Using Affective Imagery to Understand the Quality of Survey Response[1]

Patricia A. Gwartney, Ph.D.

University of Oregon
1291 University of Oregon, Eugene OR 97403-1291, pgwartney@gmail.com

Introduction

In order to gain deeper understanding of the quality of respondents' answers in telephone surveys, over the past few years certain graduate students and I explored two complementary lines of inquiry. For survey methodology, our overarching goal is to find ways to maximize the value of each telephone survey encounter and to achieve the highest data quality. As part of this objective, we value survey respondents who understand questions readily, who answer them quickly but thoroughly, who offer few refusals and "don't know" answers, and who keep interviews short. Such respondents help maximize projects' efficiency and keep them within budget, without sacrificing data quality. In other words, surveys need what we have dubbed task-dedicated respondents.

Prior Research

Respondent task dedication and task alienation was the first line of inquiry we explored (Gumbhir & Gwartney 2001, 2002). Task-dedicated survey respondents provide accurate, complete, and truthful information in response to survey questions. Theoretically, we rooted our approach in symbolic interactionism, particularly Herbert Blumer's premise that "Human beings act toward things on the basis of the meanings that they have for them" (1969). We investigated the meanings respondents have about surveys and whether those meanings affect their behavior as survey takers. We found that those who express positive feelings about surveys exhibit more task-dedicated survey behaviors than do other respondents. Specifically, task-dedicated respondents give preference to their positive meanings about surveys, as important knowledge-generating tools that potentially impact their lives, and relegate to secondary status any concerns or negative meanings that they may have about surveys. Task alienation, in contrast, refers to a condition in which respondents' survey meanings are *not* congruent with their basic survey task. Task-alienated respondents may feel ambivalent about the value of survey research, lack interest in the survey topic, and not be able to differentiate between survey research and telemarketing. Task-alienated respondents approach the answering process with little enthusiasm, care, thought, or consideration.

Our second line of inquiry concerned affective imagery as a cognitive tool for understanding the quality of respondents' telephone survey behavior (Gwartney, Gumbhir, & Leiserowitz 2004). Affective images represent the evaluative feelings of good/positive or bad/negative that people associate with particular concepts or stimuli. These feelings occur quickly and unconsciously, guiding individuals' evaluations and decision making. Researchers typically stimulate affective images with word association questions that elicit short, open-ended responses, which they then categorize by relevant theory. Psychologists have long used word association techniques (Deese 1965, Freud 1924, Galton 1880). For example, clinical psychologists use affective image analysis of word associations in drug treatment to assess clients' images of the substances they abuse as one step in charting treatment (Szalay & Deese 1978, Szalay, Strohl & Doherty 1999). As Szalay & Deese succinctly summarize: "… associations are simply a remarkably easy and efficient way of determining the contents of human minds without having those contents expressed in the full discursive structure of language" (1978:9). In surveys, we evoke affective images with open-ended word association questions of the form: "*What is the first thought or image that comes to mind when you hear the word _____?"* We used stimuli related to our substantive, non-methodological areas of research, such as "global warming," "inequality," "organic food," "farm safety experts," and "cloning." Interviewers recorded respondents' exact narrative replies, and then we coded their answers to assess respondents' patterns of meanings to each stimulus and correlated them with other survey measures.

Unexpectedly, we discovered a link between the two areas of inquiry; specifically, we found that certain substantive patterns of answers to word association questions predict survey respondents' task dedication and task alienation. For example, in examining open-ended answers to the stimulus term "global warming," we found that respondents who gave skeptical answers ("bad science" or "I don't believe in it") had more initial refusals to taking the survey than other respondents. We

[1] Prior research with former graduate students contributed to this investigation, especially Anthony A. Leiserowitz, Ph.D., Senior Research Scientist, Decision Research and Vikas Kumar Gumbhir, Ph.D., Assistant Professor, Gonzaga University. Special thanks to Hannah J. Bontrager and George G. Goldthwaite for their careful editing assistance.

also found that patterns of affective images varied significantly with respondents' beliefs about the importance of survey research and the number of words per open-ended answer. In other words, we found that images derived from word association questions predicted the quality of survey response.

Our findings indicate that the inability to provide a visual answer to a stimulus word association question predicts task alienation in survey respondents. In one survey, we split the word association in two: "*What is the first thought that comes to mind when you hear the word _____?"* and *"What is the first picture or image that comes to mind when you think of _____?"* We randomly assigned respondents to one of three stimuli for each question pair. We found that 40 percent could not supply a visual image, even when probed, to all three stimuli. Those who could not supply a visual answer – Non-visualizers – exhibited task alienation, such as attributing less importance to survey research than respondents who supplied visual answers. Importantly, it did not matter what specific picture or image "Visualizers" supplied; simply the ability to visualize seemed to provide a robust indicator of survey respondent task dedication and task alienation. In multivariate analyses, the ability to visualize was highly significant, controlling for other standard predictors, and had twice the net effect of educational attainment in explaining item nonresponse.

More broadly, results from these two lines of inquiry suggest that a symbolic interactionist approach to understanding the quality of survey response could offer new insight to the cognitive approaches currently guiding survey methodology (Krosnick 1999, Tourangeau, Rips & Rasinski 2000). The cognitive approach focuses on respondents' motivation and intellectual ability to understand questions, search their memories, and formulate replies. The symbolic interactionist approach focuses upon the meanings respondents bring to surveys and the meanings generated in the survey process, between respondents and interviewers and between respondents and instruments (e.g., routine keywords in introductions, questions, and probes). Moreover, affective imagery analysis of respondents' answers to word association questions seems able to unearth respondents' survey meanings in indirect ways.

This Research

This paper extends our exploration of affective imagery and the quality of survey response. I focus on visualization, i.e., respondents' ability to provide visual answers to word association questions. The ability to visualize pictures and images, to graphically imagine, or to see, understand, and orient objects in an envisioned space, represents one type of intelligence. It is one of the numerous types of "multiple intelligences," but distinct from logical thinking, symbolic reasoning, musical and aesthetic intelligence, and numerous other types of aptitude. My overall hypothesis is that so-called Visualizers will exhibit greater task dedication and survey skill than Non-visualizers. Specifically, I expect that:

H_1 Visualizers will give shorter interviews than Non-visualizers.
H_2 Visualizers will answer questions with less item nonresponse[2] than Non-visualizers.
H_3 Visualizers will more often volunteer answers outside the offered answer categories (using "if volunteered" and "other – specify" options) than Non-visualizers.
H_4 Visualizers will offer more words per open-ended question (an indicator of task dedication) than Non-visualizers.
H_5 Visualizers will ascribe greater importance to participating in scientific telephone surveys than Non-visualizers.
H_6 Visualizers will believe that scientific telephone surveys impact their lives more than Non-visualizers.
H_7 In multivariate analysis, the ability to visualize will explain as much as, or more, variation in measures of task dedication than education, with standard control variables.

Essentially, I expect Visualizers to behave as task-dedicated respondents, e.g., to focus upon the survey task and perform it quickly, consistent with H_1. It is possible, however, that Visualizers may take their survey task so seriously that they give longer interviews than task-alienated respondents. I expect Visualizers to exhibit task-dedication by finding answer categories that suit them, consistent with H_2, instead of refusing or giving up. When answer categories do not suit them, however, I expect that they will more often initiate the "if volunteered" and "other – specify" answer categories, where available, because they want to ensure their unique answers are fully and accurately recorded, consistent with H_3. Similarly, I expect that Visualizers will attempt to explain their answers more thoroughly than Non-visualizers, resulting in more words per open-ended question, per H_4.

[2] Item nonresponse refers to "don't know" and "refuse" answers.

To take an anonymous, RDD telephone survey seriously, respondents must believe that survey sponsors value their opinions, attitudes, knowledge, and beliefs and, moreover, will take their answers into account. Thus, I expect task-dedicated respondents to answer questions about the importance and impact of survey research with greater idealism than task-alienated respondents, consistent with H_5 and H_6. Finally, I expect the ability to visualize will explain task dedication and task alienation at least as well as cognitive sophistication, typically operationalized as educational attainment; see H_7.

Methods

Data Sources

For this investigation, I use three random digit dial telephone surveys of Oregon adults conducted by the University of Oregon Survey Research Laboratory (OSRL) between November 2000 and December 2001, using identical data collection protocols. Table 1 outlines their characteristics. The Oregon Annual Social Indicators Survey (OASIS) is an annual omnibus survey conducted early each winter for multiple sponsors, mainly state agencies and OSRL's academic affiliates. Most OASIS surveys contain embedded experiments, randomly assigning respondents to different groups of questions with systematically varying wording and answer categories. OASIS 2000 contained 99 questions, of which 17 were randomly assigned to two groups, so that the average respondent answered 72 questions. OASIS 2001 contained 144 questions, including nine randomly assigned to two groups and six randomly assigned to three groups. It also contained extensive skip logic, so that the average respondent answered 82 questions. Finally, OSRL conducted the Transportation Needs and Issues Survey (TNIS) semi-annually for the state transportation department. TNIS contained 112 questions, of which the average respondent answered 80. Sample estimates of basic demographic indicators in each survey matched state population parameters well enough to not warrant sample weighting.

Table 1: Descriptive Information on Data Sources

Items	OASIS 2000	TNIS 2001	OASIS 2001
Dates	Nov. 2000 – January 2001	May – July 2001	Nov. – December 2001
Sample size	901	1,000	802
Sample type	RDD	RDD	RDD
Response rate (CASRO)	56%	72%	56%
Sponsors	Multiple state agencies, OSRL academic affiliates, a private research firm	Oregon Department of Transportation	Multiple state agencies, OSRL academic affiliates
Average number of questions answered	72	82	82
Type of word association question	Thought or image	Thought or image	Thought and image
Random assignment	None	Two conditions	Three conditions
Word association question(s)	What is the first thought or image that comes to your mind when you think of global warming?	I would like to end the survey with a question related to another research project we are working on. What is the first thought or image that comes to mind when you think of [equality / inequality]?	Finally, what is the first thought that comes to mind when you hear the [word survey / term political poll / term U. S. census]? And what is the first picture or image that comes to mind when you think of [a survey / a political poll / the U.S. census]?
Type of target stimulus	Concept and thing	Concept	Thing
Number of word association answers	901	1,000	1,604

All three surveys contain affective imagery questions, but the stimuli systematically varied. In OASIS 2000, respondents were asked: *"What is the first thought or image that comes to your mind when you think of global warming?"* The question occurred in the middle of the survey, within a group of questions concerning the environment. In TNIS, the word association question was placed at the survey's very end and respondents were randomly assigned to one of two conditions: *"I would like to end the survey with a question related to another research project we are working on. What is the first thought or image that comes to mind when you think of [equality / inequality]?"* The content of this question was a rather abrupt departure from the preceding questions' transportation theme. In OASIS 2001, the word association was again asked last. This time, we deliberately split the basic question in two, asking thought and image questions separately. Respondents were randomly assigned to receive one of three conditions: *"Finally, what is the first thought that comes to mind when you hear the [word survey / term political poll / term U. S. census]? And what is the first picture or image that comes to mind when you think of [a survey / a political poll / the U.S. census]?"*

Because the stimuli "survey," "census," or "political poll" are things or objects, most respondents should be able to offer a visual image, especially since the second question specifically asks them to do so. The stimulus "global warming," in contrast, can be considered either a concept or an entity, i.e., an idea or a noun. For this stimulus, I foresee fewer images, especially since the instrument does not probe respondents to answer with a visual. The stimuli "equality" and "inequality" represents concepts solely. Because they are not concrete things, I expect respondents to offer fewer visual images.

Operationalization of the Visualizer Scale

My goal is to map respondents' visualization ability to their survey response behavior, i.e., measures of task dedication and task alienation. The ability to provide a visual answer in response to a word association question is the key independent variable of this analysis. I revisited each dataset and recoded 3,505 narrative answers for 2,703 respondents to identify Visualizers and Non-visualizers. Table 2 provides examples of visual images for each target stimulus in the three surveys.

Table 2: Example Visual Images

OASIS 2000	TNIS 2001	OASIS 2001
Global Warming A hole in the sky. A little blue green planet becoming a yellow brown planet. Cars. Dead fish. Environmental nuts. Greedy corporations that won't make products that are environmentally safe and cheap enough for people to buy. Holes in ozone layer and temperatures rising. It's a myth. I don't think we have global warming. Summers are getting shorter and winters seem to be to be getting damper and cooler. It seems to be going the other way. All the costal cities that are so worried about being under water. Melting of the ice caps. My personal use of appliances and cars that contribute to it. Skin cancer. Sunburn. The rain forests. The sun shining so fierce because of the ozone layer. Weather disasters.	**Equality** A woman president. An equal sign with a man and a woman shaking hands; one is black and one is white. Like if a woman is doing the same job I am, there is no reason she shouldn't be getting the same wage I am. Martin Luther King. My home state, which is Wyoming. It's called the equality state. Piano keys – ebony and ivory. Remember that song? **Inequality** A handicapped person on the street. A Mexican-American woman. Child abuse and elder abuse. County commissioners can drive drunk and not get pinched, whereas a regular citizen can't. Jesse Jackson. Me on my motorcycle coming to a 4-way stop at the same time as one of those raised pickups with the big tires. The justice scales. The racial profiling of the blacks on the highways and the streets.	**Survey** A big table of information. A chart. A group of you hard-working folks on the telephones. A list of questions to check off. **U.S. Census** A person with a clipboard standing at my door. Workers going out under bridges trying to count everybody. Map of the U.S. Masses of people. Three gingerbread men, two white and one brown. Uncle Sam peering over your shoulder. **Political Polls** A big fat politician with his hand out. Campaign headquarters. A bunch of people standing around a booth like they are voting. A dishonest politician looking me in the eye. Elephant and a donkey beating each other up in a ring. Kind of a montage of backroom criminals and schemers.

For global warming, some clearly visual answers to the stimulus were: "a little blue green planet becoming a yellow brown planet," "a hole in the sky," and "dead fish." For equality, clearly visual answers included "a woman president" and "piano keys – ebony and ivory." For inequality, clearly visual answers included "a handicapped person on the street" and "the justice scales." Many answers for surveys, the census, and political polls referred to the instruments themselves, e.g., "a list of questions to check off." Others referred to interviewers and census enumerators, e.g., "a group of you hard-working folks on the telephones" and "workers going out under bridges and trying to count everybody." In OASIS 2001 many respondents answered the first question (*"What is the first thought…"*) with an image and then answered the second question ("*And what is the first picture or image…"*) with "don't know." Any clearly visual answer to either question was coded as a Visualizer.

In the coding process, Non-visualizers were easy to identify by responses such as "nothing comes to mind" and "I don't know;" see Table 3. In addition, some respondents offered their opinions on what is right, wrong, or true. Others answered with definitions of the target stimulus, as if the word association question was a test. Indeed, one respondent answered the inequality question with the comment, "I feel like I'm being given a test." The equality/inequality stimulus generated more opinions and definitions than the other stimuli did, undoubtedly because the question asks about a fuzzy concept, not a concrete thing. Respondents who only offered a definition or an opinion were counted as Non-visualizers.

Table 3: Example Possible Visual and Non-visual Answers

OASIS 2000 Global Warming	TNIS 2001 Equality/Inequality	OASIS 2001 Survey/Census/Political Poll
Possible Visual	**Possible Visual**	**Possible Visual**
Air pollution.	It is a system or laws that are not being used to full capacity for all ethnic races.	A president.
Becoming hotter.	Men and women in the workplace.	Being able to express some of my ideas and to discuss what's going on with politics.
Better winters.	Not treating a person decently because of their race, creed, handicap or whatever.	Big brother.
Change in climates.	Prejudice against people with AIDS.	Curiosity of what our population will be after the work is in.
Environment.	Racial discrimination.	Data.
It could be disastrous.	Someone having privileges that someone else doesn't. Being treated differently.	Elections.
I worry about it.	The population centers making rules for the rural centers.	Government.
It's a long way off.	Uninsured drivers being allowed to drive on the highway.	Nosey.
Scary.	**Non-visual**	Opinion.
The Lord will take over before it gets too bad.	Freedom.	Paperwork.
The greenhouse effect.	I like to see everyone is treated equal. I don't mind any races.	Politics.
Urbanization.	Not being fairly distributed.	Republicans.
We are going to die because we are stupid and [don't] realize what we're doing to the earth.	Not having an equal advantage to pursue something.	The two-party system.
Non-visual	Nothing comes to mind. This is a big switch from the other questions.	Voting.
Bogus.	Something that is not equal.	**Non-visual**
Can you explain that one? I'm not ignorant but what is that?	Unequal distribution of money.	I live in knowing that people can be counted.
Crazy. I don't believe in it.	Unfair.	I think it's good. I love America.
I never thought about it.		It is socially responsible.
I think it's a false accusation.		It's pretty boring.
I would say it's partly cyclical.		Manipulation.
I'm moderate.		Not too enthused.
I'm not too worried about it.		Something that's needed.
It's possible.		Time consuming.
It's true.		Well honestly, inconvenience.

In the process of distinguishing Visualizers and Non-visualizers, I found that I could not determine whether certain answers represented something visual, e.g., "government," "election," "paperwork," or "the greenhouse effect." Such answers might signify a concrete image for one respondent, but another might use the same terms without an image in mind. Even when respondents answered the equality/inequality question with "discrimination" and simultaneously referred to a social category, such as women, Blacks, or Mexican-Americans, I could not determine whether they saw images in response to the target stimulus. Table 3 provides examples of "Possible Visual" answers. A simple visual intensity score captured these respondents:

0 = Non-visualizers – definitely non-visual responses (see examples in Table 3).
1 = Possible Visualizers – possibly visual responses (see examples in Table 3).
2 = Visualizers – clearly visual responses (see examples in Table 2).

Table 4 shows the results of this scoring. Visualizers comprise 15 percent of the sample in OASIS 2000, 18 percent in TNIS, and 22 percent in OASIS 2001. Non-visualizers are more numerous, comprising 40 percent of the OASIS 2000 sample, 59 percent in TNIS, and 49 percent in OASIS 2001. These results are consistent with whether the word association question asked respondents about things or concepts. When asked to give both a thought and an image about a concrete thing, respondents most often supplied a visual answer, as in OASIS 2001 about a survey, a political poll, or the census. The two-question – thought/image – combination worked respondents' thought processes so that nearly one quarter were able to find an image of the target stimulus in their minds. Respondents most often offered non-visual answers in TNIS, when the target stimuli were fuzzy concepts (equality or inequality) and incongruent with the preceding survey questions (state transportation). As one TNIS respondent remarked, "This is a big switch from the other questions," and another called the word association question "a kind of way-outer."

Table 4: Distributions and Descriptive Statistics on Visualizer Scale

Distributions	**OASIS 2000**		**TNIS 2001**		**OASIS 2001**	
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
2 Visualizer	139	15.4%	586	17.7%	180	22.4%
1 Possible Visualizer	399	44.3%	237	23.7%	226	28.2%
0 Non-visualizer	363	40.3%	177	58.6%	396	49.4%
Total	901	100.0%	1,000	100.0%	802	100.0%
Descriptive Statistics	**Mean (s.d.)**		**Mean (s.d.)**		**Mean (s.d.)**	
	1.25 (.70)		.59 (.77)		1.27 (.80)	

In bivariate analyses, the Visualizer Scale is presented as categorical variables. As independent variables in multivariate analyses, the Visualizer Scale is used as continuous variables. I also experimented with using dummy variables to identify Visualizers and Non-visualizers in the multivariate analyses, but the results were substantively identical.

Operationalization of the Dependent Variables: Five Measures of Task Dedication

One way to determine whether Visualizers and Non-visualizers differ in survey task dedication is simply to ask them in the process of conducting the interview. This carries, however, unique potential for social desirability bias and acquiescence (Groves 1989, Eisenhower, Matheiowetz & Morganstein 1991, Krosnick, Narayan & Smith 1996, Holbrook, Green & Krosnick 2003). Instead, I developed four non-reactive, unobtrusive measures of task dedication and task alienation derived from patterns of how respondents answered survey questions: interview length, item nonresponse, volunteered answers, and words per open-end answer. Only the fifth measure represents survey respondents' actual answers to direct questions: beliefs about surveys' importance and impact. Table 5 outlines the dependent variables' operationalization and descriptive statistics.

Interview Length. To determine whether Visualizers provide shorter interviews than Non-visualizers, I used the length of interviews in minutes recorded by the CATI system. In OASIS 2000, interview length ranged from 9 to 36 minutes, with a mean of 16 minutes. In TNIS, interviews ranged from 9 to 65 minutes, with a mean of 17 minutes. And in OASIS 2001, interviews ranged from 14 to 85 minutes, with a mean of 24 minutes.

Item Nonresponse. I measured item nonresponse by counting all respondents' "don't know" and "refuse" answers to the survey questions. OSRL's item codes for refusals are 7, 97, 997, 9997, etc. and for don't know answers are 8, 98, 998, 9998, etc. While OSRL surveys also allow "no answer" on each question (code 9, 99, 999, 9999, etc.), this code is interviewer-generated and used rarely. A simple count of item nonresponse would be inadequate, because instrument skip logic leads respondents to answer different numbers of questions. To standardize, item nonresponse is expressed as a percent of all questions each respondent answered. Item nonresponse in OASIS 2000 ranged from 0 percent to 34 percent and averaged 2.1 percent of all questions respondents answered. Item nonresponse in TNIS ranged from 0 percent to 31 percent and averaged 1.9 percent. Item nonresponse in OASIS 2001 ranged from 0 percent to 38 percent and averaged 3.1 percent.

Volunteered Answers. Roughly one quarter of the questions in each survey allowed respondent-initiated "other-specify" and "if volunteered" answer categories. I counted those answers and divided the sums by the number of questions offering such answer categories. The results are expressed as the mean of all questions including such options. In OASIS 2000, up to 17 percent of all respondents' answers were volunteered beyond the categories offered, but they averaged just 3.6 percent. Volunteered answers in TNIS showed very similar patterns: respondents used zero to 17 percent of all possible "other-specify" and "if volunteered" answer categories, but averaged just 4.2 percent. Interviewers recorded more such respondent answers in OASIS 2001, possibly because this instrument asked more hypothetical and difficult questions. For example, certain questions related to medically-impaired drivers and racial profiling generated numerous "if volunteered" answers. OASIS 2001 respondents used up to one-third of all possible "other-specify" and "if volunteered" answer categories, averaging 3.2 percent each.

Table 5: Operationalization of and Descriptive Statistics for the Dependent Variables

Dependent Variables	OASIS 2000		TNIS 2001		OASIS 2001	
	Range	Mean (s.d.)	Range	Mean (s.d.)	Range	Mean (s.d.)
Interview length: Minutes per completed interview; CATI generated.	9-36	16.0 (4.4)	9-65	16.9 (6.0)	14-85	23.6 (6.6)
Item nonresponse: Sum of all questions answered "don't know" and "refuse" divided by all questions a respondent answered; expressed as a percent.	0-34%	2.1% (3.2)	0-31%	1.9% (2.8)	0-38%	3.1% (4.0)
Volunteered answers: Sum of all questions answered "if volunteered" and "other – specify" divided by number of questions allowing those options; expressed as a percent.	0-17%	3.6% (3.4)	0-17%	4.2% (3.3)	0-32%	3.2% (3.5)
Open-ends mean: Sum of all characters in open-ended answers divided by the number of open-ended questions a respondent answered; expressed as a mean.	6-418	51.8 (45.0)	0-677	37.8 (46.5)	1-255	50.0 (34.3)
Survey importance: Answers to "Do you believe that participating in telephone surveys, like the one you are about to complete, is very important, somewhat important, or not important?"	Very 23% Somewhat 62% Not 9%		*Not available*		Very 22% Somewhat 66% Not 9%	
Survey impact: Answers to "Do you believe that telephone surveys and polls will generally have a significant impact, some impact, little impact, or no impact on your life?"[3]	Significant 9% Some 46% Little 25% No 14%		*Not available*		A great deal 3% Some 35% A little 33% Not at all 27%	
Survey beliefs: Cross-tabulated answers to questions about survey importance and survey impact; see text for details.	Important; impacts lives 22% Mixed 38% Not important; little or no impact 38%		*Not available*		Important; impacts lives 15% Mixed 31% Not important; impacts little or not at all 54%	

Open-ended Answers. Calculating words per open-ended question for each respondent could be an exceptionally tedious manual task, even with the "word count" option in word-processing software. Somewhat easier is an Excel function which automatically calculates characters per string. Characters include letters, digits, spaces, and punctuation. A validity check demonstrated that characters recorded by interviewers directly correlate with the words respondents utter (r = .99); thus, I

[3] The impact question changed slightly in 2001, to: "Do you believe that participating in telephone surveys like the one you just completed, will impact your life a great deal, some, a little, or not at all?"

elected to use character counts. OSRL interviewers are trained to write down everything respondents say, including "ugh," "um," "ah," "gee," incomplete sentences, non-grammatical sentences, slang, laughter, and curses. Interviewers also indicate their use of standard probes with a capital P in parentheses (P), and they type out their nonstandard probes. In creating the variable "words per open-ended answers," I deleted all answer characters related to interviewer probes to ensure that they reflect respondents' survey behavior only. In OASIS 2000, respondents answered between two and seven open-ended questions (out of eight possible), with an average of 3.6. The mean number of characters per open-ended question was 52. TNIS offered three open-ended questions, of which the average respondent answered 1.7 with 58 characters. OASIS 2001 contained 16 open-ended questions; respondents answered two to 13, averaging five. The mean number of characters per open-ended question ranged from 5 to 1,499 and averaged 262.

Beliefs about Surveys' Importance and Impact. Only the OASIS surveys concluded with questions about the importance and impact of survey research. The first question asked whether respondents believe it is important to participate in telephone surveys. This question taps civic-mindedness, like voting. The second question asked how much respondents believe surveys will impact their lives. This question serves two purposes: it balances the preceding public question with a personal question, and it is more restrictive, for it is much easier for a respondent to believe that their survey participation will benefit the public in general than to believe they will personally gain from such participation. Over 85 percent of respondents in both 2000 and 2001 believed that survey participation was important. As expected, many fewer believed that such participation would impact their lives. In 2000, nearly two fifths (39 percent) of respondents believed survey participation would impact their own lives "little" or "not at all." In 2001, this grew to 60 percent. To simplify subsequent analyses, I combined the importance and impact questions into three categories by crosstabulating them. The first group believes survey participation is unimportant and impacts their lives little or not at all (code 1). The third group believes that survey participation is very or somewhat important, and that participating in surveys impacts their lives (code 3). The second group gave mixed belief answers, e.g., that survey participation in general is important but will not impact their lives at all (code 2). In 2000, the first group comprised 38 percent of the sample, believing survey participation is unimportant and does not impact them; this group grew to 54 percent in 2001. In 2000, the third group comprised 22 percent, believing survey participation is important and will impact their lives; by 2001 they dropped to 15 percent of the sample. The mixed belief group changed from 38 percent in 2000 to 31 percent in 2001.

Bivariate Data Analysis

The first step of the statistical analysis is to determine the extent to which the ability to visualize associates with survey task dedication. For the ratio-level variables, t-tests are used to determine the extent to which Visualizers and Non-visualizers differ from each other. For ordinal-level variables, crosstabulations and chi squares are presented. Significant differences are noted in bold. The second stage of the analysis is to determine the net effects of visualizing on the five measures of task dedication and task alienation.

Bivariate Results

Table 7 summarizes the results of bivariate tests suggested by the hypotheses. The first panel indicates that, in TNIS, Visualizers' interviews lasted significantly longer than others, at 17.8 minutes, compared to 16.9 minutes for Non-visualizers. This finding suggests that H_1 should be modified; that is, task dedication may associate with longer, more detailed and careful interviews, rather than short, efficient interviews. However, Visualizers' interview length did not significantly differ from others' in either OASIS survey.

Consistent with ideas of task dedication and H_2, the second panel of Table 7 shows that Visualizers averaged significantly less item nonresponse than did others in both OASIS surveys. Visualizers answered 1.8 percent of all questions with "don't know" or refuse" answers in OASIS 2000, compared to 2.0 percent for Possible Visualizers and 3.1 percent for Non-visualizers. A similar pattern holds for OASIS 2001, with item nonresponse steadily increasing across the three levels of visualizing, from 2.6 percent of all questions for Visualizers, to 2.8 percent for Possible Visualizers, to 4.7 percent for Non-visualizers. TNIS shows a slightly different pattern. Possible Visualizers averaged the lowest item nonresponse, at 1.5 percent, closely followed by Visualizers at 1.8 percent, and Non-visualizers averaged the most with 2.0 percent.

I hypothesized that Visualizers, as task-dedicated respondents, would more often initiate "if volunteered" and "other – specify" answer categories, where available, because they want to ensure their unique answers are fully and accurately recorded. H_3 proved correct for TNIS. Visualizers volunteered answers beyond the offered categories for 4.8 percent of all questions, compared to 4.1 percent of both other groups. In the OASIS datasets, however, volunteered answers did not differ significantly across types of visualizing.

With regard to open-ended questions, H_4 proved strongly true across all three datasets. Visualizers used more words to explain their answers than Non-visualizers and Possible Visualizers. Visualizers averaged 56 characters per open-ended question in OASIS 2000, followed by 51 for Possible Visualizers, and 43 for Non-visualizers. In TNIS, Visualizers averaged 60 characters per open-ended question, almost twice as many as both other groups. In OASIS 2001, Visualizers averaged 53 characters per open-ended question, compared to 48 for Possible Visualizers and 46 for Non-visualizers.

Table 6: Dependent Variables by Visualizer Scale[4]

Dependent Variables	Visualizer Scale	OASIS 2000		TNIS 2001		OASIS 2001	
		Mean (s.d.)	Sig. Tests	Mean (s.d.)	Sig. Tests	Mean (s.d.)	Sig. Tests
Interview length	Visualizer	16.2 (4.4)	F = 2.6 (df = 2)	17.8 (6.2)	F= 3.5 (df = 2)	23.4 (6.2)	F = 1.3 (df = 2)
	Possible visualizer	15.7 (4.0)		16.3 (5.2)		23.3 (5.7)	
	Non-visualizer	16.6 (5.0)	p = .074	16.9 (6.1)	p = **.031**	24.3 (8.2)	p = .276
Item nonresponse	Visualizer	1.8% (2.6)	F = 8.7 (df = 2)	1.8% (2.4)	F = 3.8 (df = 2)	2.6% (3.3)	F = 18.2 (df = 2)
	Possible visualizer	2.0% (2.8)		1.5% (1.9)		2.8% (3.9)	
	Non-visualizer	3.1% (5.0)	p ≤ **.000**	2.0% (3.1)	p = **.024**	4.7% (5.1)	p ≤ **.000**
Volunteered answers	Visualizer	3.5% (3.4)	F = 1.0 (df = 2)	4.8% (3.5)	F = 3.0 (df = 2)	3.0% (3.2)	F = 1.5 (df = 2)
	Possible visualizer	3.8% (3.3)		4.1% (3.2)		3.2% (3.4)	
	Non-visualizer	3.6% (3.4)	p = .366	4.1% (3.3)	p = **.050**	3.6% (4.1)	p = .220
Open-ends mean	Visualizer	56.0 (49.7)	F = 4.2 (df = 2)	60.5 (83.4)	F = 27.0 (df = 2)	53.0 (35.3)	F = 3.2 (df = 2)
	Possible visualizer	50.8 (40.5)		33.6 (36.6)		48.1 (34.5)	
	Non-visualizer	43.3 (43.6)	p = **.015**	32.6 (29.4)	p ≤ **.000**	45.8 (31.4)	p = **.040**
Survey belief: Unimportant; no or little impact	Visualizer	34%				49%	
	Possible visualizer	42%				51%	
	Non-visualizer	41%				66%	
Mixed	Visualizer	42%				32%	
	Possible visualizer	37%				34%	
	Non-visualizer	37%				24%	
Important; impacts lives	Visualizer	24%	Chi^2 4.7 (df = 4)	*Not available*		18%	Chi^2 16.7 (df = 4)
	Possible visualizer	22%				15%	
	Non-visualizer	22%	p = .158			9%	p ≤ **.001**

H_5 argued that Visualizers will ascribe greater importance to survey participation than Non-visualizers. Figure 1 confirms this expectation. In 2000, 16 percent of Non-visualizers said survey participation was not important, compared to just 7 percent of Visualizers (Chi^2 = 10.6, d.f. = 4, p = .016). In 2001, the same findings are much stronger; 19 percent of Non-visualizers said survey participation was unimportant, compared to 6 percent of Visualizers. Moreover, 29 percent of Visualizers said survey participation was very important, compared to just 9 percent of Non-visualizers (Chi^2 = 42.2, d.f. = 4, p<.000).

H_6 maintained that Visualizers will believe surveys will impact their lives more than Non-visualizers do. While the results, illustrated in Figure 2, are not statistically significant, the patterns in 2001 lend some support to the hypothesis. Thirty-five percent of Non-visualizers said surveys impact their lives "not at all," compared to 26 percent of Visualizers. And 40 percent of Visualizers said surveys impact their lives "a great deal" or "some," compared to 32 percent of Non-visualizers.

[4] Significant findings better than p = .05 are indicated in all tables in **bold**. All significance tests are one-tailed.

The results for respondents' combined beliefs about survey importance and impact also generally support H_5 and H_6 (Table 6, last panel). Visualizers generally attribute greater importance and impact to survey research than others do. In 2001, for example, 18 percent of Visualizers said that surveys were both important and impacted their lives, compared to 9 percent of Non-visualizers. Fully 66 percent of Non-visualizers believe that surveys are both unimportant and have little or no impact on their lives, compared to 49 percent of Visualizers. The Possible Visualizers fell in between. In 2000, the same patterns appear, but are less distinct and significant than in OASIS 2001.

Figure 1: Telephone Surveys' Importance by Visualizer Scale, OASIS 2000 and 2001

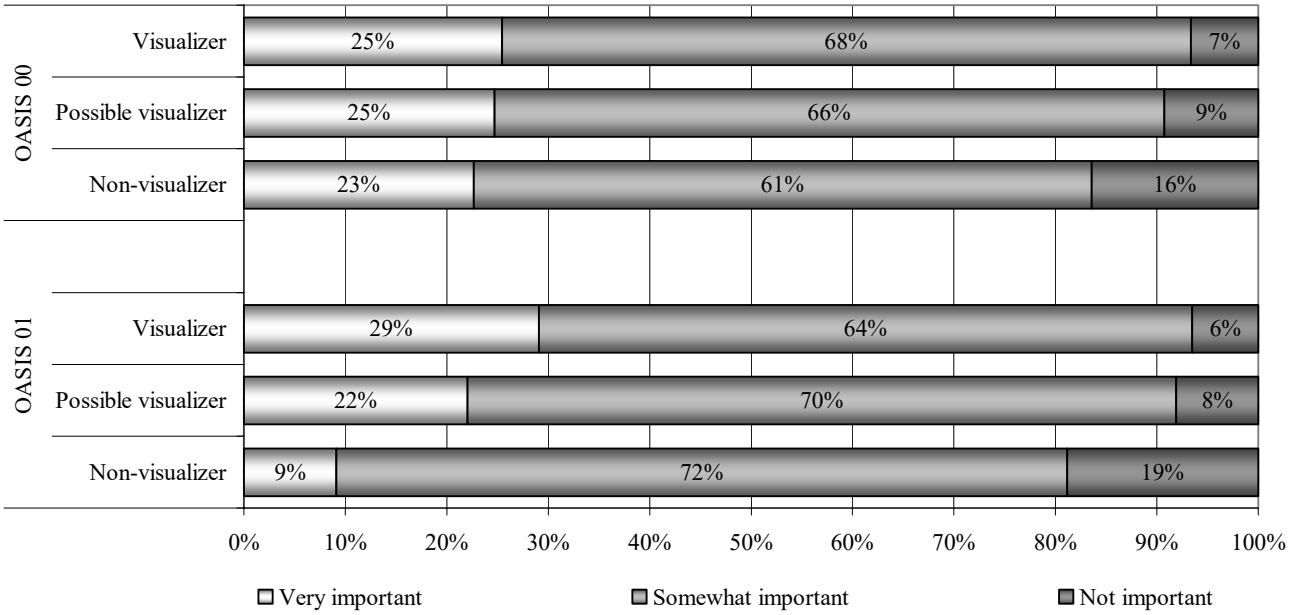
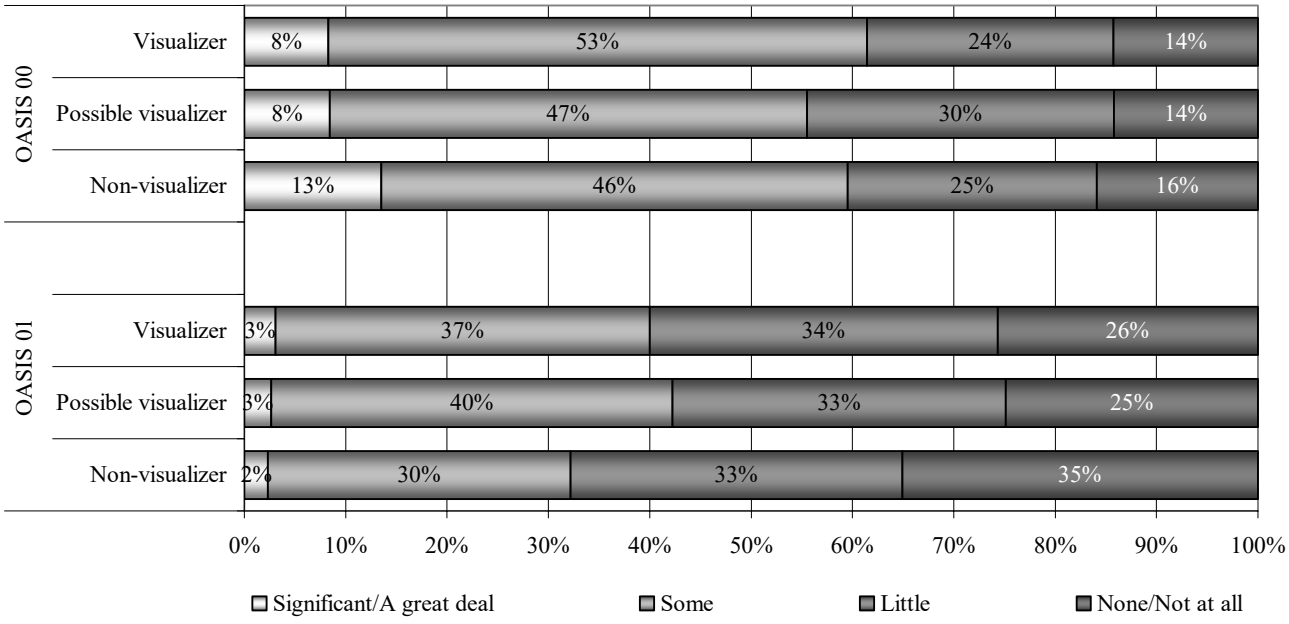


Figure 2: Telephone Surveys' Impact by Visualizer Scale, OASIS 2000 and 2001



(See footnote 3 for slight question wording changes in 2001.)

Multivariate Data Analysis

H_7 argued that the ability to visualize would better measure task dedication and task alienation than educational attainment. To ascertain the relative explanatory power of visualizing and education, this section of analysis employs ordinary least squares regressions. Standardized betas are presented to determine the relative size of the effects of visualizing and education, net of control variables. I structure the analysis in two steps. First, I regress each of the five indicators of task dedication on the Visualizer Scale and education alone. Then, I enter theoretically-relevant independent variables that pertain to the dependent variables and are common to each of the three datasets. Below I define those variables and describe their theoretical importance to task dedication and task alienation; see Table 7 for their descriptive statistics.

Common Independent Variables

Education. Respondents' educational attainment is a crucial independent variable for this study. In the prevailing theoretical paradigm, more cognitively sophisticated respondents are better able to comprehend questions, search their memories for relevant information, decide upon answers, and convey their answers clearly. Researchers typically use educational attainment as a proxy for "cognitive sophistication" to explain variation in response behaviors. Education and visualizing should correlate, but imperfectly since the ability to visualize spontaneously in a telephone interview is not part of standard academic curricula, and it may represent an inherited, not achieved, trait.

Each survey used the same question to determine educational attainment: *"What is the highest level of education you have completed?"* Each had the same nine answer categories: 0-8 years, no GED; 8-12 years, no high school diploma or GED; high school diploma or GED; some college, no degree; Associate's degree (AA, AS); Bachelor's degree (BA, BS, AB); Master's degree (MA, MS, MBA); Doctorate or professional degree (PHD, JD, EDD, MD, DDS); and an "other" category. Less than one percent of respondents in each survey reported "other." Prior OSRL surveys showed that respondents often use "other" education category to indicate certificate training gained at a community college, such as licensed massage therapy or helicopter pilot training. For this reason, "other" was recoded into "some college." Associate's degree also was merged with "some college" because just six or seven percent of respondents stopped their education at that level in all three surveys. Graduate degrees were combined into a single variable.

Table 7: Descriptive Statistics on Common Independent Variables

Variables	OASIS 2000		TNIS 2001		OASIS 2001	
Education						
< High school diploma	7.5%		7.8%		7.2%	
High school diploma	22.9		27.9		21.3	
Some college, no degree	35.7		36.6		36.7	
Bachelor's degree	21.8		17.7		21.3	
Graduate degree	11.2		9.3		13.5	
	Range	**Mean (s.d.)**	**Range**	**Mean (s.d.)**	**Range**	**Mean (s.d.)**
Age	18-93	47.4 (17.4)	18-92	48.8 (17.6)	18-95	47.3 (17.1)
Positive re: state agencies	0-5	3.76 (1.04)	0-5	3.68 (1.22)	0-4	3.40 (.78)
Skeptic	0-1	.123 (.33)	0-1	.045 (.21)	0-1	.369 (.48)
Difficult respondent	0-1	.068 (.25)	0-1	.074 (.26)	0-1	.065 (.25)

Table 8 shows that visualizing does, indeed, vary positively and significantly with educational attainment. Far more Non-visualizers stopped their education with a high school diploma than Visualizers: 49 percent *vs.* 26 percent in OASIS 2000, 46 percent *vs.* 26 percent in TNIS, and 37 percent *vs.* 25 percent in OASIS 2001. Not shown here is that almost twice as many Visualizers completed college degrees than Non-visualizers: 39 percent *vs.* 18 percent in OASIS 2000, 36 percent *vs.* 19 percent in TNIS, and 43 percent *vs.* 27 percent in OASIS 2001. Also not shown are the strongly significant bivariate correlations between education and the Visualizer Scale: $r = .16$ in OASIS 2000, $r = .24$ in TNIS, and $r = .14$ in OASIS 2001, all $p < .000$. These results suggest that visualizing and education may prove to be complementary predictors of task dedication.

Age. Because it is easy to conflate the results of natural aging processes with signifiers of task dedication and alienation, age is an important control variable for this analysis. The ability to visualize, to hear questions, and to comprehend them declines

as age increases. This gradual biological progression could result in longer interviews, more item nonresponse, and other characteristics of task alienation for older respondents. On the other hand, as age increases, survey respondents often have more leisure time to participate and, indeed, some welcome the social interaction; these factors could increase interview length and answers to open-ended questions, which characterize task dedication.

Each survey determined age with the same question: *"How old are you?"* This question typically started the demographic question group at the end of each survey. Interviewers recorded age in two digits. The age range of respondents in each survey was virtually identical, from 18 into the mid 90s, with an average age between 47 and 49 – slightly greater than the mean age of Oregon adults. For this analysis, I grouped age into the following categories: 18-29, 30-39, 40-49, 50-59, 60-69, and 70 or greater. In the multivariate analysis, I experimented with using age as a continuous – rather than categorical – variable, but the results were virtually identical. I also experimented with using age squared in the multivariate models to capture potential nonlinearities, but the results were equivocal. Table 8 shows that Non-visualizers tend to be older and Visualizers tend to be younger, but the results vary substantially across the three surveys. The age patterns in OASIS 2001 best fit predictions: Visualizers' mean age is 45, compared to Non-visualizers' mean age of 51.

Table 8: Independent Variables by Visualizer Scale

Independent Variables	Visualizer Scale	OASIS 2000		TNIS 2001		OASIS 2001	
		Mean (s.d.)	Sig. Tests	Mean (s.d.)	Sig. Tests	Mean (s.d.)	Sig. Tests
Education (percent ≤ high school diploma)	Visualizer	26%	Chi^2 35.2	26%	Chi^2 83.0	25%	Chi^2 36.6
	Possible visualizer	29%	(df = 8)	20%	(df = 8)	29%	(df = 8)
	Non-visualizer	49%	p < **.000**	46%	p < **.000**	37%	p < **.000**
Age (mean, s.d.)	Visualizer	46.4 (17.0)	F = 0.90	49.8 (17.9)	F =2.61	45.1 (15.8)	F =7.86
	Possible visualizer	48.1 (17.0)	(df = 2)	46.5 (15.8)	(df = 2)	48.4 (17.0)	(df = 2)
	Non-visualizer	47.5 (19.7)	p = **.**405	49.4 (18.1)	p = **.037**	50.9 (19.1)	p < **.000**
Positive re: state agencies (mean, s.d.)	Visualizer	3.81 (.96)	F = 3.72	3.58 (1.26)	F = 1.04	3.44 (.73)	F = 4.00
	Possible visualizer	3.79 (1.05)	(df = 2)	3.66 (1.18)	(df = 2)	3.46 (.81)	(df = 2)
	Non-visualizer	3.54 (1.14)	p = **.012**	3.72 (1.21)	p = .354	3.26 (.81)	p = **.019**
Skeptic (percent)	Visualizer	7%	Chi^2 44.2	5%	Chi^2 0.2	32%	Chi^2 17.6
	Possible visualizer	11%	(df = 2)	4%	(df = 2)	35%	(df = 2)
	Non-visualizer	29%	p < **.000**	4%	p = .455	50%	p < **.000**
Difficult respondent (percent)	Visualizer	9%	Chi^2 8.6	8%	Chi^2 1.7	7%	Chi^2 0.5
	Possible visualizer	4%	(df = 2)	5%	(df = 2)	6%	(df = 2)
	Non-visualizer	9%	p = **.007**	8%	p = .218	6%	p = **.**396

Positive re: State Agencies. All three surveys included questions asking respondents to rate their feelings about certain state agencies. The OASIS questions took the form: *"How would you rate your feelings about [state agency] in general? Do you feel very positive, somewhat positive, somewhat negative, or very negative?"* The questions' objects included the Oregon Department of Transportation, Oregon State Parks, Oregon State Lottery, Oregon police officers, and the DMV (Driver and Motor Vehicles Division), but each survey had different combinations of agencies. TNIS included satisfaction questions with how the state transportation department fulfills certain obligations. These questions took the form: *"How satisfied are you with how the transportation department maintains Oregon's roadside rest areas – are you very satisfied, somewhat satisfied, not very satisfied, or not at all satisfied?"* Other items included communicating with the public about construction projects and road closures, maintaining highways, roads, and bridges, improving highways, roads, and bridges, and planning to meet the state's future transportation needs.

While satisfaction with one state agency differs from a general positive orientation to multiple agencies, these variables are likely to operate similarly vis-à-vis the dependent variables. That is, respondents who highly regard state agencies are likely

to exhibit task dedication on surveys sponsored by those state agencies, whether their regard is rooted in generalized positive feelings or satisfaction. But feeling positively toward state agencies provides no reasoned basis for specific predictions on each task dedication measure.

The scales comprise counts of positive answer categories, but they differ for each survey by the number of such questions asked. For OASIS 2000, the scale ranges from zero to five, with a mean of 3.8. And for OASIS 2001, it ranges from zero to four, with a mean of 3.4. For TNIS, the scale counts "satisfied" answers to five questions; it ranges from zero to five, with a mean of 3.7. Visualizers show significantly greater positivity toward state agencies in the OASIS 2000, with a score of 3.8 compared to Non-visualizers' score of 3.5. OASIS 2001 shows a similar pattern. The lack of significant differences in TNIS is likely to be due to all items relating to one state agency.

Skeptics. In examining respondents' answers to the word association questions, I quickly noticed that certain respondents offered skeptical answers, no matter what the question's topic. For example, in OASIS 2000, 12 percent of respondents gave skeptical answers to the global warming question, such as "environmental nuts," "media hype," "hogwash," "it's a lie; no one bothers to check the truth," "unproven," "I kind of like it," "I don't believe it's true," and "I think it's not going to happen; natural resources will heal itself. *(sic)*" In TNIS, five percent of respondents gave skeptical answers to the equality or inequality stimulus, including "poor me," "get over it," "excuses," "arrogance," "the white guys getting the shaft," "I don't believe in it – I believe that we are all equal," and "I don't think anybody is equal."

Skepticism in OASIS 2001 is particularly important for this analysis because it represents these respondents' meanings about surveys, political poll, and the census. These meanings, which are theoretically derived in interactions with others, are likely to bear directly on task alienation. Skeptics are more likely to have negative beliefs about surveys, which in turn could associate with higher item nonresponse, and other indicators of task alienation. In OASIS 2001, fully 37 percent of respondents gave skeptical answers to the stimuli census, survey, and including "biased," "I question the accuracy," "statistics irrelevant and can be manipulated," "somebody sitting away in an office trying to explain away all the data," "a lot of silly questions that force people into very short answers without a thoughtful discussion of the issues," and "someone trying to get information to try to affirm something they have already decided on." Most skeptical answers concerned political polls. Only three respondents gave skeptical answers to the census stimulus.

Skeptic is operationalized as a dummy variable, 1=skeptic, 0=other. As predicted, Non-visualizers were substantially and significantly more likely to voice skeptical word associations than were Visualizers in OASIS 2000 and 2001: 29 percent compared to 7 percent and 50 percent compared to 32 percent, respectively. The lack of statistical significance in TNIS is likely because the object of the word association question was purely an idea, not a thing.

Difficult Respondent. This variable was operationalized by examining comments that OSRL interviewers could voluntarily add at the end of an interview. Examining these interviewer observations individually, I created a dummy variable indicating difficulties interviewers mentioned. These difficulties included problems with English as a second language, getting respondents to participate, respondents' objections to question wording, respondents' hearing and understanding questions, and respondents seemingly under the influence. They also included interviewers' self-congratulation for getting through especially difficult interviews. Several respondents demanded extra effort from interviewers, e.g., insisting that they record a special opinion or observation for delivery to the survey sponsor. These respondents were also coded as difficult.

In all three surveys, interviewers labeled about seven percent of respondents as "difficult." The extent to which difficult respondents visualize is difficult to anticipate. Some respondents may be difficult because they are task alienated, causing interviewers to exercise more skill to nudge them through interviews, which in turn could associate with longer interviews, more item nonresponse, and fewer words per open-ended question. Alternatively, task-dedicated respondents may give interviewers problems if they demonstrate their desire to supply complete and thorough data with over-long interviews and demands that interviewers convey their unique observations. In fact, Table 8 shows that interviewers slightly more often labeled Visualizers difficult than they did Non-visualizers.

Multivariate Results

Table 9 shows the results of, first, regressing the five task dedication dependent variables on the Visualizer Scale and education alone (the Base Model) and then entering four theoretically-relevant independent variables, common to all three datasets (the Common Model). Not surprisingly, the four additional variables in the Common Model substantially improve the fit and significance of all 14 equations. Importantly, the results for the two key variables remain stable in the Common

Models; i.e., the standardized betas for 27 of the 28 visualizing and education variables maintain their relative size, sign, and significance after other explanatory variables enter the equations. Moreover, in 10 of 14 equations, the Visualizer Scale's betas are larger in absolute size, consistent with expectations (H_7). The Visualizer Scale's betas are significant, strongly positive, and consistent for open-ended answers across the three surveys; they are also significantly positive for interview

Table 9: OLS Regressions of Visualizing in Base and Common Models

Dependent Variables	Independent Variables	OASIS 2000				TNIS				OASIS 2001			
		Beta	**R^2**	**F**	**p**	**Beta**	**R^2**	**F**	**p**	**Beta**	**R^2**	**F**	**p**
BASE MODEL													
Interview length	Visualizer scale	.03	.01	5.4	**.01**	**.06**	1%	4.3	**.01**	-.04	.01	3.8	**.02**
	Education	**-.11**				**-.08**				**-.08**			
Item nonresponse	Visualizer scale	**-.06**	.01	2.4	.12	-.02	1%	3.8	**.02**	**-.19**	.04	16.5	**.00**
	Education	-.02				**-.08**				-.05			
Volunteered answers	Visualizer scale	-.03	.00	0.4	.64	**.07**	1%	3.8	**.02**	-.05	.00	1.4	.25
	Education	**.01**				**-.07**				-.03			
Open-end mean	Visualizer scale	**.11**	.02	6.5	**.00**	**.21**	4%	22.9	**.00**	**.08**	.01	4.22	**.02**
	Education	**-.07**				**-.08**				**.06**			
Survey beliefs	Visualizer scale	-.04	.00	0.7	.48	*Not available*				**-.13**	.02	6.68	**.00**
	Education	.00								.03			
COMMON MODEL													
Interview length	Visualizer scale	.04	.17	30.4	**.00**	**.06**	.13	25.3	**.00**	-.01	.05	7.0	**.00**
	Education	**-.11**				**-.09**				**-.07**			
	Age	**.22**				**.22**				**.18**			
	Positive re: state	**-.19**				**-.12**				**-.11**			
	Skeptic	.03				**.06**				-.05			
	Difficult resp't	**.23**				**.21**				-.03			
Item nonresponse	Visualizer scale	**-.06**	.10	16.1	**.00**	-.03	.14	26.8	**.00**	**-.15**	.11	15.9	**.00**
	Education	-.03				**-.09**				-.04			
	Age	**.20**				**.19**				**.24**			
	Positive re: state	**-.15**				**-.30**				**-.13**			
	Skeptic	-.03				-.03				-.03			
	Difficult resp't	**.14**				.01				.01			
Volunteered answers	Visualizer scale	-.01	.09	14.6	**.00**	**.07**	.07	11.9	**.00**	-.02	.05	6.9	**.00**
	Education	.01				**-.07**				-.01			
	Age	**.17**				**.22**				**.11**			
	Positive re: state	**-.20**				**-.10**				**-.18**			
	Skeptic	**.05**				**-.05**				.05			
	Difficult resp't	**.09**				.01				.01			
Open-end mean	Visualizer scale	**.16**	.11	18.5	**.00**	**.22**	.09	15.6	**.00**	**.11**	.04	4.7	**.00**
	Education	**-.07**				**-.09**				**.06**			
	Age	**.12**				**.12**				**.13**			
	Positive re: state	**-.18**				.00				**-.08**			
	Skeptic	**.16**				**.14**				.02			
	Difficult resp't	**.08**				**.07**				-.03			
Survey beliefs	Visualizer scale	-.02	.03	4.2	**.00**	*Not available*				**-.11**	.04	4.9	**.00**
	Education	.00								.03			
	Age	**.07**								.04			
	Positive re: state	**-.11**								**-.07**			
	Skeptic	**.07**								.05			
	Difficult resp't	.01								**.10**			

length and for volunteered answers in TNIS. This means that as visualizing increases, open-ended answers increase, interview length increases, and volunteered answers increase, net of the other independent variables. The Visualizer Scale is consistently negative for item nonresponse and survey beliefs, although not always significant. This indicates that as visualizing increases, item nonresponse declines, but belief in surveys' importance and impact increases.

The net effect of education, in contrast, is generally negative. This means that as education increases interview length shortens, item nonresponse declines, volunteered answers are fewer, and words per open-ended question decrease. An exception occurs in OASIS 2001, in which each increment in education added significantly to respondents' answers to open-ended questions. This result is not surprising in this particular survey, because six of its 16 open-ended questions asked respondents to explain their opinions about testing medically-impaired drivers and reporting them to authorities. Educated respondents' answers to these questions are likely to have been long and thoughtful. Only in the survey beliefs equations is education consistently insignificant; the bivariate correlations of education and survey beliefs also were insignificant in both surveys.

In five of the 14 equations, both visualizing and education were significant – in all three equations about answers to open-ended questions, and in three of the four TNIS equations. Visualizing and education have opposite signs in each equation (except OASIS 2001 with its unusual assortment of open-ended questions, as explained above). That is, the net effect of visualizing is to lengthen interviews, generate more volunteered answers, and add words to open-ended answers, but the net effect of education is generally to shorten each of these measures. These results suggest that visualizing and education operate on measures of task dedication in a complementary manner, i.e., each explains part of the variation in the dependent variables that the other lacks the ability to do. However, in four of these five equations, the effect size of visualizing exceeds education's; indeed, visualizing averages roughly two hundred percent higher in absolute terms for this dependent variable.

Age shows consistently positive and significant standardized betas in predicting this study's measures of task dedication and task alienation. As age increases, interview length, item nonresponse, volunteered answers, and open-ended answers increase, as does belief in the importance and impact of survey research. Interestingly, age is also the only consistently significant co-predictor when both the visual scale and education are simultaneously significant; yet age does not seem to decrease the power of either other measure. Importantly, the size of the standardized betas for age generally exceeds those for visualizing and education in most equations. When it does not, the size effect of the Visualizer Scale consistently exceeds those for age; see the equations for open-ended answers in OASIS 2000 and TNIS, and the survey beliefs equation in OASIS 2001.

Positive attitudes toward state agencies are also consistently strong predictors of task dedication and task alienation, across all equations. The effect of these attitudes was, unlike age, consistently negative. That is, the more positive respondents' attitudes were, the shorter their interviews, the lower their item nonresponse, the fewer their volunteered answers, the shorter their answers to open-ended questions, and the more negative their beliefs about survey research. I predicted that positivity toward state agencies would coincide with task dedication, but this unexpected combination of results may lead to re-thinking the characteristics of task dedication. As with age, the effect sizes for positive attitudes toward stage agencies exceed those for visualizing and education in most equations and, when it does not, the effect sizes for visualizing consistently exceed those for education, again in the equations for open-ended answers in TNIS and the survey beliefs equation in OASIS 2001.

Skeptics showed some significant relationships with the dependent variables, net of the other predictors, despite the fact that each measure of skepticism derived from responses to very different word association questions. Skepticism in response to global warming in OASIS 2000 resulted in significant positive standardized betas for volunteered answers, answers to open-ended questions, and survey beliefs. Specifically, skeptics offered one-half more of an answer volunteered outside the given categories and 22 more words per open-ended question than non-skeptics, net of other predictors. Both response behaviors are indicators of task dedication. Paradoxically, skeptics also held significantly more negative beliefs about the importance and impact of surveys than non-skeptics. One interpretation of such seemingly contradictory findings is that skeptical respondents begrudge the survey process, but take it seriously, as a chance to vent their opinions. Skeptical responses about the equality/inequality stimuli in TNIS resulted in significantly longer interviews (almost two minutes), fewer volunteered answers (almost one), and 31 more words per open-ended question. In OASIS 2001, skeptical answers to surveys, political polls, and the census had no significant effects in any of the five equations (although for coefficients on interview length and survey beliefs approached significance at $p = .06$). This finding is unique, for respondents' skepticism reflects one of the meanings they give to data collection instruments – meanings that theoretically derive from interactions. Yet skeptical meanings did not affect response quality, whether measured unobtrusively or directly. The most likely explanation for this non-result is that skepticism for political polls differs from skepticism for surveys and the census; combining them into a single measure removes their individually distinctive effects.

Difficult respondents, derived from interviewer observations, significantly differed from others in three areas in OASIS 2000. Controlling for other variables, they had longer interviews (4 minutes longer), volunteered more answers outside of answer categories (1.2 more), and answered with more words per open-ended question (15 more). In TNIS, difficult respondents also averaged significantly longer interviews (by 5 minutes) and more words per open-ended question (13 more). In OASIS 2001 difficult respondents differed only in their significantly more negative beliefs about the importance and impact of survey research.

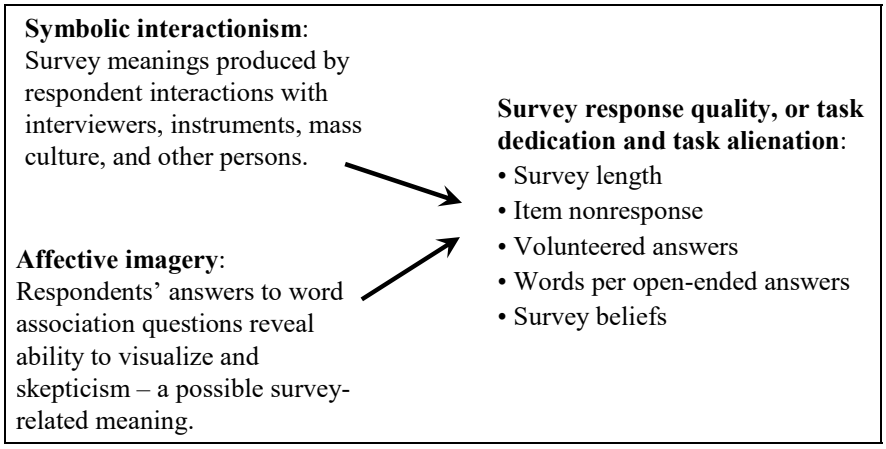
Overall, the models worked best explaining variation in interview length and words per open-ended answer, i.e., the number of predictors that matched expectations in direction and significance exceeded other dependent variables' results. The model also worked better for unobtrusive measures than for respondents' beliefs about surveys' importance and impact, which was directly-measured. In the future, I recommend treating survey beliefs as an independent variable predicting the unobtrusive measures of survey response quality, not as a dependent variable in its own right. Also, the model worked much better for OASIS 2000 and TNIS than it did for OASIS 2001; I can only speculate that the reasons are associated with the facts that OASIS 2001 interviews lasted substantially longer and that its respondents held substantially more negative beliefs about surveys, on average. This underscores the idea that survey beliefs might best operate as an independent variable and further suggests that interview length might be an important control variable for models of response quality, in addition to serving as one indicator itself of response quality.

Of course, these simple regression models are incomplete. They lack standard control variables, such as urban/rural, sex, and race/ethnicity, although nothing in the theoretical development of this approach suggests that such controls are necessary. They also lack potential independent and control variables unique to each survey. For example, the racial profiling questions in OASIS 2001 added significantly to respondents' wordiness in open-ended answers. The OASIS surveys offer indicators of foreign born, which could serve as an important control variable for language comprehension. The OASIS surveys also included behavioral indicators of volunteerism and environmentalism that could be developed as theoretically consistent predictors of task dedication. Certain indicators in TNIS could be theoretically consistent with task alienation. In addition, the best models for certain indicators of response quality might include either visualization or education, but not both. This study's goals, however, were more modest than to develop unique models for each dependent variable for each of the three surveys. Instead, the goal was to test a basic model of visualization with common predictors across three varying surveys.

Discussion and Conclusions

This paper began by combining symbolic interactionism and affective imagery analysis as an approach for understanding the quality of survey response. From an interactionist perspective, the meanings respondents develop from their interactions with interviewers, their interactions with instruments, and their prior stock of knowledge about survey research determines, in part, the quality of their survey response, i.e., whether they behave as task-dedicated or task-alienated respondents. Affective imagery analysis is also important for understanding survey response quality because respondents' ability to give visual answers to word association questions and patterns of meanings within answers, e.g., skepticism, correlate with task dedication and task alienation. Figure 3 sketches this model.

Figure 3: Schematic for Theoretical Model



This investigation aimed to determine more systematically whether the ability to visualize affects the quality of survey response. I measured response quality with four unobtrusive measures of respondent behavior – interview length, item nonresponse, answers volunteered beyond the categories offered, and words per open-ended answer – and one direct measure of respondents' beliefs about surveys' importance and impact. The four unobtrusive measures have several advantages over answers to survey questions, such as avoiding social desirability and acquiescence biases. The ability to visualize was determined by revisiting and coding 3,505 open-ended answers to six widely-differing word association stimuli for 2,703 respondents in three surveys conducted with identical data collection protocols in 2000 and 2001. The coding effort resulted in a simple tripartite Visualizer Scale comprising Non-visualizers, Possible Visualizers, and Visualizers. While the fact that each of the three surveys contained different questions, appropriate to each one's purpose and content, testing the hypotheses on three distinct surveys also tests the robustness of the theoretical notions behind the analysis.

Summary of Findings

I found that respondents' ability to generate visual answers depends upon the type of stimulus and the type of word association question used to elicit response. As predicted, stimuli that are objects, nouns, or things (in this case, surveys, political polls, and the U.S. census), paired with questions that specifically probe respondents to distinguish images from thoughts, generated the most visual answers. Stimuli that are solely concepts or ideas (in this case, equality or inequality), paired with a question that combined thoughts and images, generated the most non-visual answers. A stimulus that could be considered either an image or an idea (global warming), paired with the same combined thought/image question, generated the most "possibly visual" answers. No matter what the stimulus, Visualizers tend to be younger and better educated than Non-visualizers, and Visualizers voiced stronger and more positive feelings about state agencies. Relatively few Visualizers were found among skeptics and difficult respondents.

As predicted, Visualizers' interviews tend to last longer, show less item nonresponse, have more answers volunteered beyond provided categories, and have more words per open-ended answer than Non-visualizers. Visualizers also tend to believe in surveys' importance and impact more than Non-visualizers. However, each survey showed some exceptions in these results' magnitude and direction. Results for the final hypothesis, that the effect of visualizing would exceed the effect of education in multivariate analysis, were mixed in interesting and important ways.

Respondents' ability to visualize is at least as important as education as a predictor of survey response quality, as shown in the size and significance of standardized betas in multivariate analyses. Visualization appears to explain certain measures of response quality better than education, particularly words per open-ended answer and, to a lesser extent, item nonresponse. Education better explains interview length than visualization. More importantly, visualization and education often operate in opposite directions. For example, an increment in education tends to reduce interview length, words per open-ended answer, and answers volunteered outside provided categories, but an increment in visualization tends to increase them. Initially, I expected that visualization would contribute more to task-dedicated survey behaviors than education. Such results as these, however, lead me to consider revising these notions. Now, it appears that visualizing and education capture unique and complementary aspects of respondents' response behavior. In retrospect, such results are not surprising because visualization and education fundamentally differ. The ability to visualize spontaneously in a telephone interview is not part of standard academic curricula; indeed, it may represent an inherited, not achieved, trait. Visualization represents one type of intelligence among many that contributes independently to understanding the quality of survey response.

The multivariate models also suggest that the ability to visualize matters just as much as not being able to visualize. In OASIS 2001, in which respondents generated the most visual answers, the Visualizer Scale was significant in three of five equations. TNIS generated the most non-visual answers and the Visualizer Scale was significant in three of four equations. OASIS 2000 produced the "mushiest" results, with the most "possibly visual" answers, and the Visualizer Scale was significant in just two of five equations. In the future, dummy variables for Visualizers and Non-visualizers might clarify analyses by excluding the "Possible Visualizers."

Returning to Theory

This research is rooted in the symbolic interactionist paradigm. From this perspective, people produce and negotiate their meanings about surveys in their interactions with others (i.e., how others act toward surveys), with the larger culture (e.g., mass media), with interviewers (such as the interviewers' voices; Maynard, van der Zouwen, Schaeffer & Houtkoop 2002), and with survey instruments (e.g., topics and types of questions). The creation of meanings is a fluid, ongoing process of assigning, amending, and revising meanings. Respondents' survey meanings are important because they determine response behaviors and their quality. When respondents' survey meanings cohere with basic survey tasks, they set aside any secondary concerns and behave in a task-dedicated manner, i.e., providing accurate, complete, and truthful information in response to

survey questions (Gumbhir & Gwartney 2001). When respondents' survey meanings are incongruent with basic survey tasks, e.g., when respondents are hesitant about a survey sponsor or lack knowledge about the survey topic, they approach the answering process with more apathy, carelessness, and thoughtlessness. Affective imagery analysis is one way to capture respondents' survey meanings indirectly, e.g. skeptics.

While the interactionist concepts of task dedication and task alienation resemble the cognitive concepts of "optimizing" and "satisficing," they differ substantially in how they explain the quality of survey response. Optimizing respondents carefully interpret questions, search their memories for relevant information, integrate that information into answers, and convey their answers clearly (Krosnick 1999). Satisficing behaviors include respondents not concentrating on question meanings, making insincere efforts to interpret questions, indiscriminately choosing answer categories, and, worse, selecting reasonable-seeming answers without internal exertion to identify their true answers.

The cognitive approach explains the quality of survey response by focusing on task difficulty, respondents' abilities, and respondents' motivation. The symbolic interactionist perspective explains the same behaviors by examining respondents' meanings about surveys, how those meanings unfold throughout the survey process, the extent to which those meanings cohere and influence respondents' behaviors, and role expectations between the interviewer and respondent (Maynard, et al. 2002). One particular strength of the interactionist approach is that it better explains how respondents' motivations to complete a survey emerge as a product of socially-constructed meanings. The meanings that individuals ascribe to surveys influence their participation decision and, once they agree to take part, their response behavior as the interview unfolds.

But what does visualizing have to do with it? This investigation's findings about respondents' ability to visualize appear to contribute to both the cognitive and symbolic interactionist approach. On one hand, the ability to visualize represents a type of cognitive intelligence which operates independently of education in explaining survey response quality and it significantly adds to the understanding of response quality. On the other hand, the patterns of images that visualizers provide help direct us to their meanings about surveys and how those meanings affect survey response, e.g., skepticism. Future research using affective imagery analysis to understand survey meanings should more fully exploit the affective part of affective imagery. This investigation focused on imagery but ignored the affective, i.e., good/bad or positive/negative feelings that respondents express about their images. Clearly, these evaluative aspects of meanings should affect response quality too.

References

Blumer, H. (1969). *Symbolic Interactionism: Perspective and Method*. Englewood Cliffs, NJ: Prentice-Hall.

Deese, J. (1965). *The structure of associations in language and thought*. Baltimore, MD: Johns Hopkins Press.

Freud, S. (1924). *Collected papers*. London: Hogarth.

Galton, F. (1880). Psychometric experiments. *Brain, 2*, 149-162.

Groves, R.M. 1989. *Survey Errors and Survey Costs*. New York: John Wiley & Sons.

Gumbhir, V.K., & Gwartney, P.A. (2001). Differentiating dedicated from alienated respondents: An empirical test of interactionist concepts. Annual Meeting of the American Association for Public Opinion, Montreal, Canada.

Gumbhir V.K., & Gwartney, P.A. (2002). Further experiments differentiating dedicated from alienated respondents. Pacific Sociological Association annual meeting, Vancouver BC.

Gwartney, P.A., Gumbhir, V.K., & Leiserowitz, A.A. (2004). Task dedication, task alienation and what data collection instruments mean to respondents. International Sociological Association, Sixth International Conference on Social Science Logic and Methodology, Amsterdam, Netherlands.

Krosnick, J.A., Narayan, S.S. and Smith, W.R. (1996). Satisficing in surveys: Initial evidence. Pp. 29-44 in: *Advances in Survey Research*, Braverman, M.T. and Slater, J.K. (Eds.). San Francisco: Jossey-Bass.

Holbrook, A.L., Green, M.C. & Krosnick, J.A. (2003). Telephone versus face-to-face interviewing of national probability samples with long questionnaires: Comparisons of respondent satisficing and social desirability response bias. *Public Opinion Quarterly* 67:79-125

Krosnick, J.A. (1999). Survey research. *Annual Review of Psychology* 50:537-67.

Maynard, D., van der Zouwen, J., Schaeffer, N.C.& Houtkoop, H. (eds.). (2002) *Interviewer-respondent interaction in the standardized survey interview.* New York: John Wiley & Sons.

Szalay, L. B., & Deese, J. (1978). *Subjective meaning and culture: An assessment through word associations*. Hillsdale NJ: Lawrence Erlbaum Associates.

Szalay, L. B., Strohl, J. B., & Doherty, K. T. (1999). *Psychoenvironmental forces in substance abuse prevention*. New York: Kluwer Academic/Plenum.

Tourangeau, R., Rips, L.J. & Rasinski, K. (2000). *The Psychology of Survey Response.* Cambridge University Press.