

HIGHWAY RESEARCH BOARD

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Shopping Habits and Travel Patterns

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"PARKING AS A FACTOR IN BUSINESS"***

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Study of Parking and Its Relationships to Business

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PREFACE

Much has been said about parking as a factor in business. It is often asserted that shifts in retailing activities and land values are the direct result of insufficient parking. By the same token, it is said that availability of ample parking facilities is a major asset to business. However, in the past there has been little fundamental research in this field to evaluate the real impact of parking on business operations.

In recognition of the lack of such information, the automotive and petroleum industries made funds available to the Automotive Safety Foundation for such research. The Highway Research Board was requested to direct this work. The Board in turn established an advisory committee representing business, property owners, government, and transportation to provide practical guidance and counsel to the project. To expedite the program, a project engineer was loaned by the Bureau of Public Roads.

The initial phases of the research involved analyses of attitudes of shoppers and merchants, changes in property values, shifts in retail activities, and trends in urban transportation. These findings were reported in detail in *Special Report 11: Parking as a Factor in Business*. Since then additional studies have been made on the habits and attitudes of shoppers, the travel pattern to shopping areas, and the effect of customer parking facilities on shopping habits.

The present report pertains to the findings of research done in connection with shoppers' habits and their travel patterns. The original material was assembled by Alan Voorhees. During subsequent expansion and analysis, a great deal of assistance was contributed by Gordon Sharpe and J. T. Stegmaier.

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Shopping Habits and Travel Patterns

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This study reveals that the average shopper, far from behaving at random, follows fairly distinct patterns. His habits are closely related to an ingrained feeling as to the convenience, range of merchandise, selection, and the service offered by a particular shopping area. There seems to be a set pattern, particularly with regard to the time that he shops, the frequency of shopping trips, the mode of travel used, and the shopping area he visits.

A method has been developed whereby the destination and the frequency of auto and transit shopping trips from any residential area can be predicted. The distribution of shopping-goods trips can be estimated by applying an adaptation of Reilly's Law of Retail Gravitation, which uses automobile travel time as the distance factor and the retail floor area dedicated to apparel as the measurement of the size of the center. Similarly, convenience-goods trips can be forecast on the basis of travel time and retail floor area used for groceries and drugs. The frequency of vehicular shopping-goods trips emanating from a residential area average about one trip per week per family. Convenience-goods trips are more frequent, depending upon the degree of car ownership.

● THROUGHOUT the country considerable attention is being given to the shopper in the solution of traffic and parking problems. Cities are planning new highways to improve access to downtown areas and new suburban shopping centers. Other cities have improved circulation within shopping areas and have increased pedestrian protection, mainly to benefit the shopper. Still other cities have set up parking programs and have adjusted their parking regulations to better accommodate the shopper.

In planning and developing these improvements, it has been apparent that a broader understanding of shoppers' habits can be of material assistance; therefore, this study reviews existing information in this field and analyzes special investigations in order to provide a more-comprehensive insight into travel patterns for shopping areas.

In this undertaking data made available from origin-and-destination studies in Washington, D. C.; Houston, Texas; Albuquerque, New Mexico; and Appleton, Wisconsin, were investigated; findings from shopper-attitude studies made in Columbus, Ohio; Seattle, Washington; Boston, Massachusetts, and Houston were reviewed; and many other special studies were examined for significant information. The results of these studies, limited

as they are to existing conditions in relatively few cities, have been grouped into two categories: shopping habits and travel patterns.

SHOPPING HABITS

Shopping trips are usually divided into two general classifications: (1) trips related primarily to the purchase of convenience goods and (2) trips related to shopping goods. Convenience goods include those items generally found at neighborhood stores, such as groceries and drugs, and in this report "neighborhood stores" are considered as those stores or groups of stores that provide for the sale of convenience goods as well as personal services. Shopping goods include the merchandise typically found downtown or at a shopping center, such as apparel, home furnishings, household appliances, and furniture. In this study the term "shopping center" describes a shopping area outside the central business district that provides for the sale of shopping goods in addition to convenience goods and personal services.

Though this breakdown of shopping trips has widespread acceptance, it must be recognized that, in trying to minimize the time or effort of their shopping activities, people sometimes combine both types of shopping in one trip. This fact was

brought out in the results of a study made in Seattle, Washington, which indicated that over 16 percent of the shoppers who went downtown bought food items there (see Table 1).

However, this does not mean that most shoppers do not have rather fixed habits as to where they buy certain lines of goods. As pointed out in Figure 1, in the larger cities almost all food purchases are made outside the central business district. Conversely, there is a strong tendency to purchase clothing and furniture downtown.

Who Makes the Trip?

Women do most of the shopping. This was demonstrated by the results of the 1947 Philadelphia home-interview traffic study, which revealed that 80 percent of all shopping trips in that metropolitan area were made by women, of whom about three fourths were housewives (1). In contrast, these housewives, who represent 22 percent of the population, made only 17 percent of the trips for all purposes.

The predominance of women shoppers was further demonstrated in a recent study at a Lexington, Kentucky, (population 55,534) department store which showed 92 percent of the customers were women (2).

Time of the Trip

Figure 2 illustrates that the pattern for arrival times of shopping trips made by transit and auto varies among the different types of retail areas.

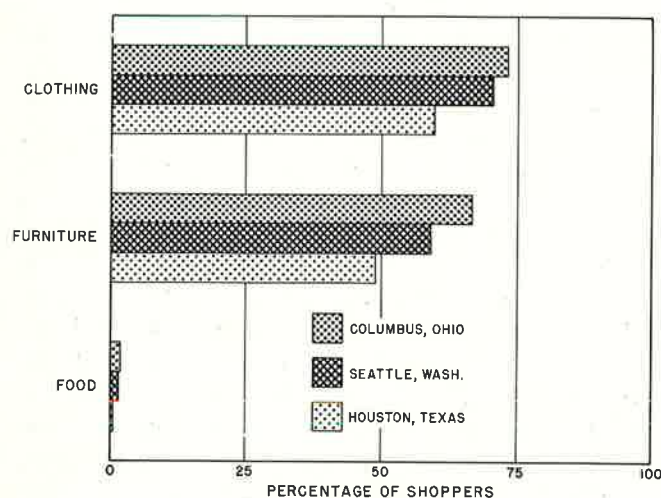


Figure 1. Proportion of shoppers who bought various types of goods downtown.

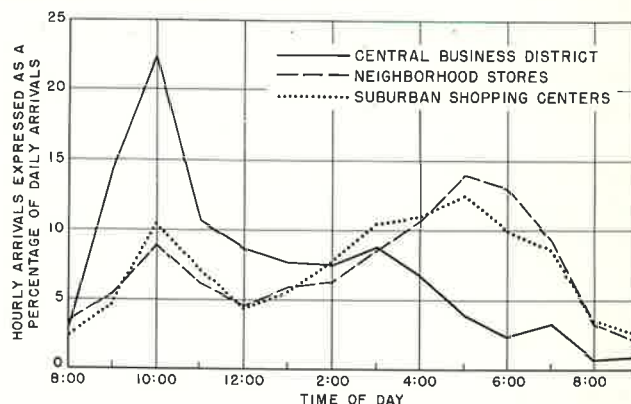


Figure 2. Time of arrival of shopping trips made to various types of shopping areas in Houston.

In Houston's central business district the maximum peak frequency is very pointed and occurs in the morning with a slight peak in mid-afternoon. The peak for outlying shopping centers takes place in the late afternoon and is quite broad, with a secondary peak in the morning. Similarly, neighborhood stores have two peaks, but the one in the morning is slightly smaller than that for outlying centers, and the afternoon peak

TABLE 1
TYPES OF MERCHANDISE PURCHASED OR
SERVICES USED ON TRIPS TO SHOPPING
CENTERS IN SEATTLE

Items	Central Business District	Suburban Shopping Center
	Percent	Percent
<i>Merchandise</i>		
Appliances	3.8	2.4
Clothing (children's)	11.2	21.3
Clothing (men's)	13.5	9.8
Clothing (women's)	33.6	14.6
Drugs	10.7	29.3
Furniture	4.5	3.7
Groceries and bakery goods	16.3	43.4
Hardware	1.7	7.3
Shoes (children's)	6.2	6.1
Shoes (men's)	13.5	1.2
Shoes (women's)	8.4	3.7
Toys	2.8	4.9
Yardage	14.6	6.7
Other	21.9	28.7
<i>Services</i>		
Bank	9.0	23.2
Restaurant	9.5	7.2
Medical service	9.5	4.9
Theater	3.9	6.7

NOTE: These percentages total over 100 percent because of multiple purchases.

SOURCE: Louis C. Wagner, "Economic Relationship of Parking to Business in Seattle Metropolitan Area," Part 2, *Parking as a Factor in Business, Special Report 11*, Highway Research Board, Washington, D. C., 1953.

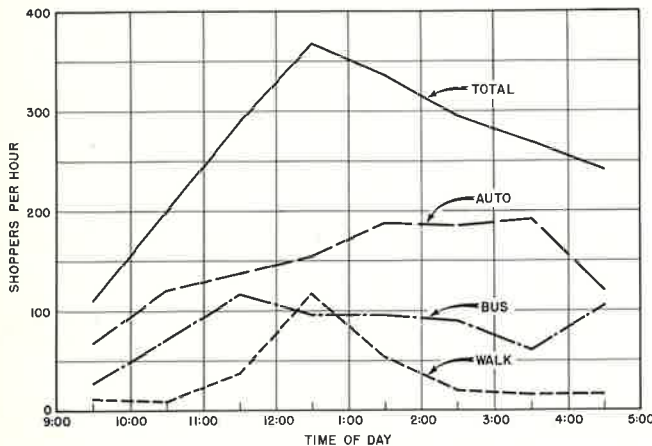


Figure 3. How people travel to shop in a Lexington, Kentucky, department store.

occurs a little later and is sharper. Because of these variations in arrival patterns, the three types of shopping areas will be discussed separately.

Central Business District. As shown by Figure 2, the maximum frequency of trips to downtown Houston took place at about 10 A.M., and accounted for 22 percent of the total trips that were made to the central business district. During this peak, the transit shopper accounted for over half of all the trips, but only 40 percent of the remaining trips made during the day were by transit.

In Philadelphia the arrival pattern for transit and auto shoppers visiting the downtown area was quite different. Here very few transit and auto shoppers arrived before 11:00 A.M., while the bulk of the shoppers arrived just before and just after the noon hour (3).

The Lexington survey showed that the total number of shoppers at the department store reached a peak at 12:30 P.M., if shoppers who walked were included (see Figure 3). The bus-passenger peak occurred at 11:30 A.M., but the automobile-driver trips showed a 2-hour plateau during midafternoon.

Regardless of these irregularities in the hourly pattern of total shoppers to the central business district, Figure 4 indicates that the automobile drivers seem to follow a more-regular pattern. As shown, arrival times of auto-driver shopping trips are distributed rather evenly throughout the day, irrespective of city size, though the highest rate of arrival occurs in the morning in the larger cities and in the afternoon in the smaller cities.

However, the accumulations of auto shoppers have a greater hourly variation. The peak is more noticeable and occurs in the afternoon. In the larger cities there is a tendency for the maximum accumulation to be nearer the noon hour.

From the parking studies conducted in the cities referred to in Figure 4, it was determined that this peak accumulation of auto-driver shopping trips generally increased with city size ranging from 390 to 1,500 (4). However, the corresponding peak accumulation of parkers for all trip purposes ranged from 3,967 to 23,751. Thus the ratio of accumulated shopper-parkers to all parkers ranged from 1 to 10 to 1 to 15 and decreased with city size, indicating that auto-shoppers were a relatively minor element in the downtown parking picture, particularly in the larger cities. In fact, the *existing* need for shoppers, even in the larger cities, could have been accommodated by a few large garages, assuming that they were properly located and operated at acceptable rates.

During a normal week, as indicated by the Lexington study, the number of downtown shoppers on any one day did not vary more than 20 percent from the daily average for the week (2). In this case, Monday and Saturday were the peak shopping days, each being about 10 percent above the average, while a Tuesday was the low day. Of course, this pattern varies from city to city, due to such differences in merchandising practices as night openings and regular "sales" days. Moreover, holiday periods, etc., will materially increase the number of shoppers, as is evidenced by the fact that the number of shoppers to the Lexington store was 65 per cent above average on the Saturday preceding Father's Day (1954).

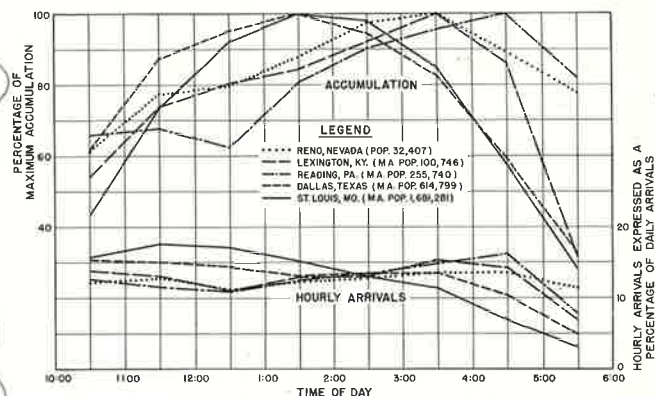


Figure 4. When automobile drivers shop downtown.

The pattern of shopping-trip volumes to downtown areas is quite varied during the year, reaching extreme peaks before Christmas and Easter, as is shown by Figure 5. This graph, which represents the usage of public lots in Passaic, New Jersey, is probably a fair representation of the annual pattern of shoppers to the central business district, since the lots are used largely by short-time parkers (5).

Suburban Shopping Centers. The pattern of shopping hours at suburban shopping centers differs from downtown. In Houston, there are two peaks, one in the morning at 10:00 A.M. and the other at 5:00 P.M. (see Figure 2). Most of the shopping was done in the afternoon particularly between 3:00 P.M. and 6:00 P.M., with the 5-o'clock peak representing one-eighth of the total. It is significant that transit transports only 1.5 percent of the day's suburban shoppers and that night openings at these centers attracted a substantial number of persons.

In suburban shopping centers Friday and Saturday are usually the peak days, but the size of these peaks may vary from center to center within a city. The average Saturday volume of parkers at two older shopping centers in Detroit (see Figure 6) was about twice as high as the average daily volume (excluding Saturday), while a special Saturday, such as the one before Christmas, runs about twice as high as the average (6).

Neighborhood Centers. The pattern of shopping hours at neighborhood centers in Houston indicates that over a quarter of the shopping occurs between 5 P.M. and 7 P.M., with the peak at 5 o'clock (see Figure 2). Only 5 percent of the trips were by transit.

In neighborhood stores, the volume of visitors on Friday and Saturday may be three times as high as on other weekdays (7). At some of the new "supermarkets," three fourths of the week's business is transacted on Friday and Saturday. Generally speaking, shopping areas that concentrate on convenience goods have a greater daily variation but less seasonal fluctuation than centers that specialize in shopping goods.

Duration of the Trip

An analysis of the time spent in stores is interesting. For example: A Spokane shopping study showed that most of the visits to downtown stores were for less than half an hour; in fact,

many were for less than 10 minutes (see Table 2). This length of visit was not affected by the vehicular mode of travel used, as auto and transit shoppers spent about the same amount of time inside a store, but those who walked spent a quarter to a third less time.

However, since many shopping trips to the downtown area consist of visits to several stores, the time that a shopper spends downtown is materially greater than that indicated in Table 2. In this case, the average time parked was 54 minutes.

TABLE 2
AVERAGE TIME SPENT IN SELECTED STORES IN
THE CENTRAL BUSINESS DISTRICT OF
SPOKANE, WASHINGTON

Kind of Establishment	Time spent in store Minutes
All Establishments	25.7
Apparel, men's	16.7
Apparel, women's	12.1
Appliance	9.1
Bank	7.9
Department store	37.3
Drug	4.8
Food	12.8
Furniture	18.6
Hardware	5.9
Shoe repair and sales	8.4
Variety	26.0

SOURCE: *Shopping Survey*—City Plan Commission, Spokane, Washington, 1952.

In the suburban areas studied in Spokane, the average stop at a drug store or food store was about 10 minutes and visits to furniture and variety stores about 15 minutes (8). Since many of these trips are single in purpose, it is indicated that customer parking facilities in such areas can be geared to a more-frequent turnover.

Purchase Habits

Studies made of several stores in New York indicated that, on the average, half of the persons entering a store made purchases. However, this ratio varied from nearly a third to two thirds, depending upon the store (9). The Lexington study of visitors to a downtown department store showed that 53 percent made purchases. Table 3, which presents the findings for one day of this latter study, shows little difference in purchase habits during various hours of the day.

The importance of overcoming traffic and parking problems is demonstrated by the Spokane survey, which revealed that the average expendi-

ture in the central business district by auto shoppers was 85 percent greater than that of the transit shopper—\$6.28 compared to \$3.40 (8). Of course, this variation probably reflects differences in the average economic status of auto versus transit shoppers and does not infer a likelihood to spend more merely because one comes downtown to shop by automobile.

TABLE 3

PURCHASE HABITS BY HOUR OF THE DAY
DEPARTMENT STORE IN LEXINGTON, KENTUCKY
1954

Time of day	Percentage of visitors who made purchases
9-10	38
10-11	53
11-12	61
12-1	47
1-2	48
2-3	53
3-4	52
4-5	60

SOURCE: Preliminary results of study by Laurence C. Pendley, University of Kentucky, for the Highway Research Board, Washington, D. C., 1954.

Another curious thing about purchasing habits is the importance of "impulse" buying. As shown in Table 4, about a third of the purchases made in seven New York stores were not planned. The ratio was rather consistent in all seven stores (9).

TABLE 4

TYPE OF PURCHASE MADE IN STORES ON 14TH STREET, NEW YORK CITY

Type of Purchase	Percent of purchase in each store							
	A	B	C	D	E	F	G	All
Planned	69.4	64.4	51.2	66.7	64.9	64.3	56.3	62.4
Impulse	27.3	32.5	48.8	33.3	29.9	31.7	35.7	33.9
Both	2.5	3.1	—	—	2.6	1.6	6.3	2.5
No answer	0.8	—	—	—	2.6	2.4	1.7	1.2

SOURCE: "Ask Your Customers," *Journal of Retailing*, Fall, 1951, Research Division, New York University School of Retailing, New York.

Furthermore, as indicated by Table 5, the sales of all lines of merchandise are affected by the impulsive nature of the customer. Although small wares and accessories are the goods most affected, ready-to-wear items are also very likely to be purchased without prior planning. These purchase habits indicate the advantages to retailers of getting people into their stores. Therefore, it is natural that merchants are interested in reducing any "impedances" to downtown shopping, in

cluding such deterrents as traffic congestion and inadequate parking.

TABLE 5

TYPE OF PURCHASE BY TYPE OF MERCHANDISE
IN STORES ON 14TH STREET, NEW YORK CITY

Type of Merchandise	Percent of purchases		Ratio (Impulse to Planned)
	Planned	Impulse	
Piece goods	2.0	0.8	0.40
Small wares	1.4	1.5	1.07
Accessories	20.6	15.4	0.75
Ready-to-wear	26.4	12.6	0.48
Men's and boy's wear	7.8	2.1	0.27
Home furnishings	4.8	1.1	0.23
Miscellaneous	2.7	0.8	0.30
Total	65.7	34.3	0.53

SOURCE: "Ask Your Customers," *Journal of Retailing*, Fall, 1951, Research Division, New York University School of Retailing, New York.

In considering retailing operations, mail- and telephone-order business should not be overlooked. In the Boston area, for example, three out of ten families made some purchases by phone and one out of four by mail (10). Those in the outlying areas relied more on mail, while use of the phone was more extensive among families living nearer downtown.

Origin of Shopping Trips

In discussing shopping trips, particularly those to the downtown area, it must be recognized that the origin of customers' trips to stores will vary a great deal. For example, the 1948 origin-and-destination traffic study conducted in Washington, D. C., revealed that 60 percent of the automobile and transit shopping trips to the downtown area originated from home, 18 percent in the central business district, and 22 percent elsewhere (11).

In a Philadelphia department store it was observed that 57 percent of the customers (including walkers) made a special trip (from home) downtown for shopping while 35 percent of those shopping in this store made the trip from their place of employment. The remaining 8 percent combined the shopping trips with some other activities (4).

It appears from these studies that although the majority of shoppers go downtown directly from home, many come from work or are attracted to the central business district for other reasons.

In the smaller cities, however, the worker-shopper and downtown attractions other than shopping

are of considerably less importance to the retailer. This was noted in the Lexington department store, where 86 percent of the shopping trips originated from home and only 12 percent of the shoppers came from work and 2 percent from elsewhere. The minor importance of the worker-shopper to the downtown retailing activities of Lexington probably resembles the conditions found in larger suburban shopping centers, which have a similar number of workers.

To what extent are stores affected by the worker-shopper and persons who go to shopping areas primarily for other than shopping purposes? The Boston survey, as well as studies made in Detroit and Kansas City, have shown that these people have had a marked effect on downtown stores (12).

The Kansas City study is particularly revealing in that it indicates the economic importance of these shoppers to retailing activities. As shown in Table 6, 40 percent of the persons who made purchases in 14 downtown stores came to the central business district for some reason other than shopping. This pattern seems to hold for weekdays as well as Saturday, even though "workers" were less prevalent on Saturday.

TABLE 6
PERCENTAGE DISTRIBUTION OF CUSTOMERS TO
14 DOWNTOWN STORES IN KANSAS CITY,
BY REASONS FOR MAKING TRIP

Reasons	Percentage	
	Saturday	Thursday
Shopping	60.0	61.1
Work	11.4	21.2
Medical and dental	7.8	3.2
Dates and appointments with friends	5.1	3.1
Movies, theaters, public events	4.7	1.5
Beauty parlors and personal service	3.2	1.9
Paying bills	3.0	1.3
Official meetings and clubs	2.1	2.0
Government business	0.6	0.5
Banking	0.3	0.9
Miscellaneous	1.8	3.3

SOURCE: *Downtown Transportation Survey*, Community Studies, Inc., Kansas City, Missouri, 1953.

Another phase of the Kansas City study showed that on a weekday the customer who worked downtown spent nearly as much as a person who makes a specific trip downtown to shop—\$2.26 as compared with \$2.57. Furthermore, it revealed that there were only slight variations in the expenditures by customers whose primary reasons for coming downtown were other than to shop or

work. This further emphasizes the additional value to retailing activities of getting people into the commercial district, not only for shopping but as a place of employment or to take advantage of the other varied activities available there.

In light of these facts certainly the increase in employment found in many of our downtown areas has provided many more "captive shoppers" and has helped these central business districts preserve their strong position as the dominant mercantile center. Notable examples where downtown employment has increased since the depression era are New York, Kansas City, San Francisco, and Atlanta (13).

Thus, it seems that the central business districts with steadily increasing employment are in a favorable retail position. Furthermore, retail establishments in central areas will profit by the existence in such areas of powerful generators of trips for purposes other than to work and shop, such as attractive theaters, restaurants, professional offices, and service establishments.

TRAVEL PATTERNS

In considering travel patterns to shopping areas, one usually thinks of the destinations of shoppers, or the mode of travel used, or the area of the drawing power of shopping centers. But possibly the most significant factor is the frequency of shopping trips, since this reflects the volume of trips that will be made to any shopping area.

Frequency of Shopping Trips

The frequency of persons' *shopping-goods* trips seems to be rather consistent throughout the country. Studies made in Seattle and Houston indicate that the average family in these cities makes nearly one trip a week for shopping goods—three trips a month in Seattle and four trips a month in Houston (14). This includes trips both to the central business district and to suburban shopping centers. In Boston, it was shown that people who lived on the fringe of the downtown area shopped approximately three times a month for shopping goods in the central business district (10). In Philadelphia, the frequency of trips to department stores was approximately one per family per week (3).

C. T. Jonassen's work reveals that the shopping-trip-frequency pattern for four representative

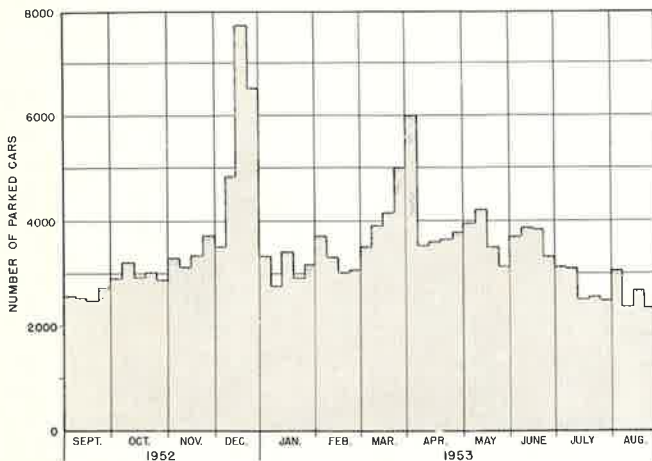


Figure 5. Cars parked per week at Passaic, New Jersey, public parking lots.

census tracts in Houston was rather consistent (see Table 7). However, it appears that the higher-income groups and automobile users shop about 6 percent more than the average. Table 7 also shows that suburban families in Houston make trips for shopping goods as often as those who live nearer the central business district.

TABLE 7

FREQUENCY OF SHOPPING-GOODS TRIPS BY FAMILIES RESIDING IN FOUR AREAS IN HOUSTON, TEXAS

Average family income	Area	Dist. from CBD (miles)	Trips per month					
			By auto users to			By nonusers to		
			CBD	Suburb. centers	Total	CBD	Suburb. centers	Total
3,156	4	4	1.69	2.02	3.71	1.83	1.86	3.69
3,324	2	2	2.05	1.73	3.78	1.84	1.57	3.41
3,378	3	2	2.18	1.87	4.05	2.51	1.36	3.87
6,073	1	5	1.98	2.44	4.42	1.94	2.06	4.00
Average								3.74

SOURCE: Based on special tabulations from C. T. Jonassen, *Shopper Attitudes, Special Report 11-A*, Highway Research Board, Washington, D. C., 1955.

This apparent consistency in the frequency of shopping-goods trips, nearly one a week per family, does not hold for *convenience goods*. The frequency of convenience-goods shopping trips, if walking trips are included, varies anywhere up to one a day.

In analyzing origin-and-destination traffic data to determine the frequency of convenience-goods shopping trips, it was assumed from the before-mentioned studies that nearly one trip a week per family was for shopping goods, the remainder for convenience goods.

On this basis the frequency of trips for convenience goods was determined for various zones in Washington, Houston, Albuquerque, and Appleton. These trip frequencies varied a great deal from zone to zone, with some at practically zero while others ran as high as three or four trips in a 5-day week. In view of these irregularities, tests were made to see if it was possible to correlate these variations in trip frequency with other known factors.

Results of these tests indicate that there is a close relationship between shopping trips per dwelling unit and the number of cars owned per dwelling unit. The results of an analysis of three separate and distinct areas of the Washington Metropolitan Area and of the entire cities of Houston and Appleton are shown in Figure 7. As can be seen, there is not only a consistent increase in shopping trips per dwelling unit as car ownership increases but also a notable uniformity of the data for all three cities studied, which ranged in population size from 40,000 to over a million.

In interpreting this pattern it should be recalled that one trip per week per family is made for shopping goods and that most of these trips are made by transit or automobile. However, the remaining trips depicted in Figure 7 are made for convenience goods and these seem to be more sensitive to car ownership. In areas where there is low car ownership, few shopping trips for convenience goods are made by bus or car, as most of the people walk. Conversely, in areas where there is high automobile ownership, most of such trips are

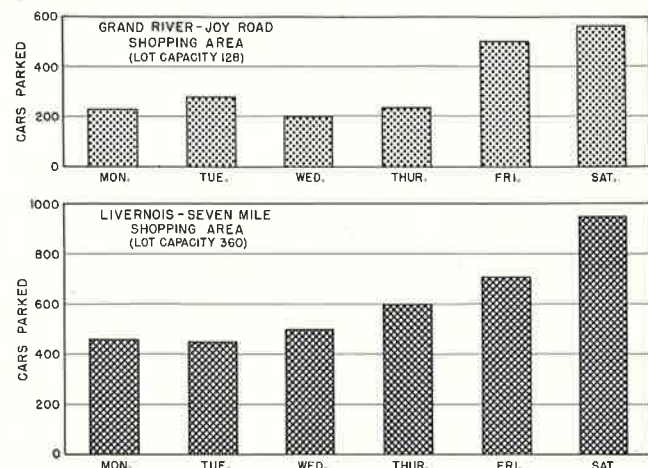


Figure 6. Day-of-the-week variation in parkers at public parking lots adjacent to two suburban shopping areas in Detroit.

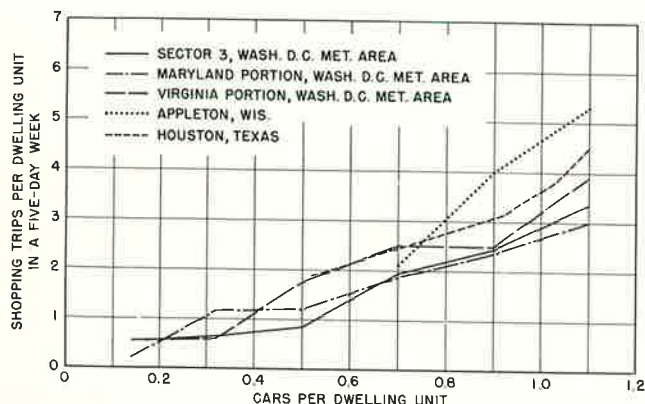


Figure 7. Frequency of shopping trips depends upon automobile ownership.

made in the family car. Of course, this correlation of trips to car ownership reflects the extensive use of the family car for shopping purposes, particularly outside of the downtown area. For example, only 4 percent of the shopping trips made to outlying centers in Houston were by transit.

This relationship is most significant, because traffic volumes and parking needs for a shopping area can be predicted more accurately from this knowledge of car ownership in conjunction with a determination of the extent of the market area.

It also sheds light on why two similar shopping areas with the same number of people living in their respective trade areas may generate considerably different traffic volumes, or why one of these shopping areas may only need a ratio of parking area to floor area of one to one while the other may require three to one. In fact, this relationship between shopping trips and car ownership raises the question whether any uniform zoning requirement on off-street parking for commercial buildings is realistic, unless car ownership in the surrounding area is considered.

There are indications that the causes of variation in the frequency of trips noted in Figure 7, above and beyond automobile ownership, are due to: newness of residential areas, family size and age, type of residential land use, income, and accessibility to shopping areas.

Probably the most important of these factors is the newness of residential areas, particularly in developments of single-family dwelling units. On the other hand, accessibility or the distance to a shopping area does not seem to be as significant a factor as many of the others. In fact, in Appleton the area most remote from the shopping center had the highest frequency of shopping trips.

Shoppers' Destinations

In studying where people shop, it is apparent that the central business district serves a unique function in urban areas. This has been substantiated by a series of studies which analyzed travel-habit data obtained from origin-and-destination traffic surveys. In these studies the shopping habits of families were determined by analyzing the frequency of their auto and transit shopping trips made to various types of retail areas.

Family residences were grouped in accordance with their distance from the central business district and the frequency of shopping trips per family made by these groups to the various types of shopping areas was determined.

The results of the Washington, D. C., study are shown in Figure 8. This figure portrays the basic patterns and the approximate frequency of shopping trips made to various shopping areas in the metropolitan area.

As noted in the figure, there are fewer trips per family by persons residing near the center of the city. This is probably due to the number of pedestrian shoppers living in this area. It is also noted that, as distance increases beyond 2 miles from the central business district, there is a gradual decrease in the number of shopping trips downtown, while there is a corresponding increase in trips to shopping centers. This trend, of course, reflects the existence of outlying centers and the influence of increased travel time between the outlying residential areas and the central business district.

Perhaps the most-significant fact demonstrated by Figure 8 is that the central business district in a city like Washington, D. C., though generating fewer trips per family, still is an important shopping area for the suburban resident.

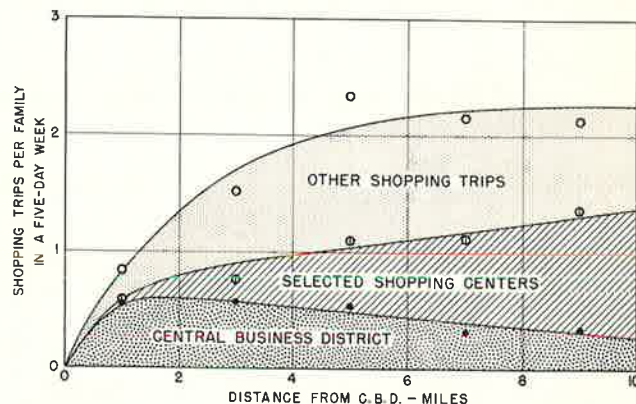


Figure 8. Pattern of shopping in Washington, D. C.

The pattern of trips to the central business district is very consistent, as indicated by the plotting points, probably due to the regularity in the frequency of *shopping-goods trips*. However, the frequency of trips to suburban shopping centers and neighborhood stores is rather irregular. This undoubtedly is related to variations in car ownership and other factors previously discussed that influence trip frequency.

The ability of the Washington central business district to attract shoppers from increasing distances and from beyond competing shopping centers was further substantiated by an additional analysis of data from the 1948 travel-habit study. This analysis is based upon a study of destinations of shopping trips by residents living in what might be called a "corridor," beginning at the central business district and continuing through the shopping center in Silver Spring, Maryland. The results, shown in Figure 9, reveal that although the number of trips to the central business district declines as distance increases, the frequency of shopping trips to the downtown area by residents living in the immediate vicinity of the Silver Spring shopping center was not materially reduced. This does not mean that such centers have little effect upon the frequency of shopping trips to the central business district, but rather that their impact is not much greater on persons living adjacent to a suburban center than on residents in any other area at the same distance from the central business district.

The two preceding figures (Nos. 8 and 9) illustrate the drawing power of various shopping areas in the Washington Metropolitan Area. But what happens in smaller cities? To probe this thought,

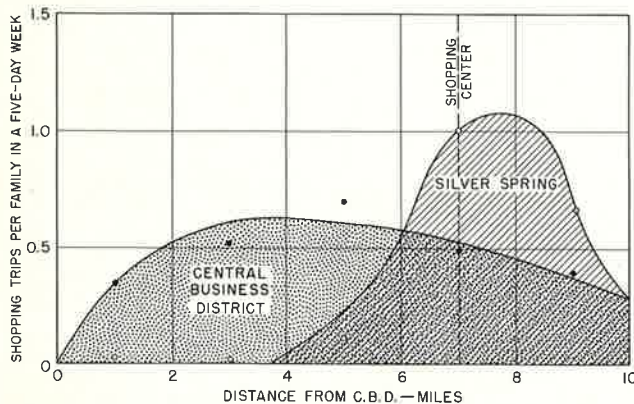


Figure 9. Effect of an outlying shopping center on the frequency of shopping trips downtown.

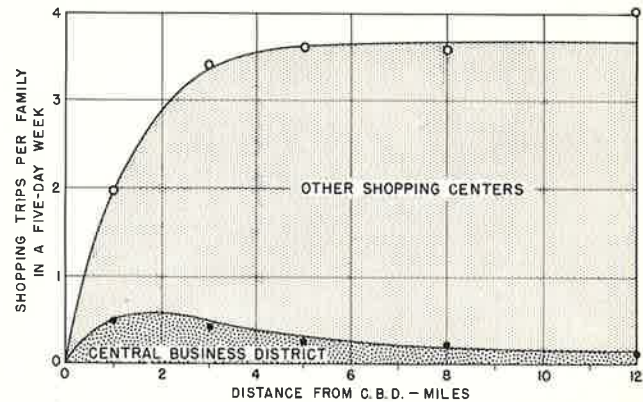


Figure 10. Pattern of shopping in Houston.

the shopping patterns for Houston, Texas; Albuquerque, New Mexico; and Appleton, Wisconsin, were analyzed.

However, in these analyses no distinction was made between shopping centers and neighborhood stores. As shown by Figure 10, the frequency pattern of residents' trips to the central business district and to suburban areas in Houston is similar to that for Washington, D. C. It is also noted that the central business district rather consistently attracts customers from suburban areas, though to a limited degree in comparison with families living near the heart of the city.

However, the frequency of trips to the outlying market areas is about half again as high as that found in Washington. This is undoubtedly accounted for by the greater automobile ownership reported in Houston, which was one vehicle per 3.1 persons as compared to 5.5 persons per vehicle in the Washington area at the time of the basic studies.

In both Washington and Houston, the maximum frequency of trips to the central business district is nearly the same (about 0.6 trips per family for a 5-day week) and occurs at about 2 miles from the central business district. However, it is noted that Houston's curve declines more rapidly than Washington's, which probably is related to the fact that Houston has important shopping centers nearer the central business district than Washington.

The uniformity of the findings for Washington and Houston suggests that similar downtown shopping patterns will be found in comparable cities, as long as there continues to be a much-greater selection of shopping goods in the central business district than in the outlying centers.

On a slightly different basis the pattern of trips to the central business district was obtained for Albuquerque (population 150,000). In this analysis the origin of the shopping trip was used instead of the place of residence of the shopper to determine the effect of distances upon shopping trips. As can be seen by Figure 11, this general pattern is similar to that of the other cities; however, the trips originating at a distance of 2 miles from the downtown area had a higher frequency than that observed for Washington and Houston. Further analysis of the travel-habit data for Albuquerque revealed that most of these trips from the 2-mile ring were generated from a neighborhood that did not have neighborhood stores nearby, thus forcing these people to do all their shopping in the downtown area. Therefore in cities the size of Albuquerque, the absence of neighborhood stores around the downtown area can materially increase the frequency of shopping trips to the central business district.

Another variation from that of the larger cities is the decline in the frequency of all shopping trips beyond the 2-mile area. This decline in trip frequency primarily reflects the difference in analytical technique, since many of the trips made by residents of outlying areas had origins in other parts of the city, particularly in the central business district.

The smallest city studied in this series was Appleton, Wisconsin (population 40,000). Figure 12 reveals that the shopping pattern in this community is quite different from the others studied. First of all, the frequency of trips to the central business district, two or three trips in a five-day week, is much greater, implying that many of the trips to the central business district are for *convenience-goods*. The low frequency of trips to other shopping areas illustrates that the downtown business district is really the hub of all shopping activities.

The preceding series of studies indicates a marked difference in the pattern of shopping trips for cities with 40,000 people from those with a population of 150,000 and over. Within this range the nature of shopping areas is in a state of transition. In the smaller cities almost all shopping trips are made to the central business district, while in the over-150,000-population group, mainly shopping-goods trips are made downtown and the more-frequent trips for convenience goods

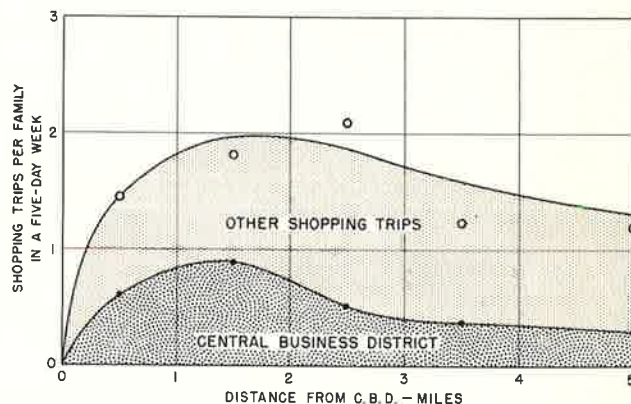


Figure 11. Pattern of shopping in Albuquerque, New Mexico.

are destined for neighborhood stores and shopping centers.

The frequency pattern of shopping trips to the central business district of the larger cities (Boston, Washington, Houston, and Albuquerque) is strikingly consistent, as displayed in Figure 13. The general decline in all the curves reflects the impact of competitive shopping areas.

The reasons for the similarity of the frequency patterns in these cities is generally related to the comparable distribution of their shopping areas. A typical example of such distribution of shopping areas appears in Figure 14, which portrays the situation in Seattle. This shows that suburban shopping centers generally do not draw customers from areas beyond adjacent centers. The few exceptions are due to locational factors or to exceptional drawing power related to greater selection of goods (15). An example of this is Northgate, the shopping center located in the upper center of the figure. This is a well-planned shopping area with a large number of stores and plenty of park-

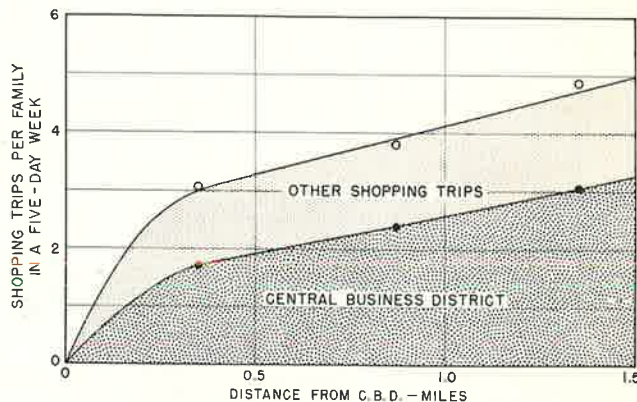


Figure 12. Pattern of shopping in Appleton, Wisconsin.

ing spaces. Yet it seldom draws customers from more than 3 miles.

These preceding patterns of urban development are significant in that, among other items, they indicate that as cities grow in population and size they begin to develop a cellular pattern of traffic destinations. Primary dependence upon a single shopping center, such as can be seen in any small town, will no longer exist. At some time in its growth the city will, like many other organic structures, subdivide into segments or cells of residential developments around secondary shopping centers.

At what point in city population growth does this subdivision of central city function take place? Figure 15 discloses that in a 1952 study, suburban branches generally had not been established by department stores in cities of less than

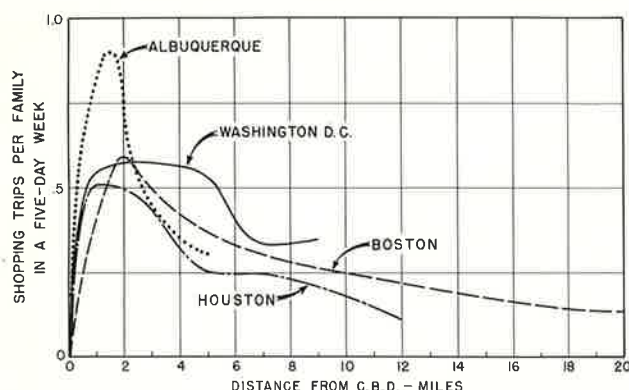


Figure 13. Comparison of the frequency of shopping trips to the central business districts of four cities.

150,000 population. However, the greater number of stores which were planning suburban outlets at that time emphasizes the potential growth of this development. Based upon these findings and the patterns of shopping trips in the cities previously analyzed, it is apparent that by the time cities reach a population of 150,000, suburban shopping centers have "become of age."

Modes of Travel

What are the effects of mass transportation and the private automobile on travel patterns of urban shoppers?

Generally, it can be stated that shopping trips to the central business districts of our larger and older cities are made in the largest numbers via public transit; while conversely, in smaller cities the predominant mode of travel for shopping is the automobile (see Table 8).

In Washington 75 percent of the shoppers going downtown used buses or streetcars, while 60 percent of the trips made to the central business district for *all other* purposes were by mass transit (11). In Houston it was 43 percent compared to 32 percent, and in Albuquerque the proportion was 47 percent as against 26 percent.

In contrast to downtown, shopping trips made by auto versus transit to outlying centers follow a different pattern. In most cases, shoppers destined to these outlying areas use the auto to a greater extent than persons going there for purposes other than shopping (see Figure 16).

In Washington it was found that an average of seven out of eight shoppers used the automobile to shop in selected suburban centers. However, public mass transit accounted for a fifth of the shopping trips made to the older secondary business areas, which often developed around transit transfer points.

The high transit usage at some of the older secondary shopping areas is also related to the low car ownership in the area. For example, 32 percent of all the shoppers at the Englewood Plaza shopping area in Chicago did not own cars. On the other hand, 22 percent of those who did own cars, did not have them available (16).

Although walking trips were not considered in the study of these shopping centers, other surveys have indicated the importance of the walker to centers of this type as well as to neighborhood stores. In a suburban center in Seattle, for ex-

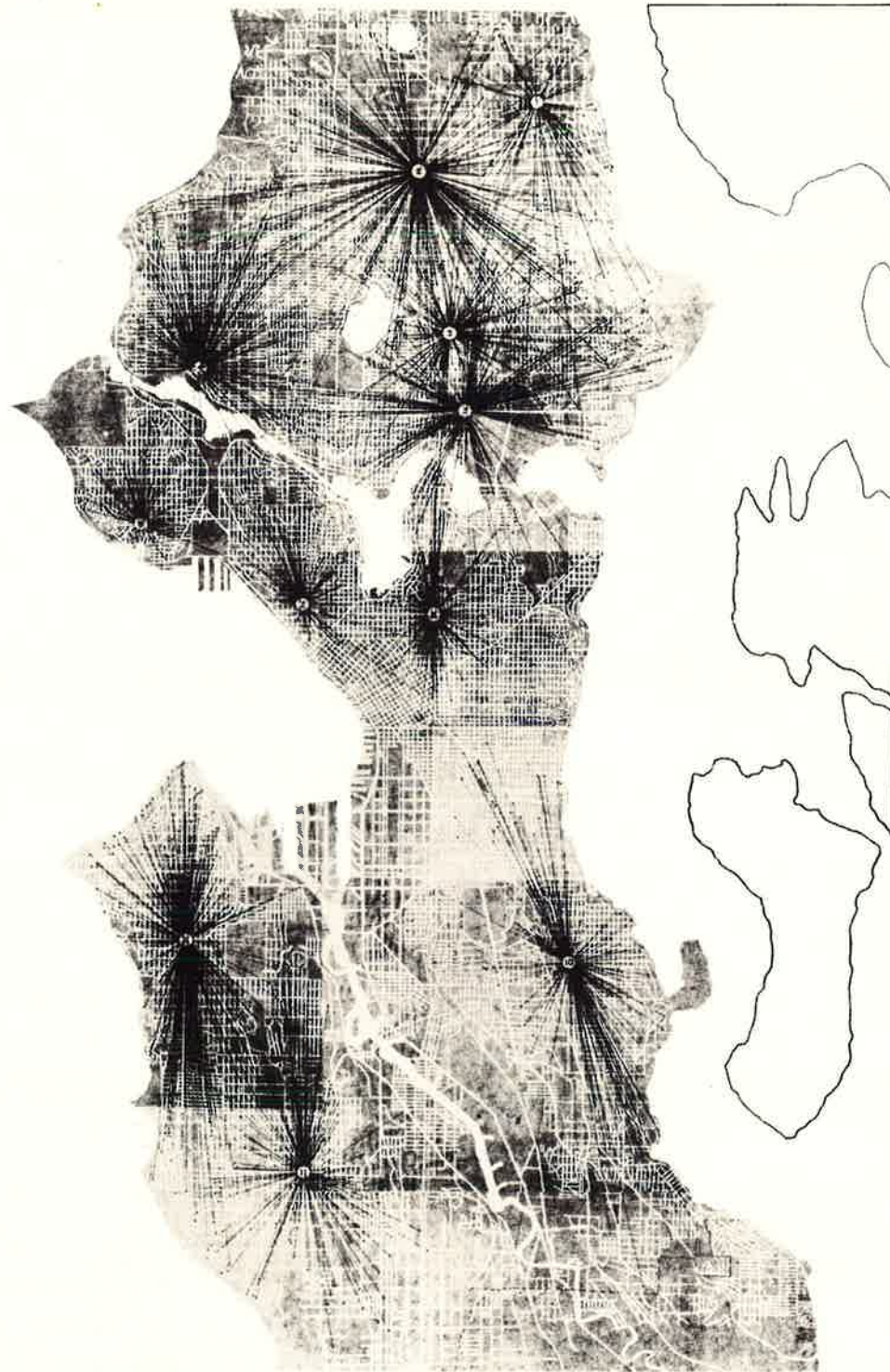
TABLE 8
MODE OF TRAVEL BY SHOPPERS TO CENTRAL BUSINESS DISTRICTS

City	Metropolitan population 1950	Study year	Mode of travel (percent)			
			Transit	Auto	Walk	Taxi
Appleton, Wis.	39,172	1953	8	91	*	1
Hagerstown, Md.	45,000 (est.)	1946	26	44	26	4
Racine, Wis.	109,105	1949	38	61	*	1
Albuquerque, N.M.	145,673	1950	47	53	*	—
Spokane, Wash.	221,561	1952	51	40	9	—
Wilmington, Del.	268,387	1947	39	45	16	—
Atlanta, Ga.	507,887	1953	56	39	4	1
Vancouver, B. C.	536,154	1953	63	28	9	—
Seattle, Wash.	726,464	1953	60	40	*	—
Houston, Tex.	806,701	1953	43	55	*	2
Washington, D.C.	1,464,089	1948	75	21	*	4
Boston, Mass.	2,177,621	1953	75	22	2	1
Philadelphia, Pa.	3,199,637	1946	88†	8	3	1

SOURCE: Origin and destination traffic studies or special shopping studies made in these respective cities.

* Not considered in survey.

† 13 percent by train.



CUSTOMER DISTRIBUTION MAJOR SHOPPING CENTERS

DATA FROM 1952 SEATTLE TIMES SURVEY

CITY OF SEATTLE - CITY PLANNING COMMISSION



Figure 14. Distribution and drawing power of major shopping centers in Seattle.

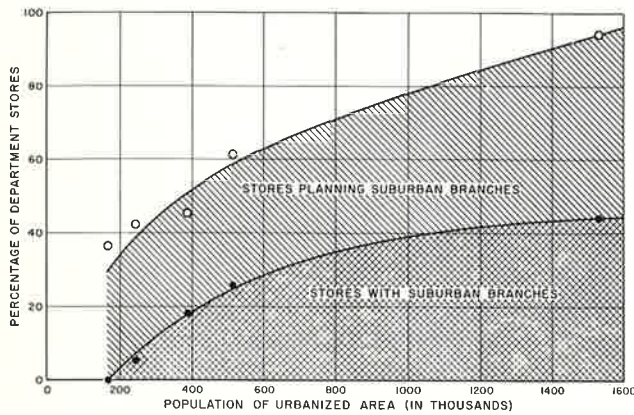


Figure 15. Department stores tend to establish suburban branches in cities of over 175,000.

ample, 24 percent of the shoppers walked, 18 percent rode the bus and the remainder traveled by auto (15).

Effect of Distance. One of the most-important items to be considered in examining the mode of travel to shopping centers is the effect of distance upon the frequency of such trips. This effect is illustrated in Figure 17, which depicts the frequency of shopping trips (by modes of travel) to downtown Washington by people living varying distances from the core of the city. It is shown that as distance increases beyond 2 miles, the frequency of shopping trips by transit passengers declines rapidly. This may be due somewhat to lack of adequate transit service in outlying areas. However, an experiment in St. Louis, in which the frequency of transit service was doubled during off-peak hours on four transit lines, revealed an increase in patronage of only 2 to 10 percent (17).

Automobile-driver trips follow a different pattern in that they gradually increase with the distance. The driver-plus-passengers curve reveals a slight tendency for auto drivers to carry more passengers on shopping trips as distance of residence from the center of the city increases.

The use of the taxicab within 1 or 2 miles of the Washington downtown shopping area is almost as frequent as that observed for automobile drivers. However, its usage drops very quickly, as its advantages decline with increased distance.

The Boston study (see Figure 18) revealed a pattern similar to that of Washington for automobile and transit shopping-trip frequencies to the downtown area (10). Mass transit reached about the same peak (as Washington) close to the central business district and, likewise, tapered off

appreciably near the suburbs. The automobile curve (drivers plus passengers) approximated the pattern found in Washington, but the trips per family were only about a third as frequent. This surprising fact dramatizes the deterring effect that travel "impedances" have on the frequency of auto shopping trips to the central business district. Such deterrents generally increase in relation to city growth.

In examining the graphs of corresponding studies in Houston and Albuquerque, shown in Figures 19 and 20, a notable similarity is apparent. In both of these cities also the frequency of *transit usage* is affected measurably by distance; but here we find that the bus is primarily limited to serving an area within 4 miles of the downtown business district. Furthermore, as was observed in Washington and in Boston, the frequency of automobile trips was not appreciably affected by distance; however, in Houston and Albuquerque the auto trips were much higher.

The frequency pattern for shoppers destined to the central business district of still smaller cities does appear to be affected by distance. In Appleton the use of buses was almost negligible (see Figure 21). However, automobile trips were

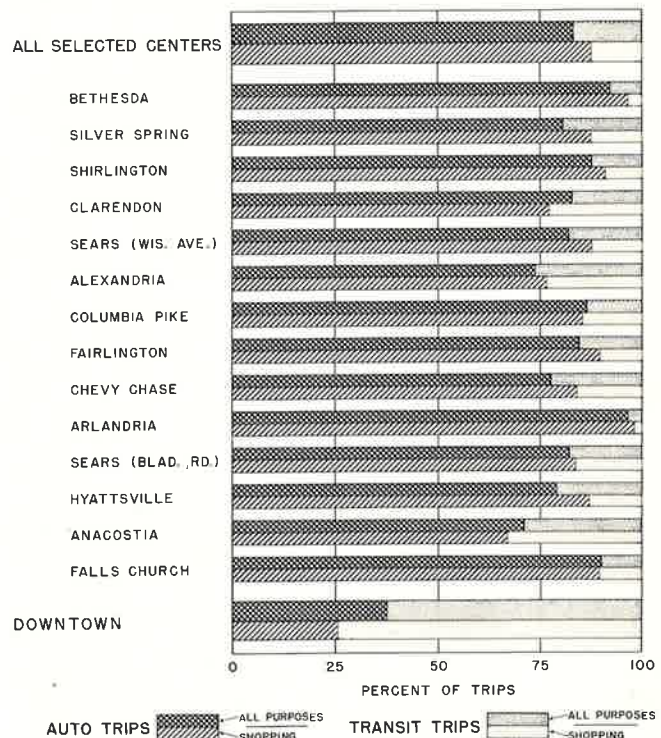


Figure 16. Purpose and mode of travel downtown and to selected shopping centers in the Washington Metropolitan Area

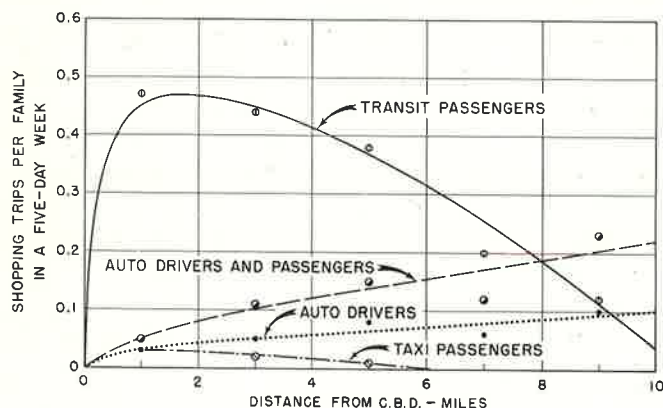


Figure 17. How people travel to shop in downtown Washington, D. C.

much-more frequent and increased noticeably with distance. But this curve represents only an area within 2 miles of the central business district—the area in which there were similar increases in the other cities studied. As discussed previously, the reason for this increase is associated with the relatively low automobile ownership of persons who live close to downtown and walk to shopping areas. Thus, it appears that in most cities downtown auto shoppers increase on a per-capita basis for the first 2 miles from the central business district and level off or decrease very gradually beyond.

It is noted in the above discussions that the frequency of auto shopping trips per capita to the central business district was smaller in the larger cities. This suggests that the absolute number of automobile trips to shop downtown reaches a maximum. Such indications are substantiated in an unpublished analysis by the Bureau of Public Roads from more than 70 comprehensive parking studies. This preliminary analysis, in comparing the number of parkers who shop with parkers for all trip purposes, reveals that as city size increases the ratio of shopper-parkers to the total number of parkers falls abruptly. Specifically, within the limits of the downtown area, the number of daily parkers with a shopping motive reaches an average peak of about 6,000 (18).

This maximum occurs in cities with a population of about 250,000 and continues throughout the range of cities up to a population of 1½ million. On the other hand, the total number of parkers for *all* trip purposes, which was about 30,000 for cities of ¼ million population, continued to rise at a rate of approximately 2,000 parkers per 100,000 population.

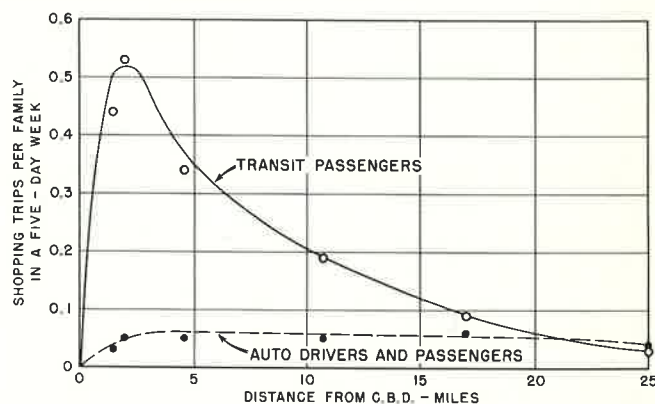


Figure 18. How people travel to shop downtown in Boston.

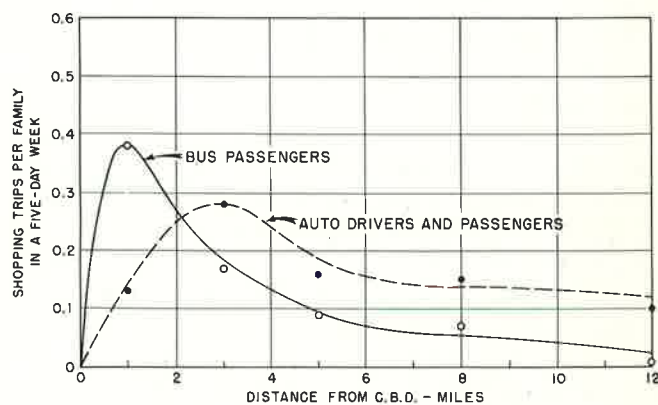


Fig. 19. How people travel to shop downtown in Houston.

The pattern for shopping trips to the central business district does not hold for trips to suburban shopping centers. Distance, in this case, has a more-noticeable influence on both transit and automobile shoppers. As shown by the findings relative to suburban shopping at Silver Spring, Maryland, auto-shopper trips reach a high frequency near the shopping center but decrease sharply at greater distances (see Figure 22).

Mass-transit trips to this outlying center were a relatively small factor, but they were similarly affected by distance. As noted on the graph, both curves are unsymmetrical about the shopping center, their maximum frequencies having been reached about a mile away, and in the opposite direction from the central business district.

Effect on Choice of Shopping Centers. It has often been claimed that the mode of travel upon which a shopper depends will strongly influence his decision as to where he will go for shopping goods. However, this would seem to be contradicted by the data of Figure 23, which indicate that in four different census tracts of Houston

little preference was shown for downtown over suburban shopping by shoppers who never use cars as compared with those car users who have a choice of either car or transit.

The reason for any variance between auto and transit shoppers in their preference of shopping areas probably is related to several factors, including traffic congestion and the lack of parking in the central business district. Furthermore, the auto shopper enjoys greater freedom of choice, since the motorist can travel anywhere that streets will carry him.

Another point which must be considered is that shoppers have rather-fixed habits as to the mode of travel they use to shop downtown. This was demonstrated by a survey made in a residential area in St. Louis. It revealed that when residents shopped downtown, 57 percent used mass transit exclusively, 25 percent relied solely upon the automobile, but only 18 percent switched mode of travel depending upon the immediate circumstances (19).

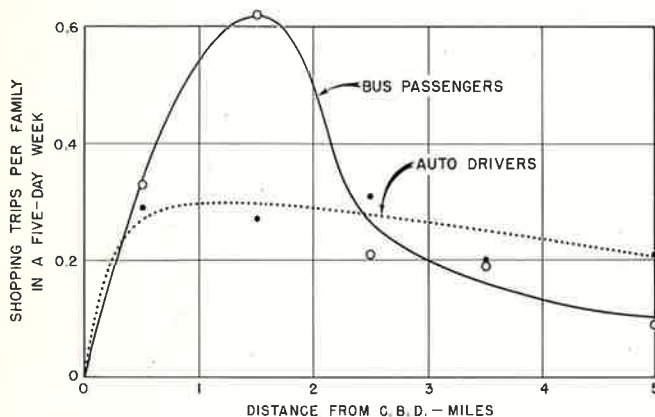


Fig. 20. How people travel to shop downtown in Albuquerque.

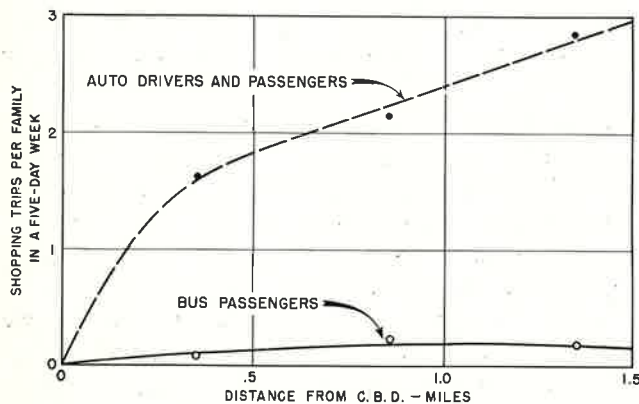


Fig. 21. How people travel to shop downtown in Appleton, Wisconsin.

However, it must be recognized that shoppers may use different modes of travel when visiting different shopping areas. For example, a shopper might walk to purchase groceries at a neighborhood store, use the automobile in going to a suburban shopping center, but use transit in making a trip downtown. This was illustrated by the Boston study, which showed that three fourths of the women who used an automobile to shop at suburban shopping centers, preferred to use mass transit when shopping downtown (10).

Drawing Power

It has become apparent in this review of shopping travel patterns that the drawing power of shopping areas is affected to a considerable degree by the size and the location of competitive shopping areas. First, it was shown that shopping centers seldom draw customers from areas beyond neighboring centers, and then only when they were offered a greater attraction in goods and services. Next it was pointed out that the central business district's drawing power is materially affected by the distribution of outlying shopping centers.

In order to shed more light on the competitive nature of shopping areas, a series of studies was made of shopping-trip habits in the Washington Metropolitan Area. The results of the first study in this series are shown in Figure 24, which depicts the destination of shoppers who reside in a so-called corridor between the central business district of Washington and an outlying shopping center in Silver Spring, Maryland. The curve marked "observed" indicates at varying distances from the central business district (expressed in

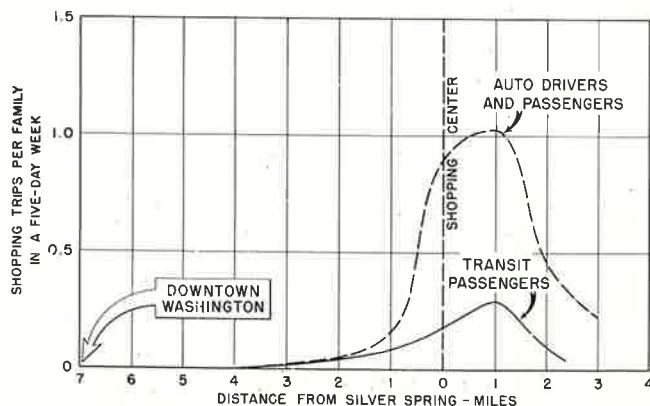


Figure 22. How people travel to shop at the Silver Spring, Maryland, shopping center.

driving time) the proportion of shopping trips made to the downtown area compared with those made to Silver Spring. In this analysis, trips to other shopping centers were not considered.

The very-strong pull of the central business district is certainly apparent from the curve. Almost all of the shoppers living midway between downtown and Silver Spring went downtown to shop, and even 5 minutes from Silver Spring (in the direction of the central business district) the downtown area attracted 71 percent of the shoppers. However, only about 13 percent of the persons living 5 minutes beyond the shopping center (in the opposite direction from the central business district) shopped downtown. Nevertheless, at still greater distances, the central business district became increasingly attractive.

Since adaptations of Reilly's Law of Retail Gravitation have been used in the past for predicting shopping patterns in urban areas, an attempt was made to compare it with these results. This law, as applied in urban areas, can be stated briefly as follows: The pull or attraction of a shopping area on a group of shoppers is related directly to the size of the shopping area and inversely to the square of the distance that the shoppers live from the shopping area (20).

In applying this principle, it was found that the most-satisfactory results were obtained when auto travel time was used as the "distance" factor, and the retail floor area dedicated to apparel as the measure of the "size of the shopping area." This factor of floor area dedicated to apparel (clothing and shoes) is a good indicator of the drawing power of a shopping center, since it represents the largest generator of shopping-goods trips (see Table 1).

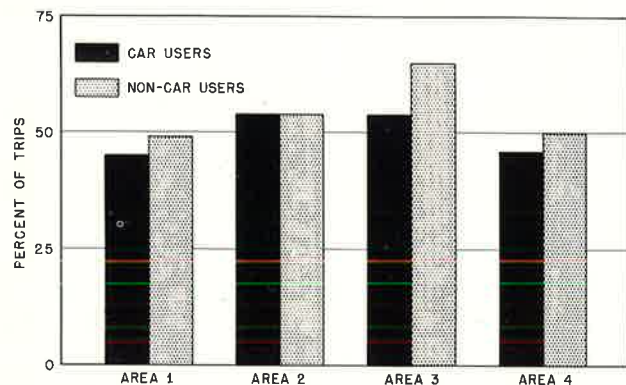


Figure 23. Proportions of shopping-goods trips downtown by car users and non-users in Houston, Texas.

The theoretical-trips curve shown in Figure 24 was computed on the aforementioned basis. The comparison of the curves for theoretical and observed curves is striking, as even the dip beyond the shopping center at Silver Spring was reproduced by this adaptation of Reilly's Law.

In these studies it was assumed that most of the trips were primarily for shopping goods. This assumption was based upon the existence of convenience-goods outlets within the corridor. It is noted, however, that there is greater agreement between the observed and theoretical curves in that portion of the corridor between Silver Spring and downtown Washington, where there was a greater variety of neighborhood stores. The area beyond Silver Spring was lacking in neighborhood stores, and therefore many residents of this section shopped for convenience goods at Silver Spring, which accounts for the greater difference between the "observed" curve and the "theoretical" curve in this area.

In view of the initial results, other studies of corridors were undertaken, one of which lies between two shopping centers, Alexandria and

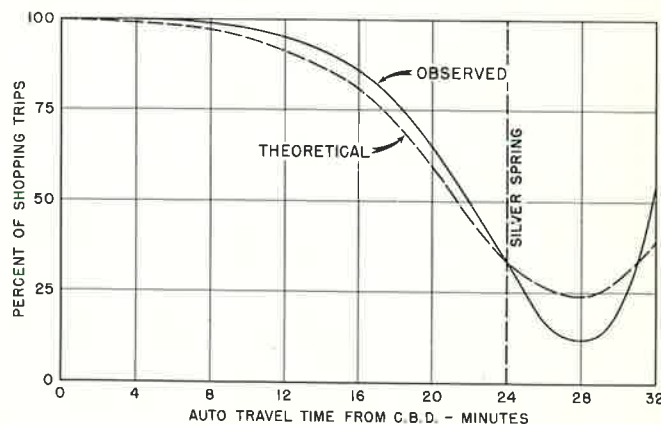


Figure 24. Proportion of trips downtown by shoppers living in a corridor between the central business district and a suburban shopping center.

Clarendon, in the neighboring Virginia suburbs (see Figure 25). Residents within this corridor were served by several neighborhood stores where they could purchase convenience goods; therefore, it was assumed that a large portion of their trips to these two centers was for shopping goods.

The general shape of the observed-trips curve indicated that the drawing power of the two shopping centers was approximately equal. This was verified by a field check in which it was estimated that the floor area dedicated to apparel was ap-

proximately the same in both centers. However, the character of these two areas was quite different, Alexandria actually being a very-old *city*, while Clarendon is a shopping center and relatively new. But these differences are not apparent when Reilly's Law is applied which would indicate that they are not factors of great significance.

These tests and other studies made for the Washington Metropolitan Area seemed to verify the applicability of Reilly's Law for estimating the destination of shopping-goods trips. The ac-

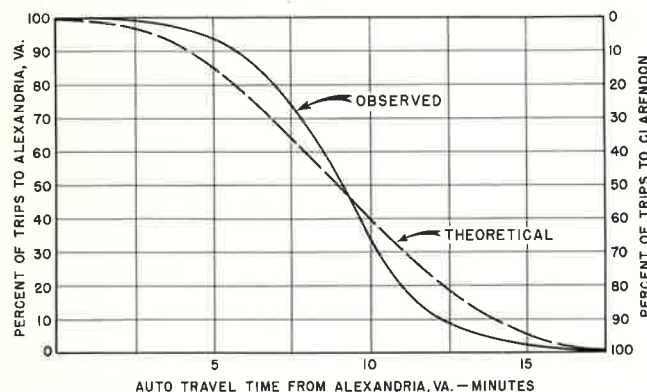


Figure 25. Habits of shoppers living in a corridor between two shopping centers.

curacy of such estimates is probably compatible with the statistical reliability of the data obtained from the home-interview traffic survey.

Accepting the principles of Reilly's Law and knowing that the general distribution of shopping areas within cities is quite similar throughout the country (see Figure 14), it was apparent that a general trip pattern could be established that would depict the drawing power of a typical shopping center. (Figure 13 illustrates the general pattern for shopping trips to the central business districts of larger cities).

In this regard a special analysis was made of the frequency pattern of shopping trips to the Silver Spring center. Two different "corridors" emanating from this center were investigated, one having many neighborhood stores within it and the other having practically none. It was assumed that the corridor with the neighborhood stores would reveal the pattern of shopping-goods trips to Silver Spring, while the other would indicate the frequency pattern of trips made for both convenience goods and shopping goods. As shown by Figure 26, the frequency pattern of shopping trips for the two types is quite different;

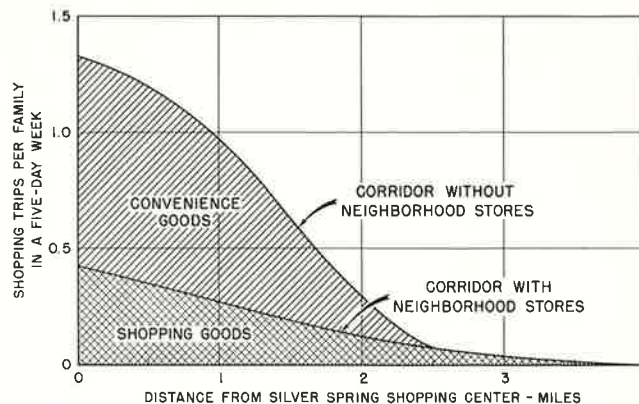


Figure 26. Effect of neighborhood stores on the type of shopping trips to a suburban center.

the curve representing shopping-goods trips (from the corridor with neighborhood stores) declines gradually for a distance of about 4 miles, while the other begins much higher, falls rapidly for the first 2 miles, and then levels off almost coinciding with the former.

This difference in the curves for shopping-goods trips and convenience-goods trips obviously is related to variations in the frequency of such shopping trips and in the distribution pattern between convenience-goods outlets and shopping-goods outlets. In most cases, neighborhood stores (convenience-goods outlets) are within 1 or 2 miles of every urban family, but shopping centers (shopping-goods outlets) may be 2 to 4 miles away.

This agrees with other investigations, which indicate that convenience-goods trips seldom exceed 2 miles; in fact most of these trips have been set at less than 6 minutes in length (7). However, since the frequency curves for convenience-goods trips and shopping-goods trips are both directly affected by distance, as noted in Figure 26, it would seem that convenience-goods trips also follow Reilly's Law, but in this case they are undoubtedly related to the floor area dedicated to foods and drugs instead of apparel (see Table 1).

In light of these observations, studies were made of several other shopping centers in the Washington area, mainly to see if the size of center was related to the frequency of the trips beyond two miles. As indicated by Figure 27, it was found that for each shopping center the curves beyond 2 miles did seem to fall into groups in accordance with the size of the centers, as measured by the amount of floor area dedicated to apparel. However, within 2 miles, the curves were rather inconsistent, indicating that the se-

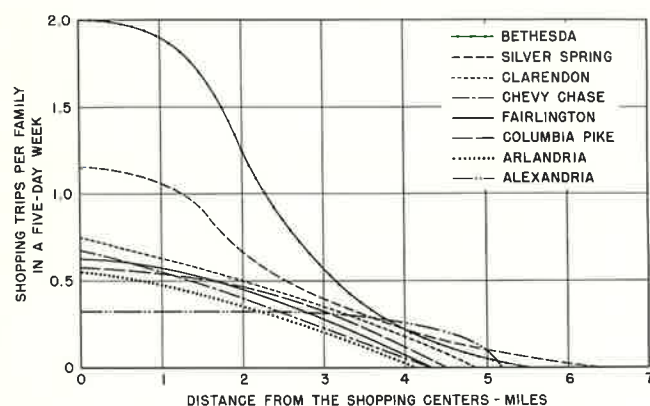


Figure 27. Frequency of shopping trips to selected shopping centers in the Washington Metropolitan Area.

lected shopping centers served in varying capacities as sources of convenience goods.

The highest frequency of trips was observed for Bethesda, Maryland, a center that had prac-

materially reduces the concentration of traffic at shopping centers.

On the basis of Figure 27, general patterns evolved which might indicate the drawing power of typical suburban centers, depending upon the amount of floor area assigned to apparel (see Figure 28). Since there is a great deal of irregularity as to the function of a shopping center with regard to convenience goods, the area indicating trip frequency for convenience goods has been shaded on this chart.

Thus, on the basis of this typical pattern, the number and origin of shopping trips could be estimated for an existing or proposed suburban shopping center that has or is expected to have the normal amount of competition. First, the drawing power for shopping-goods trips could be determined, based upon the amount of floor area dedicated to apparel; then, after analyzing the charac-

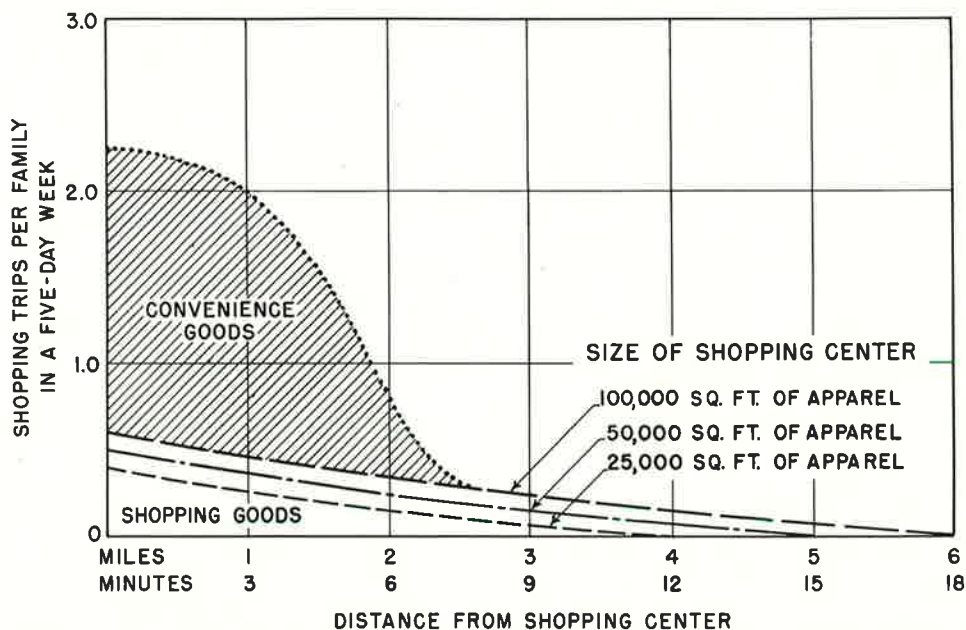


Figure 28. Typical frequency patterns for shopping trips to suburban centers of various sizes.

tically no competing convenience-goods outlets within 2 or 3 miles. Thus the shoppers in this area made their convenience-goods trips to this center and thereby greatly increased the traffic load. As mentioned earlier, the same situation existed in Silver Spring to a lesser degree. The curves for the other centers illustrate that a greater dispersion of convenience-goods stores,

ter and trade area of adjacent neighborhood stores, the frequency of convenience-goods trips could be estimated.

CONCLUSIONS

1. From 80 to 90 percent of the shopping is done by women. They do most of their suburban shopping between 4 and 6 P.M., but usually shop

downtown much earlier in the day. While the amount of time and money spent in a store depends upon a type of merchandise sought, there is a 50-50 chance that the shopper will buy something in every store visited. This tendency is strongly influenced by the fact that about a third of the buying is not planned—it is impulsive. Also, though the majority of shopping trips originate at home, the downtown worker represents an important “captive market,” since up to a third of the shopping in the downtown area is done by persons already there as a result of employment.

2. Two major factors influencing shopping habits are: (1) wide selection of goods and (2) the convenience of shopping facilities, particularly in point of time. The travel time to a shopping area and the range of selection available there appear to be more-decisive factors than parking.

3. Use of distance as the only criterion for establishing the extent of a trade area is not recommended. The movement of shoppers in an urban area is controlled largely by the competitive relationships among shopping areas, since they follow Reilly's Law of Retail Gravitation. Thus, in analyzing traffic movement in an urban area, it is not enough to evaluate the generative characteristics of various types of land use alone, but attention must be given to the relationship that exists between competitive land uses.

4. There are significant differences in shopping-trip patterns for smaller cities as compared with cities having a population of over 150,000. Shoppers in cities of 40,000 population are largely dependent upon downtown for both convenience and shopping goods; shopping trips in the larger urban areas displayed a more-dispersed pattern, with the central business district predominantly a shopping-goods center.

5. The number of auto and transit shopping trips generated from any residential area is directly related to automobile ownership. Since transit plays a relatively small role in serving most shopping areas outside the central business

district, this relationship explains why two similar shopping centers with trading areas of comparable size may generate different volumes of traffic. It also explains why one of these shopping areas may need only a one-to-one ratio of parking area to floor area, while the other needs a three-to-one ratio. This also raises serious doubt as to whether zoning regulations related to off-street parking are realistic, if consideration is not given to the degree of car ownership in residential areas surrounding such centers.

6. The frequency of convenience-goods trips is much greater than that for shopping-goods trips. Therefore, in the planning and development of shopping-goods centers, it would be desirable to consider the judicious restriction of the convenience-goods outlets, so that such centers might be relieved of conflicting traffic volumes caused by convenience-goods shoppers.

7. In order to predict adequately the traffic movements which will be generated by land-use functions, it is necessary to separate and examine the component parts of the particular type of land use. Thus, to determine the traffic potential of a shopping center, the floor area dedicated to apparel must be differentiated from the floor area in convenience goods.

8. In providing the factual data upon which many of the travel-pattern analyses were based, this study has demonstrated the value of the home-interview type of metropolitan-area travel surveys in urban research and planning. These surveys would be of even greater value if more-detailed information were obtained, such as the distinction between shopping-goods and convenience-goods shopping trips, as well as some useful measure of residents' economic status.

9. This research was concerned with relatively few cities and the need for further studies in other metropolitan areas is indicated. Such additional studies should include not only shopping-trip patterns, but also analyses of work and other major trip purposes, in order to develop relationships of more specific applicability in other areas.

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FIGURE SOURCES

Fig.
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