

Institute Review Board Application

STUDY TITLE:

Measuring the Effect of Culture on Usage of Encrypted Communication in India

PRINCIPAL INVESTIGATORS:

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VERSION DATE:

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RELATED STUDIES:

The research shall be first of its kind. Data shall not be extracted or extrapolated from any pre-existing source or research. All data shall be methodically collected indigenously based on principles of Hofstede's 5-dimensional framework for measuring culture given by Hofstede [1980] and Unified Theory of Acceptance of Usage of Technology proposed by Venkatesh et al. [2003]. The study design is a collaboration of authors of research under guidance of Prof. Mainack Mondal, Indian Institute of Technology, Kharagpur. The study design methods and data statistical methods have been considered from Mark [2006].

Check any **applicable** boxes in the table below:

Indicate Vulnerable Population(s) to be Enrolled	<input type="checkbox"/> Children (you must complete Appendix A in addition to this protocol document if you plan to enroll children) <input type="checkbox"/> Cognitively Impaired Adults <input type="checkbox"/> Pregnant Women (IF the research activities will affect the pregnancy or the fetus) <input type="checkbox"/> Prisoners (or other detained/paroled individuals)
International Research (check this box if you will collect data from individuals located outside the India)	<input type="checkbox"/>
Research involving external collaborators (some research activities will be carried out by individuals not employed by Indian Institute of Technology, Kharagpur or any of its affiliates)	<input type="checkbox"/>
Research has Indian government funding via direct award or a sub-award	<input type="checkbox"/>

1.0 Purpose and rationale of the study:

The causality of data globalization and the need for the hour secure information systems have led encryption to become a part of every user connected to a network. The intention of this project is to measure the impact of cultural dimensions on the acceptance and usability of encryption in domains of communication. The study will be defined on the method of Instant Messaging in communication as it has been proposed to be the most prominent and equally susceptible in terms of privacy and security. Unlike regular voice or video communication methods, instant messaging considers all aspects of the extended CIA model emphasizing accountability (non-repudiation factor). This project shall consider existing work on different information technologies, which summarize that the effect of culture can be measured through the social influence variable on user acceptance.

Our approach will be guided by 2 research questions:

- (1) What is the relative impact of social influence compared to others on the usage of encrypted communication systems?
- (2) Is the impact of social influence on the usage of encrypted communication systems correlated to the different variables of culture?

As the objective of our study is to quantitatively measure the anthropological concepts like usage and culture, to equally account for the technological acceptance and the behavioral intention to use by the causality of culture, the study is divided into 2 parts for all measurements henceforth. The first part deals with gathering data regarding usage and acceptance of encrypted communication in instant messaging. The second part enables collecting responses for measuring the cultural dimensions. The data for our study will be collected by conducting surveys. IRB approval is requested for both these phases.

Partial Least Squares method (PLS) to assess the discriminant validity and internal consistency (reliability) of the constructs in the UTAUT model. For culture measurement instruments, Cronbach's alpha shall be used as the coefficient of reliability. Confirmatory factor analysis will result for the final scales. To assess the reliability of the scales, internal composite reliabilities (ICRs) will be calculated. Descriptive statistics shall also be gathered for considering gender biases and demographic correlation. T-test will be conducted for calculating significance of individual constructs of UTAUT on the overall usage and acceptance of usage of encrypted communication in the account of instant messaging.

2.0 Enrollment Criteria (who can be in your study and who would not be eligible to participate in your study):

Participants of the research shall be focused on 2 categories.

The 1st category includes undergraduate students who shall have an age range of 17 to 25 years. Predominantly they shall require proficiency in English to contribute to the research. They would be belonging to India and shall be recruited from universities and institutions of all 29 states across India. Another factor to consider is the initial diversity inside the population of the universities itself. Thus, heterogeneity shall be maximized.

The 2nd category includes parents of these undergraduate students who shall fall in the age range of 40 to 55 years. They too shall require proficiency in English to

contribute to the research. Being directly related to the 1st category participants, their variation too shall be diversified from all over Indian states.

The research does not include any kind of vulnerability to children, pregnant women, prisoners, and cognitive impaired adults. The research is solely directed towards national population of India and will not consider international residents. Even non-residential Indians shall be excluded from the study.

Only those participants shall be enrolled into the research who agree to the following notions which shall be explicitly stated to them in the consent form before the execution of the research data collection from the participants:

- Agree to contribute their responses as a relation to culture
- Allow their data to be saved for this particular academic research purposes for the pre-defined period of time
- Agree to disclose information regarding their usage of text-message communication
- Agree to not circulate the research resources provided to external members in the network of the participant.

3.0 Sample Size:

For the final research study, a sample space of around 150 individuals who are willing to participate in the survey with sincerity in agreement with consent form shall be adopted. The sample size has been determined via references of previous studies in South East Asia conducted by Nitya et al. [2018], Mark [2006], and Hofstede [1980]. The authors have also considered the vast diversity in entirety of India and thus have determined the number to generalize the sample size with the total external population thereby following external validity.

For conducting the pilot study for the research, a sample size of 20 participants has been fixed by the authors. These participants shall be recruited from authors' network to form a convenience sample. This sample size shall enable to cross-verify extreme response bias and acquiescence bias.

4.0 Recruitment and Screening Methods:

The sample size for the research includes undergraduate students from Indian universities across all 29 states of India which predominantly have huge diversity inside them. Examples of these universities are IITs, BITS, VIT, SRM, Manipal, etc.

Participants shall be contacted via email circulated via Public Relations chairpersons to the entire student population of respective Indian Universities. Only the authors shall contact the Public Relations chairpersons of these universities and share with the

them the mailers to be circulated after discussion with them or the colloquial governing authority who has the privilege to circulate mails in the entire campuses. The secondary approach is to contact professors in the field of Human Computer Interaction, if initial approach leads to an unsatisfactory response, and ask their help for circulation of emails for recruiting students from all over their respective campuses. The email shall include the specifications of the experiment and all the details required from end for completion of their contribution. This will include consent form links and survey links.

For recruiting their parents, two methods shall be opted:

1. If university allows circulation of email specifically to parents, then they shall be contacted via the similar email template.
2. Else, provision for collection of phone numbers/ email ids of students' parents will be done in the demographics section of the survey section and an emailer (in case email id is provided)/ calling script (in case telephone number is provided) will be used for confirming their recruitment.

The recruitment procedure for parents via email is completely like the one defined for students. In case of telephonic calling for confirmation, it must be noted that the authorities contacting the parents via telephonic call shall be no other than the mentioned authors. The calling script has been defined in such a way that the participant is duly defined of the experiment and the consent form along with the survey link is shared via an email. They shall also be made aware of their voluntary contract so that their rights are not violated.

Eligibility screening activities:

- The emailer shall include eligibility criteria so that the participants are informed about the eligibility criteria and choose for themselves about their participation in the survey.
- For telephonic calling, eligibility criteria shall be checked for participant verbally via asking the participants if they would like to adhere to the criteria or not. The further responses shall only be recorded if they agree to all the notions required.

5.0 Research Locations:

For conducting the surveys, we have considered 2 important segments:

- a) Likert Scales
- b) Scenario based questions

To measure up for both these we have scouted form clients such as Google Form, Typeform and SurveyPlanet. We have decided to choose among these 3 considering their flexibility in data handling and convenient user interface for respondents of the

survey. For conducting statistical analysis, regression tools shall be utilized. Microsoft Excel will be used to handle the data and maintain records. Correlations shall be found using statistical softwares like R Studio and Minitab.

The participants are only anticipated from India. After entire data collection, the survey responses which have mentioned their State shall only be used for verification of our data. Authors have planned to insert the “Other” in the dropdown list for state for completeness of question and to align with participants privacy will; but the participants who select this option shall be discarded from future data analytics as they can’t be defined for external validity.

For the other aspects of research such as internal discussions and analysis, online conferencing platforms like Google Meet and Microsoft Teams shall be used among the authors. This shall completely be in online medium.

6.0 Procedures Involved:

Please check the boxes for all applicable data collection procedures you plan to use:

- ☐ One-on-one interviews
- ☐ Focus Groups
- ☒ Questionnaires/surveys
- ☐ Analysis of secondary data (medical record data, educational records, government or private sector datasets, etc.)
- ☐ Ethnographic observation
- ☐ Physiological measurements (e.g., EEG, EKG, MRI)
- ☐ Biospecimen collection (saliva samples, blood draws, hair samples, etc.)
- ☐ Mobile applications/data collection devices (e.g., Fitbits, actigraphs, etc.)
- ☐ Behavioral decision-making tasks (e.g., puzzles, interactive games, etc.)
- ☐ Physical activities such as walking and other forms of exercise
- ☐ Other procedures (briefly list types of procedures here if not covered by the check-boxes above): _____

The survey will be split into 4 parts: overview and consent, UTAUT based questions, cultural background, demographics. Consent shall be placed first to maintain ethical performance and gather data from only willing respondents. Culture based questions shall be asked later to not cause any biases while answering the UTAUT questions. Demographics have been placed last as previous studies have shown that it causes high skewness in data.

For UTAUT measurements a scenario analysis shall be conducted where 2 applications (one supporting encrypted instant messaging communication and the other not) shall be described to participants. Their response regarding their preferences for using the applications shall be recorded.

Self-report questionnaires consisting of ratings shall be deployed for cultural measurement. Respondents will have to rate the importance of each value on a Likert Scale consisting of 7 interval points or the respondent may be asked to rate his consensus with a set of statements.

The overall survey should take 20 min. With 7 minutes for UTAUT questions and 7 minutes for Culture questions and 3 minutes for demographics and 3 minutes for consent and summary.

7.0 Consent Process:

The mode of consent will be online. We will be circulating the consent form among the potential research participants via email. The consent form has been prepared in a way that will provide the potential participants a complete understanding of the purpose of the project, research procedures, confidentiality, data concerns, and study benefits for them to make an informed decision.

Since the consent form will be circulated online, we expect the form to be signed digitally and returned as a reply to the same email. Find the **Consent form** in **APPENDIX 2**.

SPECIAL CONSIDERATIONS FOR THE CONSENT PROCESS:

NON-ENGLISH-SPEAKING PARTICIPANTS:

We have been careful to recruit participants from colleges where the primary medium of communication is English hence, we require all participants to be proficient in English language. In case the participant faces an issue understanding any of the questions due to the language barrier we or otherwise, we encourage them to approach us with their queries. We will personally assist the participants in case they feel incompetent to answer the survey due to the language barrier. We will not be translating the recruitment letter, consent form, and the survey into any other local language. In case of minor incompetence due to the language barrier, we would encourage participants to ask for assistance.

8.0 Waiver of Participant Signature on Consent Form:

We will require participants to digitally sign on the consent form. In case that is not possible, we will accept the consent form filled by them with their name and other details if we receive it as a reply to the email sent to them for information.

9.0 Financial Compensation:

Every research participant will be offered INR 200/- as appreciation for participation and effort. If all sections of the survey are not complete or a failure is spotted in performing at the attention checks, participants will not receive any incentive for participating in this study. There is minimal risk to participants and no cost besides regular (<500kbps) internet connection charges to attempt the survey materials.

10.0 Potential Benefits of this Research:

Taking part in this research study may not benefit participants personally, but it may allow authors to learn new things about human behavior towards usage of encrypted communication that could help others. The final outcome of this research may lead developers get new insights for adding suitable features in encrypted communication apps. Thereby, making the entire domain of text-messaging secure and more trustworthy along with usability.

11.0 Potential Risks to Participants:

Participation in this study does not involve any risk (physical, social, economic, psychological) beyond that of everyday life. There lies a risk of data insurgence at the fundamental level. Although authors will take full responsibility in case of mishandling of data and shall take full responsibility for thwarting it in every possible way.

12.0 Provisions to Protect Participant Privacy and Data Confidentiality:

The individual responses noted in the survey will be stored in encrypted format for a year after it is coded for evaluation.

Results of this study will be used in publications and presentations. The study data will be handled as confidentially as possible. If the results of this study are published or presented, then individual names and any other personally identifiable information will not be disclosed.

If participants decide to withdraw from this study at any point of time, we will only use their pre-collected data with your consent. If they agree to cooperate, we may include the data collected until that point for analysis, otherwise we will destroy every trace of already collected data.

De-identified information from this study may be used for future research studies or shared with other researchers for future research without your additional informed consent.

13.0 Long-term Data and Specimen Storage and Sharing:

Survey response data shall be only stored for a period of 1 year after the forms have been filled by the participants.

- This data will be stored in Excel or CSV files with restricted-password access.
- The codes for analysis in Minitab or R shall be kept in a password protected zip file
- The entire folder for the research study data will be kept only on the password protected laptops of the authors (ONLY 2 devices)
- They shall not be emailed, forwarded manually, nor shall any other personnel other than the authors be allowed to access these files

Excel and CSV are used as they can be encrypted, and password protected by the inbuilt function of Microsoft. Data analysis shall be done using R and Minitab, as data compression is possible for their output files inside zip folders. Zip folders are used as they have a feature for password protection.

14.0 Qualifications of Research Team to Conduct the Research:

The authors are third-year undergraduate students of Indian Institute of Technology, Kharagpur. They have also received formal professional training in fields of Human Computer Interaction and Usable Security and Privacy.

They have technical expertise to handle data securely and derive inferences from it using exploratory data analysis, machine learning and relevant regression techniques.

APPENDIX 1: Recruitment Form for Research Study

Study Title: Measuring the Effect of Culture on Usage of Encrypted Communication in India

Institution: Indian Institute of Technology, Kharagpur

Investigators:

Ashish Gokarnkar

Third-year Undergraduate,
Industrial Engineering,
IIT Kharagpur.

ashish.gokarnkar@iitkgp.ac.in

Nandini Bajaj

Third-year Undergraduate,
Department of Chemistry,
IIT Kharagpur.

nandinibajaj@iitkgp.ac.in

Recruitment Procedure: Participants shall be contacted via email circulated via Public Relations chairpersons to the entire student population of respective Indian Universities. For recruiting their parents, two methods shall be opted:

1. If university allows circulation of email specifically to parents, then they shall be contacted via the similar email template.
2. Else, provision for collection of phone numbers/ email ids of students' parents will be done in the demographics section of the survey section and a calling script will be used for confirming their recruitment.

Template – Recruitment Email for Student/ Parent

18th October 2020

Re: Measuring the Effect of Culture on Usage of Encrypted Communication in India

Dear Student/ Parent,
Hoping that you are doing well.

I am writing to let you know about an opportunity to participate in a voluntary research study about “Measuring the Effect of Culture on Usage of Encrypted Communication in India”. I, Ashish Gokarnkar, along with my colleague, Nandini Bajaj, from Indian Institute of Technology, Kharagpur have been investigating on this topic and wish your contribution for its conclusion.

Note: This research is completely voluntary and compensation arrangements are unallocated. You are eligible for this research if you have received this email from the Public Relations Chairperson of the University you are currently studying in or if you are the Guardian of a son/ daughter/ junior studying in the respective University.

Please check the following guidelines and only choose to participate if you agree with them. The entire participation procedure is voluntary.

1. Your responses will contribute to relate to culture
2. Your provided data will be saved for academic research purposes
3. You are willing to disclose information regarding your usage of text-message communication
4. You accept to not send the resources we provide to other people in your network

If you decide to participate in this study, you will

1. Check coherence with the objectives mentioned in the consent form <link to consent form>. Time commitment for consent prospectus is 3 minutes.
2. If agreement is provided, you are requested to attempt the following survey <link to survey> as sincerely as possible. The time required for the survey shall be 20 minutes.
3. Receive INR 200/- as compensation for your efforts and time

The data we collect from you, shall not be used for any secondary purposes, and shall be deleted from existence after a period of 1 year. Within the timeframe, it shall only be utilized for research purposes authorized by the rules and regulations of Indian Institute of Technology, Kharagpur, and Constitution of India.

Thank you for your consideration, and once again, please do not hesitate to contact if you are interested in learning more about this Institutional Review Board approved project. You can reach us at: Ashish Gokarnkar (ashish.gokarnkar@iitkgp.ac.in)
Nandini Bajaj (nandinibajaj@iitkgp.ac.in)

Ashish Gokarnkar,
Investigator.
Third-year Undergraduate Student,
Indian Institute of Technology.

Template – Telephone Script for Parents only

Hello, my name is Ashish Gokarnkar. I am calling from Indian Institution of Technology, Kharagpur about a research study. Am I speaking to Mr./ Ms./ Mrs./ (other suitable title) <parent name>?

***If “no,” wait for the person to pick up or ask for a time to call back.
Research topic will only be shared with the potential participant or when permissible the person’s representative.***

If “yes”: Is this a good time to talk? I expect this phone call will take about 6 minutes of your time.

Arrange to call at another time, if appropriate.

I am calling about a research study of “Privacy in communication” called “Measuring the Effect of Culture on Usage of Encrypted Communication in India”. The purpose of this research study is to learn more about the relation between social influence on a person and its consequences in encrypted messaging communication.

I wished to see if you are interested and would be willing to participate in our research study. If you agree, I will ask you some questions to see if you can be in the study. If it looks like you might be eligible, I shall share with you a link via an SMS:

1. First SMS would contain link to a consent form with shall enlist all that we would require in terms of agreement for the research. Time commitment for consent prospectus is 3 minutes
2. If agreement is provided, another link for a survey shall be sent to you via an SMS. We request you to attempt the following survey as sincerely as possible. The time required for the survey shall be 20 minutes.

Before we go on to the questions, let me tell you a little bit about your rights as a research subject.

You do not have to answer any questions that you do not want to, and you can choose to stop at any time without penalty. The research study is entirely voluntary. The main risk of answering my questions today, is that you might share some information regarding your relationships or loss of confidentiality. However, we will do our best to keep your information confidential by keeping no recordings of this call and maintaining no notes whatsoever regarding the contents of the call.

If you have questions about the study, you can call us at this same number. If you have questions about your rights as a research subject or research-related inquiry, you reach out to ashish.gokarnkar@iitkgp.ac.in. I shall also share these details via the SMS for your reference.

May I go ahead with the eligibility questions?

If no, thank the individual and end the call.

If yes start the questions:

- Are you a parent of a child who attends an University for undergraduate degree?

If no, thank the individual for his time and end the call.

- I am going to give a list of things that would PROHIBIT you from being in the study. Please do not indicate if these things apply to you until the end of the list.
 - You do not wish your responses to contribute as a relation to culture
 - You do not wish your data to be saved for academic research purposes
 - You do not wish to disclose information regarding your usage of text-message communication
 - You would like to send the resources we provide to other people in your network
- **End the call if someone answers in the affirmative.**

If eligible, thank the individual for his time and inform him about the incentive of INR 200/- for participation in the research study and send the SMS for consent form along with investigators' contact details, after consent agreement send the participant the SMS containing survey link; if not thank them for their time.

Appendix 2: Consent Form

Consent Form for Research Participation Indian Institute of Technology, Kharagpur

Study Number: e.g., IRB20-7854

Study Title: Measuring the Effect of Culture on Usage of Encrypted Communication in India

Researcher(s): Nandini Bajaj, Ashish Gokarnkar

Collaborating Institutions: Indian Institute of Technology, Kharagpur

Description: We are students at Indian Institute of Technology, Kharagpur doing a research study about Measuring the Effect of Culture on Usage of Encrypted Communication in India.

The study will be defined on the method of Instant Messaging in communication as it has been proposed to be the most prominent and equally susceptible in terms of privacy and security.

The project scenario is set as inclusive of two famous instant messaging apps. One of which is WhatsApp and the other being Facebook Messenger. WhatsApp is an app that is known to prioritize its user's privacy since all conversations on it are end-to-end encrypted. Facebook Messenger is a competitor of WhatsApp that focuses more on user satisfaction in terms of display appeal than user privacy, however it does have a hidden feature called secret messaging that employs end to end encryption which has low accessibility. We deploy our scenario by naming these applications in such a way to not cause any perception bias.

While recruiting individuals for answering our surveys we aim to focus on having representatives from multiple demographic and social backgrounds to ensure sufficient variance in the dimensions of culture.

In our survey we do not intend to ask any sensitive questions that might upset the participant. The survey aims at finding a link between social influence, culture, and their impact on the usage of encrypted communication. Participation should take about 12 minutes to complete the survey with competence. Your participation is voluntary.

Incentives:

Every research participant will be offered INR 200/- as appreciation for participation and effort. If all sections of the survey are not complete or we spot failure in performing at the attention checks, you will not receive any incentive for participating in this study.

Risks and Benefits:

Your participation in this study does not involve any risk to you beyond that of everyday life. Taking part in this research study may not benefit you personally, but we may learn new things about human behavior towards usage of encrypted communication, that could help others.

Confidentiality:

The individual responses noted in the survey will be stored in encrypted format for a year after it is coded for evaluation.

Results of this study may be used in publications and presentations. The study data will be handled as confidentially as possible. If the results of this study are published or presented, then individual names and any other personal identifiable information will not be disclosed.

If you decide to withdraw from this study at any point of time, we will only use your pre-collected with your consent. If you agree to cooperate, we may include the data collected until that point for analysis, otherwise we will destroy every trace of already collected data.

De-identified information from this study may be used for future research studies or shared with other researchers for future research without your additional informed consent.

Rights as a research participant:

Participation in the study is voluntary. You do not have to answer questions that you think would harm you personally. If at any point of time you prefer to withdraw your participation for any reason feel free to notify us, and it will cause no penalty. We would encourage you to complete the survey in one go so that we can gain the best results from it.

Contacts & Questions:

If you have questions or concerns about the study, you can contact the researchers at

Nandini Bajaj
nandinibajaj@iitkgp.ac.in

Ashish Gokarnkar
ashish.gokarnkar@iitkgp.ac.in

If you have any questions about your rights as a participant in this research, feel you have been harmed, or wish to discuss other study-related concerns with someone who is not part of the research team, you can contact the researchers.

Consent:

By clicking “Agree” below, you confirm that you have read the consent form, are at least 18 years old, and agree to participate in the research. Please print or save a copy of this page for your records. Please fill the details below:

FULL NAME AND SIGNATURE: _____

EMAIL-ID: _____

AGE: _____

CITY OF RESIDENCE: _____

HOME STATE: _____

(checkbox) I AGREE to participate in the research

(checkbox) I do NOT AGREE to participate in the research