

Abridgment

Route Designators to the Centers of Large Urban Areas and Suburbs Within Urban Areas

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ABSTRACT

Presented in this paper are the results of a laboratory study to determine proper freeway guide sign descriptors for use in directing motorists to the central business district (CBD) of a large urban (metropolitan) area and to the central business district of a suburb situated in a large metropolitan area. Locations within the metropolitan area where the various descriptors are appropriately used are also discussed. Both one-word and two-word descriptors are suggested. The drivers approaching the urban area (15 to 20 mi away) indicated that they preferred the NAME OF THE CITY as the one-word descriptor and DOWNTOWN--NAME OF THE CITY as the two-word descriptor. As they approach the loop area (5 to 10 mi from the CBD) the preferred single-word message was DOWNTOWN or BUSINESS, and the two-word message was again DOWNTOWN--NAME OF THE CITY. As they were approaching the interchange with another freeway near the CBD area (1 to 5 mi away) the preferred one-word messages were either DOWNTOWN or NAME OF A MAJOR ARTERIAL in the area. The same two-word message was preferred or a similar DOWNTOWN--NAME OF THE CITY combination was preferred. In the central city area, the NAME OF MAJOR ARTERIALS are preferred for one-word messages and DOWNTOWN--NAME OF ARTERIAL was the preferred two-word message. In the suburbs either the NAME OF THE SUBURB or the MAJOR ARTERIAL to the city center is used. The term DOWNTOWN is never used in combination with the larger urban area when reference is being made to the downtown of the suburb as it would confuse the motorist.

As motorists approach the central business district (CBD) of a large urban area, the appropriate designators used to guide these motorists may change depending on the motorist's location. As motorists get closer to the downtown area, their preference in terminology may shift from more general terms, such as DOWNTOWN or the CITY NAME, to more specific terminology, such as the NAME OF A MAJOR ARTERIAL leading into the downtown area. The exact location of these changes and the preferred language has not been determined. Another related problem exists when motorists approach suburbs that are surrounded completely by the larger urban area. Motorists usually are not aware when they enter a suburb unless the city limit sign appears on the overhead sign structure. To the unfamiliar motorist, it is very difficult if not impossible to distinguish between when they are in the metropolitan area or a suburb without getting off the freeway and asking. The unfamiliar motorist has no way of knowing whether a particular street will take them to the central business district of a suburb. The findings of a study that addresses these important guidance problems are reported in this paper. The major objectives of the study were to determine (a) the most appropriate terminology for guiding motorists to the downtown or CBD area of large metropolitan areas, and (b) the most appropriate terminology for guiding motorists to the center or downtown area of a suburb.

RESEARCH METHODOLOGY

A scenario laboratory technique was used to conduct this research. Slides were used to present the various messages to 100 test subjects, who were

selected on the basis of age, sex, educational background, and whether or not they held a driver's license. The subjects were told they were traveling along prescribed routes to specific destinations. To determine the most appropriate descriptions to use for the downtown area, six one-word messages and six two-word combination messages were presented at each location under investigation. The six one-word messages were: DOWNTOWN, CBD, DENVER CBD, BUSINESS, DENVER, and LAMAR STREET. The six two-word messages were: DOWNTOWN--DENVER, BUSINESS--DENVER, DENVER CBD--LAMAR STREET, BUSINESS--DENVER CBD, DOWNTOWN--LAMAR STREET, and BUSINESS--LAMAR STREET. Each test message was presented on a miniature sign complete with route shield and cardinal direction. A number appeared below each test sign. The test subjects were to indicate the number of the sign they would (a) expect to see at this location, and (b) prefer to see at this location. The locations at which each of the one- and two-word messages were presented are

1. Near the entering city limits,
2. Approaching a major loop around the urban area,
3. Approaching an intersecting freeway near the center of the urban area, and
4. Near the subjects' destination.

Each test sign was projected for 6 sec followed by a 20-sec pause to allow the subjects to respond. The subjects were required to find the test panel and respond by pressing a button that corresponded to the number under the sign panel of their choice. The time required to locate the test sign and respond, as well as the subjects' preferences and expectancies were also recorded.

To investigate the appropriate suburb city descriptors to use, an identical laboratory technique was employed. In two of the four trips through Denver, the subjects' destination was either in a suburb or such that they must travel through a suburb to reach their destination. The subjects were presented a slide showing their destination, the suburb city limit sign, and a sign bridge with four sign panels. These three slides were presented in sequence. Each of the four trials were designed such that the subjects were evaluating four ways of presenting suburb information on the same sign. The types of information directing the subjects to their destinations were (a) suburb city arterial street information (Marion Avenue, Linsay Street) and (b) destination city (Limon, Kansas City) which was on another freeway that passes through a suburb. The presentation of both control cities on the same sign can be confusing to motorists. The test subjects would respond by pushing the button corresponding to the sign they would use to reach their destination.

Another related problem addressed in this study was the presentation of destination information relating to an intermediate destination in the downtown area of the city after the motorists had passed the downtown area when their primary destination is another city. Therefore, information that directs motorists back to the downtown area of the city they had just passed is not expected by the motorist. In this portion of the study, the use of the term DOWNTOWN, the NAME OF THE DESTINATION CITY, and the NAME OF THE URBAN AREA just passed were evaluated.

RESULTS

The results indicated that 69.7 percent of the subjects expected to see the message DENVER and/or DOWNTOWN displayed as they approached the city limits and 61.4 percent of the subjects indicated they preferred the same two-word message at this location. Seventy percent of the subjects were able to choose the correct lane in an average of 5.7-sec response time (Table 1). When the term DOWNTOWN was used, 63 percent selected the correct lane in an average time of 5.7 sec. The use of the terms DOWNTOWN and/or DENVER at this location is strengthened when considering that almost one-half of the subjects (44.6 percent) indicated they expected to see DOWNTOWN--DENVER as a two-word message. Thirty-three percent of the subjects indicated they preferred DOWNTOWN--DENVER as an alternative two-word message at this location. The next closest two-word message was DOWNTOWN--LAMAR STREET, which 18.7 percent of the subjects selected.

As the subjects approached the loop area, 59.8 percent indicated they would expect DOWNTOWN (33.3

percent) and/or BUSINESS (26.5 percent) as the message. Twenty-one percent of the subjects indicated they would also expect to see DENVER at the same location, which means that 81.2 percent of the subjects expected to see either DOWNTOWN, BUSINESS, or DENVER. Sixty-five percent of the subjects indicated they preferred to see DOWNTOWN (35.5 percent), BUSINESS (14.9 percent), and/or DENVER (14.9 percent). Sixty-four percent of the subjects selected the correct lane in an average time of 5.4 sec when the term DOWNTOWN was used, and 59 percent chose the correct lane in 5.8 sec when DENVER was used. Almost three-fourths of the subjects (72 percent) said they would expect the two-word messages when DENVER, DOWNTOWN, and BUSINESS were used in combination, and 43.1 percent said they would prefer the two-word messages in which these three terms were used.

The wide disparity between the messages the motorists expect and those they prefer indicates a shift between driver expectancy and driver preference. Driver expectancy is based on past driving experiences. A portion of drivers' previous driving experience relates to the signing presented, which, in turn, becomes an integral part of each driver's data base and driving set (expectancy). What the drivers learn to expect and what they would prefer to see may be completely different. For this reason, the terms "the drivers expect to see" and "what they prefer to see" are not the same. The results obtained from this study tend to support this initial premise.

As the subjects approached an intersecting freeway leading into the CBD, 70.2 percent indicated they would expect (a) DOWNTOWN (34.6 percent), (b) DENVER (17.8 percent), and (c) LAMAR STREET (17.8 percent). Seventy-four percent indicated they preferred to see (a) DOWNTOWN (22.8 percent), (b) DENVER (13.9 percent), and (c) LAMAR STREET (32.4 percent). Again, this fact is borne out when considering that almost one-half (45.6 percent) of the subjects selected two-word messages that contained the three terms described previously, those they would expect to see, and more than one-half (57.8 percent) of the subjects indicated they would prefer to see these messages at this location. The two, two-word messages were (a) DOWNTOWN--DENVER and (b) DOWNTOWN--LAMAR STREET. When the term LAMAR STREET was used, 53 percent of the subjects selected the proper lane in an average time of 6.8 sec. When DOWNTOWN was used, 47 percent selected the correct lane in 6.4 sec, and when DENVER was used, 37 percent chose the correct lane in 5.9 sec.

At location 4 (the LAMAR STREET exit), 64.2 percent of the subjects indicated they would expect to see LAMAR STREET used and 72.8 percent indicated they preferred to see LAMAR STREET used. At this location, 75 percent of the subjects selected the cor-

TABLE 1 Percentage of Motorists Selecting the Correct Lane and the Average Decision Time Required to Select by Message and Sign Location

Test Messages	Near City Limits		Near Loop Around City		At Intersecting Freeway near CBD		Near Exit to CBD	
	Lane Choice (%)	Decision Time (\bar{x})	Lane Choice (%)	Decision Time (\bar{x})	Lane Choice (%)	Decision Time (\bar{x})	Lane Choice (%)	Decision Time (\bar{x})
	Downtown	63	5.7	64	5.4	47	6.4	66
CBD	62	5.5	45	6.3	41	6.4	39	8.3
Denver CBD	75	5.7	57	6.3	38	8.0	56	7.0
Business	72	7.2	-	-	48	5.9	59	6.2
Denver	70	5.7	59	5.8	32	5.9	38	7.7
Lamar Street	-	-	40	5.4	53	6.8	75	5.7

Note: Dashes indicate lane choice responses and decision times were not obtained because of experimental error.

rect lane in 5.7 sec. When the two-word messages were used, more than one-half of the subjects (70.8 percent) selected one of two messages [DOWNTOWN--LAMAR STREET, (41.6 percent) and the second was BUSINESS--LAMAR STREET (29.2 percent)] as those they would expect to see at this location. These same two messages were selected by 76.1 percent of the subjects as the messages they would prefer to see at this location.

The results of the suburb city descriptors are presented in Tables 2 and 3. These results indicate that there was no significant difference between the

CONTROL CITY and the MAJOR ARTERIAL STREET messages. This would indicate that motorists can relate to either type of message when traveling to a specific destination in a suburb city. The subjects were told that there was a street to the downtown section of Sherwood and the name of the street was either Marion Avenue or Linsay Street. With regard to ARTERIAL STREET messages, the message LINSAY STREET 1/4 MILE had a significantly higher number of responses (80) than the message MARION AVENUE EXIT (47). The message providing advanced warning information had a significantly higher response frequency

TABLE 2 Subjects' Preference with Regard to Information Presented in Suburb Within a Metropolitan Area by Chi-Square Significance—Trip 1

Trip #	Category Tested	Messages	Frequency	Chi-Square Significance
1	Individual Messages	I-50 East, Limon, 3/4 + Mile. I-50, Kansas City, x. Marion Ave. x. Linsay St., 1/4 Mile, x.	63 47 47 80	Ho: f ₁ =f ₂ =f ₃ =f ₄ $\chi^2 = 13.04$ $\alpha = 0.005$
	Control City Messages	I-50 East, Limon, 3/4 + Mile. I-50, Downtown-Kansas City, x.	63 47	Ho: f ₁ =f ₂ $\chi^2 = 2.65$ n.s.
	Arterial Street Messages	Marion Ave., x. Linsay St., 1/4 Mile, x.	47 80	Ho: f ₁ =f ₂ $\chi^2 = 8.57$ $\alpha = 0.005$
	Control City Versus Arterial Street Messages	I-50 East, Limon, 3/4 + Mile; & I-50 - Kansas City, x. Marion Ave., x; and Linsay St., 1/4 Mile, x.	110 127	Ho: f ₁ =f ₂ $\chi^2 = 1.37$ n.s.
	Advanced Warning Versus Immediate Exit Messages	I-50 East, Limon, 3/4 + Mile, & Linsay St., 1/4 Mile, x. I-50, - Kansas City, x; and Marion Ave., x.	143 94	Ho: f ₁ =f ₂ $\chi^2 = 10.59$ $\alpha = 0.005$

TABLE 3 Subjects' Preference with Regard to Information Presented in Suburb Within a Metropolitan Area by Chi-Square Significance—Trip 2

Trip #	Category	Messages	Frequency	Chi-Square Significance
2	Individual Messages	I-50, Downtown-Kansas City, x ; I-50, Denver-Kansas City, x . I-50 West, Downtown, 1/2 Mile, I-50 West, Denver, 1/2 + Mile.	40 58 81 78	Ho: f ₁ =f ₂ =f ₃ =f ₄ $\chi^2 = 17.07$ $\alpha = 0.005$
	Downtown Versus Denver Messages	I-50, Downtown-Kansas City, x ; & I-50 West, Downtown, 1/2 Mile, + I-50, Denver-Kansas City x ; & I-50 West, Denver, 1/2 + Mile.	121 136	Ho: f ₁ =f ₂ $\chi^2 = 0.88$ n.s.
	Immediate Exit Message	I-50, Downtown-Kansas City, x. I-50, Denver-Kansas City, x.	40 58	Ho: f ₁ =f ₂ $\chi^2 = 3.31$ n.s.
	Advanced Warning Messages	I-50 West, Downtown, 1/2 Mile, +. I-50 West, Denver, 1/2 + Mile.	81 78	Ho: f ₁ =f ₂ $\chi^2 = 0.06$ n.s.
	Advanced Warning Versus Immediate Exit Messages	I-50 West, Downtown, 1/2 Mile +; & I-50 West, Denver, 1/2 + Mile. I-50, Downtown-Kansas City, x, & I-50, Denver-Kansas City x.	159 98	Ho: f ₁ =f ₂ $\chi^2 = 14.48$ $\alpha = 0.005$

(143) than the exit direction or gore messages (94). The location of the test sign in relation to the destination to which the subjects were traveling may have biased the subjects in responding more to advanced warning signs than to exit direction signs. The location of the test sign in the slide indicates that the subjects could have continued a little further down the loop before exiting.

The message I-50, DOWNTOWN--KANSAS CITY, in trip number 2 had the worst response rate and the longest response time than that of the other three messages. This indicates that when the term DOWNTOWN is used with a familiar city name, the subjects were confusing the term downtown to mean downtown Kansas City and not downtown Denver. The term DOWNTOWN in all other cases performed well. This means that the term DOWNTOWN should be used alone or with the name of the urban center the motorists are presently in. It should not be used with a familiar city name several miles away.

CONCLUSIONS

In the metropolitan/downtown study, it was determined that at the entering city limits, the subjects both expected and preferred the CITY NAME as the one-word message. The two-word message both preferred and expected was DOWNTOWN--DENVER. As the subjects approached the loop, they expected to see DOWNTOWN or BUSINESS. The two-word message that the subjects both expected and preferred was again DOWNTOWN--DENVER. As they approached the intersecting freeway leading to the downtown area, the subjects indicated they would expect either DOWNTOWN or LAMAR STREET. The subjects responded that at this location, they would expect to see the two-word mes-

sage DOWNTOWN--DENVER. And as the subjects were approaching their exit on LAMAR STREET, they responded that they would expect and prefer DOWNTOWN--LAMAR STREET as the two-word message. The analysis of variance indicated that the location and the message at each location had a significant effect on the subjects' response times, whereas the messages themselves did not have a significant effect.

In the study investigating descriptors for central areas of suburbs, the subjects' responses for the CONTROL CITY messages were not significantly different than the MAJOR ARTERIAL message for determining any meaningful relationship. The responses for the advanced warning messages were significantly different than those for the exit direction messages. The responses also indicated that there was no significant difference in response rates between the DOWNTOWN messages and the CITY NAME messages. The average response time for the DOWNTOWN messages was 8.7 sec. and 8.66 sec for the CITY NAME messages. The only message in which there were very few correct responses and longer response times was DOWNTOWN--KANSAS CITY. This indicated that the subjects were interpreting their messages to mean downtown Kansas City literally and not downtown Denver. In all other situations the term DOWNTOWN was competitive with the other messages. Thus, DOWNTOWN should be used on a sign panel either alone to refer only to the downtown area of the central city, or in combination with the name of the central city of the metropolitan area.

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