A NEW MODAL CLASSIFICATION SYSTEM FOR PUBLIC TRANSPORTATION

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ABSTRACT

The gathering of public transportation statistics requires a system for classifying data by mode. The majority of naming conventions have consistently recognized transit operations as 'heavy rail," "commuter rail," and "light rail" for the past 40 years (although some others still use older terms). New systems now emerging have unique characteristics, which have led some classifying organizations such as the National Transit Database to begin using terms such as "hybrid rail" and "streetcar" to include systems which were part of commuter rail and light rail until 2011. Similarly, NTD designation of some bus operations as "bus rapid transit" and "commuter bus" also requires an updated classification system. This presentation will take inventory of all types of bus and rail mode classifications, discuss the issues associated with changing classifications, and put forth a revised classification of transit modes.

PROBLEMS IN PUBLIC TRANSPORTATION MODAL CLASSIFICATION SCHEMES

Classification systems for collection and publication of transit operating and financial data identify modes to allow the analysis and comparison of service using different vehicles and with different operating characteristics. Changes, or a lack of change, to the names and number of basic modes of three most used transit data collection and publication modal classification systems have led to confusion and inaccurate data reporting. The three publications are the American Public Transit Association's (APTA) *Public Transportation Fact Book*, the Federal Transit Administration's (FTA) *National Transit Database* (NTD), and the Bureau of the Census *American Community Survey* (ACS). In the case of the FTA database, three modes that existed in the 2011 NTD were divided intp two or three modes. The name of the single 2011 mode in each case was retained as one of the names of the new modes. Thus the name that represented the old mode in its entirety in 2011 represented only a subset of that data in 2012. No new name was created to match the total of the new sets of two or three modes. This leads to potential confusion where the original named mode and the new part of that mode with the same name are thought to define the same set of agencies and that there has been decline rather than growth in data associated with that mode.

Table 1: Number of Agencies Reporting Rail Modes of Service to the the NTD, 2010 compared to later Years After Additional Modes Added

Mode	Before Change 2010	Reporting New Modes Optional		Reporting New Modes Required	
		2011	2012	2013	2014
Light Rail	31	24	23	23	23
Streetcar	--	7	10	11	11
Unreported Total	31	31	33	34	34
Commuter Rail	25	24	24	23	24
Hybrid Rail	---	4	4	5	5
Unreported Total	25	28	28	28	29

Table 1 illustrates this problem. Table 1 counts only agencies that reported to the NTD in the year listed. All transit rail systems and whether or not they are included in NTD reports is reported in APTA's *Public Transportation Fact Book Appendix A: Historical Tables*. The screened back cells on Table 1 indicate that there is not a category to report summations of these pairs of modes in the NTD and these data do not appear in the NTD.

Reporting a mode of service that belongs in the new category was optional in 2011 and 2012 but was required beginning in 2013. In 2010 there were 31 light rail systems but in 2011 there were only 24. Where did the 7 light rail systems go? They became streetcar system of course, but since there is no

summation mode totaling these two modes, it is not obvious. There are tables of other data such as passengers, vehicle miles, etc., where it will not be apparent that the two years light rail data are for different group of systems. As will be discussed in the next section, APTA now uses another name to represent the total and alleviate this problem.

The Census data classification in contrast has changed little in the last century and results in misreporting of travel behavior because the mode names are unrelated to current technology or the names of transit modes with which commuters are familiar. This paper will describe the history of the three modal classification systems, describe the current difficulties with each of them, and propose a limited solution to those problems.

APTA AND FTA RAIL CLASSIFICATION SCHEMES

The American Street Railway Association (ASRA), APTA's original predecessor, was founded in 1882. The ASRA and its successors published statistics in verbatim proceedings of their conventions, but the first stand alone document of national data still available, *Electric Railway Operations*, was published by the APTA predecessor American Electric Railway Association (AERA) in 1922. That publication differentiated Electric Railway (comparable to current light rail) into City Lines and Interurban Lines. In 1942 the American Transit Association began publishing the *Transit Fact Book* which was renamed the *Public Transportation Fact Book* in 2000. Agencies operating service comparable to heavy rail were not included until 1933 and commuter rail until 1977. The years that modes were introduced or their names changed for APTA, FTA, and Census classifications are shown on Table 2 for modes comparable to light rail, on Table 3 for modes comparable to heavy rail, and Table 4 for modes comparable to commuter rail. By 1977 the APTA classification has reached what was considered the modern differentiation of basic modes which lasted until 2011; light rail, heavy rail, and commuter rail. Tables 2 and 4 report inclusive category names and partial category names. Inclusive category names are summary mode names that include all data for all light rail type or commuter rail type modes. Partial category names define only a portion of the systems included in the inclusive category name.

The Federal Transit Administration's National Transit Database was first published in 1979 and included light rail and heavy rail type modes under the older names, streetcar and rapid rail. APTA had adopted the modern terms light rail and heavy rail in 1974. The NTD would not adopt those names as options until 1984 and as standard names in 1993. The term light rail was coined in 1972 (Thompson, 2003). Adoption of heavy rail to describe what had been called subway and elevated differentiated the two primary urban rail modes by their capacity, light rail carried smaller volumes of traffic and heavy rail carried larger volumes of traffic. The terms streetcar and subway and elevated for the two primary urban rail modes differentiated physical attributes of the system. But both modes operated in tunnels and elevated structures so the names did not actually describe what the differences between the two modes were. Commuter rail was added in 1984.

Beginning in 2011 the NTD differentiated light rail into light rail and streetcar and differentiated commuter rail into commuter rail and hybrid rail. The problem created by this action is that light rail in 2010 and 2011 are a different set of agencies and commuter rail in 2010 and 2011 are a different set of agencies. A new classification name to summarize the two new modes in each set was not introduced. Therefore, there is no continuation of total all light rail and total all commuter rail between 2010 and 2011. The decrease of "light rail" between the two classifications could be interpreted as a decrease on overall light rail and similarly the decrease in "commuter rail" between the two classifications could be interpreted as a decrease in overall commuter rail. The fact that the new classification hybrid rail in 2012 included two former light rail agencies and two former commuter rail only further complicates matters. Because of this the NTD no longer reports continuous summary data among rail modes from before and after 2011.

Table 2: Light Rail Type Mode Names, Data Years of Use in Publications

Time Period	American Public Transit Association		National Transit Database		Census	
	Inclusive Category	Partial Categories	Inclusive Category	Partial Categories	Inclusive Category	Partial Categories
1890					Street Railway	Electric Railway, Cable Railway, Horse Railway, Steam Railway
1902 - 1911					---	Street and Electric Railway, Interurban Railway
1912 - 1921					Surface Railway	---
1922 - 1924	Electric Railway	Urban Electric Railway, Interurban Electric Railway			Surface Railway	---
1925 - 1930	Electric Railway	City Lines, Interurban Lines			Surface Railway	---
1931	Electric Railway	City Lines, Interurban Lines, Commutation Lines, Suburban Lines			Surface Railway	---
1932 - 1935	Electric Railway	City Lines, Interurban Lines			Surface Railway	---
1936	City Surface Lines	---			Street Railway	---
1937	Railway	City Railway, Interurban			Street Railway	---
1938 - 1941	Railway	City Railway, Interurban				
1942 - 1959	Surface Railway	---				
1960 - 1973	Surface Railway	---			Streetcar or Trolley Car	---
1974 - 1978	Light Rail	---			Streetcar or Trolley Car	---
1979 - 1983	Light Rail	---	Streetcar	---	Streetcar or Trolley Car	---
1984 - 1992	Light Rail	---	Streetcar or Light Rail	---	Streetcar or Trolley Car	---
1993 - 2010	Light Rail	---	Light Rail	---	Streetcar or Trolley Car	---
2011 - 2014	Surface Rail	Light Rail, Streetcar	---	Light Rail, Streetcar	Streetcar or Trolley Car	---

No Summary data published or modes not reported in summary data publications.

--- No partial categories reported for inclusive category or no inclusive category summing partial categories.

Table 3: Heavy Rail Type Mode Names, Data Years of Use in Publications

Time Period	American Public Transit Association	National Transit Database	Census
	Inclusive Category	Inclusive Category	Inclusive Category
1907 - 1911			Included In "Street and Electric Railway"
1912 - 1926			Elevated and Subway Railway
1927 -1933	Included In "Electric Railway"		Elevated and Subway Railway
1933 - 1935	Rapid Transit		Elevated and Subway Railway
1936	Rapid Transit Lines		Elevated and Subway Railway
1937	Included In "Railway"		Included In "Street Railway"
1938 - 1941	Included In "Railway"		
1942	Rapid Transit		
1943 - 1959	Subway and Elevated		
1960 - 1973	Subway and Elevated		Subway or Elevated
1974 - 1978	Heavy Rail		Subway or Elevated
1979 - 1982	Heavy Rail	Rail Rapid	Subway or Elevated
1983 - 1989	Heavy Rail	Rapid Rail	Subway or Elevated
1990 - 1992	Heavy Rail	Rapid Rail or Heavy Rail	Subway or Elevated
1993 - 2014	Heavy Rail	Heavy Rail	Subway or Elevated

No Summary data published or modes not reported in summary data publications.

Table 4: Commuter Rail Type Mode Names, Data Years of Use in Publications

Latest Data Year	American Public Transit Association		National Transit Database		Census	
	Inclusive Category	Partial Categories	Inclusive Category	Partial Categories	Inclusive Category	Partial Categories
1960 - 1976					Railroad	---
1977 - 1983	Commuter Rail	---			Railroad	---
1984 - 2010	Commuter Rail	---	Commuter Rail	---	Railroad	---
2011	Passenger Railroad	Commuter Rail, Hybrid Rail	---	Commuter Rail, Hybrid Rail	Railroad	---
2012 - 2014	Regional Railroad	Commuter Rail, Hybrid Rail	---	Commuter Rail, Hybrid Rail	Railroad	---

No Summary data published or modes not reported in summary data publications.
--- No partial categories reported for inclusive category or no inclusive category summing partial categories.

APTA has dealt with this problem by creating two new classification categories to maintain continuity between 2010 and later data sets. In 2011 through 2014 APTA has used "surface rail" as a term for the sum of the new light rail and streetcar modes and a continuous historical comparison to the former light rail. In 2011 APTA used "passenger railroad" as a term for the sum of the new commuter rail and hybrid rail and in 2012 through 2014 APTA used "regional railroad" as a sum for commuter rail and hybrid rail. . "Passenger railroad" was used for only one year because it might be incorrectly viewed as including intercity passenger railroad. This allows APTA to publish continuous data for the old light rail and a sum of the new light rail and streetcar modes and the old commuter rail and the new commuter rail and hybrid rail modes

A difficulty of selecting a new modal classification scheme to summarize light rail and streetcar and commuter rail and hybrid rail is the difference in the basis of modal names. Some names have been based on the generalized location of the light rail type modes, e.g. streets, urban, surfaces, interurban but commuter rail is based on a description of activity. The APTA selection as a summary mode for the new

light rail and the new streetcar cannot, of course, use either of those names and uses a name poplar over a century ago, "surface rail." This name is chosen because most light rail and streetcar service is provided on the surface rather than in tunnels or elevated structures, and all other historical names appear to be inappropriate. This is in fact, the primary location of each mode, and was the basis of the classification by the Census as far back as 1917 as reported in this quote.

> "Classification according to character of roadway. This classification presents statistics of elevated and subway roads in comparison with the surface roads, or those which are essentially surface. The elevated and subway group includes those having elevated or subway trackage in excess of surface trackage.
> (*Census of Electrical Industries 1917: Electric Railways*. Washington: Bureau of the Census/Government Printing Office, 1920.)

"Surface rail" and "regional rail" are currently used as inclusive summary mode names in the *APTA Public Transportation Fact Book, Appendix A: Historical Tables* because that publication compares transit data over time, on sum tables for nearly a century. Historical comparison requires categories that may have changed names over time but do not change the group of systems and type of operation included over time. "Regional rail" is taken from European usage and describes shorter travel within a region on systems operating on current or former freight railroad type infrastructure. In the *APTA Public Transportation Fact Book*, which has data solely for the reported year, summary categories are not needed for continuity and have not been used.

CENSUS RAIL CLASSIFICATION SCHEMES

The current rail classification scheme used in the Census *American Community Survey* to describe the primary mode of travel by commuters is dated and results in obviously incorrect data. These data are nevertheless published by the Census and may result in erroneous planning, research, and political decision making.

The original Census classification scheme used from 1890 through 1937 was for statistical reports describing the transit railway industry in the same manner as the current APTA *Public Transportation Fact Book* and the FTA *National Transit Database*. Most of those publications differentiated between "surface railway" and "elevated and subway railway." The last Census publication of rail transit data was for 1937 data.

Beginning in 1960 the Census began collecting, as part of the *Decennial Census* and then the *American Community Survey*, data on mode of transportation for commuters. For transit they adopted variations on the categories used to collect transit data earlier in the century. Rail modes were "streetcar or trolleycar," "subway or elevated," and "railroad." In 1960 these names were not inconsistent with industry practice and represented the rail service available at that time. The common names used to describe these modes by transit passengers and the industry have changed since then, but the Census names have not. A passenger who rides a light rail system likely does not know the correct commute mode response on a Census form is "streetcar or trolleycar."

Census data indicates the commuter frequently selects the wrong rail mode. The effect of this is shown on Table 5 which reports commute mode data from the 2014 American Community Survey. Each of these urbanized areas has a single type of transit rail service. In many cases the reported number of commuters is skewed to modes of service not operated in that urbanized area.

Table 5: Number of Rail Commuters Reporting Alternative Rail Modes of Travel in Single Mode Urbanized Areas, 2014 American Community Survey

Urbanized Area/ Transit Agency	Only Available Mode of Service in 2014	Number of Commuters Using Streetcar and Trolley Car	Number of Commuters Using Subway and Elevated	Number of Commuters Using Railroad	Percent Correct Response
St, Louis, MO-IL: Bi-State Development Agency	Light Rail	587	5,914	981	7.85%
Denver-Aurora, CO: Regional Transportation District	Light Rail	1,348	9,460	3,717	9.28%
Atlanta, GA: Metropolitan Atlanta Rapid Transit Authority	Heavy Rail	330	21,633	2,336	89.03%
Houston, TX: Metropolitan Transit Authority of Harris County	Light Rail	931	701	703	39.87%
Nashville-Davidson, TN: Nashville Metropolitan Transit Authority	Commuter Rail	9	182	206	51.89%
Sacramento, CA: Sacramento Regional Transit District	Light Rail	2,299	2,012	2,195	35.34%

Modes not operated in urbanized area.

St. Louis's only rail service is a light rail system. In the Census light rail would be classified as streetcar and trolleycar. But only 7.85% of commuters in St. Louis reporting any form of rail transit as their primary commute mode report the mode correctly. The light rail line does go into a tunnel in downtown St. Louis and crosses bridges and other elevated structures, thus subway and elevated could be a logical choice and is incorrectly selected by 79 percent of respondents. Changing this classification would require action by the Census.

APTA AND FTA BUS CLASSIFICATION SCHEMES

Similar to the way they divided light rail and commuter rail into two modes in 2011, the NTD also divided the existing bus category into three modes: bus rapid transit, commuter bus, and bus. As with the rail modes, one new category has the same name as the previous total category. This does not present the same degree of problem as the division of light rail and commuter rail does. The new bus modes are operational divisions using the same technology and often the same vehicles. APTA, in the *Public Transportation Fact Book, Appendix A: Historical Tables* addresses this problem by simply having a "total bus" column that adds the three new modes together and provides continuity with historical data.

Table 6: Number of Agencies Reporting Bus Modes of Service to the the NTD, 2010 compared to later years After Additional Modes Added

Mode	Before Change 2010	Reporting New Modes Optional		Reporting New Modes Required	
		2011	2012	2013	2014
Bus	584	609	688	695	700
Bus Rapid Transit	---	5	4	7	10
Commuter Bus	---	36	72	110	120
Unreported Total	584	650	764	802	830

No Summary data published.

Table 6 illustrates this problem for bus modes. In this case the number of agencies in the basic mode continues to increase. In the rail categories, light rail and streetcar are an either/or mode selection as are commuter rail and hybrid rail. In bus, however, a bus mode agency before 2011 may have operated what is now termed bus service as well as bus rapid transit service and commuter bus service. An agency reporting the new modes will likely also continue to report the bus mode. The increase in bus systems

between 2011 and 2012 results in part from the 2010 Census delimiting 32 more urbanized areas than the 2000 Census and the expansion of existing urbanized areas brought some formerly rural systems into urbanized areas. If an agency has both directly operated and purchased transportation service for any of these modes, the agency would have been counted twice.

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