Date: 11-4-2020

IRB #: IRB-20-10
Title: Personalized Information Visualization
Creation Date: 1-28-2020
End Date:
Status: Approved
Principal Investigator: Patriz Elaine Daroy
Review Board: CPP IRB members
Sponsor:

Study History

Submission Type Initial	Review Type Expedited	Decision Approved

Key Study Contacts

Member Ben Steichen	Role Co-Principal Investigator	Contact bsteichen@cpp.edu
Member Patriz Elaine Daroy	Role Principal Investigator	Contact pmdaroy@cpp.edu
Member Patriz Elaine Daroy	Role Primary Contact	Contact pmdaroy@cpp.edu

Initial Submission

Core Info- Funding, Review Category

If you are unsure about a question or if you want to know what details the IRB is looking for in your answers, please click on the gray "?" at the right of each question for hints and advice.
[v18]

In what general discipline(s) is your proposed research with human subjects?

- Biological or clinical science (biomedical), e.g,. nutrition and kinesiology.
- ✓ Social science, behavioral science, or education (SBER), e.g., consumer preference and psychology.
- A combination of biomedical and SBER
- Other

What kind of funding or support do you have for this study with human subjects?

- Federal such as NSF, NIH, DoD, DoE, DoEd, etc.
- State agency such as CARB, California Dept. of Ed., etc.
- CPP program such as McNair, Trio, Office of Research, etc.
- Other type, such as private sources.
- ✓ None

Are you collaborating with another group such as a school, community association, government agency, etc.?

Yes

✓ No

Under which IRB review category would you consider that your study will fall?

The IRB will make the final determination

Exempt (includes the CPP designations of Studies of Assessment and Evaluation (SAE) and Policy on Educational Improvement Protocol (PEIP) - see the "?" for details)

✓ Expedited (the review category, not the speed of review)

Please explain your reasoning

The study will not be involving any vulnerable subjects and participants will be making relevant judgement on data visualizations to determine whether the personalized visualization aids improved information synthesis.

Full Board

Personnel- PIs, status, training, facilitator

Identify your status as it applies to this IRB protocol.

For example, a staff member enrolled in a CPP master's degree program would choose "Graduate Student".

- ✓ Undergraduate Student
- Graduate Student
- Faculty
- Staff
- External Researcher
- Unaffiliated Investigator
- Other situations and explanations of anything in this section

Principal or Primary Investigator (PI)

Name: Patriz Elaine Daroy
Organization: Computer Science
Address: , Pomona, CA 91768
Phone:
Email: pmdaroy@cpp.edu

Human Subjects Protection Training - PI

Please provide your CITI ID number, completion date, and expiration date and attach a copy of the CITI transcript. For help, open the "?" at right.

CITI ID Number: 34751619
Completion Date: 22 Jan 2020
Expiration Date: 20 Jan 2025

IRB_Certification.pdf

Who is the Primary Contact (e. g., study director, lab manager)?

Unless there is someone designated for this purpose within your research group, enter yourself with the **FIND PEOPLE button.**

Name: Patriz Elaine Daroy
Organization: Computer Science
Address: , Pomona, CA 91768
Phone:
Email: pmdaroy@cpp.edu

Faculty Advisor, co-PI

The guidelines of the CPP IRB allow for students to be PIs. However, student researchers serving as the PI are required to have a faculty member as their co-PI on the study.

Name: Ben Steichen
Organization: Science
Address: , Pomona, CA 91768
Phone:
Email: bsteichen@cpp.edu

Human Subjects Protections Training

Please provide your CITI ID number, completion date, and expiration date and attach a copy of the CITI transcript.

CITI ID Number: 35117864
Completion Date: 26 Feb 2020
Expiration Date: 24 Feb 2025

certificate.pdf

Will you be working with persons outside of CPP? In other words do you have an external or unaffiliated co-PI?

Yes

✓ No

If any, select the co-PI(s) for this study.

A co-PI applies when there is a collaborative research project being proposed in this protocol.

Human Subjects Protection Training

Please provide the CITI ID number, completion date, and expiration date for each co-PI and attach a copy of the CITI transcript.

Will you be using research assistants?

Research assistants are typically students helping with the study.

Yes

✓ No; if this should change, you can amend/modify the protocol later to include them.

Section 1- Research Focus & Concepts

Research, for IRB purposes, is defined as a systematic investigation including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.? http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html

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Describe the purpose of the study.

Why are you conducting this study? What are the goal(s), objective(s) and outcome(s)? What hypothesis or hypotheses are you testing or what are the research questions?

I am conducting this study to further examine the relation between personalized visual aids and an individual's ability to synthesize information on data visualizations.

Our research project aims to address the gap between visualization and the individual user. We plan to test this by understanding how different groups of people (e.g. people differing in terms of cognitive abilities or styles) interact and synthesize information using different visualizations, and which visualization overlays may best help different groups of people understand the underlying data. Examples of data visualizations that the project explores are simple line graphs, bar charts, and pie charts. Visualization overlays include adding data points, graph grids, as well as additional visual elements. Each of these visualizations and overlays are investigated using lab-based user studies, including detailed eye-tracking analyses.

State the relevance of the study.

State specifically the relationship of your proposed research to other, previous scientific and/or scholarly investigations in the field or to existing best practices. Include literature references.

With so much information available to people, organizations, and communities, it is becoming increasingly important to address the issue of information overload. When interacting with too much information, a user can feel inundated and have difficulty extracting relevant information in a timely manner. This can lead to a decrease in productivity, loss of concentration, and even an increase in stress when attempting to extract specific pieces of information. Information visualization systems have been shown to significantly help

humans deal with such large amounts of information [1]. However, they have typically followed a one-size-fits-all model, whereby the same visualization is shown to each user, without taking into consideration an individual user's preferences, abilities, or context [2]. Adaptive and personalized data visualizations for each individual user are yet to be achieved.

Our research project aims to address this gap by understanding how different groups of people (e.g. people differing in terms of cognitive abilities or styles) interact and synthesize information using different visualizations, and which visualization overlays may best help different groups of people understand the underlying data. Examples of data visualizations that the project explores are simple line graphs, bar charts, and pie charts. Visualization overlays include adding data points, graph grids, as well as additional visual elements. Each of these visualizations and overlays are investigated using lab-based user studies, including detailed eye-tracking analyses.

References

[1] Kong, N., & Agrawala, M. Graphical Overlays: Using Layered Elements to Aid Chart Reading. (2012)

[2] Steichen, B., & Fu, B.Towards Adaptive Information Visualization - a Study of Information Visualization Aids and the Role of User Cognitive Style. (2019)

Section 2- Methods

It is important that the procedures to be applied-some might call these treatments - to the human subjects are thoroughly explained and outlined. Those who will review and approve your study must fully understand what will take place during its conduct. Once approved, it is necessary that the procedures be carried out in the way they are officially described in this protocol.

Summarize the overall design of your proposed study.

We will have participants use a computer which has an eye tracker attached to the monitor. During the study, we will have participants fill out a simple demographic questionnaire. After they will be presented with a series of data visualizations accompanied with a question and submission box. They will then utilize the personalized visual aids to answer the provided question.

After the participants complete the series of data visualizations, they will take a post-task questionnaire that will ask them questions about how they felt about the visualizations and aids.

Will you be testing a food product on participants or providing a nutritional supplement to participants as part of the study?

- Yes
- ✓ No

Provide a step-by step outline of the activities included in this study.

What events will occur and in what order? How will the information about the study be presented to the participants?

The participant will be presented with a questionnaire on the computer which will have demographic questions. After the participants fills out the questionnaire, they will then move on to the main part of the study.

The next page will have a data visualization followed by a question to be answered. The data visualizations will either be a bar chart, line graph, or a pie chart. The order of the data visualizations will be randomly presented. Under each data visualization, they will answer the question based on the data visualization with the use of visual aids. These visual aids include overlays such as horizontal lines, data points, and dotted grids. Once they make all their judgements, they will advance to the next data visualization, question, and its corresponding visual aids. They will keep making these judgements until they reach the post questionnaire survey.

This survey will ask questions such as how easy they found to answer the question given the data visualization and its visual aids. Once they complete this post questionnaire survey, the study is completed.

Data collection will occur when participants click the 'Submit' button when entering their answer to the corresponding question for the data visualization. During this time, we will also be collecting eye gaze information using Gazepoint 3 Eye tracker in order to record eye gaze behavior.

Section 3- Subjects & Recruitment

The terms subjects and participants are often interchangeable. A human subject is a living individual about whom an investigator (whether professional or student) conducting research obtains data through intervention or interaction with the individual or identifiable private information. (Dept. of Health and Human Services, 45CFR46)

Describe the characteristics of the subject group(s) that will be used in the study.

The subject group for our study will be Cal Poly Pomona students of all majors who have proficiency in English and are at least 18 years of age.

What is the study's expected sample size?

How many subjects (or participants) will be involved in the research project? How did you determine your sample size?

We anticipate that 20-25 students will participate in this study. We determined this size as the minimum number of participants that will allow us to have a good sample size. The upper range is based on how much time we will actually have to have participants complete our study.

Will subjects be compensated, meaning something they get or receive from participating?

✓ Yes

In what way (token of appreciation, money, gift, cash card, course credit, food, lottery ticket, etc.)?

This information, summarized, must be included in the consent (and/or assent)

form as well. If there is no compensation, then state that clearly.

They will receive a $10 gift card.

No

What are the benefits, if any, to the subjects from their participation in the study?

The terms benefit and compensation have their own meanings in the IRB setting. For example, a cancer patient is paid $100 as compensation for a tissue biopsy and may receive benefit learning about a gene predictive of treatment. Please answer these questions appropriately.

Possible benefits are the exposure to an innovated personalize information visualization prototype.

How will you recruit your potential subjects to participate in the study? From where will you recruit them?

Defining and describing the recruitment helps to standardize what is said to the potential subject. It does not need to be as detailed as the informed consent form (ICF), but must be consistent with the same information.

Participants will be recruited through a mailing list **sent out to students, faculty, and staff in the Computer Science department and Kellogg Honors College. The recruitment flyer will be posted in the mailing list and general bulletin boards in the College of Science.**

Attach any recruitment materials you will be using with your application.

Provide below the text of the script, e-mail, posted flyer, etc. Include the statement as follows: The Cal Poly Pomona Institutional Review Board has reviewed and approved for conduct this research involving human subjects under protocol IRB YY - ### (meaning year and sequence number, e. g., IRB 17-123)

recruitment-over-18.doc

Attach any authorizations for recruiting on electronic or at physical sites.

Authorizations and permissions to conduct studies are not equivalent to informed consent forms. To recruit from/on online (Internet sources, blogs, chat rooms), provide documentation allowing for the research from the moderator or from the site's terms and conditions.

Are you collaborating with another group for recruiting purposes, such as a school, community association, government agency, etc.?

Please explain and attach any approvals/permissions

- Yes
- ✓ No

Will translation of materials be necessary to other languages or to a different reading and comprehension level for recruiting purposes?

Consider that children often need simplified language. Studies show that the average adult reads at a 5^{th} to 8^{th} grade level.

- Yes
- ✓ No

Describe your procedures for the recruitment of a representative sample of the population. Is your recruitment based upon race, ethnicity, gender, health status, or other characteristics?

If this is not the case, discuss the reasons for not having such a balanced sample (such as, the research is focused on a certain subject group or it's a case study).

Participants will be recruited using a recruitment flyer and mailing list. There will be no specific recruitment based on race, ethnicity, gender, health status, or other characteristics.

Section 4- Data Collection

Collection methodologies include, but are not limited to: surveys, interviews, focus groups, observational research in public schools, physiological sensors, weight scales, and the extracting information from existing data sets.

Data include: the information (responses) on survey sheets and questionnaires, biological samples, audio and video tapes, interview questions.

Personal and private data deemed by the IRB to be a risk to subjects if revealed include: gender, income, number of children, age, religion, ethnicity, e-mail addresses, and more. Even when labeled as "demographic" data, it is still personal and private and could potentially identify an individual. The term is PII for personally identifiable information. Any information that can be used to distinguish one person from another and could then be used for de-anonymizing anonymous data can be considered **PII**. This is not to say that PII data should not be collected, but mechanisms must be described in this protocol to protect the interests of the subjects should they be (somehow) identified.

What type of data will you collect?

For example, the variables/responses to questions from surveys and interviews, the information extracted from transcripts after making audio and video recordings, data collected when reviewing medical histories, taking blood samples, measuring treadmill running times, asking for income, weighing the amount of food eaten, etc.

The participant will be presented with a questionnaire on the computer which will have demographic questions. After the participants fills out the questionnaire, they will then move on to the main part of the study.

The next page will have a data visualization followed by a question to be answered. The data visualizations will either be a bar chart, line graph, or a pie chart. The order of the data visualizations will be randomly presented. Under each data visualization, they will answer the question based on the data visualization with the use of visual aids. These visual aids include overlays such as horizontal lines, data points, and dotted grids. Once they make all their judgements, they will advance to the next data visualization, question, and its corresponding visual aids. They will keep making these judgements until they reach the post questionnaire survey.

This survey will ask questions such as how easy they found to answer the question given the data visualization and its visual aids. Once they complete this post questionnaire survey, the study is completed.

Data collection will occur when participants click the 'Submit' button when entering their answer to the corresponding question for the data visualization. During this time, we will also be collecting eye gaze information using Gazepoint 3 Eye tracker in order to record eye gaze behavior.

Will your research utilize any copyrighted materials, instruments, measurements, scales, etc. that were created by someone other than you?

Questionnaires, surveys, measurements, etc.

Yes

✓ No

IMPORTANT: By selecting **No**, you are verifying that all of your study materials, instruments, measurements, scales, etc. were created by yourself or a member of the research personnel and/or are designated as "free access" and do not require authorization to utilize.

What methods will you use to collect data from participants?

Select all that apply.

Paper survey/questionnaires

✓ Electronic survey/questionnaires

Please explain how this will be done.

The participant will be presented with a questionnaire on the computer which will have demographic questions. After the participants fills out the questionnaire, they will then move on to the main part of the study.

The next page will have a data visualization followed by a question to be answered. The data visualizations will either be a bar chart, line graph, or a pie chart. The order of the data visualizations will be randomly presented. Under each data visualization, they will answer the question based on the data visualization with the use of visual aids. These visual aids include overlays such as horizontal lines, data points, and dotted grids. Once they make all their judgements, they will advance to the next data visualization, question, and its corresponding visual aids. They will keep making these judgements until they reach the post questionnaire survey.

This survey will ask questions such as how easy they found to answer the question given the data visualization and its visual aids. Once they complete this post questionnaire survey, the study is completed.

The survey, hosted on Amazon's Mechanical Turk, cannot be published until IRB approval is received. Thus the survey is not currently active, but a PDF preview is attached below.

Please attach PDF version

Sample Questionnaires.docx

Sample Task.pdf

Please paste the active survey link

The survey, hosted on Amazon's Mechanical Turk, cannot be published until IRB approval is received. Thus the survey is not currently active, but a PDF preview of a sample task is attached above.

Interview

Audio/visual recording

Bio-specimens (blood draws, urine, saliva, etc.)

Focus Group

Exercise protocol

Archival/Secondary Data

Observation

✓ Other

Please explain your data collection methods and attach any documents.

Data collection will occur when participants click the 'Submit' button when entering their answer to the corresponding question for the data visualization.

Please attach any materials, if any.

Will your research take place in another country?

Yes

✓ No

Where will the research be conducted?

For example, a laboratory, a classroom, a hospital, field work, and other places.

The research will be conducted in the Computer Science Research Lab.

Attach any authorizations obtained, allowing for conducting research at a location. For example, the superintendent of a school district, the owner of a business, the medical director of a clinic, and others.

Will you be using any third (3rd) party online websites to collect data?

e.g. facebook, twitter, etc.

Yes

✓ No

Will you be gathering information from subject medical records?

Yes

✓ No

What is the estimated start date of the study?

10/26/2020

Comments

What is the estimated end date for data collection for this study?

02/05/2021

Comments

Section 5- Vulnerable Subjects

When a subject has limitations, is coerced or manipulated, there is a loss of capability to volunteer, and the subject may be vulnerable. According to regulations, vulnerable subjects include prisoners, pregnant women, minors and fetuses. The IRB considers other kinds of vulnerability, for example, the possibility that bosses can coerce at the workplace and teachers can manipulate in the classroom. Research conducted with regulated vulnerable subjects requires demonstration of your training and experience with that specific population.

Will the research involve any of the following populations?

- Children, Minors, or Wards
- Pregnant Women
- Fetuses
- Prisoners
- ✓ None

Will the research involve other vulnerable populations?

- Yes
- ✓ No

Section 6- Data Security

Per California law, CC 1798.24, the researcher must provide a plan sufficient to protect personal information from improper use and disclosures, including sufficient administrative, physical, and technical safeguards to protect personal information from reasonable anticipated threats to the security or confidentiality of the information.

Is the study:

Anonymous

Justify

✓ Confidential

Justify

The consent form will be stored at a different location than the study information. All information (including questionnaire, task answer, and sensor information) will be stored on a password-protected computer in a locked room. All information will be confidential as no personal information will be stored in the computer and informed consent will be obtained in person.

None/Neither

Will personally identifiable information (PII) be collected/used?

Yes

✓ No

Justify

No, the demographic questionnaire only asks for their age.

Who will have access to the data?

Will any data collected from the study be made available as open access? For example, some funders and journals request that data be housed (kept, stored) at an approved site (e.g., clinicaltrials.gov), accessible to the public.

Only the primary investigator and the research advisor.

How will the raw data be kept protected and secure?

How will it be coded or identified?

All information (including the questionnaire, task answer, and sensor information) will be stored on a password-protected computer in a locked room.

What will become of the data at the end of the study?

The data will be destroyed 2 years after publication.

How will the data, results, and conclusions be utilized?

*Do you plan to use any data in a presentation, publication, or something else? Will any data be used *only* internally, for example within an institutional department?*

The raw data will not be used but the results and conclusions from the data will be used in a Thesis presentation and published in a journal.

Section 7- Potential Risks & Their Assessment

Definition of risk: A potential harm, discomfort, or inconvenience associated with your research that a reasonable volunteer would be likely to consider significant in deciding whether or not to participate. Risks include legal, social, emotional, or psychological issues, physical or biological hazards, revealing an identity, damage to reputation, exposure of behavior or medical character, illness, injury, side effects of applied or consumed products, revealing or a loss of private information, etc. Risk comes at various orders of magnitude, ranging from mere inconvenience to perceptible bodily pain.

What are the risks? Describe any potential harm, discomfort, or inconvenience, however minimal, as you would explain them to the subjects.

There is the possibility of slight discomfort from sitting and or looking at the computer for a prolonged time. If at any point there is any discomfort, the participant is encouraged to stand up and stretch.

Describe your procedures for protecting against or minimizing the potential risks stated above.

Participants will be instructed to adjust their seating arrangement for what makes them feel the most comfortable prior to setting up the study. Participants are also instructed to not place their names on the experimental data, thus their participation will be confidential.

Explain why these risks should be determined as reasonable in relation to the anticipated benefits, if any, while conducting research with the subjects.

The risks are minimal as it is no worse than sitting in a classroom in front of the computer. Possible benefits of your participation are the exposure to personalized information visualization research

prototypes, and the exposure and engagement in the academic research. In addition, you will receive a $10 gift card as a reward.

Will you utilize any of the following for the study's potential risks?

Check all that apply

- [ ] Debriefing Statement
- [ ] Counseling and Psychological Services (Ex. SHCS at CPP)
- [ ] Adverse event protocol (medical emergency services contact)
- [x] None

Section 8- Affiliations

These questions ask about how you are related to the institution and subjects where the research project is to be conducted. As examples: you are a teacher using your students in a classroom setting as your subjects, or you work for the company where a marketing survey is to be conducted, or you have a financial interest in a product being tested. Each of these examples presents an element of risk. IRB reviewers will evaluate whether these risks are reasonable and whether they are sufficiently controlled, minimized, or eliminated by your procedures.

Do you have any kind of pre-existing relationships with the subjects (participants) or institutions involved in conducting this study?

Working at the place where the study is to be conducted may be seen as coercive to others. Consider the possibility that collection of data from either the participant or institution may be seen as a favor when asked to volunteer information. The IRB is interested in reading a statement from the PI(s) of the potential and it may be of no concern at all. See the "?" for more.

Yes

✓ No

As an investigator involved with the project, do you or any of your family members (e.g. spouse, child) have a financial or other self interest in this study?

Yes

✓ No

Though there may not be one, could there be the perception of a conflict of interest for either you, as the investigator, or for the subjects in this study?

Yes

✓ No

Section 9- Informed Consent & Assent Form(s) (ICFs)

The informed consent form (ICF) is the means by which you as the PI convey not only the research, but also the principles of human subjects protections to your subjects: respect, beneficence, and justice*. There are examples on the*IRB website*. Towards the top of this web page is the Word protocol document which contains the elements for the ICFs and the required header in English and Spanish: "blank IRB protocol application for training, classroom exercise, and development."*

To test your ICFs for appropriate reading levels, submit your ICF to this software: www.hemingwayapp.com

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Select the type of ICF you will utilize

Note that you should add the current IRB protocol number obtained when you created this protocol in Cayuse to your ICF(s) before you upload it to this site. Be sure to check the **list of required ICF elements** (available in the Word protocol document at the IRB website) and that the domain *csupomona* has been changed to *cpp* in email addresses and websites.

✓ Informed Consent, paper version. This is the most typical means to explain a study and convey the ICF elements to potential subjects/participants.

Consent Form - Updated.docx

Informed Consent, electronic version (sometimes called implied consent because the subject doesn't sign but instead **clicks** yes/I agree or no/I don't agree). This type of consent doesn't always work and may not be applicable in certain risky and potentially harmful studies.

Waiver of Informed Consent, when obtaining consent is not practicable in order to conduct the research; see the federal regulations

Will there be recruitment of subjects who cannot themselves provide informed consent?

Yes

✓ No

How will you obtain and document informed consent?

See the "?" for more.

Informed consent will be obtained in person.

Which study personnel will be involved in obtaining consent?

Know that makes such personnel ***engaged*** with the potential study subjects/participants.

Patriz Elaine Daroy

Describe how you will maintain and secure the consent forms received from the subjects?

Consent forms can be electronic or paper.

The consent forms will be kept separate from the experimental data in a locked drawer inside a locked room.

Section 10- Study PI(s) Declaration

THE CAL POLY POMONA IRB DECLARATION BY ALL INVESTIGATORS:

- This proposal is guided by the ethical principles regarding research involving human subjects as set forth in the Belmont Report.
- I/We agree to abide by the policies and procedures of the IRB at CPP, including obtaining appropriate training in human subject research for myself and those involved in its conduct.
- I/We will not initiate any research associated with this proposal on or off campus until authorized by the IRB.
- I/We will report to the IRB about any adverse events or unanticipated problems (unexpected, possible greater risk, etc.) that occur.
- I/We will inform the IRB of a need to modify the study design requiring an amendment.
- I/We understand that approval, when granted, is valid for up to one year and will submit a renewal for its continuation if needed.

By entering your name below, you as the PI are agreeing to adhere to the "CAL POLY POMONA IRB DECLARATION" above and are acknowledging responsibility for any co-PIs and research assistants listed in the protocol and their adherence to the "CAL POLY POMONA IRB DECLARATION"

Signature of Principal Investigator (please enter your name below):

Patriz Elaine Daroy