INSTITUTE FOR DEFENSE ANALYSES

Introduction to Survey Design

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The Institute for Defense Analyses is a non-profit corporation that operates three federally funded research and development centers to provide objective analyses of national security issues, particularly those requiring scientific and technical expertise, and conduct related research on other national challenges.

About This Publication

An important goal of test and evaluation is to understand not only how a system performs in its intended environment, but also users' experiences operating the system. This briefing aimed to provide the audience with a set of tools – most notably, surveys – that are appropriate for measuring the user experience. DOT&E guidance regarding these tools is highlighted where appropriate. The briefing was broken into three major sections: conceptualizing surveys, writing survey items, and formatting surveys. At the end of this briefing, the audience should have a better understanding of the value and purpose of surveys and how to construct them.

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Executive Summary

The Institute for Defense Analyses (IDA) in collaboration with the National Aeronautics and Space Administration (NASA) hosted the first annual Knowledge Exchange Workshop from April 11th to 13th 2016. The Knowledge Exchange Workshop served as a forum for the operational test community to discuss rigorous statistical approaches for test design and evaluation. In the afternoon of April 12, three members of the test science team presented a 1.5-hour introductory course on survey design supported by the briefing in this document. The topics covered during this briefing are outlined in greater detail in the sections below.

A. Course Description

An important goal of test and evaluation is to understand not only how a system performs in its intended environment, but also users' experiences operating the system. This briefing aimed to provide the audience with a set of tools – most notably, surveys – that are appropriate for measuring the user experience. DOT&E guidance regarding these tools was highlighted where appropriate.

The briefing has three major sections:

- Conceptualizing Surveys
- Writing Survey Items
- Formatting Surveys.

The material covered in each of these sections is summarized below.

B. Conceptualizing Surveys

The first section introduced the audience to survey research and its psychological underpinnings. Surveys are a systematic measure of people's thoughts, feelings, and opinions. Surveys are a specific form of social interaction in which researchers request information in the form of written questions and users respond using the response options provided by the researcher (e.g., open-response, likert-type scales). Users go through several mental processes when responding to these questions. The goal in survey design is to construct questions in a way that facilitates a user's ability to understand the question, recall relevent information from memory, and respond honestly.

Survey design impacts not only data quality, but how motivated users are to respond thoughtfully.

C. Writing Survey Items

The second section addressed best practices for constructing survey items. The complexity and clarity of sentences has a significant impact on the reliability and validity of survey data. Researchers should strive to write questions that are clear, concise, and neutral and that avoid topics that are so specific that users may not recall the event or for which they are unlikely to have accurate responses – for instance, questions that require complex mental math. Questions that are written in this way produce better quality data because users find them easy to understand and recall from memory.

D. Formatting Surveys

The third section addressed best practices for formatting surveys. Surveys typically consist of several questions. The order in which questions are presented, the consistency of the layout, and the use of white space all impact how users respond to questions. Researchers should:

- Include an introduction to their survey to increase users' motivation to provide thoughtful responses
- Group questions that address the same topic and have the same response option format into matrices to reduce perceived burden
- Use cues – for instance, numbering and section alignment – to help users navigate the survey
- Provide a consistent layout.

Following these simple principles will help to motivate users to complete the survey by facilitating recall and ensuring that they can move from one question to the next with ease.

E. Conclusion

As mentioned above, this briefing was created to support a course on survey design at the Knowledge Exchange Workshop. At the end of this briefing, the audience should have a better understanding of the value and purpose of surveys and how to construct them.

Introduction to Survey Design

Knowledge Exchange Workshop

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IDA

Introduction

A **systematic** measure of people's thoughts, feelings, and opinions.

We want to understand users' experiences with systems

- How easy is the system to use?
- How much mental effort is required?
- Is the task stressful?
- Do users trust the system?

Parts of a Survey

Surveys are comprised of several parts.

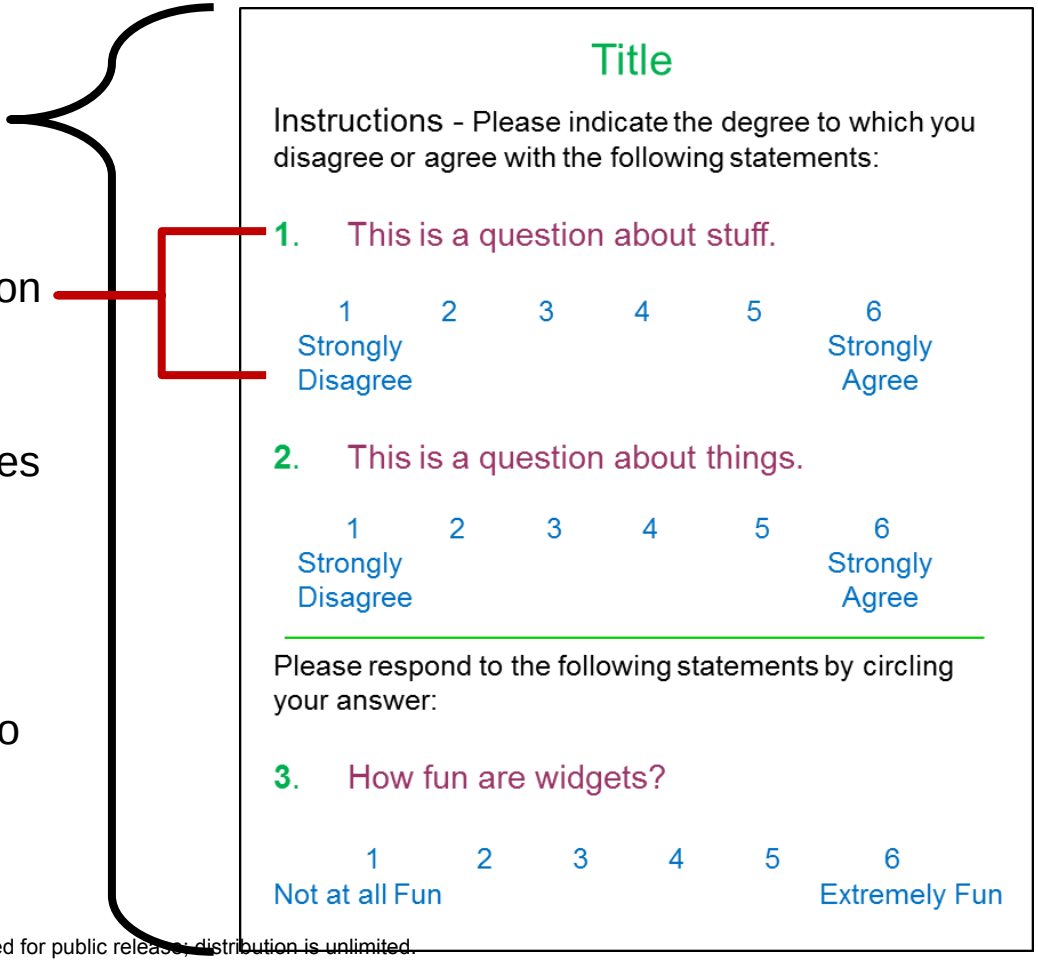
Survey: a collection of questions

Question: item and response option

Item: words a respondent addresses

Response Options: how the respondent provides an answer

Formatting: symbols and layout to assist in organizing the survey



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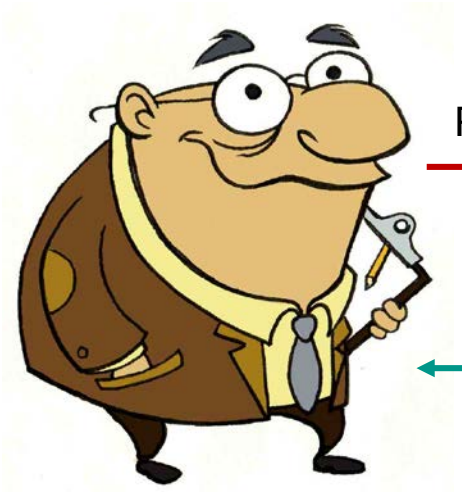
Outline

- **Conceptualizing surveys**
- **Writing survey items**
- **Formatting surveys**
- **Conclusion**

Surveys as Social Interaction



Request information

COMMUNICATION

Return information

Mental processes

Researcher **Respondent**

Shaped by all aspects of the survey not simply the words!

Steps for Answering Questions

1. Understand question
2. Recall information
3. Form judgment
4. Respond using the format provided.

Survey Design

Survey Design Impacts Data Quality

- It impacts the **reliability** and **validity** of data collected.

The consistency of a measure.

Reliable ≠ valid.

Degree to which the survey is a good measure of the concept it's intended to measure.

Survey Design

Survey Design Impacts Respondent Motivation

Survey that emphasize expected benefits and minimize perceived cost increase motivation.

Benefit

- Helping others
- Improving a product
- Being Consulted

Include in the introduction!

Cost

- Time
- Mental Effort
- Revealing personal opinions

Your Turn!

Draft a Survey

- **Examine user experience to inform development of the perfect smart phone**
  - Preferences for new phone design
  - Experience using prototype
- **Write a draft survey**
  - What aspects of user experience are important?
  - Draft questions to ask about these experiences

Task	Elements	"Experience"
Use interface	• Display visibility • Input responsivity • OS navigation	? (Write your questions at the experience level)
Make a call	• Speech clarity	
Send an email	• Application layout • Keyboard utility	
Transport	• Portability • Durability • Size/Weight	

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Outline

- Conceptualizing surveys
- **Writing survey items**
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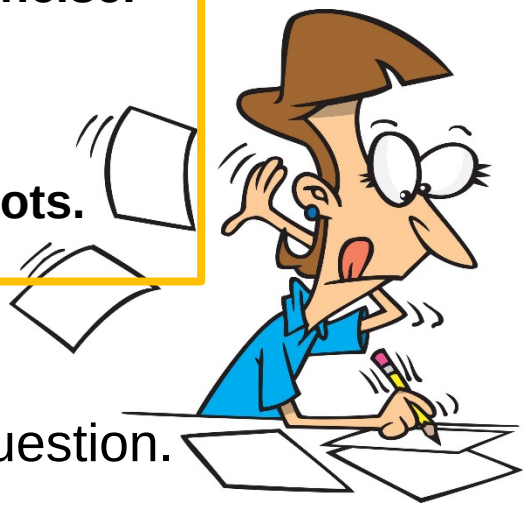
Question Writing Goals

- **Write questions that are clear and concise.**
- **Write neutral questions.**
- **Write questions for humans NOT robots.**



Impacts how respondents understand the question.

Impacts data quality and respondents' motivation

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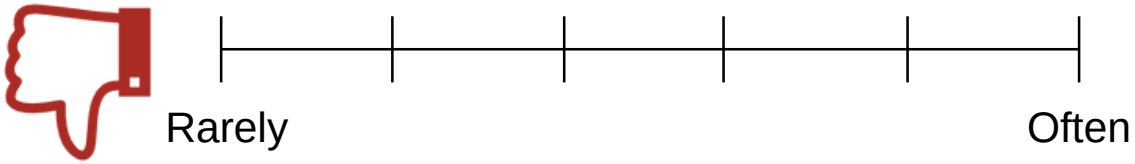
Write Questions That Are Clear & Concise

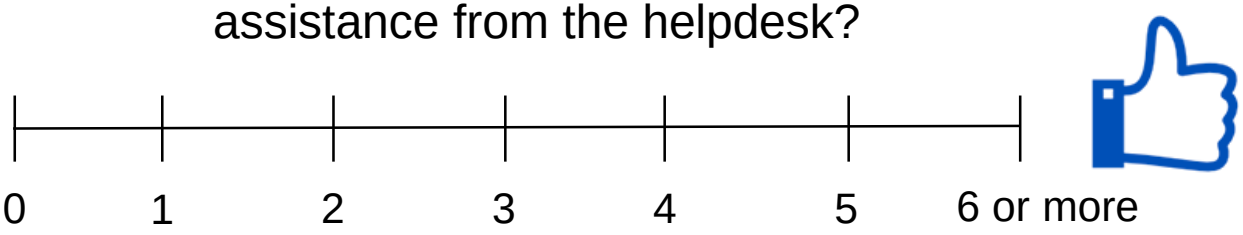
- Clearly articulate what you want to know AND how you want respondents to answer.

Avoid vague quantifiers and qualifiers.
(Dillman, 2007)

How often do you request assistance from the helpdesk?



During the past week, how many times did you request assistance from the helpdesk?



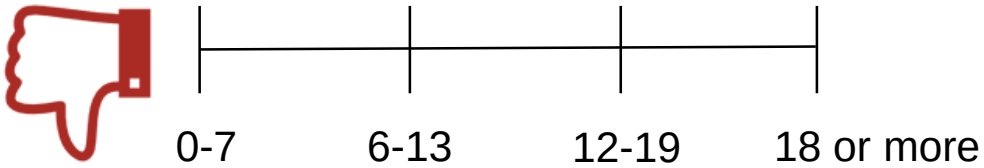
Write Questions That Are Clear & Concise

- Clearly articulate what you want to know AND how you want respondents to answer.

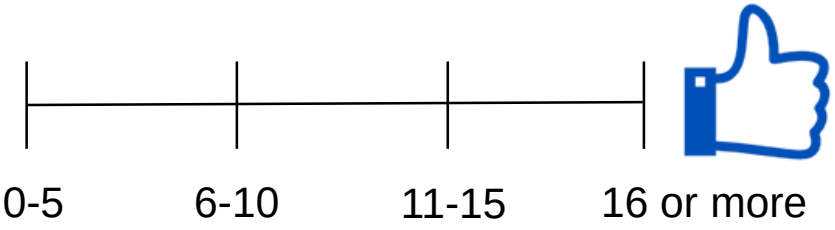
Develop mutually exclusive response options.

(Dillman, 2007)

How many years of experience do you have?



How many years of experience do you have?



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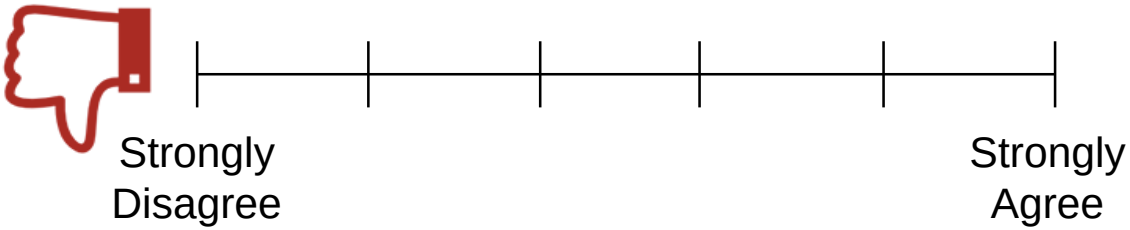
Write Questions That Are Clear & Concise

- Clearly articulate what you want to know AND how you want respondents to answer.

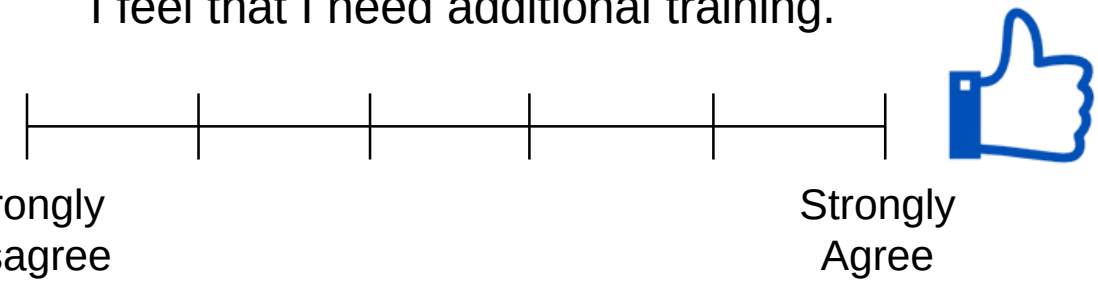
Avoid asking respondents to yes in order to say no.

(Dillman, 2007)

I feel that I do not need additional training.



I feel that I need additional training.



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Write Questions That Are Clear & Concise

- Clearly articulate what you want to know AND **how you want respondents to answer.**

↓

Keep data analysis in mind. Some response options allow greater statistical flexibility than others.

Dichotomous

☐ No

☐ Yes

Multiple Choice

☐ Blue

☐ Green

☐ Red

☐ Orange

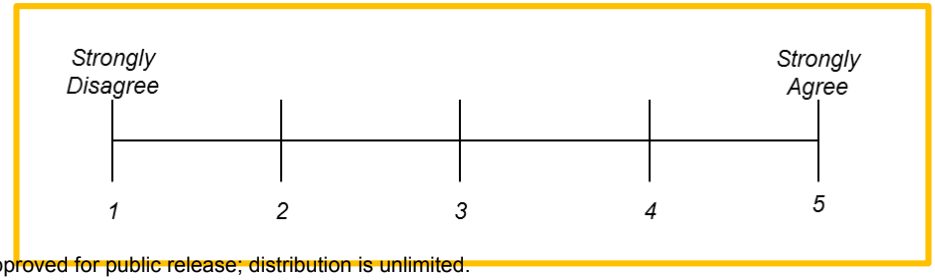
Rank

_1_ Killer Robots

_2_ Aliens

_4_ Zombies

_3_ Vampires



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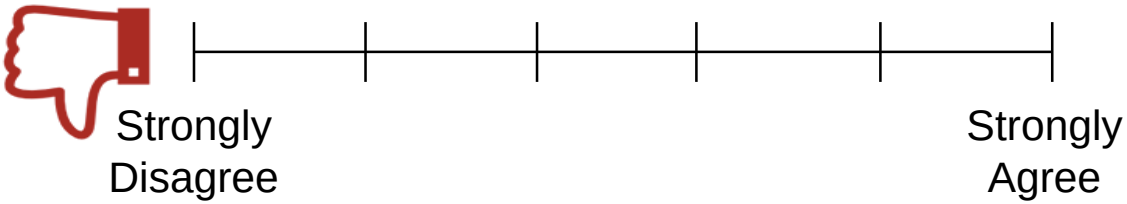
Write Questions That Are Clear & Concise

- Clearly articulate what you want to know AND how you want respondents to answer.
- Ask **one** question at a time. (Dillman, 2007; Fowler & Cosenza, 2008)

The interface was easy to **use and intuitive**.



	Ease of Use?		**Intuitive?**	
1. Interface:	Easy	Difficult	Yes	No

The interface was easy to use.

Write Questions That Are Clear & Concise

- Clearly articulate what you want to know AND how you want respondents to answer.
- Ask one question at a time.
- Use simple words and write in short, complete sentences. (Dillman, 2007)

Reliability suffers as questions get more complex.

Saris & Gallhofer, 2007

Write Neutral Questions

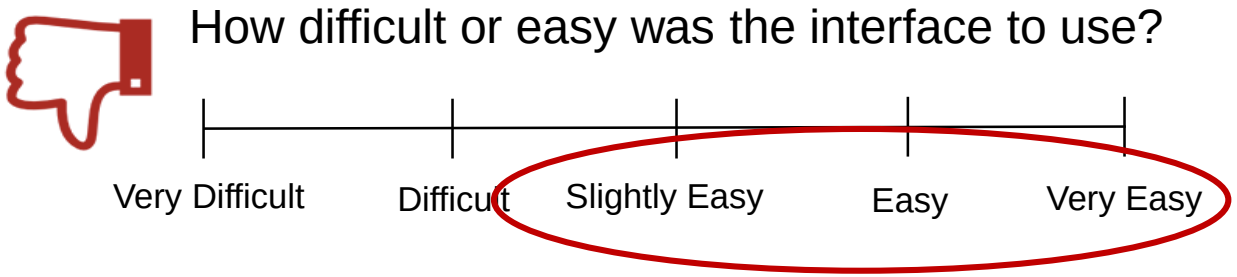
- Avoid biased language. (Fowler & Cosenza, 2008)

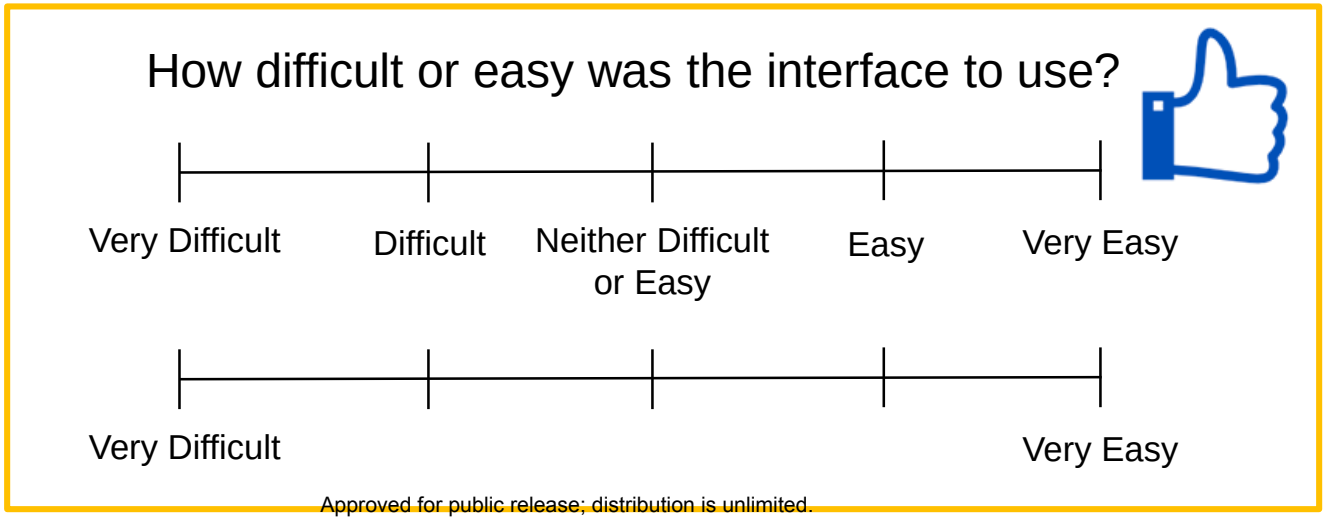
Describe how the interface enabled you to navigate the system more easily.

How did the interface impact your ability to navigate the system?

Write Neutral Questions

- Avoid biased language. (Fowler & Cosenza, 2008)
- Use balanced, bipolar scales. (Dillman, 2007)

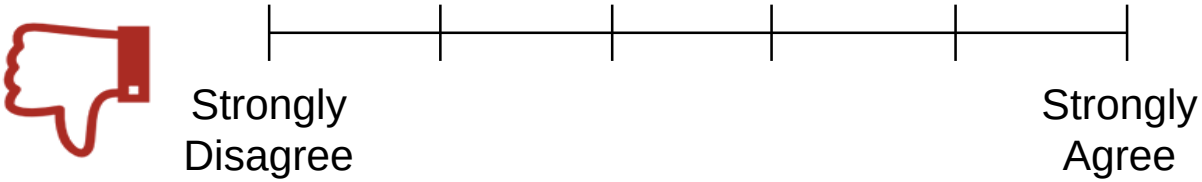




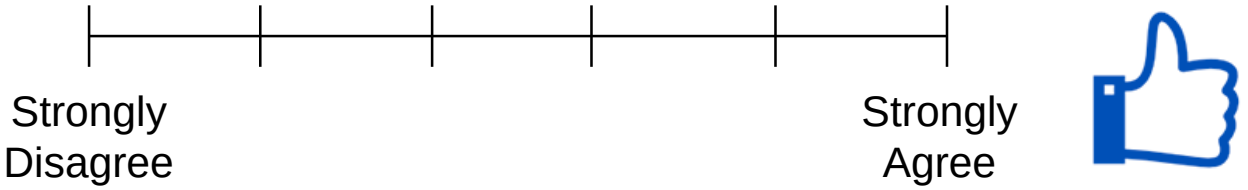
Write Neutral Questions

- Avoid biased language. (Fowler & Cosenza, 2008)
- Use balanced, bipolar scales. (Dillman, 2007)
- State both sides of attitudinal scales in the item. (Dillman, 2007)

Do you agree that the task was mentally demanding?



Do you agree or disagree that the task was mentally demanding?



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Write Questions for Humans NOT Robots

- Avoid questions that are so specific respondents may not recall the event or for which they are unlikely to have an accurate, ready-made answer.

Avoid asking respondents to make unnecessary calculations.

(Dillman, 2007)

By what percentage has the ratio of down-time to up-time changed for the new system compared to the legacy system?

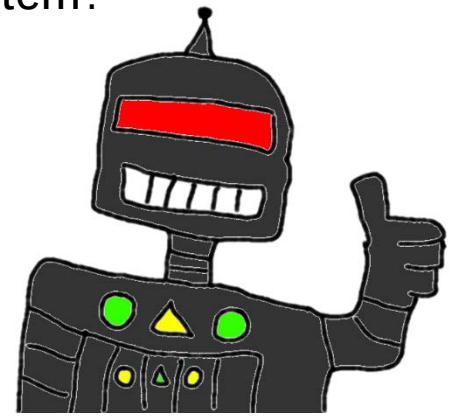
Write Questions for Humans NOT Robots

- Avoid questions that are so specific respondents may not recall the event or for which they are unlikely to have an accurate, ready-made answer.

Provide appropriate time referents.

(Dillman, 2007)

How many minutes have you spent operating the legacy system?



Write Questions for Humans NOT Robots

- Avoid questions that are so specific respondents may not recall the event or for which they are unlikely to have an accurate, ready-made answer.

- Eliminate check-all-that apply questions. (Dillman, 2007)
  - The likelihood that respondents will check a response option differs by position in the list. (Stern, Dillman, & Smyth, 2007)

Identify areas where you encountered a problem.
(Check all that apply)

- ☐ Option A
- ☐ Option B
- ☐ Option C
- ☐ Option D

Summary

- **Write questions that are clear and concise.**
- **Write neutral questions.**
- **Write questions for humans NOT robots.**

Impacts how respondents understand the question.

Impacts data quality and respondents' motivation

Your Turn!

Survey Review

- **Revisit your survey draft questions**
  - Use the best-practices checklist to evaluate your original questions
  - Rewrite questions that would benefit from revision
  - How might revisions impact the quality of results these questions would produce?

Outline

- Conceptualizing surveys
- Writing survey items
- **Formatting surveys**
- Conclusion

Formatting Surveys

- **Include an introduction.**
- **Group similar questions.**
- **Use cues to help respondents navigate the survey.**
- **Provide a consistent layout.**

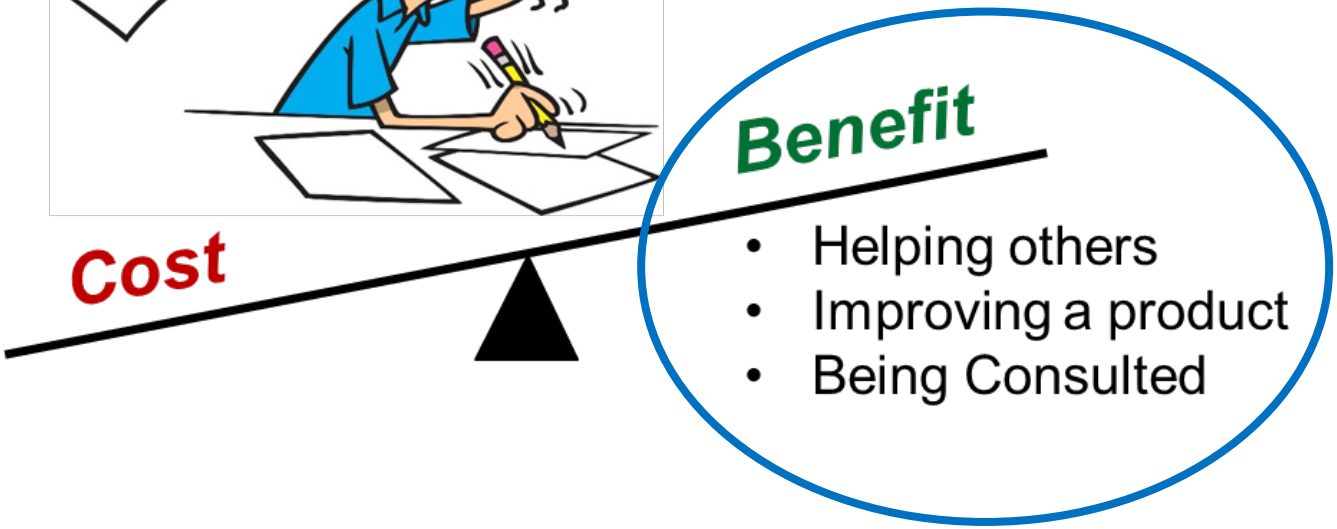
Helps respondents understand what researchers want to know and how to appropriately respond.

Increases respondent motivation

Include an Introduction

Articulate the purpose of the survey and the benefit to the respondent.

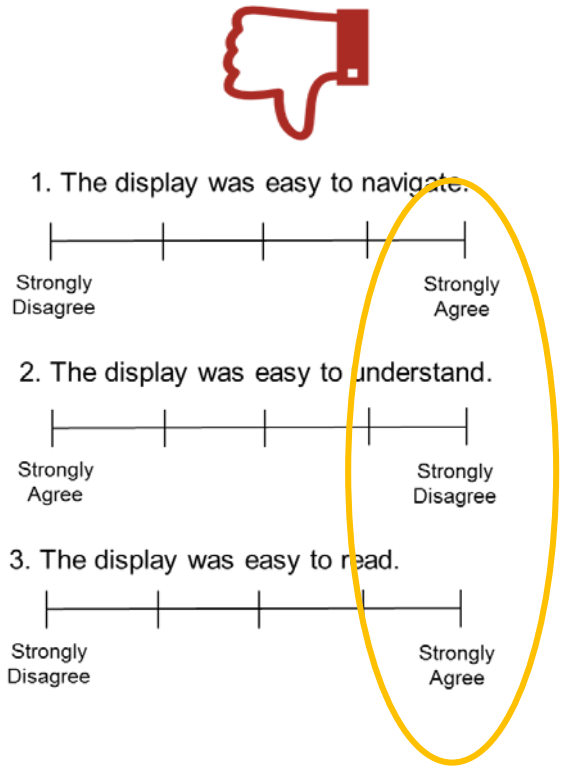
Increase motivation



(Dillman, 2007)

Group Similar Questions

- Place items with the same response option in a matrix format. (Dillman, 2007; 2008)
- Be consistent in the direction scales are displayed. (Dillman, 2007)



	Strongly Disagree				Strongly Agree
1. The display was easy to navigate.	1	2	3	4	5
2. The display was easy to understand.	1	2	3	4	5
3. The display was easy to read.	1	2	3	4	5

Group Similar Questions

- Place items with the same response option in a matrix format.
- Be consistent in the direction scales are displayed.
- Place multiple choice responses in one column. (Dillman, 2007)

1. What type of candy do you prefer?

☐ Reese's Cups ☐ Lollipops ☐ Gumballs

☐ Starburst ☐ Snickers ☐ Sweedish Fish

1. What type of candy do you prefer?

☐ Reese's Cups

☐ Starburst

☐ Lollipops

☐ Snickers

☐ Gumballs

☐ Sweedish Fish

Use Cues to Aid in Navigation

- Place instruction where needed (not simply at the beginning).
- Number questions consecutively from beginning to end.
- Emphasize words that introduce important, but easy to miss changes in item wording or instructions. (Dillman, 2007)

1. During **THE LAST WEEK**, how often did you contact the **helpdesk** to fix a *problem*?
2. During the last week, how often did you contact helpdesk to fix a problem?

1. During **the last week**, how often did you contact the helpdesk to fix a problem?

Provide a Consistent Layout

- Provide a consistent figure/ground format to encourage respondents to read all the words on the page. (Dillman, 2007)

1. Use darker print for items and lighter print for response options.
2. Place more blank space between questions than subcomponents of questions.
3. Vertically align question subcomponents across questions.

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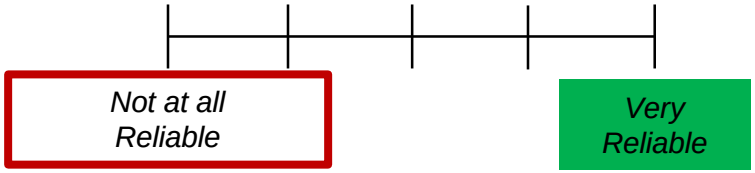
Provide a Consistent Layout

- Provide a consistent figure/ground format to encourage respondents to read all the words on the page. (Dillman, 2007)

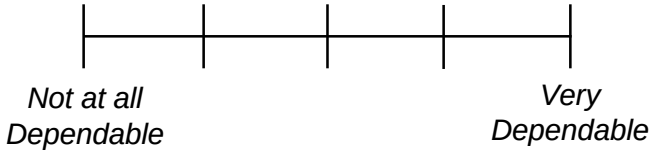
★ 1. How dependable is the system?

- ☐ *Not dependable*
- ☐ *Sort of dependable*
- ☐ *Dependable*

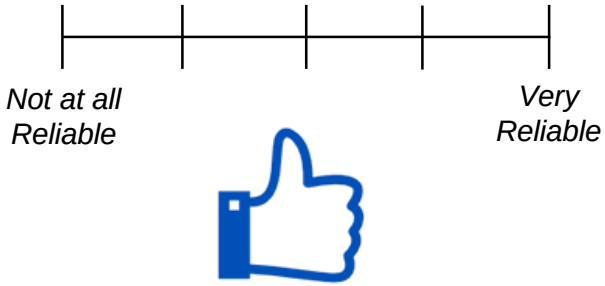
2. How **RELIABLE** is the system?



1. How **dependable** is the system?



2. How **reliable** is the system?



Formatting Surveys

- **Include an introduction.**
- **Group similar questions.**
- **Use cues to help respondents navigate the survey.**
- **Provide a consistent layout.**

Helps respondents understand what researchers want to know and how to appropriately respond.

Increases respondent motivation

Outline

- Conceptualizing surveys
- Writing survey items
- Formatting surveys
- **Conclusion**

Conclusion

- **Surveys measure thoughts, feelings, and opinions.**
- **Survey design impacts respondent motivation and data quality.**

↓

Well-written items and properly formatted surveys can boost motivation and improve the reliability and validity of the data.

Happy researchers!

&

Happy respondents!

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