J. ENVIRONMENTAL SYSTEMS. Vol. 13(2), 1983-84

ARSON AND AMERICAN CITY TYPES

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ABSTRACT

This research, utilizing data from the County and City Data Book and the Uniform Crime Reports, investigates the distribution of arson in 727 American cities with populations over 25,000. The concern is to uncover not only the salient dimensions of urbanization that describe homogeneous clusters, but to ascertain whether the derived clusters condition high or low rates of arson. Tryon and Bailey's Key Cluster Analysis (BC TRY) delineates five dimensions of urbanization from which fifteen types of cities are derived. By extending the classification procedure, the research demonstrates that low arson rates occur under a variety of environmental conditions. High arson rates, on the other hand, seem to occur in two basic types of cities: 1) those with low socioeconomic status and high crime, and 2) those with low taxes and low expenditures per capita.

ARSON: ITS MANY DIMENSIONS

The Uniform Crime Reports' definition of arson is simply, "the willful or malicious burning or attempt to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another." [1] Although the definition establishes the basic elements of the crime, it does not convey the diverse motivations, targets, and actors associated with the offense. In some cases, children have died in flames because their parents have succumbed to the pressures of parenting and the hopelessness of their lives. The mentally ill have sought the flames as a means to exorcise demons or destroy alien creatures who torment their bodies. Some arsonists strike because of the monetary gains that result from the destruction, and in some not too tranquil homes, the flames have become the final arbiter between estranged lovers or vengeful neighbors. Incendiarism (the deliberate setting of fires) has destroyed or severely damaged every type of structure or mode of transportation, depleted our forests, diminished our watersheds, and killed our

doi: 10.2190/KTVK-FU14-1NV7-3CK4
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citizens. Clearly arson as a singular crime does not exist. What we observe in metropolitan areas are acts of vandalism, insurance fraud, assault, murder, and crime concealment–a wide range of criminal activity that uses fire as the weapon.

During the last ten years, there has been a staggering increase in the number of incendiary and suspicious fires in the United States. From 1964 to 1974, the reported incidence of such fires has more than tripled, increasing from approximately 31,000 to 114,000–an approximate 270 percent increase. Monetary loss resulting from such fires increased approximately 726 percent for the same period [2]. In 1980, 770 civilian fire deaths occurred as a result of incendiary or suspicious fires, and represented an 8.4 percent increase from 1979. The 146,000 incendiary or suspicious fires in structures that occurred in 1980 caused property loss of $1,760,000,000–a 32.5 percent increase over 1970 [3].

Until recently, arson has received little attention by either researchers or the public, and the offense was largely viewed as a problem of local concern. However, fire authorities at all levels of government are mounting a vigorous campaign to deter arson, but the complexity of the problem inhibits its prevention and control. Further, two significant perceptions by law and fire officials hinder prevention: the view that the offense is difficult to investigate and to prosecute, and the belief that arson is a property crime rather than a crime of violence.

As more cities experience arson problems and the negative externalities associated with it, the spatial character of this offense will have a profound impact on the social life of urban populations and economic bases of cities. In many cities, for example, mortgage-lending agencies may engage in the restrictive practice of "redlining" by evaluating loan applications on the basis of the property's location in areas of high fire risk. However, it is difficult to determine if the supposed decrease in lending preceded or precipitated the decline, accelerated an already existing decline, or occurred subsequent to the decline of the urban area. It would be fair to say that fire loss is at least a contributing factor in disinvestment and is, therefore, one of several factors that contributes and accelerates urban decline [4]. Not only does the increased numbers of arson influence disinvestment but the resulting visual blight creates a depressive landscape of "bombed out" buildings that become part of the seemingly worthless extensions of urban life.

To date basic geographic research has attempted to observe the degree of association between urbanization and various index crime offenses. Various factor analytic designs and other correlational procedures assert collinear variation between crime and certain environmental variables. The results have been the acceptance of a set of traditionally criminogenic variables to understand the incidence of crime, but these factors may constitute only one ecological-structural dimension that differentiates cities and relates to crime. Therefore, high crime rates in general and high arson rates in particular may not be conditioned by a single set of "universal causal factors," but may be

contingent on different mixes of geographical and structural characteristics found in urban places.

This research, utilizing a set of geographical and ecological variables for 727 urban places with populations over 25,000, partitions cities into types and identifies those environmental characteristics that condition particular levels of arson. More specifically, this research discerns the typology of urban form and structure associated with differing rates of arson so that the level of arson can be predicted for various types of urban places. Population-specific rates of arson are not used here. Rather, the denominator is specific to the target. Therefore, arson risk rates are derived from the model:

$$A_r = \frac{A_f}{\frac{R_u}{100{,}000}}$$

Where: A_r is the arson-risk rate; A_f is the frequency of arson for a specific geographical area; R_u is the number of units at risk; and 100,000 is the population denominator. Rates for all other index offenses are computed in a similar fashion [see 5, 6].

By extending classification to include a means to predict the levels of arson that occur within the derived types of cities, one can determine how different structural types relate to observed arson rates in American cities. The essential question addressed here is: For which community structures, as expressed by types of cities, can arson-risk rates be predicted with the confidence that the observed rates did not occur by chance? In answering this question it is possible not only to observe the multivariate character of American cities, but also to discern the way that these derived ecological clusters establish conditions that actuate arson rates of varying incidence.

URBANIZATION AND CRIME

There is a dearth of research on the spatial character of arson. The little that has been done has been at the microlevel of analysis (intra-city). The dominant belief is that arson is more prevalent in areas of instability and low socioeconomic status. Neighborhoods in the inner core of most cities experience a greater incidence of residential fires than other sections of the city [7–9]. Gunther examines the various causes of fire in inner city neighborhoods and finds that family income was more important than race in Toledo, Ohio [10].

Research on other illegal activities has attempted to establish an association between measures of status and crime [11–17].[1] However, empirical research to assess the link between illegal activity and economic well-being has produced inconsistent results and has prompted some to conlucde that economic well-being

[1] Instability and the large mass movement of people has been noted by Nettler [12] as a criminogenic factor.

is not related systematically to the level of crime [18, 19]. Cohen and Felson suggest that these inconsistent findings result from the macro analyst's use of the wrong economic and social factors [20]. It is perhaps more important to view these inconsistent findings as resulting from the synergistic interplay of socioeconomic factors and other attendant characteristics of urbanism which produce different environmental structures. As such, thinking about the spatial character of crime entails an understanding of the peculiar environmental conditions present in urban systems that produce differing rates of crime and reinforces the principle that no particular set of conditions actuate high crime rates in all instances.

While some scholars investigated the role of status and crime causation, others, influenced by the work of ethologists [21–23], studied the pathology of induced forced interactions that resulted from high density and crowding in urban areas. These researchers demonstrated on occasion that density is a criminogenic factor, but others [24–27] asserted that excessive crowding rather than density was responsible for many urban problems. Thus, overcrowding seems to be a more important consideration than density, but the process by which overcrowding leads to crime is not clear.

Still others, in their search for a link between crime and aspects of urbanization, sought explanation by exploring the juxtaposition of legal and non-legal conduct norms in geographic areas. The scholars suggest that culture conflicts arise along the border line of contiguous cultural areas [28], that a minimal mass is necessary for the development of local subcultures [29], and that crime rates tend to be higher in cities that tend to segregate its poor into slums [30].

Unlike other illegal activities research on the nature of arson has not determined whether even singular characteristics such as socioeconomic status (SES), demographic composition, and cultural processes in cities relate empirically to the incidence of arson across a large set of urban places. From the few micro studies of arson incidence, it appears that close association between race and/or income and variables such as crowdedness, education, single-parent houses, family stability, and home ownership suggest that poor economic sections of large cities suffer from a greater incidence of arson [7–10]. Like inter-urban studies of crime, micro studies of arson mirror research that demonstrates that certain crimes correlate with particular indicators.[2] Typical studies of crime at the inter-urban scale have involved simply a collection of cities and social variables to arrive at an assumption of concomitant association

[2]For example, density appears to relate positively with violent and property crime [15, 16, 31] as well as indicators or urban pathology, and the presence of the black population tends to be associated with extremely high crime rates [11, 32–34].

between crime and social variables. However, Polk, in assessing intra-urban analyses in general, argues that [35, pp. 321-322]:

> The explanatory power of an ecological frame of reference is obscured by the use of a method of statistical analysis which does not permit examination of characteristics within various types of urban social areas.

City classification does establish the framework for the examination of characteristics within various social areas, and urban researchers have a long history of investigating this latent structure. For example, Price [36] found that four dominant dimensions (size, nonservice occupational specialization, socioeconomic status, and trade-center orientation) describe the character of metropolitan centers for 1930 and Perle confirmed the existence of these factors for 1960 using the same set of variables [37]. Hofstaetter [38] found the principal components to be SES, degree of industrialization, and prevalence of slum conditions. Hadden and Borgatta derived sixteen factors in their use of sixty-five variables and 664 cities [39]. The derived factors are: SES, non-white population, age composition, educational centers, residential mobility, population density, foreign-born concentration, total population, wholesale concentration, retail concentration, manufacturing concentration, durable manufacturing concentration, communication centers, public administration centers, high-school education, and transportation centers. These and other studies clearly demonstrate that:

> . . .urban structures may be defined in terms of a set of 'independent' dimensions covering at least (a) size of population, (b) quality of physical development (c) age structure of population, (d) education level of population, (e) economic bases, (f) ethnic and/or religious orientations, (g) welfare, and (h) geographical situation [40, p. 50].[3]

The recognition of a complex urban landscape, consiting of places that vary in characteristics from population size to geographic situation, allows for an assessment of the role of particular functional and structural arrangements in facilitating certain types and magnitudes of crime. All too often the use of reductionistic methods to ascertain aspects of urban character over-simplify the multivariate quality of American places. For example, the social science literature are replete with commentaries on the importance of economic factors in describing urban character, but Sutton et al. showed that economic indicators of urban function were more important characteristics than socio-cultural variables in Wealthy Wholesale Cities and in cities with Broadening Secondary Economies [41]. However, for 86 percent ($N = 573$) of the cities investigated, sociocultural variables were more important as a descriptive measure. Therefore, for the 669

[3] Differences in the size, composition, and order of these dimensions reflect differences in the subset of variables employed. Large-scale studies [39–41] embrace the subsets and results of studies using a smaller list of variables.

cities used, the resulting types are made up of a variety of characteristics that differ in importance across city types.

As a departure from the bulk of the social science literature that emphasize the correlation of singular aspects of urbanization with crime and/or fail to examine characteristics and the results of such characteristics within social areas, the present study attempts to demonstrate that arson and perhaps crime in general is conditioned by the mixture of urbanization's attendant characteristics that produce identical levels of arson in city types that are inherently different. As such, this paper will attempt to fill partially the void associated with the general absence of urban macroscale analysis of arson incidence.

DATA BASE AND METHOD

The research population consists of 727 cities that in 1975 had populations of 25,000 or more and that reported arson statistics to the Federal Bureau of Investigation[4] for a twelve-month period during 1980. The fifty-eight variables taken from the County and City Data Book for 1977 (see Table 1), do not constitute an indiscriminate selection of variables but parallel those used both in studies of inter-urban crime and urban classification [11, 39, 41].

Method of Analysis

Cluster analysis was the method chosen to examine patterns of characteristics among cities and to predict arson rates within city types. Although a number of classification procedures have been used, from Mumford's [44] normative judgment approach to Hadden and Borgatta's [39] use of factor analysis,[5] Tryon and Bailey's cluster analysis techniques are used here because of the procedure's powerful data reduction, classification, and prediction capabilities [50].

First, a large number of specific variables characterizing the economic, demographic, and social attributes of cities are reduced to a much smaller number of salient dimensions. Cluster scores for each case (analogous to factors scores) are computed on each dimension. (In BC TRY, this phase of analysis is known as variable clustering). Then to create a typology of cities, different patterns of these cluster scores are identified. Cities form object clusters on the basis of their variable cluster scores' deviation from the standardized mean score of 50 for any dimension. That is, cases are distinguished in terms of whether their scores are one standard deviation below or above the mean (±10): below 40

[4]The problem associated with UCR statistics are well known and will not be discussed here. A thorough discussion may be found in Hindelang [42] and Wolfgang [43].

[5]Since Hadden and Borgatta's [39] classification of American cities, Forstall [45], Jones and Jones [46], Bruce and Witt [47], Meyer [48], King and Jeffrey [49], and Sutton et al. [41] accept the possibility that urban areas may be grouped into tight clusters that represent types rather than classes.

Table 1. Variable List

Population (1975 Estimates)	Per Capita Expenditures (Excluding Capita Outlays)
Population Density (1975)	Percent General Expenditures For Education
Population Density Change (1970–1975)	Percent General Expenditures For Highways
Percent Population Black (1970)	Percent General Expenditures For Public Welfare
Percent Change in Black Population (1960–1970)	Percent General Expenditures For Police and Fire Protection
Percent Population 18 and Over (1970)	Percent General Expenditures for Sanitation and Sewer
Percent Population 65 and Over (1970)	Police Officers Per 100,000 (1975)
Percent Foreign Stock	Total Manufacturing Establishments Per Capita
Percent Change (Population) 1970–1975	Ratio of Manufacturing Establishments With 20 or More Employees
Population Change 1960–1970	Percent Change 1967–1972 (All Manufacturing Employees)
Birth Rates Per 1,000 (1975)	Percent Change in Value Added by Manufacturing (1967–1972)
Deaths Per 1,000 (1975)	Wholesale Establishments Per Capita
Percent Persons Over 25 Who Completed Less Than Five Years School	Wholesale Sales Per Capita
Percent Persons Over 25 Who Completed Four Years of High School or More	Percent Wholesale Sales By Merchant Wholesalers
Total Per Capita Income	Retail Establishments Per Capita
Total Median Family Income	Total Retail Sales Per Capita
Percent of Families Below the Poverty Level	Percent Retail Sales Change (1967–1972)
Percent Black Families Below the Poverty Level	Service Establishments Per Capita
Percent Housing Unit Change 1960–1970	Index Crime Rate
Percent Housing in One-Unit Structures	Murder Rate
Percent Owner-Occupied Housing	Rape Rate
Percent Black Owner-Occupied Housing	Robbery Rate
Percent Lacking Some or All Plumbing Facilities	Aggravated Assault Rate
Percent With 1.01 or More Persons Per Room	Burglary Rate
Median Value of Owner-Occupied Units	Larceny-Theft Rate
Median Gross Rent of Rented-Occupied Units	Motor Vehicle Theft Rate
Percent in Single-Unit Structure (New Housing Authorized–1976)	Arson Rate
Percent of New Units Authorized For 5 or More Families–1976	South vs. Non-South
Total General Revenue	
Average Property Taxes Per Capita	

(Low), between 46 and 54 (Moderate), or above 60 (High) on each dimension.[6] A typology describing the pattern of cluster scores as Low-Medium-High would be interpreted to mean that the pattern of cluster scores is low on the first dimension, moderate on the second and high on the third dimension.

Once these city types have been constructed, the final stage of the analysis utilizes Tryon-Bailey's typological prediction (4CAST) to assess arson rates for

[6]Scores between 41 and 45 are moderately low and scores between 55 and 59 are moderately high. They are labeled Low and High. The underlined terms, Low and High, signify that a cluster has scores of one standard deviation below (Low, < 40) or above (High > 60) the mean; terms without underlining identify scores that are from .5 to 1.0 sigma below or above the mean.

the derived city types. The 4CAST routine of BC TRY predicts arson rates by comparing observed arson rate means and their homogeneity coefficients for each city type with a probability distribution of means and homogeneities generated by random sampling. The 4CAST procedure determines the significance of each comparison by calculating the probability by which the observed mean and homogeneity for each city type would not result from mere chance alone. Monte Carlo drawings from the full supply of 727 arson rates serve as the basis for estimating the probability distribution in this procedure. Hence, none of the normal curve assumptions made in usual estimation statistics is made here.

CITY TYPES AND ARSON

Data Reduction (Variable Cluster Analysis)

The intial calculation identifies a matrix of correlations for fifty-eight city characteristics and determines the extent to which these variables "tap" important dimensions of urbanism. The analysis isolated five dimensions that account for 73 percent of the variance in the original data. They are: 1) Economic Base-Function, 2) Socioeconomic Status (SES), 3) Crime, 4) Taxes-Expenditures, and 5) Age-Crowding.

The first dimension, economic base of cities, is the most fundamental characteristic of American urbanization–accounting for the largest population of total variance of 727 cities. The number of retail, manufacturing, and wholesale establishments per capita; the total retail sales per capita; the population density; and the change in population density define this dimension. The coefficients suggest that the dimension indexes high-density cities with diversified economic structures that in turn offer a broad range of job types to a growing population.

The second dimension is a general measure of SES that comprises the traditional indices of status (e.g., income, education, value of homes, and rent). In terms of education this factor distinguishes between adults who have completed high school and those who have little formal education. High SES cities tend to have relatively few families below the poverty level. Examination of the cluster scores for this dimension reveals that cities with the lowest SES are primarily southern cities with large black populations. This factor appears to possess an important regional component, and seems to suggest that the SES of blacks is inversely related to their relative proportion in the total population. It is not a causal relationship, but the dimension identifies southern, low socioeconomic cities in which, because of various historical circumstances, black Americans represent a relatively large percentage of the total population.

Dimension III measures crime in American cities. Cluster scores for this dimension reveal that the highest crime rates occur in primarily southern and western cities of low SES. Although the proportion of blacks are high in some

cities (e.g., Atlanta, Detroit, St. Louis, and New Orleans), other cities have a relatively small proportion of blacks (e.g., Lynwood and Merced, CA). There are high positive factor coefficient scores for all the index offenses. *Arson, however, is not an offense that loads on this dimension.* As such, it does not share collinearity with other index offenses. That is to say, arson neither correlates positively with the other crime variables nor does it follow the cluster score profile pattern of the more traditional index offenses.

The fourth dimension, taxes and expenditures, has high positive coefficients on per capita expenditures, percent expenditures for education, and the average property taxes per capita; but it shows a high negative coefficient for the percent of general expenditures for fire and police protection. High positive scores on the fourth dimension indexes the presence of high property tax bases from which cities provide human services for their populations. High general expenditures do not indicate high expenditures for police and fire protection, services that may be provided by agencies other than city governments.

The final dimension, age-crowding, includes high positive coefficients on percent of population over eighteen, and death rates per 1,000, while high negative coefficients occur for crowding. These indicators give only a crude picture of the age pyramid and the degree of longevity in American cities.

Five dimensions reveal the underlying structure of the American urban system. Covering a diverse collection of city characteristics, these dimensions are used in BC TRY object cluster analysis for purposes of constructing city types.

Typology Construction (Object Cluster Analysis)

Once cluster scores were computed for each case on each dimension and cutting points assigned, the object clustering procedure derived fifteen city types. The summary descriptions for these types appear in Table 2. As an example, interpreting those patterns reveals that Cluster 6 consists of seventy-three cities whose scores are Low on the functional comprehensiveness dimension, High on the SES dimension, Low on the crime dimension, Low on the property tax and the general expenditures dimension, and Low on the age-crowding dimension. These are suburban communities that serve as dormitory for larger urban places. The overall homogeneity values are high for fourteen of the fifteen city types (only Cluster 13 is too low—a homogeneity value of .71), and indicates that each of the fourteen types is composed of cities that have very similar scores on the attribute dimensions. (A city cluster is a multivariate selection of characteristics because each type reflects different dimensions of urbanism, and the homogeneity coefficient (H) measures the cohesiveness of the profiles of cities that compose a given cluster. When the members of a cluster have identical profiles, the within-group variance is zero and the homogeneity value is 1.00. If the cluster is a random selection, the homogeneity value is zero. The overall homogeneity value presented here is merely the average of the H value across all five dimensions.)

Table 2. City Types and Predicted Arson-Risk Rates

Type	Descriptive Name	Frequency of cases	Profile Level/Prediction Attributes					Overall H Value	Predicted Arson-Risk Rates (per 100,000)			
			Function	SES	Crime	Taxes	Age		Mean Rate	Homogeneity	Significance Level	
1	Average	118						.93	193.59	.89	Low	.01
2	Low Crime, High Tax, High Age	37			45[b]	70	56	.90	257.88	.50		.37
3	Low Function, Low SES	60	45	36				.92	146.43	.93	Low	.001
4	Low SES, High Crime	62		44	65			.88	369.62	−.82	High	.001
5	Low Function, Low SES, High Tax	16	44	38		65		.89	265.94	.24		.35
6	Low Function, High SES, Low Crime, Low Tax, Low Age	73	45	60	43	45	35	.90	297.11	−.54		047
7	Low Crime, High Tax	32			42	73		.90	137.84	.92	Low	.001
8	Low Tax, Low Age	53				44	42	.90	413.43	−1.01	High	.001
9	Low SES, Low Crime, High Age	40		42	42		61	.90	187.56	.72		.073
10	Low SES, High Crime, Low Tax, Low Age	23		44	59	43	36	.86	367.56	.51		.070
11	High SES, Low Crime, Low Tax	69		59	42	44		.92	167.71	.34	Low	.003

12	High SES, Low Crime, High Age	27		70	43		56	.82	117.59	.85	Low	.003
13	High Function, High Crime, High Tax, High Age	21	69		57	73	56	.71	296.88	.53		.167
14	High Function, Low Tax, High Age	27	63			45	57	.81	324.96	−1.38		.073
15	High Crime, High Age	25			58		68	.86	211.15	.79		.267
American Cities		638[a]							247.71			

[a]727 cities were actually used but during the iterative procedure of assignment some cities were considered so unique that they were rejected from the 0-Analysis. There were twenty-four cities which could not be typed because of their uniqueness and there were nineteen cities deleted from the analysis because of missing data.

[b]Denotes Z-scores. When there is no entry, the city's Z-score on a particular dimension is indistinguishable from a mean of 50—that is within plus or minus .5 standard deviation from the mean. Such patterns should be viewed as moderate.

The value of the typological method already begins to be revealed. In terms of crime, the reciprocal relation of SES and crime is well documented, but socioeconomic position appears here as only one of several dimensions that condition high crime-specific rates.

> The typology indicates that there are four types of cities in which crime-specific rates are high: 1) low socioeconomic cities (Cluster 4; e.g., New Orleans, LA; St. Louis, MO; Savannah, GA; Birmingham, AL); 2) low status cities with low property tax bases and low general expenditures (Cluster 10; e.g., Santa Ana, CA; Chicago Heights, IL; Baton Rouge, LA; Corpus Christi, TX); 3) economically diverse cities with high property taxes and expenditures, as well as older populations who reside in uncrowded residences (Cluster 13; e.g., San Francisco, CA; District of Columbia; Baltimore, MD; East Orange, NJ; Yonkers, NY); 4) cities with older populations (Cluster 15; e.g., Palm Springs, CA; Boynton Beach, FL; Fort Lauderdale, FL; St. Petersburg, FL; Minneapolis, MN; Seattle, WA). Cities with low crime-specific rates are 1) cities with high property taxes and expenditures (Cluster 2; e.g.; Portland, ME; Cincinnati, OH; Richmond, VA; La Crosse, WI); 2) high status cities that score low on all other dimensions of urbanism (Cluster 6; e.g., Anchorage, AK; Huntingdon Beach, CA; Park Forrest, IL; Dearborn Heights, MI; St. Clair Shores, MI; Mesquite, TX); 3) cities with high taxes and expenditures (Cluster 7; e.g., Middletown, CT; New Haven, CT; Linden, NJ; Alexandria, VA; Virginia Beach, VA); 4) cities with older populations and lower status (Cluster 9; e.g., Hot Springs, AR; Terre Haute, IN; Bethlehem, PA; Scranton, PA); 5) cities with low property taxes and high socioeconomic status (Cluster 11; e.g., Monterey Park, CA; South San Francisco, CA; Newark, DE; Des Plaines, IL; Wheaton, IL; Baldwin, PA); and 6) cities with older populations with high status (Cluster 12; e.g., Arcadia, CA; Manhatten Beach, CA; Palo Alto, CA; Skokie, IL; Oak Park, IL; Cleveland Heights, OH; Shaker Heights, OH).

Thus, the procedure demonstrates that economically diverse cities with high property taxes-expenditures and older populations (e.g., San Francisco, CA; Washington, DC; Baltimore, MD; and East Orange, NJ—Cluster 13) also tend to have high crime-specific rates. Cities such as Santa Ana, CA; Chicago Heights, IL; Corpus Christi, TX (Cluster 10) display a pattern that fits the traditional view of the relation between crime and urbanism. The cluster's low scores on all but one dimension (economic diversity) describes a collection of cities that suffer from one form of "pathology"—i.e., a low status, young populations residing in the crowded dwellings of cities with low property tax bases and low general expenditures. Given the arrangement of cities among the fifteen city clusters and the defining characteristics of these clusters, the aim is to uncover those types of cities where the observed arson-risk rates are not stochastic occurrences. Differential typological prediction (4CAST) of BC TRY accomplishes this task.

Differential Typological Prediction: Arson

Table 2 also summarizes the comparison of each of the fifteen actual city type arson rate means to the distribution of its randomly generated sampling distribution of mean arson-risk rates.

Several cities were deleted from the procedure because their unique cluster profiles made it impossible for them to fit into any of the fifteen derived clusters. The cities and the clusters from which they were rejected are:

Cluster 3	Harlingen, TX; McAllen, TX; Laredo, TX
Cluster 4	Inglewood, CA; Camden, NJ; Miami, FL; Highland Park, MI; Las Vegas, NV; Deerfield Beach, FL
Cluster 10	Compton, CA; Brownsville, TX
Cluster 12	Beverly Hills, CA
Cluster 13	Newark, NJ; New York, NY; Atlantic City, NJ; Hoboken, NJ; West New York, NY; Union City, NJ
Cluster 14	Huntingdon Beach, CA; Mount Vernon, NY; Passaic, NJ
Cluster 15	Lakeworth, CA; Beal Beach, FL; Miami Beach, FL.

Those city clusters with descriptive terms in Table 2 indicate the manner by which each cluster is distinguished relative to its mean scores on the five dimensions of urbanism. An examination of the descriptive terms for the various types of cities (the predictor attributes) with the terms associated with arson (the predicted attribute) reveals interesting predictor-predicted patterns for each city cluster.

Cluster 12 consists of twenty-seven cities that have older populations who, because of their educational achievements, have high median family incomes that allow them to pay high rents or own housing of high value. These clearly affluent cities have high per capita incomes (e.g., Palo Alto, CA; Saratoga, CA; Skokie, IL; Wilmette, IL; Shaker Heights, OH), and are virtually white satellite communities that have low general educational expenditures. Because per capita costs increase when large proportions of a city's population are poor, aged, undereducated, unskilled and nonwhite [51–53]; it is not surprising that general expenditures are lower in such cities. To some extent their geographical situations (Midwest and West) suggest that these are relatively young cities with city governments that provide specialized urban services; that is, they are "governments which provide only a narrow range of municipal services and depend upon independent school districts, and state agencies to provide many urban services." [54, p. 105]The 4CAST routine demonstrates that this type, not surprisingly, has a substantial probability of having arson-risk rates of a low level.

The dimensions and arson rates of Cluster 11 (e.g., Monterey Park, CA; Des Plaines, IL) closely paralleled those of Cluster 12. Both Clusters 11 and 12 contain cities that have high SES and low crime, but Cluster 12 is low on the

fourth urban dimension (Tax Expenditures) whereas Cluster 11 is low on the fifth dimension (Age-Crowding). 4CAST also demonstrates that arson-risk rates are significantly below the mean in three other types of cities; those that are average on all urban dimensions (Cluster 1, e.g., San Diego, CA; Bloomington, IL; Dearborn, MI), those that have rather specialized economic bases and populations with low SES (Cluster 3, e.g., Decatur, AL; Columbus, GA; Jackson, MS), and those that have low crime-risk rates but score high on the tax-expenditure dimension (Cluster 7, e.g., New Haven, CT; Quincy, MA; Madison, WI). High SES appears in two of the five types that actuate low arson rates, and low rates also appear in cities that have populations with low SES. Low arson rates seem to appear under a wide range of socioeconomic conditions.

The effect of low SES and high crime on the predictability of arson appears in Cluster 4. The mean arson rate is 369.62. Cluster 4 consists of sixty-two cities that have high crime-risk rates and a population that is low in the socioeconomic continuum, whereas other dimensions are moderate (e.g., Los Angeles, CA; Denver, CO; Atlanta, GA; Kansas City, KS; St. Louis, MO; Houston, TX). These cities' geographical situation is mixed, but most are located in the southern (26) and western (21) regions of the country. In addition, the cities of Cluster 4 are located in close proximity to many of the nation's national parks, forests and resort areas (e.g., Little Rock, AR–Ouachita National Forest; Merced, CA–Yosemite National Park; Reno, NV–Tahoe National Park; Muskegon, MI–Manistee National Forest; Modesto, CA–Stanislaus National Forest–Yosemite National Park) or located near other features that provide other recreational uses (e.g., Del Ray Beach, FL; Fort Myers, FL; Orlando, FL). The low SES of these cities and the high crime rates found in them are perhaps outcomes of being exposed to a transient population and a restricted seasonal economy. Table 2 shows that this city cluster has a significantly higher mean arson-risk rate than the overall rate for the 727 cities. On the surface, socioeconomic status and the resulting high rates of crime are conditions under which high arson-rates occur, but geographical areas that provide recreational and resort opportunities may interact to condition high arson rates as well.

The highest mean arson-risk rate (413.43) occurs in Cluster 8 which consists of fifty-three cities having relatively small populations. Only five cities have populations over 100,000 (Huntsville, AL; Anaheim, CA; Garden Grove, CA; Riverside, CA; and Colorado Springs, CO). The average value of property suggests that these cities are not grossly deteriorated and that property is valuable for its commercial potential. The mixed economic activity and moderate SES indicates that these cities are composed of working class or lower-middle class populations who experience considerable crowding. Most cities (e.g., Mesa, AZ; Anaheim, CA; Upland, CA; Vacaville, CA; Aurora, CO; Carrolton, TX) of Cluster 8 are satellites of larger urban places (Phoenix, AZ; Los Angeles, CA; Sacramento, CA; Detroit, MI; Dallas-Fort Worth, TX; Denver, CO; Oakland,

CA) that make up Cluster 4. 4CAST predicts that the high arson-risk rate in this group did not occur by chance. The nature of arson in this city cluster may be influenced directly by the inability of city governments to adequately provide for the human service support needs of their relatively young populations.

Although the analysis shows that arson rates are higher in city clusters 4 and 8 than the mean arson rate and that one would expect to obtain such rates 1 in 1,000 times, the homogeneity values for these clusters demonstrate that arson rates vary considerably for the cities comprising these types. This is clearly revealed by comparing the rates for cities such as Los Angeles, CA; Atlanta, GA; and Detroit, MI that have extremely high rates and cities such as Pomona, CA; Tyler, TX; and Gulfport, MS that have lower rates. It could be reasoned that these clusters (4 and 8) are high simply because of the extreme rates present in some cities of the clusters. As such, it is questionable whether these high rates are contingent upon the characteristics of the cluster (i.e., Low SES and High Crime). Rather, it would appear that the more heterogeneous the urban place is in terms of status and crime levels, the more likely that place will have extremely high arson rates. In other words, it is the presence of Low status-High Crime areas, located in cities with enclaves of affluence, that conditions these high rates.

At the other end of the arson-rate continuum are clusters 1, 3, 7, 11, and 12 that have arson rates lower than the mean rate. Only clusters 1, 3, 7, and 12 were found to be significantly below the mean with homogeneity values that suggested uniformity of arson rates and we may be relatively certain that the definers of these types condition these low rates. However, the homogeneity value (.34) of Cluster 11 suggests that arson rates vary substantially within this cluster of sixty-nine cities, and that low score attributed to this cluster is the result of internal variation.

It is important to ascertain which cluster of cities are at the average in terms of their rates; that is, it is as important to know which mean values are not significantly different from the mean but whose homogeneity values are extremely high. Table 2 illustrates that there are no such clusters present in this research. Cluster 6 can be considered average, but its homogeneity value (-.54) illustrates that the cluster's average score is probably due to the extreme variation of rates possessed by cities in the cluster.

4CAST was used to draw a large number of samples (matching the size of the respective city clusters) from the full set of 727 arson scores, and to compute the mean arson-risk rates for each of the 300 repeated samples. Results indicate that Cluster 4 and 8 have significantly higher arson-risk rates and Clusters 1, 3, 7, 11 and 12 have significantly lower arson-risk rates than the overall arson rate mean. Four of the seven clusters (3, 4, 7, and 8) means are significant at the .001 level, and the remaining means are significant at the .01 level (Cluster 1, 11, and 12).

SUMMARY

The results of this study reveal that the latent structure of urban places with populations of 25,000 or more can be reduced to five basic dimensions. From these dimensions fifteen city types are derived and within these types arson rates are observed. Low arson rates occur in concert with a variety of structural characteristics. Although low rates do occur in cities with high SES, older populations and generally lower crime rates, this is not the only type of city in the urban matrix where low arson rates are found. Low arson rates are found in city types that are average on all dimensions, as well as in those types that have low scores on the first (functionality) and second (SES) dimensions. Similar rates also occur in cities that score low on the crime dimension and high on the tax dimension. It is apparent that low arson rates occur under a number of environmental conditions. Because of the uniformity of arson rates that exist in four of the five clusters, it is safe to assume that the respective characteristics of these types condition low rates and that certain city-characteristics condition rates that are lower than others. It seems that the lowest rates are to be found in cities with older, high status populations and low general crime rates (Cluster 12). As cities become more average in terms of their standing on the five dimensions uncovered in this research, their mean scores become higher on the low end of the spectrum (Cluster 1).

In contrast, high arson rates do not vary across dimensions. Low SES, high crime rates, low taxes, and low age (young populations) are environmental conditions that foster high arson rates. On the surface the analysis indicates a connection between low SES and high arson-risk rates in conjunction with high rates for the other index offenses, but the predictability of high rates also seems conditioned by the relatively low status on the tax and age dimensions of cities. Whereas low arson rates occur under a variety of conditions, high arson rates seem to occur under only two environmental conditions. Rates are highest in Cluster 8 (Low Tax, Low Age; 413.43) and are slightly lower in Cluster 4 (Low SES, High Crime; 369.62). The high rates for these clusters are not uniform within the respective clusters; subsequently, one cannot conclude that these high rates are due exclusively to the characteristics of the cluster. The results suggest that it is the variability of these characteristics within certain cities and the geographic position of these cities that account for the high arson rates found in these two clusters. As such, the more heterogeneous the population and the more juxtaposed these cities are to recreational and amusement areas, the more likely extreme rates of arson will occur.

Arson as a crime is ubiquitous, but the characteristics which account for rates of different degree appear to be tied to a mix of certain city characteristics. The effect of low SES on arson rates, for example, does not conform to traditional notions concerning the interaction between status and high crime rates. Although Cluster 3 has very low arson-risk rates, it is composed of moderate-sized

cities whose populations score extremely low on the SES dimension. These cities have populations who, because of their low educational attainment, earn low incomes and reside in housing of little value or pay low contract rents. These cities are also distinguished by their high proportion of families (particularly black families) below the poverty line. The homogeneity coefficient (.92) shows that the cities comprising the cluster have nearly identical score profiles. These cities are all located in the South with the exception of Pueblo, Colorado and Hamilton, Ohio. Given the geographical situation of these cities and their extremely low SES, it would appear that arson rates as well as crime rates would be high in these cities.

For these and other clusters, the research illustrates that certain mixtures of the environmental-structural dimensions of urbanism are generally good predictors of arson-risk rates. The association between the level of arson and the structural attributes of cities within types should not be considered causal relations but what Dunn refers to as "contingent control" relations. He states that:

> . . .such relationships are described as those in which characteristics of the setting or environment place limits upon, or provide opportunities for, the occurrence or existence of certain entities. Such relationships are not causal, in the sense that (A) is a direct and immediate cause of (B). Rather, contingent control refers more appropriately to the influence which a particular structure of the environment has in creating or facilitating conditions under which behaviors or activities such as particular kinds of patterns of offenses occur [55, pp. 140-141].

It is apparent that different structures facilitate similar rates and that in some types considerable variance exists. What accounts for this variability of arson rates between particular city-types? Low SES has been considered the root "cause" of expressive and instrumental violence, but its influence on arson may be conditioned by SES's interaction with other dimensions of urbanism. It seems also important to focus our attention on mixed status populations along with other dimensions that are moderate and low in cities in order to gain a better understanding of the incidence of arson within and across American cities.

ACKNOWLEDGMENT

I am indebted to Christopher S. Dunn and George F. Rengert for their helpful comments on earlier versions of this paper.

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