Modelling walking accessibility to public transport terminals

Sony Sulaksono Wibowo

2005

Sony, S. W. (2005). Modelling walking accessibility to public transport terminals. Master's thesis, Nanyang Technological University, Singapore.

<https://hdl.handle.net/10356/12007>

<https://doi.org/10.32657/10356/12007>

Nanyang Technological University

Downloaded on 26 Apr 2023 23:14:49 SGT

APPENDIX

APPENDIX A

Survey Forms

A.I. Pilot Survey

NANYANG TECHNOLOGICAL UNIVERSITY

INTERVIEW NO.: _____

INTERVIEW SURVEY

A. INTERVIEWER TO COMPLETE	1. Interviewer's Name: _____	
2. LOCATION: _____		3. DATE: __/__/__
BUS INTERCHANGE: ₁ ☐ with MRT station ₂ ☐ w/o MRT station		4. DAY: _____
MRT STATION: ₃ ☐ with Bus Interchange ₄ ☐ w/o Bus Interchange		5. TIME: _____
6. WEATHER: ₁ ☐ Sunny ₂ ☐ Cloudy ₃ ☐ Rainy		

B. TRAVEL DATA

1. PLACE OF ORIGIN (POSTAL CODE, BLOCK NO.): _____

2. PURPOSE OF TRIP:

1. HOME	4. WORK/ NS	7. PART OF WORK
2. SCHOOL	5. SHOPPING	8. SOCIAL/ RECREATION
3. MEDICAL/ DENTAL	6. FOOD	9. PERSONAL BUSINESS
10. OTHERS _____		☐

3. HOW OFTEN?

1. EVERY WEEKDAY	3. ONCE/ WK	☐
2. 2-4 TIMES/ WK	4. SELDOM	

4. HOW DO YOU GET HERE?

1. BY WALKING

↓
Go to Section C

BY OTHER (2. BUS/ 3. CAR/ 4. TAXI)*

Bus No.: _____

Go to Section D

☐

C. BY WALKING

5. HOW LONG YOU TOOK TO WALK HERE? (Minutes)

6. MAIN REASON FOR CHOOSING WALKING?

1. NEAR/ CONVENIENT	3. SAVE MONEY	5. EXERCISE/ HEALTHY
2. NO DIRECT BUS	4. FASTER THAN	6. OTHERS, MEANS
_____ ☐		

7. CAN YOU SHOW US WHICH ROUTE YOU TOOK? (Interviewer to trace on map provided)

8. HOW WOULD YOU RATE THE WALKING DISTANCE TO THE MRT STATION/ BUS INTERCHANGE?

1. SHORT, VERY CONVENIENT	3. LONG BUT STILL ACCEPTABLE
2. MEDIUM, STILL COMFORTABLE	4. TOO LONG
☐	

9. HOW WOULD YOU RATE THE QUALITY OF THE ROUTE?

1. VERY GOOD	3. ACCEPTABLE
2. GOOD	4. POOR, NEEDS IMPROVEMENTS
Specify: _____ ☐	

10. WHAT IMPROVEMENTS WOULD YOU SUGGEST TO THE ROUTE YOU TOOK?

NANYANG TECHNOLOGICAL UNIVERSITY

INTERVIEW NO.: _____

INTERVIEW SURVEY

D. BY OTHERS (BUS/ CAR/ TAXI)*

11. MAIN REASON FOR NOT CHOOSING WALKING? _____
12. HOW LONG YOU TOOK TO WALK TO THE (BUS STOP/ CARPARK/ TAXI STAND)* WHERE YOU BOARDED THE VEHICLE? (Minutes) **For Car, go to Question No. 14**
13. HOW LONG YOU TOOK TO WAIT FOR THE (BUS/ TAXI)*? (Minutes)
14. HOW LONG IT TOOK THE VEHICLE TO REACH HERE? (Minutes)
For Car/ Taxi go to Question No. 16
15. IS THE BUS CROWDED? (Y / N)

16. RATE THE FOLLOWING FACTORS AFFECTING YOUR CHOICE OF WALKING TO PUBLIC TRANSPORT:
(circle the appropriate rating)

	<i>Not Imp</i>	<i>Somewhat Imp</i>	<i>Important</i>	<i>Very Important</i>
A. Walking Distance	1	2	3	4
B. Walking Comfort (i.e. presence of obstructions, etc.)	1	2	3	4
C. Rain Shelters	1	2	3	4
D. Having to climb stairs or slopes	1	2	3	4
E. Risk of traffic accident	1	2	3	4
F. Unnecessary detours	1	2	3	4
G. Crowded walkways	1	2	3	4
H. Security	1	2	3	4
I. Number of road crossings and delays	1	2	3	4
J. Others: _____	1	2	3	4

F. PERSONAL

17. AGE:
1. <21 2. 21-30 3. 31-40 4. 41-50 5. 51-60 6. >60
18. OCCUPATION
1. EMPLOYED 3. HOUSEWIFE
2. STUDENT (PRI./ SEC./ TER.)* 4. RETIRED
19. THE COMBINED INCOME OF YOUR FAMILY
1. <\$1000 3. \$2001-3000 5. \$4001-6000 7. >\$8001
2. \$1001-2000 4. \$3001-4000 6. \$6001-8000

20. GENDER OF INTERVIEWEE
1. Male 2. Female
- ☐

Very heartfelt thanks for you taking time off to help us in this survey. Your response is deeply appreciated!!

Nanyang Technological University

Date: _____ Location: _____ Surveyor's Name: _____

WALKING ROUTE FORM

Walking Path: _____

Legend:	
	Starting / Ending Point
	Sidewalk/Walkway
	Access Road
	Zebra Cross
	Signalised Crossing
	Unmarked Crossing
	Overpass (Pedestrian Bridge) and number of steps
	Underpass (Pedestrian Tunnel) and number of steps
	Ascending Steps and number of steps
	Descending Steps and number of steps
	Segment Number

Assumption:

1. A housing block is expressed with one node as **STARTING POINT**
2. MRT station is expressed with a node as **ENDING POINT**

Nanyang Technological University

Date: _____ Location: _____ Surveyor's Name: _____

PEDESTRIAN ROUTE ASSESSMENT FORM

A - General Information		Form Code Number:				
1) Segment No.		1	2	3	4	5
2) Type of Facility (Abbreviations: Sidewalk = SW, Walkway = WW, Combined Crossings (combination of signalised (SC) and unsignalised (UC) crossings as one segment) = CC or as individual otherwise, Overpass = OP, Underpass = UP, Escalators = ES)						
B - Physical Characteristics		Unit For Facility				
1) Actual Measured length of each segment (By Pedometer - In Bracket)		Metres				
2) Actual number of Steps (By Pedometer - In Bracket)		Number				
3) Average Width (Applicable for width less than or equal to 3m)		Metres				
4) Surface Type (Abbreviations: Asphaltic = A, Blocks/Bricks = B, Concrete = C, Grass = G, Soil = S, Tiling = T, Others = Please Specify)		Type				
5) Surface Quality - Rate on the scale of 1-5 (1 being worst, 5 being Best) 1- Unsealed and/or many cracks/bumps, i.e. Very poor quality. 2- Poor quality 3- Moderate quality, i.e. Some cracks and bumps. 4- Good quality, i.e. Very few cracks/Bumps. 5- Excellent quality		Scale				
6) Continuity - Rate on the scale of 1-5 (1 being worst, 5 being Best) 1- Continuous breakages that results in pedestrian not utilising the facilities. 2- Frequent breakages that results in pedestrians walking out of their way. 3- Moderate standard for continuity i.e. Pedestrian can still stay on course their path. 4- Acceptable standard for continuity i.e. few breakages along the length of facility. 5- Continuous movement without requiring the pedestrians to walk out of their way.		Scale				
7) Obstructions		Number				
8) Support facilities (Yes/No) (i.e. Benches, Refuge median, signage, provision of rest stops etc). If Yes, Please specify:		YES / NO				
9) Barrier(s) for wheelchairs/pushchair/Disabled (Yes/No) (i.e. without any presence of curb ramp for sidewalk will mean a barrier.) Please specify:		YES / NO

Nanyang Technological University

Date: _____

Location: _____

Surveyor's Name: _____

PEDESTRIAN ROUTE ASSESSMENT FORM

Segment Number		Form Code Number:				
		1	2	3	4	5
Type of Facility - From Assessment Form 1						
C - Physical Characteristics (Comfort Issue)						
1) Provision of Shelters (Yes/No)	Unit YES / NO	For Facility SW,WW,OP,UP				
2) Slope (Please indicate + for positive % or - for negative %)	%	ALL				
Describe the condition of the slope:						
3) Number of Ascending Steps/Riser height (mm)	Number	SW,WW,OP,UP				
4) Number of Descending Steps /Riser height (mm)	Number	SW,WW,OP,UP				
5) Straightness of Path - Rate on the scale of 1- 5 (1 being worst, 5 being Best)	Scale	SW,WW				
1- Almost all bends and deviations along the length of path. 2- Major bends and deviations along the length of path. 3- Moderate numbers of bend along the length of path. 4- Slight bends along the length of path. 5- Almost Straight along the length of path.						
D - Locality Issue						
1) Vehicle conflict Points.	Unit Number	For Facility SW,WW,CC				
2) Level of exposure to traffic or other potential hazards - Rate on the scale of 1-5	Scale	SW,WW,CC (SC,UC)				
1- Very high (Reduced visibility caused by objects e.g. trees, Very Heavy traffic flow, Very high speed, located next to the road curb or side drains and ditches etc) 2- High (Heavy flow, high speed, locate within 1m from road curb or side drains and ditches etc) 3- Medium (Medium flow, medium speed, locate within 1 and 2m from road curb or side drains and ditches etc) 4- Fair (Fair flow, fair speed, Located between 2 and 3m from road curb or side drains and ditches etc) 5- Minimal (No reduction of visibility, Minimal flow, Low speed, located more than 3m away from the road curb or side drains and ditches etc)						
E - User's Concern						
1) Level of Congestion - Rate on the scale of A- F (F being worst, A being Best)	Unit Scale (LOS)	For Facility ALL

2) Presence of Other non-Motorised traffic, i.e. Cyclists.	YES / NO	ALL				
3) Possible Security Concern's (Yes/No)	YES / NO	ALL				
4) Average Delays.	Seconds	CC (SC,UC)				

A.2. Main Survey

Nanyang Technological University

INTERVIEW NO.: _____

MRT ACCESSIBILITY SURVEY – INTERVIEW FORM

A. Interviewer to complete before interview	1. Location: _____
Interviewer's Name: _____	2. Date: ____ / ____ / ____
	3. Weather: ☐ 1. Sunny ☐ 2. Cloudy ☐ 3. Rainy

B. ESSENTIAL QUESTIONS

Q1. **Where did you start this trip?** (Origin: Block No., Building name): _____
(trip must start within the survey area/New Town)

Q2. **Purpose of your trip:**

☐ 1. Going home	☐ 2. School	☐ 3. Work/ NS	
☐ 4. Part of work	☐ 5. Personal business	☐ 6. Recreation	☐
☐ 7. Shopping	☐ 8. Social	☐ 9. Eating	

Q3. **How long did you take to get here from the origin?** (Minutes) _____
(excluding any stops on the way for shopping, eating, etc.)

Q4. **How many times did you make this trip in the last week?** _____ times

Q5. **How did you get here?**

☐ 1. by Walking

☐ 2. by Car	☐ 3. by Taxi
☐ 4. by Motorcycle	☐ 5. by Bicycle
☐ 6. by Bus	☐ 7. by LRT
Bus No.: _____	Station: _____

☐

Go to Q8 on next page

Q6. **How would you rate the walking distance to the MRT station?**

☐ 1. Short, very convenient	☐ 2. Medium, still comfortable	
☐ 3. Long but still acceptable	☐ 4. Too long	☐

Q7. **Other than distance, how would you rate the comfort of walking on your route?**

☐ 1. Very good	☐ 2. Good	
☐ 3. Acceptable	☐ 4. Poor, needs improvements	☐

Q8. **Rate the following factors affecting your choice of walking to this MRT station:**
(circle the appropriate rating)

	Not Imp	Somewhat Imp	Important	Very Important	
A. Walking Distance	1	2	3	4	☐
B. Walking Comfort (obstructions, etc.)	1	2	3	4	☐
C. Rain Shelters	1	2	3	4	☐
D. Having to climb stairs or slopes	1	2	3	4	☐
E. Risk of traffic accident	1	2	3	4	☐
F. Unnecessary detour	1	2	3	4	☐
G. Crowded walkways	1	2	3	4	☐
H. Security	1	2	3	4	☐
I. Number of road crossings and delays	1	2	3	4	☐
J. Others (specify):	1	2	3	4	☐

Q9. **Your age:** _____ years

(If refused, interviewer later to estimate age)

Q10. **Your current situation**

☐ 1. Employed /NS

☐ 2. Student

☐ 3. Housewife

☐ 4. Unemployed

☐ 5. Retired

☐ 6. Other

☐

Q11. **What is the combined income of your family per month?**

☐ 1. <\$2000

☐ 2. \$2001-3000

☐ 3. \$3001-4000

☐ 4. \$4001-6000

☐ 5. \$6001-8000

☐ 6. >\$8001

☐

C. ADDITIONAL QUESTIONS

Q12. **Can you show us which route you took?** (refer to the map provided, next page)

(Interviewer to mark the origin and trace the walking path to bus stop/MRT station)

Q13. **What improvements would you suggest to the route you took?**

D. Interviewer to complete after the interview	D1. Time (24h format):
D2. Gender of respondent ☐ 1 Male ☐ 2. Female	☐

BEDOK

Nanyang Technological University

MRT ACCESSIBILITY SURVEY – Route Assessment Form A

Route from Block No.: _____

Towards MRT Station: _____

Joining route No.: _____

Rough Sketch of the Survey Location

Symbols:

———— Sidewalk - SW

- - - - Walkway - WW

• • • • • Shortcut - SC

◄ ———► Signalised Crossing - SX

● ———● Unmarked Crossing - UX

||||| Zebra Crossing - ZX

===== Pedestrian Bridge - BR

===== Pedestrian Tunnel - TU

//// Escalator - ES

Date of Survey: _____

Time of Survey: _____

Surveyor Name: _____

Checked by: _____

Nanyang Technological University

MRT ACCESSIBILITY SURVEY - Route Assessment Form B

Route from Block No. _____

Towards MRT Station: _____

Item	Data description	Method	Unit						
1	Segment Number								
2	Segment Type (use codes below)								

Normal: **WW**-walkway, **SW**-sidewalk, **SH**-shortcut,Crossing: **SX**-signalised, **ZX**-zebra, **UX**-unmarked, **BR**-bridge; **TU**-tunnel, **ES**-escalator

for all segment types

Stride: _____

3	Segment length (distance)	measure	steps						
			metres						
4	Slope - towards MRT (+ uphill, - downhill)	measure	% or step*						
5	Steps up - towards MRT	count	number						
6	Steps down - towards MRT	count	number						
7	Weather protection (rain shelter)	estimate	% length						
8	Barriers for wheelchairs, pushchairs, etc.	visual	Yes/No						

for walkway/sidewalk/shortcut/bridge/tunnel only

9	Surface quality 1-worst, 5-best	estimate	rating 1-5						
10	Continuity 1-worst, 5-best	estimate	rating 1-5						
11	Congestion 1-worst, 5-no congestion	estimate	rating 1-5						
12	Traffic conflicts (driveways, car park roads)	count	number						
13	Obstructions (e.g. posts, trees, benches)	count	number						
14	Overall walking comfort 1-worst, 5-best	estimate	rating 1-5						

for level road crossings only (zebra, unmarked or signalised)

15	Average waiting time (at zebra/unmarked x-ing)	measure	sec						
16	Signal cycle time (for signal crossing only)	measure	sec						
17	Signal green time (steady+blinking green man)	measure	sec						

* use equivalent steps for short slopes

Remarks _____

MRT ACCESSIBILITY SURVEY – Route Assessment Form B

Route from Block No. _____

Continued

Item	Data description	Method	Unit						
1	Segment Number								
2	Segment Type (use codes below)								

Normal: **WW**-walkway, **SW**-sidewalk, **SH**-shortcut,Crossing: **SX**-signalised, **ZX**-zebra, **UX**-unmarked, **BR**-bridge; **TU**-tunnel, **ES**-escalator

for all segment types

Stride:

3	Segment length (distance)	measure	steps						
			metres						
4	Slope - towards MRT (+ uphill, - downhill)	measure	% or step*						
5	Steps up - towards MRT	count	number						
6	Steps down - towards MRT	count	number						
7	Weather protection (rain shelter)	estimate	% length						
8	Barriers for wheelchairs, pushchairs, etc.	visual	Yes/No						

for walkway/sidewalk/shortcut/bridge/tunnel only

9	Surface quality 1-worst, 5-best	estimate	rating 1-5						
10	Continuity 1-worst, 5-best	estimate	rating 1-5						
11	Congestion 1-worst, 5-no congestion	estimate	rating 1-5						
12	Traffic conflicts (driveways, car park roads)	count	number						
13	Obstructions (e.g. posts, trees, benches)	count	number						
14	Overall walking comfort 1-worst, 5-best	estimate	rating 1-5						

for level road crossings only (zebra, unmarked or signalised)

15	Average waiting time (at zebra/unmarked x-ing)	measure	sec						
16	Signal cycle time (for signal crossing only)	measure	sec						
17	Signal green time (steady+blinking green man)	measure	sec						

* use equivalent steps for short slopes

Remarks _____

MRT ACCESSIBILITY SURVEY – Route Assessment Explanation Sheet

Item	Data element	Unit	Method of measurement/ description
1	Segment Number	number	the MRT station
2	Segment Type		WW -walkway = a footpath not along any street, SW -sidewalk = footpath along a street, SH -shortcut = path through a car

for all segment types

3	Segment length (distance)	steps/ metre	measure steps using pedometer, multiply by stride to get metres
4	Slope - towards MRT (+ uphill, - downhill)	%	long slopes = measure using spirit level and ruler short slopes = estimate the equivalent number of up steps
5	Steps up - towards MRT	number	count the ascending steps (in the direction of MRT station)
6	Steps down - towards MRT	number	count the descending steps (in the direction of MRT station)
7	Weather protection (rain shelter)	% length	covered walkway or path under a building (void deck)
8	Barriers for wheelchairs, pushchairs, etc.	Yes/No	curb is lowered, then there is no barrier.

for walkway/sidewalk/
shortcut/bridge/tunnel only

Estimate the rating according to the description below

			1	2	3	4	5
9	Surface quality 1-worst, 5-best	rating	unsealed, very poor quality	many cracks/ bumps (poor quality)	some cracks or bumps (moderate quality)	few cracks or bumps (reasonable quality)	no cracks or bumps (excellent quality)
10	Continuity 1-worst, 5-best	rating	fragmented, dis-continuous path	←		→	continuous path
11	Congestion 1-worst, 5-no congestion	rating	very crowded	crowded	some congestion	few people around	practically no people
12	Traffic conflicts	number	count the driveways, car park roadways that cross the segment path				
13	Obstructions	number	movement, e.g. lamp posts, mail boxes, trees, benches, etc.				
14	Overall walking comfort 1-worst, 5-best	rating	narrow, congested, uneven	←		→	wide, even, not congested

for ground level road crossings only

15	Average waiting time (at zebra/unmarked x-ing)	sec	using stopwatch measure how long you need to wait before crossing - take the average of 3 measurements
16	Signal cycle time (for signal crossing only)	sec	start of 'green man' - take the average of 3 measurements
17	Signal green time (steady + blinking green)	sec	using stopwatch measure the 'green man' time (start of 'green man' to start of 'red man') - take the average of 3 measurements

APPENDIX B

Study Areas

HGG – Hougang

KOV - Kovan

APPENDIX C

Data Summary and Coefficient Estimation for WAM

Segment index:

① denoting to walking route form home to MRT station

② denoting to walking route from home to the nearest bus stop (or LRT station)

③ denoting to walking route from bus stop (or LRT exit) to MRT entrance point

Detail Summary

Item	Average	Standard Deviation	Maximum	Minimum	Count	Unit
General Data						
ADIST	853.7	418.5	3650	120	646	m
PURP	3.2	1.7	9	0	600	-
ACCT	12.8	7.6	45	1	646	min
FREQ	5.2	2.2	20	0	560	-
MODE	3.7	2.5	7	1	646	-
AGE	27.2	10.0	70	12	496	years
AGEGP	2.2	1.0	6	1	646	-
STATUS	1.5	0.8	6	1	559	-
INCOME	2.9	1.5	6	0	550	\$
SEX	1.5	0.5	2	1	646	-
Segment 1						
WDIST1	1140.1	552.2	2954	198	646	m
ASTEP1	20.2	21.2	115	0	646	-
DSTEP1	10.7	15.3	90	0	612	-
WPRO	35.4	22.8	100	0	529	%
WBARR	46.4	26.8	100	0	518	%
SURQ	4.0	0.4	5.1	2.7	529	-
CONT	4.0	0.6	5.1	2.1	529	-
CONG	3.6	0.6	5	2	518	-
TCONF1	3.3	2.5	13	0	646	-
OBST1	8.8	8.0	35	0	535	-
WCOMF	3.7	0.4	5	2.1	518	-
WDELAY1	37.1	37.2	198	0	646	second
RXING1	2.5	1.7	11	0	646	-

Item	Average	Standard Deviation	Maximum	Minimum	Count	Unit
Segment 2						
TWAIT	4.0	1.2	7	1.5	646	min
VTIME	5.8	3.4	21.3	0.9	646	min
WDIST2	187.1	113.8	752	15	646	m
ASTEP2	1.7	7.8	52	0	646	-
DSTEP2	1.7	8.3	53	0	518	-
WPRO2	50.2	22.2	100	0	534	%
TCONF2	0.8	1.0	11	0	518	-
OBST2	0.8	1.0	4	0	518	-
RXING2	0.3	0.5	1	0	646	-
WDELAY2	3.7	5.8	40	0	646	second
Segment 3						
WDIST3	145.7	110.5	377	15	646	m
ASTEP3	3.9	4.1	36	0	518	-
DSTEP3	2.8	4.7	36	0	518	-
WPRO3	99.2	4.2	100	75	534	%
TCONF3	0.0	0.0	0	0	518	-
OBST3	0.6	0.7	2	0	518	-
RXING3	0.2	0.4	1	0	646	-
WDELAY3	3.9	8.0	20.8	0	646	second
DDIST	807.2	530.9	2616	0	646	m

Data Structure

I. General Data

RNO	Respondent's number
LOC	Location
BLKNO	Block Number
PCODE	Postal Code
ADDRESS	Address
ADIST	Airline distance (m)
PURP	Trip Purpose
ACCT	Access Time (min), reported time to reach MRT station
FREQ	Trip frequency in the last week
MODE	Mode choice to access MRT station
AGE	Respondent's age
STATUS	Respondent's status 1: Employed/NS 2: Student 3: Housewife 4: Unemployed 5: Retired 6: Other
INCOME	Respondent's combined income per month 1: < \$2000 2: \$2001-3000 3: \$3001-4000 4: \$4001-5000 5: \$5001-6001 6: > \$6000
SEX	Respondent's gender (1: male; 2: female)

II. Walking Characteristics

WDIST1	Walking distance from home to MRT station (m)
ASTEP1	Total number of ascending steps to reach MRT station
DSTEP1	Total number of descending steps to reach MRT station
WPRO	Weather protection (% of total length of walking distance)
WBARR	Barriers for wheelchairs (% of total length of walking distance)
SURQ	Surface quality (quality rating for total length)
CONT	Continuity (quality rating for total length)
CONG	Congestion in walkways (quality rating for total length)
TCNF1	Total number of traffic conflicts along the walking route
OBST1	Total number of obstructions along the walking route
WCOMF	Walking comfort (qualitative rating for walking comfort along the route)
WDELAY1	Walking delay due to road crossing along the route from home to MRT station (second)
RXING1	Number of road crossing along walking route to access MRT station

III. Non-walking Characteristics

BUSNO	Bus number
NWTYPE	Type of non walking mode (feeder mode) FBUS: feeder bus TBUS: trunk bus LRT: light rapid transit OTHER: car, taxi, bicycle
TWAIT	Waiting time, 0.5*average bus headway (min)
VTIME	In-vehicle time (moving time, stopping time at bus stop, and delay due to traffic condition) (min)
WDIST2	Walking distance from home to bus stop or LRT station (m)
ASTEP2	Total number of ascending steps to reach bus stop or LRT station
DSTEP2	Total number of descending steps to reach bus stop or LRT station
TCNF2	Number of traffic conflicts to reach bus stop or LRT station
OBST2	Total number of obstructions along the way to reach bus stop or LRT station
RXING2	Number of road crossing along walking route to reach bus stop or LRT station
WDELAY2	Walking delay due to road crossing for reaching bus stop or LRT station (min)
WDIST3	Walking distance from bus stop to MRT station (m)
ASTEP3	Total number of ascending steps from bus stop to MRT station
DSTEP3	Total number of descending steps from bus stop to MRT station
TCNF3	Number of traffic conflicts from bus stop to MRT station
OBST3	Total number of obstructions along the way from bus stop to MRT station
RXING3	Number of road crossing along walking route to reach MRT gate from bus stop
WDELAY3	Walking delay due to road crossing from bus stop to MRT station (min)

Sample Data

General Data

RNO	LOC	BLKNO	PCODE	ADDRESS	ADIST	PURP	ACCT	FREQ	MODE	AGE	AGEGP	STATUS	INCOME	SEX
746	BDK	62	469983	Bayshore Park	1590	7	15	1	6	19	1	2	4	2
643	BDK	19	478935	Aquarius by The Park	1610	3	10	4	6	35	3	1	5	1
644	BDK	706	470706	Bedok North Road	1840	6	15	1	6	18	1	2	3	1
611	BDK	622	470622	Bedok Reservoir Road	1850	3	20	2	6	44	4	1	2	2
638	BDK	1600	469700	Canossian Sec, Bedok North Ave 4	1610	1	15	0	6	32	3	1	1	2
645	BDK	702	470702	Bedok Reservoir Road	1930	8	25	7	6	25	2	1	5	1
686	BDK	707	470707	Bedok North Road	1760	3	20	5	6	26	2	1	1	2
740	BDK	88	460088	Bedok North Road	1420	2	30	7	6	17	1	2	0	2
743	BDK	24	469971	The Bayshore	1580	3	20	5	6	53	5	1	6	2
766	BDK	24	469971	The Bayshore	1590	2	28	1	6	n.a.	1	2	n.a.	2
623	BDK	22	469970	The Bayshore	1570	6	10	2	6	22	2	6	0	2
640	BDK	774	470774	Bedok Reservoir View	1570	8	15	2	6	16	1	2	3	2
694	BDK	769	470769	Bedok Reservoir View	1560	4	15	6	6	25	2	2	1	1
782	BDK	769	470769	Bedok Reservoir View	1560	3	33	1	6	n.a.	1	n.a.	n.a.	2
125	CLE	1	276893	Mount Sinai, Blk 1	1650	5	10	1	6	38	3	1	6	1
677	BDK	87	460087	Bedok North Road	1320	6	2	7	6	52	5	3	2	2
630	BDK	90	460090	Bedok North St 4	1450	3	10	2	6	40	3	1	2	2
66	CLE	716	120716	Clementi West St 2	1450	3	15	6	6	50	4	1	4	1
168	CLE	716	120716	Clementi West St 2	1450	n.a.	28	n.a.	6	n.a.	2	n.a.	n.a.	2
663	BDK	98	460098	Bedok North Ave 4	1560	3	13	6	6	55	5	1	3	1
636	BDK	5000C	449286	4 Siglap Link (Laguna Park)	1710	8	15	0	6	20	1	2	1	1
670	BDK	158	460158	Bedok South Ave 3	1750	5	10	4	6	30	2	1	2	1
769	BDK	142	520142	Simei St 2	3650	n.a.	33	n.a.	6	n.a.	3	n.a.	n.a.	2
659	BDK	107	460107	Bedok North Road	1140	2	7	5	1	17	1	2	2	1
683	BDK	107	460107	Bedok North Road	1140	5	5	2	6	32	3	6	5	1
429	CKK	59	658517	PAVILION CIRCLE	1650	2	10	4	6	15	1	2	5	2
647	BDK	104	460104	Bedok North Ave 4	1250	3	10	6	6	29	2	1	4	1
1818	TAM	497A	520497	Tampines St 45	1630	2	33	n.a.	6	n.a.	2	n.a.	n.a.	2
1934	TAM	497A	520497	Tampines St 45	1630	1	33	5	6	n.a.	2	1	4	2
80	CLE	724	120724	Clementi West St 2	1290	4	13	5	6	37	3	1	6	2
111	CLE	724	120724	Clementi West St 2	1290	6	15	6	6	15	1	2	3	2
745	BDK	106	460106	Bedok North Ave 4	1390	5	15	1	6	25	2	1	1	2
1879	TAM	888	520888	Tampines St 81	1580	1	33	5	6	n.a.	2	1	4	2
1893	TAM	888	520888	Tampines St 81	1580	1	33	5	6	n.a.	4	1	3	2
626	BDK	101	460101	Bedok North Ave 4	1440	7	5	5	6	14	1	2	2	1
775	BDK	708	470708	Bedok North Rd	1720	n.a.	35	n.a.	6	n.a.	5	n.a.	n.a.	2
680	BDK	715	470715	Bedok Reservoir Road	1680	3	15	6	6	25	2	1	4	1
1811	TAM	881	520881	Tampines St 84	1380	2	28	n.a.	6	n.a.	3	n.a.	n.a.	2
1904	TAM	881	520881	Tampines St 84	1380	1	28	5	6	n.a.	3	1	3	2
1917	TAM	881	520881	Tampines St 84	1380	2	28	5	6	n.a.	1	2	3	2
1929	TAM	881	520881	Tampines St 84	1380	1	28	5	6	n.a.	3	1	3	2
1825	TAM	884	520884	Tampines St 83	1390	2	27	n.a.	6	n.a.	2	n.a.	n.a.	1

Sample Data Walking to access MRT station

RNO	LOC	BLKNO	PCODE	WDIST1	ASTEP1	DSTEP1	WPRO1	WBARR	SURQ	CONT	CONG	TCONF1	OBST1	WCOMF	WDELAY1	RXING1
746	BDK	62	469983	2954	5	0	11.3	20.6	3.9	4.9	3.9	8	5	3.9	100.8	3
643	BDK	19	478935	2702	39	29	41.0	44.9	4.1	3.6	3.5	7	35	3.7	48.4	2
644	BDK	706	470706	2568	50	45	12.3	40.8	4.8	4.6	3.9	3	9	4.6	198.0	3
611	BDK	622	470622	2599	95	90	12.1	41.5	4.8	4.6	3.9	2	8	4.6	198.0	4
638	BDK	1600	469700	2511	35	38	63.5	59.1	4.1	3.9	3.6	5	25	3.7	67.9	3
645	BDK	702	470702	2548	50	45	12.4	40.3	4.8	4.6	3.9	3	9	4.6	198.0	3
686	BDK	707	470707	2570	50	45	12.3	40.8	4.8	4.6	3.9	3	9	4.6	198.0	5
740	BDK	88	460088	2221	35	38	70.2	66.1	4.1	3.8	3.6	4	24	3.6	52.9	2
743	BDK	24	469971	2693	5	0	7.3	16.6	3.9	4.8	3.8	8	5	3.8	100.8	3
766	BDK	24	469971	2693	5	0	7.3	16.6	3.9	4.8	3.8	8	5	3.8	100.8	3
623	BDK	22	469970	2663	5	0	6.4	15.7	3.9	4.8	3.8	8	5	3.8	100.8	3
640	BDK	774	470774	2678	39	29	46.1	45.3	4.1	3.6	3.5	7	35	3.7	48.4	2
694	BDK	769	470769	2782	39	29	45.9	43.6	4.1	3.6	3.5	7	35	3.7	48.4	2
782	BDK	769	470769	2782	39	29	45.9	43.6	4.1	3.6	3.5	7	35	3.7	48.4	2
125	CLE	1	276893	2783	37	0	18.3	72.8	3.8	3.7	3.8	5	3	3	30.2	1
677	BDK	87	460087	2142	35	38	69.9	68.3	4.1	3.8	3.6	3	23	3.6	52.9	2
630	BDK	90	460090	2259	35	38	70.1	65.1	4.1	3.7	3.6	5	25	3.6	67.9	3
66	CLE	716	120716	2125	55	36	18.5	7.3	4	4.5	4.4	3	3	3.5	84.2	4
168	CLE	716	120716	2125	55	36	18.5	7.3	4	4.5	4.4	3	3	3.5	84.2	4
663	BDK	98	460098	2344	35	38	69.4	62.9	4.1	3.8	3.6	4	25	3.7	67.9	3
636	BDK	5000C	449286	2379	17	0	9.4	42.8	3.8	4.8	3.8	13	5	3.8	67.2	2
670	BDK	158	460158	2459	13	0	5.8	15.7	3.6	4.3	3.2	8	7	3.6	126.0	3
769	BDK	142	520142	2080	45	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	3.9	11
659	BDK	107	460107	2028	39	36	58.0	71.1	4.1	3.5	3.3	4	31	3.6	48.4	2
683	BDK	107	460107	2028	39	36	58.0	71.1	4.1	3.5	3.3	4	31	3.6	48.4	2
429	CKK	59	658517	2129	19	2	6.3	15.9	4.3	4.4	4	2	6	3.9	103.0	7
647	BDK	104	460104	2108	39	36	57.3	72.2	4.1	3.5	3.3	5	31	3.6	48.4	2
1818	TAM	497A	520497	2220	6	0	n.a.	n.a.	n.a.	n.a.	n.a.	5	n.a.	n.a.	5.0	8
1934	TAM	497A	520497	2220	6	0	n.a.	n.a.	n.a.	n.a.	n.a.	5	n.a.	n.a.	5.0	8
80	CLE	724	120724	2013	55	36	21.3	13.4	4	4.6	4.4	1	4	3.6	109.5	3
111	CLE	724	120724	2013	55	36	21.3	13.4	4	4.6	4.4	1	4	3.6	109.5	3
745	BDK	106	460106	2244	39	36	56.2	73.8	4.1	3.6	3.4	6	32	3.6	48.4	2
1879	TAM	888	520888	2210	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.2	4
1893	TAM	888	520888	2210	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.2	4
626	BDK	101	460101	2306	39	36	55.8	74.5	4.1	3.6	3.4	6	32	3.6	48.4	2
775	BDK	708	470708	2184	61	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	3.2	5
680	BDK	715	470715	2082	61	74	33.8	42.3	4.1	4	4	7	24	3.8	18.3	2
1811	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1904	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1917	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1929	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1825	TAM	884	520884	2150	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	6	n.a.	n.a.	3.2	4

Sample Data

Feeder mode to Access MRT station

RNO	LOC	BLKNO	PCODE	BUSNO	NWTYPE	TWAIT	VTIME	WDIST2	ASTEP2	DSTEP2	WPRO2	TCONF2	OBST2	RXING2	WDELAY2	WDIST3	ASTEP3	DSTEP3	WPRO3	TCONF3	OBST3	RXING3	WDELAY3
746	BDK	62	469883	31	TBUS	3.3	8.0	323	0	0	30	2	3	1	10	15	5	0	100	0	0	0	0.0
643	BDK	19	478935	168	TBUS	6.3	9.0	135	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
644	BDK	706	470706	60	TBUS	3.3	9.1	80	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
611	BDK	622	470622	228	TBUS	3.8	21.3	155	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
638	BDK	1600	469700	17	TBUS	4.0	11.0	90	0	0	30	0	0	1	10	201	4	8	100	0	0	0	0.0
645	BDK	702	470702	228	TBUS	3.8	14.6	145	0	0	40	0	0	1	10	201	4	8	100	0	0	0	0.0
686	BDK	707	470707	60	TBUS	3.3	9.1	175	0	0	60	1	0	0	0	201	4	8	100	0	0	0	0.0
740	BDK	88	460088	222	TBUS	5.0	8.4	30	0	0	100	0	0	0	0	20	4	0	100	0	0	0	0.0
743	BDK	24	469971	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	0	0.0
766	BDK	24	469971	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	1	10.0
623	BDK	22	469970	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	0	0.0
640	BDK	774	470774	28	TBUS	5.0	7.7	375	0	0	30	1	2	0	0	201	4	8	100	0	0	0	0.0
694	BDK	769	470769	67	TBUS	3.3	7.7	485	0	0	20	1	2	0	0	201	4	8	100	0	0	0	0.0
782	BDK	769	470769	67	TBUS	3.3	7.7	485	0	0	20	1	2	0	0	201	4	8	100	0	0	1	10.0
125	CLE	1	276893	7	TBUS	5.5	7.9	665	0	0	5	3	1	0	0	65	0	0	100	0	2	0	0.0
677	BDK	87	460087	222	TBUS	5.0	8.4	88	0	0	60	0	1	0	0	20	4	0	100	0	0	0	0.0
630	BDK	90	460090	222	TBUS	5.0	6.8	210	0	0	40	2	1	0	0	20	4	0	100	0	0	0	0.0
66	CLE	716	120716	282	TBUS	5.8	12.2	65	0	0	50	0	1	1	10	65	0	0	100	0	2	0	0.0
168	CLE	716	120716	282	TBUS	5.8	12.2	65	0	0	50	0	1	1	10	65	0	0	100	0	2	0.0	1.2
663	BDK	98	460098	17	TBUS	4.0	9.8	169	0	0	40	0	1	1	10	201	4	8	100	0	0	0	0.0
636	BDK	5000C	449286	196	TBUS	5.0	16.2	248	0	0	30	0	0	1	10	201	4	8	100	0	0	0	0.0
670	BDK	158	460158	229	TBUS	5.3	18.4	353	0	0	30	3	4	0	0	201	4	8	100	0	0	0	0.0
769	BDK	142	520142	9	TBUS	4	18.5	182	0	n.a.	n.a.	n.a.	n.a.	1	10	36	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
659	BDK	107	460107	222	TBUS	5.0	9.9	148	0	0	60	1	0	0	0	20	4	0	100	0	0	0	0.0
683	BDK	107	460107	222	TBUS	5.0	9.9	148	0	0	60	1	0	0	0	20	4	0	100	0	0	0	0.0
429	CCK	59	658517	188	TBUS	5.5	8.9	220	0	0	30	2	3	1	10	75	6	0	100	0	0	0	0.0
647	BDK	104	460104	222	TBUS	5.0	9.9	260	0	0	40	1	2	0	0	20	4	0	100	0	0	0	0.0
1818	TAM	497A	520497	293	TBUS	2.8	15.8	51	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1934	TAM	497A	520497	293	TBUS	4.0	8.0	51	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
80	CLE	724	120724	282;189	TBUS	5.8	10.0	143	0	0	60	1	3	0	0	65	0	0	100	0	2	0	0.0
111	CLE	724	120724	282	TBUS	5.8	10.0	143	0	0	60	1	3	0	0	65	0	0	100	0	2	0	0.0
745	BDK	106	460106	222	TBUS	5.0	9.9	436	0	0	30	2	3	0	0	20	4	0	100	0	0	0	0.0
1879	TAM	888	520888	293	TBUS	4.0	10.0	82	0	n.a.	n.a.	n.a.	n.a.	1	10	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1893	TAM	888	520888	293	TBUS	4.0	12.0	82	0	n.a.	n.a.	n.a.	n.a.	1	10	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
626	BDK	101	460101	222	TBUS	5.0	9.9	507	0	0	20	2	3	0	0	20	4	0	100	0	0	0	0.0
775	BDK	708	470708	60;87	TBUS	4.3	7.1	217	0	n.a.	40	n.a.	n.a.	0	0	240	n.a.	n.a.	100	n.a.	n.a.	0	0
680	BDK	715	470715	228	TBUS	3.8	13.1	160	0	0	40	1	0	1	10	201	4	8	100	0	0	0	0.0
1811	TAM	881	520881	291	TBUS	2.3	7.8	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1904	TAM	881	520881	291	TBUS	4.0	10.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1917	TAM	881	520881	291	TBUS	4.0	8.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1929	TAM	881	520881	291	TBUS	4.0	10.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1825	TAM	884	520884	291	TBUS	2.3	7.8	114	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0

Format Data Input (646 observations):

OBS	MODE	DDIST	NWTIME	DRXING	DASTEP	DTCONF	SEX	AGEGP	LRT	TBUS
1	1	387	-5.3	1	4	-1	0	1	0	0
2	0	1335	-14.8	2	70	6	1	1	0	0
3	1	332	-5.3	1	4	0	0	1	0	0
4	1	87	-11.9	1	-22	1	0	1	0	1
5	0	1452	-10.0	3	55	0	0	0	0	0
6	1	384	-8.2	0	9	4	0	0	0	0
7	1	684	-11.9	1	73	1	1	1	0	1
8	1	25	-9.9	0	4	1	0	1	0	0
9	1	405	-5.7	1	4	-1	0	1	0	0
10	1	34	-9.9	0	0	-2	1	1	0	0
11	0	1343	-15.7	2	115	1	0	1	0	1
12	0	978	-11.5	0	7	3	0	1	0	1
13	1	34	-9.9	0	0	-2	0	1	0	0
14	1	243	-9.9	0	4	1	1	1	0	0
15	1	1092	-5.5	3	4	2	1	1	0	1
16	1	410	-11.9	1	-8	1	1	1	0	1
17	0	1190	-10.0	1	73	3	0	1	0	0
18	1	243	-9.9	0	4	1	1	0	0	0
19	0	1184	-11.5	1	-20	6	1	1	0	1
20	0	551	-6.9	1	4	0	0	0	0	1
21	1	340	-9.0	1	4	0	1	1	0	0
22	0	862	-11.5	1	-23	4	0	1	0	1
23	1	242	-11.9	1	-8	0	0	1	0	1
24	1	115	-9.9	0	4	1	0	1	0	0
25	0	1006	-11.3	1	73	3	1	1	0	0
26	1	552	-11.9	1	70	1	1	1	0	1
27	1	425	-7.1	1	4	0	1	1	0	0
28	1	1092	-5.5	3	4	2	0	0	0	1
29	0	1195	-10.0	1	73	3	0	1	0	0
30	1	564	-7.1	1	4	0	1	1	0	0
31	1	684	-11.9	1	73	1	1	0	0	1
32	1	393	-11.9	1	-8	1	1	1	0	1
33	1	199	-11.9	1	-8	0	1	0	0	1
34	1	879	-9.3	1	4	2	1	1	0	1
35	1	433	-5.7	1	4	-1	1	1	0	0
36	1	506	-8.2	0	39	0	0	0	0	1
37	1	6	-5.2	0	4	0	1	1	0	0
38	1	407	-9.0	1	4	0	1	1	0	0
39	0	1411	-19.0	3	55	3	0	0	0	0
40	0	1103	-5.5	3	4	1	0	0	0	1
41	1	666	-8.2	0	9	4	0	1	0	0
42	1	491	-8.2	0	39	0	0	1	0	1
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
640	0	530	-10.0	0	44	4	0	0	0	0
641	0	1473	-10.0	3	49	8	1	1	0	1
642	0	1704	-14.0	4	44	7	0	1	0	0
643	0	1669	-14.0	7	6	3	0	0	0	1
644	0	1381	-14.0	2	44	8	0	1	0	0
645	0	953	-11.0	1	6	1	1	1	0	1
646	0	1827	-12.0	8	6	5	0	1	0	0

LOGIT;Lhs=MODE;Rhs=ONE,DDIST,VTIME,DRXING,DASTEP,DTCONF,SEX,AGE,LRT,TBUS\$
Normal exit from iterations. Exit status=0.

Multinomial Logit Model		
Maximum Likelihood Estimates		
Dependent variable		MODE
Weighting variable		ONE
Number of observations		646
Iterations completed		7
Log likelihood function	-191.6807	
Restricted log likelihood	-445.9882	
Chi-squared	508.6150	
Degrees of freedom	9	
Significance level	.0000000	

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.226830697	.60412986	6.997	.0000	
DDIST	-.5171659304E-02	.51444400E-03	-10.053	.0000	807.21207
NWTIME	-.1671365082E-01	.50591648E-01	-.330	.7411	-9.7631579
DRXING	-.2578183455	.90154738E-01	-2.860	.0042	1.9055728
DASTEP	-.1404351852E-01	.63339456E-02	-2.217	.0266	15.461300
DTCONF	-.1881376246	.63041881E-01	-2.984	.0028	2.6408669
SEX	1.025622454	.27564448	3.721	.0002	.46439628
AGE	.2698651786	.30447606	.886	.3754	.71207430
LRT	-3.452640214	1.1312766	-3.052	.0023	.47987616E-01
TBUS	-.3697768510	.27512717	-1.344	.1789	.40247678

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646 N0= 347 N1= 299		
LogL = -191.68067 LogL0 = -445.9882		
Efron	McFadden	Ben./Lerman
.64265	.57021	.81900
Cramer	Veall/Zim.	Rsqr ML
.63598	.75954	.54494
Information Akaike I.C. Schwartz I.C.		
Criteria	.62440	448.06933

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			
Actual	0	1	Total
0	309	38	347
1	41	258	299
Total	350	296	646

```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,AGE,LRT,TBUS$
Normal exit from iterations. Exit status=0.
```

```
+-----+
| Multinomial Logit Model
| Maximum Likelihood Estimates
| Dependent variable          MODE
| Weighting variable          ONE
| Number of observations      646
| Iterations completed        7
| Log likelihood function     -191.7355
| Restricted log likelihood    -445.9882
| Chi-squared                 508.5052
| Degrees of freedom          8
| Significance level           .0000000
+-----+
```

```
+-----+-----+-----+-----+-----+
|Variable | Coefficient | Standard Error | b/St.Er. | P[|Z|>z] | Mean of X|
+-----+-----+-----+-----+-----+
|          |             |               |          |          |          |
| Characteristics in numerator of Prob[Y = 1]
| Constant  4.352117837   .47391556      9.183   .0000
| DDIST     -.5125875204E-02 .49407620E-03 -10.375 .0000  807.21207
| DRXING    -.2592423006 .89901032E-01 -2.884  .0039  1.9055728
| DASTEP    -.1360579459E-01 .61759180E-02 -2.203  .0276  15.461300
| DTCONF    -.1856923442 .62717068E-01 -2.961  .0031  2.6408669
| SEX       1.034960745   .27444182      3.771  .0002  .46439628
| AGE       .2576138757   .30211051      .853   .3938  .71207430
| LRT       -3.537010538   1.1018287     -3.210  .0013  .47987616E-01
| TBUS      -.3827817735   .27241503     -1.405  .1600  .40247678
```

```
+-----+
| Fit Measures for Binomial Choice Model
| Logit model for variable MODE
+-----+
| Proportions P0= .537152   P1= .462848
| N =      646 N0=      347   N1=      299
| LogL =  -191.73555 LogL0 =  -445.9882
+-----+
|      Efron   | McFadden   | Ben./Lerman
|      .64210   | .57009     | .81887
| Cramer   | Veall/Zim. | Rsqrd_ML
|      .63572   | .75944     | .54486
+-----+
| Information   | Akaike I.C. | Schwartz I.C.
| Criteria      | .62147       | 441.70829
+-----+
```

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

```

              Predicted
-----
Actual      0      1      | Total
-----
0           309    38      | 347
1           39    260      | 299
-----
Total       348    298      | 646
```

```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,LRT,TBUS$
Normal exit from iterations. Exit status=0.
```

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-192.0993
Restricted log likelihood	-445.9882
Chi-squared	507.7777
Degrees of freedom	7
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.531581133	.42924682	10.557	.0000	
DDIST	-.5149490713E-02	.49339757E-03	-10.437	.0000	807.21207
DRXING	-.2606602438	.89879209E-01	-2.900	.0037	1.9055728
DASTEP	-.1323319415E-01	.61471117E-02	-2.153	.0313	15.461300
DTCONF	-.1787604960	.61824459E-01	-2.891	.0038	2.6408669
SEX	1.074559443	.27076431	3.969	.0001	.46439628
LRT	-3.585009519	1.0983472	-3.264	.0011	.47987616E-01
TBUS	-.4127562944	.27005630	-1.528	.1264	.40247678

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646 N0= 347 N1= 299		
LogL = -192.09933 LogL0 = -445.9882		
Efron	McFadden	Ben./Lerman
.63949	.56927	.81806
Cramer	Veall/Zim.	Rsqr ML
.63409	.75884	.54435
Information Akaike I.C. Schwartz I.C.		
Criteria	.61950	435.96505

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

		Predicted		
		0	1	Total
Actual	0	309	38	347
	1	45	254	299
Total		354	292	646

```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,LRT$
Normal exit from iterations. Exit status=0.
```

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-193.2829
Restricted log likelihood	-445.9882
Chi-squared	505.4105
Degrees of freedom	6
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.171198053	.37912174	11.002	.0000	
DDIST	-.4881672415E-02	.47678023E-03	-10.239	.0000	807.21207
RXING	-.2704396932	.89024296E-01	-3.038	.0024	1.9055728
ASTEP	-.1373234763E-01	.60882096E-02	-2.256	.0241	15.461300
TCONF	-.1772467431	.61045237E-01	-2.904	.0037	2.6408669
SEX	1.066280486	.26680883	3.996	.0001	.46439628
LRT	-3.314598739	1.0869219	-3.050	.0023	.47987616E-01

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646	N0= 347	N1= 299
LogL = -193.28289 LogL0 = -445.9882		
Efron	McFadden	Ben./Lerman
.63459	.56662	.81613
Cramer	Veall/Zim.	Rsqr ML
.63021	.75685	.54268
Information Akaike I.C. Schwartz I.C.		
Criteria	.62007	431.86137

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			
Actual	0	1	Total
0	305	42	347
1	40	259	299
Total	345	301	646


```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDPRO,DDNRPO$
Normal exit from iterations. Exit status=0.
```

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	517
Iterations completed	7
Log likelihood function	-171.7519
Restricted log likelihood	-358.3329
Chi-squared	373.1620
Degrees of freedom	2
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.514401480	.39639668	11.389	.0000	
DDPRO	-.3965728175E-02	.54172239E-03	-7.321	.0000	174.57311
DDNRPO	-.6540555386E-02	.57038482E-03	-11.467	.0000	617.19749

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .495164 P1= .504836		
N = 517 N0= 256 N1= 261		
LogL = -171.75191 LogL0 = -358.3329		
Efron		
.59713		
McFadden		
.52069		
Ben./Lerman		
.79616		
Cramer		
Veall/Zim.		
Rsqr ML		
.51412		
Information Akaike I.C. Schwartz I.C.		
Criteria		
.67602 362.24794		

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			

Actual	0	1	Total

0	219	37	256
1	34	227	261

Total	253	264	517

Data Structure

I. General Data

RNO	Respondent's number
LOC	Location
BLKNO	Block Number
PCODE	Postal Code
ADDRESS	Address
ADIST	Airline distance (m)
PURP	Trip Purpose
ACCT	Access Time (min), reported time to reach MRT station
FREQ	Trip frequency in the last week
MODE	Mode choice to access MRT station
AGE	Respondent's age
STATUS	Respondent's status 1: Employed/NS 2: Student 3: Housewife 4: Unemployed 5: Retired 6: Other
INCOME	Respondent's combined income per month 1: < \$2000 2: \$2001-3000 3: \$3001-4000 4: \$4001-5000 5: \$5001-6001 6: > \$6000
SEX	Respondent's gender (1: male; 2: female)

II. Walking Characteristics

WDIST1	Walking distance from home to MRT station (m)
ASTEP1	Total number of ascending steps to reach MRT station
DSTEP1	Total number of descending steps to reach MRT station
WPRO	Weather protection (% of total length of walking distance)
WBARR	Barriers for wheelchairs (% of total length of walking distance)
SURQ	Surface quality (quality rating for total length)
CONT	Continuity (quality rating for total length)
CONG	Congestion in walkways (quality rating for total length)
TCNF1	Total number of traffic conflicts along the walking route
OBST1	Total number of obstructions along the walking route
WCOMF	Walking comfort (qualitative rating for walking comfort along the route)
WDELAY1	Walking delay due to road crossing along the route from home to MRT station (second)
RXING1	Number of road crossing along walking route to access MRT station

III. Non-walking Characteristics

BUSNO	Bus number
NWTYPE	Type of non walking mode (feeder mode) FBUS: feeder bus TBUS: trunk bus LRT: light rapid transit OTHER: car, taxi, bicycle
TWAIT	Waiting time, 0.5*average bus headway (min)
VTIME	In-vehicle time (moving time, stopping time at bus stop, and delay due to traffic condition) (min)
WDIST2	Walking distance from home to bus stop or LRT station (m)
ASTEP2	Total number of ascending steps to reach bus stop or LRT station
DSTEP2	Total number of descending steps to reach bus stop or LRT station
TCNF2	Number of traffic conflicts to reach bus stop or LRT station
OBST2	Total number of obstructions along the way to reach bus stop or LRT station
RXING2	Number of road crossing along walking route to reach bus stop or LRT station
WDELAY2	Walking delay due to road crossing for reaching bus stop or LRT station (min)
WDIST3	Walking distance from bus stop to MRT station (m)
ASTEP3	Total number of ascending steps from bus stop to MRT station
DSTEP3	Total number of descending steps from bus stop to MRT station
TCNF3	Number of traffic conflicts from bus stop to MRT station
OBST3	Total number of obstructions along the way from bus stop to MRT station
RXING3	Number of road crossing along walking route to reach MRT gate from bus stop
WDELAY3	Walking delay due to road crossing from bus stop to MRT station (min)

Sample Data

RNO	LOC	BLKNO	PCODE	ADDRESS	ADIST	PURP	ACCT	FREQ	MODE	AGE	AGEGP	STATUS	INCOME	SEX
746	BDK	62	46983	Bayshore Park	1590	7	15	1	6	19	1	2	4	2
643	BDK	19	478935	Aquarius by The Park	1610	3	10	4	6	35	3	1	5	1
644	BDK	706	470706	Bedok North Road	1840	6	15	1	6	18	1	2	3	1
611	BDK	622	470622	Bedok Reservoir Road	1850	3	20	2	6	44	4	1	2	2
638	BDK	1600	469700	Canossian Sec, Bedok North Ave 4	1610	1	15	0	6	32	3	1	1	2
645	BDK	702	470702	Bedok Reservoir Road	1930	8	25	7	6	25	2	1	5	1
686	BDK	707	470707	Bedok North Road	1760	3	20	5	6	26	2	1	1	2
740	BDK	88	460088	Bedok North Road	1420	2	30	7	6	17	1	2	0	2
743	BDK	24	469971	The Bayshore	1580	3	20	5	6	53	5	1	6	2
766	BDK	24	469971	The Bayshore	1590	2	28	1	6	n.a.	1	2	n.a.	2
623	BDK	22	469970	The Bayshore	1570	6	10	2	6	22	2	6	0	2
640	BDK	774	470774	Bedok Reservoir View	1570	8	15	2	6	16	1	2	3	2
694	BDK	769	470769	Bedok Reservoir View	1560	4	15	6	6	25	2	2	1	1
782	BDK	769	470769	Bedok Reservoir View	1560	3	33	1	6	n.a.	1	n.a.	n.a.	2
125	CLE	1	276893	Mount Sinai, Blk 1	1650	5	10	1	6	38	3	1	6	1
677	BDK	87	460087	Bedok North Road	1320	6	2	7	6	52	5	3	2	2
630	BDK	90	460090	Bedok North St 4	1450	3	10	2	6	40	3	1	2	2
66	CLE	716	120716	Clementi West St 2	1450	3	15	6	6	50	4	1	4	1
168	CLE	716	120716	Clementi West St 2	1450	n.a.	28	n.a.	6	n.a.	2	n.a.	n.a.	2
663	BDK	98	460098	Bedok North Ave 4	1560	3	13	6	6	55	5	1	3	1
636	BDK	5000C	449286	4 Siglap Link (Laguna Park)	1710	8	15	0	6	20	1	2	1	1
670	BDK	158	460158	Bedok South Ave 3	1750	5	10	4	6	30	2	1	2	1
769	BDK	142	520142	Simei St 2	3650	n.a.	33	n.a.	6	n.a.	3	n.a.	n.a.	2
659	BDK	107	460107	Bedok North Road	1140	2	7	5	1	17	1	2	2	1
683	BDK	107	460107	Bedok North Road	1140	5	5	2	6	32	3	6	5	1
429	CKK	59	658517	PAVILION CIRCLE	1650	2	10	4	6	15	1	2	5	2
647	BDK	104	460104	Bedok North Ave 4	1250	3	10	6	6	29	2	1	4	1
1818	TAM	497A	520497	Tampines St 45	1630	2	33	n.a.	6	n.a.	2	n.a.	n.a.	2
1934	TAM	497A	520497	Tampines St 45	1630	1	33	5	6	n.a.	2	1	4	2
80	CLE	724	120724	Clementi West St 2	1290	4	13	5	6	37	3	1	6	2
111	CLE	724	120724	Clementi West St 2	1290	6	15	6	6	15	1	2	3	2
745	BDK	106	460106	Bedok North Ave 4	1390	5	15	1	6	25	2	1	1	2
1879	TAM	888	520888	Tampines St 81	1580	1	33	5	6	n.a.	2	1	4	2
1893	TAM	888	520888	Tampines St 81	1580	1	33	5	6	n.a.	4	1	3	2
626	BDK	101	460101	Bedok North Ave 4	1440	7	5	5	6	14	1	2	2	1
775	BDK	708	470708	Bedok North Rd	1720	n.a.	35	n.a.	6	n.a.	5	n.a.	n.a.	2
680	BDK	715	470715	Bedok Reservoir Road	1680	3	15	6	6	25	2	1	4	1
1811	TAM	881	520881	Tampines St 84	1380	2	28	n.a.	6	n.a.	3	n.a.	n.a.	2
1904	TAM	881	520881	Tampines St 84	1380	1	28	5	6	n.a.	3	1	3	2
1917	TAM	881	520881	Tampines St 84	1380	2	28	5	6	n.a.	1	2	3	2
1929	TAM	881	520881	Tampines St 84	1380	1	28	5	6	n.a.	3	1	3	2
1825	TAM	884	520884	Tampines St 83	1390	2	27	n.a.	6	n.a.	2	n.a.	n.a.	1

Sample Data Walking to access MRT station

RNO	LOC	BLKNO	PCODE	WDIST1	ASTEP1	DSTEP1	WPRO1	WBARR	SURQ	CONT	CONG	TCONF1	OBST1	WCOMF	WDELAY1	RXING1
746	BDK	62	469883	2954	5	0	11.3	20.6	3.9	4.9	3.9	8	5	3.9	100.8	3
643	BDK	19	478935	2702	39	29	41.0	44.9	4.1	3.6	3.5	7	35	3.7	48.4	2
644	BDK	706	470706	2568	50	45	12.3	40.8	4.8	4.6	3.9	3	9	4.6	198.0	3
611	BDK	622	470622	2599	95	90	12.1	41.5	4.8	4.6	3.9	2	8	4.6	198.0	4
638	BDK	1600	469700	2511	35	38	63.5	59.1	4.1	3.9	3.6	5	25	3.7	67.9	3
645	BDK	702	470702	2548	50	45	12.4	40.3	4.8	4.6	3.9	3	9	4.6	198.0	3
686	BDK	707	470707	2570	50	45	12.3	40.8	4.8	4.6	3.9	3	9	4.6	198.0	5
740	BDK	88	460088	2221	35	38	70.2	66.1	4.1	3.8	3.6	4	24	3.6	52.9	2
743	BDK	24	469971	2693	5	0	7.3	16.6	3.9	4.8	3.8	8	5	3.8	100.8	3
766	BDK	24	469971	2693	5	0	7.3	16.6	3.9	4.8	3.8	8	5	3.8	100.8	3
623	BDK	22	469970	2663	5	0	6.4	15.7	3.9	4.8	3.8	8	5	3.8	100.8	3
640	BDK	774	470774	2678	39	29	46.1	45.3	4.1	3.6	3.5	7	35	3.7	48.4	2
694	BDK	769	470769	2782	39	29	45.9	43.6	4.1	3.6	3.5	7	35	3.7	48.4	2
782	BDK	769	470769	2782	39	29	45.9	43.6	4.1	3.6	3.5	7	35	3.7	48.4	2
125	CLE	1	276893	2783	37	0	18.3	72.8	3.8	3.7	3.8	5	3	3	30.2	1
677	BDK	87	460087	2142	35	38	69.9	68.3	4.1	3.8	3.6	3	23	3.6	52.9	2
630	BDK	90	460090	2259	35	38	70.1	65.1	4.1	3.7	3.6	5	25	3.6	67.9	3
66	CLE	716	120716	2125	55	36	18.5	7.3	4	4.5	4.4	3	3	3.5	84.2	4
168	CLE	716	120716	2125	55	36	18.5	7.3	4	4.5	4.4	3	3	3.5	84.2	4
663	BDK	98	460098	2344	35	38	69.4	62.9	4.1	3.8	3.6	4	25	3.7	67.9	3
636	BDK	5000C	449286	2379	17	0	9.4	42.8	3.8	4.8	3.8	13	5	3.8	67.2	2
670	BDK	158	460158	2459	13	0	5.8	15.7	3.6	4.3	3.2	8	7	3.6	126.0	3
769	BDK	142	520142	2080	45	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	3.9	11
659	BDK	107	460107	2028	39	36	58.0	71.1	4.1	3.5	3.3	4	31	3.6	48.4	2
683	BDK	107	460107	2028	39	36	58.0	71.1	4.1	3.5	3.3	4	31	3.6	48.4	2
429	CKK	59	658517	2129	19	2	6.3	15.9	4.3	4.4	4	2	6	3.9	103.0	7
647	BDK	104	460104	2108	39	36	57.3	72.2	4.1	3.5	3.3	5	31	3.6	48.4	2
1818	TAM	497A	520497	2220	6	0	n.a.	n.a.	n.a.	n.a.	n.a.	5	n.a.	n.a.	5.0	8
1934	TAM	497A	520497	2220	6	0	n.a.	n.a.	n.a.	n.a.	n.a.	5	n.a.	n.a.	5.0	8
80	CLE	724	120724	2013	55	36	21.3	13.4	4	4.6	4.4	1	4	3.6	109.5	3
111	CLE	724	120724	2013	55	36	21.3	13.4	4	4.6	4.4	1	4	3.6	109.5	3
745	BDK	106	460106	2244	39	36	56.2	73.8	4.1	3.6	3.4	6	32	3.6	48.4	2
1879	TAM	888	520888	2210	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.2	4
1893	TAM	888	520888	2210	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.2	4
626	BDK	101	460101	2306	39	36	55.8	74.5	4.1	3.6	3.4	6	32	3.6	48.4	2
775	BDK	708	470708	2184	61	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10	n.a.	n.a.	3.2	5
680	BDK	715	470715	2082	61	74	33.8	42.3	4.1	4	4	7	24	3.8	18.3	2
1811	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1904	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1917	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1929	TAM	881	520881	2230	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	7	n.a.	n.a.	3.3	4
1825	TAM	884	520884	2150	44	0	n.a.	n.a.	n.a.	n.a.	n.a.	6	n.a.	n.a.	3.2	4

Sample Data Feeder mode to Access MRT station

RNO	LOC	BLKNO	PCODE	BUSNO	NWTYPE	TWAIT	VTIME	WDIST2	ASTER2	DSTEP2	WPRO2	TCONF2	OBST2	RXING2	WDELAY2	WDIST3	ASTER3	DSTEP3	WPRO3	TCONF3	OBST3	RXING3	WDELAY3
746	BDK	62	469883	31	TBUS	3.3	8.0	323	0	0	30	2	3	1	10	15	5	0	100	0	0	0	0.0
643	BDK	19	478935	168	TBUS	6.3	9.0	135	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
644	BDK	706	470706	80	TBUS	3.3	9.1	80	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
611	BDK	622	470622	228	FBUS	3.8	21.3	155	0	0	60	0	0	0	0	201	4	8	100	0	0	0	0.0
638	BDK	1600	469700	17	TBUS	4.0	11.0	90	0	0	30	0	0	1	10	201	4	8	100	0	0	0	0.0
645	BDK	702	470702	228	FBUS	3.8	14.6	145	0	0	40	0	0	1	10	201	4	8	100	0	0	0	0.0
686	BDK	707	470707	60	TBUS	3.3	9.1	175	0	0	60	1	0	0	0	201	4	8	100	0	0	0	0.0
740	BDK	88	460088	222	FBUS	5.0	8.4	30	0	0	100	0	0	0	0	20	4	0	100	0	0	0	0.0
743	BDK	24	469971	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	0	0.0
766	BDK	24	469971	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	1	10.0
623	BDK	22	469970	31	TBUS	3.3	8.0	544	0	0	10	2	3	1	10	15	5	0	100	0	0	0	0.0
640	BDK	774	470774	28	TBUS	5.0	7.7	375	0	0	30	1	2	0	0	201	4	8	100	0	0	0	0.0
694	BDK	769	470769	67	TBUS	3.3	7.7	485	0	0	20	1	2	0	0	201	4	8	100	0	0	0	0.0
782	BDK	769	470769	67	TBUS	3.3	7.7	485	0	0	20	1	2	0	0	201	4	8	100	0	0	1	10.0
125	CLE	1	276893	7	TBUS	5.5	7.9	665	0	0	5	3	1	0	0	65	0	0	100	0	2	0	0.0
677	BDK	87	460087	222	FBUS	5.0	8.4	88	0	0	60	0	1	0	0	20	4	0	100	0	0	0	0.0
630	BDK	90	460090	222	FBUS	5.0	6.8	210	0	0	40	2	1	0	0	20	4	0	100	0	0	0	0.0
66	CLE	716	120716	282	FBUS	5.8	12.2	65	0	0	50	0	1	1	10	65	0	0	100	0	2	0	0.0
168	CLE	716	120716	282	FBUS	5.8	12.2	65	0	0	50	0	1	1	10	65	0	0	100	0	2	0.0	1.2
663	BDK	98	460098	17	TBUS	4.0	9.8	189	0	0	40	0	1	1	10	201	4	8	100	0	0	0	0.0
636	BDK	5000C	449286	196	TBUS	5.0	16.2	248	0	0	30	0	0	1	10	201	4	8	100	0	0	0	0.0
670	BDK	158	460158	229	FBUS	5.3	18.4	353	0	0	30	3	4	0	0	201	4	8	100	0	0	0	0.0
769	BDK	142	520142	9	TBUS	4	18.5	182	0	n.a.	n.a.	n.a.	n.a.	1	10	36	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
659	BDK	107	460107	222	FBUS	5.0	9.9	148	0	0	60	1	0	0	0	20	4	0	100	0	0	0	0.0
683	BDK	107	460107	222	FBUS	5.0	9.9	148	0	0	60	1	0	0	0	20	4	0	100	0	0	0	0.0
429	CKK	59	658517	188	TBUS	5.5	8.9	220	0	0	30	2	3	1	10	75	6	0	100	0	0	0	0.0
647	BDK	104	460104	222	FBUS	5.0	9.9	260	0	0	40	1	2	0	0	20	4	0	100	0	0	0	0.0
1818	TAM	497A	520497	293	FBUS	2.8	15.8	51	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1934	TAM	497A	520497	293	FBUS	4.0	8.0	51	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
80	CLE	724	120724	282,189	FBUS	5.8	10.0	143	0	0	60	1	3	0	0	65	0	0	100	0	2	0	0.0
111	CLE	724	120724	282	FBUS	5.8	10.0	143	0	0	60	1	3	0	0	65	0	0	100	0	2	0	0.0
745	BDK	106	460106	222	FBUS	5.0	9.9	436	0	0	30	2	3	0	0	20	4	0	100	0	0	0	0.0
1879	TAM	888	520888	293	FBUS	4.0	10.0	82	0	n.a.	n.a.	n.a.	n.a.	1	10	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1893	TAM	888	520888	293	FBUS	4.0	12.0	82	0	n.a.	n.a.	n.a.	n.a.	1	10	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
626	BDK	101	460101	222	FBUS	5.0	9.9	507	0	0	20	2	3	0	0	20	4	0	100	0	0	0	0.0
775	BDK	708	470708	60,87	TBUS	4.3	7.1	217	0	n.a.	40	n.a.	n.a.	0	0	240	n.a.	n.a.	100	n.a.	n.a.	0	0
680	BDK	715	470715	228	FBUS	3.8	13.1	160	0	0	40	1	0	1	10	201	4	8	100	0	0	0	0.0
1811	TAM	881	520881	291	FBUS	2.3	7.8	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1904	TAM	881	520881	291	FBUS	4.0	10.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1917	TAM	881	520881	291	FBUS	4.0	8.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1929	TAM	881	520881	291	FBUS	4.0	10.0	184	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0
1925	TAM	884	520884	291	FBUS	2.3	7.8	114	0	n.a.	n.a.	n.a.	n.a.	0	0	342	n.a.	n.a.	n.a.	n.a.	n.a.	0	0

Format Data Input (646 observations):

OBS	MODE	DDIST	NWTIME	DRXING	DASTEP	DTCONF	SEX	AGEGP	LRT	TBUS
1	1	387	-5.3	1	4	-1	0	1	0	0
2	0	1335	-14.8	2	70	6	1	1	0	0
3	1	332	-5.3	1	4	0	0	1	0	0
4	1	87	-11.9	1	-22	1	0	1	0	1
5	0	1452	-10.0	3	55	0	0	0	0	0
6	1	384	-8.2	0	9	4	0	0	0	0
7	1	684	-11.9	1	73	1	1	1	0	1
8	1	25	-9.9	0	4	1	0	1	0	0
9	1	405	-5.7	1	4	-1	0	1	0	0
10	1	34	-9.9	0	0	-2	1	1	0	0
11	0	1343	-15.7	2	115	1	0	1	0	1
12	0	978	-11.5	0	7	3	0	1	0	1
13	1	34	-9.9	0	0	-2	0	1	0	0
14	1	243	-9.9	0	4	1	1	1	0	0
15	1	1092	-5.5	3	4	2	1	1	0	1
16	1	410	-11.9	1	-8	1	1	1	0	1
17	0	1190	-10.0	1	73	3	0	1	0	0
18	1	243	-9.9	0	4	1	1	0	0	0
19	0	1184	-11.5	1	-20	6	1	1	0	1
20	0	551	-6.9	1	4	0	0	0	0	1
21	1	340	-9.0	1	4	0	1	1	0	0
22	0	862	-11.5	1	-23	4	0	1	0	1
23	1	242	-11.9	1	-8	0	0	1	0	1
24	1	115	-9.9	0	4	1	0	1	0	0
25	0	1006	-11.3	1	73	3	1	1	0	0
26	1	552	-11.9	1	70	1	1	1	0	1
27	1	425	-7.1	1	4	0	1	1	0	0
28	1	1092	-5.5	3	4	2	0	0	0	1
29	0	1195	-10.0	1	73	3	0	1	0	0
30	1	564	-7.1	1	4	0	1	1	0	0
31	1	684	-11.9	1	73	1	1	0	0	1
32	1	393	-11.9	1	-8	1	1	1	0	1
33	1	199	-11.9	1	-8	0	1	0	0	1
34	1	879	-9.3	1	4	2	1	1	0	1
35	1	433	-5.7	1	4	-1	1	1	0	0
36	1	506	-8.2	0	39	0	0	0	0	1
37	1	6	-5.2	0	4	0	1	1	0	0
38	1	407	-9.0	1	4	0	1	1	0	0
39	0	1411	-19.0	3	55	3	0	0	0	0
40	0	1103	-5.5	3	4	1	0	0	0	1
41	1	666	-8.2	0	9	4	0	1	0	0
42	1	491	-8.2	0	39	0	0	1	0	1
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.
640	0	530	-10.0	0	44	4	0	0	0	0
641	0	1473	-10.0	3	49	8	1	1	0	1
642	0	1704	-14.0	4	44	7	0	1	0	0
643	0	1669	-14.0	7	6	3	0	0	0	1
644	0	1381	-14.0	2	44	8	0	1	0	0
645	0	953	-11.0	1	6	1	1	1	0	1
646	0	1827	-12.0	8	6	5	0	1	0	0

LOGIT;Lhs=MODE;Rhs=ONE,DDIST,VTIME,DRXING,DASTEP,DTCONF,SEX,AGE,LRT,TBUS\$
Normal exit from iterations. Exit status=0.

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-191.6807
Restricted log likelihood	-445.9882
Chi-squared	508.6150
Degrees of freedom	9
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.226830697	.60412986	6.997	.0000	
DDIST	-.5171659304E-02	.51444400E-03	-10.053	.0000	807.21207
NWTIME	-.1671365082E-01	.50591648E-01	-.330	.7411	-9.7631579
DRXING	-.2578183455	.90154738E-01	-2.860	.0042	1.9055728
DASTEP	-.1404351852E-01	.63339456E-02	-2.217	.0266	15.461300
DTCONF	-.1881376246	.63041881E-01	-2.984	.0028	2.6408669
SEX	1.025622454	.27564448	3.721	.0002	.46439628
AGE	.2698651786	.30447606	.886	.3754	.71207430
LRT	-3.452640214	1.1312766	-3.052	.0023	.47987616E-01
TBUS	-.3697768510	.27512717	-1.344	.1789	.40247678

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646 N0= 347 N1= 299		
LogL = -191.68067 LogL0 = -445.9882		
Efron	McFadden	Ben./Lerman
.64265	.57021	.81900
Cramer	Veall/Zim.	Rsqr ML
.63598	.75954	.54494
Information Akaike I.C. Schwartz I.C.		
Criteria .62440 448.06933		

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			
Actual	0	1	Total
0	309	38	347
1	41	258	299
Total	350	296	646

--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,AGE,LRT,TBUS\$
Normal exit from iterations. Exit status=0.

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-191.7355
Restricted log likelihood	-445.9882
Chi-squared	508.5052
Degrees of freedom	8
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.352117837	.47391556	9.183	.0000	
DDIST	-.5125875204E-02	.49407620E-03	-10.375	.0000	807.21207
DRXING	-.2592423006	.89901032E-01	-2.884	.0039	1.9055728
DASTEP	-.1360579459E-01	.61759180E-02	-2.203	.0276	15.461300
DTCONF	-.1856923442	.62717068E-01	-2.961	.0031	2.6408669
SEX	1.034960745	.27444182	3.771	.0002	.46439628
AGE	.2576138757	.30211051	.853	.3938	.71207430
LRT	-3.537010538	1.1018287	-3.210	.0013	.47987616E-01
TBUS	-.3827817735	.27241503	-1.405	.1600	.40247678

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646 N0= 347 N1= 299		
LogL = -191.73555 LogL0 = -445.9882		
Efron McFadden Ben./Lerman		
.64210 .57009 .81887		
Cramer Veall/Zim. Rsqrd_ML		
.63572 .75944 .54486		
Information Akaike I.C. Schwartz I.C.		
Criteria .62147 441.70829		

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			
Actual	0	1	Total
0	309	38	347
1	39	260	299
Total	348	298	646

```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,LRT,TBUS$
Normal exit from iterations. Exit status=0.
```

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-192.0993
Restricted log likelihood	-445.9882
Chi-squared	507.7777
Degrees of freedom	7
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.531581133	.42924682	10.557	.0000	
DDIST	-.5149490713E-02	.49339757E-03	-10.437	.0000	807.21207
DRXING	-.2606602438	.89879209E-01	-2.900	.0037	1.9055728
DASTEP	-.1323319415E-01	.61471117E-02	-2.153	.0313	15.461300
DTCONF	-.1787604960	.61824459E-01	-2.891	.0038	2.6408669
SEX	1.074559443	.27076431	3.969	.0001	.46439628
LRT	-3.585009519	1.0983472	-3.264	.0011	.47987616E-01
TBUS	-.4127562944	.27005630	-1.528	.1264	.40247678

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646	N0= 347	N1= 299
LogL = -192.09933 LogL0 = -445.9882		
Efron	McFadden	Ben./Lerman
.63949	.56927	.81806
Cramer	Veall/Zim.	Rsqr ML
.63409	.75884	.54435
Information Akaike I.C. Schwartz I.C.		
Criteria	.61950	435.96505

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

		Predicted		
		0	1	Total
Actual	0	309	38	347
	1	45	254	299
Total		354	292	646

--> LOGIT;Lhs=MODE;Rhs=ONE,DDIST,DRXING,DASTEP,DTCONF,SEX,LRT\$
Normal exit from iterations. Exit status=0.

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	646
Iterations completed	7
Log likelihood function	-193.2829
Restricted log likelihood	-445.9882
Chi-squared	505.4105
Degrees of freedom	6
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.171198053	.37912174	11.002	.0000	
DDIST	-.4881672415E-02	.47678023E-03	-10.239	.0000	807.21207
RXING	-.2704396932	.89024296E-01	-3.038	.0024	1.9055728
ASTEP	-.1373234763E-01	.60882096E-02	-2.256	.0241	15.461300
TCONF	-.1772467431	.61045237E-01	-2.904	.0037	2.6408669
SEX	1.066280486	.26680883	3.996	.0001	.46439628
LRT	-3.314598739	1.0869219	-3.050	.0023	.47987616E-01

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .537152 P1= .462848		
N = 646 N0= 347 N1= 299		
LogL = -193.28289 LogL0 = -445.9882		
Efron McFadden Ben./Lerman		
.63459 .56662 .81613		
Cramer Veall/Zim. Rsqrd_ML		
.63021 .75685 .54268		
Information Akaike I.C. Schwartz I.C.		
Criteria .62007 431.86137		

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

	Predicted		
Actual	0	1	Total
0	305	42	347
1	40	259	299
Total	345	301	646


```
--> LOGIT;Lhs=MODE;Rhs=ONE,DDPRO,DDNRPO$
Normal exit from iterations. Exit status=0.
```

Multinomial Logit Model	
Maximum Likelihood Estimates	
Dependent variable	MODE
Weighting variable	ONE
Number of observations	517
Iterations completed	7
Log likelihood function	-171.7519
Restricted log likelihood	-358.3329
Chi-squared	373.1620
Degrees of freedom	2
Significance level	.0000000

Variable	Coefficient	Standard Error	b/St.Er.	P[Z >z]	Mean of X
Characteristics in numerator of Prob[Y = 1]					
Constant	4.514401480	.39639668	11.389	.0000	
DDPRO	-.3965728175E-02	.54172239E-03	-7.321	.0000	174.57311
DDNRPO	-.6540555386E-02	.57038482E-03	-11.467	.0000	617.19749

Fit Measures for Binomial Choice Model		
Logit model for variable MODE		
Proportions P0= .495164 P1= .504836		
N = 517	N0= 256	N1= 261
LogL = -171.75191 LogL0 = -358.3329		
Efron	McFadden	Ben./Lerman
.59713	.52069	.79616
Cramer	Veall/Zim.	Rsqr ML
.59228	.72162	.51412
Information Akaike I.C. Schwartz I.C.		
Criteria	.67602	362.24794

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

Predicted			
Actual	0	1	Total
0	219	37	256
1	34	227	261
Total	253	264	517