**Pre-Screening**

***Title of research study:*** Data Visualization

***Investigator:*** Kelly Wellman

***Key Information:*** The following is a short summary of this study to help you decide whether or not to be a part of this study. More detailed information is listed later on in this form.

***Why am I being invited to take part in a research study?***

We invite you to take part in a research study because you passed the passed the screening questionnaire

***Why is this research being done?***

This study is designed to investigate the optimal display of the visualization of financial data; taking into account individual characteristics.

***How long will the research last and what will I need to do?***

We expect that you will be in this research study for the duration of this survey, approximately 30 minutes.

You will be asked to answer questions based on data visualizations within an imagined scenario. You will then be asked to complete a survey about your experience.

More detailed information about the study procedures can be found under ***“What happens if I say yes, I want to be in this research?”***

***Is there any way being in this study could be bad for me?***

The risks to participation are minimal and do not exceed the risks associated with activities found in daily life.

***Will being in this study help me any way?***

We cannot promise any benefits to you or others from your taking part in this research. However, possible benefits include you will help advance academic research.

***What happens if I do not want to be in this research?***

Participation in research is completely voluntary. You can decide to participate or not to participate.

***Detailed Information:*** The following is more detailed information about this study in addition to the information listed above.

***What should I know about a research study?***

Someone will explain this research study to you.

Whether or not you take part is up to you.

You can choose not to take part.

You can agree to take part and later change your mind.

Your decision will not be held against you.

You can ask all the questions you want before you decide.

***Who can I talk to?***

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team: Kelly Wellman [Kelly.wellman@ucf.edu](mailto:Kelly.wellman@ucf.edu) or Dr. Theresa Libby Theresa.libby@ucf.edu

This research has been reviewed and approved by an Institutional Review Board (“IRB”). You may talk to them at 407-823-2901or [irb@ucf.edu](mailto:irb@ucf.edu) if:

1. Your questions, concerns, or complaints are not being answered by the research team.
2. You cannot reach the research team.
3. You want to talk to someone besides the research team.
4. You have questions about your rights as a research subject.
5. You want to get information or provide input about this research.

***How many people will be studied?***

We expect 150 people will be in this research study.

***What happens if I say yes, I want to be in this research?***

You will be asked to:

* Respond to a series of questions as well as taking two spatial ability tests.
* Should you pass the screening you may be invited back for a second survey.

***What happens if I say yes, but I change my mind later?***

You can leave the research at any time it will not be held against you.

Should you chose to leave the study your data will not be used and will be deleted.

***What else do I need to know?***

If you agree to take part in this research study, we will pay you $3.00 for your time and may be invited to an additional survey.

***Consent***

If you consent to participate in this study, click OK.

1. **Screening Questions**

**NOTE: rejection should come at the end of the entire survey in the form of messages provided below.**

**MESSAGE**: You will be asked to complete a short series of screening questions followed by two spatial ability tests. You will receive $3.00 for completion of the survey.

|  |  |  |
| --- | --- | --- |
| **Question** | **Options** | **Required Answer** |
| How many years of college education do you have? | Less than one year  One year  One year or more | Reject if: Less than one year |
| How many years’ experience do you have managing a budget within an employment setting? | Less than one year  One year  One year or more | Reject if: Less than one year |
| Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? | More than $102  Exactly $102  Less than $102  Do not know | Correct: More than $102  Reject if: any other answer |
| Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? | More than today  Exactly the same  Less than today  Don’t Know | Correct: Less than today  Reject if: any other answer |
| Please tell me whether this statement is true or false. “Buying a single company’s stock usually provides a safer return than a stock mutual fund.” | True  False  Do not know | Correct: False  Reject if: any other answer |

**3. Insert Punched Hole test**

**Message: ‘**This is a timed two-section test. You will have 3 minutes for each section. Below is a sample question. Once you are ready to begin the timed test click OK”

Insert sample question and allow people to click OK when finished.

I need an appropriate time limit but no tracking of answers selected, etc. Would prefer each part is its own screen where participants scroll and can move between questions; better representing the original test. Need to insert instructions from the original test.

**Message**: “Thank you for completing this section of the survey. You will now be asked to complete an additional spatial ability test. This will come in two parts. Below is a sample question. When you are ready to proceed to the timed portion click OK”

Insert sample/practice question and instructions. Allow participants to click “OK” to begin the card rotation test.

**4. Insert Card Rotation Test**

This is a timed two-section test. I need an appropriate time limit but no tracking of answers selected, etc. Would prefer each part is its own screen where participants scroll and can move between questions; better representing the original test.

**Message**: “Thank you for completing this section of the survey. Almost done! You will now be asked to respond to a short demographic survey.”

**5. Insert demographic questionnaire**

This is an untimed section and I do not need any timing data.

|  |  |  |
| --- | --- | --- |
| Question | Answer options | Rejection |
| What is your age? | Free response limited to numeric | N/A |
| What is your gender? | Male  Female  Nonbinary  Transgender  Prefer not to say | N/A |
| How many years of higher education (post high school) have you completed? | Free response limited to numeric | Reject if less than one year.  Accept: if one year or more |
| How many years of work experience do you have? | Free response limited to numeric | Reject: if less than two years  Accept: if two years or more |
| How many years of budgetary managerial experience do you have? | Free response limited to numeric | Reject: if less than one year.  Accept: if one year or more. |
| Please rate your previous experience with graphic presentation of numeric data? | 7-point Likert scale: 1=no experience; 7=very experienced, 4= somewhat experienced. | All answers are valid |

**6. Rejection/ Acceptance**

If participants fail any of the screener or demographic questions:

**Message: “**Thank you for your participation. You will receive $3.00.”

If participants pass the screener questions:

**Message**: “Thank you for your participation. You will receive a request to participate in a subsequent study within the next two weeks. Please respond when you are alerted”

**Study 1**

Participants will receive an invitation to this study.

1. **Introduction**

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***Investigator:*** Kelly Wellman

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We expect that you will be in this research study for the duration of this survey. Approximately 30 minutes.

You will be asked to answer questions based on data visualizations within an imagined scenario. You will then be asked to complete a survey about your experience.

More detailed information about the study procedures can be found under ***“What happens if I say yes, I want to be in this research?”***

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***How many people will be studied?***

We expect 150 people will be in this research study.

***What happens if I say yes, I want to be in this research?***

You will be asked to:

* Respond to questions based on the visualization of financial data.
* Complete a survey about your experience.

***What happens if I say yes, but I change my mind later?***

You can leave the research at any time it will not be held against you.

Should you chose to leave the study your data will not be used and will be deleted.

***What else do I need to know?***

If you agree to take part in this research study, we will pay you $5.00 for your time and effort and an additional bonus of $0.20 for each correctly answered question in the main study.

***Consent***

If you consent to participate in this study, click OK.

1. **Assignment**

At this point participants should be randomly assigned to 1 of 4 conditions:

* Time-Series Questions/ Column Graphs
* Time-Series Questions/ Bar Graphs
* Structural Questions/ Column Graphs
* Structural Questions/ Bar Graphs

“You are playing the role of an accounts manager at XYZ Tech. XYZ Tech produces a number of electronic components including chips, transistors and completed circuit boards. XYZ Tech operates globally with sales in Japan, Canada, Mexico, US, UK and Brazil.

As part of your role as an accounts manager you are required to use the firm’s digital dashboard to answer management inquiries regarding both current sales and general trends across product lines and markets.

You will be paid $5.00 for the completion of the entire survey as well as a bonus of $0.20 for each question correctly answered in the main study.

Once you begin this activity you will be presented with the digital dashboard below as well as a series of questions regarding the data. You can click on any graph to enlarge it in order to answer the questions. Here is a sample question. Once you are comfortable with the dashboard and have correctly answered the question you can click OK to proceed to the timed exercise”

Dashboard provided should reflect participants assignment (Columns for Column condition and Bars for Bar conditions”.

Sample question:

* Time-series conditions:

|  |  |  |
| --- | --- | --- |
| Which chip had the most consistent upward trend in unit sales? | CHP01 | CHP01  CHP02  CHP03  CHP04 |

* Structural conditions:

|  |  |  |
| --- | --- | --- |
| In which country were unit sales of CHP03 highest? | Brazil | Japan  Canada  Mexico  US  UK  Brazil |

1. **Experiment Questions**

Participants should be given 7 minutes to complete as many questions as possible. There should be a visible timer.

For each condition the dashboard should be displayed along with the question. Participants should be able to click on each of the four graphs in order to enlarge them while still viewing the questions and possible answers on a single screen.

I need data on the graphs people click on, the amount of time they spend on each graph and the amount of time they take to answer each question. I also need data on the number of answers selected and whether the final answer was correct.

I know you expressed some concern about whether or not you could time the length that each enlarged graph is visible. I read something about “heat maps” that are an option in Qualtrics; I don’t know if that applies here. We can work on this. If it’s not possible it isn’t a deal-breaker. I’m just trying to capture as much as possible.

**Time-Series**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Question** | **Answer** | **Options** |
| 1 | From 2015 to 2019 what was the trend for total unit sales of chips? | Upward | Upward  Downward  No clear trend |
| 2 | Which circuit board had the greatest change in sales between 2015 and 2016? | CRT04 | CRT01  CRT02  CRT03  CRT04 |
| 3 | Between which, two years did circuit boards experience the greatest change in unit sales? | 2017-2018 | 2015-2016  2016-2017  2017-2018  2018-2019  2019-2020 |
| 4 | What is the trend for unit sales of CRT04 between 2016 and 2018? | Downward | Upward  Downward  No clear trend |
| 5 | In what year were unit sales for all transistor types most similar? | 2019 | 2015  2016  2017  2018  2019  2020 |
| 6 | Which circuit board had the greatest one-year increase in unit sales? | CRT02 | CRT01  CRT02  CRT03  CRT04 |
| 7 | Which transistor had the most consistent downward trend in unit sales? | TRN03 | TRN01  TRN02  TRN03  TRN04 |
| 8 | Which chip had the greatest one-year decrease in unit sales? | CHP04 | CHP01  CHP02  CHP03  CHP04 |
| 9 | In what year were sales of all circuit boards most consistent? Regardless of the answer select 2015. | 2015 | 2015  2016  2017  2018  2019  2020 |
| 10 | What is the trend for unit sales of CHP02 between 2016 and 2018? | Downward | Upward  Downward  No clear trend |
| 11 | What is the trend for unit sales of CRT02 between 2027 and 2020? | Downward | Upward  Downward  No clear trend |
| 12 | What was the trend for unit sales of chips between 2016 and 2018? | Upward | Upward  Downward  No clear trend |
| 13 | Which transistor had the most consistent upward trend in unit sales? | TRN02 | TRN01  TRN02  TRN03  TRN04 |
| 14 | What was the trend for unit sales of transistors between 2016 and 2019? | Downward | Upward  Downward  No clear trend |
| 15 | What is the trend for unit sales of CHP03 between 2015 and 2017? | No clear trend | Upward  Downward  No clear trend |
| 16 | Which chip had the most consistent downward trend in unit sales? | CHP02 | CHP01  CHP02  CHP03  CHP04 |
| 17 | What was the trend for unit sales of circuit boards between 2016 and 2018? | No clear trend | Upward  Downward  No clear trend |
| 18 | Which transistor had the single largest one-year increase in unit sales? | TRN01 | TRN01  TRN02  TRN03  TRN04 |
| 19 | What is the trend for total sales? | No clear trend | Upward  Downward  No clear trend |
| 20 | Which transistor had the largest one-year decline in unit sales? | TRN04 | TRN01  TRN02  TRN03  TRN04 |
| 21 | Which circuit board had the most consistent trend in unit sales? | CRT02 | CRT01  CRT02  CRT03  CRT04 |
| 22 | Which circuit board had the greatest one-year decrease in unit sales? | CRT04 | CRT01  CRT02  CRT03  CRT04 |
| 23 | Between 2015 and 2017 what was the trend for unit sales of TRN04? | Upward | Upward  Downward  No clear trend |
| 24 | Which chip had the greatest one-year increase in unit sales? | CHP04 | CHP01  CHP02  CHP03  CHP04 |

**Structural**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Question** | **Answer** | **Options** |
| 1 | In which country were total unit sales of transistors lowest? | UK | Japan  Canada  Mexico  US  UK  Brazil |
| 2 | In which countries were unit sales of CRT03 equal? | Mexico and UK | US and Mexico  Brazil and UK  Mexico and UK  Canada and Mexico  US and UK |
| 3 | In which country were total unit sales of circuit boards highest? | Mexico | Japan  Canada  Mexico  US  UK  Brazil |
| 4 | In which country were unit sales of CRT03 second lowest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 5 | In which country were sales of TRN02 and TRN04 equal? | US | Japan  Canada  Mexico  US  UK  Brazil |
| 6 | In what country were unit sales of CRT02 and CRT03 equal? | UK | Japan  Canada  Mexico  US  UK  Brazil |
| 7 | In which country were the second-highest unit sales of TRN01? | Mexico | Japan  Canada  Mexico  US  UK  Brazil |
| 8 | In which country were unit sales of CHP04 second lowest? | Brazil | Japan  Canada  Mexico  US  UK  Brazil |
| 9 | In which country were unit sales of CRT03 lowest? Regardless of the answer select Mexico. | Mexico | Japan  Canada  Mexico  US  UK  Brazil |
| 10 | In which country were unit sales of CHP03 and CHP04 closest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 11 | In which country were unit sales of CRT02 second highest? | US | Japan  Canada  Mexico  US  UK  Brazil |
| 12 | In which country were total unit sales of chips lowest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 13 | In which country were the unit sales of TRN03 the lowest? | Brazil | Japan  Canada  Mexico  US  UK  Brazil |
| 14 | In which country were total unit sales of chips? | US | Japan  Canada  Mexico  US  UK  Brazil |
| 15 | In which countries were unit sales of CHP01 and CHP02 closest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 16 | In which country were unit sales of CHP03 highest? | Canada | Japan  Canada  Mexico  US  UK  Brazil |
| 17 | In which country were the total unit sales of all products lowest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 18 | In which country were total unit sales lowest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |
| 19 | In which country were total unit sales highest? | Mexico | Japan  Canada  Mexico  US  UK  Brazil |
| 20 | What was the second highest-selling transistor product in the US? | TRN01 | TRN01  TRN02  TRN03  TRN04 |
| 21 | In what country were unit sales of CRT02 highest? | Mexico | Japan  Canada  Mexico  US  UK  Brazil |
| 22 | In what country were unit sales of CRT04 lowest? | US | Japan  Canada  Mexico  US  UK  Brazil |
| 23 | Which transistor line had the lowest total unit sales across all six countries? | TRN02 | TRN01  TRN02  TRN03  TRN04 |
| 24 | In which country were unit sales of CHP03 second lowest? | Japan | Japan  Canada  Mexico  US  UK  Brazil |

1. **End of First Section**

When the 7 minutes are up participants should receive the following

**Message:** “Thank you for completing this portion of the survey. You will now be asked some questions about you experience. This section is not timed; please consider your answers carefully. At the end of the survey, you will be told your score on the first portion and informed of your total payment.”

**5. Insert NASA TLX test.**

This is an untimed section. I’m not interested in time spent on particular screens, etc. I do, however want to know how long they spent on each portion of the survey. There are two sections.

For the first section, each pairing from the TLX should be on a separate screen. Following the second section, which should be likert scales proceed to:

**9. Final Screen**

**Message**: “Thank you for your participation. You answered X questions correctly. Your compensation will be Y.”

Values to be automatically calculated.

If any participant answers question 9 please flag. This may change to rejection as it is an attention check question but I need to work with my colleagues to determine the appropriate approach.