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THE ARCHAEOLOGY OF VACANT LOTS IN TUCSON, ARIZONA

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An archaeological survey of 17 vacant lots in Tucson, Arizona, was carried out as a student exercise. The survey disclosed evidence for a recurrent set of activities: travel from place to place, refuse disposal, storage, automobile-related uses, adult and children's play, camping, and various removal processes. Hypotheses about several formation processes, especially trampling, are provided. It is argued that vacant lots are a distinctive kind of activity area involving public use of private space, present in all cities, whose archaeological study may shed light on past urban systems.

In the spring of 1973 the authors taught a course at the University of Arizona on the method and theory of archaeological fieldwork. Students were presented with a series of practical problems requiring observation and interpretation of material culture in Tucson. One exercise, an archaeological survey of a vacant lot, produced results that may be of general interest. In this paper we summarize the students' hypotheses about the patterns of use and the formation processes that created the archaeological record in Tucson's vacant lots. We include our ideas about the broader implications of these findings.

The vacant lot project served to introduce students to a variety of cultural and noncultural for-
mation processes. After choosing a lot, preferably one with paths, students were asked to (1) construct a pace map of the lot showing all major features, including paths, sidewalks, artifact concentrations, and vegetation patterns; (2) describe in general terms the kinds and distributions of material culture; (3) select five sample units and record the artifact inventory in each; (4) formulate hypotheses about past and ongoing formation processes; and (5) make additional, independent observations as needed for hypothesis testing. Seventeen lots were surveyed in diverse locations, although most tended to be in the vicinity of the university.

The assignment was not ethnoarchaeological; rather it treated the archaeology of the recent past. Thus students did not make systematic, direct observations of behavior in vacant lots, although they could draw upon their general knowledge of such behavior.

USES OF VACANT LOTS

The surveys permit us to characterize vacant lots as a distinct class of activity area that may be present in all cities. Vacant lots serve as a locus for a set of activities that seem to recur frequently, although the surveys do not furnish fully quantified results.

Travel

Vacant lots provide opportunities for human travel to depart from the formal grid laid down by urban planners. A nonlinear network of foot and bicycle paths is perhaps the most obtrusive and complex cultural feature found consistently in vacant lots. The behavior responsible for paths has archaeological consequences beyond the obvious inhibition of vegetation growth and change in drainage patterns. People walking on paths deposit (and alter) artifacts in regular ways.

There is a general class of objects discarded "in transit," definable archaeologically as a zone of randomly spaced artifacts along the length of a path. Most of the objects ceased being useful to a person while he or she was in the vicinity of the lot (e.g., wrappers, containers, cigarette butts). The nature and abundance of "in transit" refuse are conditioned by the spatial distribution of sources for immediately consumable items. For example, fast-food outlets and convenience markets dramatically affect the kinds and quantities of items deposited on all lots within a presently undefined radius. The "in transit" depositional zone is not found on paths that terminate within lots. (Terminating paths are not used by people in transit across the lot.)

"In transit" processes operate not only in vacant lots but on trails, roads, and in all settlements. Future research should strive to identify the specific variables that influence depositional processes. Students suggested that distance traveled, frequency of travel, locations of food and water sources, artifact use-lives, vegetation cover, and the kinds of material culture that people have with them may be among the more important of these variables.

Refuse Disposal

Another prevalent use of vacant lots is for refuse disposal, which often takes place along and at the ends of terminating paths. By far the largest amount of refuse consists of materials not readily collected by the Tucson Sanitation Division in its biweekly residential pickup, especially vegetal matter from yard maintenance and bulky waste products of demolition and construction. Many factors, such as proximity to the lot, availability of transport, and the amount of refuse produced, determine whether individuals will choose vacant lot disposal over the two alternatives available in Tucson: transport to the sanitary landfill or processing and packaging of the material so that it will be collected by the city. If bulky refuse is generated at high frequency, institutionalized disposal mechanisms are needed: for example, producers of high-volume industrial wastes generally make use of the city's commercial pickup or recycle their refuse. The materials discarded in vacant lots are often bulky; yet they are infrequently produced by individuals. This illustrates the more general archaeological principle that the rate of refuse production and the nature of the refuse affect the means and place of disposal (Schiffer 1972, 1976).
Storage

Another category of "refuse" in vacant lots consists of usable but bulky materials, deposited in an orderly fashion, apparently for storage. Many of these items, such as I-beams, bricks and sand, and low-grade lumber, have long shelf-lives and are subject to irregular demand on a household level. The value of this material thus lies in its potential for future use, which in some cases never occurs. Storage of items in vacant lots can grade imperceptibly into abandonment and disposal, as a continuum rather than an abrupt transformation. We term this the storage-abandonment process. Barring scavenging during storage or after abandonment, the probability of which is often reduced because of low unit value and high transport costs, these materials will enter the archaeological record, perhaps in a recognizable form. The storage-abandonment process may be responsible for many enigmatic deposits of usable items in other archaeological contexts. We believe in fact that the storage-abandonment transition is a general process that encompasses hoards of coins and caches of chert blades as well as brick piles in a vacant lot [see also Baker 1975]. Additional work is needed to identify the major varieties of this process and to specify the laws governing them.

Automobile-Related Uses

Activities associated with America's "superartifact," the automobile [Ascher 1974:13], leave traces on vacant lots. Easily accessible lots in heavily traveled areas are used in Tucson to display cars for sale. Vacant lots are also used for parking areas. In addition, evidence for car repair and maintenance turns up regularly. The oft-noted dumping of crankcase oil in vacant lots by individuals is similar to the disposal of bulk wastes in that institutionalized means for disposal are needed only by high-volume producers of the refuse. Automobiles may also be subject to storage-abandonment processes. Access routes, visibility, and proximity to residential and business places are probably among the factors that condition the mode and frequency of auto-related uses of vacant lots.

Children's Play

Children use vacant lots a great deal. Students found evidence of construction (e.g., play forts, tree houses, and hearths) and disturbances (e.g., broken bottles, pits, clearings, and bicycle tracks) that they attributed to children's play. Certain artifacts diagnostic of games and features indicating other play were found, often in less visible parts of lots. Terminating paths sometimes lead to play areas. It is not hard to see why these messy and often destructive activities occur in vacant lots rather than homes.

Adult Play

The play of adults (and adolescents) also leaves traces. In particular, liquor bottle and beer can concentrations were noted and attributed to consumption activities in those locations. Students even suggested that single-event deposition could be distinguished from recurrent drinking loci on the basis of the variety of brands present; single events would tend to leave more homogeneous inventories. It should be apparent that comparative studies of urban drinking behavior would need archaeological information if they were to include the patterns of alcohol consumption that occur in vacant lots. Concentrations of clothing were occasionally found in small clearings, which may be "sleeping" circles. Spent cartridges suggest target practice in some of the more out-of-the-way lots. Glass fragments were noted in every surveyed lot; at least some of the breakage is intentional during destructive play. As for children's play, evidence of adult play was often restricted to the most remote portions of lots. Holman's (1976) independent study of more distant vacant lots in Tucson provides additional evidence of adult play and illegal activities.

Camping

One student found what resembled a nomadic encampment, which she later identified as
belonging to a vagrant. A more thorough survey, though warranted, might not be encouraged by
the inhabitant.

DISTURBANCE, REMOVAL, AND NONCULTURAL PROCESSES

At present, it is difficult to determine whether patterns of surface artifact distribution in va-
cant lots are the result of differential deposition, disturbance, or reclamation processes. Ar-
chaeologists could take this uncertainty as a general lesson, for they often do not consider the ef-
fects of disturbance and reclamation and tend to attribute spatial patterns exclusively to cultural
deposition. The vacant lot is therefore a valuable laboratory for teaching the complexity of these
processes and for experimenting with ways to differentiate among them. Despite the paucity of
evidence for and systematic study of these processes, students were able to generate several
hypotheses that seem worthy of further consideration and testing in archaeological, ethnoarchae-
ological, and experimental settings.

Students framed several hypotheses about the effects of foot (and bicycle) traffic on the distri-
bution and condition of previously deposited objects, augmenting extant hypotheses about the con-
sequences of "trampling" (Ascher 1968; Stockton 1973; McPherron 1967; Gifford 1978; Yellen
1977; Tringham et al. 1974; Schiffer 1977):

1. Large objects (ca. 50 cm$^2$) do not stay for long on paths. They are kicked or moved aside
   (often to be trapped by vegetation) or broken into smaller fragments.

2. The permeability (Gifford 1978:82; Schiffer 1977:23) of paths affects the condition of arti-
facts that are not displaced. Where surface permeability is high (e.g., muddy and sandy
   areas), smaller artifacts are trapped and receive a modicum of protection from further size
   reduction and abrasion. Where permeability is low (e.g., hardpan and caliche), fewer arti-
facts will remain on paths; those that do remain are subjected to high rates of crushing,
   fragmentation, or abrasion.

Obviously further work—including experimentation (cf. Stockton 1973)—can be expected to
reveal additional disturbance processes and their regularities.

Another hypothesis is that the probability that culturally deposited items will be disturbed
varies inversely with the amount and nature of vegetation present, assuming other variables are
held constant. Therefore, even if artifacts are deposited on paths initially, continued traffic and
noncultural processes will cause many of them to become displaced and trapped in adjacent
vegetation. Thus, archaeologically, the path itself may be characterized by a relative dearth of ar-
tifacts, particularly large ones, even though the path may have been the major locus of "in
transit" deposition. There is also some evidence to suggest that people walking on paths purpose-
fully discard objects in nearby vegetation. This is perhaps a special case of what might be called
the Arlo Guthrie trash-magnet effect: refuse attracts more refuse (Guthrie 1967).

Several students grappled with the relationship between artifact characteristics and disturbance
probabilities. A common hypothesis is that light objects are displaced from their loci of
deposition by wind until trapped by bushes, shrubs, and features. It was also noted that, once
trapped, objects are sheltered by vegetation, which slows decay and reduces the probabilities of
human and animal disturbance. The complex interrelationship between cultural deposition, traf-
cic, vegetation, and artifact entrapment may be responsible for a lack of easily interpreted ar-
tifact distributions on prehistoric occupation surfaces. Conversely, disturbance processes have
considerable potential for creating artifact clusters and linear distributions from items that were
not deposited together culturally in one episode. Several students proposed experiments involving
the release of marked artifacts to study these processes in detail over time.

Just as foot traffic creates patterns, so too does its absence, especially in places directly adja-
cent to features and structures. Indeed, it is possible to define a "fringe effect." Surrounding any
large stationary object or structure is a narrow zone relatively free of foot traffic. Thus artifacts
deposited by any process in that zone have a much reduced probability of being displaced by dis-
turbance processes, particularly trampling. Unless removed by maintenance activities, artifacts
will accumulate in these fringe areas. Furthermore, vegetation—aided by runoff from the artifact
or structure—may grow vigorously and unimpeded, producing an artifact and sediment trap. (The fringe effect should also operate in interior spaces, but it will be attenuated considerably by maintenance activities.) This rather simple effect may help explain otherwise anomalous patterns of artifact and soil accumulation found archaeologically, especially around the perimeter of architectural remains or along perishable linear constructions (see Green 1961).

Given Tucson’s arid climate, fluvial effects on artifact distributions are variable and were difficult to study systematically. Nevertheless, some observations were possible because the vacant lot study took place during one of Tucson’s wettest winters. It appears that pits and depressions (perhaps created by soil removal) act as artifact traps because sediment covers deposited items, reducing the probability of further disturbance. Continued flow of sediment and artifacts in these areas would produce archaeologically obtrusive pit features, which should be readily interpretable with present knowledge of sediments and pit-filling processes (Limbrey 1975).

Although there is little evidence reported by the students for systematic removal of materials from vacant lots, the authors’ casual ethnarchaeological observations document the occurrence of such activities. For example, trees and other plants are collected, dead and alive. Soil and rocks may be hauled away, sometimes leaving pits that later trap or attract refuse. And items like aluminum cans are collected for recycling.

CONCLUSION

As a teaching aid, this assignment introduced students firsthand to problems of sampling, identifying, and recording spatial patterns and hypothesis testing in the field. Perhaps its greatest value is that it forced students to consider the myriad processes that continually create, modify, and destroy patterns in artifact distributions. This exercise is therefore a helpful antidote to the enthusiastic but naive urge to interpret all patterning as the direct result of patterned cultural deposition. Quite clearly, artifact clusters may be formed nonculturally, and culturally deposited clusters may be dispersed. This lesson should not be lost on archaeologists, given their sometimes simplistic approaches to interpreting spatial distributions (e.g., Hodder and Orton 1976; Clarke 1977; Whallon 1973, 1974).

In addition to fulfilling their pedagogical aims, these student surveys stimulated hypotheses about the general nature and function of unoccupied urban spaces. We defined a recurrent set of activities that typify vacant lots: travel from place to place, refuse disposal, storage, automobile-related uses, and children’s play, camping, and various removal processes. We can now ask, on the basis of these activities, what distinguishes vacant lots from other urban areas? It appears that most of these activities are marginal—they are either illegal or unacceptable behavior on public or private property. This is why, we suspect, they take place on vacant lots—which occupy an ambiguous legal and structural position within cities.

In modern urban areas, there is a clear division between public and private property that usually corresponds to a division in use. Public areas are open to public use (with some restrictions), and private areas are private domain from which the public is legally excluded (with exceptions provided by contractual agreements). Vacant lots do not fit this ideal paradigm of ownership and use, because very often they are private property used without restriction or contract by the public. Thus vacant lots occupy a nebulous legal space; as private property, the primary responsibility for protection and enforcement resides with the owner; yet the owner, who does not live there, cannot fully maintain control over use. At the same time, public authorities are unwilling to assume the burden of regulating what is, after all, the use of private property. We did not realize when we formulated this assignment that the same factors that make vacant lots attractive study areas for archaeology classes are those that make them a distinct kind of urban space.

This paper inadvertently touches on wider issues in urban planning. Empty lots are perceived as a problem by city planners, who want them “filled in” before dispersed cities, like Tucson, continue to sprawl. Our study suggests that these lots are not empty behaviorally and that in fact they serve multiple purposes to many segments of the public. We might ask, then, what would be the consequences were these spaces to become usurped by high-density housing? Might not some of
the destructive aspects of vacant lot behavior take place more frequently in public areas, such as parks, malls, schools, and plazas? It is perhaps the case that archaeologists are now developing the method and theory capable of dealing with this sort of question.

Empty spaces occur in the ruins of cities, although archaeologists rarely note their presence or nature. Our preliminary findings indicate that investigation of vacant urban areas may be a productive alternative to massive, costly, and sometimes unfruitful excavations of residences and public structures. First of all, some (mostly quasi-legal) activities may leave identifiable traces only in vacant lots. Second, there is the possibility that vacant lots may contain relatively unmixed deposits of secondary refuse that have not been subjected to institutionalized recycling and further disposal. And third, the amount, distribution, and nature of vacant lots can perhaps reveal aspects of social structure and property relations difficult to identify by other means. Certainly this list does not exhaust the potential contributions that vacant lot studies can make to the archaeology of urban areas.

This paper has shown that student projects, even those dealing with the most unpromising set of data, can disclose tantalizing regularities with interesting implications for archaeological research. We suspect that many of the hypotheses presented above are applicable to vacant spaces in all cities and to many other types of extramural space; we hope that they can be tested and refined in future studies.

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AVAILABLE MEAT FROM FAUNAL REMAINS:
A CONSIDERATION OF TECHNIQUES

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A common practice in faunal analysis is the estimation of diet. Review of the various techniques used reveals fallacies in each and a basic misconception about what was actually consumed. Explicit definitions of consumed meat and available meat and means of employing these concepts are presented. Use of the concepts in an example suggests that commonly used concepts provide estimates that are not realistic reflections of consumed meat amounts.

Faunal analysts working with archaeological bone assemblages have long been interested in deriving dietary information and determining the relative dietary importance of various species. Techniques employed in such endeavors include comparing species' bone counts (Gustafson 1972), the most economically important species being the one represented by the greatest number of bones: weighing all bone of each species (Stewart 1974), the species with the greatest bone weight being the most economically important; and calculating the amount of meat represented by each species' bones (Cook 1975; Shawcross 1972).

Bone counts are subject to numerous biases, the main ones being interdependence (Grayson 1973, 1979) and differential representation (see Binford and Bertram 1977: Brain 1967; Grader 1974; Lyon 1970; and Noe-Nygaard 1977). Bone weights are subject to biases from differential mineralization, leaching, weathering, and preservation (Uerpmann 1973:311). Determination of the amount of meat represented has concerned many, is the most frequently used technique, and will be discussed at length in this paper. I assume throughout that samples are representative.

Several concepts commonly used in the literature are sorely in need of clarification and explicit definition (see also Casteel and Grayson 1977). Live weight is the weight of an animal while alive. The concepts consumed meat and available meat are frequently used interchangeably. Available meat is defined in the context of this paper as all parts of an animal exclusive of bone and hide, that is, live weight minus bone and hide weight. Consumed or consumable meat is here defined as those portions of the available meat of a species that were consumed by the group of people under study. Available meat includes muscle tissue, fat, viscera, brains, marrow, eyes, blood, etc. Consumable meat must be delimited by and for the situation at hand since different groups con-