CORRELATIONS AND THE EXPLANATION OF DISTRIBUTIONS

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The category of material objects observed in this study is litter; specifically, artifacts occurring in outdoor areas used primarily for pedestrian traffic. This investigation sought to answer the question: What, if any, discrepancy is observed between the ideal and actual behavior of people in the presence of opportunities for disposing of unwanted items as secondary refuse? The hypothesis to be tested is that the presence of trash cans (or other receptacles) acts as a deterrent to littering only if the size of the object to be discarded exceeds certain dimensions.

The potential law under which this hypothesis is subsumed is as follows: In areas where trash receptacles are provided for the purpose of disposing of waste as secondary refuse, the efficacy of the units, that is, the likelihood of their use as intended, is a function of the size of the object to be discarded. Waste items below a certain dimension should become primary refuse irrespective of the availability of methods for their disposal as secondary refuse.

One of the major assumptions of the present study is that the deposition of the litter at its observed location was the result of cultural formation processes, not non-cultural processes such as wind or water action. Additionally, it is assumed that refuse receptacles were placed along the routes of most frequent use, thus reducing chances that litter distributions were influenced by anomalous placement of the receptacles. Also assumed is that the composition of the traffic during the period of observation was a random sample unbiased in terms of specialization, sex, or age group. A final assumption is that all litter had an equal chance of remaining at its location of discard, i.e. some areas were not cleaned more often than others.

With the foregoing stipulations in mind, the author derived a number of test implications. First, small items of trash should not exhibit covariance with large articles of litter within the zone of influence of a container. Second, large items should demonstrate a non-random negative correlation with trash cans. That is, large items should be infrequent near trash cans, and there should be a high frequency of large trash in the absence of such units. Additionally, more large items will tend to be discarded along more frequented paths, despite the presence of trash receptacles, than will be discarded along less well traveled routes having a similar number of receptacles. Also, in heavily traveled areas, there should be a greater ratio of small to large trash.

Having formulated the above implications, data were collected from the campus of the University of Arizona and analyzed. Some implications were demonstrated to be true, while others proved inconclusive, primarily because of the small number of samples.

Research Techniques

For the purposes of this study, "litter" included all man-made objects and vegetable matter (not occurring naturally) that were not deliberately placed at a specific location for functional or decorative

purposes. This extraneous material was divided into two subsets, one consisting of those items of litter larger than four inches in overall dimensions, and the other consisting of items smaller than this size.

The class of small litter includes such elements as beverage can tabs,gum wrappers, cigarette butts, theater tickets, matchbooks, bits of cellophane wrappers, etc. The class of large litter includes newspapers, large wrappers, boxes, bottles, cans, paper cups, and similar objects. Often, the relegation of an item to the large or small category depended on whether it was whole or fragmentary.

Each trash receptacle's sphere of influence was calculated as the maximum distance that people will walk out of their way in order to deposit trash in the container. Based on general observation, this distance was estimated at 30 feet radially from each receptacle. If litter did not occur within the trash can's sphere of influence, it was presumed to have had a deterrent effect. If litter appeared in this radius, it was assumed to negate the unit's deterrent capacity. The conclusion drawn from tests of implication two was based on the ratio of deterring units to non-deterring units. In relation to test implication three, use-frequency of routes was calculated as the number of people per hour observed using specified routes during a specific time period. A study was made of the ratio of persons to receptacles along well traveled routes (those over fifty persons per hour) and less well traveled routes with similar numbers of cans.

Support was found for the first implication. Small bits of litter were discovered under all circumstances, often existing in quantity in direct proximity to a waste receptacle. The second implication was proved true in the majority of cases, but there was a fair number of exceptions. Results for the third implication were not conclusive, but this might be remedied by close observation over a longer period of time, or by observing this phenomenon in a less well-tended area, or by the choice of different routes to study. Implication four was quite well borne out by the fact that large litter was sparse enough to be counted by item, whereas small litter had to be estimated as its quantity made individual item counts prohibitively time consuming.

If one were to further examine the hypothetical law upon which this study is based, several implications could be devised to test its truth. One such test would attempt to discern differences in the littering behavior of pedestrians as opposed to persons in vehicles. Another test would be to observe whether other cultures or different areas of the same culture also deposited small objects as primary refuse in the presence of trash receptacles. Do other cultures or parts of the same culture exhibit a negative correlation between waste receptacles and large litter? Similarly, is the absence of large trash actually a function of the presence of receptacles, or is it due to some other factor? We might study cultures which do not have this particular method of disposing of secondary refuse to determine the distribution of its large versus small items of trash.

One also can resort to collection of more data on the assumption that the sampling procedure was faulty or lacked sufficient examples.

Data

Total number of units equals 40.

I. **Incidence of Covariance**

Number of unit influence-spheres exhibiting covariance - 2

Percent of covariance - 5%

Final Result: Positive

II. **Non-Random Distribution**

Number of non-deterring (large) - 5
Percent of non-deterring (large) - 12.5%

Number of non-deterring (small) - 19
Percent of non-deterring (small) - 47.5%

Final Result: Positive

III. **Route-Use to Large Refuse Ratio**

Route 1a to Route 2 = 20 to 0, Positive

Route 1b to Route 2 = 5 to 0, Negative

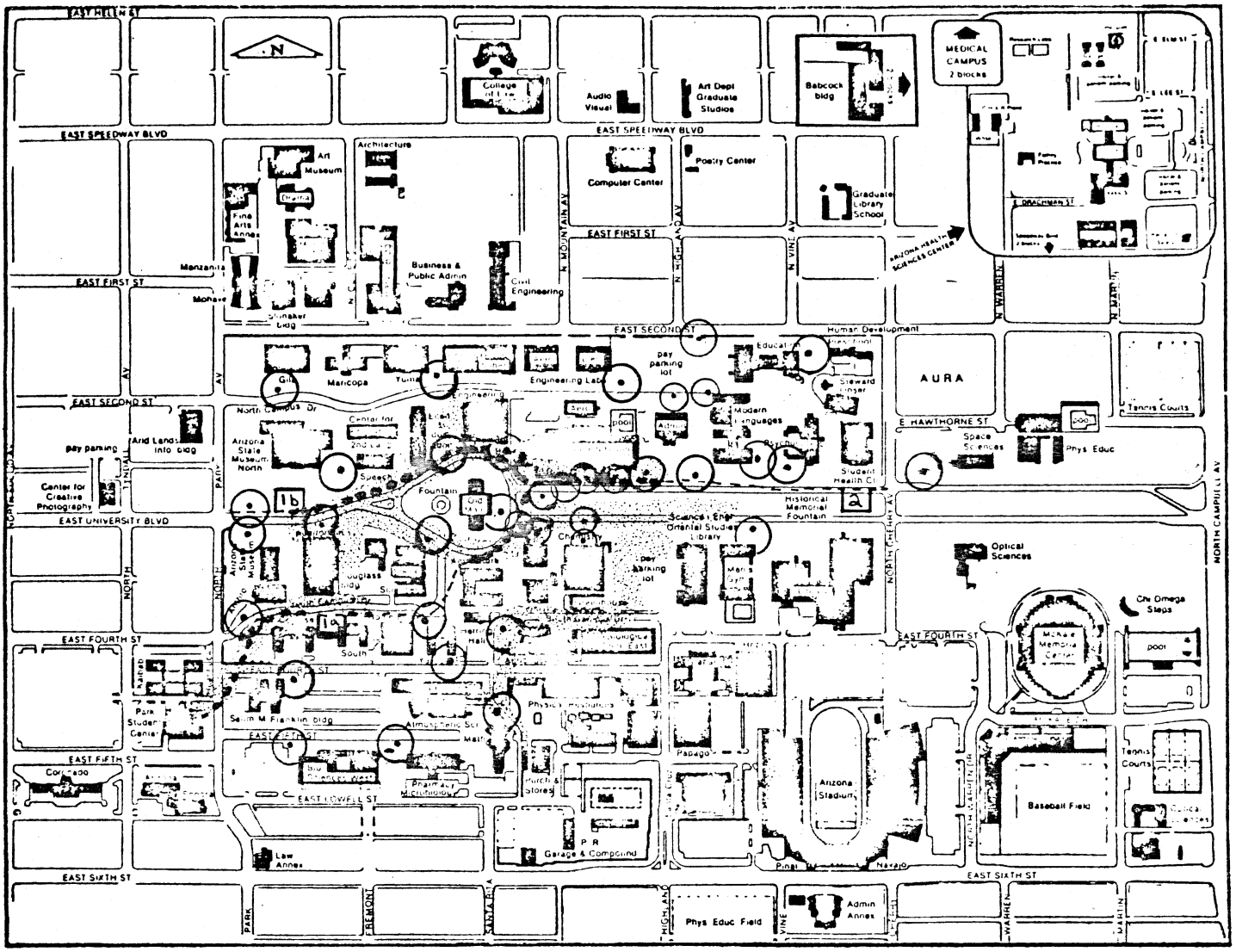
Final Result: Inconclusive

IV. **Large to Small Trash Ratio**

Number of Large Refuse Items - 78

Number of Small Refuse Items - too numerous to count, estimate several thousand

Final Result: Positive



• Disposal unit (not to scale). Number of units = 40.

Zone of influence

General Distribution of small items of litter

Route of travel

[1] Indicates primary access route

[2] Indicates secondary access route

Editors' note: We apologize for the poor quality of this map. Numerous xeroxes of the original map made it difficult to reproduce.