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April 2009

Surveying through Text Message: Planning, Programming, and Analyzing

Zannette A. Uriell
Evangeline M. Clewis



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14. ABSTRACT
Surveys conducted through text messaging, or Short Message Service (SMS), are a relatively new phenomenon, since SMS text messaging has only existed since 1992. SMS surveys are even more recent for the military population, with the first known military-population SMS survey being conducted in 2008. This report provides the method used for the early SMS surveys, named Lightning Polls when conducted by NPRST, and includes suggestions on planning for an SMS survey, programming an SMS survey, and analyzing the results.

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Foreword

In 2008, the Office of Naval Research (ONR) funded the Personnel Integration of Selection, Classification, Evaluations, and Surveys (PISCES) effort to address three deficiencies seen in the personnel arena: (1) reliance on independent, single use measures for assessing the Navy Total Force; (2) lack of measures to classify and select individuals for team assignments; and (3) lack of integration of tools to measure and predict Navy Total Force performance. One objective of PISCES is to alleviate the first deficiency by developing a set of data collections alternatives that could be used, then matching the best collection method with the type of information needed.

Lightning Poll is one of the data collection alternatives developed. It is a text messaging-based option for data collection, adapted from civilian use of text messaging for participation in television shows, among other things. This report is the first of three to outline the Lightning Poll portion of the Data Collection Alternatives project, and discusses the reasons behind considering this as an alternative as well as the mechanics of creating a Lightning Poll. The second report will provide results of the first Lightning Poll, conducted with Navy Recruiters who are authorized to use text messaging in their recruiting duties and therefore may have experience with text messaging. The third report contains results of the second Lightning Poll as well as the accompanying Telework and Technology Survey, and suggests other possible data collection alternatives based upon the results of the survey.

The authors thank ONR for their sponsorship. They also gratefully acknowledge members of the two information technology departments who were instrumental in gaining approval to purchase and use the Lightning Poll software. Within the Navy Personnel Command Chief Information Officer Department, Mr. Dell Turner and LCDR Joseph Namie; and within NPRST's Research Information Systems Management Office, ITCS Billy Freeman and ETC Derek Brown were particularly helpful at the outset of this project.

David L. Alderton, Ph.D.
Director

Contents

Introduction	1
Description of Text Messaging.....	1
Planning	3
Legality	3
Software/Hardware.....	4
Sample	4
Survey Design.....	6
Push vs Pull	7
Notification process	8
Programming	9
Administration	13
Importing users	13
Sending First Message (for “Push”ed Surveys)	14
Monitoring Messages While the Survey is in the Field	15
Analysis	16
Exporting Data	16
Data Cleaning	17
Analyses in SPSS	18
Future Directions	19
References	21

List of Figures

1. Telephone keypad.....	2
2. Adding a new Trivia Task.....	9
3. Trivia Task overview screen.	10
4. Adding questions to a survey.	10
5. Adding a survey question that has no correct answer.	11
6. Stopping the survey and sending a thank you message.	12
7. Trivia Task with steps programmed.	12
8. Import users subscreen.	13
9. Users screen, with different colors in use.	14
10. Sending text messages to multiple phone numbers.	15

11. Incoming messages, placed automatically in the Trivia folder for an active Trivia Task.....	15
12. Exporting survey data.....	16
13. Exported text message data, opened in Notepad.	17
14. Sample SPSS syntax to convert message date/time.....	18
15. Sample SPSS syntax to create a message number.....	19

Introduction

The possibility of near instantaneous, scientifically-reliable survey data gathered from a geographically dispersed group at low cost is intriguing to many survey researchers. Historically, this has not been possible; however, recent technological advances have made it feasible. Web-based surveys are close to the ideal, but typically require access to a computer, which necessitates additional time for those who are away from their home or office. The increased use of cell phones with internet access alleviates this issue, but still requires a potential respondent to take action such as checking e-mail (i.e., requires the person to “pull” information from an e-mail server) to learn that they have been selected to participate in a survey. Surveys through text messaging eliminate this step by “pushing” the survey directly to the respondent through their cell phone and providing questions almost instantly.

Realizing the possibilities of surveys through text messaging, the Navy conducted the first known Navy text message-based survey in summer 2008. This report explains the history of text messaging and some of the current uses in the civilian population, before describing the four stages that NPRST used to develop their Lightning Poll, or survey-by-text-message, capability. The first stage, Planning, includes recommendations based upon lessons learned that are useful regardless of the software package and/or contractor used to send text message surveys. The second two stages, Programming and Administration, provide steps and screen shots specific to the Lightning Poll software. The final stage, Analysis, includes some software specific information as well as suggestions for analyzing the data returned and sample SPSS syntax. A discussion of future directions of text messaging surveys is also included.

Description of Text Messaging

Because a cell phone does not restrict its user’s mobility, the location of a cell phone changes constantly. However, a great deal of information must be used to maintain connectivity regardless of the location. Within the Global System for Mobile (GSM) family of protocols, a portion of the information used to maintain that connectivity is dedicated to Short Message Service (SMS), otherwise known as text messaging. The first SMS was sent in 1992 (Grenville, 2007), and usage has been climbing since, with June 2008 statistics showing that 75 billion text messages are sent every month (CTIA, 2009). Usage by younger populations (which can be defined as those born since 1980 (Pew Research Center for the People and the Press, 2007)) is highest, and some have made news for the large number of messages that they send within one month (Mah, 2009). Results from Pew indicate that 60 percent of those between 18 and 29 years old who have a cell phone or personal digital assistant send or receive text messages in a typical day, decreasing to 32 percent of 30–49-year-olds, 14 percent of 50–64-year-olds, and 2 percent of those 65 and over (Horrigan, 2008).

In this regard, the Navy population does not appear much different from the civilian population at large. Findings show that in 2005, 61 percent of enlisted personnel sent a text message each week, with 7 percent sending 50+ messages per week (Uriell & Schultz, 2007). More recent results show that 64 percent of enlisted personnel and 59 percent of officer personnel in Generation Y (also known as Generation Next, which includes those born from 1966-1980 (Pew Research Center for the People and the Press, 2007)) sent or received text messages in the last day, decreasing to 31 percent and 32 percent of those in the Boomer generation (defined as those born in 1965 and before (Pew Research Center for the People and the Press, 2007)), enlisted and officers respectively (Schultz, Newell, Whittam, & Uriell, 2008).

Text messages are generally created on a cell phone using the QWERTY keypad (if available) or the numeric keypad, as shown in Figure 1. Using the QWERTY keypad is like using a computer keyboard, with each button assigned to a particular letter. For phones that do not have the QWERTY keypad, messages are typed by pressing the numeric keypad either 1, 2, or 3 times (or 4 times for numbers 7 and 9) to arrive at the appropriate letter. For example, an “X” would require pressing the 9 key twice. For more recent phones, there is also a function that will attempt to automatically complete the word being typed based upon the numeric keys pressed, allowing the users to only have to type each numeric key once, however sometimes the automatic completion needs to be checked since “GO” and “IN” use the same keys.



Figure 1. Telephone keypad.

Because text messages are sent as part of the processing overhead for cell phone connectivity (Stross, 2008; see Dryburgh & Hewitt, 2004, for a detailed description), they generally arrive shortly after they are sent, although this is dependent upon the cell phone reception. The cost is based upon the cell phone plan of the user; some plans allow for unlimited use for a monthly fee while others may charge 10 or 20 cents per message (incoming and outgoing). Messages are at most 160 characters, although some cell phone providers utilize some of this space; therefore, 140 characters is the suggested maximum per message.

The length of the message has not deterred their use for a variety of reasons beyond the initial use of contacting friends and family (McCarthy, 2009). Text messages are now used to coordinate events, spread information about political candidates (Graff, 2008; Kennedy, 2009), and gather donations (Kim, 2009). They are also used in emergencies for sending out city-wide emergency notifications (Chang-Yen, 2009), school closure messages, Amber Alerts (Hodgin, 2009); to interact with businesses, such as the voting in *American Idol*; advertising (Richtel, 2009); receiving coupons (Bowman, 2007); ordering products and food (The Daily Green, 2008); and even programming home electronics such as TiVo (Falcone, 2009).

Planning

Planning ahead is a key step in the process of doing a successful text messaging survey. In particular, a number of issues need to be considered early in the process, including how to gather cell phone numbers of potential respondents, how to notify potential respondents of their legal rights, and how to design question-and-answer combinations that fit within the 140 character limit of text messages.

Legality

When planning to do a text message survey, there are two laws to be aware of: the Telephone Consumer Protection Act (TCPA) of 1991 (available online from the Library of Congress at <http://thomas.loc.gov/cgi-bin/query/z?c102:S.1462.ENR>;) and the Controlling the Assault of Non-Solicited Pornography and Marketing (CAN-SPAM) Act of 2003 (available from the Government Printing Office at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ187.108), the second of which enabled the national Do Not Call list. The TCPA indicates that the sending of text messages to cell phones using an automatic telephone dialing system is prohibited without the express consent of the person receiving the message. The CAN-SPAM Act does not include messaging to those with a pre-existing relationship. While it could be argued that a member of the Navy has a pre-existing relationship with the Navy, it is recommended that you receive the consent of potential respondents prior to conducting a survey using text messaging since voluntary participation is a requirement for all Navy surveys (see OPNAVINST 5300.8 series).

Additionally, many are concerned about phishing (emails from seemingly legitimate sources such as banks that contain links to fake websites that request sensitive information such as account number or password) and identity theft, so they may be concerned about giving any information to an unknown source, be it through a phone call, an e-mail, a website, or a text message. In fact, the 2009 Navy training about Information Assurance states that Navy personnel should

not participate in text messaging surveys, so prior notification to respondents of the legitimacy of the survey is key to having a successful data collection. See the sampling section below for more details on ways to gather cell phone numbers and, thereby obtain, consent.

Software/Hardware

There are many software products and services available that can provide the tools to conduct text message surveys. Many of those available at the time of the initial Navy text message survey required that the company have access to the cell phone numbers (e.g., cell phone numbers were uploaded to a company web server, as well as question/answer messages), which would be a concern considering Navy and DoD regulations and concerns about protecting personally-identifiable information (PII) (e.g., name, SSN, phone number). Therefore, Interactive Messaging Unlimited (IMU) Pro was purchased from Pangolin Laser Systems, Inc. This software provides the flexibility to conduct a text messaging survey yourself and keep all data in-house. As part of the IMU Pro package, a wireless modem (at the time of purchase, the modem provided was the MultiModem GPRS, model MTCBA-G-U-F2, from MutiTech Systems) is included to enable the in-house computer to wirelessly send text messages to cell phones.

Because of Navy security concerns about wireless computing, a standalone Dell Precision T3400 was purchased with a 2.66GHz processor and 4GB of SDRAM. This Windows XP system was placed into a secured environment to protect the data.

A Subscriber Identity Module (SIM) card was purchased through the General Services Administration (GSA). SIM cards are now used in cell phones as additional memory and to store the cell phone's number, increasing the portability of the owner's information from one phone to another. Since the project only required a SIM card that was able to send text messages and not voice transmissions, the contract included unlimited text messaging and no voice capabilities. The SIM card was inserted into the modem and used to transmit incoming and outgoing messages.

IMU Pro is programmed to automatically hang up on incoming voice calls, which can lead to frustration for a potential respondent if they attempt to call the phone number from which they received a text message. Call forwarding, caller-ID, and/or working with the cellular carrier are options that would allow those receiving the messages to know who sent them.

Sample

Currently, an accessible database of personally-owned cell phone numbers of the Navy Total Force does not exist (and databases that may collect this information would be for emergency contact use only). There are databases for Navy-provided cell phone numbers, but this may not include the population of interest. At present, there is no standard or preferred way to obtain personal cell

phone numbers. Some suggestions include creating a registration page on a website where potential respondents can provide their demographic information and cell phone number, sending a Naval message to commands of interest asking respondents to send a text message to the survey phone number in order to start the survey, or asking respondents to provide their cell number as part of a larger survey.

Since gathering phone numbers might be the hardest part of the process, a series of surveys could be more effective, such as those that use a panel format. This would allow for a single notification, but multiple collections of data. Doing a long-term panel might require consideration of methods to refresh the panel. A text message panel has not yet been established within the Navy, so these issues are not addressed here.

Some respondents may be aboard a deployed vessel (i.e., Navy ship, or submarine) or overseas and may experience difficulties with text messaging. At present, it is unclear if text messaging is possible aboard a deployed Navy ship (i.e., distance limitations from cell phone transmitters may inhibit text messaging), but those assigned to a ship/submarine may be pier-side and thus able to participate in a text message survey.

Surveying overseas respondents presents another challenge. Overseas cell phone providers may not have an agreement with a U.S. provider to enable international text messaging. Table 1 contains a listing of participating international providers for AT&T as well as for Verizon, as obtained from their respective websites on 15 January 2009; only those overseas respondents who used one of the AT&T partners could have participated, since AT&T is the SIM card provider for the Lightning Poll. OCONUS phone numbers were not used in either of the Lightning Polls conducted by NPRST to date.

Table 1
International Participating Providers for AT&T and Verizon

	AT&T	Verizon
Bahrain	Batelco	-----
Guam	Hafatel Pulse Mobile	Guamcell Hafatel ITE Guam
Iceland	Landssiminn Nova Og Vodafone Viking Telecom	Iceland Telecom Viking Telecom
Italy	H3G Vodafone WIND	Vodafone
Japan	DoCoMo Vodafone	DoCoMo KDDI Tuka Vodafone
Spain	France Telecom Espana SA Telefonica Moviles Vodafone Xfera Moviles	Vodafone
United Kingdom	Hutchison 3G Orange O2 Vodafone	Orange O2 T-Mobile Vodafone

Note: Information obtained from company websites on 15 January 2009.

Regardless of the method for obtaining cell phone numbers, researchers must have proper Navy survey (Report Control Symbol (RCS)) and, if applicable, Institutional Review Board (IRB) approvals prior to conducting any Navy survey. For more information on RCS (examples, frequently asked questions, etc.) and IRB requirements, visit the Navy Survey Policy website at <http://www.npc.navy.mil/AboutUs/NPC/SurveyPolicy/>.

Survey Design

Survey design is both an art and a science, and this is especially true for text message surveys that are limited to 140 characters for both the question and the answer choices. When writing the survey, one must be careful not to use special characters as not all systems will interpret the characters the same. Therefore, characters should be limited to letters, numbers, and the period (.).

Acronyms (e.g., CO, POD, SOP) are used daily within Navy operations, but extreme caution must be taken in using acronyms when creating survey questions, particularly for text message surveys. Some individuals may be considered “heavy-texters”, who send several messages daily, and they may be familiar with text message lingo (see, for example, <http://www.lingo2word.com/index.php>), but it is possible that most of those receiving the survey will not be familiar with this form of short-hand. To minimize confusion and potential miscommunication of the survey questions and responses, researchers should exercise caution in using any acronym.

Because of the limited number of characters, it may be appropriate to confine answer choices to two or three options. This could possibly hinder comparisons to larger web- or paper-based surveys, but it benefits both the respondent and the programmer to keep questions within the 140 characters of a single text message. In addition, using different letters as answers to each question should be considered. For example, answers to the first question could be A, B, C, and for the second question could be X, Y, Z. Realizing that message timing might become scrambled (e.g., the respondent decides to expand on their answer to a previous question, thereby negating the easy flow of question-answer-question-answer), researchers could still match answer choices with the relevant question.

Additionally, answers need to be offset from the questions sufficiently so that respondents can easily see what the answer choices are. Each cell phone brand/model and provider handles and displays special characters differently, so the decision was made for NPRST Lightning Polls to separate each of the answers from the question with a series of periods (“How satisfied are you with your Navy job? . . . a. Satisfied . . . b. Neither . . . c. Dissatisfied”); preliminary tests showed that multiple spaces, hard returns, and special characters did not format consistently across phone models, whereas periods did.

A text message survey should be short, precise, and quick. This can be accomplished by restricting the number of questions (i.e., 5 or less). Demographic data may be gathered through other means so that the questions are not part of the text messaging survey, and then the text message responses can be linked to that demographic data during analyses.

Also consider including the question number as part of the question text message (e.g., 1., 2., 3.,...). A proxy progress bar may also be included by including the question number as well as the total number of questions (e.g., 1/3, 2/3, 3/3).

Push vs Pull

There are two techniques to be considered for the survey, depending upon the notification method. If cell phone numbers are not available and a broadcast method is used whereby the survey’s cell phone number is provided and those interested in participating are asked to send a message to that number to start the survey, this is a “pull” technique; the respondents are “pull”ing down the survey. A longer fielding period for “pull”ed surveys may be needed. For example, if

mailing letters to potential participants, some may be able to start the text message survey a week earlier than others (dependent upon how long the mail takes to arrive), so the fielding period may need to remain open to account for delays in mailing.

If a list of cell phone numbers is already available and all respondents will begin at the same time (perhaps thereby having a shorter yet delayed fielding period), this is a “push” technique where the first question is “push”ed to everyone. If using a panel (series of surveys, with known respondents and cell phone numbers), respondents may be simply awaiting the next month’s questions, so the “push” technique is faster.

An issue to be aware of when deciding between “push” vs “pull” is that messages are handled in a first-in first-out manner by IMU Pro as well as other software. When pushing survey questions to a batch of 100 respondents, there may be a delay in sending out second questions; the first person in the batch may reply to the first question and be expecting the second, but must wait to receive it until the other 99 people have received the first question. In small batches, this delay may be just a few minutes. In batches of several thousands of respondents, the delay may be more extreme (a day or two). If using a “push” technique, it is important to consider doing a series of smaller waves (groups of respondents) so that the respondent pool of 1,000 becomes 10 pools of 100, separated by a period of time such as an hour. This will allow those who are quick responders to finish their survey without waiting for delays in message sending.

It may be possible to convert a “pull” survey (e.g., unknown cell phone numbers that normally would require respondents to start as soon as they are notified by an alternate method) to a “push” survey (e.g., if desiring the start of the survey to coincide with a particular event). An option to consider would be to send a letter to respondents asking them to access a registration website prior to the text message survey, where respondents could register their cell phone number and demographic data at any time. The text message survey could then be sent at the same time to all those who have registered, regardless of the day that they received their notification letter or registered.

Notification process

All Navy-wide surveys are required to have a RCS, or license, as outlined in OPNAVINST 6300.8C. The instruction indicates that all Navy survey respondents be notified of their rights prior to beginning a survey (Chief of Naval Operations, 2008). In addition, the Navy Survey Office who requests the RCS may determine that review of the survey by an IRB is required if the survey may involve protection of human subjects issues, and the IRB may require additional consent. Because of the limited amount of space in a text message, respondents will likely need to be notified of this information through alternative means, along with notifying them of the opportunity to participate.

Part of the requirements for Navy survey approval relate to confidentiality. It may be appropriate to reiterate in plain language within the notification letter that this confidentiality includes their cell phone numbers, and that those numbers will be used only for the survey and not retained nor reused.

Respondents may lack experience in completing text message surveys nor realize that the system is automated, so the notification should also include some instructions for respondents. For example, provide a statement that respondents should only provide the letter of the answer instead of the entire answer, and that they may call a separate phone number if they have technical questions.

Costs of text messaging are dependent upon the cell phone plan that each person has chosen. Consider notifying the respondent of the number of text messages that they will use on their monthly allowance (both incoming and outgoing) when notifying them of the opportunity to participate.

Programming

The NPRST Lightning Polls were programmed with IMU Pro software. IMU Pro identifies capabilities as Tasks. There is a Voting Task, which might be effective for a single question. This was not tested since the goal of the Lightning Poll was to ask multiple questions, preferably in a manner such that a response to the first question generates the second question, repeated until reaching the end of the survey. The Trivia Task can successively send questions, and therefore was chosen for the NPRST Lightning Poll.

To begin the process, a new trivia task was created by clicking Tasks on the menu on the left, and then Trivia, yielding Figure 2.

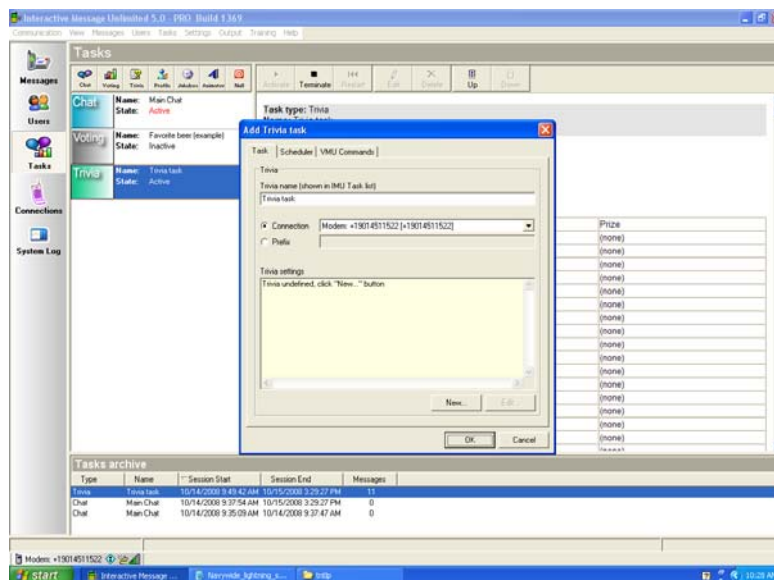


Figure 2. Adding a new Trivia Task.

Clicking OK to this screen presented an overview screen of the task (Figure 3), including start and stop dates, cell phone number of the SIM card being used, current status, and users who have completed (when there are some).

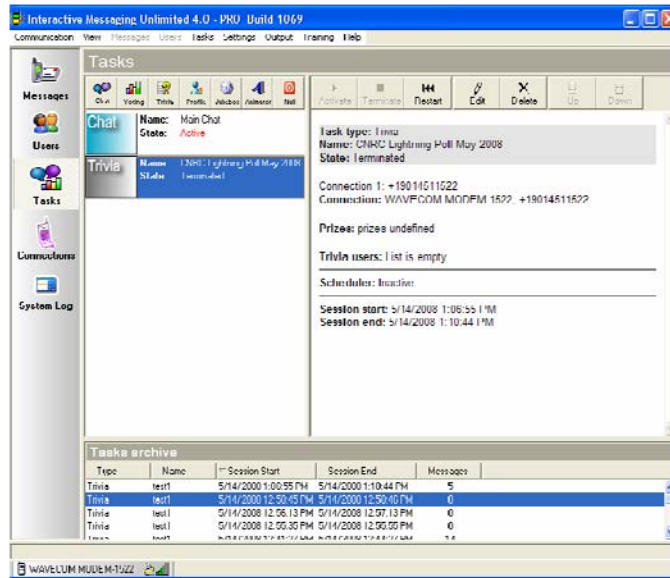


Figure 3. Trivia Task overview screen.

The new task was edited (by using the button above the overview screen) to allow creation of the survey. The two key tabs of the Trivia Setup for a survey are the Q&A Steps and Options. Q&A Steps is where questions actually are input into the system. The Q&A Steps tab (Figure 4) was clicked and a new step was added.

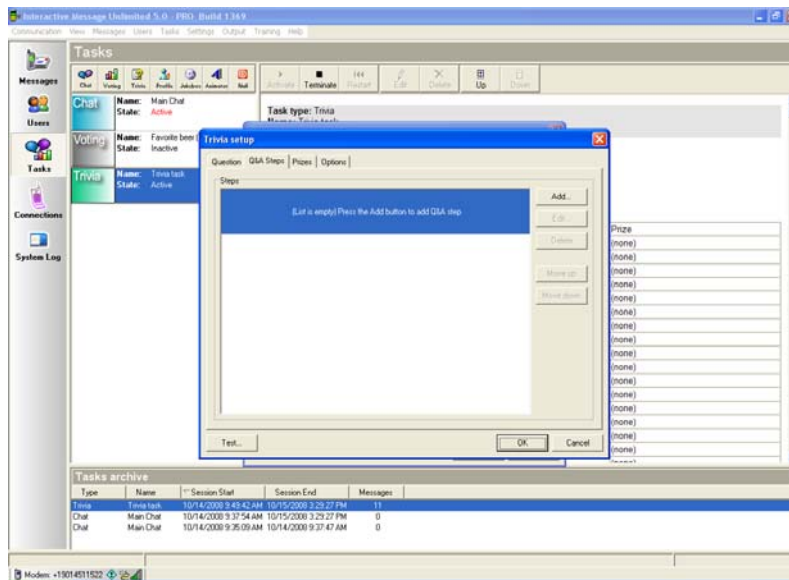


Figure 4. Adding questions to a survey.

IMU Pro can check for either a correct text answer, a correct numeric answer, or allow all answers. In a survey, respondents can select any one of several possible answers (e.g., “A,” “B,” or “C”) and they may also provide their response in one of many formats (e.g., “A,” “a,” “Agree,” “agree,” “AGREE,” “a. Agree,” “A) Agree,” “A. ;-),” “A. Go Navy”); there is no single correct answer as there would be on a test, so the easiest method of programming is to select “Without correct answer” (Figure 5).

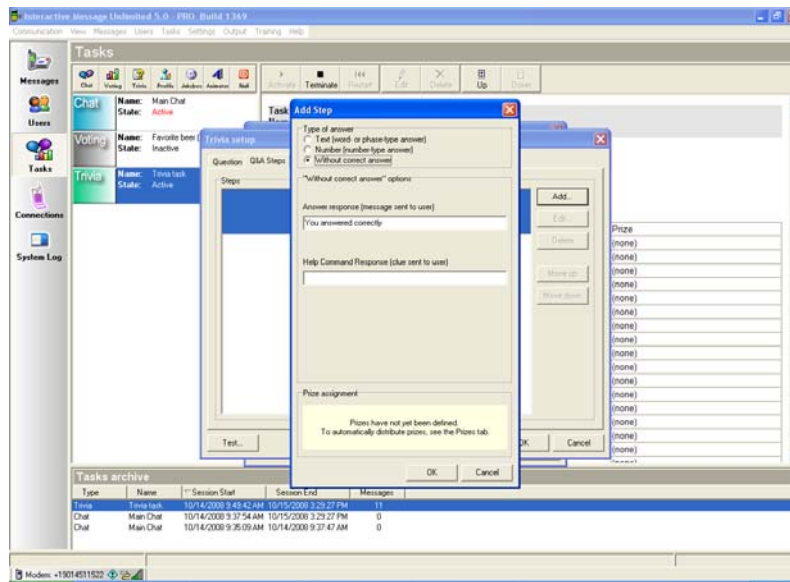


Figure 5. Adding a survey question that has no correct answer.

The next question to be asked—including the possible answers for it—was input into the “Answer response” blank. Any additional questions can be added in the same manner.

Once all questions except for the first (for a “push”ed survey) were input as Q&A Steps, the Options tab was selected in order to end the survey. A thank you message was added as well (see Figure 6).

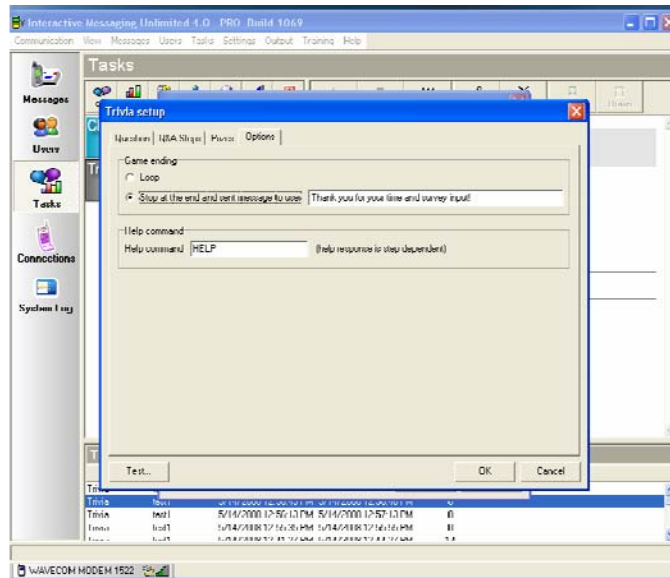


Figure 6. Stopping the survey and sending a thank you message.

Once everything is programmed, the subscreen showed the steps that were programmed, as in Figure 7.

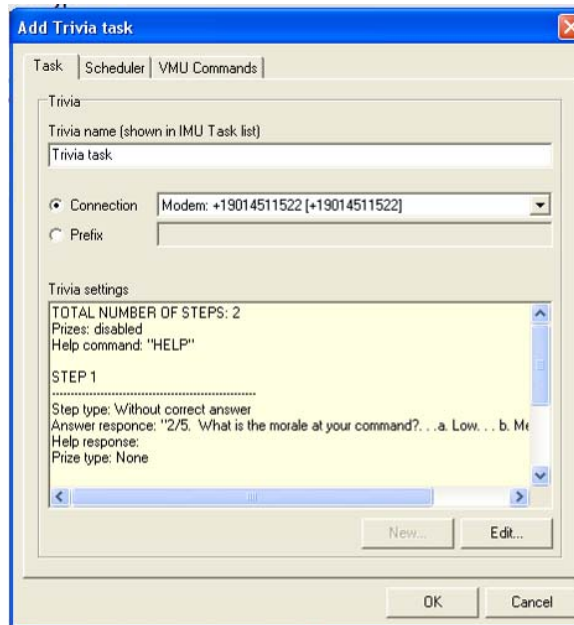


Figure 7. Trivia Task with steps programmed.

To enable the system to process the answers and send the questions automatically, the Trivia Task was activated.

Administration

Once the Trivia Task was active, the system was ready to send out survey questions automatically. If the survey is planned such that respondents can start the first question at any time (“pull” technique), no further action is needed to start the survey other than notifying those selected that they may begin at any time. For “push”ed surveys, the first question still must be sent to the respondents.

Importing users

If the survey is launched to all respondents at the same time (“push” technique), respondent phone numbers still need to be added to the system. To do this in IMU Pro, all cell phone numbers need to be properly formatted (with no punctuation and a +1 added for CONUS numbers) for importing. This can be done through Microsoft Excel or similar software for concatenating +1 to the beginning of each phone number. The properly formatted list of cell phone numbers then needs to be saved as a .txt file. For ease, and to minimize delays that might occur in reading from a floppy drive, save the .txt file onto the hard drive of the survey computer prior to importing the phone numbers.

To import into IMU Pro, select the Users icon from the left menu and then select Users on the menubar, followed by “Import users.” The Import Users subscreen is displayed, as in Figure 8; click “Open text file...” and select the file name, then select Apply (making the numbers appear on the screen) and Close.



Figure 8. Import users subscreen.

If the survey is being sent out in waves, consider adding a color to the users to aid in tracking the waves. This must be done individually for each user, but is worth the time when different waves are being sent out as the list of users can be sorted by Color and only those with a particular color may be easily selected (see Figure 9). To change user colors, right click on the cell phone number to display the user properties, and then use the pulldown arrow to select a different color.

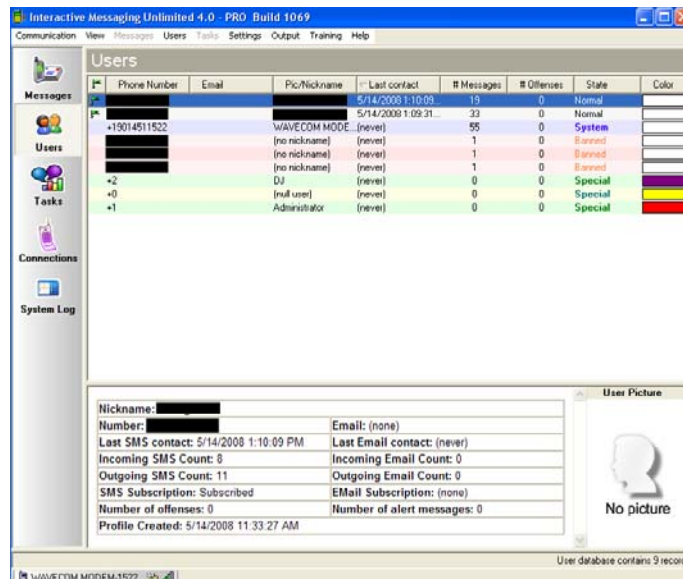


Figure 9. Users screen, with different colors in use.

Sending First Message (for “Push”ed Surveys)

With a “push”ed survey, all respondents start the survey by receiving the first question at roughly the same time (dependent upon how fast the messages are sent by the computer/modem). To send the first question in IMU Pro, select those users to receive it (if doing waves and utilizing colors to differentiate between the waves, select all of those with the desired color) and right click to send message to those users. IMU Pro provides a message indicating how many users have been selected. If this is the correct number, select OK. Paste the text of the first message into the box provided (see Figure 10); if the text is longer than 140 characters, appropriate changes can be made at this point. Be sure that all the answer choices are included, separated from the question and each other by periods. Once the message is correct, click send.

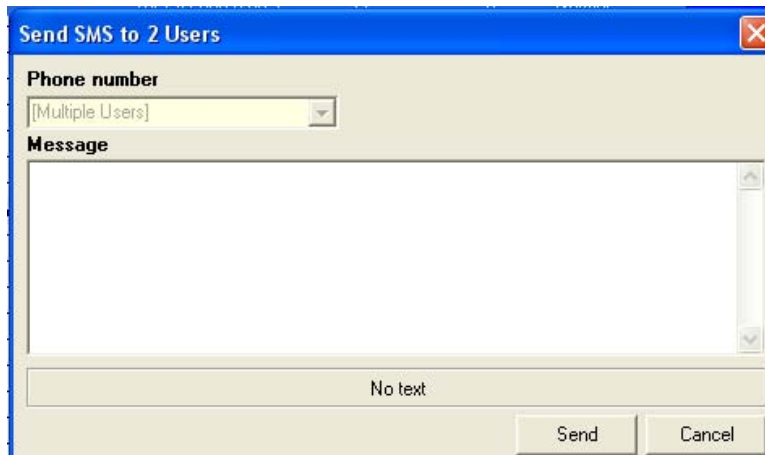


Figure 10. Sending text messages to multiple phone numbers.

Monitoring Messages While the Survey is in the Field

Once the survey has started, everything should be automatic so only occasional monitoring of the messages and computer is required. Clicking the Messages icon on the left displays the different folders for the messages (Figure 11). Since the Trivia Task is active, all incoming messages are automatically deposited in the Trivia folder (toward the bottom of the list of folders) and not the Inbox. All the outgoing messages are briefly in the Outbox (queued to be sent) before going to the Sent folder. If numbering of the questions was provided, sorting either the Outbox or the Sent folder by the message itself can show how many will soon or have already received a particular question. If question number was not included, answers may be sorted for each person (phone/e-mail).

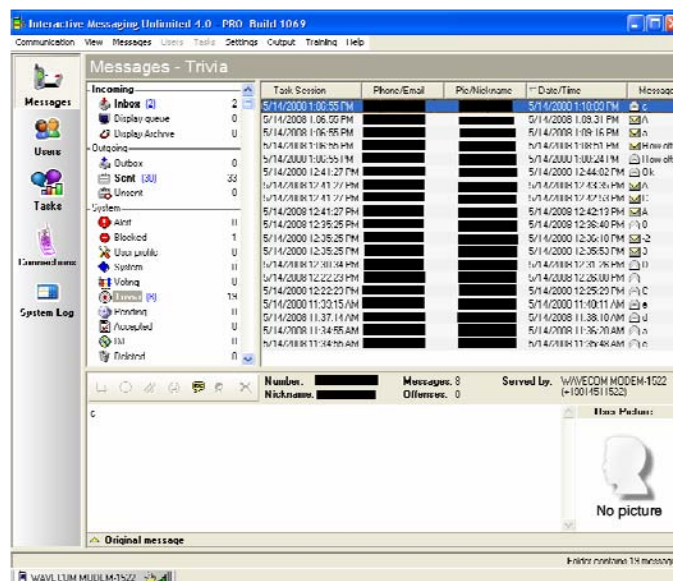


Figure 11. Incoming messages, placed automatically in the Trivia folder for an active Trivia Task.

Occasionally, messages have problems during the sending process and are placed into the Unsent folder. If the intended cell phone numbers of these messages are correct, you can attempt to resend them by selecting the unsent message, right clicking, and choosing to move it to the Outbox.

When the survey fielding period is ready to close, go to the Trivia Task and click Terminate.

Analysis

Exporting Data

Once survey administration is complete and the Trivia Task is terminated, messages must be exported from IMU Pro so that they can be analyzed in another software program (e.g., Microsoft Excel, SPSS, SAS). The key variables needed are the phone number (in order to link between responses as well as to other demographic data, if needed), date/time (for ordering response messages), and either the original message text or the Edited/Displayed message text (the response). The Folder may be useful as well to differentiate the sent messages from the incoming, if exporting both the questions and the answers (click the All Messages folder at the bottom of the folder list); see Figure 12 for selections within IMU Pro.

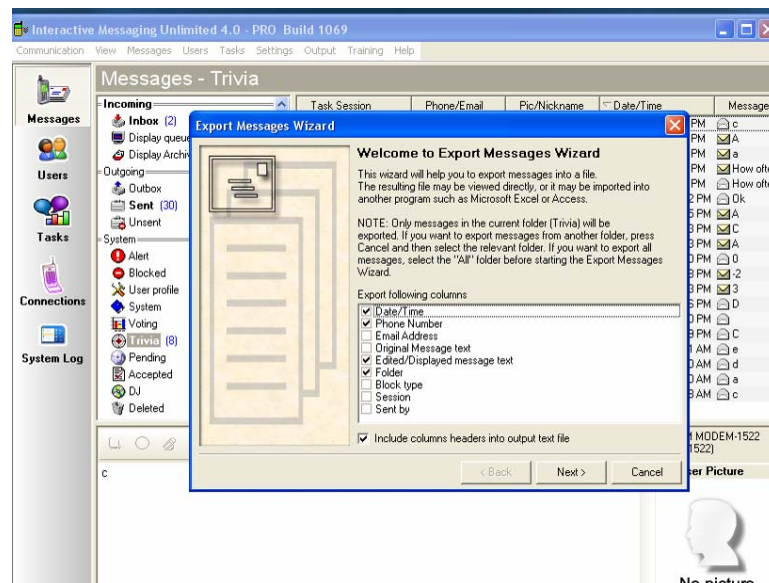


Figure 12. Exporting survey data.

To conduct any time analyses (time to complete first question, time to survey completion, etc.), the outgoing messages should also be exported. This can be done from the Sent box. Alternatively, All Messages (bottom folder) can be exported to avoid doing this in two steps.

Messages are saved as a tab delimited text file that can be imported into analysis software, as shown in Figure 13.

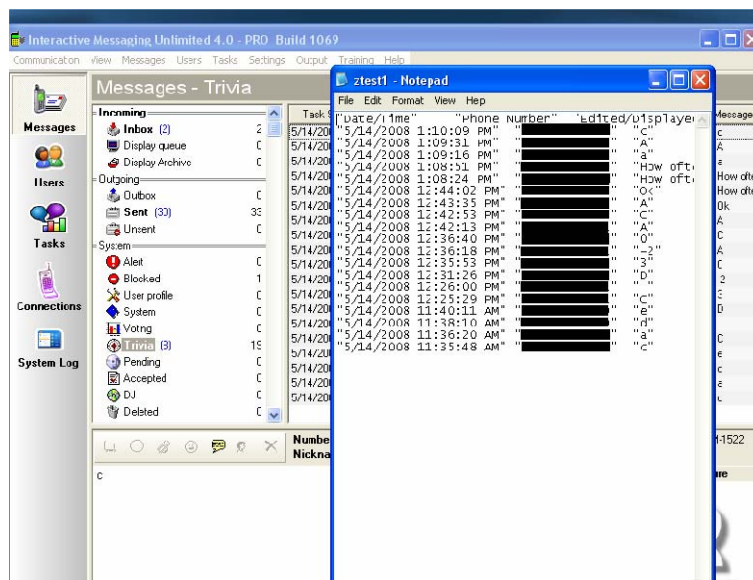


Figure 13. Exported text message data, opened in Notepad.

Data Cleaning

Almost all survey data must be cleaned in some way before being ready for analysis, and text message data is no different. Because respondents may not be constrained in their answers, there may not be a simple way of counting how many said “a,” for example. An easy way to start cleaning the data is to sort the answers alphabetically. Those that do not have answers in the desired format can be modified before continuing with analyses. Occasionally, some respondents may include a letter of their answer as well as the word, for example “a. Disagree,” and the two may be inconsistent with the responses possible. A recommendation would be to select the written answer (“Disagree”) instead of the letter (“a”), since the respondent likely spent more time typing in the written answer than the letter.

In addition, some people may have responses that were too long for a single message, perhaps because the entire question was included in the response; these may be easily determined by looking for simultaneous responses from a single user. The actual response for these messages may be at the end of the second/last message, at the beginning of the first, or embedded in other text. These data may not be easily modified after an alphabetical sort as discussed above. For cases where there are multiple messages for a single response, sorting by user and time of response will make it easier to determine the answer.

Analyses in SPSS

There are a number of tools that can be utilized to analyze the data. The information below may be adapted but is written using the SPSS programming language (see the SPSS website at www.spss.com for more information).

Regardless of the analysis package, the text messaging data likely needs to be modified to make it easy to analyze. For example, the date/time of the messages are exported from IMU Pro as “5/14/2008 1:10:09 PM”, which may not be the needed format for computing time differentials. Figure 14 provides some example syntax for converting the date/time of a message into the date/time formats used within SPSS.

```
*** Computing new variables for month, day, and year.
*** dtout is the variable name given to the message dates/times when
    importing the data.

compute out1mo=number(substr(dtout,1,(index(dtout,'/'))-1),F2.0).
compute out1da=number(substr(dtout,index(dtout,'/')+1,rindex(dtout,'/'))-
    index(dtout,'/'))-1,f2.0).
compute out1yr=2008.

*** Computing new variables for hour (24-hour format), minute, and second.

compute out1hr=number(substr(dtout,index(dtout,'')+1,index(dtout,':')-
    index(dtout,'')+1),f2.0).
if substr(dtout,index(dtout,'M')-1,1)='P' out1hr=out1hr+12.
if out1hr=12 out1hr=0.
if out1hr=24 out1hr=12.
compute out1mn=number(substr(dtout,index(dtout,':')+1,rindex(dtout,':')-
    index(dtout,':'))-1,f2.0).
compute out1ss=number(substr(dtout,rindex(dtout,':')+1,2),f2.0).

*** Combining new variables into SPSS date and time formats.
compute msgdate=date.mdy(out1mo,out1da,out1yr).
```

Figure 14. Sample SPSS syntax to convert message date/time.

Once the dates and times are in SPSS format, completion times can be found using the datediff function.

It may be useful to number each message (line of data). For example, if the data has been cleaned so that there is one line of data for each survey answer, then analyses for question 3 will always be on the third line of data for each person. Sorting by message date/time is a proxy for this (the first answer is the message with the oldest date/time), but having a count of how many responses per person might be useful. Figure 15 provides SPSS syntax for easily numbering

each line of data per person. If response times are a concern, questions and answers will need to be merged together, so answers should be numbered with even numbers while questions should be numbered with odd numbers.

```
*** Computing message numbers (for ease in analyses and when combining
questions data with answers data).
*** phonenum is the phone number, msgdate and msghour were created prior
and are the message's date and time.
*** If making answers the even numbered messages and questions the odd
numbered messages, change the lag function to be +2 and have the
answers start with a msgnum=2.

sort cases by phonenum(a) msgdate(a) msghour(a).

compute msgnum=1.
execute.

if serial=lag(serial,1) msgnum=lag(msgnum,1)+1.
execute.
```

Figure 15. Sample SPSS syntax to create a message number.

It may be most useful to have one line of data per person instead of several lines. This can easily be done in the newer versions of SPSS by using the CASESTOVARS command; sort by phone number and message number beforehand to ensure that messages are in a consistent order.

Once there is a single line of data for each person, demographic variables that may exist in a separate data base (for example, the database with everyone who registered to participate) can be merged using the phone number as the common element between the databases.

Future Directions

Research on Navy text message surveys has just begun. The lessons learned presented here are based upon the two Lightning Polls conducted thus far. Both were conducted as “push” surveys, with the second one also being separated into smaller waves across three months. Additional lessons may be learned through a “pull”ed text message survey, and opportunities for conducting a “pull”ed survey are currently being considered.

Research remains to be done on the comparability of results between a text message survey and a more traditional method such as web-based. The current Lightning Poll mirrors questions asked on other web-based surveys, but responses have not yet been analyzed. An issue that may be fundamental regards the changes required to convert a survey question and answers into the 140 characters required for a text message.

There may also be unique questions or topics that can be satisfied best with a text message survey (e.g., usefulness of text messaging as a communication tool) while other topics (e.g., sexual harassment) may not be suitable or too sensitive for text messaging; future research should investigate these issues as well. This issue may also be demographically based, with some populations more likely to respond via text message on specific topics than through traditional survey methods. Future research should investigate what topics and/or populations are most suitable for text message surveys.

Another possible future direction for text message surveys would be to create a panel. This would allow for a single notification of respondents, but survey questions would be asked periodically. This however does present the challenge of refreshing the panel periodically.

The surveys as programmed here use the Trivia Task, but IMU Pro also includes a Voting Task, which allows for one question and calculates responses automatically. While this would likely not be a scientific survey with weighted results, it could be useful and should be tested at some point in the future.

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