Mode Choice

New Logit models for HBO and NHB purposes

Mode choice was considered a relatively weak link in version 2.1, particularly for non-work trips. It has been extensively revised. The mode choice models' major deficiencies were lack of independent Logit models for the HBO and NHB purposes. Trips for these purposes were calculated by factoring HBW trips – a practice considered sub-standard by the January 2001 peer review. Independent models for each purpose now exist.

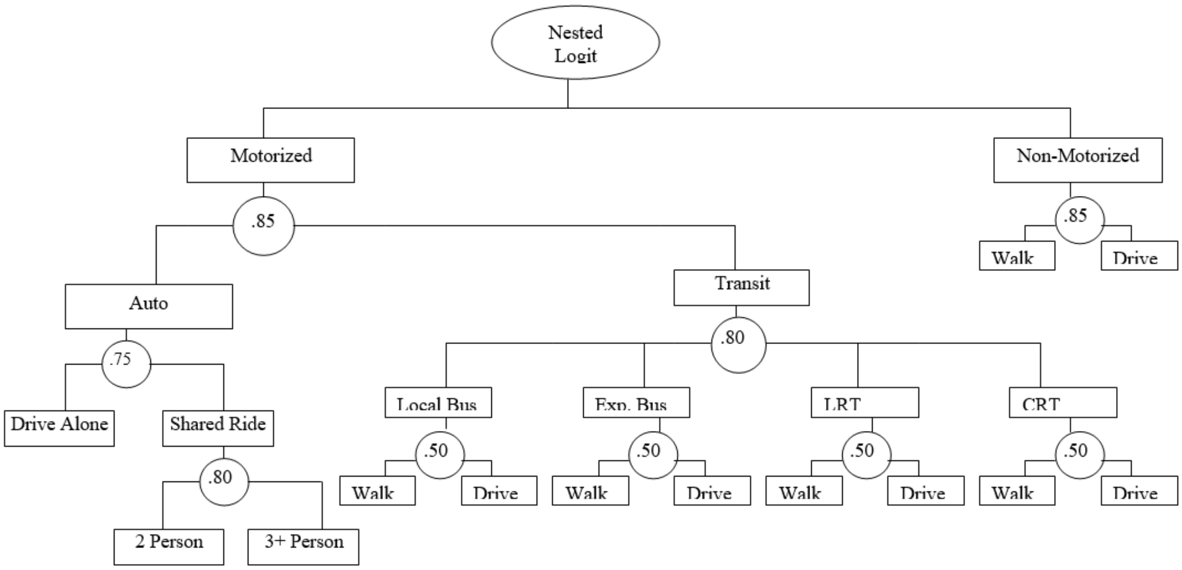

Figure 1: Mode Choice Model Nesting Structure (and nesting coefficients).

	HBW	HBO	HBC	NHB	Variable Description
ivt_coef	-0.0250	-0.0083	-0.0250	-0.020	in-vehicle time
walk_coef	-0.0375	-0.0124	-0.0375	-0.030	walk time, including first walk time & auto OVT
drive_coef	-0.0500	-0.0165	-0.0500	-0.050	drive access time to transit
cost_lowinc_coef	-0.0027	-0.0053	-0.0027	-0.003	non-parking cost for lowest income quartile
cost_highinc_coef	-0.0017	-0.0033	-0.0017		non-parking cost for 3 highest income quartiles
parkcost_lowinc_coef	-0.0027	-0.0053	-0.0027	-0.003	parking cost for lowest income quartile
parkcost_highinc_coef	-0.0017	-0.0033	-0.0017		parking cost for 3 highest income quartiles
transfers_coef	-0.2500	-0.0830	-0.2500	-0.200	transit transfers (note: first rail-to-rail is not penalized)
initwait_7_coef	-0.0438	-0.0206	-0.0438	-0.050	first 7 minutes of first wait time
initwait_gt_7_coef	-0.0250	-0.0083	-0.0250	-0.020	additional first wait time beyond 7 minute threshold
xferwait_coef	-0.0625	-0.0206	-0.0625	-0.050	transfer wait time
bike_coef	-0.0625	-0.0206	-0.0625	-0.050	bike travel time coefficient
CBD_dummy	1.0000	1.3500	0.8000	0.750	CBD dummy variable

Figure 2: Mode Choice Model Coefficients by purpose.

Market segmentation for home-based purposes

HBW, HBC, and HBO models have been market segmented by three auto-ownership classes (0,1,2), and two income classes (lowest income quartile, 3 highest income quartiles). Since NHB by definition has no specific household information, HNB trips cannot be segmented using household data.

Walk access to transit methodology revised

Version 2.1 contained an "all or nothing" approach to determining whether a zone had walk access to transit. If the zone centroid was within ½ mile of a bus stop, 100% of the zone had access (3/4 mile for rail). However, network-traced paths often require far more walking than would occur in reality. Further, a wide variance in the size of zones (and hence the number of people who "have access") caused some concern.

The new approach attempts to determine the percentage of each zone's area that truly is within walk distance of transit. GIS is used to create a 4/10 mile buffer around bus lines, express bus stops, and rail stops. This buffer is then intersected with the TAZs to estimate the number of people and jobs within the buffer.

The algorithm to determine walk-access times for zones within walking distance of transit makes a concerted effort to trace at least one walk path to a transit stop for all zones within walking distance of transit. This is done by tracing a series of access paths, increasing the maximum path length over the network. The algorithm then caps the access path length at .4 miles.

Drive access to transit coding

A coding flaw was also discovered that affected drive access to transit. The previous code ensured drive-to-transit access in the form of park-n-ride links, but neglected to ensure that there were walk links available to egress the system at the destination. In other words, you could easily drive-to-transit, it was just hard to find places where you could get off. Modes where drive access can range from 25-85% (express bus, light rail, commuter rail), were seeing only a 10-15% drive share in Version 2.1. This has been corrected.

Summit-formatted output

FTA New Starts funding requests require the analysis of mode choice output using software named "Summit". FTA developed Summit for comparing two alternatives to determine "winners and losers". It is a useful tool for all types of alternatives analysis, including highway alternatives. The model can now easily generate the input required for Summit with a simple toggle switch.

Improved transit speeds

Version 2.1 had a carry over from much earlier models that assumed that if a bus traveled on any street outside the CBD or a freeway, that its average speed (including stops) would be 0.9 multiplied by the average congested speed for vehicles. This may be true under the most extreme congestion, but for most circumstances the relative speeds between buses and private autos is more pronounced. Version 3.0 conducted a substantial review of UTA's scheduled stops (to determine typical average bus speeds), and compared these against average private auto congested speeds obtained using GPS. The resulting factors are noted below. The new transit speed coding methodology, as well as the observed auto speed data allowed us to closely model observed bus speeds (see Figure 3) and bus boardings (Figure 4).

Table 1: Congested Speed Factors between Model Versions

Version 2.1	#.#* Congested speed	Version 3.0	#.#* Congested speed
Freeway factor	1.0	Freeway factor	0.9
Freeway factor		Ramp factor	0.5
CBD factor	0.5	Principal/Collector	0.6
All others	0.9	Minor art CBD/urban	0.55
All others		Minor art Suburban/rural	0.65

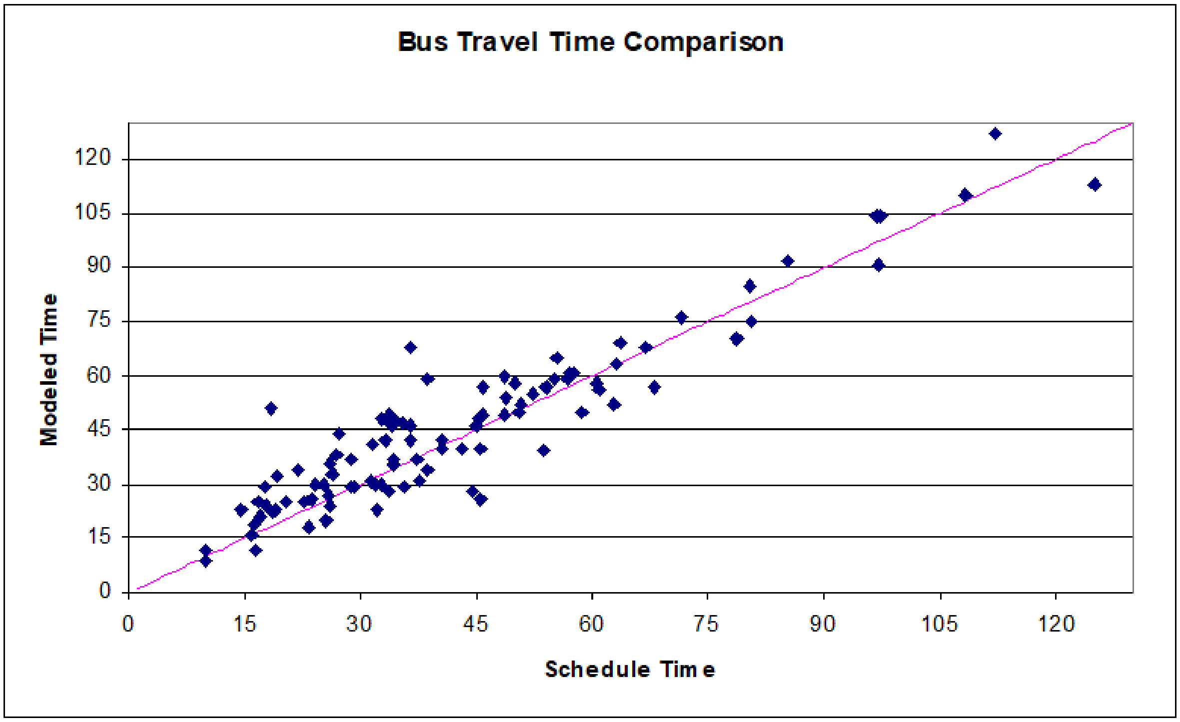

Figure 3: 2001 Modeled vs. Actual Bus Speed Comparison.

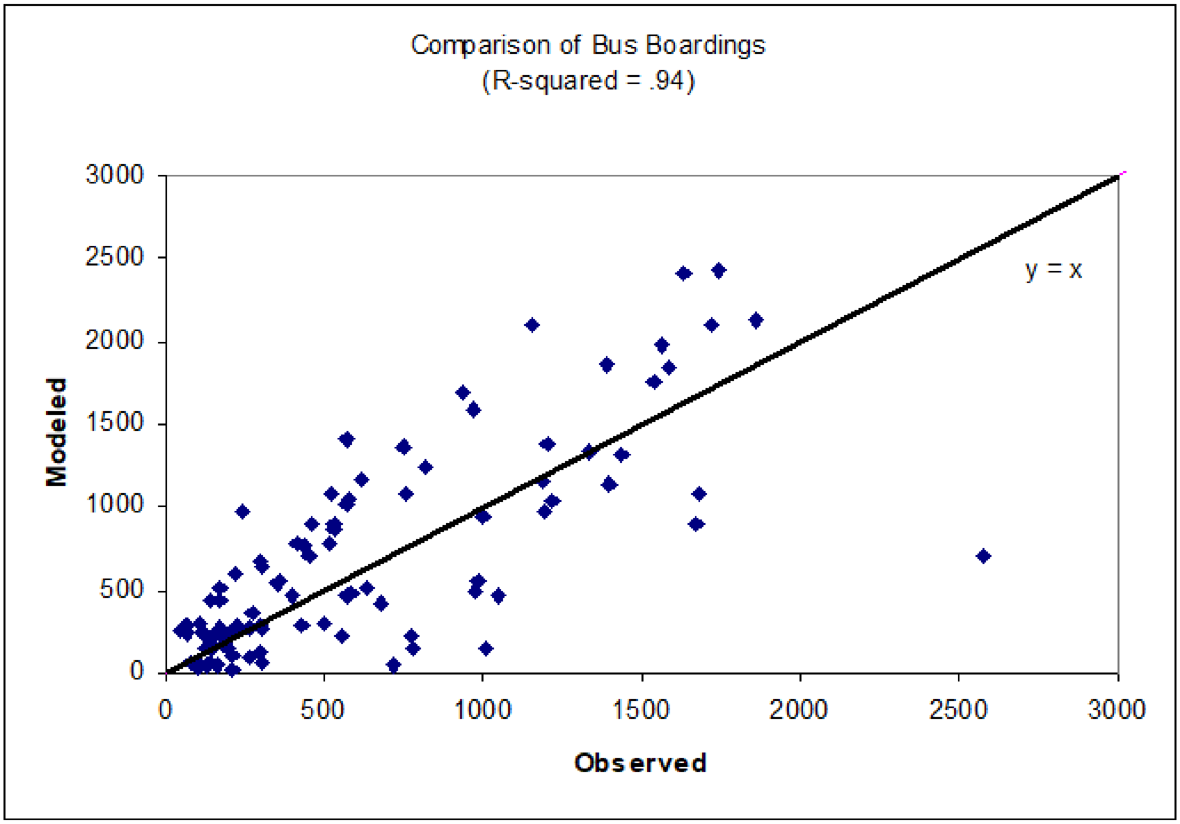

Figure 4: 2001 Mode vs. Actual Bus Boardings.