weng appear, as do vessel lids and stands. Ceramic assemblages from Xishuiquan, Nasitai, and Erdaoliang are thought to be typical examples of this phase.

The Late Phase is witness to a further increase in the availability of painted pottery, with triangle and hook patterns most frequently observed. Horizontal zigzags predominate as short registers on coarser vessels. Fine black burnished pottery was also once thought to be restricted to Late Hongshan phase (Guo 1995), but more recent finds from the early Nantaizi and Baiyinchanghan sites require we reevaluate this idea. Additional ceramic accoutrements related to food presentation appear during this phase, such as stemmed dou plates and bei drinking cups. The most characteristic vessels of the Late Phase are the large, bottomless tongxingqi cylinders (sometimes painted) that were arranged around the stone pile graves of the Hongshan elite. Typical assemblages of this phase are restricted largely to those sites with conspicuous ceremonial architecture, including Dongshanzui, Chengzishan (Niuheliang Locality 16), Hutougou, and Niuheliang Localities 1 and 2.

3.1.1. A Multivariate Approach to Relative Dating

There are two much more detailed approaches to ceramic periodization that we might make use of in dating Fushanzhuang's ceramic assemblage in relative terms. The most commonly used are those of Yang Hu (1989) and Zhang Xingde (1991), both of which have since been modified by other scholars (e.g., Guo 1995, 2005; Li 2003). Zhang's approach is purely typological, based on minute changes in a few diagnostic vessel forms and decorative elements, or their presence/absence, and is therefore of only limited applicability to Fushanzhuang dataset (Figures 3.4). Guo (1995, 2005) relies largely on Zhang's (1991) chronology, with some modification. We believe a more useful approach is that of Yang (1989), who, while not completely eschewing a typological approach, augments his arguments with quantitative measures for some specific attributes (such as the percentage of vessels made of fine clay, or the percentage of painted pottery). Li (2003) relies heavily on a modified version of Yang's approach (Figure 3.5). An additional advantage of Yang's approach is that it has produced more discrete phase-based assignments of Hongshan assemblages (see Table 3.2).

We have therefore modeled our approach to periodization around Yang's (1989)—our point of departure is that we have relied more heavily on ratio variables. We do, however, also utilize the work of Zhang (1991), Yang (1989), and others in establishing a baseline chronology with which to compare the efficacy of our modified approach. Unlike most of the data reported for Hongshan ceramic assemblages (Hongshanhou and Chengzishan being notable exceptions), that from Fushanzhuang is non-associative. That is, in the interest of expediency, various attributes of each sherd recovered and examined were recorded, but no attempt was made to keep track of which attributes occurred in what combination with what others particular to any sherd (see Appendix A). As a result, our ability to make use of relational typologies for purposes of seriation is seriously impeded. The manner in which data was collected, however, lends itself readily to more quantitative approaches aimed at characterizing compositional variability at the assemblage level.

3.1.2. Hongshan Ceramic Datasets Suitable For Multivariate Analysis

We have opted for a comparative multivariate approach to dating Fushanzhuang based on the particulars of its ceramic assemblage. If we are to compare the Fushanzhuang assemblage to others in terms of some set of common variables, we need a robust set of such data with which to work. Such a dataset ought to include assemblages that span (or are thought to span) the greatest temporal range possible. They ought also meet these additional criteria to the greatest extent possible: (1) the artifacts reported are not limited to mortuary contexts, which have tended to be highly visible cairn burials, usually of later date—and which contain few, if any, ceramics—but preferably a mixture of pits, middens, house fill/floors, and burials; (2) the artifacts reported are from single, discrete deposition contexts, or from multiple deposits that can be correlated stratigraphically across the site; (3) information on the occurrence of different decorative elements, proportion of fine ceramics, and proportions of different vessel types are presented in tabulated form, or in such a way as they could be reasonably determined; and (4) that the sizes of each of these three component samples are all sufficiently large enough to have confidence in comparisons between cases.

Nine Hongshan period ceramic datasets which largely met these criteria were used in this analysis (Table 3.2), including those from Nantaizi (Layers 2A and 2B; Neimenggu 1994b, 1997), Hongshanhou (Dwelling Site II, Areas A, B3–7, C, D, E, F, and G; Hamada and Mizuno 1938), Zhizhushan (T1, Layer 3; Zhongguo 1979), Erdaoliang (Layers 1 and 2; Neimenggu 1994a), Nasitai (aggregate surface collections; Neimenggu 1994b, 1997), Xishuiquan (Areas 1, 2, and 3, Layers 1 and 2; Zhongguo 1982), Niuheliang (Locality 5, Lower Layer; Liaoning 2001), Dongshanzui (all excavations; Guo and Zhang 1984), and Chengzishan (Layer 2; Li 1986). It is worth mentioning that the Niuheliang Locality 5 context used in this analysis is stratigraphically younger than the features most commonly associated with the Late Phase Niuheliang complex, such as the “Goddess Temple” of Locality 1 and the cairns and altars of Locality 2. The remains from Chengzishan, on the other hand, which is also known as Niuheliang Locality 16 (see Chaoyang and Liaoning 2004), appear closer in date to Localities 1 and 2 than to Locality 5.

This composite dataset is not unproblematic, however. For one, the overall sample of sites is small. In fact, the Zhizhushan assemblage was included even though it contains only nine identifiable vessels—although its numbers of decorated elements are comparable to other assemblages—in order to increase our overall sample size. Because of sample size issues, the results of our analysis must be considered preliminary in lieu of additional information and/or independent corroboration, such as through radiometric dating. Unfortunately, radiocarbon dates are available for only one of the sites included in our sample—Dongshanzui—so that any structure of phases that might be uncovered through this analysis cannot be anchored to multiple specific points in time. Rather, such a structure would be a relative, free floating one. Presumably, ceramic assemblages from other sites that share a number of measurable similarities with that of Dongshanzui would be of a similarly late date, whereas others positioned farther away in either direction of a scaled continuum of ceramic variability would be of relatively earlier or later date.

Secondly, these sites are not spread equally among all three hypothesized phases. Fewer than half the assemblages are thought to date on typological grounds to the Early and Late phases combined.

Thirdly, few Hongshan sites have been extensively excavated, and these nine are no exception. Most excavations of non-funerary specific sites have been limited from one to about a half-dozen stratigraphically dug rectangular test pits (from 1 to 4 m to a side). The compositional representativeness of these nine excavated ceramic assemblages, then, is not above question, due to the possible spatial autocorrelation of vessel types and kinds of decoration. Another is that some of the assemblages included are considered on typological grounds to span multiple phases. While we cannot rule out the possibility that materials from multiple phases are included in some ceramics datasets, only two (Hongshanhou and Nasitai) are thought by Zhang (1991) to span more than two phases, although Yang (1989) disagrees, assigning Hongshanhou to the Middle Phase, and regarding Nasitai as a composite of Middle and Late. We also consider the former possibility highly unlikely given the clear stratigraphic relationships between units reported by Hamada and Mizuno (1938), but cannot be so certain in the case of Nasitai. We have included it anyway, however, as our preliminary reading of the report suggested that all artifacts recovered were reported, and that the assemblage was very similar in composition—and therefore in age—to that from Erdaoliang. The aggregate collection of surface contexts at Nasitai (although of unknown coverage or intensity) means that its ceramics are effectively randomized, which makes them the most comparable of these nine assemblages to those from Fushanzhuang. Although greater chronological control is obtained through excavation, there is also (as mentioned above) a greater propensity for artifacts from limited excavations to be spatially autocorrelated. This is not a worry for Nasitai. Of the other two assemblages thought by Zhang (1991) to date to more than one phase (Xishuiquan and Chengzishan), Yang (1989) again disagrees, assigning each to a single phase.

While ceramics remain the most chronologically sensitive class of archaeological materials recovered, some progress has also been made in seriating Hongshan period lithic assemblages—particularly in terms of its ground stone tools and jade artifacts (see e.g., Guo 1995, 2005; Hua and Yang 1998). We have not, however, included such information in our discussion leading to the proper periodization of the Fushanzhuang community for two reasons: (1) those few kinds of ground stone tools that such lithic chronologies have been built on were not recovered in large amounts from Fushanzhuang; and (2) only three very small and incomplete jade ornaments were collected (see Chapter 6)—ornaments which do not appear to have been restricted to any one phase of the Hongshan period.

3.2. TIME CURVE CREATION BY MULTIDIMENSIONAL SCALING OF CERAMIC ASSEMBLAGES

In comparing our nine ceramic assemblages, we have employed the non-metric multivariate statistical technique known as multidimensional scaling (MDS). MDS is an exploratory technique that scales the measurable variation between cases in any dataset graphically, as a function of their (dis)similarity, along a specified number of dimensions (Kruskal and Wish 1978). The highly intuitive and interpretable MDS graphical output consists of computed coordinates of points, the distances between which closely represent the measured (dis)similarities between cases in the dataset. MDS is a data reduction technique that makes no a priori assumptions as to data structure or patterning, and is thus a robust exploratory tool. MDS can also usually "best fit" a model solution in fewer dimensions than related multivariate techniques such as principal components or factor analysis, therefore increasing the probability of its interpretability over other methods. The technique has previously, and successfully, been used to seriate archaeological assemblages (e.g., Cowgill 1972; Drennan 1976; Kendall 1971; Kruskal 1971).

The specific approach to pilot seriation used here closely follows that described by Drennan (1976), but our results are far less precise given the differing nature of datasets used, and our lack of corroborative radiocarbon determinations for more than one provenience. The underlying logic of these analyses is that assemblages more similar in age ought to be positioned closer to one another in the MDS output than those of more distant age. Perhaps most importantly for our purposes, the results can be compared directly to those produced from the same baseline dataset, but which also include additional similarly-organized information from other sites. Thus, we can later incorporate the Fushanzhuang dataset, and visually compare the results of both scalings, in order to make a relative determination as to the community's age. The overall shape of both the control and the experimental distributions, however, must be fairly similar (even with the addition of the new assemblage) for us to have much confidence in the assignment of Fushanzhuang to any particular phase. The second requirement is, of course, that the majority of attributes of all the ceramic assemblages we are measuring reflect change over time and not just idiosyncratic variation. Since the attributes we have decided to measure and compare are largely the same as those used previously in more traditional typological approaches to Hongshan period ceramic seriation by Yang (1989), Zhang (1991), and others (albeit expressed in more quantitative terms), we are confident that chronological patterning will be revealed. Furthermore, any sequencing of assemblages that might emerge can be compared to previous traditional attempts at seriation to determine its "goodness of fit".

The first step in our analysis was to compile relevant information for each of our nine ceramic assemblages from the above reports, and to then reduce the data to a mixed set of nominal, categorical, and ratio measures (Table 3.3) comparable to the non-associative ceramic data collected at Fushanzhuang. This mixed set of measures included 15 variables related to decoration, fineness of sherd/vessel clay, and vessel diversity within assemblages, specifically: (1) the proportion of undecorated elements (sherds/vessels); the proportion of decorated elements inscribed with the (2) horizontal Z motif (hengzhiziwen), the (3) vertical Z motif (shuzhiziwen), or with (4) other forms of inscribed or impressed decoration (e.g., parallel lines, braids, nail impressions, and/or stippling [duiwen]); (5) the proportion of painted (caitao) and/or burnished decorative elements (inside, outside, or both—cailiang); (6) the proportion of elements manufactured from fine clay (nizhi tao); (7) the presence/absence of slanted-mouthed pots (xiekouqi); the proportions of all identifiable vessels that were: (8) pots (guan), (9) bowls (bo), (10) kettles/decanters (hu), (11) urns (weng), (12) basins (pen), or (13) plates (pan); and the (14) presence/absence of other rarer serving vessels, and of (15) bottomless funerary cylinders (painted or unpainted) (tongxingqi). Other ceramic artifacts (such as spindle whorls or figurines) were not included in our analysis.

Some vessel types that are considered to be particularly good chronological markers (such as xiekouqi, and painted tongxingqi), were only occasionally quantified in the reports utilized here (either because of their ubiquity, as in the case of tongxingqi, or because of their extreme rarity), so these data have been converted to presence/absence information for all sites. Also, vessel subtypes used in these reports were collapsed into the more generic categories given above, both as an aid to interpretation, and because of inconsistent classification between different sets of authors. Occasionally we assigned vessels to a completely different category than those in the original reports, either because we disagreed with the initial classification, or because comparable vessels from Fushanzhuang had been classified differently in the field (see below). Furthermore, the categories of decoration recorded are not mutually exclusive—multiple forms of decoration were often present on single ceramic elements. Due to the high degree of variability, but low frequency, of non-Z motif incising, these data were lumped together into a single category. Incidences of painting and/or burnishing were also collapsed into a single category because painted ceramics were often (although not always) slipped and then burnished prior to the application of any pigment. In many cases this pigment has not survived, although the telltale signs of burnishing remain. Secondly, some fine vessels, particularly bowls and basins, were fired in a reducing atmosphere to blacken the ceramics, probably in lieu of painting, and then burnished. Black burnished pottery was not employed as a nominal chronologically sensitive marker in and of itself, despite the arguments of some (Guo 1995; Li 2003; Yang 1989; Zhang 1991), given that it is both exceedingly rare, and occurs in assemblages from all three phases.

The second step was to create a matrix of dissimilarity scores between cases (our nine assemblages) based on this mixed dataset. Dissimilarities between cases were measured with Gower's coefficient. The final rectangular matrix of dissimilarity scores was then input into a computerized statistical software package, and five separate MDS configurations produced in 1, 2, 3, 4, and 5 dimensions. As Drennan (1976:49–50) has discussed, there are good reasons of interpretability why a two- or perhaps even a three-dimensional scaling solution are to be preferred where the goal is chronological seriation. The Kruskal stress values associated with each of these five solutions are graphed as a continuous line in Figure 3.6. In all likelihood, the most interpretable of these solutions is that striking the best balance between a low stress value (one less than 0.15 is often considered interpretable) and the fewest dimensions. This particular dimension often appears as a "hinge point" or "elbow" in a graph like Figure 3.6. In our case, no clear elbow is present, but Drennan's preferred two-dimensional solution is also associated with a very low and therefore highly interpretable Kruskal stress value of 0.08349. Moreover, the variation in the dataset "explained" by these two dimensions is greater than 95% (r^2=0.96461). Thus, we have decided to base our preliminary seriation of Hongshan ceramic assemblages around this two-dimensional solution.

A scatterplot of dimension one against dimension two for this dataset is presented as Figure 3.7. At first glance, the distribution of assemblages according to their dissimilarity appears quite random. There is little apparent clustering of assemblages, for example. A closer look, however, reveals a very clear structure to the arrangement of assemblages. The two assemblages in the lower left portion of the graph are considered by Guo (1995, 2005), Li (2003), Yang (1989), and Zhang (1991), among others, to be relatively early examples, while those in the lower right are considered to be very late examples. Those toward the middle top of the graph are considered by these same authors to fall generally between the other two extremes. In other words, one could draw a "best-fit" horseshoe-shaped curve through these points that would represent a time-ordered sequence of ceramic change. The theoretical basis for expecting just such a "twisted one-dimensional object" from a linear sequence subjected to MDS is discussed by Kendall (1971:227). Illustrative examples are provided by Kendall (1971) and Drennan (1976). The particular "goodness of fit" of this curvilinear sequence to previous typological sequences is discussed in greater detail below, but our selection of mixed ceramic attributes appears to have homed in on much of the same variability, in different form, as more traditional typological approaches to Hongshan period ceramic change. In the absence of conventional, associative ceramic data for Fushanzhuang, we can use this approach to relatively date the Fushanzhuang community through quantitative comparison with these other nine assemblages. First, however, we must thread a "best-fit" time curve through the cloud of points in Figure 3.7, and map our nine assemblages to it.

3.2.1. Plotting the Fitted Time Curve

Although Drennan (1976) mathematically generated a time curve and "fit" his stratigraphic proveniences to it, his analysis incorporated a great many more elements than ours, all much more closely spaced in time than the assemblages used here. The benefit of greater precision in Drennan's case outweighed the additional cost in effort to create the curve and fit proveniences to it through computation. Because the resolution with which we are working is much lower, there is presently no need for us to go to such lengths. Rather, we have simply used our best judgement as to the inter-point distances involved in plotting the curve and in mapping assemblages to it. The final fitted time curve is presented as Figure 3.8. How well our scaling conforms to previous interpretations of the age of assemblages included is discussed in greater detail below, following our use of "breakpoints" to partition the fitted sequence into discrete phases of ceramic change.

3.2.2. Ceramic Frequency Breakpoints and Phasing of the Hongshan Period

Once our nine Hongshan sites, arranged in order from earliest to latest, were fitted to the idealized time curve, we were able to use combinations of changes in the relative frequencies of some variables through time to propose "breakpoints" between sets of sites, that could be used to distinguish between different archaeological phases. One way to investigate these changes is graphically (Drennan 1976:57–65). Scatterplots of proportional frequency or presence/absence against the nine Hongshan sites in our pilot sample, placed in chronological order from earliest to latest, were constructed for each of our 15 variables. Thirteen of these plots (87%) show clear gradual unidirectional trends in attribute frequencies, or changes in the direction of such trends that, in combination, could signal the approximate boundaries of chronological phases within the Hongshan period. This indicates a remarkably high degree of relevance among the attributes selected for measurement. Furthermore, it indicates that Yang's (1989) initial suppositions regarding proportional changes, in terms of at least some ceramic attributes, is correct.

One of these 13 plots is not particularly useful, however. Although there is a trend towards a slight proportional decrease in bo bowls over time among all assemblages one outlier aside (Niuheliang Locality 5, Lower Layer), the rate of change appears to have been fairly consistent, without "steps", and therefore no subdivisions of this plot are possible (Figure 3.9). In addition, plots of the remaining two variables (proportions of the horizontal Z motif among decorated elements, and the proportion of pan plates among identified vessels) do not display any chronological patterning whatsoever. The compositional distribution of these decorations and vessels must either be purely idiosyncratic, or reflect something other than change through time.

Six of the 12 most useful plots show clear gradual trends of increasing or decreasing attribute frequency that can be subdivided. The first of these is a decrease in the proportion of sherds inscribed with the vertical Z motif (Figure 3.10). There appear to be two breaks between assemblages with greater than about 10% of this decoration and those with less than about 5%, and between these with about 5% and those with almost no representation of this motif at all. These breakpoints fall between Erdaoliang and Xishuiquan, on the one hand, and between Niuheliang (Locality 5, Lower Layer) and Dongshanzui on the other. There is a similar decrease in the proportion of guan pots over time (Figure 3.11). In this instance two breakpoints are also evident, one between Zhizhushan and Nasitai, the other between Xishuiquan and Niuheliang. This produces three sets of three assemblages. The earliest three with proportions of pots greater than 60% of the identifiable vessels, the middle set with 40–50% guan, and the later set with less than 30% guan. The opposite trend—an increasing one—characterizes the proportion of painted and/or burnished decoration (Figure 3.12). The outlier of Zhizhushan aside, the breakpoint in this trend appears to be between Xishuiquan and Niuheliang, or between about less than 30%, and more than about 40% painted and/or burnished decoration. A very similar increasing trend in the proportion of pen basins over time can be seen in Figure 3.13. Here, however, the breakpoint is less distinct than in the previous plot, as either Xishuiquan or Niuheliang represents something of an outlier. Depending on which assemblage it might be (our guess is Xishuiquan), there is a change from less than 10% basins up to the time of Erdaoliang/Xishuiquan to more than 25% basins after this time. The proportion of weng urns also shows a clear and relatively gradual increase over time (Figure 3.14). We interpret the breakpoint in this plot to be between Zhizhushan and Nasitai, or between the effectively zero representation of weng in assemblages earlier than Nasitai, and a steady increase in representation thereafter. Finally, the plot of the changing proportions of fine clay vessels shows a steady trend toward increase over time, but with a breakpoint between Hongshanhou and Zhizhushan, or between less than 30% fine and greater than 50% fine wares (Figure 3.15).

Two of our plots display trends with “elbows” indicating a reversal in terms of ceramic change over time. The first of these is graphs the proportion of undecorated elements (Figure 3.16). Early in the chronological sequence of assemblages, the proportion of undecorated ceramics was almost 40%. This persisted only through the Nantaizi and Hongshanhou assemblages, however. The subsequent Zhizhushan assemblage contains no undecorated elements. Following this point in time, the proportion of undecorated elements gradually increases again to comprise about 30% of Chengzishan’s decorated elements at the end of the sequence. Thus, the breakpoint in this trend is between Zhizhushan and Nasitai. Likewise, but in an almost mirror image of the undecorated ceramics, the proportion of “other” forms of decoration (other than Z motifs, or painting and/or burnishing), begins low, representing less than 20% of the decorated elements in the Nantaizi and Hongshanhou assemblages, increases to about 30% in Zhizhushan times, and finally begins a gradual proportional decrease towards less than 20% again by the end of the sequence (Figure 3.17). The breakpoint is also similar, being only slightly earlier, or between the Hongshanhou and Zhizhushan assemblages.

The final four plots are of presence/absence variables, or in the case of hu jugs, a ratio variable that patterns like the former do (Figure 3.18). In this plot of the changing proportional frequency of hu, the most obvious pattern is that of effectively zero prior to Nasitai times. After this time, there is a messy decrease in proportional representation from greater than 15% to about 5%, if we set aside Niuheliang (Locality 5, Lower Layer) as something of an outlier. Thus, the breakpoint in this graph is between Zhizhushan and Nasitai. Two other of these final four plots also display breakpoints between these same two assemblages. “Other” kinds of presentation vessels (vessels stands, lids, drinking cups, etc.) are entirely absent before Nasitai times, but remain a fixture of all assemblages thereafter, with the exception of Niuheliang (Figure 3.19). Similarly, slanted-mouthed xiekouqi pots appear only after Nasitai times, but then disappear again during the latest part of the sequence, or during Dongshanzui and Chengzishan times. Thus, there are two discernable breakpoints in this graph, the former already discussed, and the later falling between Niuheliang and Dongshanzui. The last of our plots also has a breakpoint that falls between Niuheliang and Dongshanzui (Figure 3.20). In this case, bottomless tongxingqi funerary cylinders appear only in the latest part of the sequence, or during Dongshanzui and Chengzishan times.

Based on the frequency of coincidence of breakpoints we can hypothesize a gross three part phasing of these nine Hongshan period assemblages, with possible further subdivisions (Figure 3.21). These latter sub-phases must be regarded as suggestions only—the current size of the sample of assemblages is very small, and at least one breakpoint was observed for nearly every adjacent set of assemblages on our time curve. Following previous conventions we have labeled the three most conspicuous phases as Early, Middle, and Late. A remarkable degree of correspondence is noted between our assignment of relative ages to assemblages, and the assignments of previous authors (see Table 3.2).

3.2.3. The Early Phase

The division between the Early and Middle phases is the clearest, with six attribute frequency breakpoints falling between the Zhizhushan and Nasitai/Erdaoliang assemblages. The combined characteristics of Early Phase ceramic assemblages, then, as suggested by our analysis, are: (1) a high proportion of undecorated ceramics; (2) a high proportion of guan pots among identifiable vessels (>60%); and (3) the lack of slanted-mouthed xiekouqi pots, hu, weng, or presentation vessels. This constellation of attributes conforms largely to that compiled from other authors discussed at the beginning of this chapter. The only discrepancy is in the lack of xiekouqi, which has been suggested by Li (2003) to be an early phenomenon based on the presence of these vessels in the Baiyinchanghan assemblage. This assemblage has not been radiometrically dated and was not included in our analysis. Our results do not support Li's (2003) assignment of the Baiyinchanghan assemblage to the Early Phase. Li was writing prior to the publication of the full Baiyinchanghan report, however, in which the site's excavators (Neimenggu 2001) make a strong case for a Middle to Late Phase date. More recently, Suo and Guo (2004) have argued for a late Middle Phase date based on their analysis of the Baiyinchanghan assemblage. Moreover, other assemblages known to contain such vessels (most of which are included in our analysis here) have all been assigned according to various schemes to the middle or later portion of the Hongshan period (e.g., Guo 1995, 2005; Yang 1989; Zhang 1991). Thus, we consider the lack of xiekouqi in Early Phase assemblages another indictor that these are meaningful breakpoints. In addition, painted pottery is not absent during this phase, as has been suggested, but it does occur in the lowest proportions in this earliest phase. The three assemblages assigned to this Early Phase are Nantaizi, Hongshanhou, and Zhizhushan. The Hongshanhou assemblage has previously been assigned to the Middle Phase (Yang 1989), or thought to contain components spanning the entire Hongshan period (Zhang 1991), so its assignment to an earlier phase may be problematic. It is not unexpected, however, that the largely unorthodox criteria employed in our scaling would produce an ordering of assemblages occasionally at odds with those produced through different means. In terms of the criteria used, Hongshanhou appears among the earliest assemblages in our sample, and our subjective interpretation of the physical assemblage presented by Hamada and Mizuno (1938) is in agreement with this early characterization. Li (2003) and Zhang (1991) have respectively assigned Nantaizi and Zhizhushan to the earliest phase of the period, and our scaling obviously does not contradict these assignments.

The combination of two additional breakpoints partition these three assemblages into two sub-sets, or sub-phases. The slightly later Zhizhushan assemblage belongs to Early Phase II, and is differentiated from the Early Phase I assemblages of Nantaizi and Hongshanhou, by a marked increase in both the proportions of fine clay pottery and "other" incised, impressed, or duiwen decoration. Regarding the former, this proportion is correlated with a gradual increase in painted and/or burnished pottery beginning in the later part of this Early Phase, pottery made exclusively from finer clay. In terms of the latter, Zhizhushan and Nasitai (the latter of Middle Phase date according to our scaling) display the highest proportions of this kind of decoration in our sample of assemblages. This observation also conforms to previous suggestions regarding periodization—that these forms of decoration are most prevalent during the earliest part of the Hongshan period. We are able to put a slightly finer point on this observation with our analysis, however, by showing that it pertains only to Early Phase II. In fact, the Early Phase I assemblages have among the lowest proportions of this kind of decoration in our sample.

3.2.4. The Middle Phase

Based on our analysis, four assemblages can be assigned to a Middle Phase of the Hongshan period. These include Nasitai, Erdaoliang, Xishuiquan, and Niuheliang Locality 5 (Lower Layer). Both Zhang (1991) and Yang (1989) consider surface-collected Nasitai to be of Middle to Late date, and our results are not inconsistent with these interpretations. An exclusively Middle Phase date is suggested, however, by the very close compositional similarities with Erdaoliang. Our scaling confirms our previous suggestion that Nasitai and Erdaoliang were of a similar age—in fact, there appear to be the most contemporaneous of any two assemblages in our sample. Furthermore, Erdaoliang is considered by Zhang to date exclusively to the middle part of the period, which lends additional support to a Middle Phase date for Nasitai. Xishuiquan is considered by Zhang (1991) to be of Early/Middle Phase date, and by Yang (1989) to be of Middle Phase date. Xishuiquan is not very distantly placed along our time curve from Nasitai and Erdaoliang, so again, an Exclusively Middle Phase date is most probable. The Niuheliang (Locality 5, Lower Layer) assemblage has not previously been discussed in these terms, save that it is stratigraphically superimposed by cairn burials of later date. These four assemblages are offset from those of the Late Phase by the combination of four breakpoints: (1) the appearance of xiekouqi pots; (2) the lack of tongxingqi cylinders; (3) the proportion of pen basins among identifiable vessels remains less than 10% on average; and (4) the proportional representation of the vertical Z motif has not yet dropped below 5%. As stated previously, the appearance of both presentation vessels and restricted-mouth vessels (hu and weng) during this phase differentiate it from the Early Phase. Both of these characteristics are two of those traditionally used to differentiate Middle Phase assemblages from those earlier or later. Interestingly, the notion that the horizontal Z motif becomes particularly conspicuous during this phase is not borne out by our analysis. In fact, the plot for hengzhiziwen was one of those that displayed no consistent temporal pattern among assemblages whatsoever. The relevant observation appears to be that while the proportion of hengzhiziwen varies idiosyncratically from assemblage to assemblage, shuzhiziwen decreases stepwise over time.

The Middle Phase so described can be further subdivided into at least two sub-phases. One breakpoint—representing a reduction in the proportional representation of the vertical Z motif (to below 5%)—falls between Nasitai/Erdaoliang and Xishuiquan. Two additional attribute frequency breakpoints separate the Niuheliang assemblage from the three others clustered closely together. These are: (1) a further decrease in the proportion of guan among identifiable vessels (between 40–50%); and (2) a drastic increase in painted and/or burnished pottery (>40%). Thus we propose subdividing the Middle Phase into three sub-phases: Middle I (represented by Nasitai and Erdaoliang in our MDS plot), Middle II (represented by Xishuiquan), and Middle III (represented by Niuheliang Locality 5, Lower Layer).

3.2.5. The Late Phase

As already mentioned, four breakpoints partition the Middle and Late phases, the latter represented by Dongshanzui and Chengzishan in our sample of assemblages. These are: (1) the lack of xiekouqi; (2) the presence of tongxingqi; (3) the negligible representation of shuzhiziwen decoration; and (4) and the high proportion of pen basins (>25% of all identifiable vessels). Both Yang (1989) and Zhang (1991) consider Dongshanzui to be a Late Phase site, and our scaling reaffirms this idea. Although Yang also considers Chengzishan a Late Phase assemblage, Zhang assign it to both the Middle and Late Phase. Since Dongshanzui and Chengzishan fall very close together on the time curve, it is more likely that they are of very similar age. Dongshanzui is radiocarbon dated to 4895±70 BP, or to between 3640–3382 calibrated BCE. Unlike for the other two Hongshan phases, there is no basis to further subdivide the Late Phase.

3.2.6. Relative Dissimilarity, Not Measurable Temporal Distance

If we were to “unbend” our fitted time curve and depict it as a straight line, would the differences in measurable distance between the hypothetical midpoint boundaries separating phases be representative of differing numbers of centuries per phase? While it is quite likely that these three Hongshan phases do not represent equal intervals of time, we presently have no formula for translating linear distance along the curve into temporal distance because we lack the necessary radiocarbon dates to securely anchor assemblages to multiple "real" points in time. Were we in possession of at least three dates for assemblages positioned at either end of the curve, as well as at its apex (or midpoint if straightened), we might consider the feasibility of parsing the curve according to even increments of the difference between anchored points (see Drennan 1976 for a discussion). Until known sites are dated, and/or new sites are excavated, dated and reported, however, the full potential of this approach must remain unrealized for the Hongshan case. As additional dated assemblages accrue, they can easily be incorporated into the time curve as constructed here—in the manner described below for Fushanzhuang.

3.2.7. Fitting Fushanzhuang to the Time Curve

Of the ceramics collected at Fushanzhuang by both intensive grid-based and more general methods, only those greater than 10 mm to a side were subsequently analyzed. We refer to this sample as the "large ceramic fraction" (see Chapter 6 for more details). Even so, the size of most ceramics collected from Fushanzhuang are very small. In most cases these small sherds were badly eroded, and evidence of surface decoration was minimal as a consequence. It is probably not an exaggeration to say that more than half would have been discarded by other projects working in the region, even those engaged in excavation. As a result, our proportions of undecorated sherds are much, much higher than any of those determinable for the nine other assemblages used in our pilot seriation. Therefore, in order to make our data more comparable, proportions of undecorated (sumian) ceramics were treated as missing data for Fushanzhuang when calculating a new set of dissimilarities. Otherwise, variables were calculated as per the cases discussed above. Regional survey collections were not combined into this dataset, as the more cursory way in which this information was collected—and for different purposes, primarily the determination of occupation on a period-by-period basis rather than within periods—limits its comparability to intensive collections and the other nine assemblages used. We are confident however, that these outlying settlements are of similar age to the core community at Fushanzhuang, as the particulars of the ceramics collected during regional survey were strikingly similar to those recovered by more intensive means at Fushanzhuang itself.

Once the ceramic data collected from Fushanzhuang were reorganized along the same lines as the nine other assemblages used in the pilot seriation above, it was a simple matter to "fit" it to our constructed time curve in order to determine its relative age vis-à-vis these others. First, these 10 assemblages were combined into a single dataset (see Table 3.3) and a second dissimilarity matrix constructed. This matrix was then used as the basis of a second MDS analysis, and a new plot produced. This new plot is nearly identical to that presented previously as Figure 3.7, except that the solution required was a three-dimensional one, and the positions of two adjacent assemblages were reversed. (There is no reason to suppose that the same dimensions will be numbered similarly from one scaling to another.) Since the configuration of assemblages in our second plot of dimensions 2 and 3 is nearly identical to that of dimensions 1 and 2 in Figure 3.7, we can have considerable confidence that the chronological "age" of the Fushanzhuang assemblage as indicated by its position vis a vis these nine others, is relatively accurate. Using the same non-computational principles discussed previously, Fushanzhuang can be fitted to the previous time curve nearest its inserted position from our second scaling (Figure 3.22).

As can be seen, Fushanzhuang falls slightly later along the curve than Niuheliang (Locality 5, Lower Layer), but some distance still from Dongshanzui or Chengzishan. In terms of the phases as we have described them here, Fushanzhuang appears to belong to the Middle III Phase, very probably straddling the boundary between the Middle and Late phases. This intermediate position is most clearly attested to in the ceramic assemblage by the presence of both slanted-mouthed xiekouqi pots and tongxingqi cylinders. This assignment also seems appropriate given the presence of cairns at Fushanzhuang, a form of burial facility thought by many Hongshan scholars to date to the later part of the period.

3.3. CONTEMPORANEITY OF THE FUSHANZHUANG COMMUNITY

While it would be a simple matter to reorganize our Fushanzhuang ceramic dataset by intensive surface grids and/or general collections in similar terms as for the core community as a whole, then scale them along with the nine other sites included in the preliminary seriation, and fit the results to the established time curve above, this is not possible for several reasons. Firstly, the samples of decorated sherds, and numbers of vessels identified to type are simply too small to have much confidence in differences between household assemblages. While our data on the proportion of coarse or fine sherds is sufficient for such a comparison, between, for example, all 19 systematically-collected grids, only 11 of these grids have decorative samples with more than 10 decorated elements, and only two grids have samples with 10 or more identifiable vessels. Secondly, there is the matter of representativeness between the proportion of different artifacts—and therefore the specific attributes that might be coded for each—by collection phase for different households at Fushanzhuang, one that is irrelevant if the entire aggregate assemblage is being compared to that from another site per the above discussion. While the problem of differential recovery between phases is soluble—see Chapters 5 and 6—the cost in effort here is without any appreciable return if the sample of attributes is initially insufficient. Thirdly, there is the issue of just how contemporaneous our sample of Fushanzhuang households has to be in order to be able to draw the kinds of conclusions we wish to make concerning them.

If we reasonably assert a tripartite division of the Hongshan period, with Fushanzhuang assigned to late Middle (III) Phase, this narrows the temporal window of occupation considerably, even if we cannot provide a range of actual dates. Moreover, if we are interested in how this community coalesced along hierarchical lines, then our timeframe of interest is further limited by the inferred nature of some of the evidence for hierarchical organization found there. The most conspicuous evidence of social hierarchy at Fushanzhuang—the reason our study location was selected in the first place—is the mound group itself. While the possibility of multiple hierarchies in Hongshan society has been suggested (Drennan and Peterson 2006; Chapter 6), the highest ranking members of each are thought to have enjoyed very different funerary treatments, with only "symbolic elites" (i.e., ritual specialists) being interred in elaborate mounded graves. Assuming that burial investment is positively correlated with elite status, then the four largest Hongshan period mounds at Fushanzhuang (Z1–Z4) ought to have been built for successive paramount ritual leaders of the community. (We consider the possibility of four contemporaneous leaders as improbable.) This number could be reduced to three if Z2 is later revealed through excavation to have been a non-burial ceremonial construction as currently presumed given the lack of associated grave goods, and its different method of construction (see Chapter 4). If we further assume an estimated "leadership generation" of 20–30 years, then Fushanzhuang existed as a hierarchically-organized community for between about 50 and 150 years. If the 2–3 other smaller Hongshan period mound graves (Z5, Z7, and Z8) do not overlap in time with those of Z1–Z4 (being earlier or later in the developmental trajectory of the community, or simply representing the resting places of less esteemed leaders in the eyes of the community) then the life span of the settlement could be substantially less than even 150 years. It could also, however, be substantially longer than this if not every leader was accorded this treatment in death.

Even were the temporal range of households at Fushanzhuang greater than this estimate, this yet fuzzier palimpsest of occupation would still be "synchronic" enough to have reasonably and reliably supported the set of analyses we have here. That is because we are interested in understanding the complete developmental trajectory of this community, not some specific subset of its developmental history. This dynamic is only observable in the time-averaged matrix (or palimpsest) of interactions and activities between households within which social hierarchy became institutionalized. Obviously, this period of occupation cannot be too long, or it becomes difficult to sort out the information of interest from the background "noise" contained in a deeply time-averaged dataset. We believe we have shown, however, that this is unlikely to be the case for information obtained from Fushanzhuang. Therefore, in the remaining chapters, we have treated all discrete units of intensive collection containing overwhelming proportions of Hongshan period artifacts as "contemporaneous" for analytical purposes.

Table 3.1. Radiocarbon dates for eight Hongshan period sites or components (modified from Li 2003:133, table 5.3).

Site	Lab Code	C14 date	Cal. BCE
Xinglongwa	ZK-1394	5865 +/- 90	4714-4463
Xinglongwa	ZK-2064	5735 +/- 85	4501-4338
Niuheliang	ZK-1355	4995 +/- 110	3779-3517
Niuheliang	ZK-1352	4975 +/- 85	3771-3519
Niuheliang	ZK-1351	4970 +/- 80	3700-3521
Niuheliang	ZK-1354	4605 +/- 125	3360-2920
Dongshanzui	BK-82079	4895 +/- 70	3640-3382
Wudaowan	ZK-1180	4455 +/- 85	3039-2894

Table 3.2. Various periodizations of the Hongshan ceramic assemblages discussed (E= Early; M= Middle; L= Late).

Archaeological Site/Context	Zhang (1991) Phase	Yang (1989) Phase	Li (2003) Phase	HICARP Phase
Nantaizi	--	--	E	EI
Hongshanhou Areas A, B3-7, C, D, E, F, and G	E/M/L	M	--	EII
Zhizhushan, T1 Layer 3	E	--	M	EII
Nasitai, surface collection	E/M/L	M/L	M	MI
Erdaoliang, Layers 1, 2, and associated pits/houses	M	--	--	MI
Xishuiquan, Areas 1, 2, 3, Layers 1 and 2	E/M	M	M	MII
Niuheliang Locality 5, Lower Layer	--	--	--	MIII
Fushanzhuang, intensive surface collection	**--**	**--**	**--**	**MIII**
Dongshanzui, all contexts	L	L	L	L
Chengzishan, Layer 2 houses/graves/fill	M/L	L	L	L

Table 3.3. Mixed dataset for all 10 Hongshan period ceramic assemblages used to relatively date Fushanzhuang (99999= missing data; Pres.= presentation; TXQ= tongxingqi).

Hongshan Period Archaeological Site	**Total Dec.**	**% Total Decoration**										**% Coarse/Fine**			
		Undec.		**Hori. Z**		**Vert. Z**		**Other**		**Paint/Burr**		**Coarse**		**Fine**	
	n	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Nantaizi	23	9	39.1	1	4.3	5	21.7	4	17.4	4	17.4	13	72.2	5	27.8
Zhizhushan	10	0	0.0	2	20.0	1	10.0	3	30.0	4	40.0	3	33.3	6	66.7
Xishuiquan	98	17	17.3	20	20.4	5	5.1	27	27.6	29	29.6	35	39.3	54	60.7
Erdaoliang	65	12	18.5	11	16.9	11	16.9	14	21.5	17	26.2	26	50.0	26	50.0
Chengzishan	1082	305	28.2	3	0.3	20	1.8	232	21.4	522	48.2	31	2.9	1050	97.1
Dongshanzui	28	7	25.0	6	21.4	0	0.0	3	10.7	12	42.9	5	20.0	20	80.0
Niuheliang	18	4	22.2	1	5.6	1	5.6	4	22.2	8	44.4	5	31.3	11	68.8
Hongshanhou	1673	609	36.4	387	23.1	212	12.7	43	2.6	422	25.2	1251	76.7	397	24.4
Nasitai	85	12	14.1	13	15.3	17	20.0	26	30.6	17	20.0	16	39.0	25	61.0
Fushanzhuang	**483**	**99999**	**N/A**	**69**	**14.3**	**61**	**12.6**	**98**	**20.3**	**0**	**0.0**	**0**	**0.0**	**0**	**0.0**

Table 3.3 (continued).

Hongshan Period Archaeological Site	**Total Sherds/ Vessels**	**Slant Mouth (+/-)**	**Total ID'd Vessels**	**Guan**		**Bo**		**Hu**		**Weng**		**Pen**		**Pan**		**Other Pres. (+/-)**	**TXQ (+/-)**
				n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
Nantaizi	18	0	18	11	61.1	5	27.8	0	0.0	0	0.0	0	0.0	2	11.1	0	0
Zhizhushan	9	0	9	6	66.7	3	33.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0
Xishuiquan	89	1	81	38	46.9	14	17.3	5	6.2	4	4.9	19	23.5	1	1.2	1	0
Erdaoliang	52	1	46	21	45.7	12	26.1	8	17.4	2	4.3	3	6.5	0	0.0	1	0
Chengzishan	1081	0	108	33	30.6	6	5.6	14	13.0	23	21.3	28	25.9	4	3.7	1	1
Dongshanzui	25	0	22	4	18.2	4	18.2	1	4.5	2	9.1	8	36.4	0	0.0	1	1
Niuheliang	16	1	15	4	26.7	9	60.0	0	0.0	1	6.7	1	6.7	0	0.0	0	0
Hongshanhou	1630	0	1630	1255	77.0	292	17.9	15	0.9	3	0.2	65	4.0	0	0.0	0	0
Nasitai		1	41	18	43.9	8	19.5	6	14.6	1	2.4	3	7.3	0	0.0	1	0
Fushanzhuang	**0**	**1**	**269**	**166**	**61.7**	**73**	**27.1**	**0**	**0.0**	**13**	**4.8**	**10**	**3.7**	**0**	**0.0**	**0**	**1**

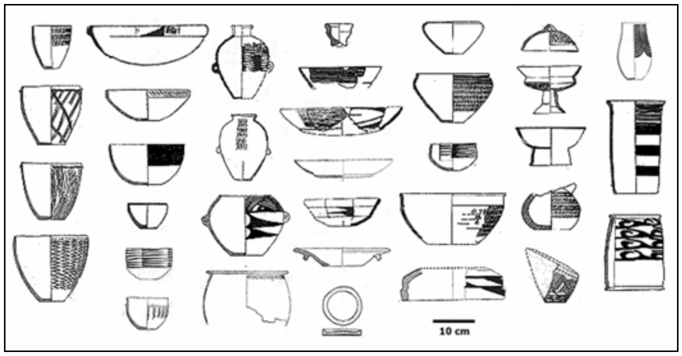


Figure 3.1. Hypothetical Hongshan period ceramic assemblage incorporating vessels drawn from all three phases (redrawn with modification from Yang 1989:218 and 220, figures 2 and 3; Zhang 1991:731, figure 6; Zhongguo 1982:192–194, figures 7, 8, and 9).

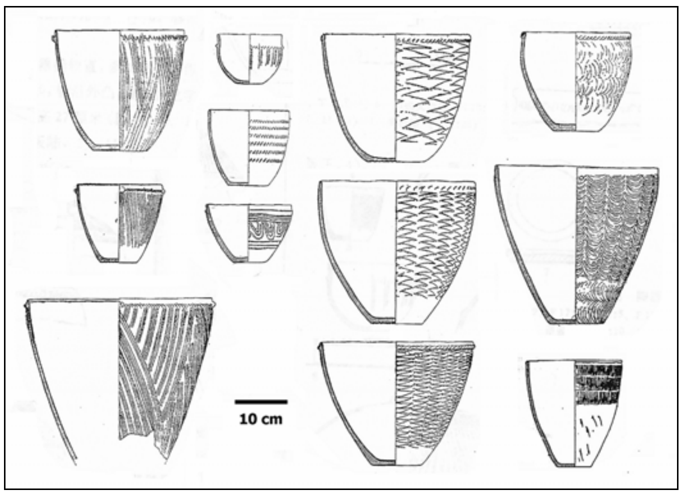


Figure 3.2. Examples of Hongshan period incised ceramic decoration (redrawn with modification from Liaoning 1986:15, figure 23; Zhongguo 1982:193–194, figures 8 and 9).

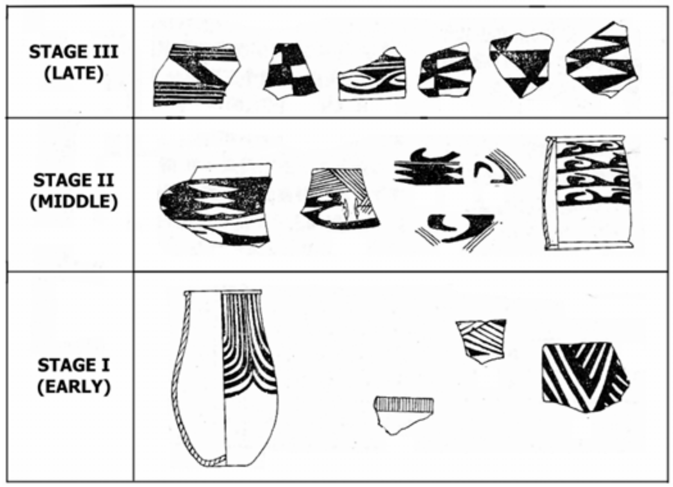


Figure 3.3. Temporal variability in Hongshan period painted pottery design (redrawn with modification from Zhang 1991, figure 7). (Not all designs drawn to the same scale.)

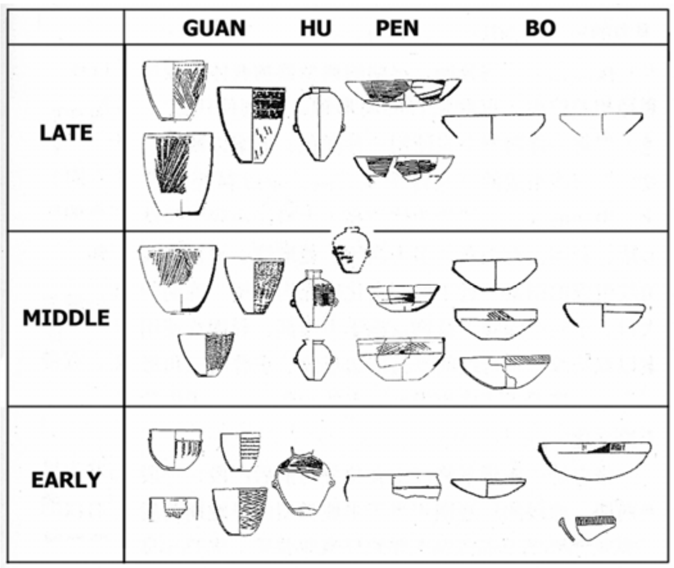


Figure 3.4. Zhang's (1991) Hongshan period vessel typology (redrawn with modification from Zhang 1991, figure 6).

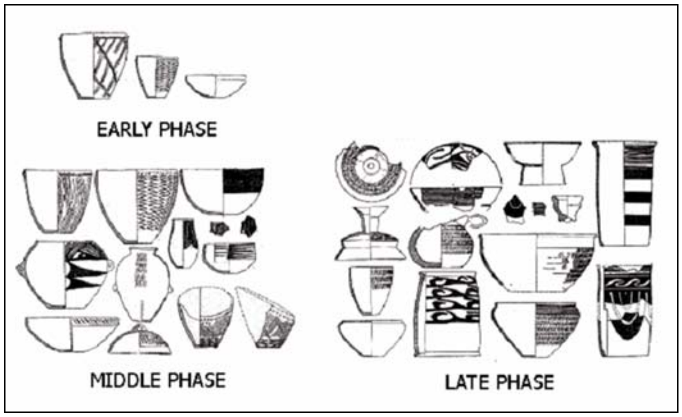


Figure 3.5. Yang's (1989) Hongshan period ceramic typology (Middle and Late Phases redrawn with modification from Yang 1989, figures 2 and 3 [Middle Phase modified to include xiekouqi pots, cf. Li 2003]; Early Phase redrawn with modification from Li 2003, figure 5.2).

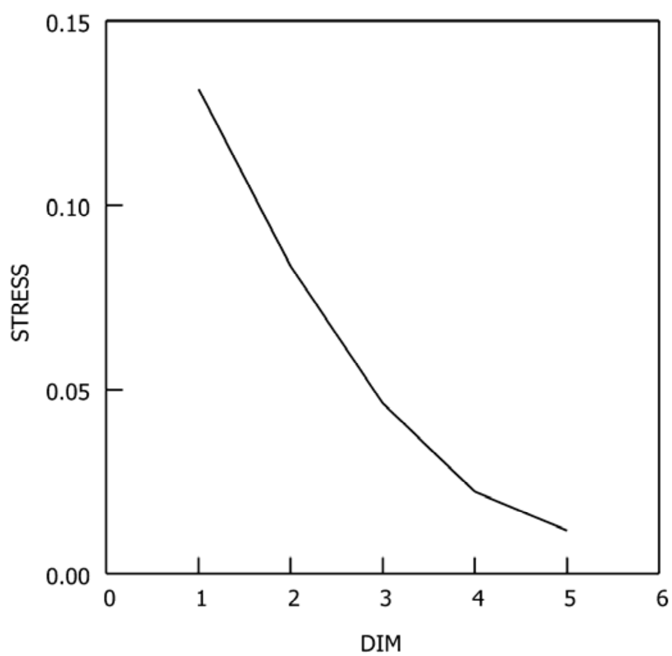


Figure 3.6. Graph of Kruskal stress values for each of five different MDS analyses using different numbers of dimensions.

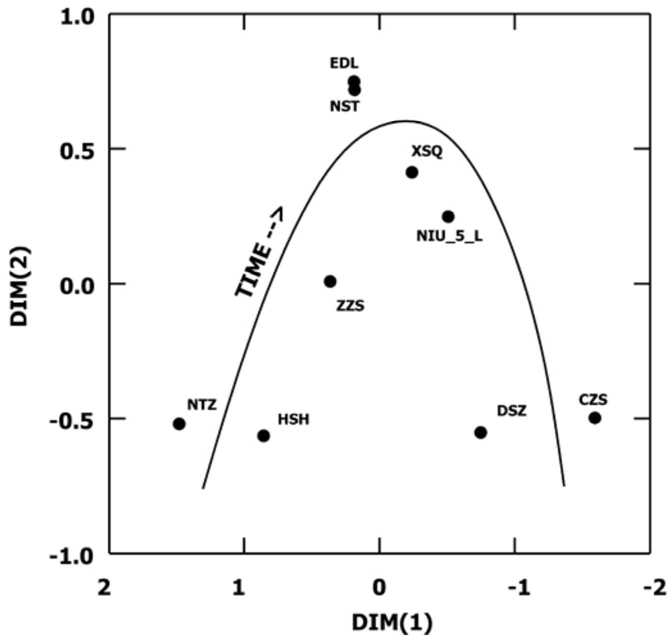


Figure 3.7. MDS plot of dimension 1 against dimension 2. (NTZ= Nantaizi; HSH= Hongshanhou; ZZS= Zhizhushan; NST= Nasitai; EDL= Erdaoliang; XSQ= Xishuiquan; NHL_5_L= Niuheliang Locality 5, Lower Layer; DSZ= Dongshanzui; CZS= Chengzishan [NHL Locality 16].)

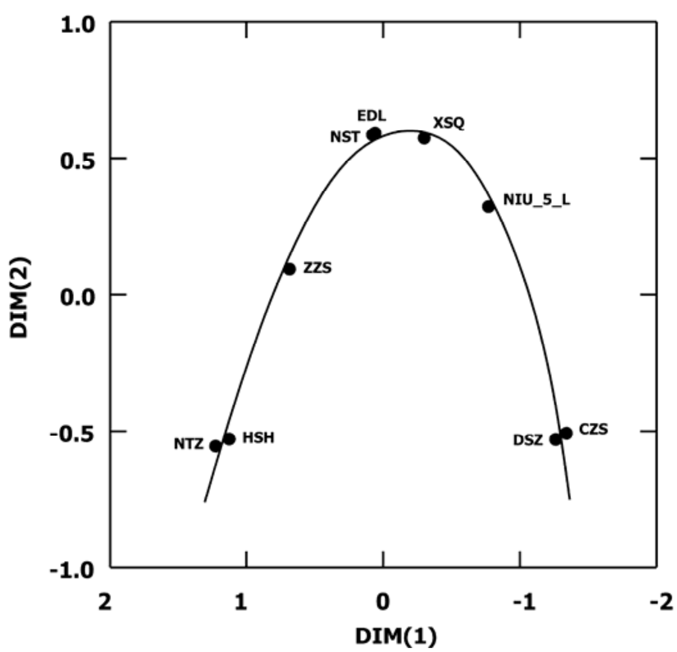


Figure 3.8. Time curve “fitted” to points in Figure 3.7.

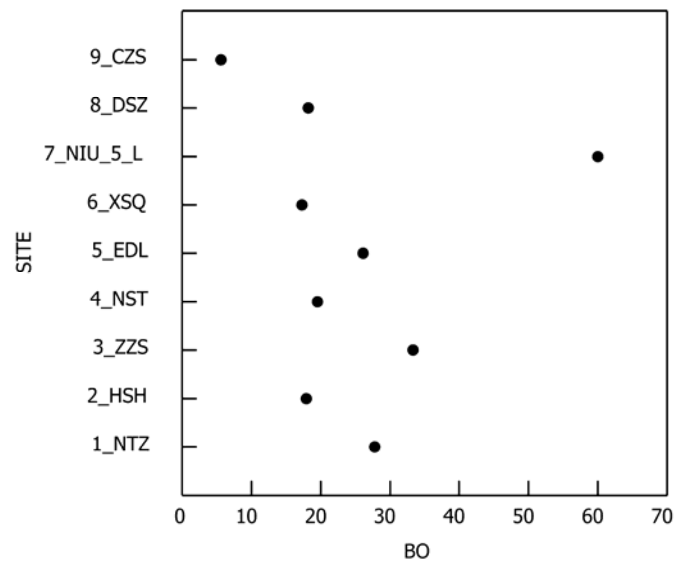


Figure 3.9. Plot of changes in proportion representation of bo bowls over time in our sample of Hongshan assemblages.

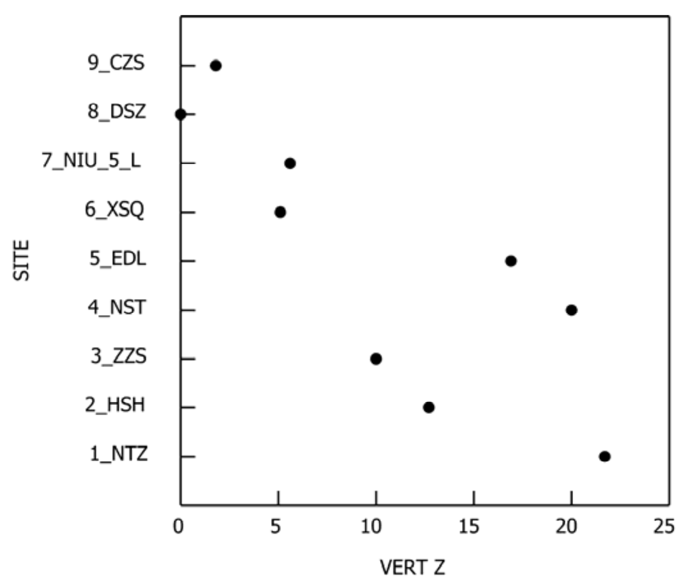


Figure 3.10. Plot of changes in proportion representation of vertical Z shuzhiziwen decoration over time in our sample of Hongshan assemblages.

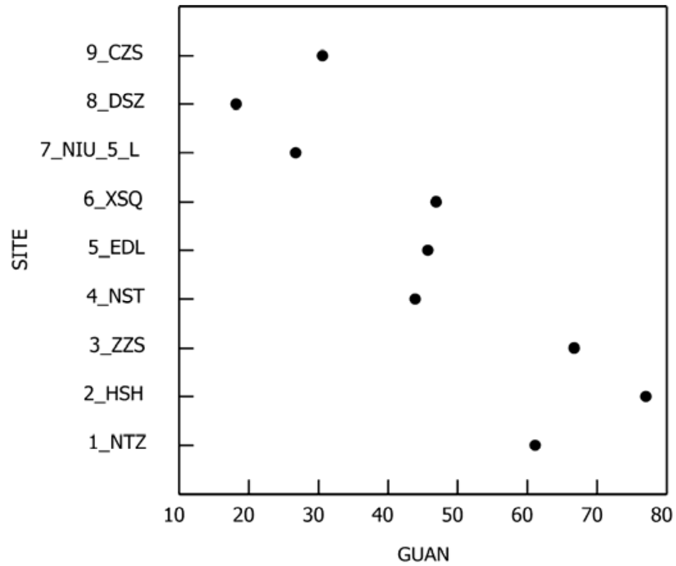


Figure 3.11. Plot of changes in proportion representation of guan pots/jars over time in our sample of Hongshan assemblages.

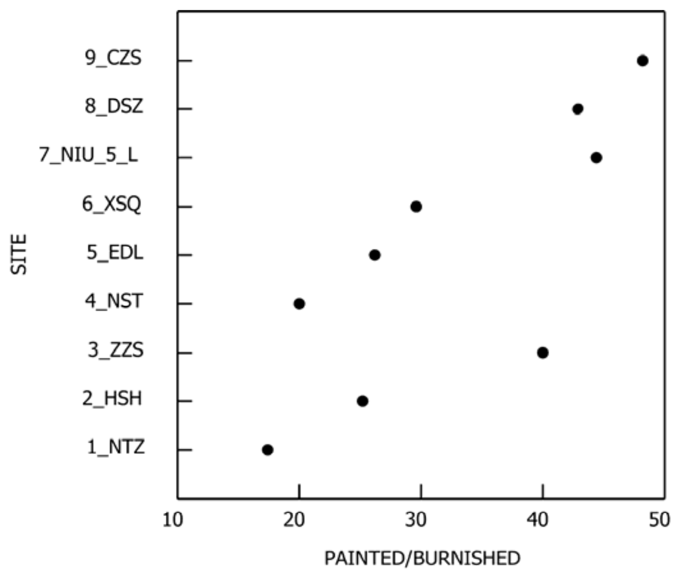


Figure 3.12. Plot of changes in proportion representation of caitao/cailiang painted/burnished pottery decoration over time in our sample of Hongshan assemblages.

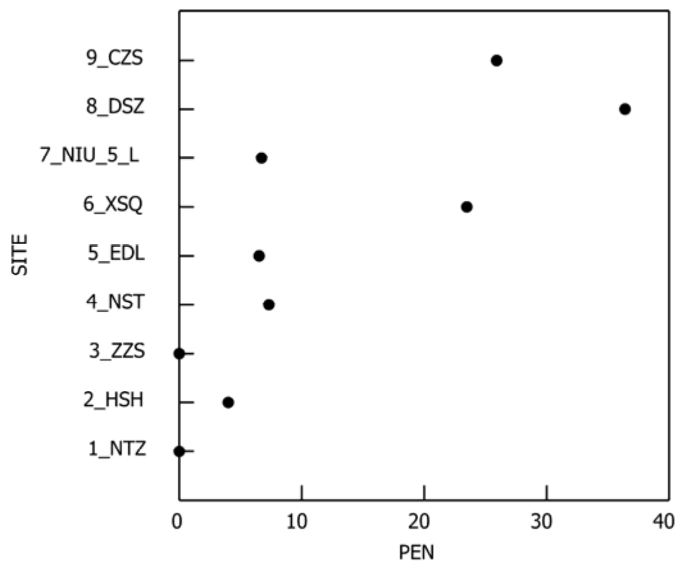


Figure 3.13. Plot of changes in proportion representation of pen basins over time in our sample of Hongshan assemblages.

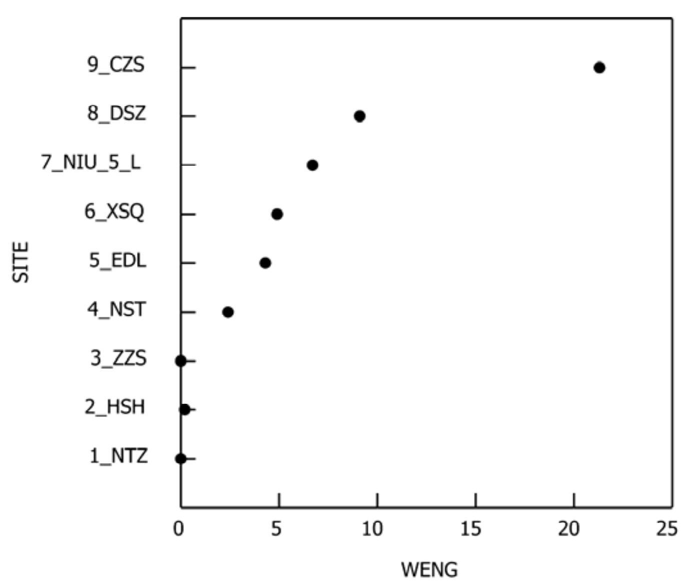


Figure 3.14. Plot of changes in proportion representation of weng urns over time in our sample of Hongshan assemblages.

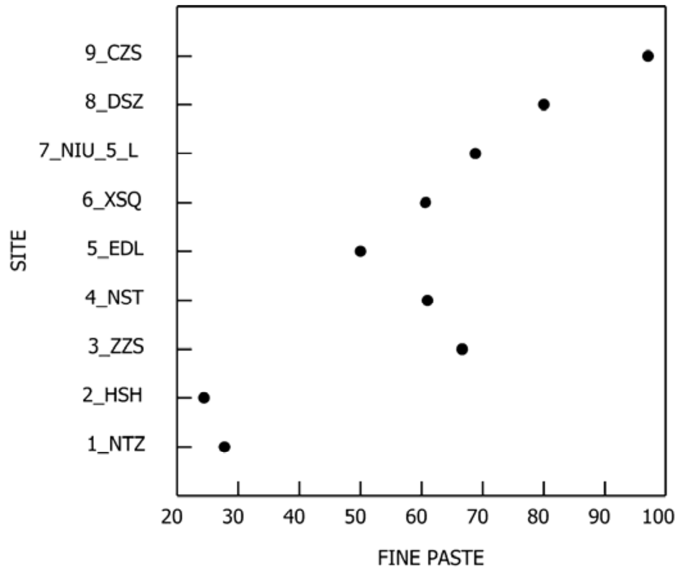


Figure 3.15. Plot of changes in proportion representation of vessels made of fine nizhi tao clay over time in our sample of Hongshan assemblages.

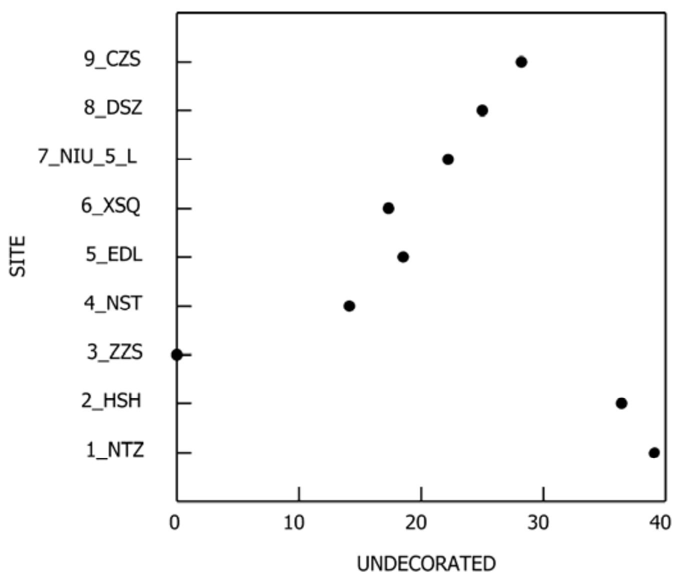


Figure 3.16. Plot of changes in proportion representation of undecorated sumian sherds over time in our sample of Hongshan assemblages.

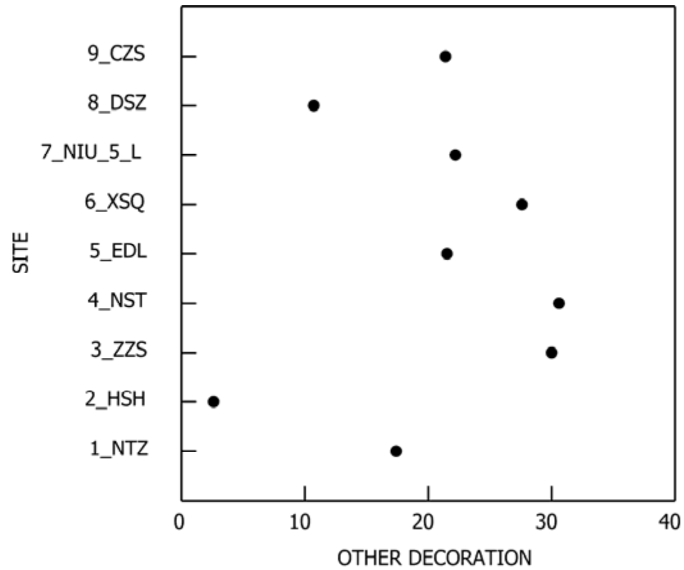


Figure 3.17. Plot of changes in proportion representation of other incised decoration over time in our sample of Hongshan assemblages.

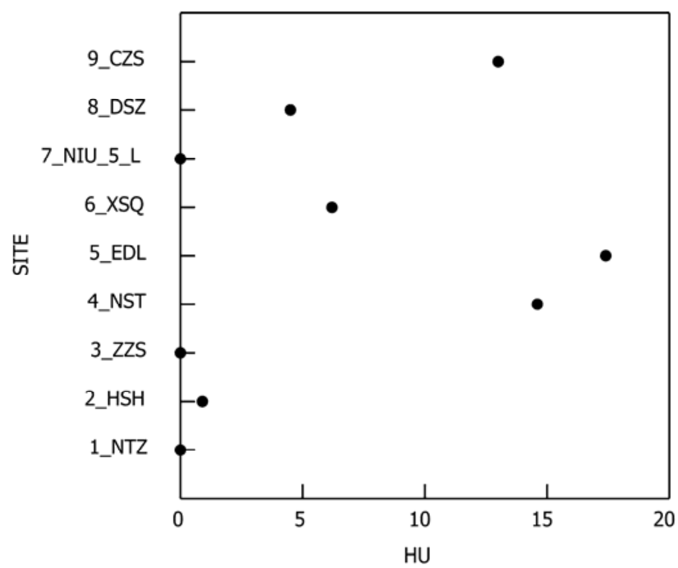


Figure 3.18. Plot of changes in proportion representation of hu jugs over time in our sample of Hongshan assemblages.

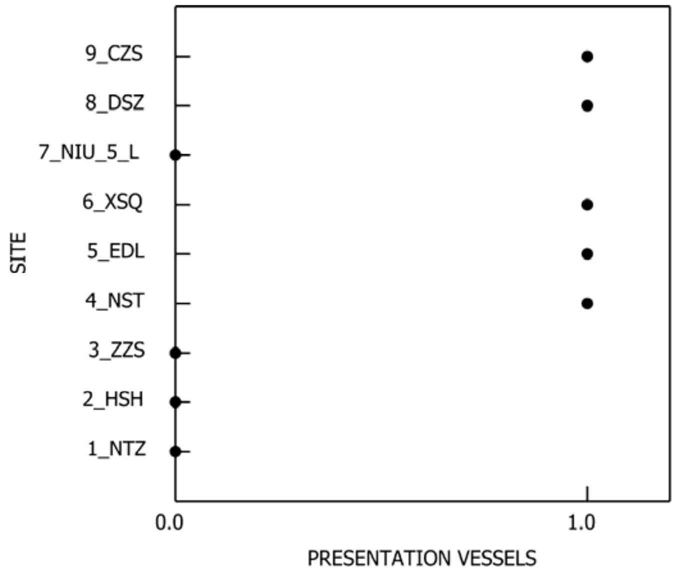


Figure 3.19. Plot of changes in proportion representation of other presentation vessels over time in our sample of Hongshan assemblages.

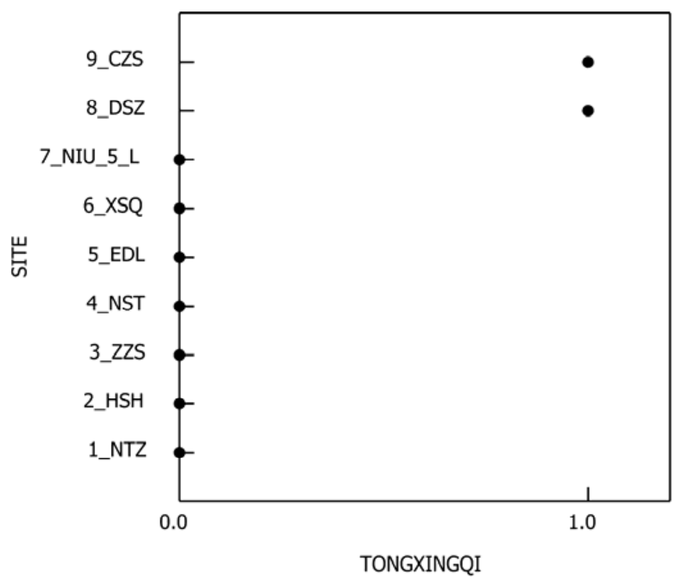


Figure 3.20. Plot of changes in proportion representation of tongxingqi funerary cylinders over time in our sample of Hongshan assemblages.

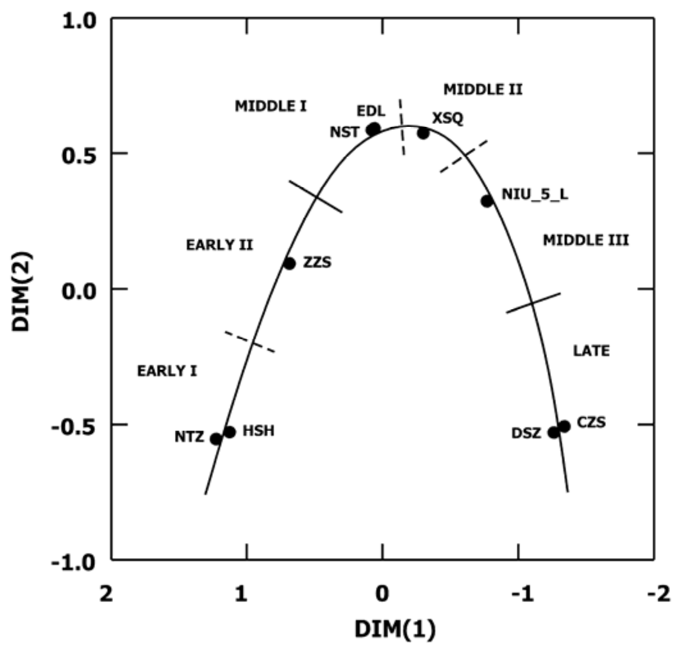


Figure 3.21. MDS plot with fitted time curve and phases based on attribute “breakpoints” marked.

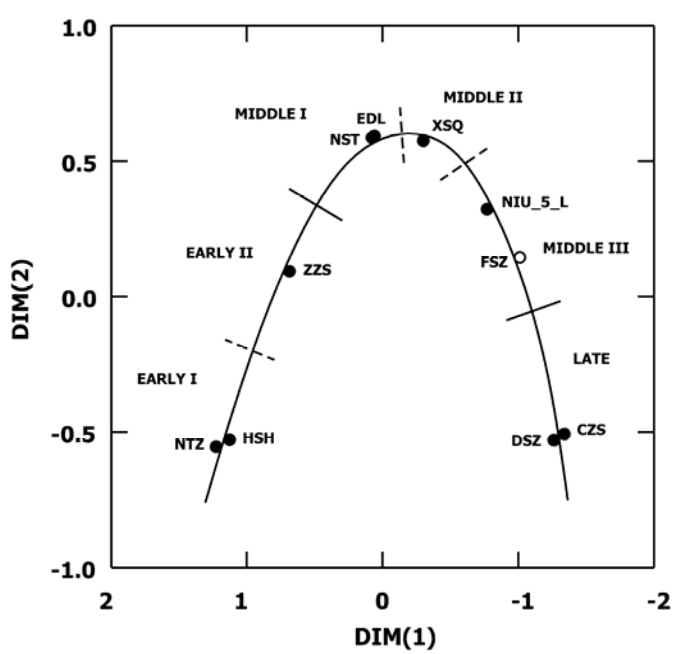


Figure 3.22. MDS plot presented as Figure 3.21 with Fushanzhuang (FSZ, unfilled) inserted at location prescribed by dissimilarity configuration coordinates of second analysis, then “fit” to the existing time curve.

4. AREAL AND DEMOGRAPHIC PARAMETERS OF THE FUSHANZHUANG COMMUNITY

If we assume a contemporaneous Hongshan occupation of the Fushanzhuang local community, then we can begin to calculate estimates of residential density to arrive at a plausible range of its number of inhabitants during the period. Since all 29 of our amalgamated collection grids, general collections, and special general collections contained substantial numbers of Hongshan period sherds, in both absolute and proportional terms (see Chapter 2, Table 2.1), we feel confident that the primary occupation represented by each overwhelmingly dates to the Hongshan period. While we cannot be certain on the basis of surficial evidence alone that some adjacent intensive collection units do not represent the archaeological remains of single household units (particularly F09A/F09B, F10A/F10B, and F13A/F13B, but possibly also F02 and F03, and F11 and F12), we have decided to treat each unit as an individual household for analytical purposes. The rationale for doing so is simple enough. If the artifactual assemblages of each turn out to be relatively similar in composition, and therefore in the activities represented, then the only harm done is to have split our already sizable samples of artifacts (for most units) into smaller sub-samples. If larger sample sizes are then desired to improve our statistical confidence in any comparisons drawn between households in terms of their activities, it is simple enough to combine similar nearby units. On the other hand, if substantial variability in artifact composition is observed, perhaps indicative of the differing activities of different households, then our ability to analyze them separately is preserved. Likewise, if we suspect that such variability is due not to different numbers of households present, but rather to differences in the spatial distribution of activities within households, then such patterns are easily analyzed separately by individual grid (GCs and SGCs cannot be investigated in this fashion because information on the relative location of artifacts collected vis à vis each other was not recorded) (see also Chapter 2). As it turns out, we never did divide nor further collapse collection units in the course of the analyses performed herein, although we might desire to do so at some later date.

4.1. ESTIMATES OF RESIDENTIAL DENSITY AND CENTRAL PLACE POPULATION

If we take our 29 collections (counting contiguous units only once) to represent 29 individual families, then we can estimate both the residential density and total population of the settlement. One of the most common means of such estimation is the application of a persons/m^2 of habitable area ratio to the excavated floor area for each structure, which yields a specific number of persons per structure depending on its size. These per household estimates are then easily summed to come up with a settlement-wide population estimate. Another common method is to multiply a fixed minimum and maximum number of inhabitants by the number of structures excavated. In neither case, however, have we excavated any structures, and although we could easily assign minimum and maximum values to each collection unit, what we should consider appropriate values is not readily apparent.

As mentioned in Chapter 1, those 23 Hongshan period residences that have been excavated vary in size (see Figure 1.5). A list of these 23 structures and their areas in square meters is provided in Table 4.1. The smallest of these structures is 6.8 m^2, the largest is 105.3 m^2, and the average size is 25.0 m^2. As can be seen in the box-and-dot plot in Figure 4.1, however, there are two outliers in this batch of excavated dwellings (F17 from Xishuiquan [105.3 m^2], and AF26 from Baiyinchanghan [52.5 m^2]). If we consequently disregard these two very large structures (which simply must be something other than "typical" family residences), and recalculate an average area from the remaining 21 excavated structures, we arrive at a figure of 19.8 m^2. Although this sample of structures is quite small, it nevertheless seems a good starting place for the estimation of population at Fushanzhuang. The area of most surface artifact scatters at Fushanzhuang, at around 400 m^2, is slightly more than 20 times that of our average excavated house floor area; this is probably not an unreasonable ratio once the nearby placement of storage and refuse pits, external activity areas, and midden deposits are factored in. In addition, some limited horizontal movement of artifacts has surely occurred over time due to plowing, erosion, etc. If we assume that this average figure of 19.8 m^2 is typical also of households at Fushanzhuang (except perhaps for F08A–D, which, based on the size of its surface scatter of artifacts, is potentially 2–4 times that of other households), then we can explore the application of ratios of persons/m^2 of excavated floor area.

4.1.1. Population Estimation From House Floor Area

Considerable attention has been paid in the ethnoarchaeological literature to methods of household population estimation based on house floor area (e.g., e.g. Naroll 1962; Cook and Heizer 1968; LeBlanc 1971; Casselberry 1974; Wiessner 1974; Yellen 1977; Read 1978; Watson 1978; Kramer 1979, 1980, 1982:116–126; Kolb 1985; Brown 1987). These studies all suggest a strong correlation between a dwelling's size and its number of inhabitants, although specific ratios vary cross-culturally. Naroll's (1962) cross–cultural summary estimate of 10 m^2 of roofed area per individual (for 18 different societies) remains widely cited. Kramer (1982:125, note 24) notes a similar mean residential density of one person per 10.3 m^2 at Shahabad (a.k.a. Aliabad) in western Iran (cf. 9–10 m^2 in Kramer 1979:155 and 1980:321), although Brown (1987:7) has observed this mean density drops to 5.5 m^2/person if wall thickness and young children are taken into account. LeBlanc (1971) presents unpublished data from Samoa, Iran (see also Watson 1978:137), and Peru that range from 7.3 m^2 to 11.0 m^2 of floor area per person. Wiessner (1974) and Yellen (1977) observed ratios ranging from 5.9 m^2 to 10.5 m^2 of campsite per person (depending on group size) for African hunter-gatherers. Kolb (1985:590) has observed a mean density of 6.1 m^2/person for contemporary Mesoamerican villages. Brown (1987), in a restudy of HRAF-collected residential density data for 38 societies (including hunter-gatherers, horticulturists, agriculturists, and pastoralists), observed this same mean of 6.1 m^2/person (sd=4.1 m^2, range=0.3–18.5 m^2). He also re-coded data for 11 of Naroll's (1962) 18 cases, corrections which decreased the mean dwelling floor area (for all 18 societies) from 10 m^2/person to 6 m^2/person (sd=5.6 m^2, range=0.8–22.5 m^2; Brown 1987:32 and 33, table 6). Casselberry (1974) similarly suggests a ratio of one person/6 m^2 based on an analysis of multifamily dwellings from eight New World societies; in actuality, the mean of his sample is 5.3 m^2/person (sd=1.5 m^2, range=2.9–7.1 m^2, see Brown 1987:33, table 6), but a test of the difference between this mean and the mean of Brown's (1987) 38-society sample (6.1 m^2/person) is statistically insignificant (p=0.41; cited in Brown 1987:41, note 21). It appears that 6 m^2/person represents a common cross-culturally observed measure of residential density.

Some researchers have suggested, however, that residential densities per structure in Neolithic villages may have been substantially higher than those cited above. Byrd (1999:82–85), for example, observed that dwellings of Natufian and early Neolithic communities in the Near East were much smaller than some of those studied by the above authors, but could not have sheltered fewer than three people (a nuclear family), an untenable hypothesis if ratios of 6–10 m^2/person were employed. Byrd (1999:83) therefore suggested that Neolithic residential densities may have been more akin to those of modern hunter-gatherer groups than ethnographically modern agricultural ones, and suggested the alternative usage of such densities for purposes of prehistoric estimation. Although some of the above authors studied more mobile populations, many hunter-gather residential densities are much higher than those cited above. For example, residential densities summarized by Hayden et al. (1996) for 20 hunting and gathering groups of the British Columbian Interior, Alaska, Labrador, and the Canadian Arctic range from 0.8 m^2 to 6.7 m^2, with a mean of 2.5 m^2/person (sd=1.5 m^2; Note 2.1), while data tabulated by Cook and Heizer (1968:90–91, table 2, column V) on mean floor space per person for 27 aboriginal Californian hunting and gathering groups range from 1.2 to 7.7 m^2, with a mean of 3 m^2/person (sd=1.9 m^2; Note 2.2). Coupland (1996:78) cites a slightly higher figure of 4 m^2 of floor space per person for largely sedentary complex hunter-gatherers on the northern Northwest Coast. According to Warrick (1996:14, table 2.1 caption), residential densities in Great Lakes Region of North America among pre-Iroquoian and early Iroquoian period horticulturists varied between 2.5 m^2 and 6.0 m^2, with about 4 m^2 being most typical. And even among Kolb's (1985:589) 11 Mesoamerican agricultural communities with monogamous nuclear families, four have a mean ratio of about 4 m^2/person.

4.1.2. Residential Density and Central Place Population

If we accordingly adopt ratios of 6 m^2 and 4 m^2/person, the most commonly cited figures at either end of the residential density scale based on above sources, the population of an average-sized Hongshan period house (19.8 m^2) would range between 3.3 (using the 6 m^2/person ratio) and 5.0 (using the 4 m^2/person ratio). Rounding up or down to the nearest whole person, then, a typical Hongshan dwelling at Fushanzhuang may have sheltered between 3–5 people—a nuclear to small extended family. We cannot know with any certainty how variable the size of Hongshan dwellings are from surface evidence alone at Fushanzhuang, however, and therefore which (if either) of these two ratios is more plausible. Nor can we take this variability into account when totaling up individual household populations across the site. Rather, we must use these two "typical" values as minimal and maximal estimates of household population (the second of our two estimation methods mentioned above), multiplying each by the total number of known (or estimated) structures at Fushanzhuang. Based on 29 "households" recovered, this calculation yields an estimated range of between 87 (=29 x 3) and 145 (=29 x 5) people within a 35 ha area, for a site-wide residential density of between 2.5 and 4.1 persons/ha.

These estimates assume complete recovery of all households at Fushanzhuang, however. In addition to the 29 households we collected, at least two other promising surface scatters of what appeared to be Hongshan ceramics and associated stone tools were encountered during our intensive survey of Fushanzhuang, but were ignored due to time constraints and a desire for the broadest spatial sample of households possible. Since some areas of Fushanzhuang were surveyed late in the field season (especially the lower terraces of the southern and southeastern portions of the site) when vegetation coverage was greater, it is likely that even a few more such scatters were overlooked. Thus, it would not be inappropriate to take these additional households into account and adjust our estimates of total population upward slightly. Consequently we should add 12 more people (=4 households x 3) to our lower site-wide estimate, and 20 (=4 x 5) to our upper estimate, for an adjusted population range of between 99 and 165. Thus far we have also treated F08A–D as any other household at Fushanzhuang, although we suspect that it was substantially larger than any of the others at the site, perhaps even as large as largest excavated Hongshan dwelling known at present (or more than 100 m^2). (Alternatively, more than one dwelling may be represented by this composite collection.) If we double the population of F08A–D, then our range increases again to between 102 and 175 people; this is a conservative estimate, and the number of residents may have been even higher. Averaging together these final two estimates gives us a ballpark population figure of about 140 inhabitants at Fushanzhuang, and an averaged site-wide residential density of about 4 persons/ha.

This remarkably low estimate is, of course, a product of the very dispersed pattern of residence observed (although still not as dispersed as we had initially anticipated; see Chapter 2). A brief comparison with a few other differing cases provides a useful point of reference. Peterson and Shelach (n.d.) estimated the population at the very compact (less than 2 ha) Early Yangshao period (5000–4000 BCE) agricultural village of Jiangzhai in northern China's Yellow River Valley. Peterson and Shelach estimated that the residential density of Jiangzhai village was about 285 persons/ha, one of the most densely occupied prehistoric villages of which we are aware. In the Chifeng region, Shelach (2000) estimated the residential density of the large 9 ha Zhaobaogou period (5250–4500 BCE) type site to have been between 39–64 persons/ha. Nevertheless, Zhaobaogou is considered by most archaeologists working in the region to have been relatively sparsely occupied. Fushanzhuang, with roughly 4 persons/ha, falls well below either of these two examples. One reason often cited for less compact distributions of households on the landscape is the labor demands of cultivation. Economic practicality dictates that agrarian households will situate their residences adjacent to the lands they farm, in order to minimize the distance traveled daily from homes to fields, if there are not other overriding reasons for greater nucleation (Chisholm 1970; Drennan 1988; Stone 1993). One example of such household dispersion is to be found during the Regional Classic period (AD 1–900) in the Alto Magdelana region of the northern Andes. There, the landscape was populated by a near continuous distribution of isolated farmsteads (representing single families), without any village-scale nucleation (Drennan and Peterson 2005, 2006; Peterson and Drennan 2005). Fushanzhuang is clearly not so dispersed—it does represent a bounded group of households offset from other such groups on the landscape. And yet, it is also not nearly so tightly nucleated Jiangzhai, or even Zhaobaogou. At Fushanzhuang the areas separating households are not large enough to have supported extensive millet cultivation, although the terraced topography they may well have been suitable for the planting and tending of household gardens. Compact settlements, or "villages", facilitate and foster greater among households, be these interactions economic (such as craft specialization and exchange, or the organization of agricultural production above the level of the household), ritualistic (such as participation in ceremonies), or purely social (like maintaining the bonds of kinship, finding mates, or exchanging information) (Peterson and Drennan 2005:7). Clearly, the loosely nucleated pattern of residence at Fushanzhuang is at the low end of the continuum of residential density represented by these four cases. This indicates (as discussed briefly in Chapter 5 with respect to economic specialization), that the interactions between households at Fushanzhuang were probably less intense that between households organized into more compact settlements elsewhere, and yet, these would have still been more intense within this central place than between households at Fushanzhuang and those of outlying settlements. If they were not, then we would expect the pattern of residence at Fushanzhuang to have been even more dispersed than it is.

4.2. OUTLYING OCCUPATION AND SUPRA-LOCAL COMMUNITY STRUCTURE

We can use proxy measures of occupational density on a regional scale to reconstruct the distribution of Hongshan period population drawn toward the activities of those living in the shadows of the Fushanzhuang mounds, and across the entire composite HICARP/CICARP survey area. Methods developed by Peterson and Drennan (2005), based on distance-interaction principles, that use successive mathematical smoothing of surfaces depicting occupational distributions, are employed to confirm the presence of local and higher-order community structures in the Yin River Valley similar to those identified elsewhere in the Chifeng region, and to delimit their areal and demographic boundaries.

The first step in this process is to render the more intensive survey conducted at the Fushanzhuang mound group comparable to the less intensive regional surveys conducted by ourselves and the CICARP. In short, we need some means by which to allocate the intensive surface collections made at Fushanzhuang to hypothetical regional-scale collection units—the collections that would have been made across Fushanzhuang had we begun with the micro-regional survey and finished with more intensive work, rather than the other way around. This is not nearly as difficult a procedure as it might appear at first glance. Based on our recollections of the distributions of archaeological materials across the site (including their relative densities), field notes, and an appreciation of the topographic context, we can easily and confidently draw 1-ha-or-less-sized collection units around intensive collections (or multiples thereof). The extents and boundaries of both contiguous and non-contiguous units shown in Figure 4.2 were drawn based on a combination of our field observations of thresholds in artifact densities of all periods—the points at which densities would have been too low for teams of five surveyors walking 50 m apart to have encountered three or more sherds (of any mix of periods) within any 100 m tract—and the contours of terraces, gullies, etc. Regional-scale collections would not likely have been made at M1, Z2, Z6, or Z7 because of the very few sherds visible in proximity to these monuments and the lack of any associated residential occupation. The Z8 mound was adjacent to a preexisting regional collection labeled 04P058, and likewise did not receive a new number, although we have associated it with this collection in our records. These 20 additional and hypothetical collection units were assigned the next set of unused collection numbers in the series employed during the CICARP's regional survey: 04P148–04P167. The specific intensive survey collection units that correspond to each regional counterpart are presented, with their CICARP designations, in Figure 4.2 (monuments are not considered parts of collections).

Including our mock collection units at Fushanzhuang, the HICARP's micro-regional survey revealed a total of 17 Hongshan period "sites" comprised of one or more of the 36 Hongshan sherd-yielding collection units recorded (Figure 4.3). The dummy units of the Fushanzhuang mound group account for five of these 17 sites, including two of the three largest sites. The total Hongshan period occupation recorded within our 18 km^2 survey area is some 16.9 ha (treating Fushanzhuang as a conglomeration of regional scale collection units, rather than as a 35 ha survey block). Combined with the adjacent CICARP survey area, 282 collection units, in 177 sites, representing 285.9 ha of Hongshan occupation have been identified in the Chifeng region. Figure 4.5 shows the complete composite 783 km^2 regional distribution of Hongshan period collection units for the Yin River Valley and larger Chifeng area recorded by ourselves in 2004 and by the CICARP from 1998 through 2001.

4.2.1. Application of the Density-Area Index (DAI)

The second step in delineating Hongshan period community structures in the region, and specifically around Fushanzhuang, is to assign values to each of the areas of Hongshan occupation identified on survey representing relative differences in the populations that inhabited these locations. This is achieved by means of a density-area index (DAI) developed by Drennan et al. (2003b) for the CICARP survey area. Quite simply, the DAI makes use of two separate sets of information. The first is the area of individual collection units drawn in the field, and later digitized into electronic format. The second is the surface density of ceramic sherds collected for each of these units. Recall that two different kinds of micro-regional surface collections were made on an either/or basis: general and systematic. Systematic collections were made only when sherd densities were perceived to be at least $0.5/m^2$. Because systematic collections were obtained from small, regularly-sized areas every time (a circle 3 m in diameter, or 7.065 m^2), surface sherd densities can be calculated easily and with confidence. To do so, the total number of identifiable sherds collected for any unit (modern sherds, or sherds not datable to archaeological period, are omitted from this total) is divided by the product of 7.065 times the number of systematic collection circles made for that unit. Although the specific location(s) of systematic collections within any high sherd density collection unit were selected at random, the specific values subsequently calculated are taken to reflect an average density for the entire collection unit. Systematic collections were made much more infrequently than general collections, reflecting a tendency for the surface densities of sherds encountered during survey in the Chifeng region to be relatively low. In fact, of the 145 "real" (non-dummy) collection units recorded for the HICARP survey area, only three (or 2.1%) were systematic collections. In the adjacent CICARP survey region, the percentage of systematic collections made between 1998–2001 is substantially higher, but still low (about 11%) (Drennan et al. 2003a:138–139).

Much more frequently, opportunistic general collections were made of the first artifacts encountered until at least 20 sherds/ha were collected, or until all visible sherds were collected if this total was less than the target sample of 20 (see above, and Drennan et al. 2003a:138 for a brief discussion of the procedures employed to minimize bias when making general collections). Since the areas of general collections from which sherds were obtained could vary widely depending on the specifics of their distribution as first encountered (from a few tens of square meters upwards of an entire hectare), and could not be accurately measured without considerable increase in the time spent making collections, surface sherd densities cannot be calculated for these individual units. However, it has been previous CICARP practice to arbitrarily assign general collections sherd density values of 0.25/m^2, reflecting the midpoint between areas of the landscape devoid of sherds, and surface densities high enough (greater than or equal to 0.5 sherds/m^2) that systematic collections, rather than general ones, would have been made in the field (Drennan et al. 2003b:157). We have followed this same practice here.

To calculate the DAI from these data, the percentage of sherds of a particular period (in this case the Hongshan period) is determined for each collection unit (by dividing by the total number of identified sherds collected in that unit), and then multiplied by the generic surface sherd density for that unit, discussed above, to arrive at a surface sherd density value particular to the archaeological period of interest. Finally, this value is multiplied by the total area recorded for that collection unit, completing the DAI calculation. In the case of the 20 ad hoc collection units at Fushanzhuang, arbitrary generic density values of 0.25 sherds/m^2 were used, as we believe no systematic collections would have been made there had the area been more extensively surveyed. An impression of even lower surface sherd densities than 0.25 sherds/m^2 formed during our brief walkover of Fushanzhuang in 2002 was not substantiated two years later. Although densities can still be said to have been low in 2004, the late season growth of vegetation during our earlier visit substantially hampered sherd visibility, and so we believe that the use of 0.25 sherds/m^2 for each of these collections is appropriate. The numbers of sherds recovered from most of our intensive collections, however—those contributing to the sherd totals of each mock regional unit—are tens if not hundreds of times greater that those collected during regional survey. Nonetheless, we believe that roughly similar proportions of sherds of different periods would have been collected by regional survey techniques as were collected by our more intensive methods employed. Therefore we have also used these proportions when calculating the DAI for these 20 units. The areas used in our calculations were obtained from measurements of individual collection units drawn on our maps and then digitized into electronic form. A DAI value was computed for each of the 36 Hongshan sherd-yielding regional collection units in the HICARP survey area. (Only 163 collection units of the total 167 could have possibly contained Hongshan sherds, as four mark the locations of graves, and would therefore not factor into the DAI for any archaeological period.)

Comparable DAI data has also been produced for each of the 246 Hongshan period collection units in the adjacent CICARP survey area. These values have been used previously by Drennan et al. (2003b) in the initial presentation of the DAI, and by Peterson and Drennan (2005) in the construction of artificial surfaces graphing the interaction “pull” of discrete Hongshan period populations on their neighbors within this larger region, but these raw data have not yet been formally published. We have not, therefore, presented that data here. Eleven DAI values in the CICARP dataset were adjusted downwards by Peterson and Drennan to correct for isolated field collection errors. The size of six CICARP collection units were drawn unreasonably large in the field, and were therefore reduced to 2 ha each in size to correct for their artificial inflation of the demographic index; likewise, the surface sherd density values for another four units were all arbitrarily reduced to 0.85 sherds/m^2 (the next highest non-problematic Hongshan value in this survey area) to correct for the obvious placement of systematic collection circles in surface artifact “hot spots.” Corrections of this sort were also made in calculating the HICARP Hongshan period demographic index.

4.2.2. Using Occupation Surfaces to Delineate Community Structure

Final DAI values were then permanently associated with each digitized collection unit in Figure 4.4, as an independent property of its elevation. Following the methodology proposed by Peterson and Drennan (2005:9–10, figure 5), these collection units and their associated elevation data were then rasterized into a grid of z-values at 100-m intervals (or, at a resolution of 1 ha). In so doing, more than one collection unit may have fallen within each 100 m interval. The z-value, then, for each square 100-m cell in this grid is the sum of the different surface sherd densities present by collection unit multiplied by the corresponding fractional areas of the collection units present. Areas of the map without any Hongshan period occupation received z-values of 0.0. The values in this grid of surface sherd densities for the combined HICARP/CICARP survey area were then mathematically transformed by assigning a new value to each cell in the grid that corresponds to the weighted average of all the z-values in the grid, where the weights are equal to one over the distance between z-values raised to some power (1/[$\text{distance}^{\text{nth power}}$]). Cells that are closer to the cell for which a new z-value is being interpolated will be given more weight in the calculation than those located farther from that cell. That is, the weight is inversely proportional to some power of distance. The effect of this transformation is to “smooth” our regional distribution of surface sherd densities, so that the interaction “pull” of z-values (our proxy indicators of local population densities) on their neighbors is strongest at short distances, and weakest at long distances. The strength of this pull, and hence the radius of effect, is controlled by the mathematical power the distance that values separated from one another are raised. The greater the power, the lesser the effect of distant values. Powers greater than four represent almost no smoothing. Conversely, the lower the power, the greater the interpolation of values will be, even at long distance. As this power approaches zero, the values of each cell become increasingly similar, until, at zero, they are uniformly the same. The power of zero therefore represents the complete mathematical smoothing of any dataset.

Following the lead of Peterson and Drennan (2005), our composite surface sherd density data was transformed multiple times substituting different powers into the equation, and each time starting with the original unaltered grid of z-values. The powers used were 8, 1, 0.5, 0.25, and 0.001. These five differently smoothed datasets were then graphed as three-dimensional topographic surfaces of z-values, or "occupation" surfaces. Drennan and Peterson (2005, 2006; Peterson and Drennan 2005), have taken these surfaces to represent patterns of interaction between local populations within a region at different scales of resolution. Exploratory analysis of these five surfaces permitted us identify those which best illustrate the interaction structure of Hongshan period occupation in the greater Chifeng region. Two of these surfaces, the power 8 and power 1 surfaces—those same ones found to be most useful by Peterson and Drennan (2005) in an earlier treatment of interaction structure, one based on a less complete dataset than now available—are discussed in detail below.

4.2.3. Local Community Structure and Population

The power 8 surface shown in Figure 4.5 displays a series of sharp, isolated occupational peaks rising up from a flat unoccupied plane representing the combined HICARP/CICARP survey area. The higher the peak, the greater the population. Representing this surface as a two-dimensional contour map provides "a basis for systematically clustering collection units into meaningful groupings" (Peterson and Drennan 2005:10), or "small local communities." The occupational peaks shown in the power 8 surface are sometimes composed of only single collection units, other times of contiguous collection units, and yet others of clusters of separate and/or contiguous units. If an appropriately low contour is selected as a cutoff, then the bases of these peaks and their constituent collection units are delineated by a single contour that can be used as the basis of grouping collection units together into small local communities—the sociospatial building blocks of the Chifeng region during the Hongshan period (Drennan and Peterson 2004, 2005, 2006; Peterson and Drennan 2005). The cutoff we have chosen is depicted in Figure 4.6. Although this is an arbitrary selection, it does satisfyingly group together collection units separated by only trivial distances that would be no impediment to daily face-to-face interaction. It is also not so low as to group together much more widely dispersed occupation to form sprawling units of occupation that would be very difficult to interpret as small local communities.

Our analysis groups the 282 collection units in our composite 783 km^2 survey area into 133 small local communities, eight more than the number identified by Peterson and Drennan (2005) in a slightly smaller (765 km^2) area. As noted previously by Peterson and Drennan (2005), these small local comminutes range in size from less than 100 m long (a single collection unit) to about 800 m long (with as many as a dozen or more collection units). A distance of one linear kilometer (1000 m) seems near the upper threshold in which daily face-to-face interaction can take place. Fushanzhuang appears as one of the more extensive of these small local communities, covering an area 600 m wide by 800 m long, and containing 28 collection units. Our analysis has confirmed, then, what we assumed at the outset of our fieldwork at Fushanzhuang: that the mound group was the focal point of a large, moderately dispersed (or loosely aggregated, if one prefers) Hongshan period community similar to those identified elsewhere in northeastern China through surface survey (e.g., Li 2003) (cf. Peterson and Drennan 2005).

The population of the Fushanzhuang local community (not just the core area around the mound group), and that of each of the other 132 local communities we identified, can be estimated by summing up the DAI values for all collection units comprising each Hongshan local community, dividing these sums by the DAI total for all Hongshan communities, and then multiplying the result by an estimate of total regional population during the period. Drennan et al. (2003b) have previously estimated the Hongshan period population of the CICARP survey area as between 4000–8000. The use of a range recognizes the varied sources of potential error that may be incorporated into the making of such estimates. To simplify the method, Drennan et al.'s (2003b) range was obtained by summing the DAI values for all Hongshan collection units recorded on survey in the CICARP survey area, dividing this sum by the number of centuries represented in the period (in this case 15), and then multiplying this product by minimum and maximum estimates of the number of people required to produce a fixed surface sherd density over an area of 1 ha during a single century (see the original publication for a more detailed discussion). If we take this estimate of 4000–8000 people as equally applicable when Hongshan occupation in the CICARP survey area is combined with that from our adjacent survey area, it becomes a relatively simple matter to calculate the populations of all small local communities revealed through mathematical smoothing of our occupation surfaces. The summed DAI values for all collections grouped together into small local communities are first divided by the sum of the Hongshan DAI valves for the entire region, and then multiplied by the midpoint of the regional population range (or in this case 6000). Use of the midpoint allows us to expedite calculations and avoid speaking continually in terms of ranges, even though in many respects this would be the more appropriate approach.

The populations of the 133 small local communities in the CICARP/HICARP survey area range from single families upwards of 500 people, with only 15 having more than 100 inhabitants. The Fushanzhuang local community is estimated to have been inhabited by 191 individuals, seventh largest among local community populations in the composite survey area. This estimate based on regional DAI values agrees well with our earlier estimate of population at Fushanzhuang based on minimal and maximal household occupancy. This latter estimate, which ranged between 87–175 people, and averaged about 140 people, is for the mound group and associated occupation only within our 35 ha intensive survey zone (04P148–04P167)—it does not include households occupying the additional eight 1 ha or less collection units with Hongshan sherds (04P001–04P006, 04P057, and 04P058) that further comprise the small local community delineated above and clustered around these mounds. If each one of these other eight collection units was the location of only a single Hongshan household (and some, especially 04P001–04P005, may have contained more than one household based on the number of large ashy circles visible on the surface of these units during survey), then these additional 24–40 people increase the range of population to between 111 and 215, or about 100–200 people. This upper end of this range is very similar to the population estimated from information collected during regional surface survey, indicating that Drennan et al.'s (2003b) adjusted density-area index tracks very well against other kinds of demographic evidence, at least for the Hongshan period. Even if we expect that more than eight additional households would be recovered were all areas of Hongshan occupation within the local community examined with the same intensity as those closest to the Fushanzhuang mounds, these small differences in population estimates are hardly worrisome, reflecting only small sources of error inherent in such kinds of estimation.

4.2.4. Higher-Order Community Structure and Population

Higher-order Hongshan period community structure is also evident in occupation surfaces "smoothed" using progressively lower inverse powers. The pattern of this structure is most clear in the power 1 surface (Figure 4.7). Unlike the peaks in the power 8 surface, the basal flanges of those in the power 1 surface broaden considerably to "capture" much more extensive clusters of occupation than before. The use of a contour map of this surface and the selection of a contour cutoff once again provides a convenient, systematic means of grouping small local communities into higher-order structures, although the pattern is more complicated that in the previous surface (Figure 4.9). The contour cutoff selected paints a similar picture to that presented by Peterson and Drennan (2005) in their analysis of the Hongshan power 1 surface of the CICARP survey area.

This contour satisfyingly groups together small local communities in the northwestern and central portions of the composite survey area, but in the southeast it demarcates an very extensive area of occupation—some 150 km^2. A closer examination of the power 1 surface suggests that such a characterization does not accurately reflect the underlying structures of interaction that produced the multitude of separate occupational peaks in this southeastern area. These closely packed peaks appear quite similar to those more isolated examples in the northwestern and central portions of the survey area. Based on the shape and spacing of contours within this extensive area, however, we can divide the areas surrounding peaks into territorial entities according to the topographic "valleys" separating them, and group these orphaned communities with other occupation (Figure 4.10). These "districts," as Peterson and Drennan (2005) have labeled them, are similar to those higher-order communities identified for the rest of the combined survey area, but with a more clearly defined territorial dimension.

The higher-order Hongshan community situated in the center of the HICARP survey area is centered on the Fushanzhuang local community, but incorporates additional outlying small local communities as well. Applying the same DAI approach discussed in the previous section ([the sum of community DAI/the sum regional DAI]*6000), the Fushanzhuang higher-order community, or chiefdom, is estimated to have incorporated a total of 226 people. This represents the addition of less than a dozen other households living outside the boundaries of the small local community. Shelach (1996, appendix 3, 1999) identified evidence for Hongshan occupation at nine additional locations within the western portion of his survey area that was not reexamined by the HICARP (Figure 4.10). Substantial remains of residences (ashy circles, foundation rubble) were detected at two of these sites, and two others had Hongshan period stone pile graves very similar to those identified at Fushanzhuang. This combined evidence suggests that, were additional area to the west of Fushanzhuang surveyed systematically with an intensity comparable to that of the HICARP or CICARP, substantially more Hongshan occupation would be recovered. Especially intriguing is the possibility that a Hongshan local community of similar size, had formed up around site 99 on the southern side of the Yin River opposite Fushanzhuang. This occupation, if substantial, might even combine with Fushanzhuang into a yet larger and more populous higher-order community.

Of the 49 higher-order communities defined on the basis of our contour map in Figure 4.9, 34 have populations of less than 100, and correspond closely to those small local communities identified in the contour map of the power 8 surface, although a very few with small populations represent pairs of local communities. These 34 communities, however, account for less than one-fifth of the total estimated midpoint regional population of 6000 during the Hongshan period. Rather, the majority of Hongshan population is organized into the 15 largest higher-order communities identified in the power 1 occupation surface. It is these 15 higher-order communities and districts, combining as many as a dozen small local communities in the role of building blocks (although some are large single settlements), and with estimated populations of between 100 and more than 600, that constitute the maximal meaningful human community in Hongshan society—the “chiefdom.” These clusters of occupations, some as much as 3 km across, represent regional-scale structures of interaction of less intensity than those occurring on a daily basis in small local communities. They also indicate that the strength of interactions between the local communities of each higher-order community, or district, was substantially greater than the those between the local communities of differing districts.

Both our estimates of Fushanzhuang’s central place population (the local community), and total societal population of which it is a part (the higher-order community), are within the range of ethnographically known chiefdoms (e.g., Feinman and Neitzel 1984; see also Drennan 1987; cf. Earle 1987). Productive specialization, and its corollary economic interdependence, could very well have been responsible (in whole, or in part) for the pattern of inwardly-focused interaction inferred for Hongshan communities in the Chifeng region—especially if such specialization were associated with elite activities. It might also, however, have resulted from participation in supra-household ceremonial activities for which the “monumental” architecture at Hongshan central places such as Fushanzhuang were presumably built. Both activities would almost certainly have been under the direction of ritual specialists.

Table 4.1. Areas of excavated Hongshan period house floors.

Archaeological Site	House Feature	House Shape	Dimensions (m)	Area (m2)	Reference(s)
Baiyinchanghan	AF26	Sq.	7.5 X 7.0	52.5	Neimenggu 2004:10, 379-380, figures 294; vol. 2, table 12
Baiyinchanghan	AF29	Sq.	5.0 X 4.5	22.5	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	AF45	Sq.	4.3 x 4.2	18.1	Neimenggu 2004:10, 379-380, figures 294 and 295; vol. 2, table 12
Baiyinchanghan	AF80	Rect.	5.0 X 3.0	15.0	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	AF81	Sq.	5.8 x 5.4	31.3	Neimenggu 2004:10, 379-380, figures 294 and 297; vol. 2, table 12
Baiyinchanghan	AF84	Sq.	4.6 x 4.9	22.5	Neimenggu 2004:10, 379-380, figures 294 and 296; vol. 2, table 12
Baiyinchanghan	AF85	Sq.	5.9 x 5.8	34.2	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	BF1	Rect.	5.5 x 3.6	19.8	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	BF7	Sq.	5.0 X 4.8	24.0	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	BF33	Sq.	3.5 X 3.4	11.9	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	BF46	Sq.	4.0 x 3.2	12.8	Neimenggu 2004:10, 379-380, figures 294 and 302; vol. 2, table 12
Baiyinchanghan	BF49	Sq.	4.9 X 4.2	20.6	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Baiyinchanghan	BF54	Sq.	4.5 x 4.0	18.0	Neimenggu 2004:10, 379-380, figures 294 and 300; vol. 2, table 12
Baiyinchanghan	BF57	Sq.	4.9 X 4.1	21.1	Neimenggu 2004:10, 379-380, figures 294 and 301; vol. 2, table 12
Baiyinchanghan	BF58	Sq.	4.2 X 4.0	16.8	Neimenggu 2004:10, 379-380, figures 294 and 299; vol. 2, table 12
Baiyinchanghan	BF67	Sq.	5.1 X 5.2	26.5	Neimenggu 2004:10, 379-380, figures 294 and 298; vol. 2, table 12
Baiyinchanghan	BF86	Sq.	3.2 x 3.9	12.5	Neimenggu 2004:10, 379-380, figure 294; vol. 2, table 12
Chengzishan	F01	Sq.	2.7 x 2.5	6.8	Li 1986:498, figure 3
Erdaoliang	F05	Rect.	2.9 x 3.1	9.0	Neimenggu 1994:96-97, figure 3
Erdaoliang	F15	Rect.	8.4 x 4.2	35.3	Neimenggu 1994:97-98
Nantaizi	F26	Sq.	4.9 x 4.5	22.1	Neimenggu 1994:91-92, 1997:57, table 1, 71, figure 19
Xishuiquan	F13	Sq.	4.0 x 3.9	15.6	Zhongguo 1982:184-185
Xishuiquan	F17	Rect.	9.0 x 11.7	105.3	Zhongguo 1982:184-185, figure 2

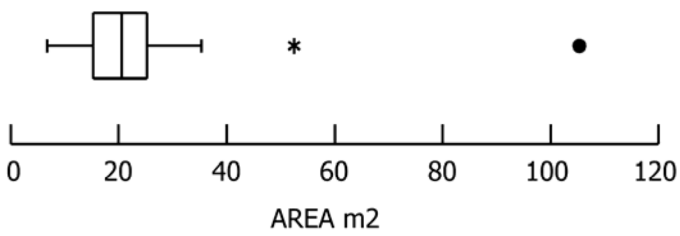
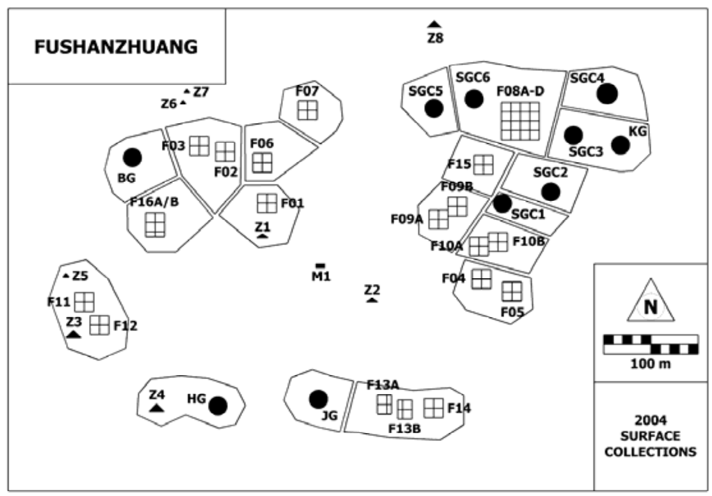


Figure 4.1. Box-and-dot plot of excavated Hongshan house floor areas (n=23). Data from Table 4.1.



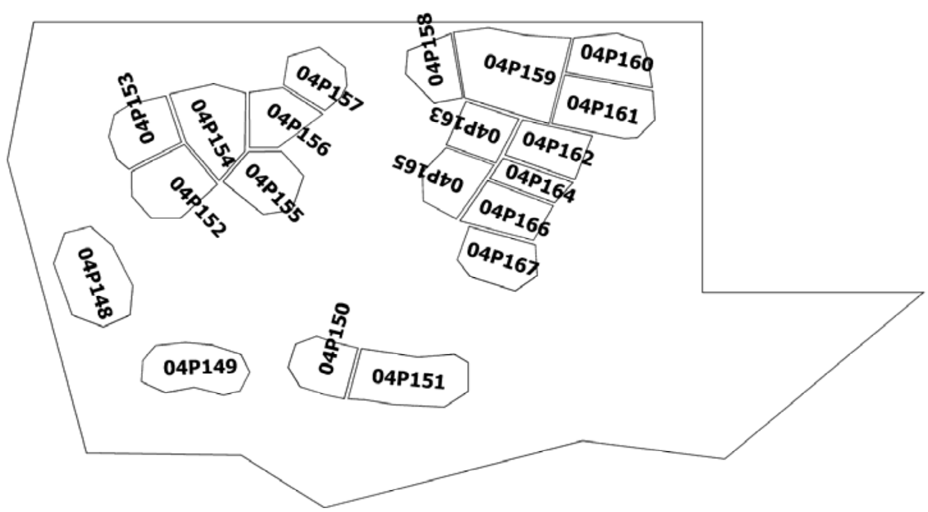


Figure 4.2. Correspondence between intensive collection units and other features at Fushanzhuang (top), and mock micro-regional collection units (bottom).

Figure 4.3. All regional-scale collection units containing Hongshan period ceramic sherds in the HICARP survey area (including both “real” and “mock” collections).

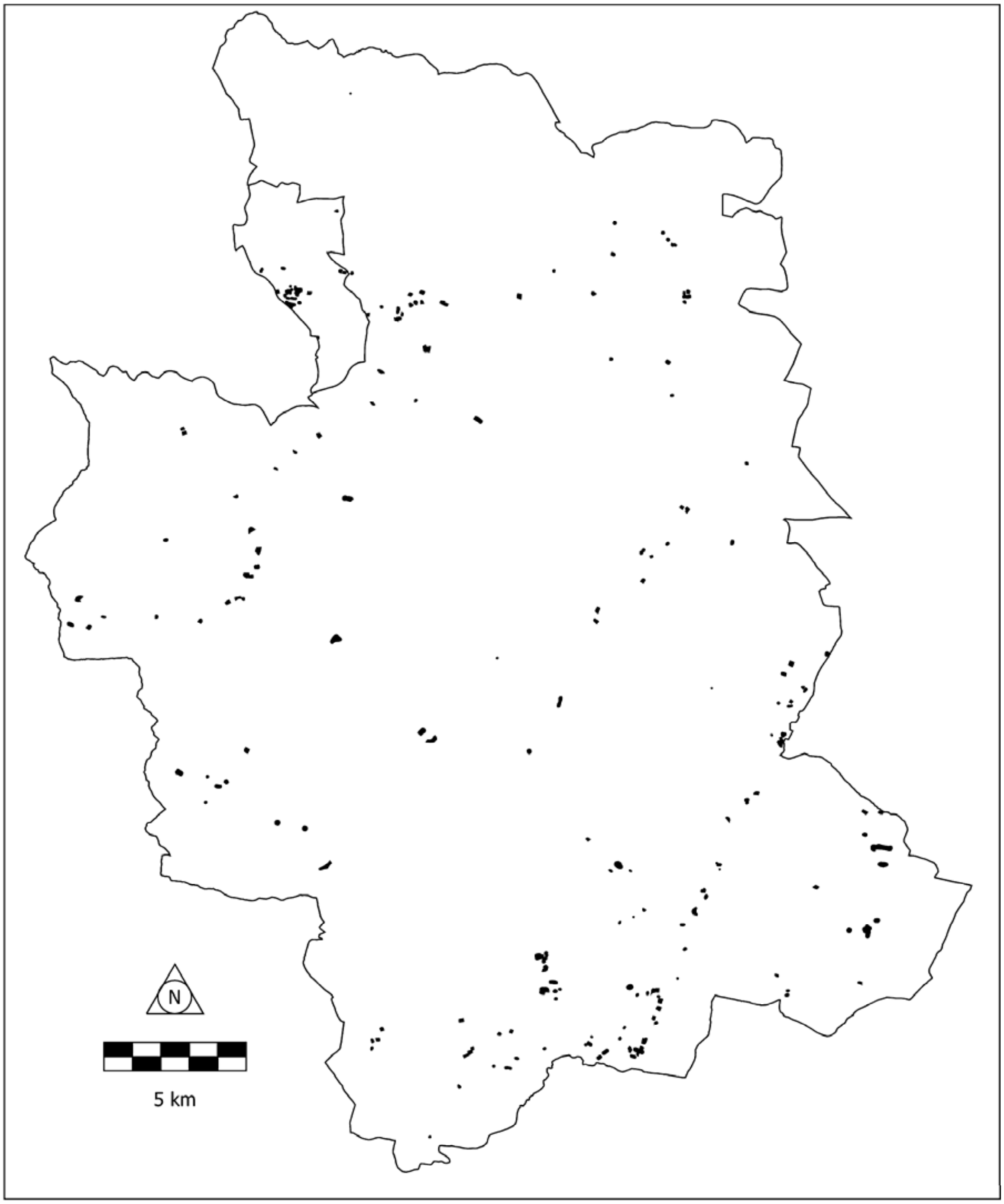


Figure 4.4. All Hongshan occupation in the composite HICARP/CICARP (1998–2001) survey area.

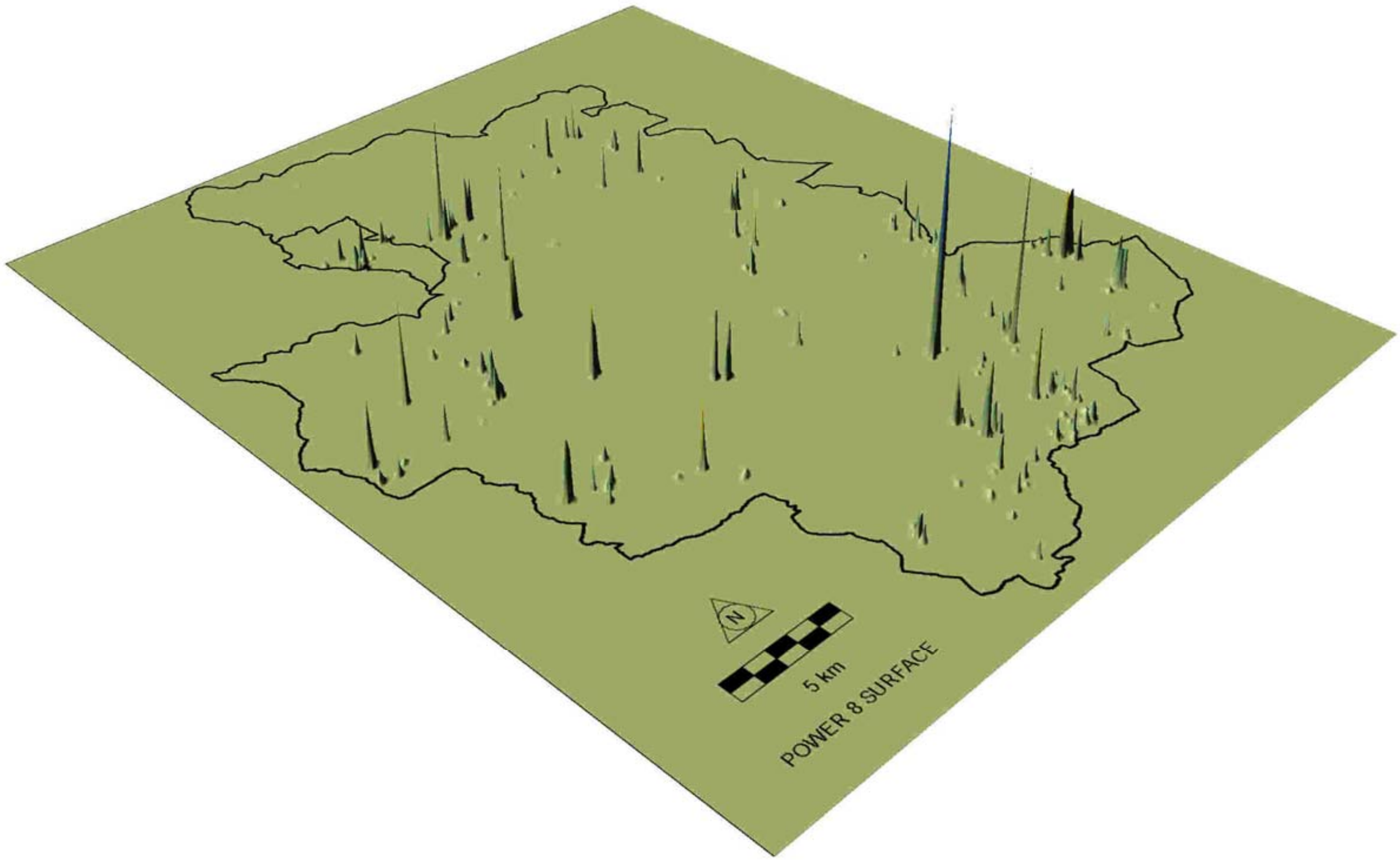


Figure 4.5. Hongshan power 8 occupation surface for the composite HICARP/CICARP (1998–2001) survey area (following Peterson and Drennan 2005).

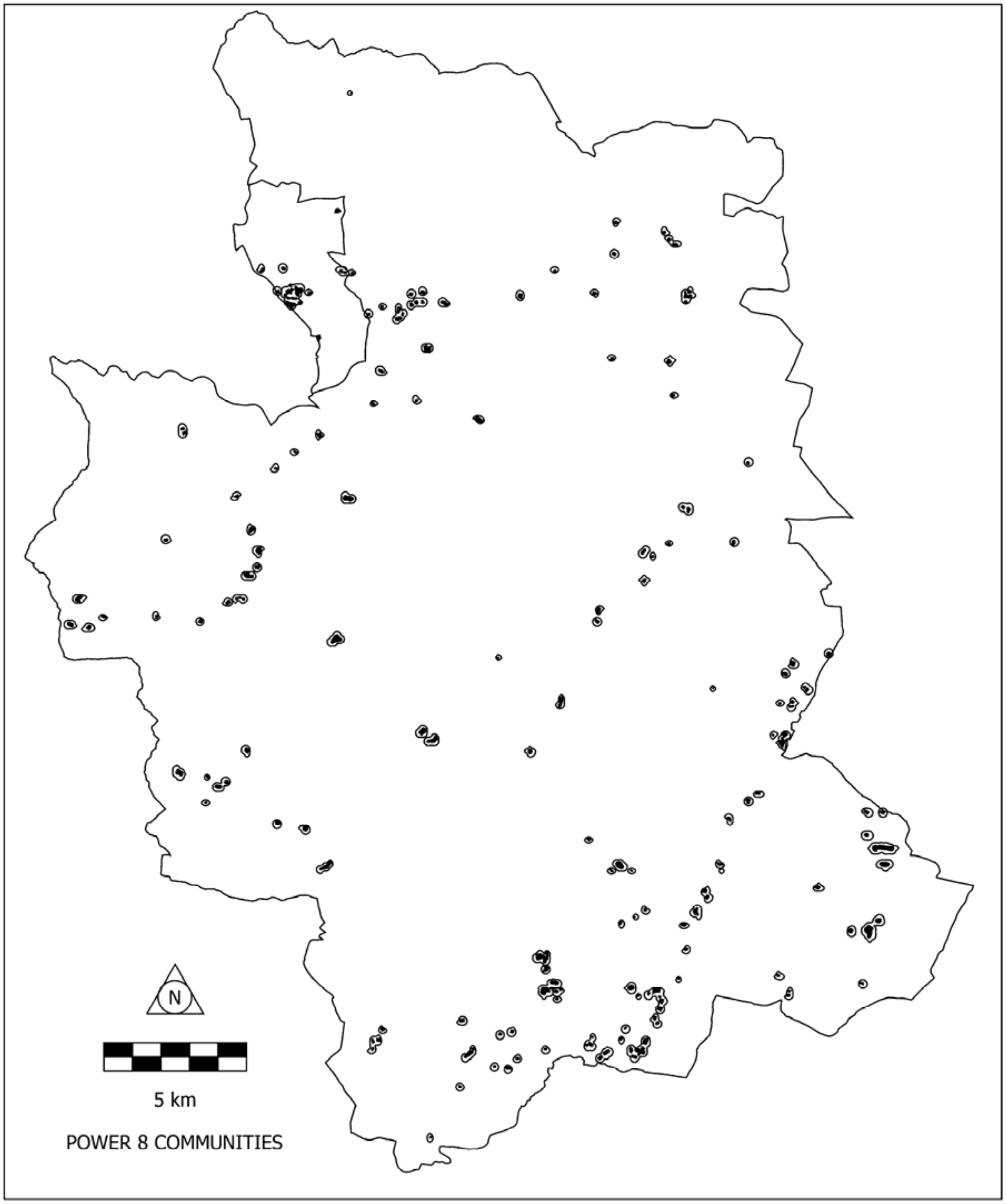


Figure 4.6. Contour map of the Hongshan power 8 occupation surface for the composite HICARP/CICARP (1998–2001) survey area.

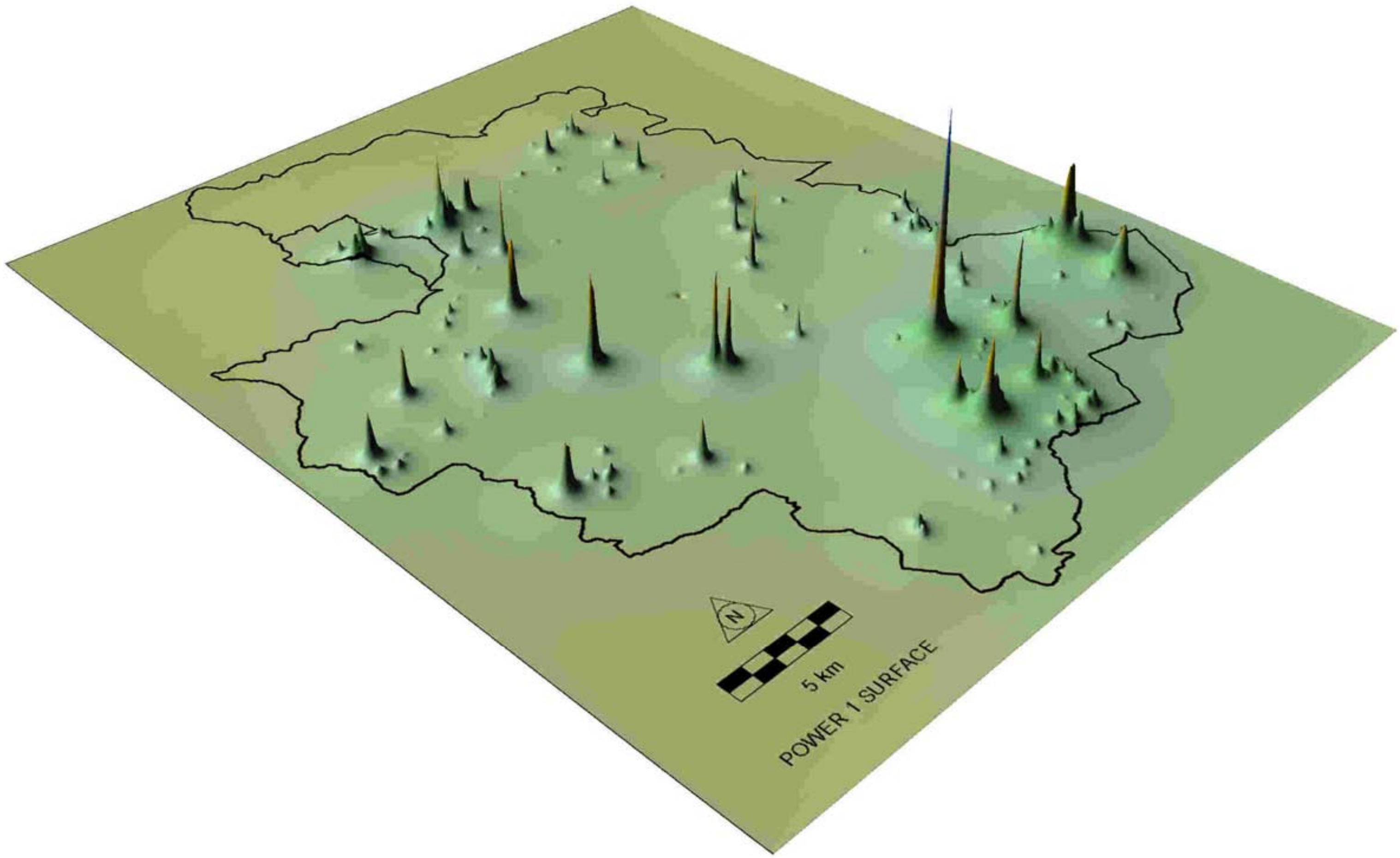


Figure 4.7. Hongshan power 1 occupation surface (following Peterson and Drennan 2005) for the composite HICARP/CICARP (1998–2001) survey area.

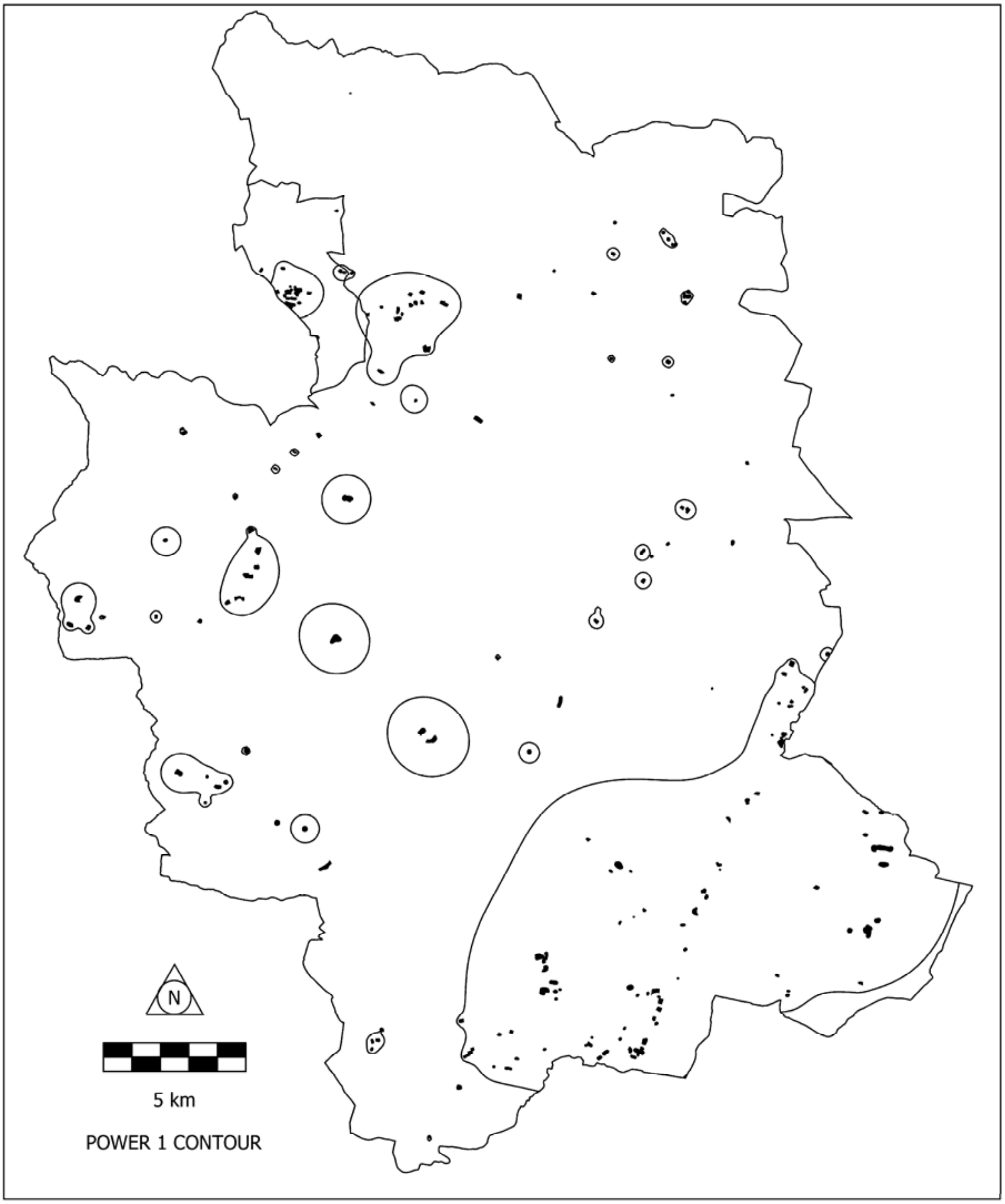


Figure 4.8. Contour map of the Hongshan power 1 occupation surface for the composite HICARP/CICARP (1998–2001) survey area. Contour cutoff delineates higher-order communities in the north-central and northwestern portions of the survey area.

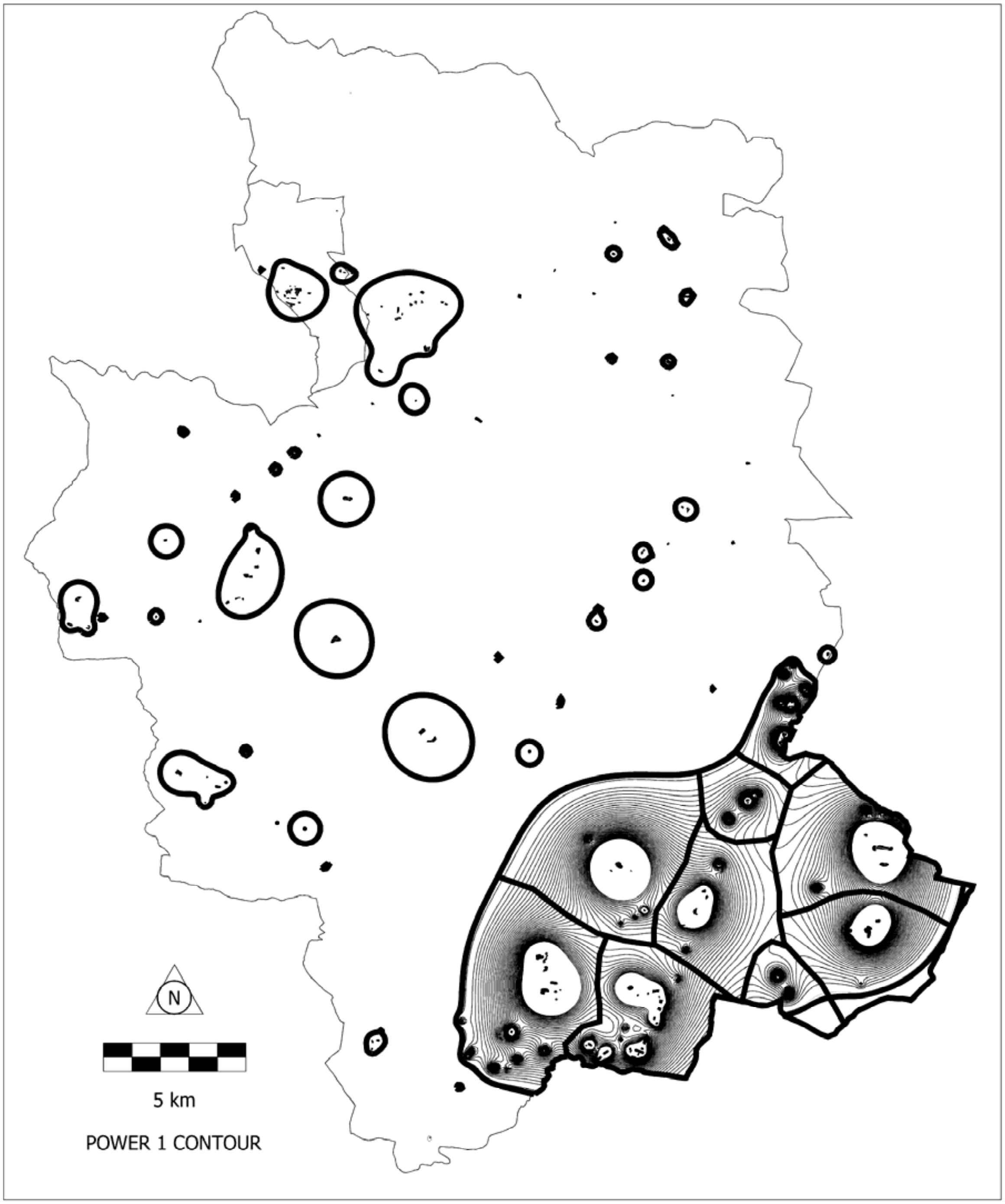


Figure 4.9. Delineation of power 1 “districts” in the southeastern portion of the survey area by dividing along the “topographic valleys” between higher-order community peaks.

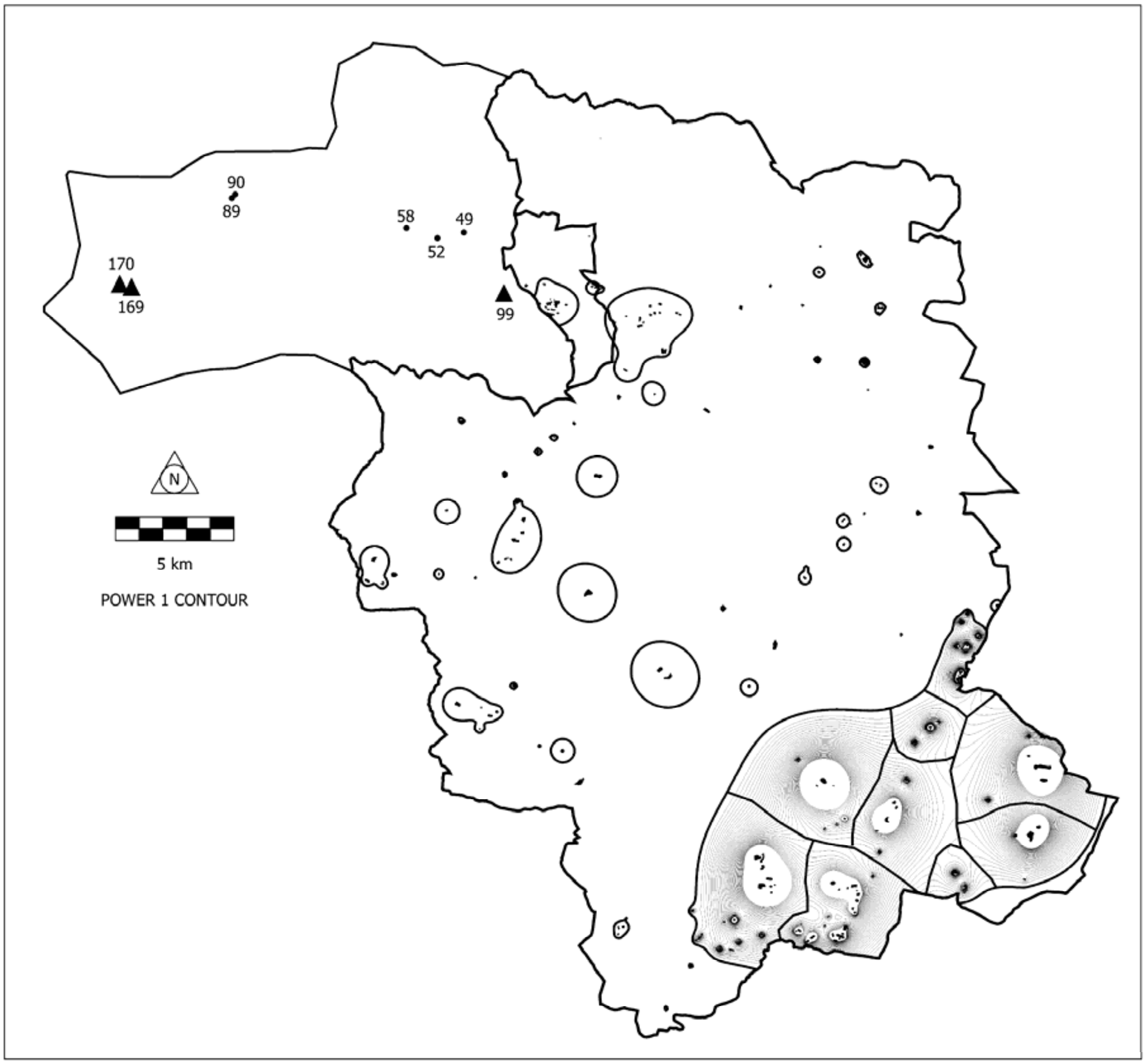


Figure 4.10. Locations of Hongshan archaeological sites west of the Fushanzhuang survey area as recorded by Shelach (1996, 1997, 1999).

5. ANALYSES OF ECONOMIC ACTIVITIES WITHIN THE FUSHANZHUANG COMMUNITY

As discussed in Chapter 2, more intensive survey of the area containing the mound group itself revealed surface traces of a number of the community's constituent households. Twenty-nine Hongshan households, identified as largely discrete surface concentrations of domestic artifacts, were organized into five or six rows occupying successive terraces of the site, interspersed with or overlooking seven mounds (Chapter 2, Figure 2.1). Each concentration corresponds to a Hongshan residential structure, such as these excavated examples, its associated midden deposits, pits and other features. The spatial organization of surface features at Fushanzhuang strongly resemble those identified and recorded by Li Xinwei (2003) at site 3864 in the Lower Bang River Valley (Chapter 1, Figure 1.3), as well as those of the extensively excavated Hongshan period village of Baiyinchanghan (Chapter 1, Figure 1.4). The three-phase program of grid-based surface raking and intensive surface collection described in Chapter 2 over areas of 400–1600 m^2 for 19 of the 29 household concentrations identified at Fushanzhuang, yielded samples of lithic artifacts totaling to 3699 specimens. The general collections of lithic artifacts from the remaining 10 households comprised an additional 953 pieces. Small numbers of stone tools were also recovered in other ways, such as spot finds (n=12) or the collection of artifacts eroding from or deposited atop burial mounds, altars, or in one non-mound grave (n=28). Included among the artifacts collected from this variety of contexts were agricultural tools and food processing items, manufacturing tools and debris, and cutting and scraping tools, among others (see below; Table 5.1). Comparative analyses of these lithic assemblages were undertaken to explore the possibility that economic specialization (as opposed to ritual specialization), as a strategy of household aggrandizement, underwrote the community's system of social ranking so clearly evident in its burial mounds (see also Chapter 6).

5.1. HONGSHAN PERIOD LITHIC ARTIFACTS FROM FUSHANZHUANG

The most extensively analyzed and reported Hongshan period lithic assemblages are those excavated at Hongshanhou, Erdaoliang, Xishuiquan, and Baiyinchanghan, and from controlled surface collection at Nasitai and five locations in Jianping county (Liaoning Province) (Balinyou 1987; Hamada and Mizuno 1938; Li 1984; Neimenggu 1991, 1994a, 1994b, 2004; Zhongguo 1982). The range of tool types, and the particulars of manufacture are fairly consistent from assemblage to assemblage. Most are composed of large flaked and ground stone tools used in agriculture, as well as smaller (including "microlithic") flake, blade, and bifacial tools used in other subsistence pursuits, tool and craft production. Much of this lithic technology is very similar to that of the preceding Xinglongwa and Zhaobaogou periods. There is, however, a diversification of tool forms over these earlier periods (particularly in large agricultural tools), and at least a few new tools were introduced (e.g., semi-lunar reaping knives). Both the average and absolute numbers of large stone tools recovered from Hongshan settlements are substantially greater than those of earlier periods, which probably reflect both an increased reliance on agriculture for subsistence, and an increase in regional population levels (e.g., Drennan et al. 2003b). Guo (1995:28) has observed that at some Hongshan sites, lithic artifacts actually outnumber ceramic sherds. While this is not true of Fushanzhuang, our intensive surface collections do contain a remarkably large number, and diverse array of lithic artifacts.

The most diagnostic tools of the period are the large flaked and ground stone shovels (chan), hoes (chu), and plows (si) used in agriculture (Figure 5.1). Most are made of hard volcanic stone in the diorite family, such as rhyolite, andesite, and basalt, although the largest examples (upwards of 20–30 cm in length) tend to be made of softer limestone. The distinction between shovels, hoes, and plows is largely a heuristic one; in practice it is very difficult to differentiate between them, especially when fragmentary. "Waisted" (shaped like an inverted "T" with a broad working edge), "shouldered" (broad and triangular, with protrusions emanating from two corners), and "willow leaf"-shaped varieties are all common. We identified and analyzed examples recovered from Fushanzhuang only by the more inclusive category of shovel/hoe/plow (Figure 5.2). It is not clear whether these tools were simply held in the hand, or, if hafted, how this was accomplished. Some rectangular, triangular, and circular "picks" and "digging tools" of related function were perforated for hafting. Rectangular or slightly ovate grinding slabs (saddle querns) and rollers (mopan and mobang) with D-shaped profiles used to process plants are also common fixtures of Hongshan assemblages (Figure 5.1), and Fushanzhuang was no exception (Figure 5.3). Mortars (jiu) and pestles (chu), however, were not recovered during our intensive survey. Long narrow ground and/or flaked stone axes and adzes (fu/ben), often thinly bladed, but with steep bits, and smaller "chisels" (zao) are also ubiquitous (Figure 5.1), and were probably used for a combination of field clearance, woodworking, and generalized chopping tasks. Similar examples from Fushanzhuang are shown in Figure 5.4.

Guo (1995:29) has suggested that many large hard stone tools were first ground into shape, and then flaked to produce sharper edges than could be achieved through grinding alone. This order of operations is unlikely from both an energetic point of view, and a technological one. For one, shaping hard stone tools through abrasion is incredibly time-consuming, whereas tool-flaking is a relatively expedient activity. Therefore, it makes little sense to devote substantial effort in surface abrasion only to subsequently remove these surfaces through flaking (cf. with platform preparation in some circumstances). A more cost-effective approach is to first make large bifacially flaked or pecked tool blanks or “preforms”, and then follow by grinding flush the shallow flake scars or divots. During our extensive analysis of lithics at Fushanzhuang (see below), we observed numerous examples of such “tools in production” (Figure 5.5). While post-abrasion flaking was also observed, these instances relate to attempts to rejuvenate damaged edges. Grooved abraders (modaoshi), grinding and polishing stones (moshi) used in ground stone tool production have been recovered from a few Hongshan sites (Figure 5.1), including Fushanzhuang (Figure 5.6). Secondly, ground stone tools are sharper than unifacial, bifacial, or retouched flaked tools, and hold their edges longer—although unmodified flakes from highly siliceous materials may be incredibly sharp, they dull quickly. As do tools with sinuous edges manufactured through the repeated removal of flakes from one or more working edges.

Other common Hongshan period implements include perforated leaf-shaped ground stone and crescent-shaped bifacially flaked sickles or reaping knives (lian), and thin-edged ovate bifacial knives (dao) used in harvesting and animal butchery (Figure 5.7). Only examples of the latter kind were collected from Fushanzhuang (Figure 5.8), although Shelach (1996:429, 1999:77) reports the surface discovery of a crescent-shaped example from site 89, some 15 km to the west of Fushanzhuang. Large chopping tools and scrapers (both unifacial and bifacial; guaxiaoqi) are equally if not more numerous in most assemblages (Figure 5.7) and may have been used in related activities. Examples collected at Fushanzhuang are shown in Figure 5.9. Small finely-made triangular to lanceolate bifacial projectile points (jiantou), and grooved line weights or netsinkers (wangzhui) attest to the continued importance of hunting and fishing, respectively, during Hongshan times (Figures 4.7). Our work at Fushanzhuang yielded only a few examples of the former (Figure 5.10), and none of the latter.

Equally important, although often ignored, are the flakes (shipian), blades (shiye), and the cores (shihe) from which both were struck (Figure 5.11), that comprise the bulk of the Hongshan “microlithic” toolkit. Unidirectional and multidirectional flake cores were recovered from Fushanzhuang, as well as conical blade cores with circumferential parallel-sided flake removals (Figure 5.12). The use of direct, hard hammer percussion is implied by the recovery of hammerstones (chuizi; Figure 5.13), although soft-hammer or indirect percussion may have also been used in blade production. Local villagers showed us a collection of several artifacts reported to have been collected nearby, that appeared to be “punches” (ground stone cylinders with tapered ends) as may have been used in combination with a soft billet as a means of indirect percussion. Alternatively, bone or antler punches could have been used. Many blade fragments from Fushanzhuang appear to have been intentionally snapped into relatively uniform sizes, perhaps for use as inserts in composite tools as suggested by Guo (1995:29). The complete flakes and blades used for generalized cutting and scraping activities were sometimes retouched through pressure-flaking to resharpen them, or to fashion small formal flake/blade tools like awls (zhui), gravers (diaokepin) and drills (zuan; Figure 5.14), used to make (and decorate) a variety of other non-lithic tools (from bone, wood, or shell), finished leather goods, ornaments, and spindle whorls.

5.2. LITHIC ARTIFACT ANALYSIS AND DATA TRANSFORMATION

All Phase I and II systematically collected lithic artifacts were analyzed in the laboratory (including debitage). Additionally, some of those recovered during Phase III operations at both F-series grids, and GC and SGC collections were also analyzed. The latter were sieved through two successively smaller wire mesh screens according to individual context. We labeled the resulting “size fractions” as large (greater than 25 mm, in shortest dimension), medium (less than 25 mm, but greater than 10 mm), or small (less than 10 mm). The small and medium fractions were examined for formal tools (non-debitage), and removed to the large fraction as encountered for additional analysis. Thus, our analysis of lithic artifacts from Fushanzhuang includes all the formal tools recovered. Because of budgetary constraints, and the limitations of macroscopic analysis, only the large fraction debitage from F-series and SGC collections was also analyzed. Of the 3699 lithic artifacts recovered through systematic three-phase surface collection of 19 grid units (where F08A–D is considered a single grid), only 2744 (or 74.2%) were analyzed in any detail. Of the further 501 lithics recovered from our six SGCs, only 142 (28.3%) were analyzed. The lithics from our four general collections (BG, HG, KG, and JG) were analyzed in their entirely due to their relatively small samples (n=19, 13, 13, and 38, respectively). The remaining small and medium non-tool debitage fractions were counted and used in some of the analyses below (Tables 5.2 and 5.3).

Gwen Bennett and Christian Peterson shared the responsibilities of analysis. We recorded at least 13 different attributes per artifact in the composite Phase I, II, and III (large fraction) dataset, including those related to provenience, collection method, metrics, tool/debitage type, tool/debitage condition, the presence/absence of cortex, manufacturing type, manufacturing location, and any additional comments specific to specimen. Low-level microscopic analysis (5–20X magnification) of our large fraction tools revealed ubiquitous evidence of flake, blade, and tool utilization—including sheen, damage to or micro-fracture of the working edge, retouching and the removal of attrition/rejuvenation flakes. Definitional and interpretive criteria used in the identification and analysis of lithic artifacts can be found in Appendix B.

5.2.1. Comparability of Systematic Collections

As previously mentioned, we have taken most individual 20 x 20 m collection grids, even if contiguously placed, as individual households for analytical purposes. Two sets of contiguous grids, however, have been treated differently: F08A–D and F16A/B. F16A/B is slightly larger than the standard 20 x 20 single grid, but only by an extra quarter grid (5 x 20 m). This was used to increase artifact sample size. No other domestic artifacts were found in concentration outside this 25 x 20 m area, so we believe that these two grids represent the same household. We do not believe the small additional area of F16A/B affects its comparability to other grids.

The largest of our contiguous grids, F08A–D, on the other hand, cannot be compared in exactly the same fashion as other grids. Although the Phase I and II collection operations were the same as for all other grids, F08A–D does differ slightly in terms of its Phase III methodology. Specifically, it was decided in the field to treat all four of F08's 20 x 20 m grids (A–D) as a single unit for Phase III collection operations. The rationale for this decision was that the local topography suggested a single household terrace separated from adjacent terraces, each with their own dense concentrations of surface artifacts. While we believe that our amalgamation of these grids was a reasonable one, it does beg the question of just how comparable F08 is to other the households identified at Fushanzhuang in terms of artifact recovery between Phases I/II on the one hand, and Phase III on the other. In Table 5.4, lithic artifacts recovered during Phases I and II are compared across A–D grids at F08. Slightly more than 92% of all lithics were collected from F08 during Phases I/II, a proportion very similar to the settlement-wide average of 89.6%. Of the 35 tool types identified for the site as a whole, 29 are represented at F08. The percentages of nine of these 29 types differ substantial between Phases I/II and III, including: (1) utilized flakes; (2) utilized and retouched flakes; (3) unifacial scrapers; (4) shovels/hoes/plows; (5) awls; (6) indeterminate flaked-ground-and-polished tool fragments; (7) multipurpose grinding implements; (8) utilized blades; (9) and non-flake/blade debitage. The sample sizes of five of these types by phase, however, are very small—often consisting of a single artifact—and therefore we can have little confidence that these differences are real or meaningful. The percentages of Phase III tools are higher than Phase I/II tools in three out of the remaining four of nine cases. Non-flake/blade debitage is the only lower Phase III percentage—one slightly less than that of Phases I/II combined. This general pattern conforms to the reasonable expectation that raking-assisted intensive collection ought to recover greater quantities of artifacts than general surface collections alone. Nevertheless, these three higher proportions must also be explained. These categories include utilized flakes, utilized blades, and shovels/hoes/plows. Phase II general collections often include material that was located just beyond the extents of referent grids, including the valleys between house terraces in the upper part of the site. It is reasonable to assume that many of these spent flakes and blades were gathered up and tossed off F08's terrace so as not to be underfoot in the course of daily activities. Likewise, nearly all of the Phase III shovels/hoes/plows (many of which were broken) are known to have been retrieved from the slopes of the F08 terrace, where they were presumably disposed of by F08's inhabitants, or tossed aside by modern farmers engaged in agricultural activities atop the large level terrace.

If we compare artifact proportions recovered during Phases I/II by F08 grid to those of Phase III, a similar pattern is observed to that discussed above (Table 5.5). Four categories display inequities in tool proportions between F08 grids A–D: utilized flakes, indeterminate ground only fragments, indeterminate flaked only fragments, and utilized blades. Two of these categories are the utilized flakes and blades that figured into our discussion above. The higher proportions of these tools were recovered from F08C and D in the case of the former, and in F08D in the case of the latter. This distribution is consistent, however, with our earlier observations—F08C and D are the southernmost grids in series, located closest to edge of the terrace, and, in the case of F08D, including some of its lower slope. Thus, it is not surprising that the highest Phase I/II concentrations of such tools were located here, nearest to the most convenient location of disposal. This explanation holds too for indeterminate ground only tool fragments (with no polish from production)—the largest proportion of which were recovered from F08D, since many of these are probably broken shovels/hoes/plows, axes/adzes, or other large chopping tools, that would have been disposed of farthest from the center of the terrace for the same reasons as previously proposed. The latter indeterminate flaked only tools occur in modestly greater proportions in F08B, which does not fit our pattern of disposal, and may therefore simply represent an activity concentration within or adjacent to the unexcavated structure. Thus, it does not appear as though a single, undifferentiated Phase III collection at F08A–D has introduced much (if any) bias regarding the kinds or numbers of stone tools recovered. We believe that this same conclusion ought to also hold for the ceramics collected from F08 (discussed in Chapter 6).

5.2.2. Differences in Lithic Artifact Recovery by Systematic Collection Phase

Following laboratory analysis we were able to quantify what had become obvious during the course of fieldwork at Fushanzhuang—that different numbers of lithic artifacts were being recovered per collection phase (Table 5.6). In contrast to our Phase I systematic grid-based surface collections, during which 30.2% of all 2744 large fraction lithic artifacts were recovered, our Phase II operations, which incorporated an intensive two-tiered program of surface raking, yielded double that number of stone tools, or 59.4% of the large fraction sample. The Phase III general collections yielded only one-third the number of lithic artifacts as Phase I did, or 10.5% of the total. This roughly 30:60:10 ratio of average proportional recovery of lithic artifacts between collection phases is very similar to that observed for ceramics between phases, or roughly 25:65:10 (see Chapter 5). This relative similarity between classes of artifacts (lithics and ceramics) in terms of differential recovery per collection phase suggests that these differences are simply an inherent function of the recovery methodology used—the products of a stepwise increase in recovery intensity from Phase I through III, counteracted by an arithmetic decrease in the quantities of artifacts available for recovery, as well as an overall reduction in their size. Such overall differences between collection phases are reasonable and expected. The real worry is whether the proportional representation of tool types differs substantially across grids within the same collection phase—that is, that these proportions do not vary similarly from grid to grid. If they do, we can collapse the artifacts from these three collection phases per household and proceed to compare them without additional corrective action. If they do not, then additional factors—those unrelated to our collection methodology—must have contributed to the differential recovery of artifacts from phase to phase and grid to grid. We would then need to make allowances for these differences prior to any comparison of household lithic assemblages.

As can be seen in Table 5.6, there are notable differences in the proportions of tools recovered during different collection phases from grid to grid. Before we can attempt to correct for these differences, however, we must have an idea as to what produced them. We have already mentioned size as a potential contributor to differences in recovery. While this may be true in the aggregate across all grids (with larger more visible artifacts being more likely to have been collected first, and smaller less visible ones later, as collection intensity increased from Phase I to II), it is not reasonable to conclude that the sizes of similar artifacts vary considerably from one grid to another. To do so would require the presence of very different post-depositional processes responsible for differing rates of breakage at work in not very distant parts of the core area of this small settlement. With the exception of soil deflation near Z3 and Z4 (affecting only F11 and F12) due to the modern removal of the slope in order to obtain basalt boulders for house construction, this seems unlikely. Much more likely is that differences in the current surface conditions of household locations at Fushanzhuang are responsible for differences in artifact recovery between collection phases.

All areas of the settlement were likely under cultivation during the modern era, if not before, but some of these areas had obviously lain fallow for many years by the time of fieldwork in 2004. Other locations (or parts thereof), in contrast, had been disturbed by more recent activities, including plowing, and reforestation efforts—specifically the excavation of parallel rows of pits for the planting of trees (usually 100 x 50 x 50 cm, and spaced about 2 m apart) (Table 5.7). Both plowing and tree-pitting produced highly visible surface scatters of artifacts, as well as brought to the surface some rare items otherwise stratified by depth (such as debris from semi-subterranean house floors or pit features that could differ from more generalized and randomized sheet midden deposits). Parts of F01, F04, F05, F13A, F13B, F14, and F16A/B, on the middle and lower terraces of the core community were recently tree-pitted, while F02, F03, F08A–D, F11, and F12, from the upper, middle, and lower portions of the site, bore evidence of plowing within the last five years or so. Households F06, F07, F09A, F09B, F10A, F10B, and F15, were not recently plowed, and never tree-pitted. All of these latter households were slightly more vegetated than recently plowed ones.

The percentage of lithic tools recovered per household during the first phase of systematic collection ranges from 10.3 to 60.3%. The nine highest percentages, ranging from 33.3% to 60.3%, include all but one example of tree-pitted surface conditions. These shallow but regularly-placed subsurface excavations would have brought substantial Hongshan period material to the surface, exposed or eroding from backdirt, and thereby increasing its availability for collection during Phase I operations. This would account for a higher proportion of artifact recovery during Phase I compared to grids not tree-pitted. In contrast, households with plowed or not recently disturbed surface conditions experienced a higher proportion of artifact recovery during Phase II. Raking helped to increase artifact availability over a wide area during this phase in lieu of deeper but more restricted tree-pitting activities—the nine lowest percentages include all but one example of tree-pitted grids. The presence of associated ashy pit features (huikeng) with some surface concentrations of household debris may have further exacerbated the effects of surface disturbance, since these pits often contained many artifacts, and were equally disturbed by tree-pitting or plowing. A total of 17 such pits were identified at Fushanzhuang, associated with 11 households (Table 5.7). The surfaces of 7 of these 11 households (63.6%) were either tree-pitted (n=4) or plowed (n=3). In addition, these pits had not gone unnoticed by local inhabitants, who were observed or known to have excavated a few examples, further distributing their unwanted contents across the ground surface. The percentages of lithics recovered during Phase II range from 31.0% to 71.3%, with the nine lowest under 54%. Many tree pits could not be effectively raked, given their size, but also because they contained seedlings which we could not risk damaging. In any case, at about 50 cm in depth, many pits were probably already deeper than the thickest Hongshan cultural strata at the site, and would therefore have been unlikely to yield additional Hongshan materials. Phase III percentages of lithic recovery vary from 3.6% to 27.6%, and display no discernable patterning with respect to surface conditions. The only reasons we can give at present for these Phase III differences in lithic artifact recovery are that: (1) the placement of specific grids may have meant that greater or lesser numbers of stone tools fell outside them and were collected during Phase III; and that (2) differences in house size as reflected in the size of surface artifact scatters could have increased or decreased the overall area of the artifact scatter "captured" by each grid, the remainder of which would have been collected during Phase III operations.

To increase our confidence that differences in the proportions of lithic tools observed between households are "real" and meaningful, as opposed to reflecting differences in artifact visibility, availability, and recovery between collection phases, we mathematically transformed—or standardized—artifact frequencies for all 35 large fraction tool types prior to additional analysis.

5.2.3. Standardization of Systematically Collected Lithic Artifact Frequencies

A data table of artifact frequencies per tool type by collection phase was produced for each of our 19 collection grids. The total number of artifacts collected per phase was calculated and then summed for each grid, as were row proportions (ranging from 0.000 to 1.000). This data appears in its entirety in Table 5.8. A set of three ratios were then produced, one for each of three collection phases, specific to a particular collection grid. These ratios were obtained by dividing the proportions of the total number of tools collected from all grids (recalculated from the percentages given in Table 5.8), by the row proportions per collection phase for each grid. The number of artifacts of each tool type collected during a particular phase was then multiplied by the respective ratio for that phase and grid. The resulting product is the standardized number of artifacts recovered. These new frequencies are decimal fractions that differ, sometimes markedly, from the frequencies of artifacts originally collected. The effect of this transformation is to redistribute the total number of artifacts of each type across phases within each grid unit, as if each phase of collection yielded the same proportion of its artifacts averaged across the site as a whole (or, roughly 30:60:10). When the standardized artifact frequencies per phase are collapsed and summed across tool types, the total number of standardized artifacts is (with the exception of rounding error) identical to that prior to standardization. For subsequent use, these standardized counts were expressed as percentages of artifacts collected (Table 5.9).

5.2.4. Lithic Artifacts from General Collections

The numbers of stone tools recovered from each of our systematic grids range from 41 to 1061. If we set aside the very large sample from F08A–D (n=1061), the average number of lithics recovered from the other 18 systematic collections is 94. Not all of our 10 other general collections (the GCs and SGCs) are included in this particular analysis. Their different method of collection has produced, on average, smaller sample sizes than our systematic collections (ranging from 12 to 48 lithics per collection). Only one collection, SGC2, has more stone tools (48) than our two smallest systematic collections (F03 and F05, with 41 and 45 lithics respectively). Because of the small sample sizes involved, we can have only very little confidence that differences in the proportions of types of stone tools from all but three with 30 or more tools (JG, SGC2, and SGC3) are not simply due to the vagaries of sampling. We have thus included only these three general collections in our MDS analysis below (cf. Drennan and Peterson 2006, who base a similar analysis on only our 19 systematic collections) (Table 5.10).

5.3. MULTIDIMENSIONAL SCALING OF HOUSEHOLD LITHIC ASSEMBLAGES

In order to ascertain whether or not economic specialization was a causal factor in the formation of the Fushanzhuang community, we must first demonstrate its presence through analyses of differences in household artifact composition. Since our samples of stone tools are larger than those of ceramic sherds and other artifacts, and potentially contain more information on productive activities than do these other classes of artifacts, most of the empirical support for specialization must come from an analysis of stone tools. In comparing domestic stone tool assemblages, we have again employed non-metric multidimensional scaling. Only the large fraction tools from our 19 F-series grid-based collections and from SGC2, SGC3, and JG are included in this analysis.

The first step in our MDS analysis of stone tools was to create a matrix of dissimilarity scores between cases (our households) based on the proportions of standardized artifact frequencies in Table 5.9. Only 19 of the 35 tool types presented, however, were included. The 19 tool types are: utilized flakes, retouched flakes, utilized and retouched flakes, unifacial scrapers, bifacial scrapers, cores, hammerstones, tool blanks and unfinished tools, axes/adzes, shovels/hoes/plows, knives, projectile points, awls, grinding rollers and slabs, retouched blades, utilized blades, gravers, utilized debris/non-flake/blade debitage, and non-flake/blade debitage, as they appear in Table 5.9. As can be seen, two tool categories have been collapsed for purposes of this analysis, axes/adzes and grinding slabs/rollers. We did this because of the difficulty encountered in differentiating between the former pair morphologically (and therefore also in activity terms), and also because, in the case of the latter, the pair of tools form a set, with both elements required to carry out the task. Tools indeterminate to function were not included when creating the matrix of dissimilarity scores (although they were included in the totals when calculating proportions of particular tools per household) because of the interpretive pitfalls that would inevitably result. More than 50 such tools were classified, however, as to their method of manufacture, and information on them can be found in Appendix B. An additional three tool types consisting of only a single specimen were similarly eliminated from this analysis (i.e., a drill, a grooved abrader, and a multifunctional grinding implement), as their uniqueness would have a strong tendency to artificially inflate dissimilarity scores. Especially since all three artifacts were recovered from a single household unit, F08A–D. As discussed above, almost 40% of all systematically-collected large fraction artifacts were from this large composite grid, suggesting that unique tool recovery is largely a function of sample size. Ground stone ornaments were also not included, because the presence of these artifacts speaks more to inter-household differences in status than to differences in economic activities. Furthermore, these are finished ornaments, rather than objects in production, so it is unclear which of Fushanzhuang's households (if any) might have manufactured them. (Ornaments are discussed along with ceramic evidence for status hierarchy at Fushanzhuang in Chapter 6.) Dissimilarities between cases were measured according to standardized Euclidean distance.

The final square matrix of dissimilarity scores was the basis for five separate MDS configurations produced in 1, 2, 3, 4, and 5 dimensions. The Kruskal stress values associated with each solution are graphed as a continuous line in Figure 5.15. In all likelihood, the most interpretable of these five solutions will be the one striking the best balance between a low Kruskal stress value (one less than 0.15 is often considered interpretable) and the fewest dimensions. This particular dimension often appears as a "hinge point" or "elbow" in a graph like Figure 5.15. In our case, two subtle elbows are present, corresponding to the two- and four-dimensional solutions. The two-dimensional solution, however, is associated with a Kruskal stress value of 0.17058, slightly higher than usually considered interpretable. The four-dimensional solution is more interpretable, with an associated stress value of 0.13313. Plots based on both solutions were examined, and it was decided that the four-dimensional solution was indeed more interpretable. We thus have decided to base our inter-household comparison of lithic artifact assemblages around this four-dimensional solution.

5.4. EVIDENCE FOR INTER-HOUSEHOLD ECONOMIC SPECIALIZATION

Figure 5.16, a plot of dimension 2 against dimension 3, is the clearest and most enlightening of the six plots produced as the end result of our four-dimensional scaling. It forms the basis of the following discussion (cf. Drennan and Peterson 2006, figure 6). In this plot, the relative dissimilarity between Fushanzhuang households in terms of their lithic assemblages is represented as a measure of the distance between labeled points. Households more similar in terms of their various proportions of stone tools are more closely spaced than are those more dissimilar in terms of these proportions. Sets of points that cluster strongly together in one area of the graph represent households more similar in terms of the activities these tools represent than those which cluster together in other areas (so long as they occupy the same dimensional plane). Our summary interpretation of these plots is one of inter-household economic specialization.

5.4.1. Activity Emphases Based on Proportional Variation in Tool Type Composition

In Figure 5.16, the 22 household lithic assemblages included in the analysis are distributed largely in the right side of the graph. The densest concentration of assemblages is in the central right portion of this distribution—lesser numbers are placed more peripherally above and below. Two other households are spun off from the main top-to-bottom axis of the distribution towards the left side of the graph. Based on this distribution of scaled proportions, five largely distinct groups of economic activities, or "specializations" can be identified (Figure 5.17). (Our use of the term "specialization" throughout refers only to patterned differences observed in economic activities between households at Fushanzhuang—we do not concern ourselves with measures of artifact standardization, intensity of production, etc., used by some archaeologists to document, or chart the development of specialized craft production systems [e.g., Arnold 1984; Costin 1991, 2001]).

The first emphasis is interpreted as a "specialization" in agricultural production, based on the co-variant moderate to high proportions of certain agriculture-related stone tools in the five household assemblages situated in the upper right portion of Figure 5.16. These tools include axes/adzes, shovels/hoes/plows, knives, and utilized blades, relatively modest proportions of cores, and grinding slabs and rollers. This assortment of tools suggests a strong emphasis on field clearance and homestead construction, the plowing of farmland, the planting and tilling of crops, plant harvesting and/or animal butchery, blade production for generalized cutting and slicing, and the processing of grain (such as millet). Households F05, F06, F10A, F13A, and JG, all appear to have been "agricultural specialists". F05 and F10A, however, are less specialized in this regard than the other three households, given their closer positioning to the bulk of assemblages in the central right portion of the graph. All other household assemblages are comprised of different proportions of tools in different combinations, although some in the central group do exhibit some similarities with these five. For example, F08A–D and F15 are the only other assemblages scaled that contain shovels/hoes/plows, and these, along with F02 and F09A, are the only others containing grinding slabs and rollers, albeit in lesser proportions than our five agricultural specialists. These same four centrally-placed assemblages also have roughly equal proportional ratios of cores to utilized blades. Thus, there appears to be an axis of variability in household economics relating to agricultural production that originates in the central mass of assemblages and projects outwards towards the upper right corner of the distribution in Figure 5.17.

The second emphasis, which includes eight households in the lower right portion of the graph (F01, F02, F03, F07, F09A, F09B, F13B, and F14), is interpreted as a specialization in the initial production of stone tools (including flakes, blades, and large tool blanks) and in the production of other craft goods. Specifically, these households appear to have been engaged in blade and flake production (staple multi-purpose tools), making of tool blanks (performed outside the core community, discussed below) and their shaping into agricultural and other tools (occurring on-site), and the production of indeterminate goods made from perishable materials (such as wood, bone, or leather hides). Our interpretation is based largely on the high proportions of (blade and non-blade) cores, large agricultural tool blanks—axe/adze, and shovel/hoe/plow performs—(F03, F07, F02, F09B), and awls (F03, F07, F13B, and F09A) in these assemblages, as well as high average proportions of non-flake/blade debitage (ranging between about 77% and 85% of all lithics). With the exceptions of F13B and F14, all of the assemblages in this group contained no or very low proportions of utilized flakes, and only two (F09A and F14) contained utilized blades. No agricultural tools other than a few grinding slabs/rollers (F02 and F09A), and knives (F09A) were recovered, despite the large proportions of agricultural tool blanks in each assemblage. Both observations are consistent with flake, blade, and bifacial tool reduction for inter-household exchange. A couple of individual assemblages also contained low proportions of hammerstones (F09B) and gravers (F07) used in secondary reduction and primary tool production. Only the F01 assemblage contained retouched tools—in this case, blades—further evidence for production over use in most of these households. Thus, it appears as though a second axis of economic variability runs from the middle of the main group of household assemblages out and down towards the bottom of the distribution in Figure 5.17.

The four assemblages closer the center right of Figure 5.16 (F02, F09A, F09B, and F13B), however, appear to have specialized less in initial tool production than the four positioned more towards the bottom center (F03, F07, F01, and F14). The former have lower proportions of the relevant tools, in addition to modest proportions of other tool types which indicate a wider range of economic activities. Some of these additional tools include unifacial and bifacial scrapers, as well as grinding slabs and rollers. This is in addition to the knives and utilized blades mentioned previously. Thus, these four slightly less specialized households also engaged in more generalized cutting and scraping activities, perhaps the harvesting or processing of grain and/or working of animal hides (two of the households are those that also have high proportions of awls). In addition to tools used in the primary production of other tools and goods, four assemblages (F01, F07, F09A, and F14), including three of the four more distantly positioned households, also contained very low proportions of projectile points (never more than 2%)—the only examples of such artifacts recovered from Fushanzhuang. Based on excavations of other Hongshan settlements, deer appears to have been the predominant prey species during the period (Guo 1995:30; Nelson 1994, 1997, 2001; Hamada and Mizuno 1938). Thus, at least some of Fushanzhuang's craft-producing households appear also to have engaged part-time in non-agricultural subsistence pursuits.

The third emphasis, secondary production of stone tools and other goods (or "tool finishing"), is represented by the lithic assemblages of three households, F11, and F12, and SGC3. The first two of these are clearly flung off the main group to the far left of the distribution in Figure 5.16. Both are characterized by a relative paucity of cores (compared with those households engaged in flake and blade production) and very low proportions of overall non-flake/blade debitage (64–75% of all lithics), but high proportions of utilized flakes (as well as some retouched flakes and utilized debris), unifacial and bifacial scrapers/choppers, hammerstones, and stone tool blanks (at least in the case of F12). The most plausible interpretation of these co-variant proportions is one of specialization in the manufacture of relatively expedient tools from large flake "blanks" or unmodified cobbles from which only a limited number of additional removals were made. These tools may have included large choppers, and small but simple unifacial and bifacial end scrapers and elongate scrapers used in the production of other non-lithic tools, and leather-working (including skinning, carcass processing, and tanning). Given morphological similarities, projectile points might also have been produced, although none were recovered from F11, F12, or SGC3. The large flakes, other tool blanks, and even the raw materials themselves, utilized by these three households may have been acquired from our "initial tool producers", since these households appear to have been utilizing many times more flakes than they were producing (even accounting for multiple flake/blade removals per core; see also the results of our reduction analyses below). Small flake tool production, however, would not produce much debitage recoverable by our particular collection methodology (as it would be very, very small). Limited production of these flakes and blades is further suggested by F11 and F12's practice of rejuvenating small proportions of dull flakes and blades through retouching, and recycling sharp pieces of scarce non-flake debitage for use.

SGC3, the third of our tool finishing households, is positioned only slightly to the upper left of the main group of assemblages. SGC3 differs from F11 and F12 in only two ways, but which nonetheless pull it back towards the main group of households (especially toward F16A/B)—the latter two have proportions of cores and utilized blades less than 3%, whereas SGC3's proportions, at 10% and 17% respectively, indicate substantially more flake/blade production than F11 or F12. SGC3's high proportions of utilized flakes, unifacial scrapers, and tool blanks, however, and its very low proportion of non-flake debitage (36%), clearly suggest strong overall similarities to F11 and F12 in tool manufacturing. It is likely than SGC3 was engaged in more large tool finishing, and/or blank production, than either F11 or F12. Thus, this third structural axis of variability in economic activity runs outward from the main group of households with an origin point near SGC3, through F12, and terminates at F11 at the far left-hand side of the plotted distribution of households in Figure 5.17.

Unlike a few of the eight households that emphasized primary production, neither the F11, F12, or the SGC3 assemblage contain any clearly agricultural tools. It is possible that these three households traded finished tools (such as scrapers) with primarily agricultural or even generalist households for foodstuffs, or other differently specialized producers within or beyond the core community. Basic tools (flakes/blades, and some preforms) would seem most likely to have been obtained from one or more of the initial tool producing households (who were also probably the primary producers of large agricultural tools), perhaps in exchange for which F11, F12, and SGC3 may have processed the carcasses and/or hides of hunted game (perhaps even keeping a portion of the meat) to be used in leather-working and in the manufacture of bone and antler tools. The production of finished non-lithic tools and craft goods—but not the acquisition of the necessary raw materials—by initial tool producing households, is suggested by their high proportions of awls (and in one case also of gravers), and conversely low proportions of choppers and/or scrapers.

The fourth activity emphasis is represented by the lithic assemblages of only two households, F04 and SGC2, and bears some resemblance to that shared by F11, F12, and SGC3. Like the latter three households, F04 and SGC2 have low levels of non-flake debitage (73% and 42% respectively), high proportions of utilized flakes and blades, as well as retouched flakes and blades. (No utilized non-flake debitage was recovered though.) The proportion of tool blanks in the SGC2 assemblage is comparable to those of F11 and SGC3. Agricultural tools are also similarly absent. In these respects, then, F04 and SGC2 look to have been engaged in some sort of tool finishing. That said, their much higher proportion of cores and utilized blades are much more in step with our eight initial tool producers—thus accounting for their proximity to F01, F03, F07 in the lower right of center portion of Figure 5.16. F04 and SGC3 lack the awls and projectile points, however, that figure prominently in these other assemblages. And their proportions of retouched tools are greater than either group of initial or secondary tool producers. Thus, we think it likely that the economic activities of F04 and SGC2 included a substantial focus on some form of tertiary production, such as drill, graver, awl, or composite tool insert manufacture, wild plant gathering (requiring substantial cutting and slicing), and/or tool refurbishment. Whether this latter retooling was in support of the production of particular kinds of tools and/or goods made only by F04 and SGC3, or a specialization in the maintenance of others' toolkits, is unclear from the proportional evidence of tool types alone. The fourth activity emphasis runs through the center of the plotted distribution of households, through F02, and toward F04 and SGC2 in Figure 5.17.

The fifth and last activity emphasis is shared by the remaining four households, F08A–D, F10B, F15, and F16 A/B, located just right of center in Figure 5.16. These households have the most evenly-distributed, and uniformly low proportions of all 19 tool types analyzed, reflecting a wide range of relatively unspecialized activities. All four assemblages share a number of similarities with several of the other less specialized examples in three out of four of the activity groups identified, including F05, F10A (agriculturists), F02, F09A, F09B, F13B (initial tool producers), and SGC3 (a tool finisher), as reflected by their loose association in the plot of our scaling. We may therefore think of them as economic generalists, or "ordinary" agrarian households (Figure 5.17). Were these households self-reliant? Or simply less economically dependent on others for their livelihoods? Perhaps a mix of both. F08A–D and F15 both appear as though they may have been largely self-reliant, as their assemblages respectively contain 16 and 12 of the 19 tool types incorporated into our analysis. The F08A–D assemblage contains tools representative of all four specializations, including shovels/hoes/plows, grinding slabs and rollers, cores, tool blanks, hammerstones, unifacial and bifacial scrapers, awls, gravers, utilized and retouched flakes and blades, utilized debris, and an average amount of non-flake/blade debitage (83%). Three other unique tools (a drill, a grooved abrader, and a multipurpose grinding implement) not included in our analysis here were also recovered from F08A–D, suggesting an even slightly broader range of generalized activities including tool production, finishing, and maintenance. The F15 assemblage similarly contains shovels/hoes/plows, grinding slabs and rollers, utilized and retouched flakes and blades, cores, tool blanks, awls, both kinds of scrapers, and average quantities of non-flake debitage (82%). Again, the particulars of this assemblage suggest both agricultural production and the means to manufacture and repair a very generalized agrarian toolkit. The tools from F10B and F16A/B, on the other hand, are much more sparsely distributed between categories (6 and 4 respectively). In both cases, a simplified system of flake tool (including scraper) production and use is attested. In addition to the utilized flakes, cores, and unifacial scrapers which characterize the F16A/B assemblage, those from F10B also include retouched flakes and utilized blades. F10B's activities appear to have been more diverse, and evidence of tool repair suggests a higher degree of self-reliance than F16A/B.

5.4.2. Mass Debitage and Technological Analyses of Reduction Stages

Additional independent evidence in support of an interpretation of different economic emphases derives from a two-part complementary study of lithic reduction at Fushanzhuang. The first component is often referred to as aggregate or mass debitage analysis (Ahler 1989). This is an analysis of all debitage by size grade irrespective of "type," and avoids the subjective pitfalls of many typological approaches (see discussion in Ahler 1989, for example). We use discriminant analysis to determine whether household differences in the proportions of total debitage, weight of debitage, and cortical debitage by size class correspond to grouped inter-household differences in specialized production outlined above. In particular, we are interested in whether differences in stages of stone tool reduction conform to hypothesized differences in the primary, secondary, and tertiary production goods that would suggest their exchange. While mass debitage analysis may enable us to identify differences in the stages of stone tool reduction between households, it is not particularly effective at discriminating between different kinds of reductive activities (such as core reduction vs. tool production), especially in mixed assemblages (like household middens). Some researchers have used constrained least squares regression to partition experimental mixed datasets, but only with limited success (e.g., Stahle and Dunn 1984:23–31). We have instead resorted to an "interpretation-free" typological analysis of household debitage based on the work of Sullivan and Rozen (1985), as our second component, in order to better differentiate between core reduction and tool production activities. The results of both approaches are complementary, and reinforce our previous conclusions based on co-variant high proportions of particular tool types.

5.4.3. Multivariate Discriminant Analysis of Mass Debitage Proportions

Unlike MDS, factor analysis, or other exploratory data reduction techniques, discriminant analysis assumes a priori structure. Moreover, this presumed structure must be specified up front. In effect, the procedure attempts to replicate a known heterogeneous structure inherent to some population of things, through classification, based only on a limited set of measurements taken from the things themselves (Baxter 1994; Klecka 1980; Shennan 1997:350–352). Thus, it is a particularly appropriate technique for hypothesis testing. Four of our five activity emphases identified above assume differences in the stages of specialized manufacture and use of particular combinations of tools ("generalization" as a non-specialization, of course, does not). A form of independent corroboration of these groupings, then, would be if any inter-household differences in stage-specific stone tool debitage were to group consistently in a manner similar to that based on our MDS analysis. If they did not, it would imply that our interpretations as to the specific kinds of specialized economic activities at Fushanzhuang were incorrect. The technique has been used successfully by several authors to study lithic procurement and reduction through the aggregate analysis of size-graded debitage (e.g., Ahler 1989), although, to the best of our knowledge, it has never been applied in exactly the way we have here. It is well known that the size of both the objective piece (the soon-to-be tool) and its associated debitage decreases as the number of reduction stages increases. Thus, differences in the relative amounts of aggregated size-graded debitage between households ought to reflect differences in the stage(s) of tool production emphasized by each (such as early-middle stage [initial/primary] production, or middle-late stage [secondary or even tertiary] production). If the assumptions about economic specialization and interdependence that underlie our interpretation of the previous MDS analysis are (essentially) correct, a discriminant analysis of the size-graded debitage recovered each household will create groupings whose members are (nearly) the same as those previously assigned to each activity emphasis.

Seven categories of tools and/or debitage from our large fraction of lithics were included in the aggregate analysis: (1) utilized flakes; (2) retouched flakes (without usewear); (3) utilized and retouched flakes; (4) utilized blades; (5) utilized and retouched blades; (6) debitage (angular/blocky/shatter); and (7) utilized debitage. Flakes and blades were both included, even though we also consider them “tools” in their own right (see above). We also included all lithic artifacts from the small and medium fractions. These fractions contained only debitage, as any tools were removed from them during initial laboratory analysis and placed with the large fraction tools for additional attribute-based analysis. The only information recorded for small and medium fraction lithics were counts and total weights per household context. All lithic artifacts collected during Phase I and II collection were examined individually regardless of size, and therefore the “large” fraction contains numerous lithics smaller than 25 mm in size. Thus, we partitioned the large fraction sample into three size grades equivalent to initial stratification: grade 1 (25 mm or larger maximum dimension), grade 2 (10 mm to <25 mm), and grade 3 (<10 mm). Some researchers have opted to use more size categories than we have here—sieving artifacts through additional nested series of screens, or through subsequent subdivision of assemblages for which linear measurements and/or weights per artifact were recorded (e.g., Ahler 1989; Ammerman 1979; Ammerman and Andrefsky 1982; Patterson 1990; Stahle and Dunn 1982). Without access to the artifacts themselves (which remain in China) or other measurements, however, we have no basis to partition the small and medium fractions into yet smaller intervals; similarly, experimental studies have shown that subdivision of debitage larger than about 1 inch (or 25 mm) yields no appreciable increase in understanding sequences of reduction based on mass debitage analysis (Ahler 1989).

Nine typical, and potentially discriminating mass debitage variables (after Ahler 1989) were produced from our seven tool type/debitage categories per household assemblage for comparison (Table 5.11). These include: (1) the percentage of total debitage present in each of three size grades; (2) the percentage of total weight present in each of three size grades; and (3) the percentage of cortical flakes and other debris present in each of these size grades. The latter was calculated for partitioned large fraction debitage only, as this information was not recorded in the course of counting and weighing lithics from the two smaller fractions. (The amount of cortical material obviously decreases as the number of reductive stages increases).

We do not expect complete separation of tool reduction groups, since many of the activities defined on the basis of co-variant tool types are related and/or overlapping, as one would expect of part-time specialization. That is, their assemblages are composed of “mixed” activities. The most extreme likelihood of overlap is between the reductive activities of our generalist households and those of all others, since F08A–D, F10B, F15, and F16A/B were engaged in low levels of all economic activities identifiable from analyses of household lithic assemblages at Fushanzhuang. For this reason we have not included households in this activity group in the discriminant analysis below. A look at proportional measurements in Table 5.11 confirms that the debitage from generalist households is both highly variable, and overlaps substantially with those thought to be engaged in more specialized economic pursuits. In terms of debitage, then, these four households really do appear to have generalized assemblages.

A complete linear discriminant analysis was performed on our nine variable dataset for 18 non-generalist households. The result is two "canonical plots" of household assemblages based on differences in the scores of three significant discriminant functions (Figures 4.18 and 4.19). The first function (or dimension) explains most of the variation in the dataset (eigenvalue=4.374, r=0.907, cpd=0.807); that is, our predictor variables do a very good job of discriminating between groups. Our analysis correctly classified 89% households to the activity emphases previously specified despite the small samples involved. Only 2 of 18 households were misclassified: F05, an agriculturist household mistaken for a secondary tool producing one, and F04, a tertiary household mistaken for a secondary one (shown in Figures 4.18 and 4.19). Even so, the arrangement of households in our plots of canonical scores are strikingly similar to that produced by our scaling of tool types (although compare the relative distances between SGC2 and F04, and between SGC3 and F11 and F12). Moreover, both misclassified households are situated along the boundaries of "groups" that are actually highly continuous. Given considerable overlap in absolute activities between each of our activity emphases (even disregarding our "generalist" households for the moment), it is not surprising that the significance of between-groups differences is not as high as it would be if they were totally discrete (Wilks' lambda=0.082, F=1.9801, df=18, p=0.057). Nevertheless, the strong canonical correlation coefficient (r) associated with variables of the first function, and a high proportion of correctly-classified households to a priori groups, indicates that real and meaningful differences in activities are present between households at Fushanzhuang. Furthermore, as is clear in Figures 4.18 and 4.19, there is a closer association between agricultural and initial tool production, on one hand, and agricultural production and "tool finishing" (chopper/scraper production), on the other, than either initial production or tool finishing to each other. Likewise, tertiary tool production is more closely aligned to initial tool production than to agriculture or tool finishing. This suggests strong differences in the stages of tool reduction practiced by initial/tertiary toolmakers and tool finishers, which converge on, but are separated by, agricultural producers, the presumed consumers of many of the specialized tools produced. Thus, these results corroborate our earlier assignment of households with respect to four out of five kinds of economic activity included in the analysis.

The analysis also specified which of our nine variables were especially useful in correctly classifying households to activity groups on the basis of their associated stone tool debitage (those with high F-to-remove values). In order of importance, these are: the proportion of debitage weight in size grades 2 (medium-sized) and 1 (large), followed by the proportion of debitage in size grades 2 and 1, and finally the proportion of cortical debitage in grades 2 and 1. A closer look at Table 5.11 reveals the patterning in these four variables. Most households show a proportional pattern of mid-to-low weight in size grade 1, followed by an equal or higher proportion of total weight in grade 2. Nine others, however, display substantially higher proportions of debitage weight in the first size grade (F06, F08A–D, F09B, F10B, F11, F12, F13A, F13B, and JG). In some cases this proportion by weight is more than double that in the second grade. Since weight is an effective proxy for size, and declines over time as reduction increases, this latter pattern suggests that these nine households were preferentially involved in early-to-middle stage lithic reduction. This group of households includes only two initial tool producers—the others were all identified as tool finishers, generalists, or agriculturists based on our MDS analysis. In contrast, the other 13 would appear to have been involved in middle-to-late stage reduction. (The lowest proportion of debitage by weight for all households is in the smallest size grade, although many of the most specialized initial and tertiary tool producers identified in our MDS plot have higher proportions of this smallest debitage than do the initial tool producers.) Although the largest proportion of debitage recovered falls, for all but two households (SGC2 and SGC3), in size grade 2, initial and tertiary producers tend to have much lower proportions of debitage in size grade 1 than households identified as having other activity emphases. Finally, the proportion of cortical debitage in size grade 2 is about 20% higher on average among initial and tertiary tool producing households (except for SCG2), than among agriculturists and tool finishing households. Conversely, initial and tertiary tool producing households are those tending to have the lowest proportions of cortical debitage in the largest size grade, whereas agriculturists and tool finishers tend to have the highest.

At face value, this patterning is the opposite to what we would expect based on our MDS analysis. That is, our initial tool producers ought to display a pattern of higher proportions of debitage by weight in size grade 1 than grades 2 or 3 if engaged in core trimming and early reduction (for tool blank production) that produces fewer larger flakes than mid or late stage reduction. Similarly, our tool finishing households ought to show a pattern of lower weight in size 1, but steadily increasing through grades 2 and 3, as larger numbers of smaller shaping flakes are recovered. Both statements ought to hold also for the proportion of debitage. Likewise, a higher proportion of all cortical debitage is expected in size grade 1, than in grades 2 or 3. However, there are three other factors to consider, including: (1) what is actually meant by “initial tool producers” and “tool finishers”; (2) differences in the sizes and range of types of tools being produced by each set of tool producers; and (3) the location of primary reduction/manufacture.

It is not likely that F11, F12, and SGC3 (our tool finishers) were obtaining very many tool blanks from other households for subsequent reduction. Rather, F11, F12, and SGC3 appear to have produced complete or “finished” tools by engaging, for the most part, in all stages of manufacture. The term “tool finishers” was selected to indicate that the tools produced as a result of this activity were complete and readily useable (regardless of how expedient the technology may have been). “Initial tool producers”, on the other hand, was chosen to reflect the fact that the end product of the activity was an unfinished tool, or one still in the initial stages of manufacture. While the low overall proportions of debitage recovered from F11, F12, and SGC3 could be taken as evidence against initial-through-final stage manufacture, it is not contradictory if we consider that the cobble and formal flake tools produced in large numbers by at least two of these households require relatively few initial flake removals to produce (as few as one in the case of scraper blanks). Thus, a high proportion of debitage by weight in size grade 1 plausibly reflects large cobble trimming flakes produced by expedient large chopper manufacture, and large flake "blanks" that were not selected for subsequent reduction into different kinds of scrapers. Moreover, a higher proportion of debitage (as well as the finished tools themselves) is likely to be cortical, because relatively few late stage removals are needed to complete these tools (and therefore do not proportionally depress the cortical counts). In fact, the non-linear removal of all (or nearly all) cortex in the first stage of reduction, as observed for SGC3, is often the sign of highly patterned tool manufacture (Ahler 1989:90; Mauldin and Amick 1988:69–73). On the other end of the size spectrum, the very small flake removals and retouching required for final scraper production are small enough that our coarser-grained collection methods failed to recover them.

Our initial tool producers were probably engaged in a wider range of tool-making than just blank production, but on average, the complex shaping of these blanks would produce a great many more middling-sized flakes (of the sort sometime called "secondary", "tertiary", or "bifacial thinning" flakes) than large trimming flakes. The goal would almost have certainly be to produce sets of "standardized" preforms with shallow flake scars and clean margins requiring a minimum of additional labor-intensive grinding and polishing for completion. (These blanks were most likely exchanged with specialized agriculturist households who finally formed them into the tools desired.) This would then account for the observed pattern of higher proportions of debitage by count and weight in size grade 2 instead of 1 among initial producers. It does not, however, explain the comparatively low proportions of cortical debitage in the largest size grade among initial and tertiary producers. This could indicate that much of the initial trimming of tool stone occurred elsewhere, either near the raw material sources themselves, or at the very least, outside the core area of the community. It might also indicate a high ratio of flake and blade production to tool (blank) production.

There is clearly strong correspondence between our <u>a priori</u> MDS activity emphases and the results of our discriminant analysis. Despite this correspondence, and despite clear differences in lithic reduction stages between households, the reasons we have provided for them are mostly counterintuitive by the logic of mass debitage analysis. Therefore, we have sought corroboration of the meaning assigned them via a second, independent analysis of reduction technology.

5.4.4. Typological Analysis of Reduction Technology

The second approach taken to debitage analysis is that advocated by Sullivan and Rozen (1985). Unlike most technological approaches to classification, which utilize unstandardized and highly subjective debitage categories such as “primary”, “secondary”, “tertiary”, and “bifacial thinning/attrition” flakes, Sullivan and Rozen’s approach is objective and highly replicable. The approach employs a monothetic divisive dendrogram to partition debitage into four types based on the presence or absence of only three variables. The types are: (1) debris or shatter (debitage without a single interior surface); (2) flake fragments (medial/distal fragments without a “platform” or point of applied force); (3) broken flakes (proximal fragments with platforms but without intact margins); and (4) complete flakes (those with intact margins in addition to platform characteristics). Each piece of debitage in our large fraction sample of lithic artifacts (including the same seven “tool types” aggregated for discriminant analysis) was coded according to this scheme while working in the field.

Although the application of Sullivan and Rozen’s (1985) typology is itself “interpretation-free”, their explanations of the patterned results of their classification have been criticized (e.g., Baumler and Downum 1989; Mauldin and Amick 1989; Prentiss and Romanski 1989). For example, Sullivan and Rozen (1985:763) suggested that core reduction ought to produce relatively more complete flakes than broken flakes or flake fragments than finished tool production, which ought to produce relatively more flake fragments than complete flakes. Subsequent experimental studies have shown, however, that these expectations are not borne out with real-world data. Rather, these studies have repeatedly indicated that when all stages of the same kinds of reduction are performed sequentially in the same location and are not mixed with the products from other kinds of tool-making, that (bifacial) tool production produces substantially more complete flakes and flake fragments (medial/distal flakes), the same amount or slightly fewer broken (proximal) flakes, and much less shatter than does core reduction and/or bifacial tool blank production (Baumler and Downum 1989; Mauldin and Amick 1989; Prentiss and Romanski 1989). We can use these experimental data as the basis of our own comparisons of reduction stages at Fushanzhuang.

In order to do so, the frequencies of these four debitage types recovered from F-series contexts were subjected to the same standardized transformation as performed on complete tools prior to MDS analysis. This provided a “correction” for differences in debitage recovery per household grid and collection phase visible in Table 5.12. The effect, as before, was to redistribute these counts among the available categories based on the site-wide proportions of these types (Table 5.13). Information from three general collections (JG, SGC2, and SGC3) was incorporated without further manipulation (see Table 5.10). A set of 22 profile plots of the proportions of these standardized counts of debitage per household (as applicable) was then produced (Figure 5.20). Quick comparisons of the overall shape of each household's distribution of debitage provides a simple and straightforward way to differentiate earlier core reduction and tool blank production from later tool production, use, and maintenance. We must bear in mind, however, that our assemblages are most likely mixed, representing multiple events and possibly multiple kinds of reduction. Nevertheless, it seems reasonable in a specialized economy to expect that particular emphases will be restricted to either early-middle or middle-late stage core reduction and/or tool production. Of the 22 households compared, all but nine (F01, F02, F03, F05, F07, F10B, F11, F12, and F14) are best interpreted as evidence for later-stage tool production, use, and reuse. An interesting pattern emerges when we compare households engaged in one or the other kind of tool reduction/production to our previously-defined MDS (and discriminant analysis-verified) activity emphases.

Four out of five households thought to have specialized in agriculture appear to have emphasized tool production (or no production) over core reduction, an observation that seems reasonable if these households were obtaining tool blanks from initial producers, and then grinding and polishing them, and/or rejuvenating these and other flake tools from time to time—as this would produce very little debitage, but among it a higher proportion of complete flakes to shatter. Likewise, most generalist households (3/4) were also engaged preferentially in tool production, probably for very similar reasons to those given for agricultural specialists. In contrast, households labeled as initial tool producers or tool finishers were predominantly engaged in core reduction, not final tool production per se. This includes five out of eight initial producers, and two out of three tool finishers. This counterintuitive pattern of reduction makes sense in light of our above discussion of mass debitage results. Most Hongshan technology is based around core-reduction, with pressure-flaking or abrasion used to create the final tools. Those four "tool-producing" households with less evidence for core reduction based on debitage type (F09A, F09B, F13B, and SGC3) may have been engaged in more off-site reduction, less flake/blade production, more expedient formal tool production, and/or the abrasive reduction of tool blanks. In some instances, a case could be made, on the basis of Figure 5.20 alone, for assigning households to the opposite reductive stage than we have above—for example, F13B might plausibly be inferred to have engaged in core reduction rather than tool production, a classification that is actually better fits our interpretations. Nevertheless, our point is simply that the reduction sequences of some specializations will appear much "messier" than others because of differences in the range of activities pursued between them. Finally, the debitage profiles for both tertiary tool-producing households (F04 and SGC2) conform to previous suggestions: blade production and subsequent manufacture of blade-form tools, such as awls, gravers, drills, and composite tool inserts.

In total, 16 out of 22 household debitage profiles (73%) conform to our expectations based on previous multivariate analyses. Of the six that do not conform to expectations, two are those misclassified by our discriminant analysis: F04 and F05. The former, a tertiary producer, was classified accurately using Sullivan and Rozen's (1985) approach, but not on the basis of aggregate debitage. The latter, on the other hand, remained misclassified by both, but, in any case, it is only a small discrepancy between analyses. F05 does appear to have engaged more in core reduction than tool production, thus providing a reason for its assignment to the primary tool producing group by discriminant analysis in the first place. It is the only household assigned to the agricultural group by MDS analysis, however, whose reductive activities do not tend towards tool production. The other four non-conformist households are F09A, F09B, F13B, and SGC3. All four appear to have emphasized tool production when the majority of other households assigned to the same activity group on the basis of MDS emphasized core reduction. The first three are initial tool producers; such production is highly variable, therefore we should not expect neatly dichotomized results, but rather only an overall trend towards core reduction. The last, SGC3, has already been shown to have been engaged in both non-linear first stage tool reduction, and "tool finishing". The bulk of available debitage pertains to the former, however, thereby favoring it over the latter.

Overall, we believe the results of our typological analysis corroborate those of our mass debitage analysis. In turn, these provide strong support for our MDS identification of five household activity emphases or low-level economic "specializations" at Fushanzhuang.

5.4.5. Lithic Artifacts From Mound and Non-Mound Graves and Altars

In addition to the large quantities of sherds recovered from the surface of Fushanzhuang's mound burials, non-mound burials, and other monumental constructions (see Chapter 6), small numbers of lithic artifacts were also collected (Table 5.14). Mounds Z1, Z2, Z5, and Z6 were associated with only one artifact apiece—in all case debitage. Only from mounds Z3 and Z4 were more substantial numbers of lithics recovered (10 and 12 respectively). (We do not present information on the four lithics recovered from the Z8 mound, as we consider it to be of latter date than the Hongshan period.) A much fuller discussion of these seven monuments is presented in Chapter 6.

Since lithic artifacts (not including elaborately carved jade objects) are not typically recovered from excavated Hongshan mounds, the presence of these artifacts requires explanation. It is possible that these artifacts were introduced as fill during construction—particularly of the smaller mounds. It is less likely, however, that those recovered from the larger mounds became associated in this way. The greater amount of fill required to construct each of these mounds, were it obtained over a short period of time and from a single location, would almost certainly have come from areas away from existing households. Such material ought to have be relatively free of domestic artifacts (as are Z1, Z2, Z6, and Z7). On the other hand, were fill obtained in smaller quantities from a larger number of locations, at least some of these locations would surely have been located near enough to existing households to have included material from their respective middens. Under this scenario, we ought to recover a larger number and wider range of stone tools from individual mounds—including the broken flakes and blades found in nearly all domestic assemblages at Fushanzhuang. Although the samples of lithic artifacts from

Z3 and Z3 are larger that those recovered from other mounds, their composition does not meet expectations. Both have high proportions of debitage, but only a few or no flakes, and no blades. The majority of formal tools are cores and larger tool blanks. Rather than broken and discarded tools, these are tools in the process of manufacture (except for a single fragment of a shovel/hoe/plow). The close spatial association between F11 and F12, two of our “initial” tool producing households (engaged primarily in bifacial tool reduction), and Z3 and Z4 suggests that the members of these households may have occasionally engaged in productive activities atop these mounds (although it is also possible that this production is somehow related to public rituals often hypothesized to have been conducted atop Hongshan mounds).

A large, relatively intact axe/adze was also recovered, along with a single piece of debitage, from the surface of M1. We have interpreted M1 as a non-mound grave. Given the isolation of this burial from any identifiable households, along with the particular characteristics of its ceramic assemblage, we think it likely than both artifacts were interred along with the grave’s occupant, and may be reflective of individual’s occupation and/or social standing within the community (see Chapter 6).

5.4.6. Lithic Spot Finds

Although a nearly continuous very low density of lithics blanketed the intensively surveyed core of the local community at Fushanzhuang, we did not normally endeavor to collect these disparate artifacts. The only exception was when formal tools or portions thereof were encountered—those relatively rare in most of our domestic assemblages. These, and any other immediately associated debitage, were collected at “spot finds” both for comparative purposes, and on the off chance that we might be able to associate them with nearby households as they were identified. A total of 12 lithic artifacts were recovered in this manner from seven different locations spread along the front edge of the settlement adjacent to or interspersed with Z3, Z4, and Z5 (Table 5.15, Figure 5.21). The only households identified nearby to which they might be related, are F11, F12, and F16A/B. Alternatively, they could correspond to households destroyed through a combination of slope removal and soil deflation. But since both F11 and F12 were subject to these same processes, and we recovered large quantities of artifacts from each, the likelihood of other households having been located along this front edge of the site is very low. Some spot finds may represent tools that have moved downslope from F16A/B, or were tossed off its terrace by modern farmers while the area was under cultivation. Although examples similar to some of these isolated artifacts were recovered from F16A/B, they most strongly resemble, in the aggregate, those from F11 and F12. Moreover, they are very similar to those collected from atop the nearby Z3 and Z4 mounds discussed above. It seems a strong possibility, then, that the inhabitants of these two households made extensive use of this lower terrace in “tool finishing”.

5.5. THE NON-LITHIC ARTIFACTS

Other non-lithic tools commonly reported excavated or collected from Hongshan settlements include a variety of bone tools (such as awls, needles, reamers/gouges, chisels, straight and barbed points, etc.), shell knives, and ceramic spindle whorls (Balinyou 1987; Hamada and Mizuno 1938; Li 1984; Liaoning 2001; Neimenggu 1994a, 2004; Zhongguo 1982; Figure 5.22). Evidence for non-lithic tool use at Fushanzhuang is particularly sparse. No bone or shell tools, and only two ceramic spindle whorls were recovered. Excavation of other Hongshan settlements have shown that bone tools are often an important component of household domestic inventories (e.g., Hamada and Mizuno 1938; Neimenggu 1994a, 2004). Their absence at Fushanzhuang is therefore all the more notable, but easily explained. Bone is the least likely of all materials to survive substantial surface exposure—it weathers quickly in such arid conditions as characterize the Chifeng region today, becomes friable and disintegrates. The same agricultural activities and reforestation efforts that have brought substantial numbers of lithic and ceramics artifacts to the surface for recovery, have also likely contributed to the exposure and destruction of bone implements. Fragmentary bone refuse and broken tools on the surface or in the plowzone are further comminuted through these activities, which only accelerates their decomposition. Even so, some bone and shell refuse (which survives better) was collected from the surface of Fushanzhuang. Although some of these faunal remains may date to the Hongshan period, most are probably of modern origin. The remains of domestic pig (Sus scrofa) and ovicaprids (sheep/goats) were particularly common, and although the principal domestic animals during Hongshan times (e.g., Guo 1995:29, 41; Hamada and Mizuno 1938; Liaoning 1986; Underhill 1997; Yan 1992:123), they are also raised ubiquitously in the Chifeng region today. Some of the other identifiable elements also belonged to domestic taxa, but in this case to species not known definitively to have been introduced prior to the later Neolithic in northern China. For example, cattle are often reported to have been domesticated during the Hongshan period, despite the lack of published evidence for this designation (Guo 1995:29; Nelson 1994:5, 1997:60; 2001:79; cf. Underhill 1997, table III). Most shell fragments are from freshwater mussels, and show no evidence of having been worked into ornaments or other tools, and therefore probably also represent modern food refuse (although piles of mussel shells are reported for other Hongshan site; see Ye 1992:145)—these mussels can still occasionally be seen clinging precariously to life in the Yin River today. Other taxa (such as Gastropoda and Rodentia) are clearly intrusive to the site.

Two ceramic spindle whorls were recovered; one each from F01 and F04 (Figure 5.23). Dividing these single artifacts by the number of Hongshan sherds recovered from each household (516 and 373 sherds respectively), and multiplying by 1000, yields a standardized ratio of whorls per 1000 sherds. This measure adjusts for differences in size of the two households' artifact assemblages, permitting a more accurate comparison of "numbers" of artifacts. In this case, even after adjustment, the difference between households is only one whorl: F01 has about 2 whorls/1000 sherds, while F04 has about 3/1000 sherds. Thus, there is no meaningful difference between them in terms of the spinning and weaving activities they must surely represent. If we were to collect additional artifacts from each household, including at least a few hundred more sherds apiece, it is likely that we would uncover additional whorls. Even so, this would hardly indicate a substantial emphasis on textile production within the core of the local community at Fushanzhuang (cf. with an inferred greater emphasis on leather-working)—although it may very well have been important to the diversification of these households' individual economies.

5.6. SPATIAL DISTRIBUTION OF ECONOMIC ACTIVITIES

There are very few differences in household location within the site that correspond to differences in household activity emphases. Roughly equally proportions of agricultural, initial and tertiary tool producing, and generalist households (among those included in our analyses) are located above or below the broad terrace supporting Z1, Z2, and M1, that separates the lower settlement from the upper (Chapter 2, Figure 2.1). The strongest spatial patterning is seen in the close association of F11 and F12 (two of the three tool finishing households) at the front of the site, amidst spot find evidence of an extensive outdoor activity area along the modern bluff along the southwestern edge of the site. We return to the topic of the spatial organization of the Fushanzhuang community in Chapters 6 and 7.

5.7. SUMMARY OF ECONOMIC ANALYSES

The final picture of economic organization at Fushanzhuang then (as visible through our analysis of these 22 household lithic assemblages), is one of multiple "specializations" or emphases, and therefore of economic interdependence, between households. These specializations include agricultural production; the production of agricultural tool blanks, flakes, and blades for exchange, and for the making of other tools; "tool finishing" of small unifacial and bifacial tools used for cutting and scraping; tertiary tool production and/or tool maintenance; and "generalized" production, combining aspects of all four other specializations. It is particularly interesting that so few households appear to have been engaged in agricultural production to the relative exclusion of all other activities. Although we have emphasized the differences between household activities in this chapter, these "part-time" specializations (e.g., Brumfiel and Earle 1987; Costin 1991, 2001) are subtle and often overlapping.

Most households were probably largely self-sufficient, and it is likely that nearly all engaged in cultivation to some extent. Crop yields could not have been so high that fourth-fifths of the core population (the primary crafts producers) could be fed from the labors of the remaining one-fifth (the primary agriculturists). According to Li's (2003:182–183) calculations, 2.56 ha/person of millet fields would be required to subsist during the Hongshan period. In the case of the core area of the Fushanzhuang local community, this would amount to between 200–500 ha of fields. Because wild plants, game, shellfish, and domestic livestock also figured strongly in Hongshan period diet, it is likely that Li's estimate of 2.56 ha of agricultural land per person is simply too high. Even were we to lower our estimate by half, it is clear that F05, F06, F10A, F13A, and JG (our 5 agricultural specialist households) could not possibly have fielded enough able-bodied labor to cultivate so much land. As mentioned in Chapter 4, it is also possible that the residents of Fushanzhuang cultivated small garden plots adjacent to their houses. Although there is no direct evidence for gardening, this possibility is at least as congruent with the more diffuse distribution of farming tools among households at Fushanzhuang as is outfield agriculture. Moreover, additional foodstuffs may have been obtained through exchange (or even mobilized) from predominantly agricultural households in outlying areas of the Fushanzhuang community (see Li 2003:182–191 for this argument applied to Hongshan sites of the Lower Bang River Valley).

We also suspect that the majority of ceramics circulating within the community were manufactured in outlying areas of the settlement (see Chapter 6), perhaps in those closest to the Yin River or its tributaries, and therefore to at least two of the requisite resources (clay, water, and fuel). Outlying agriculturists would have been at least partly dependent on both their ceramist neighbors, and on the producers of stone and other tools (the majority of the latter of which were probably those living in the core of the local community). Conversely, many households in the core area may have become dependent on those from outlying areas for some food and for some or all ceramic utensils. We presently do not know the source locations of the lithic raw materials used to manufacture the stone tools we recovered from Fushanzhuang, although these were surely local (see Chapter 7).

Could one (or more) of these part-time specializations in agriculture or craft production have been the means through which households accrued wealth and/or prestige within the Fushanzhuang community? In order to address this question we must have a means of identifying which, if any, of the households sampled, enjoyed a higher social standing within the Fushanzhuang community.

Table 5.1. Artifact types identified in the large fraction sample of lithics from Fushanzhuang.

Tool Type	Description
1	utilized flake
2	retouched flake (no usewear)
3	utilized and retouched flake
4	unifacially worked scraping/chopping tool
5	bifacially worked scraping/chopping tool
6	core
7	hammerstone
8	tool blank/unfinished tool (no usewear)
9/12	axe/adze
14	shovel/hoe/plow
16	knife
18	projectile point
19	ornament
20	awl
21/22	handheld grinding roller/grinding slab
27	grooved abrader
28	drill
30	indeterminate ground and polished fragment
31	indeterminate ground only fragment (no polish from production)
32	indeterminate flaked, ground, and polished fragment (including pecking)
33	indeterminate tool fragment
34	indeterminate flaked and ground fragment
35	multiple function grinding implement
37	retouched blade
38	indeterminate pecked only
39	indeterminate flaked only
40	utilized blade
41	graver
43	utilized debris/debitage
51	not applicable (debitage)

Table 5.2. Small fraction debitage by household (<10 mm maximum dimension).

Collection	n	Weight (g)
F01	24	77.3
F02	11	55.9
F03	12	42.5
F04	12	47.7
F05	6	24.4
F06	8	30.7
F07	22	88.3
F08A-D	45	133.7
F09A	14	60.7
F09B	5	14.2
F10A	0	0.0
F10B	5	12.9
F11	13	65.3
F12	10	32.3
F13A	8	18.8
F13B	5	20.2
F14	17	61.4
F15	39	162.6
F16A/B	10	48.0
SGC1	12	80.8
SGC2	48	212.6
SGC3	23	61.0
SGC4	24	134.9
SGC5	12	89.1
SGC6	10	35.0
Total	**395**	**1610.3**

Table 5.3. Medium fraction debitage by household (>10 mm <25 mm maximum dimension).

Collection	n	Weight (g)
F01	71	29.8
F02	25	15.7
F03	10	7.6
F04	36	15.5
F05	7	3.7
F06	11	6.1
F07	24	16.9
F08A-D	229	103.9
F09A	30	15.0
F09B	25	12.6
F10A	10	6.0
F10B	19	11.9
F11	19	15.2
F12	15	9.9
F13A	11	5.6
F13B	21	9.6
F14	47	19.3
F15	71	40.0
F16A/B	8	6.7
SGC1	13	4.8
SGC2	81	33.9
SGC3	63	32.1
SGC4	34	22.1
SGC5	17	9.1
SGC6	22	14.7
Total	**919**	**467.7**

Table 5.4. Comparison of collection phase I and II lithic recovery at F08 by constituent grid.

		Tool/Debitage Type																														
Grid	**Phase**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9/12**	**14**	**16**	**18**	**19**	**20**	**21**	**22**	**27**	**28**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**	**40**	**41**	**43**	**51**
F08A	**I**	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	86.8
F08B	**I**	0.0	0.0	2.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	2.4	0.0	0.0	2.4	0.0	2.4	0.0	83.3
F08C	**I**	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	2.7	1.4	0.0	0.0	0.0	1.4	0.0	1.4	1.4	1.4	0.0	82.4
F08D	**I**	1.9	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	81.5
F08A	**II**	1.2	0.0	0.0	0.0	0.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.6	0.6	0.0	93.5
F08B	**II**	0.0	0.6	0.6	0.0	0.0	3.4	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.6	0.6	0.6	0.0	0.6	0.0	0.6	0.0	1.2	0.0	0.0	0.6	0.0	1.1	0.6	0.0	0.0	88.1
F08C	**II**	3.1	0.0	0.5	0.0	0.5	1.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.5	90.7
F08D	**II**	2.8	0.0	0.0	0.0	0.5	2.3	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.3	0.0	0.9	89.0

Table 5.5. Comparison of collection phases I/II (collapsed) and III (G) at F08.

		Tool/Debitage Type																														
Grid	**Phase**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9/12**	**14**	**16**	**18**	**19**	**20**	**21**	**22**	**27**	**28**	**30**	**31**	**32**	**33**	**34**	**35**	**37**	**38**	**39**	**40**	**41**	**43**	**51**
F08	**I/II**	1.5	0.1	0.3	0.0	0.3	2.7	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.2	0.4	0.1	0.1	0.1	0.4	0.9	0.1	0.2	0.0	1.0	0.4	0.0	0.7	1.2	0.4	0.3	88.7
F08	**III**	11.1	0.0	1.2	1.2	0.0	4.9	1.2	1.2	0.0	4.9	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	1.2	0.0	0.0	0.0	21.0	0.0	1.2	43.2

Table 5.6. Large fraction lithic artifacts from grid-based and general collections.

Phase	F01		F02		F03		F04		F05		F06		F07		F08A-D		F09A		F09B	
	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P
I	6	0.10	13	0.22	10	0.24	28	0.36	15	0.33	17	0.20	13	0.23	223	0.21	41	0.27	77	0.37
II	36	0.62	42	0.70	25	0.61	29	0.37	24	0.53	57	0.68	31	0.54	757	0.71	94	0.61	120	0.57
III	16	0.28	5	0.08	6	0.15	21	0.27	6	0.13	10	0.12	13	0.23	81	0.08	18	0.12	13	0.06
Totals	**58**	1.00	**60**	1.00	**41**	1.00	**78**	1.00	**45**	1.00	**84**	1.00	**57**	1.00	**1061**	1.00	**153**	1.00	**210**	1.00

Table 5.6 (continued).

Phase	F10A		F10B		F11		F12		F13A		F13B		F14		F15		F16A/B		All FSZ	
	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P
I	23	0.25	10	0.18	61	0.56	61	0.54	37	0.45	49	0.58	55	0.49	54	0.28	35	0.60	828	0.30
II	60	0.65	38	0.68	35	0.32	43	0.38	41	0.50	32	0.38	40	0.36	107	0.56	18	0.31	1629	0.59
III	9	0.10	8	0.14	13	0.12	8	0.07	4	0.05	3	0.04	17	0.15	31	0.16	5	0.09	287	0.10
Totals	**92**	1.00	**56**	1.00	**109**	1.00	**112**	1.00	**82**	1.00	**84**	1.00	**112**	1.00	**192**	1.00	**58**	1.00	**2744**	1.00

Table 5.7. Differences in surface conditions and number of associated surface features per household at Fushanzhuang.

Surface Collection	Surface Condition(s)	Collection Phase							Ash Pits	
		I		II		III		Total		
		n	%	n	%	n	%	n	n	% total
F01	no recent activity/margins tree-pitted	6	10.3	36	62.1	16	27.6	58	2	11.8
F02	recently plowed	13	21.7	42	70.0	5	8.3	60	1	5.9
F03	recently plowed	10	24.4	25	61.0	6	14.6	41	0	0.0
F04	tree-pitted	28	35.9	29	37.2	21	26.9	78	3	17.6
F05	tree-pitted	15	33.3	24	53.3	6	13.3	45	0	0.0
F06	no recent activity	17	20.2	57	67.9	10	11.9	84	0	0.0
F07	no recent activity	13	22.8	31	54.4	13	22.8	57	0	0.0
F08A-D	recently plowed	223	21.0	757	71.3	81	7.6	1061	1	5.9
F09A	no recent activity	41	26.8	94	61.4	18	11.8	153	2	11.8
F09B	no recent activity	77	36.7	120	57.1	13	6.2	210	0	0.0
F10A	no recent activity	23	25.0	60	65.2	9	9.8	92	1	5.9
F10B	no recent activity	10	17.9	38	67.9	8	14.3	56	1	5.9
F11	recently plowed/deflated/partially tree-pitted	61	56.0	35	32.1	13	11.9	109	0	0.0
F12	recently plowed/deflated/partially tree-pitted	61	54.5	43	38.4	8	7.1	112	0	0.0
F13A	tree-pitted	37	45.1	41	50.0	4	4.9	82	2	11.8
F13B	tree-pitted	49	58.3	32	38.1	3	3.6	84	2	11.8
F14	tree-pitted	55	49.1	40	35.7	17	15.2	112	1	5.9
F15	no recent activity	54	28.1	107	55.7	31	16.1	192	0	0.0
F16A/B	tree-pitted/ otherwise heavily vegetated	35	60.3	18	31.0	5	8.6	58	0	0.0
JG	no recent activity	n/a	n/a	n/a	n/a	38	100	38	1	5.9

Table 5.8. Raw counts of 19 lithic tool types for 22 households at Fushanzhuang.

Unit	Phase	RAW COUNTS																			Grid Totals		FSZ	Ratio
		1	2	3	4	5	6	7	8	9	14	16	18	20	21	37	40	41	43	51	n	P	P	
F01	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	0.1	0.3	2.917
F01	II	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	30	36	0.6	0.6	0.956
F01	III	4	0	0	0	2	0	0	1	0	0	0	3	0	1	0	0	0	0	2	16	0.3	0.1	0.379
F02	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	13	0.2	0.3	1.393
F02	II	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	34	42	0.7	0.6	0.848
F02	III	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	1	5	0.1	0.1	1.255
F03	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	0.2	0.3	1.237
F03	II	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	20	25	0.6	0.6	0.974
F03	III	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	6	0.1	0.1	0.715
F04	I	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	4	0	0	18	28	0.4	0.3	0.841
F04	II	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	25	29	0.4	0.6	1.597
F04	III	2	1	3	1	0	1	0	1	0	0	0	0	1	2	0	3	0	0	5	21	0.3	0.1	0.388
F05	I	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	11	15	0.3	0.3	0.905
F05	II	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	24	0.5	0.6	1.113
F05	III	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	2	0	0	1	6	0.1	0.1	0.784
F06	I	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	14	17	0.2	0.3	1.491
F06	II	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	1	0	47	57	0.7	0.6	0.875
F06	III	0	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	4	10	0.1	0.1	0.879
F07	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13	0.2	0.3	1.323
F07	II	0	0	0	0	0	3	0	1	0	0	0	0	1	0	0	0	1	0	25	31	0.5	0.6	1.092
F07	III	1	1	0	1	1	1	0	0	0	0	0	1	0	0	0	1	0	0	4	13	0.2	0.1	0.459
F08A-D	I	1	0	1	0	0	10	0	2	0	2	0	0	0	2	1	1	3	0	186	223	0.2	0.3	1.436
F08A-D	II	14	1	2	0	3	16	0	0	0	5	0	0	2	3	3	9	1	3	683	757	0.7	0.6	0.832
F08A-D	III	9	0	1	1	0	4	1	1	0	4	0	0	4	0	0	17	0	1	35	81	0.1	0.1	1.370
F09A	I	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	0	32	41	0.3	0.3	1.126
F09A	II	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	1	0	0	84	94	0.6	0.6	0.966
F09A	III	3	1	0	1	1	1	0	0	0	0	0	0	0	1	0	4	0	0	5	18	0.1	0.1	0.889
F09B	I	0	0	0	0	0	5	1	1	0	0	0	0	0	0	1	0	0	0	67	77	0.4	0.3	0.823
F09B	II	0	0	1	0	0	3	0	1	0	0	0	1	0	0	0	0	1	0	113	120	0.6	0.6	1.039
F09B	III	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	4	13	0.1	0.1	1.690
F10A	I	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	21	23	0.3	0.3	1.207
F10A	II	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	56	60	0.7	0.6	0.910
F10A	III	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	4	9	0.1	0.1	1.069
F10B	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	9	10	0.2	0.3	1.690
F10B	II	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	33	38	0.7	0.6	0.875
F10B	III	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	8	0.1	0.1	0.732
F11	I	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	54	61	0.6	0.3	0.539
F11	II	4	0	0	0	2	0	2	0	0	0	0	0	0	0	0	1	0	1	22	35	0.3	0.6	1.849
F11	III	0	0	0	4	0	1	0	2	0	0	0	0	1	0	0	2	0	0	1	13	0.1	0.1	0.877
F12	I	4	0	0	2	5	3	2	0	0	0	0	0	0	0	0	0	0	1	42	61	0.5	0.3	0.554
F12	II	2	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	38	43	0.4	0.6	1.546
F12	III	1	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	0.1	0.1	1.464
F13A	I	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	34	37	0.5	0.3	0.669
F13A	II	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	35	41	0.5	0.6	1.187
F13A	III	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	4	0.0	0.1	2.144
F13B	I	2	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	44	49	0.6	0.3	0.517
F13B	II	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	29	32	0.4	0.6	1.558
F13B	III	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.0	0.1	2.929
F14	I	1	0	0	1	0	3	0	0	0	0	0	0	0	1	0	2	0	0	46	55	0.5	0.3	0.614
F14	II	1	1	0	0	1	0	0	0	0	0	0	0	1	0	0	3	0	0	33	40	0.4	0.6	1.662
F14	III	4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	6	17	0.2	0.1	0.689
F15	I	3	0	0	1	1	1	0	0	0	1	0	0	0	0	0	3	0	0	44	54	0.3	0.3	1.073
F15	II	0	0	0	0	0	3	0	1	0	0	0	0	0	2	0	1	0	0	100	107	0.6	0.6	1.065
F15	III	3	1	0	1	1	5	0	2	0	3	0	0	1	0	1	2	0	0	8	31	0.2	0.1	0.648
F16A/B	I	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	33	35	0.6	0.3	0.500
F16A/B	II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	18	0.3	0.6	1.913
F16A/B	III	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0.1	0.1	1.213

Table 5.8 (continued).

Unit	Phase	STANDARDIZED COUNTS																			Row Totals	
		1	2	3	4	5	6	7	8	9	14	16	18	20	21	37	40	41	43	51	n	P
F01	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.5	17.5	30.2
F01	II	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	28.7	34.4	59.4
F01	III	1.5	0.0	0.0	0.0	0.8	0.0	0.0	0.4	0.0	0.0	0.0	1.1	0.0	0.4	0.0	0.0	0.0	0.0	0.8	6.1	10.5
F02	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	18.1	30.2
F02	II	0.0	0.0	0.0	0.0	0.8	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.8	35.6	59.4
F02	III	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	1.3	6.3	10.5
F03	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	12.4	30.2
F03	II	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5	24.4	59.4
F03	III	1.4	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	4.3	10.5
F04	I	0.0	0.0	0.0	0.8	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.4	0.0	0.0	15.1	23.5	30.2
F04	II	0.0	0.0	3.2	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	39.9	46.3	59.4
F04	III	0.8	0.4	1.2	0.4	0.0	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.4	0.8	0.0	1.2	0.0	0.0	1.9	8.1	10.4
F05	I	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	10.0	13.6	30.2
F05	II	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.6	26.7	59.4
F05	III	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.8	0.0	1.6	0.0	0.0	0.8	4.7	10.5
F06	I	0.0	0.0	0.0	1.5	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.9	25.3	30.2
F06	II	0.0	0.0	0.9	0.0	0.0	1.8	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	41.1	49.9	59.4
F06	III	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	8.8	10.5
F07	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	17.2	30.2
F07	II	0.0	0.0	0.0	0.0	0.0	3.3	0.0	1.1	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.1	0.0	27.3	33.9	59.4
F07	III	0.5	0.5	0.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	1.8	6.0	10.5
F08A-D	I	1.4	0.0	1.4	0.0	0.0	14.4	0.0	2.9	0.0	2.9	0.0	0.0	0.0	2.9	1.4	1.4	4.3	0.0	267.1	320.2	30.2
F08A-D	II	11.6	0.8	1.7	0.0	2.5	13.3	0.0	0.0	0.0	4.2	0.0	0.0	1.7	2.5	2.5	7.5	0.8	2.5	568.3	629.8	59.4
F08A-D	III	12.3	0.0	1.4	1.4	0.0	5.5	1.4	1.4	0.0	5.5	0.0	0.0	5.5	0.0	0.0	23.3	0.0	1.4	48.0	111.0	10.5
F09A	I	0.0	0.0	0.0	1.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	1.1	1.1	0.0	0.0	1.1	0.0	0.0	36.0	46.2	30.2
F09A	II	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	81.1	90.8	59.4
F09A	III	2.7	0.9	0.0	0.9	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	3.6	0.0	0.0	4.4	16.0	10.5
F09B	I	0.0	0.0	0.0	0.0	0.0	4.1	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	55.1	63.4	30.2
F09B	II	0.0	0.0	1.0	0.0	0.0	3.1	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	117.4	124.7	59.4
F09B	III	6.8	1.7	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	6.8	22.0	10.5
F10A	I	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.3	27.8	30.2
F10A	II	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.9	0.0	51.0	54.6	59.4
F10A	III	1.1	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	4.3	9.6	10.5
F10B	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	15.2	16.9	30.2
F10B	II	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.9	33.3	59.4
F10B	III	0.7	0.0	0.7	0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	5.9	10.5
F11	I	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	29.1	32.9	30.2
F11	II	7.4	0.0	0.0	0.0	3.7	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	40.7	64.7	59.4
F11	III	0.0	0.0	0.0	3.5	0.0	0.9	0.0	1.8	0.0	0.0	0.0	0.0	0.9	0.0	0.0	1.8	0.0	0.0	0.9	11.4	10.5
F12	I	2.2	0.0	0.0	1.1	2.8	1.7	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	23.3	33.8	30.2
F12	II	3.1	0.0	0.0	0.0	3.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.7	66.5	59.4
F12	III	1.5	0.0	1.5	1.5	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	11.7	10.5
F13A	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.7	24.8	30.2
F13A	II	1.2	0.0	0.0	1.2	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	41.5	48.7	59.4
F13A	III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	4.3	8.6	10.5
F13B	I	1.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	22.7	25.3	30.2
F13B	II	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	45.2	49.9	59.4
F13B	III	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	8.8	10.5
F14	I	0.6	0.0	0.0	0.6	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.2	0.0	0.0	28.2	33.8	30.2
F14	II	1.7	1.7	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	5.0	0.0	0.0	54.8	66.5	59.4
F14	III	2.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	2.1	0.0	0.0	4.1	11.7	10.5
F15	I	3.2	0.0	0.0	1.1	1.1	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	47.2	57.9	30.2
F15	II	0.0	0.0	0.0	0.0	0.0	3.2	0.0	1.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0	1.1	0.0	0.0	106.5	114.0	59.4
F15	III	1.9	0.6	0.0	0.6	0.6	3.2	0.0	1.3	0.0	1.9	0.0	0.0	0.6	0.0	0.6	1.3	0.0	0.0	5.2	20.1	10.5
F16A/B	I	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.5	17.5	30.2
F16A/B	II	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.4	34.4	59.4
F16A/B	III	1.2	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	6.1	10.5

Table 5.9. Percentage of standardized counts of 19 lithic tool types for 22 households at Fushanzhuang.

Collection	1	2	3	4	5	6	7	8	9*	14	16	18	20	21*	37	40	41	43	51
F01	2.6	0.0	0.0	0.0	1.3	1.6	0.0	0.7	0.0	0.0	0.0	2.0	0.0	0.7	1.6	0.0	0.0	0.0	81.0
F02	0.0	0.0	0.0	0.0	1.4	7.7	0.0	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	78.0
F03	3.5	0.0	1.7	0.0	0.0	4.8	0.0	4.8	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	79.4
F04	1.0	0.5	5.6	1.6	0.0	3.6	0.0	0.5	0.0	0.0	0.0	0.0	0.5	1.0	1.1	7.9	0.0	0.0	73.1
F05	2.5	0.0	0.0	0.0	1.7	2.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	1.7	0.0	5.5	0.0	0.0	80.8
F06	0.0	0.0	1.0	2.8	0.0	5.6	0.0	0.0	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	78.0
F07	0.8	0.8	0.0	0.8	0.8	6.6	0.0	1.9	0.0	0.0	0.0	0.8	1.9	0.0	0.0	0.8	1.9	0.0	81.3
F08A-D	2.4	0.1	0.4	0.1	0.2	3.1	0.1	0.4	0.0	1.2	0.0	0.0	0.7	0.5	0.4	3.0	0.5	0.4	83.3
F09A	1.7	0.6	0.0	1.3	0.6	2.6	0.0	0.0	0.0	0.0	0.6	0.7	0.7	1.2	0.0	3.7	0.0	0.0	79.5
F09B	3.2	0.8	0.5	0.0	0.0	4.2	0.4	0.9	0.0	0.0	0.0	0.5	0.0	0.0	0.4	1.6	0.5	0.0	85.4
F10A	1.2	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	2.5	1.0	0.0	0.0	0.0	0.0	2.3	1.0	0.0	87.6
F10B	1.3	0.0	1.3	1.3	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	82.6
F11	6.8	0.0	0.0	3.2	3.4	1.3	3.4	2.1	0.0	0.0	0.0	0.0	0.8	0.0	0.5	3.3	0.0	1.7	64.8
F12	6.0	0.0	1.3	2.3	7.8	2.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	75.9
F13A	1.4	0.0	0.0	1.4	0.0	0.0	0.0	0.8	1.4	4.2	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0	83.6
F13B	6.6	0.0	0.0	0.0	0.0	0.6	0.0	0.6	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.6	0.0	0.0	84.4
F14	4.5	2.1	0.0	0.5	1.5	1.6	0.0	0.0	0.0	0.0	0.0	0.6	1.5	0.5	0.0	7.4	0.0	0.0	77.9
F15	2.7	0.3	0.0	0.9	0.9	3.9	0.0	1.2	0.0	1.6	0.0	0.0	0.3	1.1	0.3	2.9	0.0	0.0	82.8
F16A/B	2.1	0.0	0.0	2.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.9
JG	7.9	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	2.6	0.0	0.0	73.7
SGC2	8.3	0.0	0.0	0.0	0.0	16.7	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	4.2	8.3	0.0	0.0	41.7
SGC3	16.7	0.0	0.0	6.7	0.0	10.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	36.7

Table 5.10. Information on stone tools from JG, SGC2, and SGC3 used in MDS and typological debitage analyses.

Unit	TOOL COUNTS																				TOOL CONDITION				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**14**	**16**	**18**	**20**	**21**	**37**	**40**	**41**	**43**	**51**	**Other**	**Total**	**1**	**2**	**3**	**4**	**Total**
JG	3	0	0	0	0	3	0	0	0	0	2	0	0	0	0	1	0	0	28	1	38	5	12	4	11	**32**
SGC2	4	0	0	0	0	8	0	1	0	0	0	0	0	0	2	4	0	0	20	9	48	0	17	3	10	**30**
SGC3	5	0	0	2	0	3	0	1	0	0	0	0	0	0	0	5	0	0	11	3	30	0	12	4	5	**21**
Unit	**% TOOL COUNTS**																				**% TOOL CONDITION**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**14**	**16**	**18**	**20**	**21**	**37**	**40**	**41**	**43**	**51**	**Other**	**Total**	**1**	**2**	**3**	**4**	**Total**
JG	7.9	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	2.6	0.0	0.0	73.7	2.6	100.0	15.6	37.5	12.5	34.4	100.0
SGC2	8.3	0.0	0.0	0.0	0.0	16.7	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	4.2	8.3	0.0	0.0	41.7	18.8	100.0	0.0	56.7	10.0	33.3	100.0
SGC3	16.7	0.0	0.0	6.7	0.0	10.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	36.7	10.0	100.0	0.0	57.1	19.0	23.8	100.0

Table 5.11. Production of the nine variable dataset used in our mass debitage/discriminant analysis of lithic reduction stages by household. (Cortex counts from large fraction tools only.)

				Variables for Size Grades 1, 2, and 3																	
	Total	**Total**	**Total**	**Debitage (n)**			**Total Weight (g)**			**Cortex (n)***			**% Debitage**			**% Weight**			**% Cortex**		
Collection	**Debitage**	**Weight**	**Cortex**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
F01	147	218.7	26	9	65	73	66.1	122.5	30.1	8	18	0	6.1	44.2	49.7	30.2	56.0	13.8	30.8	69.2	0.0
F02	83	158.0	23	11	45	27	53.7	88.3	16.0	6	16	1	13.3	54.2	32.5	34.0	55.9	10.1	26.1	69.6	4.3
F03	56	126.3	16	5	38	13	44.4	73.8	8.1	4	12	0	8.9	67.9	23.2	35.2	58.4	6.4	25.0	75.0	0.0
F04	113	147.1	18	10	56	47	42.4	87.7	17.0	4	14	0	8.8	49.6	41.6	28.8	59.6	11.6	22.2	77.8	0.0
F05	52	95.5	7	7	33	12	41.7	48.8	5.0	4	3	0	13.5	63.5	23.1	43.7	51.1	5.2	57.1	42.9	0.0
F06	85	194.0	27	15	47	23	119.6	66.4	8.0	12	13	2	17.6	55.3	27.1	61.6	34.2	4.1	44.4	48.1	7.4
F07	91	269.1	29	12	54	25	135.7	116.3	17.1	12	17	0	13.2	59.3	27.5	50.4	43.2	6.4	41.4	58.6	0.0
F08	1246	1672.5	295	107	710	429	873.3	663.6	135.6	70	202	23	8.6	57.0	34.4	52.2	39.7	8.1	23.7	68.5	7.8
F09A	176	292.1	44	8	116	52	115.9	157.9	18.3	5	35	4	4.5	65.9	29.5	39.7	54.1	6.3	11.4	79.5	9.1
F09B	223	322.8	62	19	139	65	189.2	115.8	17.8	13	45	4	8.5	62.3	29.1	58.6	35.9	5.5	21.0	72.6	6.5
F10A	95	105.5	28	8	59	28	46.7	50.3	8.5	6	19	3	8.4	62.1	29.5	44.3	47.7	8.1	21.4	67.9	10.7
F10B	72	168.4	24	14	34	24	121.6	33.7	13.1	11	12	1	19.4	47.2	33.3	72.2	20.0	7.8	45.8	50.0	4.2
F11	118	466.0	40	23	71	24	310.6	139.4	16.0	16	24	0	19.5	60.2	20.3	66.7	29.9	3.4	40.0	60.0	0.0
F12	116	373.4	52	22	72	22	254	108.0	11.4	17	31	4	19.0	62.1	19.0	68.0	28.9	3.1	32.7	59.6	7.7
F13A	94	235.7	35	14	57	23	166	62.8	6.9	11	21	3	14.9	60.6	24.5	70.4	26.6	2.9	31.4	60.0	8.6
F13B	106	181.0	33	12	58	36	105	64.7	11.3	9	23	1	11.3	54.7	34.0	58.0	35.7	6.2	27.3	69.7	3.0
F14	166	203.1	35	8	88	70	71.2	109.3	22.6	5	30	0	4.8	53.0	42.2	35.1	53.8	11.1	14.3	85.7	0.0
F15	276	418.1	47	17	147	112	122	248.9	47.2	11	31	5	6.2	53.3	40.6	29.2	59.5	11.3	23.4	66.0	10.6
F16A/B	71	165.6	28	12	43	16	79.5	77.1	9.0	11	15	2	16.9	60.6	22.5	48.0	46.6	5.4	39.3	53.6	7.1
JG	32	80.7	11	5	23	4	58.5	21.8	0.4	3	8	0	15.6	71.9	12.5	72.5	27.0	0.5	27.3	72.7	0.0
SGC2	159	500.2	9	9	62	88	247.5	217.9	34.8	9	0	0	5.7	39.0	55.3	49.5	43.6	7.0	100.0	0.0	0.0
SGC3	107	146.8	2	7	33	67	47.8	66.1	32.9	2	0	0	6.5	30.8	62.6	32.6	45.0	22.4	100.0	0.0	0.0
Totals	**3684**	**6540.6**																			

Table 5.12. Raw counts of four debitage types for 22 households used in technological analysis of lithic reduction at Fushanzhuang (1=complete flake; 2= prox. flake; 3= med./dist. flake; 4= shatter).

Collection	Phase	Tool Condition				Grid	P Grid	FSZ	P FSZ	Ratio	STANDARDIZED COUNTS				Row Totals	
		1	2	3	4	Totals	Totals	Totals	Totals		1	2	3	4	n	P
F01	I	10	5	1	2	18	0.4	739	0.31	0.71	7.1	3.6	0.7	1.4	12.8	30.6
F01	II	6	5	2	8	21	0.5	1497	0.62	1.24	7.4	6.2	2.5	9.9	26.0	62.0
F01	III	2	1	0	0	3	0.1	180	0.07	1.04	2.1	1.0	0.0	0.0	3.1	7.5
F02	I	7	3	0	2	12	0.3	739	0.31	1.17	8.2	3.5	0.0	2.3	14.1	30.6
F02	II	11	8	4	10	33	0.7	1497	0.62	0.86	9.5	6.9	3.5	8.6	28.5	62.0
F02	III	0	1	0	0	1	0.0	180	0.07	3.43	0.0	3.4	0.0	0.0	3.4	7.5
F03	I	6	2	0	2	10	0.3	739	0.31	1.04	6.2	2.1	0.0	2.1	10.4	30.6
F03	II	8	1	4	7	20	0.6	1497	0.62	1.05	8.4	1.1	4.2	7.4	21.1	62.0
F03	III	3	0	1	0	4	0.1	180	0.07	0.63	1.9	0.0	0.6	0.0	2.5	7.5
F04	I	4	3	11	5	23	0.4	739	0.31	0.86	3.5	2.6	9.5	4.3	19.9	30.6
F04	II	12	1	11	4	28	0.4	1497	0.62	1.44	17.3	1.4	15.8	5.8	40.3	62.0
F04	III	3	6	5	0	14	0.2	180	0.07	0.35	1.0	2.1	1.7	0.0	4.8	7.5
F05	I	6	0	3	3	12	0.3	739	0.31	0.99	6.0	0.0	3.0	3.0	11.9	30.6
F05	II	7	4	3	10	24	0.6	1497	0.62	1.01	7.0	4.0	3.0	10.1	24.2	62.0
F05	III	0	3	0	0	3	0.1	180	0.07	0.97	0.0	2.9	0.0	0.0	2.9	7.5
F06	I	8	2	2	2	14	0.2	739	0.31	1.44	11.5	2.9	2.9	2.9	20.2	30.6
F06	II	17	8	11	12	48	0.7	1497	0.62	0.85	14.5	6.8	9.4	10.2	40.9	62.0
F06	III	2	2	0	0	4	0.1	180	0.07	1.23	2.5	2.5	0.0	0.0	4.9	7.5
F07	I	6	2	3	2	13	0.3	739	0.31	1.06	6.4	2.1	3.2	2.1	13.8	30.6
F07	II	11	2	2	10	25	0.6	1497	0.62	1.12	12.3	2.2	2.2	11.2	27.9	62.0
F07	III	5	1	0	1	7	0.2	180	0.07	0.48	2.4	0.5	0.0	0.5	3.4	7.5
F08	I	70	38	40	44	192	0.2	739	0.31	1.54	107.9	58.6	61.7	67.9	296.1	30.6
F08	II	208	201	195	107	711	0.7	1497	0.62	0.84	175.5	169.6	164.5	90.3	599.8	62.0
F08	III	4	40	20	1	65	0.1	180	0.07	1.11	4.4	44.4	22.2	1.1	72.1	7.5
F09A	I	11	6	9	6	32	0.2	739	0.31	1.28	14.1	7.7	11.5	7.7	41.0	30.6
F09A	II	33	14	18	24	89	0.7	1497	0.62	0.93	30.8	13.1	16.8	22.4	83.0	62.0
F09A	III	3	4	6	0	13	0.1	180	0.07	0.77	2.3	3.1	4.6	0.0	10.0	7.5
F09B	I	16	18	19	15	68	0.4	739	0.31	0.87	13.9	15.6	16.5	13.0	59.0	30.6
F09B	II	33	31	26	24	114	0.6	1497	0.62	1.05	34.6	32.5	27.3	25.2	119.6	62.0
F09B	III	4	6	1	0	11	0.1	180	0.07	1.31	5.2	7.8	1.3	0.0	14.4	7.5
F10A	I	7	5	5	4	21	0.2	739	0.31	1.24	8.7	6.2	6.2	5.0	26.0	30.6
F10A	II	17	14	14	12	57	0.7	1497	0.62	0.92	15.7	12.9	12.9	11.1	52.7	62.0
F10A	III	1	5	1	0	7	0.1	180	0.07	0.90	0.9	4.5	0.9	0.0	6.3	7.5
F10B	I	3	0	3	4	10	0.2	739	0.31	1.47	4.4	0.0	4.4	5.9	14.7	30.6
F10B	II	13	7	3	10	33	0.7	1497	0.62	0.90	11.7	6.3	2.7	9.0	29.7	62.0
F10B	III	3	2	0	0	5	0.1	180	0.07	0.72	2.1	1.4	0.0	0.0	3.6	7.5
F11	I	27	9	6	13	55	0.6	739	0.31	0.48	12.9	4.3	2.9	6.2	26.3	30.6
F11	II	12	4	2	10	28	0.3	1497	0.62	1.90	22.8	7.6	3.8	19.0	53.3	62.0
F11	III	1	1	1	0	3	0.0	180	0.07	2.14	2.1	2.1	2.1	0.0	6.4	7.5
F12	I	20	10	4	13	47	0.5	739	0.31	0.59	11.7	5.9	2.3	7.6	27.5	30.6
F12	II	21	8	1	9	39	0.4	1497	0.62	1.43	30.0	11.4	1.4	12.9	55.8	62.0
F12	III	3	0	1	0	4	0.0	180	0.07	1.68	5.0	0.0	1.7	0.0	6.7	7.5
F13A	I	20	6	4	4	34	0.5	739	0.31	0.67	13.3	4.0	2.7	2.7	22.6	30.6
F13A	II	21	7	4	5	37	0.5	1497	0.62	1.24	26.0	8.7	5.0	6.2	45.9	62.0
F13A	III	0	3	0	0	3	0.0	180	0.07	1.84	0.0	5.5	0.0	0.0	5.5	7.5
F13B	I	25	12	5	5	47	0.6	739	0.31	0.52	13.0	6.2	2.6	2.6	24.5	30.6
F13B	II	12	5	5	9	31	0.4	1497	0.62	1.60	19.2	8.0	8.0	14.4	49.6	62.0
F13B	III	1	1	0	0	2	0.0	180	0.07	2.98	3.0	3.0	0.0	0.0	6.0	7.5
F14	I	20	16	7	6	49	0.5	739	0.31	0.64	12.9	10.3	4.5	3.9	31.5	30.6
F14	II	12	14	2	11	39	0.4	1497	0.62	1.64	19.6	22.9	3.3	18.0	63.8	62.0
F14	III	5	4	5	1	15	0.1	180	0.07	0.51	2.6	2.0	2.6	0.5	7.7	7.5
F15	I	18	22	9	0	49	0.3	739	0.31	1.03	18.5	22.7	9.3	0.0	50.5	30.6
F15	II	30	22	31	18	101	0.6	1497	0.62	1.01	30.4	22.3	31.4	18.2	102.2	62.0
F15	III	2	6	7	0	15	0.1	180	0.07	0.82	1.6	4.9	5.7	0.0	12.3	7.5
F16A/B	I	16	5	9	3	33	0.6	739	0.31	0.49	7.9	2.5	4.4	1.5	16.2	30.6
F16A/B	II	7	5	4	3	19	0.4	1497	0.62	1.73	12.1	8.6	6.9	5.2	32.8	62.0
F16A/B	III	1	0	0	0	1	0.0	180	0.07	3.95	3.9	0.0	0.0	0.0	3.9	7.5

Table 5.13. Percentages of standardized counts of four debitage types for 22 households used in technological analysis of lithic reduction at Fushanzhuang.

Surface	Percentage of Standarized Counts			
Collection	Shatter	Broken Flakes	Flake Fragments	Complete Flakes
F01	27.0	25.7	7.6	39.7
F02	23.9	30.1	7.5	38.5
F03	27.8	9.2	14.3	48.7
F04	15.5	9.4	41.6	33.5
F05	33.5	17.8	15.4	33.4
F06	19.9	18.4	18.6	43.1
F07	30.6	10.7	12.0	46.7
F08	16.4	28.2	25.7	29.7
F09A	22.4	17.8	24.6	35.2
F09B	19.8	29.0	23.4	27.8
F10A	18.9	27.8	23.6	29.7
F10B	31.0	16.1	14.8	38.1
F11	29.4	16.3	10.2	44.1
F12	22.8	19.2	6.1	52.0
F13A	12.0	24.6	10.3	53.2
F13B	21.2	21.5	13.2	44.0
F14	21.7	34.2	10.0	34.0
F15	11.0	30.2	28.1	30.6
F16A/B	12.6	20.9	21.4	45.1
JG	15.6	37.5	12.5	34.4
SGC2	0.0	56.7	10.0	33.3
SGC3	0.0	57.1	19.0	23.8

Table 5.14. Lithic artifacts recovered from funerary/monumental contexts at Fushanzhuang.

		Tool Type													
		1		6		8		9		14		39		51	
Context	Total	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Z1	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
Z2	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
Z3	10	0	0.0	3	30.0	1	10.0	0	0.0	0	0.0	1	10.0	6	60.0
Z4	12	1	8.3	1	8.3	1	8.3	0	0.0	1	8.3	0	0.0	8	66.7
Z5	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
Z6	1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
M1	2	0	0.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	1	50.0

Table 5.15. Lithic spot finds made at Fushanzhuang.

		Tool Type													
		1		4		6		8		9		14		51	
Context	**Total**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
SF1	1	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
SF2	1	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
SF3	1	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
SF4	2	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	1	50.0
SF5	1	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0
SF6	3	0	0.0	0	0.0	1	33.3	0	0.0	0	0.0	1	33.3	1	33.3
SF7	3	1	33.3	0	0.0	2	66.7	0	0.0	0	0.0	0	0.0	0	0.0

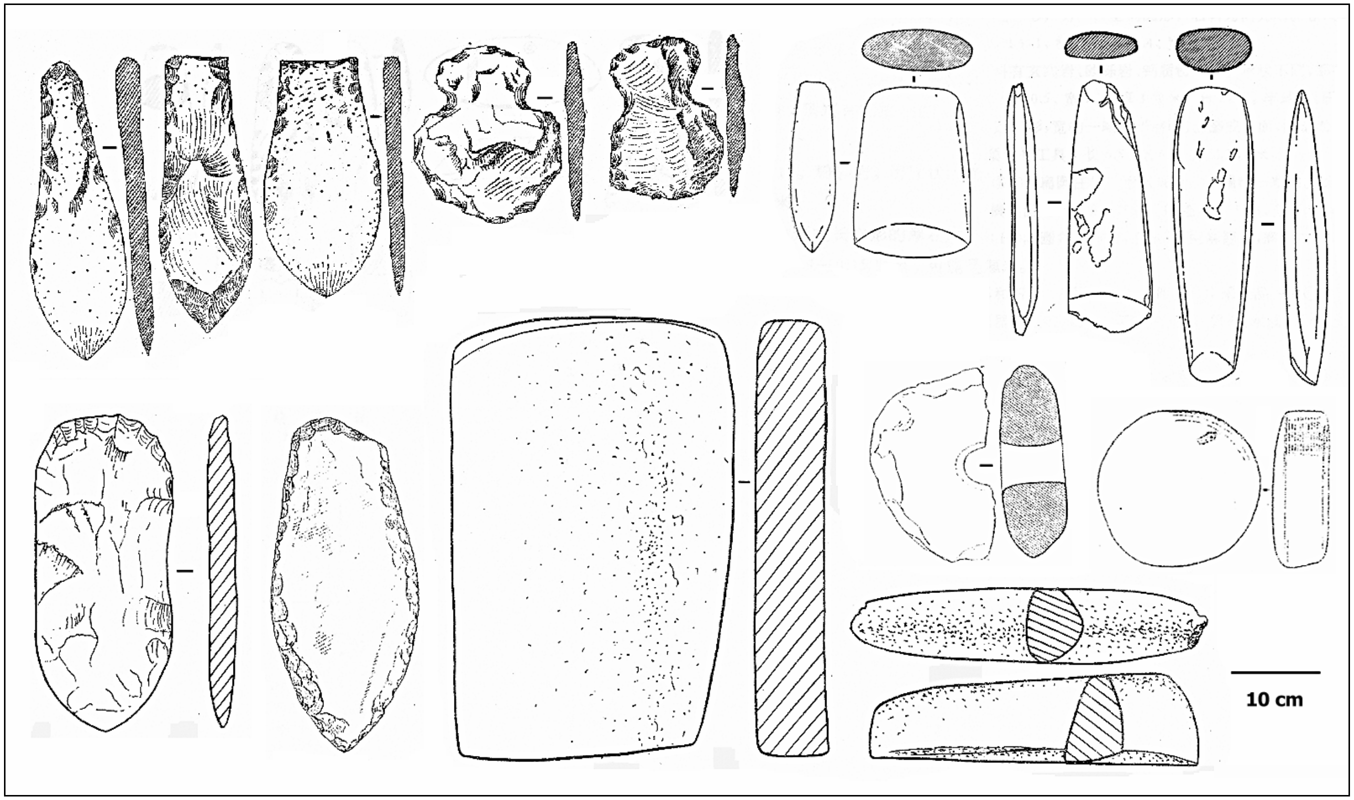


Figure 5.1. Large Hongshan period agricultural tools (redrawn with modification from Balinyou 1987:511, figure 6; Hamada and Mizuno 1938:80, figure 60, and figures 49 and 50; Neimenggu 1994a:104, 109, figures 8 and 11; Zhongguo 1982:185, 187, figures 3 and 4).

Figure 5.2. Examples of stone shovel/hoe/plow fragments from Fushanzhuang.

Figure 5.3. Examples of ground stone slabs (left) and rollers (right) from Fushanzhuang.

Figure 5.4. Examples of stone axes/adzes bits from Fushanzhuang.

Figure 5.5. Stone tool “blanks” or preforms from Fushanzhuang.

Figure 5.6. A large grooved abrader from Fushanzhuang.

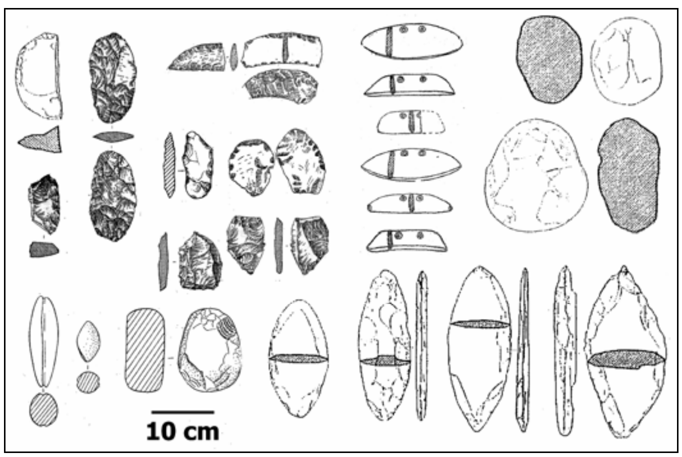


Figure 5.7. Small Hongshan period agricultural and other subsistence-related tools (redrawn with modification from Balinyou 1987:511–513, figures 6, 7, and 9; Hamada and Mizuno 1938, figures 48–50; Liaoning 2001:19, figure 6; Neimenggu 1994a:104, 106, figures 8 and 9; Zhongguo 1982:189, figure 5).

Figure 5.8. Examples of ovate stone knives from Fushanzhuang.

Figure 5.9. Examples of stone choppers (left) and scrapers (right) from Fushanzhuang.

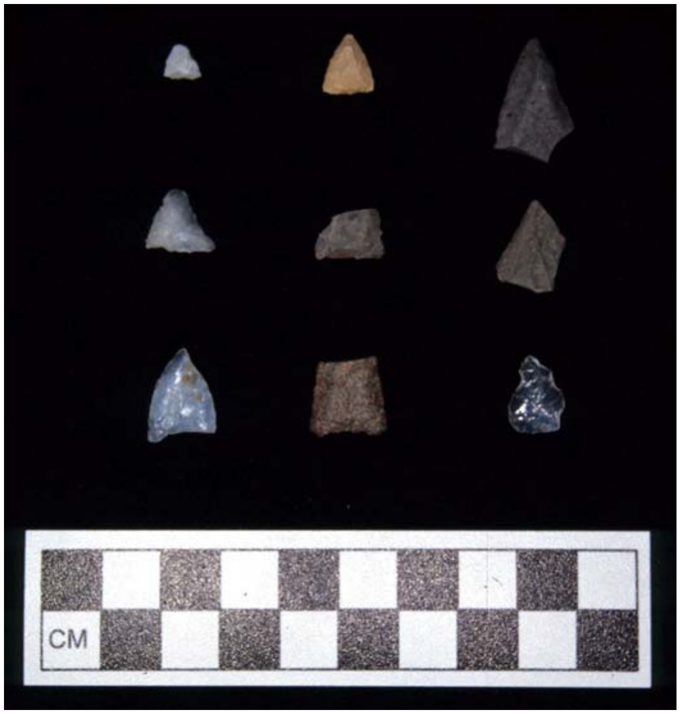


Figure 5.10. Examples of stone projectile points from Fushanzhuang.

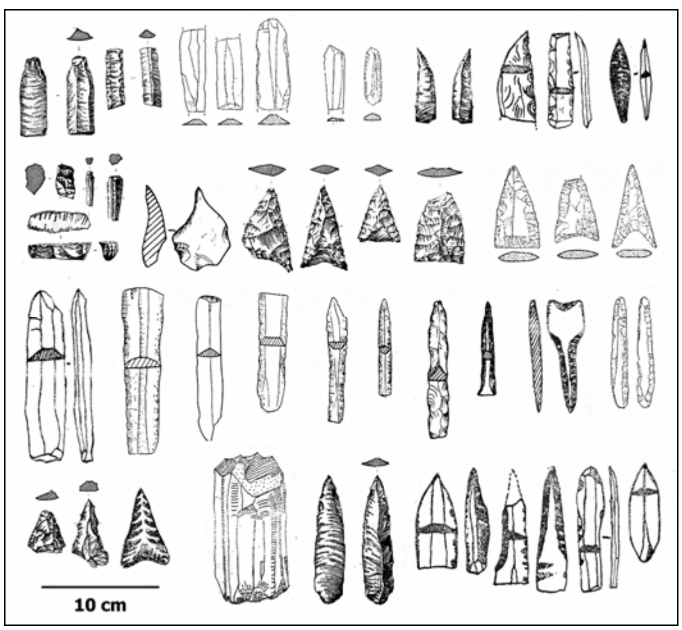


Figure 5.11. Hongshan period “microlithic” tools (redrawn with modification from Balinyou 1987:511, 513, figures 6 and 9; Hamada and Mizuno 1938:53, figure 45; Liaoning 2001:19, figure 6; Neimenggu 1994a:110, figure 12; Zhongguo 1982:189, figure 5).

Figure 5.12. Examples of blades (top left), blade cores (top right), and flake cores (bottom) from Fushanzhuang.

Figure 5.13. Examples of hammerstones from Fushanzhuang.

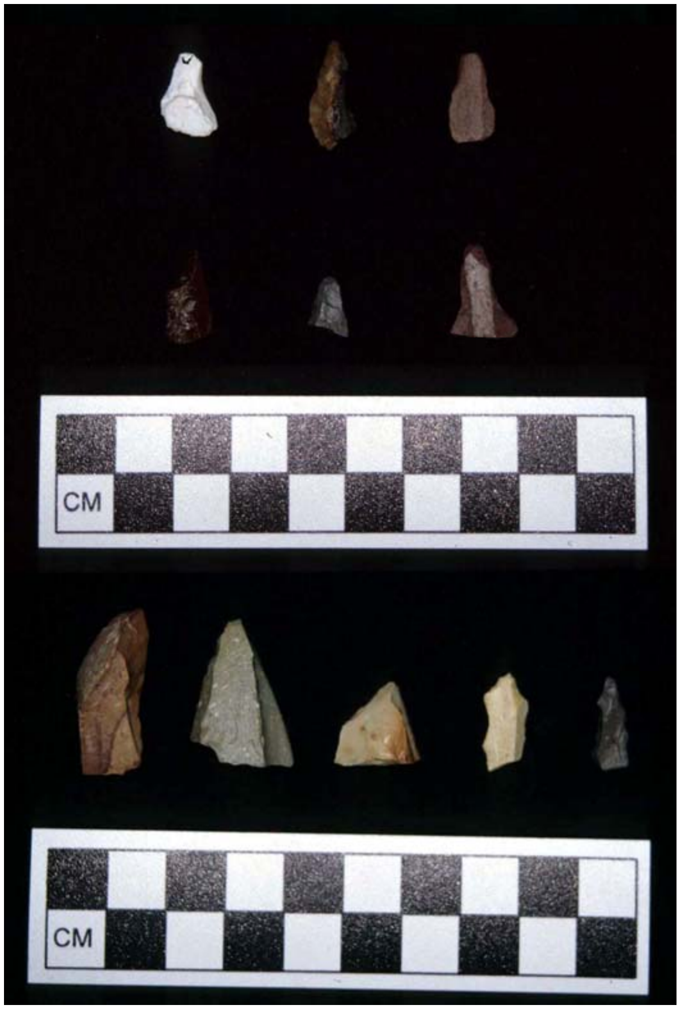


Figure 5.14. Examples of awls (top) and gravers (bottom) from Fushanzhuang.

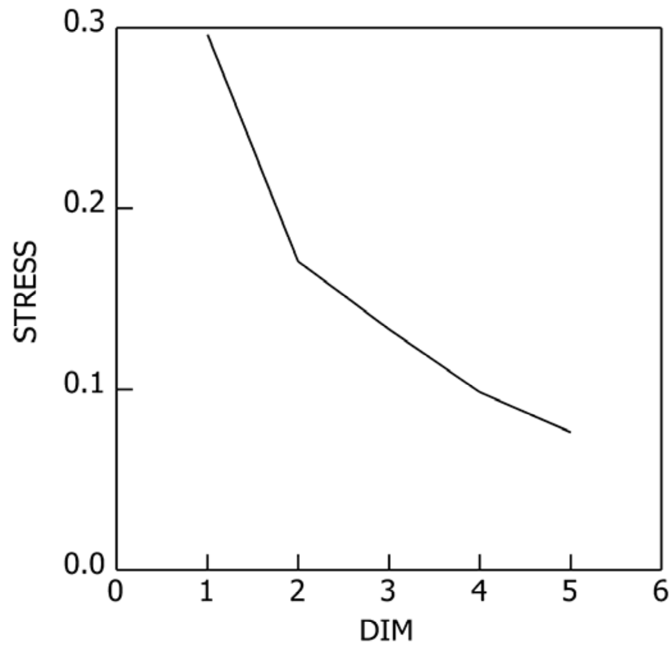


Figure 5.15. Graph of Kruskal stress values associated with MDS solutions of differing dimensions for lithic artifacts from 19 grid-based and 3 general surface collections.

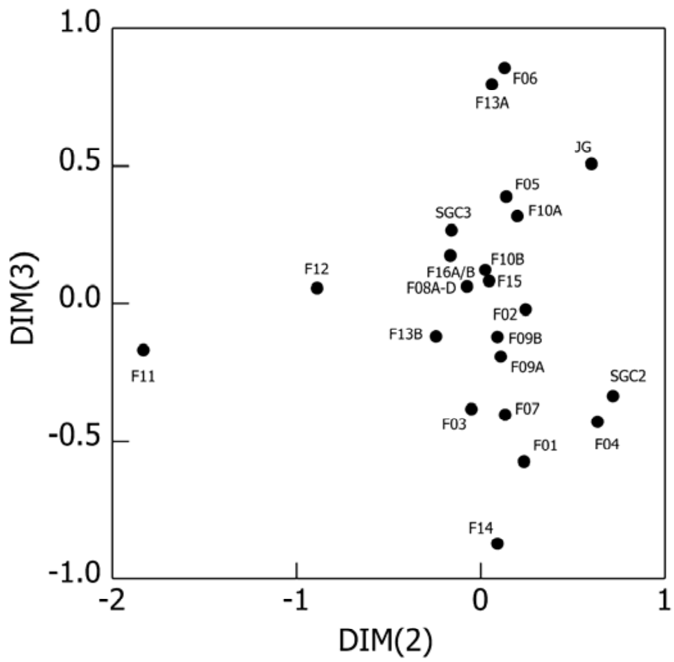


Figure 5.16. MDS plot of dimension 2 against dimension 3 for a four-dimensional solution of lithic artifacts from 19 grid-based and 3 general surface collections.

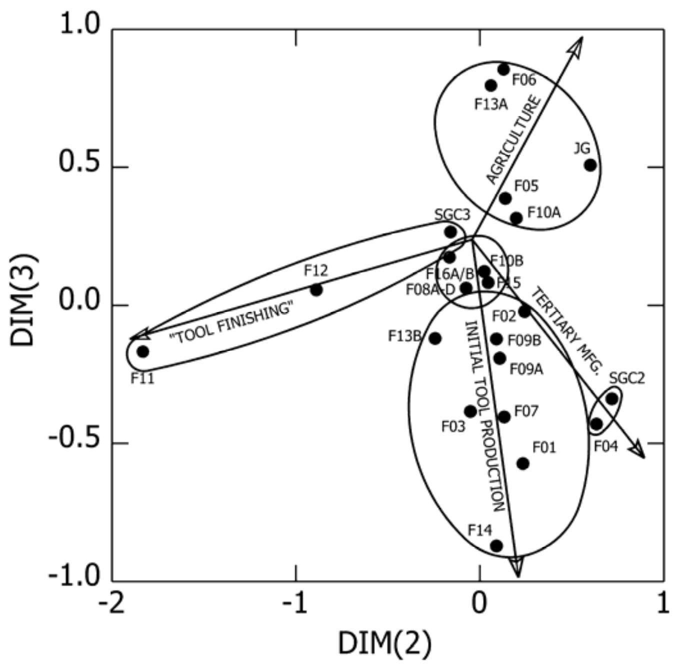


Figure 5.17. Illustration of five household economic emphases at Fushanzhuang as determined through MDS analysis of surface-collected lithic artifact assemblages.

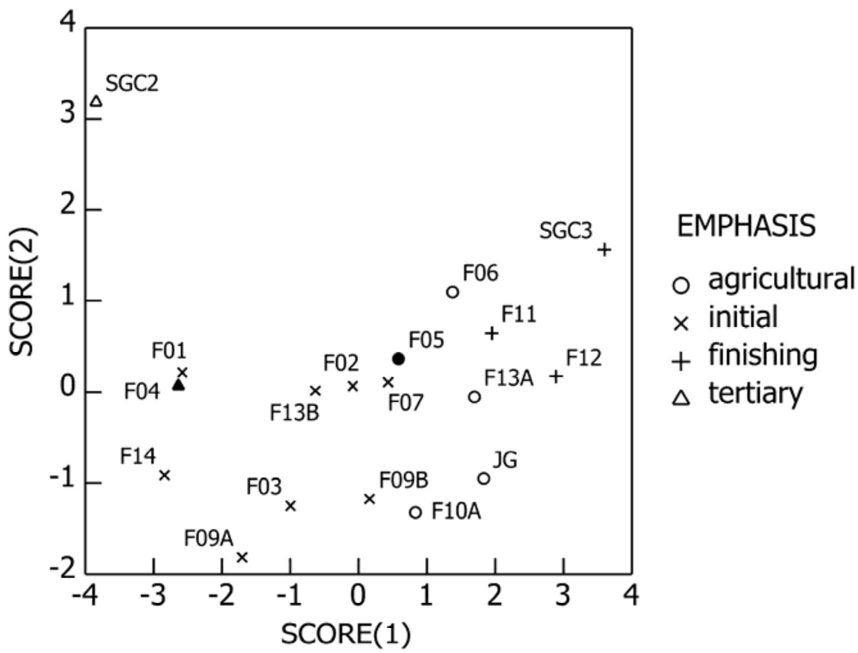


Figure 5.18. Canonical plot of discriminant function 1 against function 2 based on aggregate debitage for 18 households at Fushanzhuang. Discriminant ellipses not shown. Symbols indicate a priori groups based on previous MDS analysis. Misclassified households are shown with solid symbols (F04 and F05).

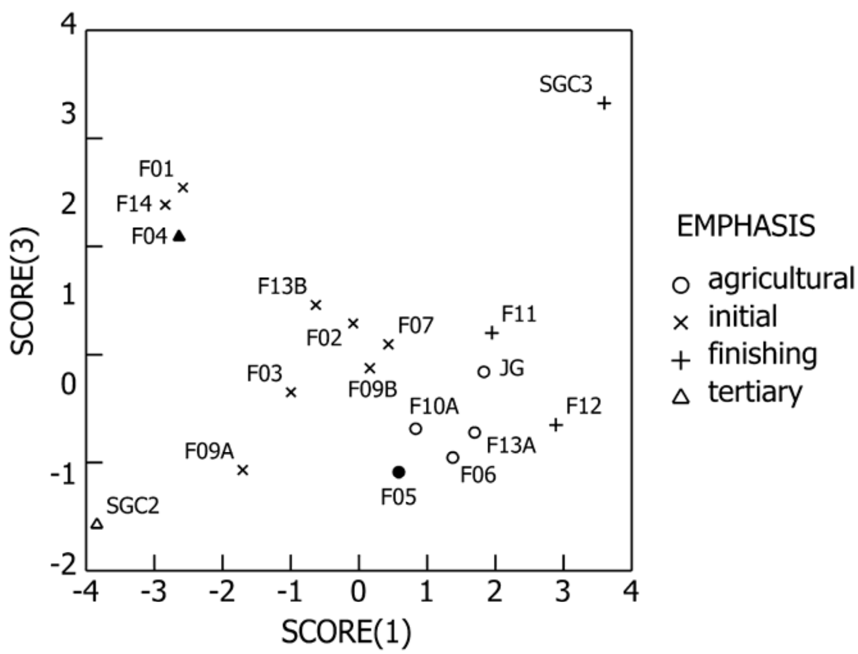


Figure 5.19. Canonical plot of discriminant function 1 against function 3 based on aggregate debitage for 18 households at Fushanzhuang. See Figure 5.19 caption for key to symbols.

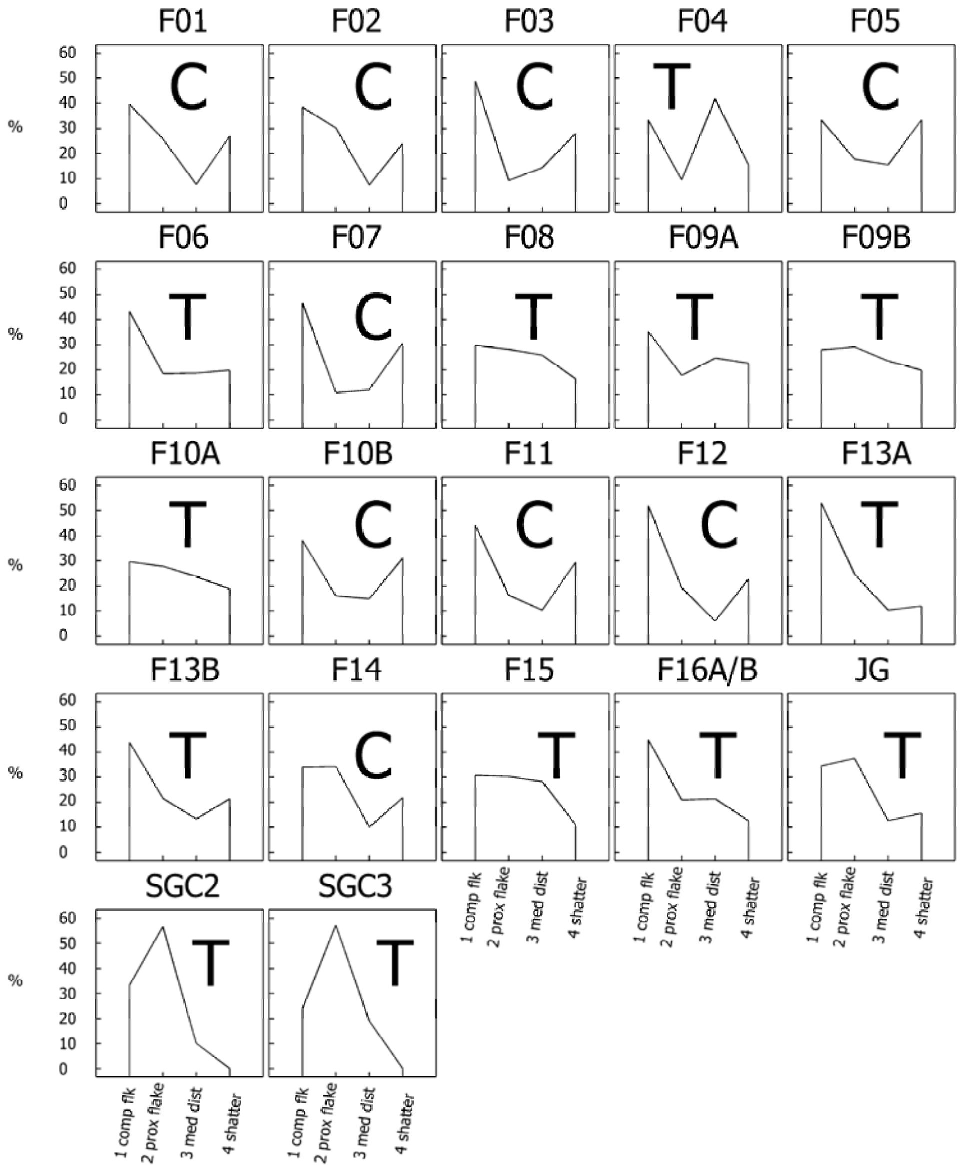


Figure 5.20. Profile plots of difference in the standardized proportions of debitage types for 22 households at Fushanzhuang (C= “core reduction”; T= “tool production”).

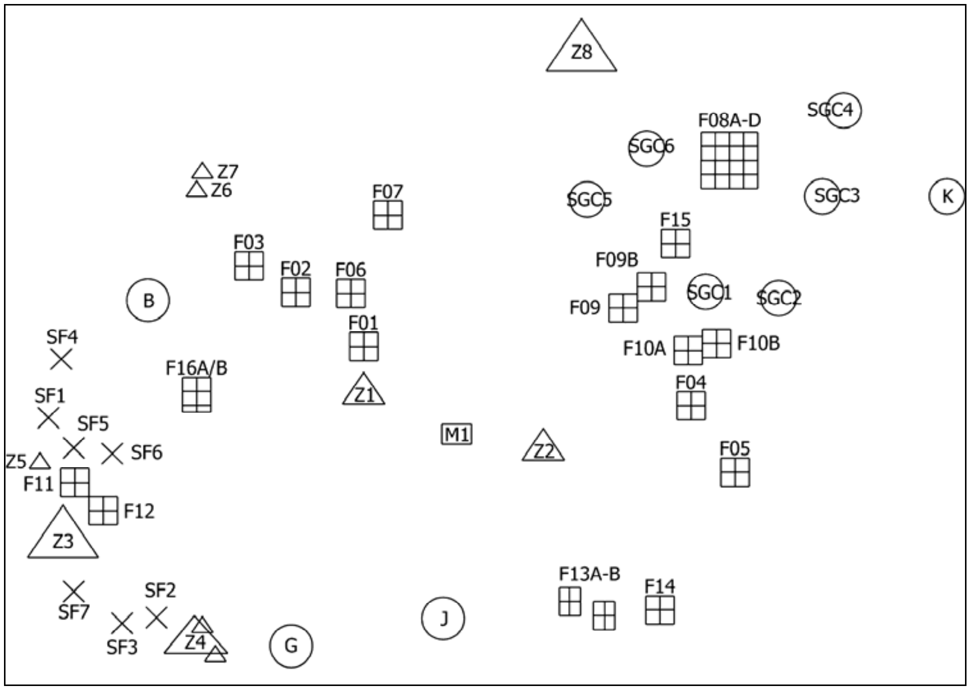


Figure 5.21. Locations of lithic spot finds (SFs) made at Fushanzhuang.

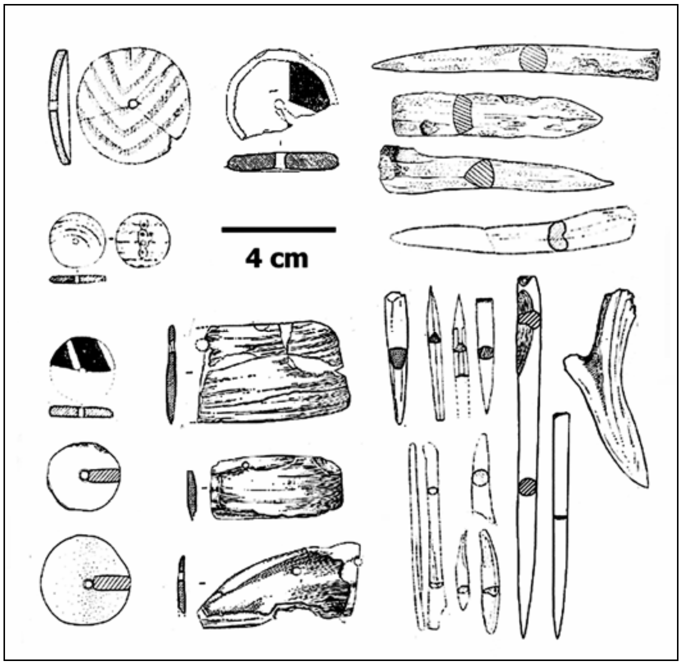


Figure 5.22. Non-lithic Hongshan period tools (redrawn with modification from Balinyou 1987:513, figure 9; Hamada and Mizuno 1938, figure 50; Li 1984:20, figure 6; Liaoning 2001:19, figure 6; Neimenggu 1994a:104, 110, figures 8 and 12; Zhongguo 1982:185, 187, figures 3 and 4).

Figure 5.23. An example of a ceramic spindle whorl from Fushanzhuang.

6. EVIDENCE FOR STATUS HIERARCHY AT FUSHANZHUANG

Hongshan period central place communities in the Chifeng, and other regions, may have emerged as their constituent households became increasingly economically specialized and interdependent, engaged in activities similar to those for which monumental public architecture was commonly built, and/or as a means of providing the labor necessary for their construction. That the residents of these communities were organized according to a system of social ranking is confirmed by three principal kinds of evidence from Fushanzhuang, including: (1) funerary monuments; (2) uneven frequencies of certain ceramic artifacts and their attributes across households; and (3) uneven frequencies of personal ornaments across households. We also consider the possibility that differences in household location relative to each other and to specific architectural features of the core community may reflect differences in their residents' social standing.

6.1. MORTUARY AND OTHER MONUMENTAL EVIDENCE

Eight stone and earthen mounds were identified during fieldwork at Fushanzhuang (Figure 6.1). All were badly disturbed, and numerous sherds were eroding from all but a few of them. We carefully collected all the sherds visible on the surfaces of these mounds, as well as their surrounding areas, so long as they were not adjacent to identified households (to prevent mixing of these assemblages). Prior to collection the vegetation covering each mound, and at the base of each, was removed or substantially reduced to increase visibility. Every attempt was made to remove this vegetation without disturbing the surfaces of the mounds themselves. Only artifacts on or eroding from the mounds' surfaces were collected. Ceramics dating to the Hongshan period were recovered from the surfaces of all of these mounds (Z1–Z8). We believe, however, that only six mounds represent Hongshan period burial facilities.

The largest of these mounds, Z8, located at the northern edge of the intensive survey area (and part of another regional collection unit, see Chapter 4), is principally associated with later Lower Xiajiadian and Zhanguo-Han period material, so the small numbers of Hongshan ceramics recovered (less than 8% of the total sherds) were probably introduced as fill from nearby Hongshan occupation during its construction. Another mid-sized mound, Z2, we believe to be a non-funerary ceremonial construction of some kind—perhaps of the sort often labeled "altars" in the Hongshan literature (Figure 6.2). Unlike the mounds we have designated as burial facilities, Z2 does not incorporate basalt boulders into its construction, nor did it have very many sherds eroding from its surface. Only six fine paste, but otherwise undecorated Hongshan period sherds were found in association. These sherds are not similar in color or thickness to those from tongxingqi funerary cylinders associated with two of the large and mid-sized Hongshan period mounds (Z1 and Z3). In addition, Z2 had been badly disturbed by looters over the years—a large tunnel had been dug into and beneath it, directly through where a burial chamber ought to be located, were one present. The backdirt of these illicit excavations contained no artifacts or large stone slabs that would suggest the presence of a burial chamber. Reconnaissance of the interior of the mound itself also yielded no traces of artifacts or of human bone.

Z2 is similar in size to the burial mound Z1, and situated on the same level terrace of the site. The distance between them is nearly identical to that which separates the much larger Z3 and Z4 mounds arrayed along the southern face of the site (Figure 6.1). Three much smaller mounds were located along the western boundary of the settlement—Z5 along the southern face to the west of Z3, and the closely-spaced Z6 and Z7 to the northwest of Z1. Very few ceramics were recovered from any of these three smallest mounds. The discovery during survey of a disturbed non-mound (high status) pit burial (M1, see below) placed equidistantly between Z1 and Z2, seems to indicate that Fushanzhuang's elite dead were buried in one of two parallel lines on the largest level terraces of the lower part of the site. The large central area of the lower settlement between Z1, M1, and Z2 to the north, and Z3 and Z4 to the south, was devoid of concentrations of surface artifacts (see also Figure 6.27). Although not particularly level, the lack of domestic refuse suggests that this area may have been reserved by Fushanzhuang's Hongshan period inhabitants for non-residential purposes—perhaps as a "plaza" (guangchang) for viewing ceremonies conducted atop the Z1–Z4 burial mounds and/or altars. This plaza is large enough to have accommodated all 200-plus estimated inhabitants of the Fushanzhuang higher-order community at once.

We believe that differences in the size, location, and ceramic artifact assemblages associated with these mounds indicate a hierarchy of graduated statuses within the Fushanzhuang community.

6.1.1. The Large and Mid-Sized Burial Mounds: Z1, Z3, and Z4

These three mounds were constructed of locally obtained basalt boulders and earthen fill. All are badly disturbed, especially Z3, which does appear to have been built with a stone slab burial chamber at its center. Z1, Z3, and Z4 range from 2–3 m in height, and 10–20 m in diameter (Figures 4.3–4.5). Z4 is slightly larger across than Z3 if one includes its two smaller satellite mounds (discussed below), but is not as high. The labor invested in building Z3 and Z4 was probably very similar overall. On the other hand, Z1 is only about half the diameter of that of the other two—although it is similar in height to Z4—so it probably required less labor to construct. In terms of location, too, Z3 and Z4 occupy the most prominent locations within the core community, overlooking the fertile valley bottom below (Figure 6.1). They can be seen from as far away as the middle of the Yin River Valley, including some outlying areas of Hongshan occupation to the south and west of Fushanzhuang. Occupying a higher terrace, but one farther back from the bluffs, Z1 is not visible from the valley below. It is, however, visible from more locations within the core area of the community than either Z3 or Z4.

While isolated examples of Hongshan burial mounds are known, most occur in groups of several mounds and non-funerary platforms or “altars,” as at Fushanzhuang (e.g., Niuheliang, Hutougou, and sites in the Lower Bang and Upper Laohushan river valleys). Public activities performed atop these mounds and platforms, possibly of a ritual nature, could have been seen by very large crowds assembled around them—perhaps entire communities with populations similar to that estimated for Fushanzhuang (see Chapter 4). Besides Fushanzhuang, Shelach (1996, 1997, 1999) located five other Hongshan period mounds during his 1995 survey of the Yin River Valley. All of these are situated west of Fushanzhuang (see Chapter 4, Figure 4.10). Despite the identification by Peterson and Drennan (2005), from 1999–2001 CICARP settlement survey data, of 14 Hongshan period chiefly communities very similar in areal and demographic scale to Fushanzhuang, but located farther to the east (see Chapter 4), no contemporaneous burial mounds have been discovered there. It seems likely, however, that these higher-order communities <u>did</u> construct small burial mounds of the sort described for Fushanzhuang, but that they have all subsequently been destroyed. The more monumental remains of other periods too, are better preserved in the Yin River Valley today than elsewhere in the region, most especially Lower Xiajiadian period walls and associated architecture. The modern regional population, as in premodern times, is concentrated around Chifeng city—the Yin River Valley is comparatively underpopulated. More intensively practiced agriculture, its associated earth-moving activities, and the curiosity of these larger numbers of people to the east of Fushanzhuang are probably most responsible for our hypothesized destruction of Hongshan mounds there—the Yin River Valley examples have not themselves proven immune to these activities.

Large numbers of fine paste cylindrical open-bottomed <u>tongxingqi</u> vessels were found eroding from Z1 and Z3 at Fushanzhuang (Table 6.1; Figure 6.6). This type of vessel is associated exclusively with elite burial mounds and other ritual contexts dating to the late Middle and Late Phase of the Hongshan period. At Niuheliang Locality 2 and Hutougou, these cylinders were arranged in a circle surrounding the central burial chamber of each mound, covered with fill, and then capped with a dressing of stone. It is impossible to know, however, whether the <u>tongxingqi</u> of Z1 and Z3 were similarly arranged, due to these mounds’ current state of disrepair. Nearly all ceramics from Z1, Z3, or Z4 (between 100–500 sherds apiece) are manufactured of fine paste, but most cannot be identified as to vessel type. Nevertheless, we believe that most indeterminate fine paste sherds probably also derive from <u>tongxingqi</u> cylinders. All three mounds have very similar proportions of such indeterminate fine paste ceramics (between 82–92% of all sherds). Thus, it is likely that <u>tongxingqi</u> vessels were also among those incorporated into the Z4 mound. Estimates of the numbers of such vessels associated with five mounds or platforms at Niuheliang (Locality 1, J3, Locality 2, Z1, Z3, and Z4, and Locality 5, Z1) vary from 80–500 (as summarized by Li 2003:161, table 5.11; see also Hua 1994). Unfortunately, we did not attempt to estimate the number of tongxingqi vessels represented in the Fushanzhuang assemblages during analysis, but it seems likely that such an estimate would fall toward or below the low end of this range.

Even so, these numbers suggest a substantial investment in the production and possible elite mobilization of funerary-specific ceramics. As discussed below, we believe these and other ceramics were manufactured locally in outlying areas of the Fushanzhuang community. The shapes of Fushanzhuang's tongxingqi, and the designs with which some were painted, are similar to those of from Niuheliang, Dongshanzui, Chengzishan, and Hutougou (Figure 6.6; Guo and Zhang 1984; Hua 1994; Hua and Yang 1998; Liaoning 1997; Fang and Liu 1984; Li 1986), but there is no reason to assume that these vessels were obtained over such long distances—the energetic costs associated with transport would have been too great (cf. the general arguments of Hayden 1998 with respect to energetics).

Given the low proportion of painted sherds recovered from the surface of Z1 (about 8%), this assemblage probably involved about a third as much investment of labor in decoration as Z3 or Z4 (with about 34% and 28% painted pottery respectively). Similar numbers of painted sherds were recovered from both Z1 and Z4, but more than four times as many were recovered from Z3, so the labor expended in decorating Z3's ceramic assemblage was approximately four times greater than for Z1 or Z4. The Z3 and Z4 assemblages also contain a greater diversity of vessel types, although the proportional representation of these vessels is small. The interment of ceramic vessels other than tongxingqi in Hongshan period burial mounds is uncommon (although small numbers of guan and bo vessels have been recovered from Niuheliang Locality 2 [Z4], Niuheliang Locality 5, Upper Layer [Z2M2], and Hutougou). These were probably placed in the stone slab burial chambers presumed to have been constructed in the center of each mound. Most often, the occupants of Hongshan burial mounds (and of less numerous multi-stepped stone slab pit-burials) were accompanied exclusively by small numbers of large and elaborate jade artifacts (Guo 1997a, 1997b). These jades, often carved to reflect supernatural themes, are considered to be ritual paraphernalia by many (e.g., Childs-Johnson 1991; Guo 1995, 1997a, 1997b, 2005). No large ritualistic jades were found in association with Z1, Z3, or Z4, although a small jade ornament was recovered from F12, nearest the Z3 mound (see below). Such smaller jade objects, however, rarely appear in cairns or deep multi-stepped stone slab pit-burials—although they are commonly seen in the more elaborate pit burials of lower status individuals (Drennan and Peterson 2006; see also Hua and Yang 1998). It is likely that any very large ritualistic jades would have been have been retrieved previously through the extensive and illicit excavation of the Fushanzhuang mounds.

Although Z1, Z3, and Z4 are smaller and less impressive than the burial mounds of Niuheliang or Hutougou, for example, they are nonetheless indicators of modest elite activity in this part of the Chifeng region during the Hongshan period. Z4 is flanked by two smaller satellite mounds similar in size to Z5, Z6, and Z7, suggesting a difference in social standing between the larger and smaller mounds (although they need not necessarily be contemporary). A similar relationship is suggested by the secondary burials incorporated into the central cairns at Niuheliang Localities 2 and 5, and Hutougou, but not one necessarily commensurate with a difference in formal rank. The Fushanzhuang satellites were not separately surface collected because there was no way to differentiate their associated artifacts from the overlapping sherd scatter of Z4. At the base of Z3 was a partially buried circular arrangement of stones (perhaps 1 m in diameter) similar to a much larger example reported for Dongshanzui (Guo and Zhang 1984). Although the exact function of these circles is unknown, they may well have been used in the practice of ritual activities. Utilized lithic artifacts recovered from the surface of Z1, Z2, Z3, and Z4, however, also attest to the use of these mounds and adjacent areas for a variety of non-ceremonial purposes (see Chapter 5).

6.1.2. The Smaller Burial Mounds: Z5, Z6, and Z7

Z5, Z6, and Z7 are very similar to the satellite mounds flanking Z4. All three are 1 m or less in height, and less than 5 m in diameter. Each is situated along the western margin of the central settlement (Figure 6.1). They are constructed of earthen fill, but may contain small stone slab burial chambers. The effort expended in constructing these mounds is substantially less than for Z1, Z3, or Z4. Few sherds were found in association with these mounds, a further indicator of less investment. Z5 yielded the greatest number of sherds (n=16), including both coarse (jiasa tao) and fine-bodied examples (Table 6.1). None could be identified to vessel type, although one sherd had been burnished. Two fine paste tongxingqi sherds were among those collected from Z5, but we believe these to have originated in the nearby Z3 mound. The two sherds from Z7 were identified as a bo bowl and pen basin respectively. Both are presentation wares made of fine clay—one was painted, while the other was burnished. Z6 yielded only three coarse and undecorated Hongshan sherds unidentifiable to vessel type, but the mound's small size, method of construction, and proximity to Z7 suggest a similar sort of facility. No other artifacts were found in association.

6.1.3. Non-mound Graves: M1

A single non-mound grave, designated M1, was located between mounds Z1 and Z2. Disturbed by tree planting activities, M1 appears to be a shallow earthen pit grave (Figure 6.7). Although stone slabs were not observed, a small quantity of badly decomposed mammalian bone was recovered in association with a diverse array of utilitarian and presentation-grade ceramics that would have been used in daily life. The nature of the ceramic vessels recovered, and the localized nature of the artifact scatter (a couple of meters in diameter) in an area otherwise devoid of household remains, strongly suggests a mortuary feature. Both coarse and fine guan jars, fine bo bowls, pen basins, and slanted-mouthed xiekouqi were identified (Table 6.1). More than half of these ceramics were burnished, and another third were painted. Only a few coarse guan sherds were inscribed with the utilitarian vertical Z motif.

More sherds (almost 200) were recovered from M1 than from the Z4 mound. Although M1 was not covered by a mound, its ceramic assemblage suggests a substantially greater investment of labor and resources than those of the small mounds Z5, Z6, or Z7. Since mounds are not particularly laborious to construct, we consider M1 to represent a level of investment intermediate between the smallest and largest of mounds at Fushanzhuang. Clusters of Hongshan burial mounds containing jade artifacts carved to reflect supernatural themes, but little else, suggest a symbolic hierarchy tied to ritual activities (e.g., Barnes and Guo 1996; Childs-Johnson 1991; Guo 1995, 1997a, 1997b, 2005; Nelson 1991, 1994, 1995, 1995, 1996, 1997, 2001, 2002; Shelach 1997, 1999). Ostensibly wealthier graves, on the other hand, such as M1, suggest the presence of a second economically-based hierarchy (Drennan and Peterson 2006). M1's prominent placement between Z1 and Z2, and occupying the same terrace as Z6, and Z7 as well, might well have been selected in reflection of its occupant's social standing within the community, but its associated artifacts suggest a higher status conceptually rooted not in ritual authority, but in the material (or economic) conditions of life. Several non-mound earthen pit and simple stone-slab graves from the sites of Nantaizi and Baiyinchanghan contain highly variable quantities of domestic artifacts and personal ornaments (Figure 6.8; Hua and Yang 1998; Neimenggu 1993, 1994b, 1997, 2004). One Early Phase grave at Nantaizi contained 10–11 artifacts (including a stone adze, axe, and plow, a block of stone perhaps used as an anvil, two coarse guan incised with the Z motif, and 4–5 bone tools), another had 7–8 artifacts (including a stone shovel, axe, grinding slab and roller, 1 fine paste bowl, 1 coarse paste guan incised with the vertical Z motif, and 1 to 2 bone tools), while a third yielded only 4 artifacts (including a stone chisel, two jade beads, and a shell ornament). Yet a fourth contained no grave goods at all. At Baiyinchanghan, six Middle to Late Phase earthen pit and stone-slab graves were without offerings, while a seventh contained only a single ceramic ding tripod. M1 at Fushanzhuang is comparable to, or perhaps even slightly more richly furnished than the most elaborate graves at Nantaizi. Most of these offerings, as for M1, seem strongly to reflect their occupants' means of livelihood and standards of living, although the presence of a few ornaments also suggest differences in status among non-mound graves not visible at Fushanzhuang because only a single such grave was discovered. Thus, we can posit a gradation of wealth and status within the (admittedly small) samples of non-mound graves from some Hongshan sites, ranging from those with no or few offerings, to those furnished with larger numbers or more labor-intensive artifacts, including ornaments.

Although less elaborate burials, similar to the most minimally furnished examples from Nantaizi and Baiyinchanghan, were not identified during our survey of Fushanzhuang, we have no doubt that "ordinary" individuals interred in them comprised the bulk of Fushanzhuang's population. The negligible surface visibility of non-mound graves (except where tree-pitting or other earth-moving activities have been undertaken), however, severely hampers their detection. Even with strong surface signatures, the graves of most inhabitants if buried near their residences (as reported for some Hongshan sites, e.g., Baiyinchanghan), would not likely be distinguishable from the background artifactual "noise" of eroded midden deposits. It is also possible, compared with other sites, that relatively few ordinary graves were located within the central part of the Fushanzhuang community, given the built environment's emphasis of symbolic leadership, including a large centrally located (and possibly ceremonial) plaza (see below).

Fushanzhuang's burials provide us with qualitative information on differences in the social standing of individuals within the community, and possibly also in their standards of living (as might reflect differential wealth accumulation). Two separate, but not necessarily unrelated, social hierarchies could be present—each comprised of a system of graduated statuses (as per Drennan and Peterson 2006). Unfortunately, these burials cannot be associated with specific Hongshan households as identified from surface remains. Differences in household artifact assemblages do, however, support the notion of dual gradients in status from high to low at Fushanzhuang.

6.2. SURFACE-COLLECTED HOUSEHOLD CERAMIC ASSEMBLAGES

As mentioned in Chapter 3, our analysis of Hongshan ceramics recovered from Fushanzhuang provided non-associative data for a number of different variables, including incidences of particular decoration, fineness of paste, numbers of identifiable vessels and other ceramic artifacts, as well as more limited categorical data on sherd size not presented here. Although limiting in some respects, this dataset is more than adequate for investigating potential differences between household assemblages as might reflect differences in the status of their occupants.

It is widely held that more lavishly decorated, more finely crafted ceramic vessels are more likely to signal higher social standing on the part of their possessors than are drab, crudely constructed ones. The use or presentation of these elaborate vessels may have strictly social implications, or, even economic ones. These vessels may be more labor intensive to manufacture and decorate than others, and could require special artistic or technological skills, and/or facilities to produce. Finely manufactured and decorated ceramics are often thought to be evidence for specialized production, either on a part-time, or full-time basis. It seems most plausible that the thin-walled, fine paste ceramics of the Hongshan period, often slipped with a thin film of even finer clay, then burnished to a high gloss and/or partially painted, were the products of specialist producers (e.g., Guo 1995; Hua 1994; Li 2003:158–161; Linduff, Drennan, and Shelach 2004; Shelach 1999). Most likely, these utensils were made on an intermittent, part-time basis at the household level. At present, however, we have little evidence to substantiate this opinion. No kilns, kiln wasters, or potters' tools were discovered at Fushanzhuang, although some of these kinds of evidence been found at other Hongshan sites (e.g., from Silengshan [Xiaoheyan]) (Guo 1995; Liaoning 1977). Therefore, we think it most likely that specialist-produced ceramics were mobilized from more peripheral areas of the Fushanzhuang community, rather than made by households residing in its core area, because our intensive investigation of the latter ought to have revealed traces of their production. This seems especially likely given the very large numbers of tongxingqi cylinders incorporated into the burial monuments of a privileged few (possibly ritual specialists) at Fushanzhuang.

In total, we recovered 18,293 Hongshan period sherds from 29 domestic contexts at Fushanzhuang through a combination of systematic grid-based and general surface collection. Prior to laboratory analysis, these ceramics were sieved through 10 mm wire mesh. Some 2,332 sherds less than 10 mm to a side were divided according to type of paste (coarse or fine), counted, re-bagged and set aside. (Nearly equal proportions of coarse and fine paste fabric were observed.) This ceramic "small fraction" was not included in the analyses reported here because these sherds were too small to have preserved information as to decoration or vessel type. A substantial number of "large fraction" sherds, too, were not large enough to have preserved decorative elements and/or to permit identifications as to vessel type. It is worth noting here that our ceramic large fraction sample differs from our lithic sample of the same name. The latter includes all artifacts, regardless of actual size, from Phase I and II systematic collections, all formal tools from Phase III collections, all non-tool debitage larger than 25 mm from Phase III collections, four GCs, and six SGCs. Of the 15,961 large fraction sherds recovered from Fushanzhuang's 29 domestic contexts, only 3.4% preserved evidence for one or more different decorative treatments (the remaining 96.6% were undecorated). These included both vertical and horizontal Z motifs (Figures 4.9–4.12), other forms of incising or cross-hatching (Figures 4.13 and 4.14), braided or punctate banding (Figures 4.15 and 4.16), painting and/or burnishing (Figure 6.17), and the burnishing of otherwise undecorated (sumian) ceramics (Figure 6.18). The ceramics analysis was performed by Guo Zhizhong and Christian Peterson (see Appendix A).

Since some individual categories of ceramic decoration appear largely to reflect changing fashion rather than social standing (see Chapter 3), it was decided to deal with decorative data on an aggregate basis. This approach assumes that the specific motifs themselves are less important than their frequency of repetition and the cumulative energy expended in particular forms of elaboration. Thus, the least labor intensive decorations (incising, appliqué, and punctate designs) were collapsed into a single category, and the most labor intensive (painting and burnishing) into another. (These incidents are not-mutually exclusive, as some sherds yielded multiple forms of decoration). The relative rarity of decoration suggests the possibility that ownership of large quantities of decorated ceramics was restricted to use by a few households, presumably those of higher status, or those with greater wealth (see below). Since the expression of social difference might not be limited to varying quantities of investment in one or the other collapsed category of ceramic decoration, but also via the combined household incidence of ceramic decoration, we have further merged these two categories into a third variable—the total combined incidence of ceramic decoration. Mat or basketry impressions (xiwen) often present on the bases of Hongshan vessels were not included in these tallies, as such impressions are neither visible when the vessel is used or on display, and are more probably a by-product of manufacture rather than a decorative element per se.

Incised decoration was almost exclusively associated with coarser clay pottery, while painted and/or burnished pottery was nearly always made of finer clay. Slightly more than 40% of the large fraction sherds (6,782) were made from finer clay (nizhi tao). The refining of fine clay, through sifting, levigation, etc., the use of more finely ground temper, and overall greater energy expenditure in shaping and finishing thinner-walled fine paste vessels, suggest that they were expensive to make, and therefore many households were probably not able to afford them in quantity. This additional expense suggests that households possessed of higher proportions of finer paste ceramics might have been wealthier, and/or have enjoyed a higher social standing within the community than those with lower proportions of such ceramics.

Compared to some other Middle Phase Hongshan period village sites, the range of vessel forms recovered from Fushanzhuang is quite narrow. Pottery recovered in association with burial facilities aside, only four identifiable vessels types comprise the entire domestic assemblage at Fushanzhuang: guan, weng, bo/wan, and pen (see Chapter 3 for comparable illustrations). Rather than indicating differences in domestic activities between Fushanzhuang and other Hongshan settlements, this narrow range is more the product of small sherd size and low identifiability to vessel type. Because the direct comparison of different artifact types strikes most directly at differences in economic activities, rather than social status and/or wealth, we have not endeavored to compare them here. Moreover, the relatively low numbers and low diversity of identifiable vessels in household assemblages at Fushanzhuang means that few (if any) meaningful differences in activities should be expected. We considered it a better approach to collapse our four vessel types into restricted-mouthed ("jars") and non-restricted ("bowls") categories, in order to increase sample sizes. In addition, these two categories of vessels, expressed as a ratio of bowls to jars, have found common use in archaeology as proxy measures of social standing. Because "bowls" are the predominant food service component of any ceramic vessel assemblage, households with high ratios of bowls to jars are inferred to have more frequently engaged in social activities where the consumption of food figured strongly (such as hosting kin, political allies, participating in ceremonies, or entertaining important persons within the community), than did households with lower such ratios. Of the 260 sherds identifiable to one of these four vessel types, 31.5% were serving-related wares (i.e., "bowls" as opposed to "jars"). As used here, "bowls" refers to both true bowls (including both shallow bo and deeper-bodied wan varieties) and pen basins, whereas "jars" refers to guan pots and weng urns.

Taken together, these data suggest the presence of a substantial ceramics industry within the Fushanzhuang community, specializing not only in the production of funerary-specific pottery, but also that for daily use and display. Before we could calculate and compare these five different measures between households, we first standardized the baseline dataset for all 19 of our grid-based collections, for the same reasons discussed in Chapter 5.

6.2.1. Standardization of Ceramic Attribute / Artifact Frequencies

Because the proportional recovery of ceramics varies substantially from collection phase to collection phase and from grid to grid (Tables 4.2 and 4.3) in a manner similar to that observed for lithic artifacts as discussed in Chapter 5, the frequencies of ceramic attributes and vessel types were also mathematically transformed before using them as the basis of analysis. As per Chapter 5, a data table of frequencies per decorative attribute or artifact type by collection phase was produced for each of our 19 collection grids. The total number of attributes/artifacts recorded/collected per phase was calculated and then summed for each grid. This data appears in its entirety in Table 6.4. Three sets of three ratios were then produced, one for incidences of decoration, another for incidences of fine paste, and a third for vessel types, for each of three collection phases, specific to a particular collection grid. These ratios were obtained by dividing the proportions of the total number of incidents of decoration, fine paste, and identifiable vessel types collected from all grids (recalculated from the figures given in Table 6.4), by the row proportions per collection phase for each grid. The frequencies of a given attribute for sherd collected during a particular phase were then multiplied by the respective ratio for that phase and grid. The resulting products are the standardized numbers of artifacts recovered, or incidences of a given attribute recorded (Table 6.5). The effect of this transformation is again to redistribute the total number of attributes/artifacts of each type across phases within each grid unit, as if each phase of collection yielded the same proportion of its attributes/artifacts averaged across the site as a whole. When the standardized artifact/attribute frequencies per phase are collapsed and summed across types, the total number of standardized attributes/artifacts is (with the exception of rounding error) identical to that prior to standardization.

The procedure was applied only to our 19 grid-based surface collections. F08A–D was treated as a single unit in accordance with our discussions of comparability in Chapter 5. Because our 10 general collections (GCs and SGCs) were subject to a single collection phase, the attribute/artifact frequencies calculated do not require transformation prior to comparison. It is worth noting, however, that the sample sizes of ceramics from GC and SGC collections are much smaller than those of our grid-based collections, averaging only 56 sherds. That said, only one household, KG (n=19), has less than 30 sherds, and we are therefore confident that most of these general collections can be meaningfully compared to their more intensive counterparts for the five variables outlined above.

6.2.2. Multidimensional Scaling of the Standardized Ceramics Dataset

Following standardization, the transformed frequencies for all 19 grids were combined with the unmodified values for our 10 other general collections. These attribute/artifact frequencies were then combined and re-expressed as four proportions and one ratio for each household, including: (1) the proportional incidence of incised, appliqué, or punctate decoration (including Z motifs, incising, and duiwen); (2) of painted and/or burnished sherds; (3) of all incidences of decoration; (4) of fine paste sherds; and (5) the ratios of “bowls” to “jars” among identifiable vessels (Table 6.6). Following the same procedure discussed in Chapter 3, a matrix of dissimilarity scores between these 29 cases was produced for this dataset. Dissimilarities were measured using a standardized Euclidean distance coefficient. The resulting square matrix of dissimilarity scores was then used to produce five MDS configurations in 1, 2, 3, 4, and 5 dimensions. The Kruskal stress values associated with each of these five solutions are graphed in Figure 6.19. A very subtle elbow is associated with the two-dimensional solution, and the Kruskal stress value of 0.09510 suggests a highly interpretable solution. The variation explained by this solution is almost 98% ($\underline{r}^2$=0.97721). The following discussion of differences in household status according to ceramic data is based on this two-dimensional solution. A scatterplot of dimension one against dimension two is presented as Figure 6.20.

As can be seen in this figure, most of the surface collected households at Fushanzhuang cluster loosely together in the middle right portion of the graph, in an elongate ellipse-like shape at or about the 0,0 intersection point of dimensions 1 and 2. This suggests that a great many households are, in fact, very similar to one another in terms of their ceramic assemblages, and specifically, in terms of their social standing as conveyed through their possession and/or display of decorated ceramics and serving wares. Nevertheless, a handful of households do stand out. Five of our 29 households (F01, F13A, SGC4, F13B, and JG) are spun off from the central group in an arc originating along its lower left side, and terminating in the upper left portion of the graph. Four of these obviously very different households are positioned in the central or lower left of Figure 6.20. In addition, there is some sub-grouping of households within the area of the main elliptical cluster. Even so, the degree of difference suggested by variability in plotted location within the main group of households is less than that between these households and those in the left part of the graph.

The structure of this plot suggests that the main axis of variability runs from right to left, and may correspond to higher household status expressed through a higher proportion of overall ceramic decoration. Between about 10 and 25% of all ceramics recovered from households to the left of the elliptical cluster are decorated, with F01 having the highest percentage of total decoration. Those within main group all have less than about 5% decorated ceramics, with those to farthest right of the plot without any decorated sherds at all (BG, HG, and SGC1).

If we take those households confined to the elliptical cluster in Figure 6.20 to represent households whose occupants were of lower status that those who inhabited F01, F13A, F13B, SGC4, and JG, based on their low overall proportions of decorated ceramics, this is not a monolithic group. We may still infer substantial variability between households within this group in terms of their relative social standing (as measured by this analysis) even though the proportional range of decoration (from 0 to 8%) is relatively narrow along dimension 1. Moreover, although the break between our "lower" and "higher" status households is clear, it is not so pronounced that a more graduated difference in status along this dimension is not apparent. The intervals of graduation certainly widen as one progresses along dimension 1 from right-to-left, but the distances between households or groups of households is never so great that clear ranks or classes are evident.

This principal axis of variability combines with a second major axis to produce the inverted arc in Figure 6.20 that runs down through the elliptical cluster, through JG, F13B, and SGC4, and then up again towards F13A and F01. This second axis corresponds to high proportions of fine paste, and more painted and/or burnished pottery in the upper half of the graph (above the 0,0 point for dimension 2), and to high proportions of coarse paste, and more incised, appliqué, and punctate decorated pottery in the lower half of the graph (Figure 6.21). Obviously, the five households most differentiated by the first axis are also those with extreme values at either end of the second (F01, SGC4, and JG).

While it is not inaccurate to say that among our five higher status households, F13A and F13B are most alike, and F01 and SGC4/JG are the most different from one another, there is not much basis for suggesting that the occupants of F01 were of much higher status than F13A and F13B, or those of SGC4 and JG, since we have no basis on which to conclude that the ownership and display of large quantities of painted and/or burnished fine paste pottery was somehow more prestigious than the ownership and display of large quantities of incised, appliqué, and punctate decorated coarse paste pottery. (Such a conclusion would require an emic understanding of differences in the prestige "value" attributable to either form of decoration; cf. Hayden 1998.) It is, however, far more costly to produce, and could therefore be indicative of differences in wealth between these, and other, households. While it is certainly true that coarse paste vessels tended to be incised, decorated with appliqué, or punctate designs during the Hongshan period, and that fine paste vessels tended to be burnished and/or painted if decorated, many vessels of both pastes were not decorated at all. Fine paste vessels were left undecorated more often than coarse paste ones, but many of the latter were also given only the most cursory decorative treatments (e.g., around their rims and bases). Thus, while paste quality and decoration may not be entirely independent variables, the amount of effort represented by an assemblage comprised of only a moderate number of undecorated fine paste vessels, is much greater than that invested in one dominated by completely decorated coarse paste ones. Painting and/or burnishing would only increase the expense of a particular piece. We can therefore suggest that the proportion of fine paste ceramics in an assemblage to be a proxy indicator of total household wealth (although it is certainly not the only such indicator, see below). This second dimension then, represents both the kind(s) of ceramic decoration, and quality of paste that could be “afforded” by each household. Thus, the conceptually distinct attributes of status and wealth appear to pattern perpendicular to one another as seen in the distribution of assemblages in Figures 6.20 and 6.21.

There would appear to be a great deal of variability in wealth among households, as indicated by the arrangement of households along dimension 2 in Figures 6.20 and 6.21, although the strength of these differences are not as great between households as they are for status. F01, F03, F06, BG, and HG all have very high proportions of fine paste ceramics in their assemblages, ranging from 57 to 66% of all sherds (Table 6.6). All but one (F01) of these wealthy households have the lowest status at Fushanzhuang as measured by the proportion of decorated ceramics in their assemblages. F01 aside, this seemingly suggests, that wealth and higher status are inversely correlated at Fushanzhuang. The existence of F01 itself, however, suggests a more complicated socioeconomic structure than just an inverse relationship. This point can be made more clearly through a discussion of ratios of bowls to jars (see also our discussion of personal ornaments below).

Eight households have bowls to jars ratios greater than about 0.50, or at least one bowl per every two jars (F01, F03, F10B, F11, F12, F13A, F13B, and SGC3). About half are positioned along the left leading edge of the main group, and about half are among the highest status households spun off to the left this group. Only one, F11, is firmly situated within the main cluster of households. While F01 and F03 have nearly equal numbers of both classes of vessels, F12, F13B, and F13A have ratios of more than 2,3, and 8 bowls per every jar respectively. While the pattern is not as unambiguous as for decoration and paste, there seems to be an association between higher and intermediate-level status and higher ratios of bowls to jars in household assemblages. Thus, our inclusion of this ratio in our analysis as a possible proxy of higher status would seem justified. Contrary to what one might expect, however, most (but not all) of these households appear to have been of only average wealth, so that simple entertaining, personal politicking, or small-scale participation in community-wide ceremonies—rather than elaborate feasting—may be indicated by higher bowls to jars ratios. Moreover, and more importantly, it is clear that a considerable “middle ground” of co-variant wealth and status existed at Fushanzhuang.

The results of this analysis conform well to the notion of a gradient in status suggested by differences in the size, location, and artifacts associated with mortuary monuments in the local community’s core. While these differences appear modest compared to other complex societies, they do conform to notions of an early hierarchical society—one with a clear gradation of statuses, but no clear-cut ranks or stratified classes. Five households (F01, F13A, SGC4, F13B, and JG) all score very high for three or four variables, especially in terms of the incidence of decoration. This suggests that these households may have enjoyed much higher social standing than those of the main group. Even within this higher status group, however, there is substantial variability, especially in terms of wealth. The remaining households likewise differ in terms of wealth and status, although not to the same degree as do those in higher status group. The lack of an obvious association between wealth and status may indicate that either they are two unrelated phenomena, or that social prestige during the period was rooted in more than one strategy of aggrandizement, only one of which was wealth accumulation. Another leadership strategy commonly presumed to have been pursued during the Hongshan period is the manipulation of esoteric knowledge (e.g., Childs-Johnson 1991; Guo 1995, 1997a, 1997b, 2005; Li 2003; Nelson 1994, 1996, 1997, 2002; Shelach 1999). Drennan and Peterson (2006) have recently suggested that both economic and symbolically-based hierarchies might have co-existed separately in Hongshan society. If we were able to consistently associate higher status, but lower wealth households, with burial mounds at Fushanzhuang, this might provide some support for the latter type of hierarchy. Not only are we unable to do so at the present time, but it is unclear whether we should expect symbolic prestige to be materialized in objects other than those specifically interred with the occupants of these mounds (i.e., elaborate jades carved to reflect supernatural themes). For the time being then, the issue of multiple hierarchies must remain unresolved (although see also Chapter 7).

6.3. PERSONAL ORNAMENTS FROM HOUSEHOLD ASSEMBLAGES

Additional evidence for differential social standing at Fushanzhuang may include seven small ornaments identified in six grid-based household assemblages at Fushanzhuang. No ornaments were recovered from GC or SGC collections. These ornaments are of three kinds, but all appear to have been worn prominently as a form of jewelry. The first of these are jadeite tubular beads (probably worn as a necklace) and hoop earrings (Figure 6.22). These ornaments appear to have been manufactured with the use of fine abrasive slabs and drills. Artifacts positively associated with the production of these objects were not recovered on site (coarse grinding slabs and a single flaked stone drill appear unsuitable for the task). The mineralogical source(s) of this jade is similarly unknown—the raw material may have been available locally, or it could have been procured at longer distance. If so, this would suggest that at least some of Fushanzhuang's households were plugged into supra-local networks of communication and exchange. At least one Hongshan period jade workshop has been identified at Dongjiayingzi in the Chifeng-Aohan region (Liu and Dong 1997:53), so it is even possible that jades items were manufactured elsewhere and then brought to Fushanzhuang. Whatever their origin, there is wide consensus that Hongshan jades must represent the work of specialized craftspeople (e.g., Childs-Johnson 1991; Guo 1995; Li 2003; Linduff, Drennan, and Shelach 2004; Nelson 1994, 1997; Shelach 1999). The second kind of ornament is a round ground stone bracelet with a circular profile (Figure 6.22). And the third type are coarse ceramic beads, no more than a few centimeters in diameter (Figure 6.23. It is not clear whether these objects were intended to have been drilled for suspension, or simply tied to a thong and worn around the neck.

Three complete or partial examples of jade beads or earrings were recovered from households F05, F10B, and F12. A single, partial stone bracelet was recovered from F09A. And three ceramic beads were also recovered, one each from F05, F10A, and F11 (Figure 6.24. Because of the rarity of these items (see below for a discussion of taphonomic problems), and because the numbers of artifacts recovered from each household vary substantially, we have standardized ornament frequencies by dividing them by the total number of Hongshan period sherds recovered from the same households. The resulting figures were then multiplied by 1000 to yield an “ornaments per 1000 sherds” ratio (Table 6.7). It was not necessary to first standardize the sherd counts in terms similar to those discussed above (or in Chapter 5), because these totals would not have changed as a result of this procedure. (The technique discussed at length in Chapter 5 redistributes existing frequencies of attributes or artifact types proportional to a site-wide average per collection phase, but does not increase or decrease the total number of such attributes or artifacts per household to be redistributed. Hence, when considering a class of artifacts that has not been subdivided into different types, or for which multiple attributes are not being considered—such as in this case—numbers of sherds per household would not change.) Once standardized, the numbers of ornaments recovered ranges from a little over 1 to a little over 7/1000 sherds.

Five of these six households (F09A, F10A, F10B, F11, F12) have both roughly similar numbers of ornaments (1 to 2/1000 sherds), and roughly similarly-sized samples of sherds (between about 500 and 800). Thus, we can take these numbers of ornaments/sherds to reflect relatively similar degrees of social difference, where such difference is thought to relate to wealth accumulation (Drennan and Peterson 2006). However, because F05 has more than 7 ornaments/1000 sherds, and not even 300 sherds—half or less the number of sherds compared to other five households—it appears as though ornaments are 3 to 7 times more numerous at F05 than at the others. Consequently, the status of this household’s residents may have been higher that those of the five others from which ornaments were recovered. In fact, since less than 300 sherds were recovered from F05, it is possible that were we to enlarge its artifact sample to include among them another few hundred sherds, we would find additional ornaments. Including F05, all six of these households belong to the relatively undifferentiated main group in the lower right-hand portion of Figures 6.20 and 6.21. While three of these households, F10B, F11, and F12, also have notably high ratios of bowls to jars which may indicate their participation in supra-household social and/or political activities, and slightly more fine paste or decorated ceramics than most other main group households suggestive of a middle range status, none of the five households most clearly differentiated in our MDS analysis of ceramic variables have any ornaments at all.

With the exception of F06, F08A–D, F09B, F14, and F15, households without ornaments have less than about 500 sherds apiece, and many of them, particularly GC and SGC collections, have between only a half to a tenth as this many sherds. We therefore have very little confidence that these ratios of zero ornaments/1000 sherds are not due simply to the vagaries of sampling. Thus, the ownership and display of personal ornaments at Fushanzhuang may not have been as restricted as appears on the basis of our current sample. This seems especially likely when we consider that the most elaborate of the seven ornaments recovered—the two jades and stone bracelet—were either broken, or if intact, so small that they may have been easily lost in the course of daily use. Except if broken or lost, there is little reason to expect that the final loci of deposition for these objects would be amongst the sheet midden debris surrounding households. Rather, we should expect them to be interred with their owners upon death, as seen in the wealthier non-mound pit graves at Nantaizi (Hua and Yang 1998; Neimenggu 1994b, 1997). These graves also frequently contain ceramic vessels, shells, and a variety of tools used in daily life. The most common of Hongshan graves contain few or no utilitarian artifacts, and no jewelry at all. Likewise, while the high-ranking individuals interred in mounds are almost exclusively accompanied by jade artifacts, most of these objects are quite large, and appear to have functioned as ritual paraphernalia, not as jewelry.

Thus, even though many more households than discussed here may have owned ornaments and worn them in the course of daily life, those household assemblages in which such ornaments were recovered are mostly those whose ceramic attributes studied suggest a fairly high status among the main group in Figures 6.20 and 6.21, and a moderately-high status overall. This result accords well with known differences in non-mound pit grave goods from Nantaizi and elsewhere, and suggests that among some households at Fushanzhuang, higher status was signaled through the combined display of moderate proportions of decorated ceramics, serving wares, and personal ornamentation of each household's ranking members, whereas other households could afford only to display theirs through one or two of these means.

6.4. RESIDENTIAL LOCATION WITHIN THE FUSHANZHUANG COMMUNITY

The relative placement of households within the core area of the Fushanzhuang community, specifically their proximity to other households of similar status, and to various monuments, seems to reinforce the more pronounced social segmentation suggested by our other analyses. As can be seen in Figure 6.25 four of the five most differentiated households identified by our MDS analysis of ceramics (F01, F13A, F13B, and JG) are located in the lower part of the settlement, bracket the open "plaza" defined by Z1, M1, Z2, Z3, and Z4, at its northwest corner (F01), and along its southeastern margin.

Household assemblages that yielded ornaments and/or had high ratios of bowls to jars (other than F01, F13A, and F13B) also tend to cluster within the site. Two such clusters of these moderately higher status households are apparent, which further enclose the open plaza at its southwestern corner and along its northeastern margin. The first of these, consisting of F05, F09A, F10A, and F10B, is situated at the interface between the upper and lower parts of the site, overlooking M1 and the Z2 altar. The low to moderate proportions of fine paste ceramics recovered from these four households, contrast with the higher proportions of the second cluster, and may indicate a difference in the overall wealth of their occupants. This second group, consisting of the adjacent pair F11 and F12, is located at the very front of the site, immediately behind the Z3 mound. Given the proximity of F12, from which the jade was recovered, to Z3, the most impressive and disturbed of burial mounds, it is possible that this artifact originally accompanied its primary occupant. As noted previously, however, such personal adornments are rarely recovered from Hongshan mound burials, and so we think this possibility unlikely.

Among the lower status households that remain to be accounted for, nearly all the wealthier examples are located north of Z1, behind F01. These include F02, F03, F06, and to a lesser degree F07 and F16A/B. The three smaller burial mounds Z5, Z6, and Z7 bound this group to the west and north (although the latter is actually closer to F11 and F12). Likewise, the lower status, less affluent households also cluster together, mainly atop, or just below the broad level expanse of the upper northeastern part of the site (F04, F05, F08A–D, F09A, F09B, F10A, F10B, F13A, F13B, F14, F15, SGC2, SGC3, SGC4, SGC5, SGC6, and JG), but also southeast adjacent to JG, F13A, and F13B (F14).

Thus, as can be seen in Figure 6.25 the entire western portion of the intensively surveyed core area at Fushanzhuang is divided predominantly northeast-southwest by the four-cornered open plaza between mounds, which further separates the wealthier households to the north and west (F01, F02, F03, F06, F07, F11, F12, F16A/B, and BG) from the more impoverished ones to the east and south (F04, F05, F08A–D, F09A, F09B, F10A, F10B, F13A, F13B, F14, F15, SGC2, SGC3, SGC4, SGC5, SGC6, and JG). Only three of 29 households—HG (at the southeast corner of the plaza), SGC1 (south of F15), and KG (in the upper right corner of Figure 6.25—do not conform to this pattern. All three are nominally wealthier households than their nearest neighbors. This is a very small number of households, however, and drops from three to two if we do not consider KG representative based on the small size of the sample of ceramic artifacts recovered from it, as discussed earlier. In contrast to the higher status households located closest to the mounds, M1, and open plaza in general, these "ordinary" lower status households are all located on the periphery of the core of the local community at Fushanzhuang.

The status of the highest and moderately-high status households may have been reinforced through their close association with the most conspicuous burials and ritual constructions. This association might also indicate links between them and the ceremonies often thought to have been conducted atop Hongshan mounds, and/or that their members or ancestors are some of those interred in the largest of these mounds. It is unclear, however, which group of households, those engaged in wealth accumulation, or those less affluent, can be most firmly associated with these constructions. It is certainly possible that elements of both groups were. While the more affluent group of households at Fushanzhuang has fewer members with moderate-to-high status (n=3) than does the less affluent group (n=7), the former are more closely associated spatially with all of the community's burial mounds (if we count HG's proximity to Z4). This might suggest that the "Niuheliang pattern" of elite-mound association (the implicit expectation of most Hongshan scholars) does not hold for Fushanzhuang. That is, at Fushanzhuang, it could be the economically-oriented elites that are interred in the most conspicuous facilities, whereas the community's "other" elites were buried in less elaborate ways. Based on the close association of these other elites with the Z2 "altar", we might suggest that the basis of their higher status within the community to have been symbolic. It is equally probable, however, that the Niuheliang pattern does hold for Fushanzhuang, and that the proximity of economic elites to large ritual constructions is based solely on the virtue of their higher status within the community, one anchored to and reinforced through the economic activities that bound the community together. This "pride of place" amongst the mounds, with its prominent view of the valley floor, may reflect only the importance of these elite households in the daily affairs of the community, rather than any relationship to the occupants of the mounds themselves or the ceremonial activities thought to have been infrequently conducted atop them.

While our results to not provide explicit confirmation of Drennan and Peterson's (2006) hypothesis, they do provide support for the notion that two systems, or gradients, of social difference were in present at Fushanzhuang during the late Middle to early Late phase of the Hongshan period. One of these appears to have been based on wealth accumulation, the other may well have been more symbolically-grounded, a subject to which we return in the following chapter.

Table 6.1. Ceramics recovered per monumental context at Fushanzhuang (C0.= coarse; Fi.= fine; XKQ= xiekouqi; TXQ= tongxingqi).

Context	Total Sherds	Hongshan Sherds		Decoration								Unkn. Coarse		Unkn. Fine		Identifiable Vessels											
				Undec.		Vert Z		Painted		Burn.						Co. guan		Fi. guan		Fi. bo		Fi. pen		Fi. XKQ		Fi. TXQ	
	n	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Z1	275	275	100.0	260	94.5	0	0.0	23	8.4	0	0.0	1	0.4	235	85.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	39	14.2
Z2 (altar)	6	6	100.0	6	100.0	0	0.0	0	0.0	0	0.0	6	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Z3	490	490	100.0	325	66.3	0	0.0	165	33.7	0	0.0	9	1.8	405	82.7	2	0.4	0	0.0	3	0.6	0	0.0	0	0.0	71	14.5
Z4	136	133	97.8	96	72.2	0	0.0	37	27.8	0	0.0	2	1.5	122	91.7	0	0.0	7	5.3	4	3.0	0	0.0	0	0.0	0	0.0
Z5	16	16	100.0	15	93.8	0	0.0	0	0.0	1	6.3	4	25.0	12	75.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	12.5
Z6	3	3	100.0	3	100.0	0	0.0	0	0.0	0	0.0	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Z7	2	2	100.0	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0	1	50.0	1	50.0	0	0.0	0	0.0
Z8	274	21	7.7	20	95.2	1	4.8	0	0.0	0	0.0	8	38.1	9	42.9	0	0.0	0	0.0	2	9.5	0	0.0	0	0.0	0	0.0
M1	182	182	100.0	28	15.4	2	1.1	53	29.1	99	54.4	23	12.6	83	45.6	4	2.2	1	0.5	13	7.1	4	2.2	1	0.5	0	0.0

Table 6.2. Large fraction ceramic artifacts by collection phase for all 19 grids.

Collection	Sherds	
Phase	n	%
I	3603	23.5
II	10376	67.5
III	1384	9.0
Total	15363	100.0

Table 6.3. Differences in proportional recovery of ceramic artifacts by collection grid.

Phase	F01		F02		F03		F04		F05		F06		F07		F08A-D		F09A		F09B	
	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P
I	82	15.7	72	15.4	63	29.2	77	20.2	49	17.6	147	17.0	62	14.7	1046	17.7	202	24.0	322	27.0
II	316	60.7	355	75.9	124	57.4	209	54.9	215	77.3	657	76.0	284	67.5	4554	77.3	548	65.2	816	68.3
III	123	23.6	41	8.8	29	13.4	95	24.9	14	5.0	61	7.1	75	17.8	294	5.0	90	10.7	56	4.7
Totals	521	100.0	468	100.0	216	100.0	381	100.0	278	100.0	865	100.0	421	100.0	5894	100.0	840	100.0	1194	100.0

Table 6.3. (continued).

Phase	F10A		F10B		F11		F12		F13A		F13B		F14		F15		F16A/B		All FSZ	
	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P	n	P
I	116	22.0	127	26.3	288	38.0	235	47.2	72	32.3	83	32.4	214	37.2	207	25.9	177	48.1	3641	23.4
II	385	72.9	290	60.2	394	52.0	215	43.2	139	62.3	147	57.4	292	50.7	393	49.1	141	38.3	10474	67.3
III	27	5.1	65	13.5	76	10.0	48	9.6	12	5.4	26	10.2	70	12.2	200	25.0	50	13.6	1452	9.3
Totals	528	100.0	482	100.0	758	100.0	498	100.0	223	100.0	256	100.0	576	100.0	800	100.0	368	100.0	15567	100.0

Table 6.4. Unmodified ceramic attribute/artifact frequencies by household collection.

Collection	Phase	Fine		ID Vessel				ID	P Grid	FSZ	P FSZ	Vessel	Total
		n	P	Guan	Bo	Weng	Pen	n	Totals	Totals	Totals	Ratio	Sherds
F01	I	53	16.2	1	1	0	0	2	0.1	51.0	0.2	4.2	82
F01	II	193	59.0	17	7	0	1	25	0.7	93.0	0.4	0.6	315
F01	III	81	24.8	3	6	0	0	9	0.2	82.0	0.4	1.5	119
F02	I	48	19.0	1	0	0	0	1	0.1	49.0	0.2	2.1	71
F02	II	178	70.4	4	0	0	0	4	0.4	68.0	0.3	0.7	352
F02	III	27	10.7	2	0	0	0	2	0.2	73.0	0.3	1.6	41
F03	I	46	25.1	0	0	0	0	0	0.0	48.0	0.2	0.0	62
F03	II	118	64.5	0	1	0	0	1	0.5	64.0	0.3	0.6	124
F03	III	19	10.4	1	0	0	0	1	0.5	71.0	0.3	0.6	29
F04	I	24	24.0	1	0	0	0	1	0.2	48.0	0.2	1.0	77
F04	II	48	48.0	0	0	0	0	0	0.0	63.0	0.3	0.0	208
F04	III	28	28.0	2	0	1	1	4	0.8	70.0	0.3	0.4	88
F05	I	9	13.0	1	0	0	0	1	1.0	47.0	0.2	0.2	49
F05	II	58	84.1	0	0	0	0	0	0.0	63.0	0.3	0.0	215
F05	III	2	2.9	0	0	0	0	0	0.0	66.0	0.3	0.0	13
F06	I	95	19.3	0	2	0	0	2	0.4	46.0	0.2	0.5	147
F06	II	372	75.8	0	1	0	0	1	0.2	63.0	0.3	1.4	653
F06	III	24	4.9	0	1	0	1	2	0.4	66.0	0.3	0.7	59
F07	I	35	17.4	1	0	0	0	1	0.1	44.0	0.2	1.3	62
F07	II	139	69.2	1	0	0	0	1	0.1	62.0	0.3	1.9	283
F07	III	27	13.4	1	3	0	1	5	0.7	64.0	0.3	0.4	53
F08A-D	I	365	19.4	12	3	1	1	17	0.4	43.0	0.2	0.5	1036
F08A-D	II	1438	76.4	16	0	2	1	19	0.5	61.0	0.3	0.6	4430
F08G	III	80	4.2	4	0	2	0	6	0.1	59.0	0.3	1.8	280
F09A	I	62	23.1	2	1	0	0	3	0.6	26.0	0.1	0.2	185
F09A	II	175	65.3	2	0	0	0	2	0.4	42.0	0.2	0.5	523
F09AG	III	31	11.6	0	0	0	0	0	0.0	53.0	0.2	0.0	86
F09B	I	130	32.6	2	0	0	1	3	0.4	23.0	0.1	0.2	320
F09B	II	254	63.7	2	0	1	1	4	0.6	40.0	0.2	0.3	814
F09BG	III	15	3.8	0	0	0	0	0	0.0	53.0	0.2	0.0	53
F10A	I	46	22.7	0	0	0	0	0	0.0	20.0	0.1	0.0	116
F09A	II	146	71.9	4	0	0	0	4	0.4	36.0	0.2	0.4	384
F10AG	III	11	5.4	3	1	2	0	6	0.6	53.0	0.2	0.4	25
F10B	I	38	24.7	2	0	0	0	2	0.1	20.0	0.1	0.8	122
F10B	II	87	56.5	6	2	0	0	8	0.4	32.0	0.1	0.3	295
F10BG	III	29	18.8	3	4	1	0	8	0.4	47.0	0.2	0.5	65
F11	I	141	40.9	0	0	0	0	0	0.0	18.0	0.1	0.0	287
F11	II	178	51.6	2	1	0	0	3	0.3	24.0	0.1	0.4	392
F11G	III	26	7.5	6	3	0	0	9	0.8	39.0	0.2	0.2	70
F12	I	105	44.7	0	1	0	0	1	0.2	18.0	0.1	0.4	235
F12	II	98	41.7	0	0	0	0	0	0.0	21.0	0.1	0.0	215
F12G	III	32	13.6	1	2	1	0	4	0.8	30.0	0.1	0.2	48
F13A	I	31	43.1	1	6	0	0	7	0.4	17.0	0.1	0.2	72
F13A	II	36	50.0	1	7	1	0	9	0.5	21.0	0.1	0.2	139
F13AG	III	5	6.9	0	1	0	0	1	0.1	26.0	0.1	1.9	11
F13B	I	30	35.7	1	6	0	0	7	0.4	10.0	0.0	0.1	83
F13B	II	49	58.3	6	3	0	0	9	0.5	12.0	0.1	0.1	147
F13BG	III	5	6.0	0	1	0	0	1	0.1	25.0	0.1	1.8	26
F14	I	93	40.4	1	0	0	0	1	0.1	3.0	0.0	0.1	214
F14	II	110	47.8	0	0	0	0	0	0.0	3.0	0.0	0.0	291
F14G	III	27	11.7	7	2	0	0	9	0.9	24.0	0.1	0.1	70
F15	I	69	24.2	1	1	0	0	2	0.1	2.0	0.0	0.1	207
F15	II	148	51.9	0	1	0	0	1	0.1	3.0	0.0	0.2	393
F15G	III	68	23.9	11	1	0	0	12	0.8	15.0	0.1	0.1	200
F16A-B	I	84	45.9	0	0	0	0	0	0.0	0.0	0.0	0.0	177
F16A-B	II	71	38.8	2	0	0	0	2	0.4	2.0	0.0	0.0	141
F16GA-B	III	28	15.3	2	1	0	0	3	0.6	3.0	0.0	0.0	48

Table 6.4. (continued).

Collection	Phase	Decoration				P Grid	P FSZ	Dec.
		Undec.	non-P/B	P/B	All	Total	Total	Ratio
F01	I	62	0	20	20	15.9	23.6	1.5
F01	II	228	12	75	87	61.0	67.4	1.1
F01	III	106	1	12	13	23.1	9.0	0.4
F02	I	70	0	1	1	15.3	23.6	1.5
F02	II	344	0	8	8	75.9	67.4	0.9
F02	III	40	0	1	1	8.8	9.0	1.0
F03	I	61	1	0	1	28.8	23.6	0.8
F03	II	124	0	0	0	57.7	67.4	1.2
F03	III	29	0	0	0	13.5	9.0	0.7
F04	I	75	2	0	2	20.6	23.6	1.1
F04	II	200	7	1	8	55.8	67.4	1.2
F04	III	81	6	1	7	23.6	9.0	0.4
F05	I	47	2	0	2	17.7	23.6	1.3
F05	II	214	1	0	1	77.6	67.4	0.9
F05	III	13	0	0	0	4.7	9.0	1.9
F06	I	143	1	2	3	17.1	23.6	1.4
F06	II	652	0	1	1	76.0	67.4	0.9
F06	III	57	1	1	2	6.9	9.0	1.3
F07	I	61	0	0	0	15.6	23.6	1.5
F07	II	283	0	0	0	71.1	67.4	0.9
F07	III	51	2	0	2	13.3	9.0	0.7
F08A-D	I	989	35	10	45	18.0	23.6	1.3
F08A-D	II	4387	35	4	39	77.1	67.4	0.9
F08G	III	271	6	3	9	4.9	9.0	1.9
F09A	I	177	4	4	8	23.3	23.6	1.0
F09A	II	501	7	15	22	65.9	67.4	1.0
F09AG	III	80	4	2	6	10.8	9.0	0.8
F09B	I	313	3	4	7	27.0	23.6	0.9
F09B	II	809	4	1	5	68.6	67.4	1.0
F09BG	III	49	2	2	4	4.5	9.0	2.0
F10A	I	105	5	6	11	22.1	23.6	1.1
F09A	II	373	6	5	11	73.1	67.4	0.9
F10AG	III	24	1	0	1	4.8	9.0	1.9
F10B	I	100	7	14	21	25.3	23.6	0.9
F10B	II	280	10	5	15	61.2	67.4	1.1
F10BG	III	59	3	3	6	13.5	9.0	0.7
F11	I	283	1	3	4	38.3	23.6	0.6
F11	II	392	0	0	0	52.3	67.4	1.3
F11G	III	67	0	3	3	9.3	9.0	1.0
F12	I	233	0	3	3	47.2	23.6	0.5
F12	II	212	1	1	2	43.2	67.4	1.6
F12G	III	46	0	2	2	9.6	9.0	0.9
F13A	I	61	2	9	11	32.4	23.6	0.7
F13A	II	130	6	3	9	62.6	67.4	1.1
F13AG	III	9	0	2	2	5.0	9.0	1.8
F13B	I	76	4	3	7	32.4	23.6	0.7
F13B	II	133	7	6	13	57.4	67.4	1.2
F13BG	III	23	3	0	3	10.2	9.0	0.9
F14	I	214	0	0	0	37.2	23.6	0.6
F14	II	291	1	0	1	50.6	67.4	1.3
F14G	III	63	6	1	7	12.2	9.0	0.7
F15	I	205	1	1	2	25.9	23.6	0.9
F15	II	392	0	1	1	49.1	67.4	1.4
F15G	III	190	7	2	9	25.0	9.0	0.4
F16A-B	I	176	1	0	1	48.4	23.6	0.5
F16A-B	II	140	0	0	0	38.5	67.4	1.7
F16GA-B	III	48	0	0	0	13.1	9.0	0.7

Table 6.5. Standardized ceramic attribute/artifact frequencies by household collection.

Collection	Phase	Fine		Total	Total	Std.	STANDARDIZED COUNTS				Row Totals	
		n	P	"Jars"	"Bowls"	B:J	Undec.	non-P/B	P/B	All	n	P
F01	I	53	16.2	4.19	4.19		91.8	0.0	29.6	29.6	121.4	23.5
F01	II	193	59.0	10.40	4.90	0.95	250.8	13.2	82.5	95.7	347.6	67.4
F01	III	81	24.8	4.50	8.99		41.3	0.4	4.7	5.1	46.4	9.0
F02	I	48	19.0	2.12	0.00		107.8	0.0	1.5	1.5	109.3	23.5
F02	II	178	70.4	2.94	0.00	0.00	306.2	0.0	7.1	7.1	313.3	67.5
F02	III	27	10.7	3.16	0.00		40.8	0.0	1.0	1.0	41.8	9.0
F03	I	46	25.1	0.00	0.00		50.0	0.8	0.0	0.8	50.8	23.6
F03	II	118	64.5	0.00	0.55	0.90	145.1	0.0	0.0	0.0	145.1	67.4
F03	III	19	10.4	0.61	0.00		19.4	0.0	0.0	0.0	19.4	9.0
F04	I	24	24.0	1.04	0.00		85.5	2.3	0.0	2.3	87.8	23.5
F04	II	48	48.0	0.00	0.00	0.17	242.0	8.5	1.2	9.7	251.7	67.5
F04	III	28	28.0	1.14	0.38		30.8	2.3	0.4	2.7	33.4	9.0
F05	I	9	13.0	0.20	0.00		62.5	2.7	0.0	2.7	65.2	23.5
F05	II	58	84.1	0.00	0.00	0.00	186.2	0.9	0.0	0.9	187.1	67.5
F05	III	2	2.9	0.00	0.00		25.1	0.0	0.0	0.0	25.1	9.0
F06	I	95	19.3	0.00	1.00		197.3	1.4	2.8	4.1	202.9	23.5
F06	II	372	75.8	0.00	1.36	0.00	580.3	0.0	0.9	0.9	581.2	67.4
F06	III	24	4.9	0.00	1.43		75.2	1.3	1.3	2.6	77.9	9.0
F07	I	35	17.4	1.33	0.00		92.1	0.0	0.0	0.0	93.6	23.5
F07	II	139	69.2	1.88	0.00	0.43	268.9	0.0	0.0	0.0	268.9	67.5
F07	III	27	13.4	0.39	1.55		34.7	1.4	0.0	1.4	36.0	9.0
F08A-D	I	365	19.4	5.98	1.84		1295.6	45.9	13.1	59.0	1358.5	23.7
F08A-D	II	1438	76.4	10.51	0.58	0.09	3816.7	30.5	3.5	33.9	3855.8	67.2
F08G	III	80	4.2	10.73	0.00		504.1	11.2	5.6	16.7	520.8	9.1
F09A	I	62	23.1	0.38	0.19		178.8	4.0	4.0	8.1	186.9	23.6
F09A	II	175	65.3	0.91	0.00	0.15	511.0	7.1	15.3	22.4	533.5	67.3
F09AG	III	31	11.6	0.00	0.00		67.2	3.4	1.7	5.0	72.2	9.1
F09B	I	130	32.6	0.46	0.23		272.3	2.6	3.5	6.1	278.4	23.5
F09B	II	254	63.7	0.91	0.30	0.39	792.8	3.9	1.0	4.9	797.7	67.4
F09BG	III	15	3.8	0.00	0.00		99.5	4.1	4.1	8.1	107.6	9.1
F10A	I	46	22.7	0.00	0.00		112.4	5.4	6.4	11.8	124.1	23.6
F09A	II	146	71.9	1.56	0.00	0.11	343.2	5.5	4.6	10.1	353.3	67.3
F10AG	III	11	5.4	1.91	0.38		45.6	1.9	0.0	1.9	47.5	9.0
F10B	I	38	24.7	1.56	0.00		93.0	6.5	13.0	19.5	114.4	23.7
F10B	II	87	56.5	1.87	0.62	0.47	308.0	11.0	5.5	16.5	324.5	67.3
F10BG	III	29	18.8	1.83	1.83		39.5	2.0	2.0	4.0	43.6	9.0
F11	I	141	40.9	0.00	0.00		172.6	0.6	1.8	2.4	175.1	23.4
F11	II	178	51.6	0.83	0.42	0.50	505.7	0.0	0.0	0.0	505.7	67.5
F11G	III	26	7.5	1.35	0.68		65.0	0.0	2.9	2.9	68.9	9.2
F12	I	105	44.7	0.00	0.39		116.5	0.0	1.5	1.5	118.0	23.7
F12	II	98	41.7	0.00	0.00	2.20	330.7	1.6	1.6	3.1	335.4	67.3
F12G	III	32	13.6	0.32	0.32		43.2	0.0	1.9	1.9	45.1	9.1
F13A	I	31	43.1	0.18	1.07		44.5	1.5	6.6	8.0	52.6	23.6
F13A	II	36	50.0	0.34	1.20	8.02	140.4	6.5	3.2	9.7	150.1	67.4
F13AG	III	5	6.9	0.00	1.91		16.5	0.0	3.7	3.7	20.1	9.0
F13B	I	30	35.7	0.11	0.63		55.5	2.9	2.2	5.1	60.6	23.7
F13B	II	49	58.3	0.59	0.29	3.98	155.6	8.2	7.0	15.2	172.0	67.3
F13BG	III	5	6.0	0.00	1.84		20.5	2.7	0.0	2.7	23.1	9.0
F14	I	93	40.4	0.13	0.00		134.8	0.0	0.0	0.0	134.8	23.4
F14	II	110	47.8	0.00	0.00	0.25	387.0	1.3	0.0	1.3	388.4	67.5
F14G	III	27	11.7	0.81	0.23		46.6	4.4	0.7	5.2	51.8	9.0
F15	I	69	24.2	0.06	0.06		186.6	0.9	0.9	1.8	188.4	23.6
F15	II	148	51.9	0.00	0.19	0.36	537.0	0.0	1.4	1.4	538.4	67.4
F15G	III	68	23.9	0.89	0.08		68.4	2.5	0.7	3.2	72.0	9.0
F16A-B	I	84	45.9	0.00	0.00		86.2	0.5	0.0	0.5	86.7	23.7
F16A-B	II	71	38.8	0.04	0.00	0.25	245.0	0.0	0.0	0.0	246.8	67.3
F16GA-B	III	28	15.3	0.04	0.02		33.1	0.0	0.0	0.0	33.1	9.0

Table 6.6. Collapsed five variable ceramic dataset for MDS analysis.

Collection	% non-P/B	% P/B	% All Dec.	% Fine Paste	B:J
F01	2.64	22.66	25.30	63.37	0.95
F02	0.00	2.08	2.08	54.53	0.00
F03	0.38	0.00	0.38	66.06	0.90
F04	3.49	0.43	3.92	26.81	0.17
F05	1.27	0.00	1.27	24.91	0.00
F06	0.31	0.58	0.89	57.16	0.00
F07	0.34	0.00	0.34	50.50	0.43
F08A-D	1.52	0.39	1.91	32.77	0.09
F09A	1.83	2.65	4.49	33.80	0.15
F09B	0.89	0.72	1.61	33.61	0.39
F10A	2.43	2.10	4.53	38.67	0.11
F10B	4.05	4.26	8.30	31.95	0.47
F11	0.08	0.63	0.71	46.06	0.50
F12	0.31	0.99	1.30	47.19	2.20
F13A	3.56	6.05	9.61	32.43	8.02
F13B	5.39	3.60	8.99	32.81	3.98
F14	1.00	0.13	1.13	40.00	0.25
F15	0.43	0.38	0.80	35.63	0.36
F16A-B	0.10	0.00	0.10	50.00	0.25
BG	0.00	0.00	0.00	61.36	0.00
HG	0.00	0.00	0.00	60.87	0.00
JG	10.91	1.82	12.73	41.82	0.00
KG	0.00	5.26	5.26	42.11	0.00
SGC1	0.00	0.00	0.00	50.98	0.00
SGC2	1.27	2.53	3.80	37.34	0.00
SGC3	4.82	0.00	4.82	37.35	0.50
SGC4	5.80	11.59	17.39	17.39	0.33
SGC5	5.00	0.00	5.00	27.50	0.00
SGC6	3.03	0.00	3.03	36.36	0.33

Table 6.7. Standardized personal ornaments per household collection.

Household Unit	Total HS Sherds	Ornaments		
		n	Orn./Sherds	Orn./Sherds*1000
F01	516	0	0.00	0.00
F02	464	0	0.00	0.00
F03	277	0	0.00	0.00
F04	373	0	0.00	0.00
F05	277	2	0.01	7.22
F06	859	0	0.00	0.00
F07	398	0	0.00	0.00
F08A-D	5746	0	0.00	0.00
F09A	793	1	0.00	1.26
F09B	1187	0	0.00	0.00
F10A	525	1	0.00	1.90
F10B	482	1	0.00	2.07
F11	749	1	0.00	1.34
F12	498	1	0.00	2.01
F13A	222	0	0.00	0.00
F13B	256	0	0.00	0.00
F14G	575	0	0.00	0.00
F15G	800	0	0.00	0.00
F16GA/B	366	0	0.00	0.00
BG	44	0	0.00	0.00
HG	46	0	0.00	0.00
JG	55	0	0.00	0.00
KG	19	0	0.00	0.00
SGC1	51	0	0.00	0.00
SGC2	158	0	0.00	0.00
SGC3	83	0	0.00	0.00
SGC4	69	0	0.00	0.00
SGC5	40	0	0.00	0.00
SGC6	33	0	0.00	0.00

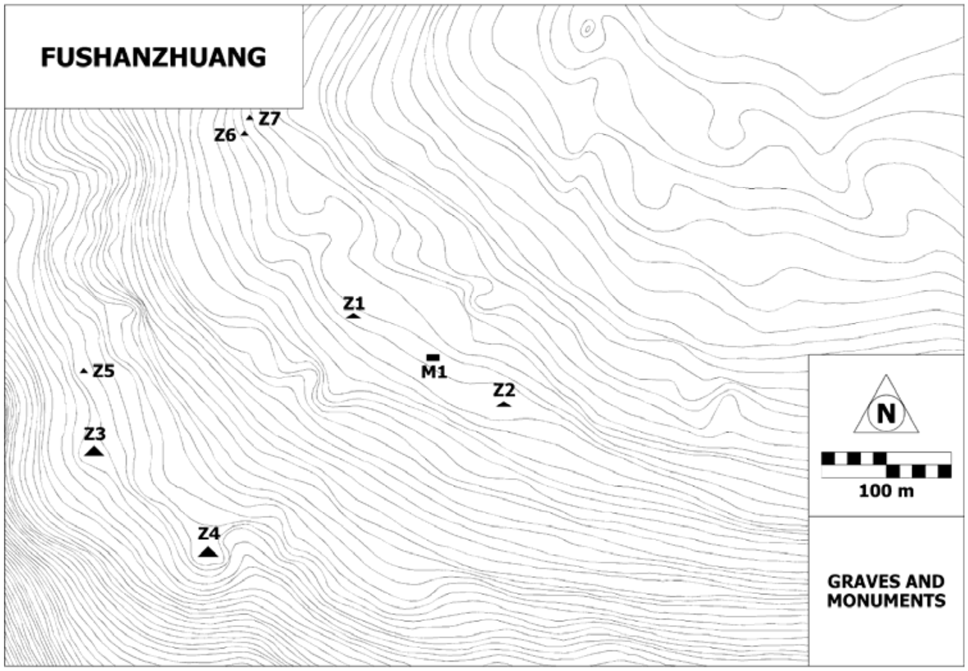


Figure 6.1. Locations of monuments within the core area of the core area of the Fushanzhuang community.

Figure 6.2. Photo of the Z2 “altar” at Fushanzhuang.

Figure 6.3. Photo of the Z1 mound at Fushanzhuang.

Figure 6.4. Photo of the Z3 mound at Fushanzhuang.

Figure 6.5. Photo of the Z4 mound at Fushanzhuang.

Figure 6.6. Tongxingqi ceramics from the Z1 and Z3 mounds at Fushanzhuang (including painted examples with designs similar to those from Niuheliang Locality 2 and Chengzishan—bottom row).

Figure 6.7. Photo of the M1 non-mound grave at Fushanzhuang.

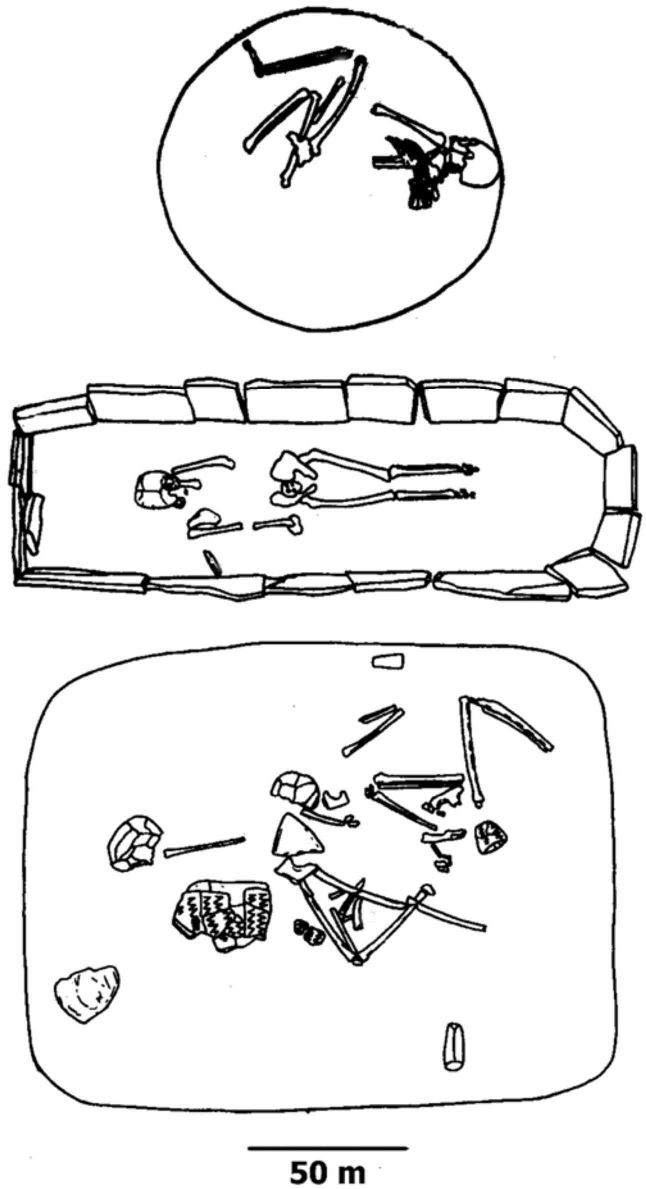


Figure 6.8. Three non-mound graves from Nantaizi showing a range of investment in construction and offerings (Top= pit grave, no offerings; Middle= stone slab grave with 3 small ornaments and 1 stone tool; Bottom= 2 person pit grave with 10–11 stone tools or ceramic vessels) (redrawn with modification from Neimenggu 1997:72–73, figures 22–24).

Figure 6.9. Photo of vertical z-decorated ceramics.

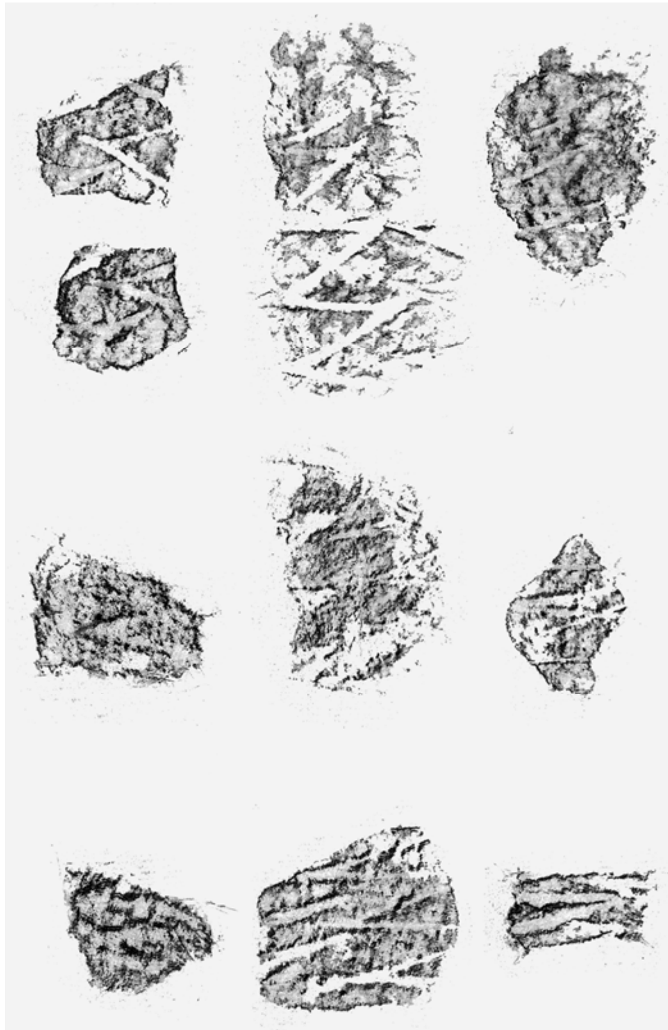


Figure 6.10. Rubbings of vertical Z-decorated ceramics.

Figure 6.11. Photo of horizontal Z-decorated ceramics.

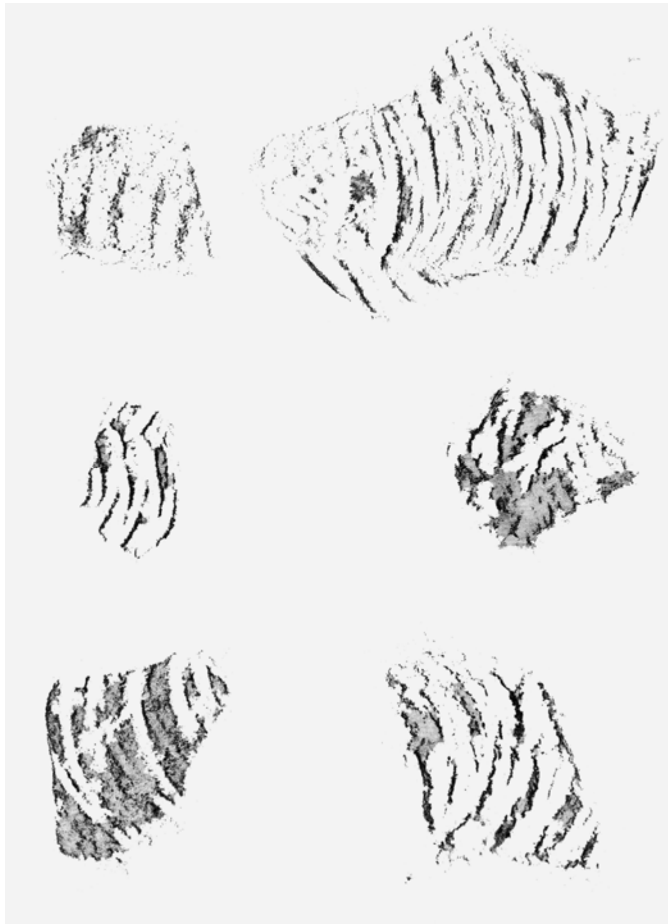


Figure 6.12. Rubbings of horizontal Z-decorated ceramics.

Figure 6.13. Photo of other (non-Z) incised ceramics.

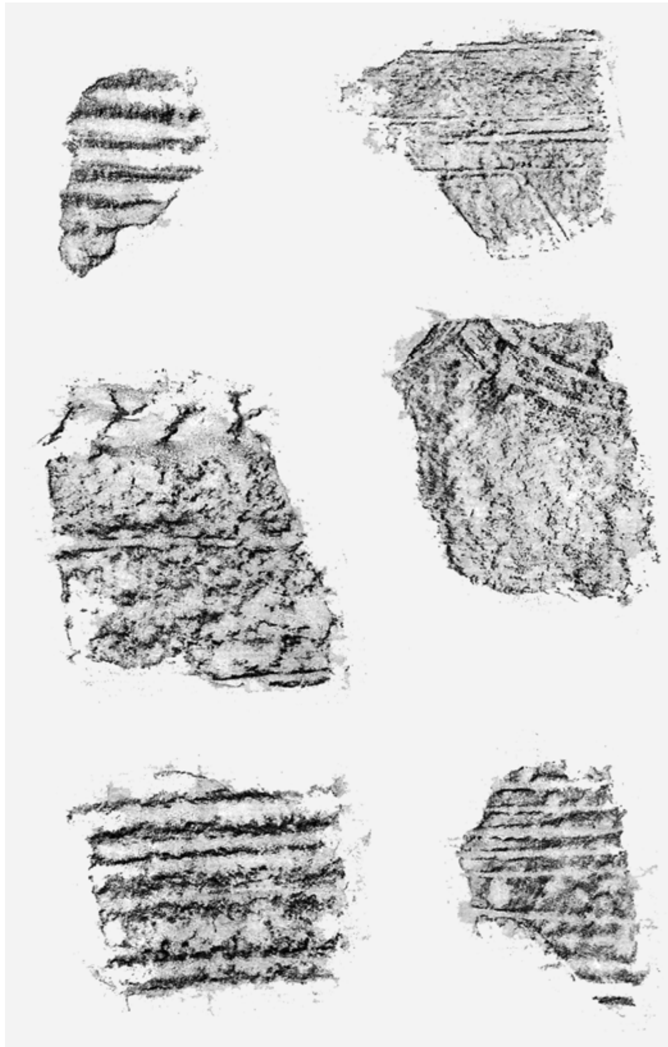


Figure 6.14. Rubbings of other incised ceramics.

Figure 6.15. Photo of duiwen-decorated ceramics.

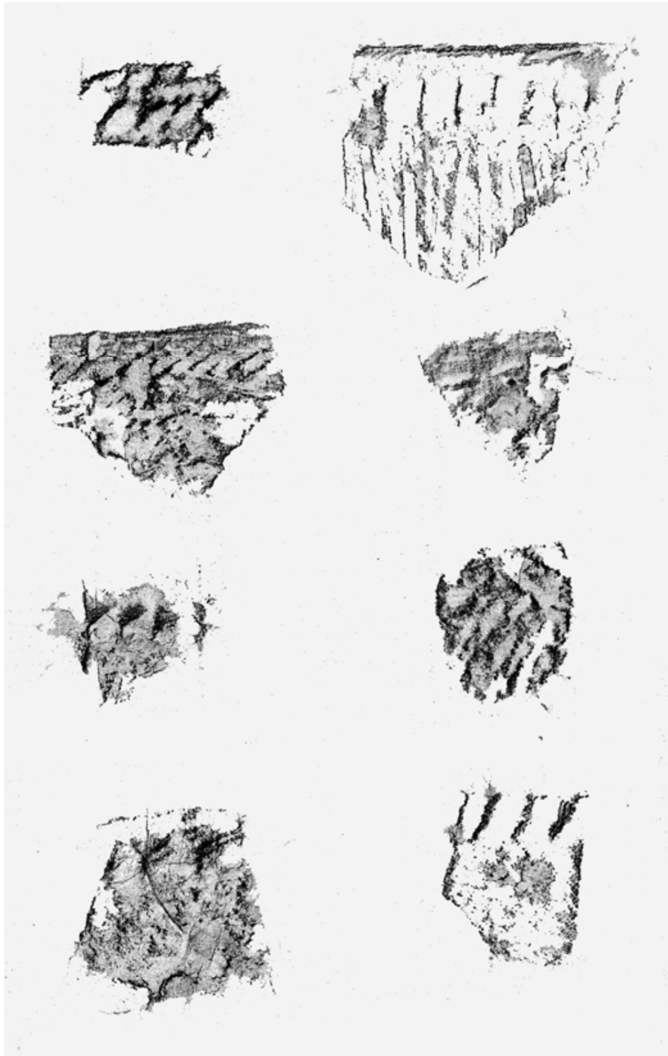


Figure 6.16. Rubbings of duiwen-decorated ceramics.

Figure 6.17. Photo of painted and burnished ceramics.

Figure 6.18. Photo of burnished sumian ceramics.

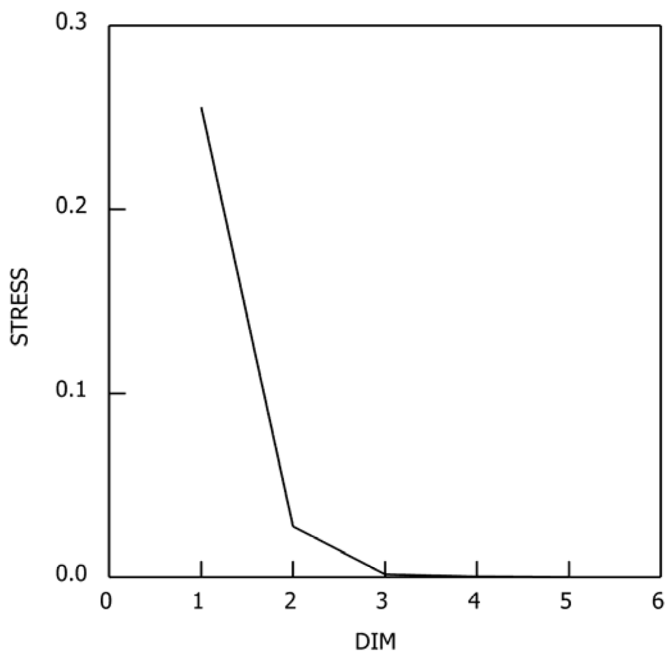


Figure 6.19. Line graph of Kruskal stress values associated with MDS solutions of differing dimensions for five ceramic variables by household.

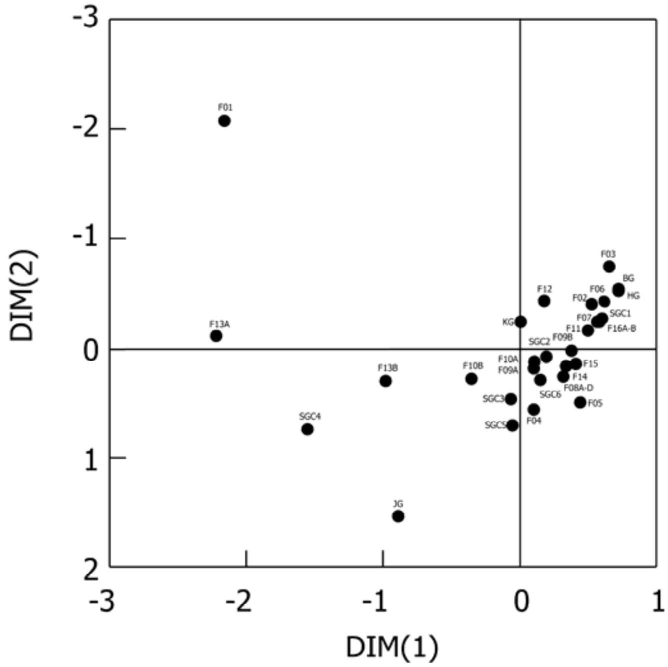


Figure 6.20. Scatterplot of dimension 1 against dimension 2 for MDS analysis of five ceramic variables by household.

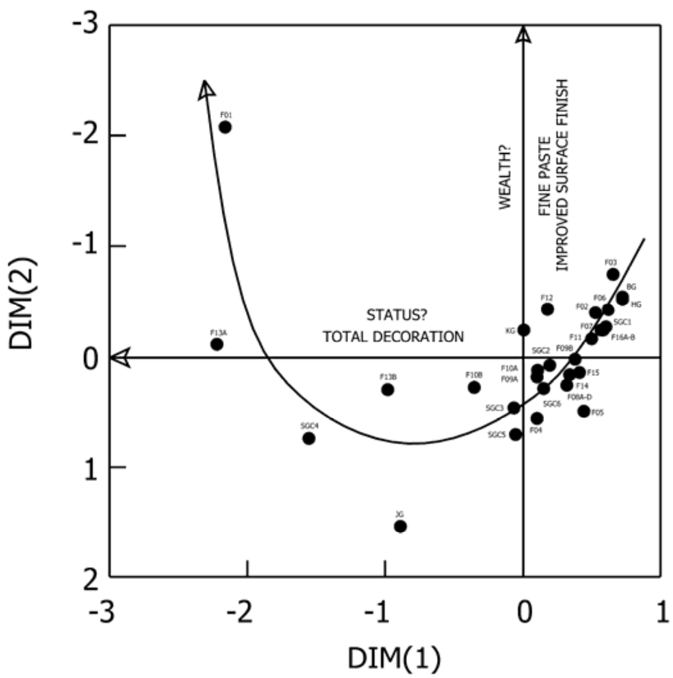


Figure 6.21. Determination of higher household status and wealth from Figure 6.21.

Figure 6.22. Photo of jade tube and earring fragments (left and center, respectively), and a fragment of stone bracelet (right) from Fushanzhuang.

Figure 6.23. Photo of ceramic beads from Fushanzhuang.

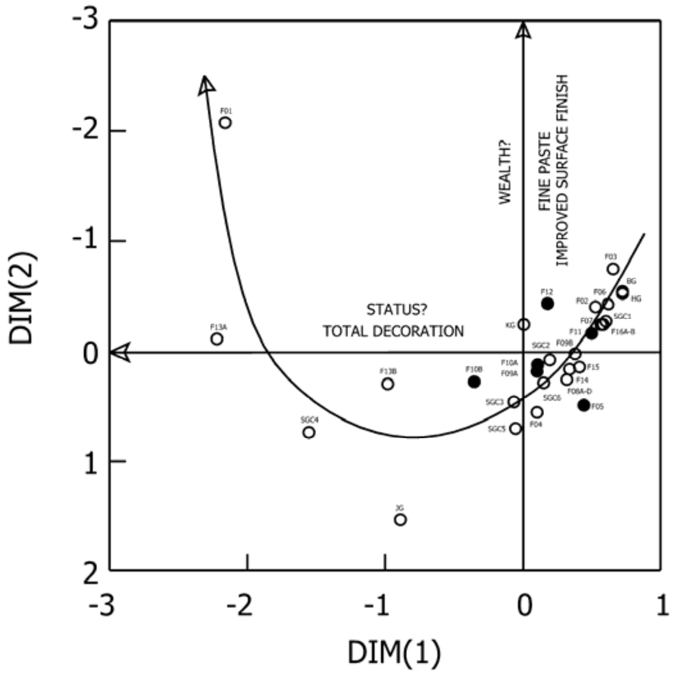


Figure 6.24. Households with ornaments (solid dots) superimposed on Figure 6.21.

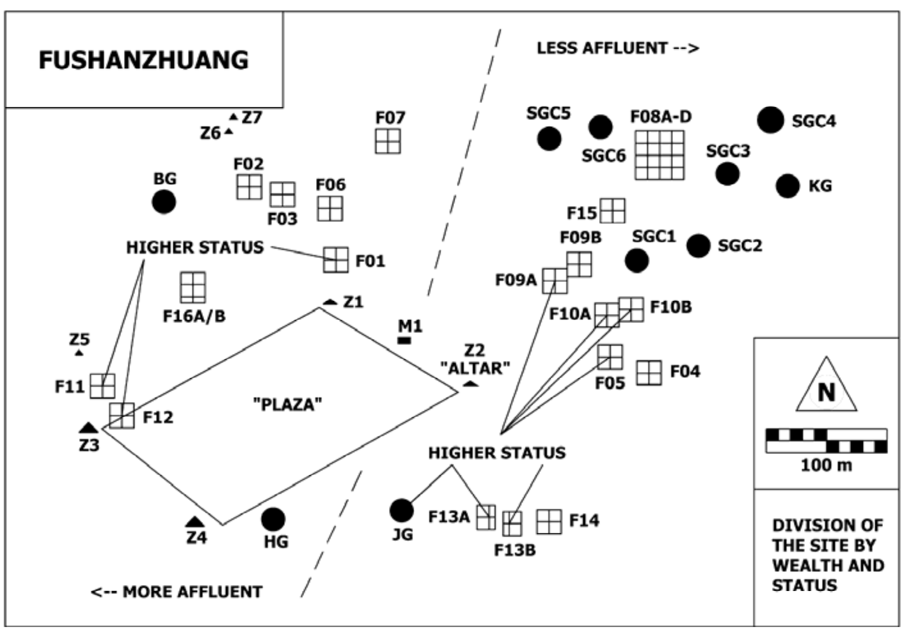


Figure 6.25. Location of higher status and wealthier households within the core area of the Fushanzhuang community.

7. CONCLUSIONS: CRAFTING HONGSHAN COMMUNITIES?

This research was undertaken in an attempt to determine to what degree, if at all, productive specialization, resource control, and labor pool enlargement were used to underwrite the development of social inequalities and the formation of chiefly communities during the Hongshan period (4500–3000 BCE) in the Chifeng region of eastern Inner Mongolia. In short, we were interested in whether social hierarchy was the product of differential wealth accumulation between specialist households, or the result of differential participation in other non-economic activities. In order to address this question, we first sought to determine whether or not there were differences in specialized production between households at Fushanzhuang. Much of the information obtained through intensive surface collection of the core area of the Fushanzhuang local community bore directly on this question. Almost none was sufficient to address the possibilities of resource control and labor pool enlargement, although some suggestions as to how this might be remedied in future work are offered below. We were also unable to identify the presence of prestige goods production at Fushanzhuang, in either ceramic, jade, or shell, indicating that the examples of some of these kinds of objects recovered were probably produced elsewhere. We have suggested that most were likely to have been made locally in outlying areas of the Fushanzhuang chiefdom, but we acknowledge that some may have been obtained at longer distance. Most of the artifactual evidence we collected (largely in the form of stone tools and stone tool debitage) is indicative of a complex and interdependent system of food and multi-stage utilitarian stone tool production within the core community (discussed in Chapter 5). From differences between households in the proportional representation of tools and tool debitage we identified four continua of “part-time” economic specialization at Fushanzhuang. These continua correspond to agricultural production, initial tool production, “tool finishing”, and tertiary tool production and/or tool maintenance. A fifth occupational emphasis, which we have labeled “generalization”, appears to have combined various aspects of the other four.

We also sought to distinguish between households of higher and lower status within the Fushanzhuang community. The micro-regional distribution of Hongshan period occupation clustered around the conspicuous burial monuments at Fushanzhuang was our first indication of the presence of substantial social hierarchy. Differences in the proportional representation of ceramic decoration in domestic assemblages proved a good means of measuring the social distance between households within the community (see Chapter 6). Ratios of bowls to jars, and the presence of personal ornaments provided corroborating evidence for higher and moderately-higher status, among a more inclusive group of households. In contrast, we interpreted differences in the proportion of costly fine paste ceramics to be largely indicative of differences in household wealth. We found no consistent association, however, between household wealth and higher or lower status at Fushanzhuang (see below). What we have not yet considered, however, is the possibility that differences in wealth and status pattern with respect to differences in productive specialization.

7.1. PRODUCTIVE SPECIALIZATION AND WEALTH ACCUMULATION

Figure 7.1 is a reproduction of an earlier MDS plot used to identify the presence of five activity emphases, or specializations, at Fushanzhuang. Four of the five higher status households identified on the basis of our ceramics analysis (F01, F13A, F13B, and JG) are distributed throughout only two of the economic specializations defined. (SGC5, the fifth of these households, was not included in our MDS analysis of activities because of concerns over the size of its lithic artifact sample.) F13A and JG are located amongst the agricultural group, whereas F13B and F01 are among the initial tool producing group. Clearly, our archaeological indicators of high household status do not consistently co-vary with respect to a single economic activity. We might conclude from this that although modest differences in economic activities were identified between households at Fushanzhuang, none appears to have exclusively underwritten community leadership. However, only F13B is not among the more specialized examples in these respective activity groups (as measured by distance from the cluster of "generalist" households in the center of the plot). The fact, however, that three of our four highest status households (the fifth must be treated as missing data) were engaged in substantially more specialized production than most others may actually suggest the opposite conclusion—that economic specialization and higher status are causally related. But, only if we view agricultural production in the same light as other kinds of specialization. If not, only one of five households (F01) would appear to have been especially "specialized".

There are at least two reasons why we may want to reconsider treating agriculture and tool production in similar terms. The first is that the generation of agricultural surplus is heavily dependent on the quality and/or quantity of farmland and/or the amount of labor at one's disposal. Although other productive activities such as ceramic and stone tool production are not free of the constraints imposed by the availability of labor and resources, it is especially difficult to disentangle agricultural production from issues of resource control and labor mobilization, particularly in a context where nearly all households within the community were engaged in this activity to some degree, and therefore required access to the same resources (e.g., land, seed, rainfall) simultaneously. Secondly, as regards Hongshan agricultural production, neither the resources themselves, nor the products produced, were probably so rare (or inequitably distributed between households) as to warrant much additional demand for them.

That leaves only one household, F01, potentially in the position of having achieved higher status within the community as a result of its specialized productive activities. While this may well indeed be the case, it is hardly sufficient evidence to conclude that productive specialization was an especially effective means of "crafting" social inequality at Fushanzhuang—other households are equally if not more specialized than F01, even with respect to the same kind of activity. One possibility worth pursuing is the inclusion of other "moderately-high" status households in our comparison. If, for example, most of these additional households also appear to have specialized in initial tool production, or to have especially emphasized another economic activity, we might still conclude that productive specialization was an important factor in the formation of the Fushanzhuang chiefly community.

We identified eight of the other 18 households in our sample as having an intermediate level of social standing within the community (F03, F05, F09A, F10A, F10B, F11, F12, and SGC3). This assessment was based on the presence of personal ornaments and/or high ratios of bowls to jars in their ceramic assemblages. (Our highest status households, F13A, F13B, F01, and SGC4, were also observed to have moderate to high ratios of bowls to jars.) In one case, F10B, a high proportion of decorated ceramics was also observed; further evidence for higher status. Although we would do well to heed our earlier warning that ornaments were probably not as restricted as presently appears, the presence of such items (rather than their absence) is nonetheless useful information. In addition, although ornaments almost certainly functioned as symbols of status within the community, some of the more labor-intensive examples (such as jade beads, earrings, and ground stone bracelets) may also have functioned as symbols of wealth amongst more ordinary households. The fact, however, that ornaments and higher ratios of bowls to jars frequently co-occur in household assemblages at Fushanzhuang, reinforces the idea that it is higher status, not greater wealth, that the former objects were meant to convey.

These eight additional moderately-high status households are spread throughout four of our five activity emphases, including initial tool production, tool finishing, agriculture, and even "ordinary" or generalist households. Tool finishing shows a particular concentration of such households, with all three specialists (F11, F12, and SGC3) evidencing the same moderately-high status. Although one of these, F11, particularly emphasized this activity, only slightly fewer moderately-high status households were assigned to initial tool production and agriculture by way of our MDS analysis. If we also include F13A, F13B, JG, and F01 in the comparison, initial tool production accounts for four of the highest status households, as does agriculture (Figure 7.2). Moreover, 6 or 7 of these 12 households (not including F10B, our generalist example) were only minimally to moderately specialized in their respective activities. Clearly then, considering a wider range of higher statuses does not provide any more support for the idea that productive specialization underwrote social inequality at Fushanzhuang than did our previous discussion.

If institutionalized social inequality was not dependent on differences in the kind or degree of specialized household production, then upon what was it based? One possibility is the general accumulation of wealth produced as a consequence of economic activity, rather than specialization per se. Such a possibility would need not necessarily be tied to relative differences in the kind or degree of specialization practiced. Under the right conditions, particular combinations of activities could decrease cost, increase productive efficiency and/or output, broaden the consumer base, all while spreading the risk of agricultural loss or lulls in demand (Hirth 1993b). Thus, both specialization and generalization could have been productive avenues for improving the social standing of households within the Fushanzhuang community. We have already noted a clear division of the core community into more and less affluent parts through the spatial segregation of households (Chapter 6). The relationship between material wealth (framed in terms of high proportions of fine paste ceramics) and economic specialization is plotted as Figure 7.3.

Households F02 and F16A/B were engaged in a mix of activities (although F02 was nominally more involved in tool production), whereas F01, F03, and F07 were specialized in initial tool production, and F11 and F12 in tool finishing. Only one, F06, was engaged in agricultural production, and appears to have been more focused on this activity than any other household at Fushanzhuang. Not all of these wealthier households were also of high or moderately-high status (cf. Figures 7.2 and 7.3), but at least half of them were (including F01). None of these wealthier, higher status households were engaged in agriculture, general, or tertiary pursuits. Rather, all four were involved in initial stone tool production and/or tool finishing for intra-community exchange. While not a perfect correlation by any means, it is better correspondence than observed between our very highest status households and specialized production. Greater wealth may have thus been the means by which some proportion of higher status households came to be regarded in a more prestigious light. That all wealthier households did not enjoy higher status would seem to indicate, however, that there were other contributing factors. No one economic activity appears to have better enabled its practitioners to generate more wealth than any other, but some activities (like stone tool production) were more often associated with higher status households. Irrespective of their particular economic emphasis, many of the wealthiest households were also among the most specialized. In addition, differences in each household's available labor and access to particular resources could have facilitated, or conversely limited, their ability to accumulate wealth. Control over the critical resources required for certain kinds of specialized production (like stone tool manufacture), or that could be used to increase productive efficiency and output, might have been the basis for the gradation of statuses observed within this more affluent group of households.

7.2. RESOURCE CONTROL AND LABOR POOL ENLARGEMENT

None of the information we collected in the course of this research is sufficient to address the role(s), if any, of resource control and/or labor recruitment in the development of wealth-based hierarchy at Fushanzhuang. We can, however, make some suggestions as to how future research might redress these shortcomings. Agricultural land is the primary resource likely to fall under the control of a few households in a largely agrarian setting (see Chapter 1). Unfortunately, such control is most easily studied archaeologically if households can be physically associated with their landholdings. That is, that individual households were dispersed across the landscape, and lived directly on the land they cultivated. Clearly this is not the case for Fushanzhuang, or other Hongshan settlements. While not as compact as some villages could be, the Hongshan period residents at Fushanzhuang were not living in direct association with their farmland. These landholdings must have been distributed throughout the adjacent uplands, and/or in the valley below.

Another resource that seems particularly worthy of attention, especially as concerns Fushanzhuang, is lithic raw material. During our lithic analysis we did collect some preliminary data on material types. We know, for example, that most blades were made from siliceous materials like chert, jasper, or chalcedony, and that most of the large agricultural tools were manufactured through a combination of flaking and grinding of volcanic materials of the diorite family (rhyolite, andesite, basalt, etc.). Volcanic, metamorphic, and sedimentary rock is present in great diversity throughout the Chifeng region. Because of this diversity it was difficult for us to assess to what degree these materials may have differed in quality and desirability. Our limited geological expertise precluded us from even being confident that two otherwise similar-looking stone tools of different color were not made from the same material. As a result, we recorded more than 40 different combinations of raw material and color “types”. Unfortunately, however, with so many materials classified, the proportions of any one type per household assemblage were so low, and the overall size of each raw material sample so small, that it was not possible to confidently assess in statistical terms how different households were in terms of their access to these resources. We considered collapsing materials into larger categories for analysis, but again, without a reasonable expectation that we could accurately lump like materials together, such efforts would not likely have produced very meaningful results. Further research might entail the reclassification of these materials with the help of a competent geologist. The proportions of different raw material types could then be confidently compared between households. We might even be able to trace patterns of stone tool exchange within the community. Moreover, a specially designed survey to locate and map raw material sources in the vicinity of Fushanzhuang, and collect samples of interest for mineralogical analysis, could be the first step in estimating the distances involved in procuring these materials. Some households involved in initial tool production, like F01, may have been trimming and shaping tool blanks off-site near the actual sources of raw materials. We might find evidence of these activities. Some materials may have been brought to Fushanzhuang from outside the region, and eliminating local sources would be the first step in the confirmation of their non-local origin.

A third important resource in many agrarian societies is labor. By enlarging the size of household labor pools more land can be cultivated, or a more diverse array of economic activities can be simultaneously pursued (see Chapter 1; Hirth 1993b). Either could lead to an increase in household wealth. Despite caveats that house size may reflect not only its number of inhabitants, but also the wealth of its inhabitants (e.g., Netting 1982; Wilk 1983), estimates of this sort are often made from archaeological data. This data tend usually to be derived from estimates of excavated house floor areas. The size of excavated Hongshan period house floors differ enough to suggest non-trivial differences in available labor and productive output between families (see Chapters 1 and 4). Unfortunately, we have no comparable excavated house floor data from Fushanzhuang. It might, however, be possible to get at relative differences in house size (and thus population size) from patterning inherent in our 19 systematically-collected surface scatters of artifacts. Although these grid-based collections were restricted (with some exceptions) to about 400 m^2, and so do not vary in scale according to the size of surface scatters directly, plots of differences in the densities of ceramics and lithic artifacts within grids, on a square by square basis, could be used to search for partial patterns of higher-artifact-density middens encircling lower-density house floors (e.g., Gonzalez 1998; Killion 1992). These differences in density could then be used to project circles corresponding to the idealized circumference of each physical house structure (the low density area). Differences in the size of these circles could be taken to indicate relative differences in household size. The high-density criteria used to locate the center of each grid means that it is likely that most were placed close to the edge of sheet midden deposits, and therefore likely to have captured any such patterns if they exist. Despite this possibility, however, we decided that the potential benefits of such a lengthy analysis did not outweigh its certain costs in time and effort at present. Were additional data available on lithic raw materials, the opportunity to discuss both facets of resource control simultaneously might provide the needed justification to proceed with such an analysis.

7.3. RITUAL AUTHORITY

Although wealth accumulation may have been one means used by Hongshan households to increase their social standing within their respective communities, it does not account for the presence of a few less affluent but still higher status households at Fushanzhuang. Two of the four highest status households we identified (F13A and JG) and three of the eight moderately-high status households (F05, F10A, and F10B) are among the least affluent, as measured by the proportion of fine paste ceramics in their assemblages. All five of them were also engaged in agricultural production (or generalized production in the case of F10B). This association could indicate one or two things. The first is that these households may have controlled access to the best farmland, or were able to put more land under cultivation than other households because their families were larger than others. The generation and control of surplus staples for exchange with other specialist households could have been responsible for the elevated status we observed archaeologically. Second, they might (also) have been able to attract and/or mobilize labor from other households for use in agricultural production on account of their pre-existing higher status. Regardless, it does not explain why the surpluses generated were expended only on decorated ceramics of low quality, and not also used to acquire pottery of finer paste as did some other of Fushanzhuang's higher status households. (Although surpluses might have been used to furnish the largest of burial mounds with painted tongxingqi vessels, and perhaps even with jade objects.) It could also be that these five households never produced substantially more foodstuffs than they could exchange with others for needed commodities, and were therefore never able to accrue material wealth in the same manner as some other households.

They may, however, have been able to parlay their agricultural associations into a symbolic authority rooted in notions of fertility and fecundity. Several researchers have suggested that many if not most of the elaborate jade carvings and "venus" figurines of the period found almost exclusively in or amongst the groupings of ceremonial constructions for which the period is best known, reflect a system of beliefs organized around, or at the very least incorporating, these twin principles (e.g., Childs-Johnson 1991; Guo 1995, 1997a, 1997b, 2005; Li 2003; Nelson 1991, 1994, 1995, 1996, 1997, 2002). The higher status afforded by these households' differential participation in ceremonial activities could have lessened their need to have engaged in other forms of specialized craft production, because wealth accumulation would likely yield little additional social benefits. The association of these households with agricultural production might also have had a completely non-ritual basis. For example, these households may have been backed into positions of economic dependency with wealthier crafts-producing elites if the latter controlled and blocked access to the non-agricultural resources necessary for the former to have engaged in other kinds of productive activities.

7.4. CONCLUSIONS

In conclusion, inter-household differences in the accumulation of wealth on a modest scale appear to have been the basis of at least some, but not all, social ranking at Fushanzhuang. In addition to productive specialization itself, the monopolization of the resources required to support this structure of economic interdependence (such as good farmland, quality tool stone, or even labor), may have been another means by which a few households accrued wealth and prestige within the Fushanzhuang community, although we were not able to evaluate this possibility in the course of our research. Most of the higher status households identified at Fushanzhuang do not appear to have been particularly wealthy, however. In fact, many are among the least affluent households as measured by the proportions of fine paste pottery in their domestic assemblages. Thus, while economic specialization clearly contributed to community coalescence, and to the creation of wealth differentials between households at Fushanzhuang, it cannot be said to have exclusively underwritten the development of social hierarchy there. This suggests the presence of a second kind of social hierarchy within the community, one based in a different currency than wealth accumulation (Drennan and Peterson 2006). At present, the most plausible explanation for less affluent households' higher status is their differential participation in the ceremonies for which Hongshan ritual monuments were presumably built. This conclusion, then, is not in disagreement with the majority of Hongshan scholars who see its institutionalized leadership as largely anchored to ritual authority (e.g., Childs-Johnson 1991; Guo 1995, 1997a, 1997b, 2005; Li 2003; Lu 1998; Nelson 1991, 1996, 1997, 2002; Shelach 1997, 1999). The means, however, by which this second and more pervasive symbolic hierarchy was effected at Fushanzhuang, and may have been effected elsewhere, remain unclear. Finally, to what degree our conclusions concerning the bases of social hierarchy at Fushanzhuang can be extended to include other Hongshan communities, both within, but most especially outside of, the Chifeng region, is certain to be both a complex and contentious issue. In order to address and resolve it, scholars will need to engage in the detailed and comparative study of many other Hongshan period chiefly communities.

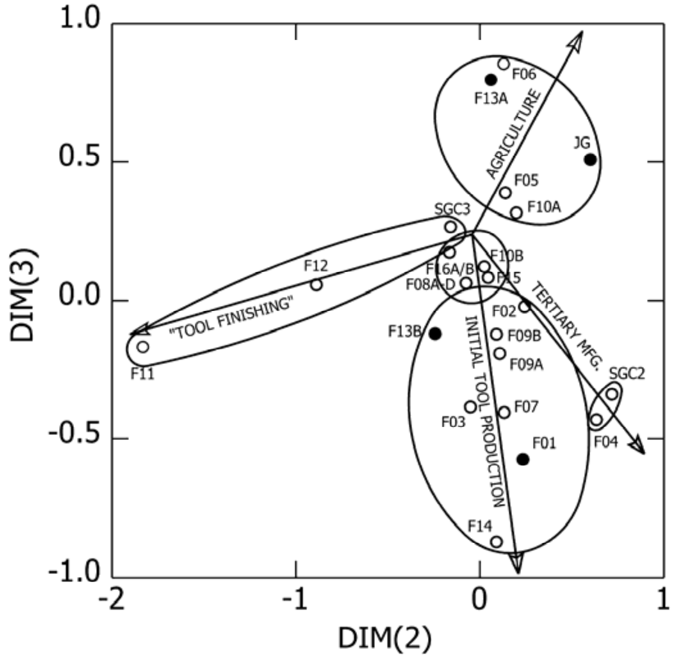


Figure 7.1. The distribution of higher status households (solid dots) as defined on the basis of high proportions of total ceramic decoration with respect to economic specialization.

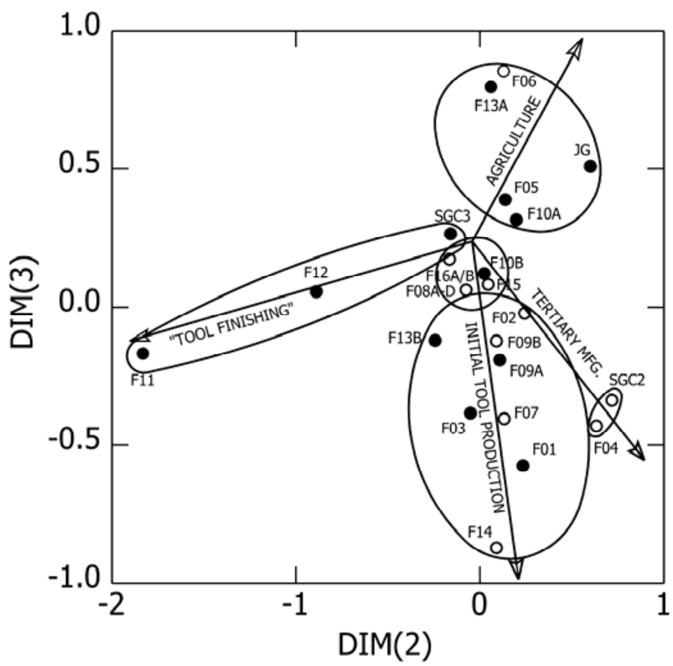


Figure 7.2. The distribution of higher and moderately-high status households (solid dots) as defined on the basis of total ceramic decoration, high ratios of bowls to jars, and/or the presence of personal ornaments, with respect to economic specialization.

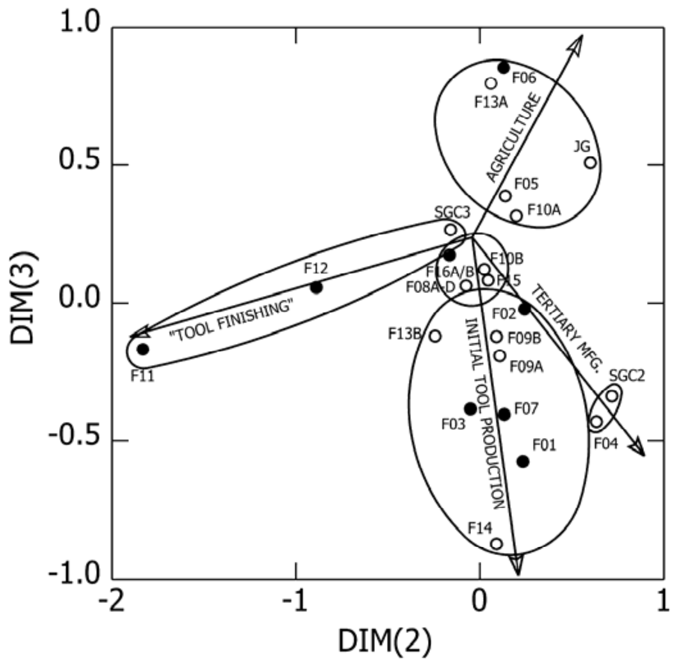


Figure 7.3. The distribution of more affluent (solid dots) and less affluent households at Fushanzhuang with respect to economic specialization.

APPENDIX A

Identification and Analysis of Hongshan Period Ceramic Artifacts From Fushanzhuang

by Christian E. Peterson and Guo Zhizhong (郭治中)

In this appendix we list and briefly describe the categories of micro-regional and intensive survey ceramics data collected in the field and laboratory. Micro-regional ceramics were used only to identify Hongshan period occupation within the HICARP survey area (as discussed and analyzed in Chapter 4). Information pertaining to the ceramics of other periods was also collected and analyzed, however. HICARP micro-regional settlement and ceramic data for all periods will be merged in the near future with that collected by the CICARP (e.g., Chifeng 2003a, 2003b; Zhong–Mei 2002) for a comprehensive regional analysis and publication of these data. Most of the information we recorded for sherds collected during micro-regional survey was to render our ceramics dataset comparable to that of the CICARP. Discussion of these materials is well beyond the scope of the present work. Consequently, we have not endeavored to list categories of data for other periods here. The information recorded during our laboratory analysis of intensive survey-collected Hongshan period sherds is far more detailed (see below).

All ceramic artifacts recovered through regional and intensive survey are, as of this writing, in permanent storage at the Data Archaeological Workstation outside Ningcheng, in Chifeng County, Inner Mongolia. Analysis was undertaken in Ningcheng from mid-to-late August 2004. Descriptions of the methods employed in the collection and analyses of ceramic artifacts collected from Fushanzhuang appear in chapters 2, 3, and 6. The complete micro-regional and intensive survey ceramic dataset is available in electronic form upon request from the senior author (cepst22@pitt.edu). (Currently, this dataset consists of two Microsoft® Access databases, two AutoCAD® maps of Hongshan settlement and household distribution [at Fushanzhuang], and a handful of scanned TIFF format sketch maps of sites.)

A. MICRO-REGIONAL SURVEY

The HICARP micro-regional settlement survey data was organized as a set of five cross-referenced Access database forms. These forms served as convenient “front pages” or “portals”—each linked directly to one of five spreadsheet-like tables—for the entering of information on a per collection or per site basis. These forms/tables include: (1) **Collections**; (2) **Sites**; (3) **Site Descriptions**; (4) **Ceramics**; and (5) **Non-ceramic Artifacts**. The **Ceramics** form is labeled in both English and Chinese. All table headings appear in English only. The categories of information recorded are listed below according to form/table.

COLLECTION FORM/TABLE

Site Number: The composite archaeological “site” to which the collection unit was assigned (see below).

Survey Tract: The last two digits of the year the collection was made. All HICARP collections were made in 2004, or “04”.

Team: A letter designating the survey team which made the collection. All HICARP collections were made by team “P” (for “Peterson”, after the usual crew chief and senior author).

Collection Number: A unique combination of three digits in sequential series identifying a specific collection. The series begins with 001.

(Collection) Key: **Survey Tract**, **Team**, and **Collection Number** combined into a six character alphanumeric key (e.g., 04P001). In subsequent publications that make use of combined HICARP/CICARP-collected regional data, 04P will be the default indicator of a HICARP-made collection. All five regional survey forms are cross-referenced by means of this collection key. Each collection is 1 ha or less in area.

Surface Visibility: A subjective on-site characterization of surface visibility within the area in which the referent collection was made. Only one of the following categories was selected per collection:

(1) High.
(2) Medium.
(3) Low.

Date: Date the collection was made in Year/Month/Day (YY/MM/DD) format.

Collection Method: The type of field collection made. At least three sherds (of any period) visible on the surface within a 100 m section of survey tract were required to initiate a collection. If surface sherd densities across the entire 1 ha collection area appeared to exceed $0.5/m^2$, then a systematic collection was made; otherwise, a general collection was made. Each type of collection is associated with different surface sherd density values used in Chapter 4 to calculate Drennan et al. (2003b)'s Density-Area Index (DAI).

(1) General. A random "grab-bag" collection whose sherds (and other artifacts) originate from multiple locations within the 1 ha collection area. The collection target was 20 sherds, if at least this many were visible on the surface. Each general collection was assigned an arbitrary surface sherd density of 0.25 m^2 for DAI use.
(2) A. Systematic. One or more randomly-placed 3 m diameter collection circles, the calculated surface sherd density for which is considered characteristic of the entire 1 ha collection for DAI purposes.
    B. The number of 3 m diameter systematic collection circles made. (If less than 20 sherds were collected in the first systematic collection, additional circles were made until a minimum threshold of 20 was reached.)

Number of Bags: The number of bags of artifacts collected per collection unit separated by material type (if separated in the field). Recorded for purposes of data checking.

(1) General (a bag of mixed artifacts).
(2) Ceramics.
(3) Flint et al.
(4) Basalt et al.
(5) Other (e.g., bone).

Feature Associations: Brief descriptions of any archaeological features visible within the confines of the collection unit (e.g., ashy house circles, pit features, architectural remains).

<u>SITE FORM/TABLE</u>

Site Number: The composite, four-digit archaeological "site" number assigned to contiguous collection units irrespective of differences in period of occupation. Groups of contiguous collection units separated by surface sherd densities of less than 3/ha as recorded on survey (i.e., "unoccupied" territory) were assigned different site numbers. Isolated collection units were also assigned site numbers. These numbers form a consecutive series—some of Shelach's (1996, 1997, 1999) site numbers were also used (see Chapter 4).

Chinese Site Name: The name in Chinese, if any, given to a previously-discovered site in the region.

Pinyin Site Name: English pinyin romanization of the **Chinese Site Name** (if any).

Photo Number: Four-character alphanumeric code identifying a particular segment of satellite photo on which individual collection units and aggregate sites were located and drawn in the field.

Date: The date, in YY/MM/DD format (see above), that the site was identified and requisite collections made.

Survey Crew Chief Name: The last name of the survey team leader, which appears in the HICARP database as either "Peterson" or "Drennan".

Survey Tract: The last two digits of the year the collection was made, or "04" (see above).

Number of Collections: The number of contiguous collections that comprise an individual "site".

Collection Numbers: The last three digits of each collection unit considered part of the specified site (the first three digits are not indicated [see above] as this is the same for all collections, or 04P).

UTM coordinates: Location of the site in Universal Transverse Mercator coordinates. Each set of coordinates begins with the prefix Z20, followed by a separate easting (E) and northing (N).

Dimensions: The approximate dimensions of the site (that of all contiguous collection units combined), for data checking purposes (e.g., during digitization into electronic format).

(1) Length, in meters (m).
(2) Width, in meters (m).
(3) Area, in square meters (m^2).

Physiogeographic Setting (check only one): Landform type on which the site is located.

(1) Mountain top.
(2) Slope.
(3) Terrace.
(4) Floodplain.

Features (check all that apply): Archaeological features preserved on the surface of the site.

(1) Defensive walls.
(2) Defensive ditches.
(3) Internal walls.
(4) Stone circles .
(5) Stone piles (cairns).
(6) Burned earth.
(7) (Stone) slab graves.
(8) Stratigraphy (exposed, as in a cut).
(9) Other.

Artifacts (check all that apply): All categories of artifacts collected from the surface of the site (i.e., its composite collection units).

(1) Stone tools (basalt et al.).
(2) Stone tools (flint et al.).
(3) Ceramics.
(4) Bone (human).
(5) Bone (animal).
(6) Other.

Primary Cultural Affiliation (check all that apply): A preliminary field assessment of the age(s) of occupation represented on the basis of surface-collected sherds. This information was used for data checking purposes (and may have modified during subsequent analysis of these ceramics in the laboratory).

(1) Xinglongwa
(2) Zhaobaogou
(3) Hongshan
(4) Xiaoheyan
(5) Lower Xiajiadian
(6) Upper Xiajiadian
(7) Zhanguo–Han
(8) Liao
(9) Unknown

Sketch map drawn?: Sketch maps of notable surface features encountered on survey were occasionally made in the field. These were scanned and linked to **Site Description** files (see below). An entry of "yes" in this field indicates that a sketch map was drawn.

<u>SITE DESCRIPTION FORM/TABLE</u>

Site Number: See above.

Description (optional): Brief (point form) listing of artifactual or architectural features (e.g., burial mounds or walls) of note compiled from all collection units that comprise that site. If a sketch map of the site was made, it is also indicated in the **Description**. If these sketch maps have been scanned, a hypertext link to this file is provided.

<u>CERAMICS FORM/TABLE</u>

Collection Key: See Collection Form above.

Total Sherds: The total number of ceramic sherds (irrespective of archaeological or modern period), as counted in the laboratory, comprising a single collection as identified by the collection key.

Hongshan Sherds: Sherds identified as dating on physical (matrix, temper, color, etc.) and stylistic grounds (see Hongshan Decoration below) to the Hongshan archaeological period as presently defined.

Hongshan Decoration: Six overlapping, or non-mutually exclusive categories of information were recorded with respect to sherd decoration. These data are non-associative—the frequencies of total occurrence of decorative elements were tallied for entire collections, not specific sherds. See Chapters 3 and 6 for information on each of the specific designs discussed below. These include:

(1) Occurrence of the horizontal Z motif.
(2) Occurrence of the vertical Z motif.
(3) Occurrence of incising.
(4) Occurrence of duiwen (twisted appliqué, punctate, or twisted bands around vessel rims or bodies).
(5) Occurrence of mat- or basketry-impressed vessel bases.
(6) Occurrence of painting (black, red, or [rarely] purple pigment).
(7) Occurrence of no decoration (undecorated sherds).

Detailed information on sherds belonging to other periods was collected and therefore also appears in the database. These other periods include: Xinglongwa, Zhaobaogou, Xiaoheyan, Lower Xiajiadian, Upper Xiajiadian, Zhanguo–Han, Liao, Modern, and Unknown. We have not endeavored to list these other categories of data here, as discussion of these archaeological is beyond the scope of the present work.

Vessel Forms and Matrix: In addition to decoration, seven vessel forms were identified (see Chapters 3 and 6 for type descriptions) according to one of two paste (matrix) types: coarse or fine. (Not all vessel/matrix combinations have been observed in excavated assemblages.) The number of vessels indeterminate to type (of either paste) were not counted, but represent the vast majority of Hongshan sherds collected.

(1) Coarse guan.
(2) Fine guan.
(3) Coarse bo.
(4) Fine bo.
(5) Coarse hu.
(6) Fine hu.
(7) Coarse weng.
(8) Fine weng.
(9) Coarse xiekouqi.
(10) Fine xiekouqi.
(11) Coarse tongxingqi.
(12) Fine tongxingqi.
(13) Coarse other.
(14) Fine other.

NON-CERAMIC ARTIFACTS FORM/TABLE

(Collection) Key: See Collection Form above.

Flaked Stone Artifacts: Number of flaked stone artifacts in the collection specified, as identified in the laboratory (irrespective of archaeological period of manufacture and use [if determinable]).

Ground Stone Artifacts: Number of ground stone artifacts in the collection specified, as identified in the laboratory (irrespective of archaeological period of manufacture and use [if determinable]).

Comments: Basic identifications of tool/debitage types represented in the specific regional collection (all identifications by Christian Peterson). Note made if forms/materials of tools/debitage similar to Hongshan examples from Fushanzhuang intensive collections.

HS (Hongshan) Artifacts: Description of type(s) and enumeration of diagnostic Hongshan period tools in the specified collection.

Other Artifacts: Description and enumeration of other non-ceramic, non-lithic artifacts in the specified collection (e.g., faunal/human remains, bone or metal artifacts, etc.).

B. INTENSIVE SURVEY

In the laboratory, Hongshan sherds were separated from those of other periods collected during intensive survey at Fushanzhuang. Those of other periods were counted and rebagged according to context of recovery, and then stored without further analysis. We recovered 18,293 Hongshan period sherds from 29 domestic contexts at Fushanzhuang through a combination of systematic grid-based and general surface collection. During laboratory analysis, these were sieved through 10 mm wire mesh. Some 2,332 sherds less than 10 mm to a side were divided according to type of paste (coarse or fine), counted, re-bagged and set aside. This ceramic "small fraction" was also not analyzed further because these sherds were too small to have preserved the information necessary for the analyses described in Chapter 6. The remaining 15,961 "large fraction" sherds were analyzed in detail, however, and the requisite information on decoration, paste, and vessel form were entered into a single Access database form/table as per the categories below.

CERAMICS FORM

(Collection) Key: The alphanumeric code indicating which F-series grid, general collection GC, SGC) or spot find (SF) the ceramics are associated with.

Total Sherds: The total number of ceramic sherds of all periods recovered from the designated F-series grid, general collection, or spot find.

Total Sherds per Period (abbreviated 3-4 letter period code follows in parentheses (if any): The total number of ceramic sherds per archaeological period recovered from the designated F-series grid, general collection, or spot find.

(1) Total Xinglongwa (XLW) sherds.
(2) Total Zhaobaogou (ZBG) sherds.
(3) Total Hongshan (HS) sherds.
(4) Total Xiaoheyan (XHY) sherds.
(5) Total Lower Xiajiadian (LXJD) sherds.
(6) Total Upper Xiajiadian (UXJD) sherds.
(7) Total Zhanguo–Han (ZGH) sherds.
(8) Total Liao sherds.
(9) Total Modern sherds.
(10) Total Unknown or Indeterminate to period sherds.

The following attributes were recorded only for Hongshan period sherds recovered during intensive surface collection at Fushanzhuang. Sherds of other periods were not further analyzed. Records are non-associative—running total incidences of particular decorative attributes/vessel types were kept for each collection context, but no attempt was made to cross-reference information specific to individual sherds.

Hongshan Sherd Decoration: Categories of decoration present on Hongshan period sherds. Incidences of decoration are not mutually exclusive (see **Micro-regional Survey** above).

(1) Undecorated.
(2) Horizontal Z motif.
(1) Vertical Z motif.
(2) Other incised.
(3) Twisted/punctate band around rim or body.
(4) Mat impressed bases.
(5) Painted (and burnished).
(6) Burnished only (otherwise undecorated).

Hongshan Vessel Forms and Matrix: For every collection context, Hongshan sherds were separated into coarse and fine examples, and determinations made (if possible) as to the vessels represented. Up to three "other" unspecified types of ceramic vessels/artifacts (such as pen, spindle whorls, or ceramic beads) could be recorded per context, along with a brief description of these types.

(1) Unknown.
(2) Jar/pot (guan).
(3) Bowl (bo).
(4) Bottle (hu).
(5) Urn (weng).
(6) Slanted-mouthed vessel (xiekouqi).
(7) Cylinder (tongxingqi)
(8) Other 1:
    A. Description 1.
(9) Other 2:
    B. Description 2.
(10) Other 3:
    C. Description 3.

APPENDIX B

Identification and Analysis of Hongshan Period Lithic Artifacts From Fushanzhuang

by Christian E. Peterson and Gwen P. Bennett

Here we present descriptions of the variables used during the analysis of lithic artifacts collected through intensive surface survey at Fushanzhuang. Variables pertaining to those collected during micro-regional survey of outlying areas are not discussed, as no analysis of this data appears in the present work; they will, however, be incorporated into analyses of regional-scale settlement pattern data by the CICARP at a later date. All lithic artifacts recovered through regional and intensive survey are, as of this writing, in permanent storage at the Data Archaeological Workstation outside Ningcheng, in Chifeng County, Inner Mongolia. Analysis of all artifacts collected was begun during fieldwork in Chifeng city, and continued following a move to Ningcheng in mid-August. Descriptions of the methods employed in the collection and analyses of lithic artifacts collected in the course of our research appear in chapters 2 and 5. The complete dataset of lithic artifacts collected during intensive surface survey at Fushanzhuang is available in electronic form (currently as a set of Microsoft® Excel spreadsheets) upon request from the senior author (cepst22@pitt.edu).

All Phase I and II systematically collected lithic artifacts were analyzed (including debitage). Additionally, some of those recovered during Phase III operations at both F-series grids, and GC and SGC collections were also analyzed. The latter were sieved through two successively smaller wire mesh screens according to individual context. We labeled the resulting "size fractions" as large (greater than 25 mm, in shortest dimension), medium (less than 25 mm, but greater than 10 mm), or small (less than 10 mm). The small and medium fractions were examined for formal tools (non-debitage), and removed to the large fraction as encountered, for additional analysis. Thus, our analysis of lithic artifacts from Fushanzhuang includes all the formal tools recovered. Because of budgetary constraints, and the limitations of macroscopic analysis, only the large fraction debitage from F-series and SGC collections was also analyzed. The lithics from our four general collections (BG, HG, KG, and JG) were analyzed in their entirely due to their relatively small samples. We recorded at least 13 different attributes per artifact in the composite Phase I, II, and III (large fraction) dataset, including those related to provenience, collection method, metrics, tool/debitage type, tool/debitage condition, the presence/absence of cortex, manufacturing type, manufacturing location, and any additional comments specific to specimen. Incidences of usewear—including sheen/gloss, damage to or micro-fracture of the working edge, retouching and the removal of attrition/rejuvenation flakes—was identified macroscopically at 5–20X magnification. Information on each of the following variables was recorded for every specimen analyzed.

Provenience: Two attributes pertaining to artifact provenience were recorded, including the household designator (F01–F16A/B, BG, HG, JG, KG, or SGC1–6) and the collection grid number (if any). (Phase III general collections and special general collections were not given collection numbers, only household designators.) These two variables were then combined into a third collection key (e.g., F01304, or household 1, collection 304).

Collection Method: The stage of intensive surface collection during which the artifact was recovered.

(1) Phase I grid-based surface collection.
(2) Phase II raking-assisted grid-based surface collection.

(3) Phase III general surface collection.

Metric Data: The length, width, thickness, and weight of each tool or piece of debitage analyzed. Digital calipers and an electronic balance were used in making the requisite measurements.

Length—measured to the nearest millimeter (mm). For flakes: the maximum dimension perpendicular to the striking platform (if present). For tools and debitage: the maximum dimension of the artifact.
Width—measured to the nearest millimeter (mm). For flakes: the maximum dimension perpendicular to the length of the artifact (see Length above). For tools and debitage: the maximum dimension of the artifact perpendicular to the length of the artifact (see Length above).
Thickness—measured to the nearest millimeter (mm). For flakes: measured at the base of the bulb of percussion, if present, otherwise at the point of maximal dimension cross-sectional to Length (see above). For tools and debitage: the maximal dimension cross-sectional to Length (see above).
Weight—measured to the nearest one-tenth (0.1) of a gram (g).

Tool/Debitage Type: Categorization of lithic artifacts types according to inferred function. Codes given in parentheses preceding each entry correspond to those in Table 5.1 (Chapter 5). Types conform to standard Anglo-American usage.

(1) Utilized flake—any detached flake with usewear (see **Manufacturing Type** below).
(2) Retouched flake (no usewear)—flake without usewear evidencing at least three contiguous microflake removals from a single edge to repair or rejuvenate it.
(3) Utilized and retouched flake—see both tool types above (usewear and retouching present).
(4) Unifacially-worked scraping/chopping tool—flake-based tool with additional removal of flakes from edges on one face only.
(5) Bifacially-worked scraping/chopping tool—flake-based tool with additional removal of flakes from edges on both faces.
(6) Core—objective piece from which flakes were struck. Examples of both unidirectional (originating from one platform only), and multidirectional (originating from multiple platforms) were noted. No distinction was made between blade and other flake cores with respect to coding conventions (although difference noted in **Comments** field of the database).
(7) Hammerstone/opportunistic chopper—object used as a percussor for stone tool manufacture, or as a generic hammering/chopping tool. Must have evidenced usewear in the form of battering or crushing on ends and/or edges.
(8) Tool blank/unfinished tool (no usewear)—preform or tool blank purposely left incomplete, or abandoned prior to completion due to breakage, manufacturing error, or raw material flaw. If usewear is present, then the tool was reused, and is coded as such (see **Reuse**).
(9/12) Axe/adze—bifacial cutting/chopping tools (undifferentiated as to hafting) with clear bits/butts. Includes both ground and flaked examples.
(14) Shovel/hoe/plow—medium-to-large in size, wide-bladed and sometimes shouldered bifacial agricultural tools.
(16) Knife—often ovate bifacial cutting tool with an elongated blade (may also be backed).
(18) Projectile point—any small but regular uni-/bifacial point likely hafted as a projectile.
(19) Ornament—personal (worn) adornments of ground stone (often of a jade-like material) including tubular beads, earrings, and bracelets.
(20) Awl—elongate tool of rectangular to circular cross section tapering to a blunt point with evidence of crushing or microflaking due to torsional rotation under pressure (reaming).
(21) Handheld grinding roller—pecked and/or ground oblong grinding roller with D-to-triangular cross-section. Used in conjunction with a grinding slab. Combined with 22 for analytical purposes.
(22) Grinding slab—pecked and/or ground slab/basin/quern of variable size for the processing of vegetable matter. Used in conjunction with a grinding roller. Combined with 21 for analytical purposes.

(27) Grooved abrader—oblong stone with grooves or depressions worn as a consequence of shaping or sharpening tool edges during manufacture or as maintenance.

(28) Drill—clear elongate bit protruding from object body with evidence of edge crushing and microflaking from friction associated with rotation.

(30) Indeterminate ground and polished fragment—fragment of indeterminate ground stone tool with a lustrous surface suggesting it was buffed and/or polished during the final stage of manufacture (see **Manufacturing Type** below).

(31) Indeterminate ground only fragment (no polish from production)—fragment of indeterminate ground stone tool without a lustrous surface.

(32) Indeterminate flaked, ground, and polished fragment (including pecking)—fragment of indeterminate tool manufactured by flaking, grinding, polishing, and/or pecking (see **Manufacturing Type** below).

(33) Indeterminate fragment—default category for indeterminate tools whose particulars did not conform to any other indeterminate category (specific attributes of interest listed in the **Comments** field of the database).

(34) Indeterminate flaked and ground fragment—fragment of indeterminate tool manufactured by a combination of flaking and grinding (see **Manufacturing Type** below).

(35) Multiple function grinding implement—usually smallish, flattened coarse stone object used to process vegetable matter or manufacture/maintain tools, etc.

(37) Retouched blade—an elongate flake with parallel margins (with a length at least double its width), with at least three consecutive microflake removals from a single edge to repair or rejuvenate it. Blades often trapezoidal in cross-section.

(38) Indeterminate pecked only—an unclassifiable tool fragment manufactured by pecking.

(39) Indeterminate flaked only—an unclassifiable tool fragment manufactured by flaking.

(40) Utilized blade—an elongate flake with regular parallel margins (with a length at least double its width) and usewear.

(41) Graver/chisel—narrow ground stone object with beveled end used to gouge or scrape materials such as wood.

(43) Utilized debris/debitage—any debris from manufacture (irregular/blocky/chunky shatter) with usewear indicating opportunistic uses in cutting and/or scraping.

(51) Not applicable (debitage)—any debris from manufacture (irregular/blocky/chunky shatter) that cannot be identified as a flake or other tool.

Tool/Debitage Condition: Debitage was partitioned into four types based on the approach of Sullivan and Rosen (1985). The debitage types are: debris or shatter (debitage without a single interior surface); flake fragments (medial/distal fragments without a “platform” or point of applied force); broken flakes (proximal fragments with platforms but without intact margins); and complete flakes (those with intact margins in addition to platform characteristics). Each piece of debitage in our large fraction sample of lithic artifacts was coded as 1 through 4 below. In addition, spalls, indeterminate condition, and the relative completeness of formal tools was coded as 5 through 12 below.

(1) Shatter—irregular, blocky, or angular fragments of raw material, possibly with cortex, than show no signs of platforms, bulbs of percussion, or similar features associated with flakes; size is highly variable.

(2) Flake fragment (no platform)—any broken flake without a platform; includes both medial and distal flake fragments (lower two-thirds of flake).

(3) Broken flake (with platform)—broken flake retaining a platform and associated attributes (upper one-third of flake).

(4) Complete flake—flake with both platform, distal termination, and all associated attributes.

(5)

(6) Almost complete tool—any broken but recognizably formalized tool, the remaining portion of which can be estimated to have been nearly complete.

(7) Indeterminate—the specific tool condition is indeterminable (and could not be assigned to another category).
(8) Broken tool (proximal)—proximal one-third of any broken tool; applied to tools only.
(9) Broken tool (distal)—distal one-third of any broken tool; applied to tools only.
(10) Broken tool (medial)—middle medial one-third of any broken tool; applied to tools only.
(11) Broken tool (lateral)—middle lateral one-third of any broken tool; applied to tools only.
(12) Complete tool—any complete formal implement not considered to be a flake or shatter.

Cortex: The presence (coded as 1 in the database) or absence (coded as 0) of cortical material on the dorsal face of tools (including flakes) or debitage.

Manufacturing Type: Up to four different manufacturing types were coded per specimen. Additional types, if any, were indicated in the **Comments** field of the database. Note that some numbers in the code sequence below have been skipped.

(1) None, Use-Wear Only—macroscopic edge damage resulting from use; identifiable with 5–20X hand lens or less; damage includes glossing, abrasion, stepping and stacking of edge, microfractures; positive identification requires patterned evidence (at least 3 contiguous patches).
(2) Flaking—lithic reduction via the application of force to produce concoidal fracture.
(3) Pecking—hammering of material with a harder, denser material to reduce and shape the former.
(4) Grinding—mass wasting of material via abrasion with coarse(r) material; may include the use of sand, water, or other media to improve frictive properties.
(5) Polishing—late stage grinding/buffing/rubbing of surfaces with fine abrasives to create a surface gloss.
(7) Drilling—localized abrasion resulting in perforation of the objective piece.
(8) Sawing—subdivision of the objective piece through concentrated linear abrasion or a narrow area.
(9) Thermal Alteration—the intentional application of heat to a specimen to alter its fracturing properties, its relative hardness (thereby improving workability), or aesthetic qualities (such as color).

Manufacturing Location: The categories used were collapsed versions of a more extensive definitional suite of locations often used by lithic analysts. Up to three different manufacturing locations were coded per specimen. Locations of manufacture were coded only for tools, not flakes, or other debitage.

(1) One face.
(2) Two or more faces.
(3) One edge.
(4) Two or more edges.
(5) One end.
(6) Both ends.
(7) Entire artifact.

Comments: Additional information about the provenience of a specimen, its formal properties, inferred usage, similarity to other artifacts, etc.

CHINESE GLOSSARY

Aohan (Banner)	敖汉
Baiyinchanghan	白音长汗
Balinyou (Banner)	巴林左
Bang River	蚌河
bei	杯
ben	锛
bo	钵
cailiang	擦亮
caitao	彩陶
chan	铲
Chengzishan	城子山
Chifeng (city/region)	赤峰
chu	锄
chu	杵
Chutoulang	初頭朗
chuizi	锤子
Dahedong	大河东
dao	刀
diaokepin	雕刻品
Dongjiayingzi	董家营子
Dongshanzui	东山嘴
dou	豆
duiwen	堆纹
Erdaoliang	二道梁
fang	方
fu	斧
Fushanzhuang	福山庄
Fuxin	阜新
guan	罐
guangchang	广场
guaxiaoqi	刮削器
hengzhiziwen	横之字纹
Hongshan	红山
Hongshanhou	红山后
hu	壶
huikeng	灰坑
Hutougou	胡头沟
Jianping	建平
jiasa tao	夹砂陶
jiantou	箭头
Jilin (Province)	吉林
jiu	臼
kaogu	考古
Kazuo (County)	喀左
Laohushan River	老虎山河
lian	镰
Liao (Dynasty)	辽代
Liao River	辽河
Liaoxi (Region)	辽西
Liaoning (Province)	辽宁
lisuo	理所
Lower Xiajiadian	夏家店下层
modaoshi	磨刀石
mopan	磨盘
mobang	磨棒
moshi	磨石
mu(zang)	墓(葬)
Nantaizi	南台子
Nasitai	那斯台
Neimenggu (Inner Mongolia)	内蒙古
Ningcheng	宁城
Niuheliang	牛河梁
nizhi tao	泥质陶
Nushenmiao	女神庙
pan	盘
pen	盆
Silengshan	四棱山
shidui	石堆
shihe	石核
shipian	石片
shiye	石叶
shuzhiziwen	竖之字纹
si	耜
Sifendi	四分地
Songshan (district)	松山
sumian	素面
tongxingqi	筒形器
Upper Xiajiadian	夏家店上层
wan	碗
wangzhui	网坠
weng	瓮
wenwu	文物

wenwuguan	文物管
Wudaowan	五道 弯
Xiaoheyan	小河沿
xiekouqi	斜口器
Xinglonggou	性隆沟
Xinglongwa	性隆洼
Xishuiquan	西水泉
Xitai	西臺
xiwen	席纹
yanjiusuo	研究所
Yin River	阴河
zao	凿
Zhanguo–Han	战国—汉
Zhaobaogou	赵宝沟
Zhizhushan	蜘蛛山
zhui	锥
zuan	钻

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