Biking In Pittsburgh

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Section I: Introduction

Bike riding is one of the few activities in life that has cross generational/racial/social/cultural appeal and is, in many places, on the rise. Driven in part by the world-wide push toward renewable energy sources; environmental consciousness; and higher energy prices; the appeal of biking as a source of transportation has seldom been greater in the age of the automobile ("Bicycle Statistical Data: Usage, Productions and Sales", n.p.). For this **"n.d."** and other health and recreation reasons, more and more people, nationally, are turning to bicycling. In that Pittsburgh is a model for rust- belt city re-gentrification and regularly shows up on lists of good places to live, it stands to reason that safe, easy biking would rank highly on citizen's priority lists. Our project surveys a cross- population of Pittsburgh residents to discover current bicycling patterns and the challenges encountered when bicycling within our city. It is envisioned that the results of this survey could help city planners make Pittsburgh a more bike friendly (Bluejay, n.p.) place to live and work.

Our survey hypotheses are:

- Winter is the season that causes people the most issues regarding their current biking habits and is their reason for not using a bike to commute.

- The vast majority of people will use their bikes for pleasure/exercise as opposed to commuting ("Bicycle Statistical Data", n.p.). This is based on the assumption that our survey will be somewhat biased towards older residents vs. college students. This assumption is based on the fact that our sample consists of only those homes with phone

landlines and we believe that college students (who use cell phones) are the segment of the population that most uses bikes to commute to work/school.

In summary, the data we collected supported our hypothesis that winter is the season when people are most deterred from riding their bikes. However, our hypothesis that people rode their bikes primarily for pleasure was not supported; as only one of our respondents answered that they ride their bike mainly for pleasure. Of our 13 respondents, 4 used their bike to commute either sometimes or most of the time.

Section II: Methods

A phone survey was chosen as the vehicle for this study.   We identified the target population as residents of Pittsburgh aged18 and over who ride bicycles, however since no such list exists, we used an imperfect sample frame of all Pittsburgh residents over the age of 18 that have a home phone number with the area code 412.   In order to get that sample frame, we made use of the white pages web site that has ("(412) Area Code | WhitePages", n.p.) a list all the prefixes associated with the area code 412. From this list we then filtered out all areas that lay outside of the Pittsburgh city limits but still had a 412 area code. Once we had this list in an excel sheet, we generated a random number 1-157 (the number of prefixes/columns of interest) followed by another random four digit number. The first number identified which prefix to use in the spreadsheet by row, and the four digit number provided the last four digits to dial. This process was repeated 600 times in order to give us a total of 600 numbers to call. We choose to originally generate 600 random numbers because assuming a response rate of 20% (on the low end for most published telephone surveys) and a target number of respondents at 96, this would leave us some room for numbers that didn't exist.

We chose not to include the other areas associated with the 412 area code in that we felt other variables (particularly longer commuting distances) would likely cloud and complicate the answers to the questions. Due to this fact and the limited amount of time, manpower and funds we had at our disposal, we felt it would be best not to clutter the data any more than was absolutely necessary if we wanted to conduct a successful survey from which relevant conclusions could be drawn. We calculated the sample size necessary to attain a 10 percent margin of error, given the worst possible potential response rate and Pittsburgh's population as 334,563 as 96 individuals("Pittsburgh Links & Facts", n.p.). This was calculated using the formula or simple random sampling without replacement.

If we want a 10 percent margin of error
Assume p = .5 (worst case scenario)
SD = .5

n>1.96)(1.96)*(.5)(.5)/(.1)(.1)

n>96.04

For SRS w/o replacement:

n>Nn/(n+N)

n>334563*96.04/334659.04

n>96.01

For a 5 percent margin of error:
n would have to be more than 384.16 using the same calculations.

We would have preferred to get a margin of error of 5%, however we would have had to sample over 300 individuals which simply could not be done due to time constraints. We called each individual back twice if they didn't answer the first time.

As we just mentioned, there was variation in how our survey was carried out, even between the members. Looking to the questionnaires in figures 1.2-1.5 you can see that Ben used a shortened version of the questionnaire that we had agreed to use and that had been approved. In addition, Nelson used another way of generating random numbers to contact individuals after he determined that our original method was too burdensome and yielded too few respondents. He used the Verizon local white pages and in order to pseudo randomly select residential phone numbers among these listings, a random number generator was used to generate a random page number. The number was arbitrarily selected among those on the selected page, and subsequently dialed. This system appeared to generally be an improvement, though it is admittedly still hard to call it successful as the response rate was still rather low. (It was much higher than the original method as the probability of hitting an ineligible number was lessened, especially if one called after normal business hours when home businesses would not likely be operating).

The two different methods served up extraordinarily different results:

Original Method:

364 numbers were called between the three of us, only 178 of these numbers actually worked and 25 were businesses opposed to residencies. We only got 3 actual respondents, giving us a $3/178 = 1.7\%$ response rate. There were 54 refusals, most of them refusing because they didn't ride a bicycle (Figure 1.7 and 1.8). Nelson got a much higher number of refusals using our technique for whatever reason, perhaps because his phone has a 412 area code so people would at least answer his call (Figure 1.9a).

Nelson's Method:

Nelson managed to get a response rate of 10/99 or 10.1 percent using his method. There were zero businesses, and only 2 non working numbers as well as 43 refusals; this can probably in part be attributed to a higher response rate (Figure 1.9b).

Sample questions from our questionnaire are listed below (not including any demographic questions, see figure 1.1 and 1.2 for the full questionnaire and introductory speech):

Do you ride a bicycle?

Is it a new or used/rebuilt bicycle?

How much did your bike cost?

Is your bike your main mode of transportation?

If not, what is your primary mode of transportation?

We decided not to perform any post stratification for several reasons. The first reason is we only had 13 respondents, thus ensuring a non-representative sample regardless of how we choose to weight answers. Secondly, few of our questions were really appropriate for weighting, and even if we could weight them, the only demographic variables we ended up getting information on were gender, neighborhood and age. We had 7/13 who were over the age of 35 (53.8% compared to 50.7% in Pittsburgh) and 7/13 females (53.8% compared to 52.4 in Pittsburgh) which are close enough to the averages of the city that even if we had enough information and a large enough sample to justify post stratification, would likely be unnecessary ("Pittsburgh Links & Facts", n.p.).

A notable discrepancy between the three of us was our questionnaires. Despite having an approved and previously agreed upon questionnaire, we all used a somewhat modified version. ✓ Ben's was the shortest, Nelsons was next and finally, Andrew's incorporated most of the original questions but left out the question on how well-maintained Pittsburgh roads were seen to be (See figures 1.2-1.5).

Section III: Results

Our survey originally aimed to answer two questions; why do people ride their bikes in Pittsburgh, and how does the weather/change of seasons affect riding? In analyzing our data we found some interesting facts.

1. Our sample was very skewed toward those who owned bicycles (12/13 owned bikes, see figure 1.6). This is most likely a direct result of the language used to introduce the survey on each phone call. We introduced our survey as a survey on bicycles and all those who didn't own bikes who answered our calls let us know that they didn't own a bike and hung up and is definitely not representative of the public at large (Bluejay, n.p.).

good point

2. The average cost of a bicycle for our respondents was 612.50 and only 3 of our respondents owned second-hand bikes (figure 1.6).

likely related to the selection effect in #1 here

3. Where people lived within the city didn't really seem to make a difference in whether or not they responded, however we did get 2 respondents from Brookshire, although both came from using Nelson's method so perhaps that played a role somehow (Figure 1.3).

Brookline (?)

4. Regarding unit non-response, we had one individual refuse to give us their age, while 2 others only offered a rough estimate of their age. (Figure 1.3).

5. Additionally every person declined to reveal their income to us. However, judging from the ages, fraction that owned a car, and the costs of the bicycles of those surveyed, we can surmise that the majority of respondents were fairly well off, and most likely in the middle class or upper middle class.

An indicator that we may not have received a representative sample, even of bikers in general was that 4/13 respondents used their bike for to commute, while other surveys have found the number to be as low as 5 percent (General Bicycling Statistics, n.p.). Other than these observations, very little unexpected and useful information was identified through our survey. Several of the open-ended questions weren't asked, and the ones that were didn't seem to indicate anything that one would find unexpected (i.e. 12/13 said winter placed the greatest restrictions on their riding from figure 1.6).

Section IV: Discussion

Considering our dismal overall response rate of 4.3 percent and our total number of respondents, 13, we are unable to produce supportable conclusions that can be generalized to the entire population of Pittsburgh. Regarding how well our survey answered the questions we set out to ask, we suggest that we were largely unsuccessful, due primarily to the enormous discrepancy between the number of respondents we sought to survey and the number we actually managed to get to participate.

However, surprisingly, the information gleaned from non-respondents told much more than did the answers from those who participated. A large number of the people that refused to participate in our survey didn't participate simply because they didn't ride a bike, and

presumably decided that their time was far too valuable to waste on doing a survey on bicycles. This led us to determine that our initial key assumption, that people were indeed very interested in riding bikes and would support the goal of improving the overall appeal of Pittsburgh as a "bike friendly city" may be flawed, or perhaps Americans, even in a city like Pittsburgh aren't as enthusiastic about biking as their European counterparts ("Bicycle Statistical Data: Usage, Productions and Sales", n.p.). At the very least, our sample frame did not correspond to those who find themselves interested in using biking as a primary source of transportation.

In retrospect, this finding makes some sense considering the sampling tool we chose. We actually had predicted that many individuals who would respond positively to this survey would be college students who are notoriously hard to reach through traditional telephone surveys. We could have used the white pages prefixes for all the cell phones in Pittsburgh, however as many people have a limited number of minutes that they can use their phone per month, it was advised we not use them.

The lessons that we took away from this project are to start early as you can never underestimate the sheer amount of time it will take to log in even 12 full interviews.. We also learned that the method for developing your call list is very important. If you think, going in, that you may be missing an important demographic, chances are high that you will end up with a failed survey. Again, in retrospect, our method of generating random numbers to call was very inefficient. In the end it would have been much more effective and efficient to use the white pages of Pittsburgh's telephone book and then deal with the fact that you will occasionally contact people living outside the Pittsburgh city limits

.   We also believe that using our own cell phones for the survey denied us much of the

yes

necessary credibility to convince people that we were really just interested in doing a survey on biking and were not telemarketers or scam artists. If we were to advise future students, we would suggest they be sure that their survey doesn't rely on getting any form of sensitive data from the respondents, and to make sure all calls are generated from CMU phones. This way, when you say you are from CMU, people will believe you (caller ID). Also, if you're going to do a survey on something very specific (i.e. bike ownership/riding) make sure that you frame the survey as one on something that all people can relate to. Had we introduced our survey as a survey on transportation in general in Pittsburgh, we likely would have gotten broader participation and a more representative sample with respect to ownership of bikes. Finally, it is important to pick a topic that has a very broad base of appeal to ensure that you can actually attract people to your survey.

Works Cited

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Appendices:

Figure 1.1

Informed Consent Statement

Hi, my name is ____, I'm a student at Carnegie Mellon University.
I'm calling as part of a research project for my stats class. The project focuses on the impact of Pittsburgh weather on bike ridership in the city.   You were selected randomly from a list of Pittsburgh prefixes, and then by random digit dialling.

Your participation in this survey is completely voluntary, feel free to skip any questions that you don't want to answer, and feel free to stop me at any time.   The survey consists of 29 short questions, it shouldn't take any longer than seven minutes.

As far as privacy goes, we will be keeping your information separate from the published data, so you cannot be linked to your answers.

If you have any questions or concerns about this survey, you can contact our professor Brian Junker at brian@stat.cmu.edu

How does that sound? Do you agree to participate?

Figure 1.1 lays out our informed consent statement that was read to all those who participated in our survey.

Figure 1.2

Finalized Questionnaire
How old are you?

What is your gender?

Do you live within the Pittsburgh city limits?

What area/neighborhood do you live in?

Do you ride a bicycle?

Is it a new or used/rebuilt bicycle?

How much did your bike cost?

Is your bike your main mode of transportation?

If not, what is your primary mode of transportation?

Do you commute on your bike?

If not, why not? And how?

Which season, if any, places the greatest restrictions on your bicycle riding?

 Why?

Do you feel the city of Pittsburgh could do anything to facilitate bike riding in the city?

On a scale of 1 to 7, how well kept would you say the roads/sidewalks

are in Pittsburgh?

Thanks for your participation, it is much appreciated.

Figure 1.2 lists our questionnaire as well as the averages for non open-ended questions that were used by all members of the group. Some questions omitted from some members questionnaires.

Figure 1.3

Age	Gender	Within Cit	Area/Neig	Ride Bicyc	New or Us	Cost of Bil	Main Mod	If not, wh;	Commute
44	F	1	Squirrel H	0	N/A	N/A	0	Auto	No
39	M	1	Beechwoc	1	U	450	0	Auto	No
"Middle Ag	F	1	Hill Distric	1	U (Craigsli	350	0	Pub Trans	No
25	M	0	Squirrel H	1	N	1100	0	Auto	No
27	F	1	Bloomfiel	1	N	Unknown	1		Sometime
19	M	1	Upper Sai	1	N	Unknown	0	Auto	No
40	F	1	Brookline	1	N	700	0	Auto	Yes
"In 40's"	F	1	Polish Hill	1	N	Unknown	0	Auto	No
34	M	1	Brookline	1	N	900	0	Walking/	No
DECLINE	F	1	Highland	1	N	600	1		Yes
35	F	1	Hazelwoo	1	N	Unknown	1		Sometime

If not, wh	Which sea	Income?	Bus Pass?	How well kept are Pittsburgh Roads and Sidewalks?			
Don't Own	Winter	.	1	4			
Weather,	Winter	.	0	6			
Distance,	Winter	.	1	5			
Storage/T	Winter	.	0	6			
	Winter	.	0	3			
Distance,	Winter	.	0	2			
	Winter	.	0	4			
Distance	Fall, Winte	.	1	5			
Storage/T	Winter	.	0	1			

Figure 1.3 is Nelson's responses to the questionnaires (would've just used one graphic but it wouldn't fit)

Figure 1.4

Age?	Gender?	Do you Liv	What Neig	Do You Rid	New/Used	How much	Is Biking Y	If not, Wh
72	male	yes	oakland	no	new	300	no	bus

Do you co	If not, wh	what seas	What sect	Do you ma	Do you fin	Do you ha	What kind:	Do you ride any of the	
no	Rides for	raining sn	retired	Neither, t	Most of th	Bus pass	Any sort o	yes, ones along the r	

Figure 1.4 is the responses from Andrew's respondent (since the questionnaires we used differed, putting them in one table was not viable, clearer version of this is attached as an excel sheet)

Figure 1.5
What is your gender?
M
Do you live within the Pittsburgh city limits?
Yes

What area/neighborhood do you live in?
East liberty

Do you ride a bicycle?
Yes (riding one right now: not a landline!)
Is it a new or used/rebuilt bicycle?
used
How much did your bike cost?
500
Is your bike your main mode of transportation?
no
If not, what is your primary mode of transportation?
I guess the bus
Do you commute on your bike?
Sometimes, depends how im feeling

Which season, if any, places the greatest restrictions on your bicycle riding?
 winter
Why?
Its too cold, it makes me pissed off.
Do you feel the city of Pittsburgh could do anything to facilitate bicycle **patronage (or riding??)**

in the city?

No, theyre doing just fine man

Figure 1.5 are Ben's one respondent, again different questionnaire.

Figure 1.6

Finalized Questionnaire and most results	
How old are you?	7/13 over the age of 35
What is your gender?	7/13 female
Do you live within the Pittsburgh city limits?	12/13 yes
What area/neighborhood do you live in?	(View attached spreadsheets)
Do you ride a bicycle?	12/13 yes
Is it a new or used/rebuilt bicycle?	9/13 new, 3/13 used, 1 no bike
How much did your bike cost?	avg = 612.50$
Is your bike your main mode of transportation?	3/13 yes
If not, what is your primary mode of transportation?	see attached spredsheets
Do you commute on your bike?	4/13 marked at least sometimes
If not, why not? And how?	see attached spredsheets
Which season, if any, places the greatest restrictions on your bicycle ridi	11/13 said winter, 1 said fall/spring
Why?	see attached spredsheets
Do you feel the city of Pittsburgh could do anything to facilitate bike ridi	see attached spredsheets
On a scale of 1 to 7, how well kept would you say the roads/sidewalks	average = 4.27

Figure 1.6 is a list of the finalized questionnaire along with quantifiable averages for those questions that were asked of the participants (Note, the final question was only asked by Nelson).

Figure 1.7

Phone Number	date called/existance
863-3249	no
421-9189	no
521 1187	didn't answer
228 6107	no
742 1474	no
624 9059	Yes

440 4801	No
428 8575	no
261 6290	no
544 2478	didn't answer
562 6248	no
697 5495	didn't answer
644 8069	didn't answer/refused on second call (immediately hung up)
762 7407	didn't answer
253 2900	business
623 9247	didn't answer
633 7824	no
469 7939	didn't answer
566 9441	no
263 4546	busy
880 4935	no
227 2177	no
641 4451	didn't answer
521 6207	no
633 8671	didn't answer/refused on third call
353 9841	Call Block
394 6097	no
762 0408	business
234 9689	no
209 0402	no
407 4144	no
291 1698	screech?
803 5809	screech?
433 6014	didn't answer
393 7488	business (Duquesne Light)
208 6368	no
655 1024	didn't answer
726 5045	Asked to call back Later/no response later
232 8652	Hospital
234 0880	immediate disconnection
641 3892	didn't answer
444 9825	no
219 9344	no
407 5702	no
633 5832	verizon

420 1038	no
350 5248	didn't answer
333 0340	no
436 6383	Refused
273 1786	customer temporairly disconnected
261 0391	no
539 2005	no
532 6121	no
208 2311	no
690 1679	no
904 3540	Refused survey due to not riding a bike
224 1457	no
624 7648	didn't answer
768 4689	PNC bank

Figure 1.7 is a list of the numbers Andrew Called along with whether they responded or not.

Figure 1.8

1: 412-201-1604

Doesn't Exist/Bad

2: 412-208-1468

Doesn't Exist/Bad

3: 412-209-2792

Doesn't Exist/Bad

4: 412-210-6119

Doesn't Exist/Bad

5: 412-219-2415

BUSY: retry

6: 412-222-2716

BUSY: retry

7: 412-223-3364

Doesn't Exist/Bad

8: 412-224-9587

RETRY:

9: 412-227-2669

BUSINESS

10: 412-228-7030

Doesn't Exist/Bad

11: 412-232-1076

Doesn't Exist/Bad

12: 412-234-6653

Doesn't Exist/Bad

13: 412-235-0833

Doesn't Exist/Bad

14: 412-236-0091

Doesn't Exist/Bad

15: 412-238-7143

ALL CIRCUITS BUSY

16: 412-246-5567

BUSINESS

17: 412-250-7869

Doesn't Exist/Bad

18: 412-251-0990

Doesn't Exist/Bad

19: 412-253-4579

Doesn't Exist/Bad

20: 412-255-8261

Doesn't Exist/Bad

21: 412-258-2533

Doesn't Exist/Bad

22: 412-251-0023

Doesn't Exist/Bad

23: 412-263-9580

Doesn't Exist/Bad

24: 412-267-7234

Doesn't Exist/Bad

25: 412-273-8598

Not Interested: 1 NON response

26: 412-280-8567

Doesn't Exist/Bad

27: 412-281-1005

No answer: RETRY

28: 412-288-8481

Answering Machine: RETRY

29: 412-291-7690

Doesn't Exist/Bad

30: 412-297-2629

Doesn't Exist/Bad

31: 412-304-8073

Doesn't Exist/Bad

32: 412-316-8974

Doesn't Exist/Bad

33: 412-320-7412

Doesn't Exist/Bad

34: 412-325-0234

BUSINESS

35: 412-333-7869

Doesn't Exist/Bad

36: 412-338-2642

No Answer: RETRY

37: 412-350-7384

no ans: RETRY

38: 412-353-8479

Doesn't Exist/Bad

39: 412-355-4556

Doesn't Exist/Bad

40:

How old are you?

30

What is your gender?

M

Do you live within the Pittsburgh city limits?

Yes

What area/neighborhood do you live in?

East liberty

Do you ride a bicycle?

Yes (riding one right now: not a landline!)
Is it a new or used/rebuilt bicycle?

used

How much did your bike cost?

500

Is your bike your main mode of transportation?

no

If not, what is your primary mode of transportation?

I guess the bus

Do you commute on your bike?

Sometimes, depends how im feeling

Which season, if any, places the greatest restrictions on your bicycle riding?

 winter

Why?

Its too cold, it makes me pissed off.

Do you feel the city of Pittsburgh could do anything to facilitate bicycle **patronage (or riding??)** in the city?

No, theyre doing just fine man

41: 412-379-7281

Doesn't Exist/Bad

42: 412-383-9145

Doesn't Exist/Bad

43: 412-386-4265

Doesn't Exist/Bad

44: 412-387-6317

Doesn't Exist/Bad

45: 412-391-5891

Busy: RETRY

46: 412-392-3404

no ans:RETRY

47: 412-393-2788

office/business

48: 412-394-2587

Doesn't Exist/Bad

49: 412-395-5280

Business

50: 412-396-2357

Doesn't Exist/Bad

51: 412-402-9987

Doesn't Exist/Bad

52: 412-407-1448

Doesn't Exist/Bad

53: 412-412-7239

Busy: RETRY

54: 412-420-8430

Doesn't Exist/Bad

55: 412-421-5009

Doesn't Exist/Bad

56: 412-422-6991

Doesn't Exist/Bad

57: 412-428-6805

Doesn't Exist/Bad

58: 412-433-9725

Doesn't Exist/Bad

59: 412-434-3304

Doesn't Exist/Bad

60: 412-436-0409

Doesn't Exist/Bad

61. 412-437-6603

Doesn't Exist/Bad

62. 412-440-7227

Doesn't Exist/Bad

63. 412-444-7666

Doesn't Exist/Bad

64.412-453-8017

Doesn't Exist/Bad

65. 412-454-6844

Doesn't Exist/Bad

66. 412-456-3757

NO ANSWER: RETRY

67. 412-459-4355

Doesn't Exist/Bad

68. 412-460-6510

Doesn't Exist/Bad

69. 412-466-5814

NOT INTERESTED: NON RESPONSE (HOARSE WOMAN)

70. 412-467-8215

NO ANSWER: RETRY

71. 412-469-9692

Doesn't Exist/Bad

72. 412-471-1486

NO ANSWER: RETRY

73. 412- 478-6476

HANG UP: NON RESPONSE

74. 412-482-1074

VOICEMAIL: RETRY

75. 412-485-6433

Doesn't Exist/Bad

76. 412-497-7232

NO ANSWER: RETRY

77. 412-502-2522

Doesn't Exist/Bad

78. 412-503-0303

Doesn't Exist/Bad

79. 412-506-9439

Doesn't Exist/Bad

80. 412-521-8976

ANS MACHINE: RETRY

81. 412-532- 4603

Doesn't Exist/Bad

82. 412-535-6227

Doesn't Exist/Bad

83. 412-539-1105

Doesn't Exist/Bad

84. 412-543-0616

Doesn't Exist/Bad

85. 412-544-2376

ANS MACHINE: RETRY

86. 412-552-0006

ANS MACHINE: RETRY

87. 412-553-1195

ANS MACHINE: RETRY

88. 412-557-3666

Doesn't Exist/Bad

89. 412-560-2520

PITTSBURGH PARKING AUTHORITY

90. 412-562-4282

Doesn't Exist/Bad

91. 412-565-9974

Doesn't Exist/Bad

92. 412-566-9681

Doesn't Exist/Bad

93. 412-567-4595

Doesn't Exist/Bad

94. 412-568-6910

Doesn't Exist/Bad

95. 412-573-6735

Doesn't Exist/Bad

96. 412-575-2525

KDKA

97. 412-577-1750

Doesn't Exist/Bad

98. 412-578-7815

Doesn't Exist/Bad

99. 412- 586-3269

Doesn't Exist/Bad

100. 412- 587-8956

Doesn't Exist/Bad

101. 412-592-8804

ANSWERING MACHINE: RETRY

102. 412-594-4467

Doesn't Exist/Bad

103. 412-623-3059

NO ANSWER: RETRY

104. 412-624-4581

ANSWERING MACHINE: RETRY

105. 412-633-3045

NO ANSWER: RETRY

106. 412-637-6699

Doesn't Exist/Bad

107. 412-641-8153

NO ANSWER: RETRY

SPLIT

1. 412-992-1604

NON-RESPONSE: I WOULD NOT LIKE TO TAKE

2. 412-267-1468

VOICEMAIL: RETRY

3. 412- 904-2792

Doesn't Exist/Bad

4. 412-644-6119

 Doesn't Exist/Bad

5. 412-422-2415

 Doesn't Exist/Bad

6. 412-521-2716

 Doesn't Exist/Bad

7. 412-553-3364

 Doesn't Exist/Bad

8. 412- 355- 9587

 Doesn't Exist/Bad

9. 412-394-2669

BUSINESS

10. 412-702-7030

Doesn't Exist/Bad

11. 412-939-1076

Doesn't Exist/Bad

12. 412-624-6653

Doesn't Exist/Bad

13. 412-624-0833

Doesn't Exist/Bad

14. 412-880-0091

Doesn't Exist/Bad

15. 412-485-7143

Doesn't Exist/Bad

16. 412-250-7869

Doesn't Exist/Bad

17. 412-467-7869

Doesn't Exist/Bad

18. 412-768-0990

NO ANSWER: RETRY

19. 412-304-4579

NO ANSWER: RETRY

20. 412-543-8261

Doesn't Exist/Bad

21. 412-803-2533

Doesn't Exist/Bad

22. 412-995-0023

BUSINESS

23. 412-485-9580

 Doesn't Exist/Bad

24. 412-219-7234

 Doesn't Exist/Bad

25. 412-407-8598

 Doesn't Exist/Bad

26. 412- 288-8567

BUSINESS

27. 412-316-1005

BUSINESS

28. 412-645-8481

 Doesn't Exist/Bad

29. 412-255-7690

 Doesn't Exist/Bad

30. 412-552-2629

 Doesn't Exist/Bad

31. 412-386-8073

 Doesn't Exist/Bad

32. 412-573-8974

 Doesn't Exist/Bad

33. 412-234-7412

BUSINESS

34. 412-765-0234

Doesn't Exist/Bad

35. 412- 543-7869

Doesn't Exist/Bad

36. 412-641-2642

NO ANSWER: RETRY

37. 412-987-7384

Doesn't Exist/Bad

38. 412-650-8479

Doesn't Exist/Bad

39. 412-592-4556

BUSY: RETRY

40. 412-440-4181

BRENTWOOD MEDICAL GROUP

41. 412-392-7281

Doesn't Exist/Bad

42. 412-557-9145

Doesn't Exist/Bad

43. 412-316-8974

Doesn't Exist/Bad

44. 412-586-6317

NO ANSWER: RETRY

45. 412-712-5891

Doesn't Exist/Bad

46.412-333-3404

Doesn't Exist/Bad

47. 412-543-2788

Doesn't Exist/Bad

48. 412-567-2587

BUSINESS

49. 412-459-5280

Doesn't Exist/Bad

50. 412-291-2357

Doesn't Exist/Bad

51. 412-532-9987

Doesn't Exist/Bad

52. 412-637-1448

Doesn't Exist/Bad

53. 412-793-7239

Doesn't Exist/Bad

54. 412-273-8430

NON RESPONSE: NO THANKS!!!

55. 412-234-5009

Doesn't Exist/Bad

56. 412-222-6991

Doesn't Exist/Bad

57. 412-592-6805

Doesn't Exist/Bad

58. 412-232-9725

Doesn't Exist/Bad

59. 412-793-3304

NO ANSWER: RETRY

60. 412-577-0409

 Doesn't Exist/Bad

61. 412-742-6603

 Doesn't Exist/Bad

62. 412-552-7227

 Doesn't Exist/Bad

63. 412-557-7666

 Doesn't Exist/Bad

64. 412-894-8017

 Doesn't Exist/Bad

65. 412-655-6844

NO ANSWER: RETRY

66. 412-765-3757

 Doesn't Exist/Bad

67. 412-961-4355

ANS MACHINE: RETRY

68. 412-745-6510

 Doesn't Exist/Bad

69. 412-941-5814

 Doesn't Exist/Bad

70. 412-543-8215

Doesn't Exist/Bad

71. 412-251-8692

OFFICIATING A TRACK MEET (WIRELESS)

72. 412-386-1486

 Doesn't Exist/Bad

73. 412-745-6476

 Doesn't Exist/Bad

74. 412-650-1074

 Doesn't Exist/Bad

75. 412-353-6433

 Doesn't Exist/Bad

76. 412-776-7232

BUSINESS

77. 412-567-2522

ANS MACHINE: RETRY

78. 412-745-0303

 Doesn't Exist/Bad

79. 412-444-9439

 Doesn't Exist/Bad

80. 412-532-8976

 Doesn't Exist/Bad

81. 412-320-4603

 Doesn't Exist/Bad

82. 412-407-6227

Doesn't Exist/Bad

83. 412-391-1105

 NO ANSWER: RETRY

84. 412-983-0616

NONRESPONSE: CHATTY FLORIDA GUY (WIRELESS)

85. 412-350-2376

CHIEF INVESTIGATOR OF THE ALLEGHENY PUBLIC DEFENDER'S OFFICE

86. 412-552-0006

NO ANSWER: RETRY

87. 412-667-1195

NON RESPONSE! "I CAANT!"

88. 412-653-3666

BUSINESS

89. 412-394-2520

 Doesn't Exist/Bad

90. 412-544-4282

ANS MACHINE: RETRY

91. 412-904-9974

NO ANSWER: RETRY

92. 412-623-9681

TRY ME SUNDAY: RETRY?/NON RESPONSE

93. 412-320-4595

 Doesn't Exist/Bad

94. 412-557-6910

Doesn't Exist/Bad

95. 412-201-6735

BUSY: RETRY

96. 412-795-2525

Doesn't Exist/Bad

97. 412-918-1750

NO ANSWER: RETRY

98. 412-393-7815

BUSINESS

99. 412-379-3269

Doesn't Exist/Bad

100. 412-776-8956

Doesn't Exist/Bad

101. 412-776-8804

Doesn't Exist/Bad

102. 412-667-4467

Doesn't Exist/Bad

103. 412-623-3059

Doesn't Exist/Bad

104. 412-624-4581

ANSWERING MACHINE

105. 412-222-3045

BUSY RETRY

106. 412-208-6699

Doesn't Exist/Bad

107. 412-228-8153

Doesn't Exist/Bad

108. 412-532-2050

Doesn't Exist/Bad

109. 412-633-5042

Doesn't Exist/Bad

110. 412-645-9935

Doesn't Exist/Bad

111. 412-444-9562

Doesn't Exist/Bad

112. 412-641-1867

NO ANSWER: RETRY

113: 412-693-2809

Doesn't Exist/Bad

114: 412-253-7894

BUSY: RETRY

115: 412-905-2387

BUSY: RETRY

116: 412-762-1182

NO ANS: RETRY

117. 412-712-2016

Doesn't Exist/Bad

118: 412-562-5673

NO ANS: RETRY

119: 412-746-8927

 Doesn't Exist/Bad

120: 412-552-8107

NO ANSWER: RETRY

121: 412-502-2513

 Doesn't Exist/Bad

122: 412-690-8583

 Doesn't Exist/Bad

123: 412-236-3433

 Doesn't Exist/Bad

124: 412-394-7213

 Doesn't Exist/Bad

125: 412-503-8489

 Doesn't Exist/Bad

126: 412-355-4290

 Doesn't Exist/Bad

127: 412-765-6487

 Doesn't Exist/Bad

128: 412-746-0657

 Doesn't Exist/Bad

129: 412-246-9001

 Doesn't Exist/Bad

130: 412-578-4975

NO ANSWER: RETRY

131: 412-273-1849

Doesn't Exist/Bad

132: 412-624-3562

Doesn't Exist/Bad

133: 412-961-3902

ANS MACHINE: RETRY

134: 412-552-9828

WIRELESS!/BAD

135. 412-918-3219

BUSINESS

136. 412-715-9952

NOT INTERESTED: NON RESPONSE

137: 412-894-1185

Doesn't Exist/Bad

138: 412-320-3185

ANS MACHINE: RETRY

139: 412-291-5111

BUSINESS

140: 412-297-9779

Doesn't Exist/Bad

141: 412-705-2332

Doesn't Exist/Bad

142: 412-227-4540

Doesn't Exist/Bad

143: 412-641-1161

Doesn't Exist/Bad

144: 412-379-1829

Doesn't Exist/Bad

145: 412-712-5307

Doesn't Exist/Bad

146: 412-485-4556

NO ANSWER: RETRY

147: 412-567-9559

Doesn't Exist/Bad

148: 412-502-4659

Doesn't Exist/Bad

149: 412-745-2085

Doesn't Exist/Bad

150. 412-578-1727

BUSY

151. 412-402-8713

ANS MACHINE: RETRY

152: 412-544-7518

Doesn't Exist/Bad

153: 412-459-8829

Doesn't Exist/Bad

154: 412-386-5802

ANS MACHINE: RETRY

155: 412-238-8348

Doesn't Exist/Bad

156: 412-291-6875

Doesn't Exist/Bad

157: 412-263-9262

Doesn't Exist/Bad

158: 412-227-5026

Doesn't Exist/Bad

159: 412-222-4210

Doesn't Exist/Bad

21 businesses

10: non-responses (hang up/not interested in or unable to do the survey

106 bad/nonexistent numbers

54 uncompleted retries

Figure 1.8 is Ben's data set.

Figure 1.9a

1288	2
4604	4
2985	4
1613	4
7603	4
8409	4
9826	4

9320	4
3277	2
0588	4
2148	4
8286	4
7260	4
3844	2
4052	3
1967	4
9300	3
3730	2
0739	4
3510	2
	1
7822	4
9926	4
7491	2
7627	3
2890	3
3477	2
5429	4
2928	3
5318	4
1081	2
8370	4
5782	3
9305	3
4829	2
7594	4
7085	4
1445	4
8276	3
9137	4
6748	4
0178	3
5344	2
4448	3
5852	3
5008	3
2098	2

7919	2
9991	2
0089	4
9186	2
1576	2
5827	3
5179	4
4972	4
7118	4
0701	3
3069	2
3719	2
0182	3
3391	2
9014	4
3080	3
4292	3
9355	2
3457	4
8512	4
4020	4
5216	2
1033	2
6073	3
8347	2
5915	2
3897	2
8035	3
2992	4
3185	3
0169	4
1978	2
8912	3
4298	3
1995	3
7973	3
1928	3
0566	4
3903	2
7752	3

CRC Index	Call Result Code Explanation
5430	3
2616	3
2935	4
2371	2
4083	3
2835	3
6057	3
5624	2
5569	2
9210	4
7898	4
6509	3
4710	4
2445	3
1119	3
4628	2
7687	2
4774	2
5889	3
2315	2
1141	2
4254	2
4917	2
7880	4
7986	2
6476	2
3048	4
7876	3
8428	4
8053	4
8385	4
9578	3
5091	4
9879	2
4256	3
6344	3
3802	3

1	Successful Response (Number should NOT be kept)
2	Incomplete or Negative Response, No Callback Attempt
3	Incomplete Response, May Attempt Callback Attempt (Busy, Home Voicemail/Answering Machine, etc.)
4	Ineligable number (Wireless, Business, Fax, Government, Disconnected)

Figure 1.9a corresponds to Nelson's data set from using our original method.

Figure 1.9b

412-963-6035	2
412-450-8186	3
412-422-3100	2
412-683-1311	3
412-683-0482	3
412-881-1084	2
	1
412-322-6633	2
412-687-4526	3
412-661-1338	2
412-831-0407	4
412-681-0939	3
412-458-1737	2
412-362-9143	4
412-441-0612	2
412-366-0185	3
412-322-0427	3
412-221-2381	3
	1

412-571-0773	3
412-367-7199	2
412-622-0206	2
412-481-6408	3
	1
412-242-2756	2
412-884-7418	3
412-782-5399	3
412-885-3927	3
412-761-1795	3
412-904-1446	3
412-207-8479	2
412-318-0916	2
412-231-8517	2
412-301-0062	2
412-279-1459	2
412-242-3676	3
412-824-3301	2
	1
412-881-1855	3
412-851-1642	3
412-793-0463	3
412-276-6768	2
412-621-1258	2
412-571-0276	2
412-884-6855	2
412-687-4536	3
	1
412-381-9295	3
412-241-8907	2
412-665-0197	2
412-561-3775	3
412-828-6880	3
412-431-6257	3
412-408-3399	2
412-782-2206	3
412-276-5879	3
412-821-1979	2
412-321-2961	2
412-433-9918	3

	1
412-661-1280	2
412-521-6098	3
412-881-4263	3
412-704-2105	3
412-931-8189	2
412-367-8082	2
412-486-4744	3
412-421-7481	3
412-242-2750	4
	1
412-371-0931	2
412-408-3373	3
412-904-2612	2
412-331-0294	3
	1
412-391-6171	3
412-882-5983	3
412-322-2142	2
412-371-8973	3
412-243-4849	3
	1
412-682-0982	3
412-825-0691	2
412-362-4268	3
412-242-1058	3
412-761-9523	2
412-521-9046	2
412-761-6602	2
412-408-3478	3
412-881-5831	2
412-665-0686	2
412-243-5637	2
412-247-0377	3
412-381-1482	3
412-661-7809	3
412-653-2525	2
412-682-2181	2
412-561-9192	3
412-367-5723	2

412-431-6587	2
412-231-1149	3
412-531-4894	3
412-661-5463	3

Figure 1.9b corresponds to Nelson's dataset using his method.

Figure 19c

Figure 19c is just a list of the responses to questions to individuals that Nelson surveyed.