

Communication challenges in distributed teams

Exploring different types of feedback for supporting distributed teams in email communication

Bachelor Thesis in computer science

By Jenny Schmid

Wölflinswil, Aargau, Switzerland

Matriculation number 13-763-602

Written at the

Department of Informatics

University of Zurich

Prof. Elaine M. Huang

Supervisor: Helen Ai He

Submission date: 21.03.2017

Table of content

Chapter 1 Introduction.....	2
Thesis problem and goal	2
Overview of the thesis.....	3
Chapter 2 Background and Related work.....	4
Culture	4
Chapter 3 Methods.....	6
Study overview	6
Setup.....	6
Procedure	6
Condition groups	7
Collaborative Decision-Making Task	10
Pre-Task Questionnaire	10
Post-Task Questionnaire	11
Interviews	11
Self-reflection Questionnaire	11
Text Analysis.....	11
Participants.....	17
Chapter 4 Findings and Discussion	22
Quantitative Analysis.....	22
Qualitative Analysis	29
Opportunities for technology support	37
Chapter 5 Conclusion and Discussion.....	39
Research question and approach.....	39
Research contribution	39
Conclusion	40
References.....	41
Appendix.....	43

Chapter 1 Introduction

Problems with intercultural communication is a topic that almost everyone can relate to. Especially in international companies, this problem occurs frequently. In these companies, employees from many different locations work together in geographically distributed teams. These teams use computer-mediated communication (CMC) tools (e.g. email, videoconferencing, telephone conferencing) for improving their communication. The team members of such teams differ in various points: They have different occupational and ethnical backgrounds, live in different time zones, and have different cultural and language boundaries. This diversity leads to different communication styles and thus also to challenges in communication that do also appear in CMC tools (He, Huang, 2014).

Differences in cultural backgrounds can lead to misunderstandings and miscommunication (Hofstede, Hofstede, 2001). This can lead to communication problems. Teams with members from different cultures often struggle because of cultural differences that are not understood or resolved and this can lead to a low level of effectiveness in such teams (Laroche, 2003).

Thus far, no CMC tools exist that support these challenges. In my thesis, I explore the potential of providing automatically detected feedback of peoples' communication styles in CMC tools and how such feedback can support communication in distributed teams. In particular, I focus on email communication. Specifically, I conducted a study in collaboration with Helen Ai He, a Ph.D. student at the university of Zurich at the department of informatics, to explore how Japanese-Canadian dyads respond to such feedback in email communication. The results of my study inform how to design technologies to support email communication in distributed teams.

Thesis problem and goal

Problems and misunderstandings in communication in distributed teams are a frequent problem. As stated above, today's CMC tools do not support people with these communication challenges. This leads to the research question of my bachelor thesis:

What is the potential of providing feedback of peoples' communication styles to mitigate email communication challenges in distributed teams?

In particular, what is the potential of automatically-detected feedback in combination with interlocutors' subjective interpretations of that feedback to mitigate communication challenges among distributed teams?

To explore this research question, I conducted a study with three different condition groups that all received a different type of feedback on their own communication style. The first group served as a baseline and did not receive any feedback at all. The second group received an objective feedback consisting of a text analysis. The analysis showed the communication style of the participant in the view of different cultural aspects. The third group received the same objective feedback as condition group 2 plus a subjective feedback in the form of a self-reflection. Additionally, interviews with all participants were conducted.

The main goal of the thesis is to explore if feedback on writing and communication styles can support people in email communication in distributed teams. I present some initial findings of this research and identify some possible areas of exploration for technology support.

Overview of the thesis

The following sections introduce the contents of the chapters of this thesis.

Chapter 2

This chapter provides an overview of related literature and background information to my thesis. It includes general information on culture and culture dimensions (Hofstede, Hofstede, 2001), work on the topic of CMC communication and communication problems, intercultural training, and differences between native and non-native speaker.

Chapter 3

In this chapter, I present the methods that were used for the study conduction. This chapter includes information about the study design and procedure, the description of the collaborative decision-making task that was used for the study, the text analysis, the pre- and post-task questionnaires, the self-reflection questionnaire, and participants. The study design is taken from previous work done by Helen Ai He (He et al., 2016).

Chapter 4

The fourth chapter presents the findings of the study. It gives an overview of the data and initial qualitative and quantitative findings from the study. All methods that were used for the data analysis are presented in this chapter. The chapter shows the initial outcomes of the different condition groups from the results of the Canadian participants and it explores the potential of feedback of people's communication styles to mitigate email communication challenges in distributed teams.

Chapter 5

The last chapter concludes the thesis. I highlight some possible opportunities for technology support and summarizes the key contributions of my work.

Chapter 2 Background and Related work

Problems in communication in distributed teams can arise because of many different reasons such as time zone differences, cultural backgrounds, personality, or language barriers. Culture and language barriers are two key barriers that lead to communication challenges in distributed teams. The following sections explain why communication challenges can arise and why it is important, that people overcome these challenges.

Culture

What is “culture” and “intercultural communication”?

Human beings differ in two points: Firstly, in culture, and secondly, in their unique behaviour (Laroche, Rutherford, 2007). The unique behaviour differs for each individual while culture is shared across groups of people (Laroche, Rutherford, 2007). There exist many different definitions of culture. I refer to the definition of culture as: “an accumulated pattern of values, beliefs, and behaviours shared by an identifiable group of people with a common history and verbal and nonverbal symbol system” by Neuliep (Neuliep, 2000). This identifiable group of people does also share a common history (Neuliep, 2000). Culture can also be seen as a group of people with shared beliefs and values (Laroche, Rutherford, 2007). The term intercultural communication according to Neuliep refers to: “communication between people of different cultures and ethnicities” (Neuliep, 2000).

Differences in cultural backgrounds can lead to misunderstandings and miscommunication (Hofstede, Hofstede, 2001). Effective cross-cultural communication is something that people need to learn (He et al., 2015). The current technological possibilities for learning and training these skills are limited (He et al., 2015). Multicultural teams often struggle because of cultural differences that are not understood or resolved and that can lead to a low level of effectiveness in such teams (Laroche, 2003).

Cultural dimensions:

There exists a variety of culture models. These models describe and explain differences in culture and how they are manifested in communication. Hofstede has identified five different dimensions of culture: “Power distance”, “uncertainty avoidance”, “individualism versus collectivism”, “masculinity versus femininity”, and “long-term versus short-term orientation” (Hofstede, Hofstede, 2001).

The dimension “individualism versus collectivism” is defined as “[...] the degree of interdependence a society maintains among its members.” (Hofstede, link). The dimension “long-term versus short-term orientation” describes “how every society has to maintain some links with its own past while dealing with the challenges of the present and future [...]” (Hofstede, link).

According to Hofstede, every country can be positioned on the scale represented by each dimension. Miscommunication and misunderstandings arise when cultures are positioned differently on these dimensions. For overcoming these problems, people need to be aware of the differences in cultures.

Intercultural communication challenges in Computer-Mediated Communication:

In their qualitative study about workplace intercultural communication tensions, He and Huang have identified four categories of tensions that occur in dyadic face-to-face and computer-mediated interactions (He, Huang, 2014). The four detected tension categories are “range of emotional expressiveness”, “level of formality”, “‘Fixed’ versus flexible appointments”, and “task versus social orientation” (He, Huang, 2014). The authors conclude that most of these tensions appear in FTF and

CMC, regardless of the medium that the participants used (He, Huang, 2014). Like for Hofstede's cultural dimensions, differences in these tension categories can also lead to problems in communication.

Shachaf conducted a study about the effects of cultural diversity on team effectiveness. The findings of the study imply that there are positive effects as well as negative effects. The negative effects resulted from increased complexities in communication. The author has categorized the identified problems into four categories, that correspond to the four stylistic modes of verbal interaction by Gudykunst and Ting-Toomey (Shachaf, 2008). The categories are: "direct/indirect" (the extent to which people show their intentions through verbal communication), "succinct/elaborate" (the different amount of information that people provide in communication), "contextual/personal" (how formal is the communication), and "instrumental/affective" (is communication sender/goal oriented or receiver and process oriented) (Shachaf, 2008).

Language barriers:

Language differences can lead to misunderstandings and miscommunication and thus to problems in communication. Non-native speakers experience a significantly higher cognitive load, compared to native speakers (Takano, Noda, 1993). When non-native speakers are in communications with mainly native speakers, the discussion can move forward quickly, leaving non-native speaker behind (Yamashita et al., 2013).

He et al. have conducted a study for exploring attribution mismatches between native and non-native speakers. The findings of their study showed that many native speakers were not aware of the magnitude of language challenges that non-native speaker did experience during their study and how this language challenges impacted non-native speakers' behaviour (He et al., 2015).

For supporting non-native speakers in the communication with native speakers, researchers have explored various tools. This includes for example tools for automated speech recognition (Hautasaari, Yamashita, 2014) or machine translation tools that facilitate conversational grounding in multilingual conversation (e.g. Echenique et al., 2014 or Wang et al., 2013 or Yamashita et al., 2009).

To date, no support for culture or language in email communication does exist. Little is known about the potential of feedback for supporting people in communication in distributed teams. This thesis explores the potential of such feedback and presents possible opportunities for technology support that could eliminate the lack of technology support for email communication in distributed teams.

Chapter 3 Methods

The following sections explain the study that we conducted for this bachelor thesis. A high-level overview of the study is given in the next section. After that, the whole study procedure and the three different condition groups are described. Next, the collaborative decision-making task that participants had to complete is explained. It follows a section about the pre- and post-task questionnaires and the self-reflection questionnaire. After that, information about participants and the participant recruiting is given. Lastly, the implementation of the text analysis is described. The study design is taken from previous work done by Helen Ai He (He et al., 2016).

Study overview

To investigate the impact of feedback on email communication in distributed teams, we conducted a study with three different condition groups. Every condition group received a different form of feedback. The three condition groups allow comparing the results in view of different forms of feedback. The study was conducted between December 2016 and January 2017. All condition groups consisted of ten dyads. For every dyad, a Canadian and a Japanese participant were paired. The pairing of Japanese and Canadian participants was chosen for evoking as many cultural differences as possible.

Setup

Prior to the actual study, a pilot study was conducted in mid-November. The pilot study served as a test for the study procedure and the tools that were used during the study. The pilot revealed some minor problems in the study process that led to small adaptations. The number of emails that participants had to write was decreased to four. The feedback that participants receive was adapted. Some minor changes were done to the task description that participants receive at the beginning of the study.

Procedure

The goal of the study was to find out if and how different kinds of feedback can influence email communication in distributed teams. Therefore, participants were split into three different condition groups that receive different kinds of feedback. The whole study lasted approximately two months. Condition group 1 started in December 2016. After the completion of this group, condition group 2 and 3 started in January 2017.

During the study, the participants completed a collaborative decision-making task over email. The dyads had approximately six days for completing the task. Each participant had to write a total of four emails. The decision-making task was the same in every condition group. The Canadian participants always started and had to write the first email. After that, the participants had to alternately write an email. With the last email, they had to come to an agreement for the task.

Prior to the study, participants had to fill out a pre-task questionnaire. After the completion of the task, participants had to fill out a post-task questionnaire and every participant was interviewed.

The procedure was the same for participants from all three condition groups. The only thing that differed between the condition groups was the type of feedback that participants received during the study. This setup allows to analyse the influence of different feedback forms on the participants because all other variables like the study process and the task were the same for every condition group. A detailed description of the procedure for different condition groups can be found in the next sections.

Condition groups

For exploring the potential of different types of feedback, the participants were split into three condition groups. The following sections explain the differences between the three condition groups.

Condition Group 1

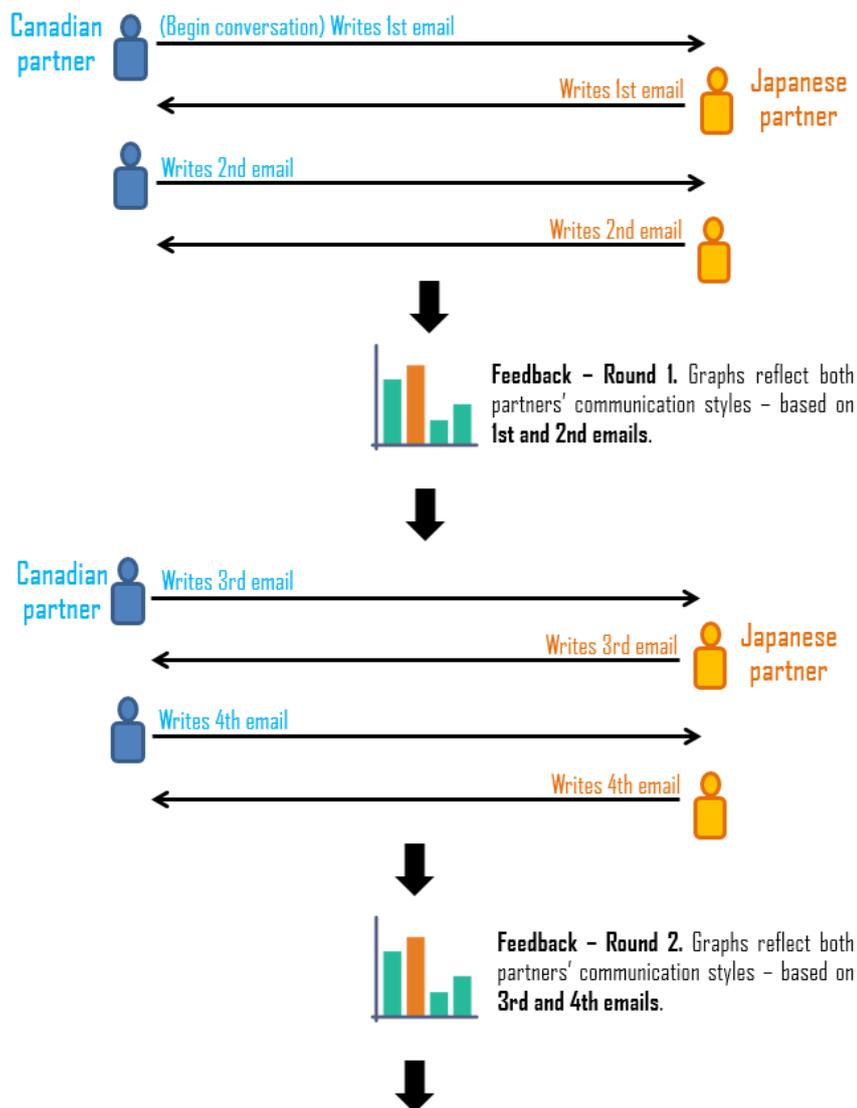
Condition group 1 served as a baseline group. This group did not receive any feedback at all. The participants had to complete the collaborative decision-making task with a total of eight emails, four from the Canadian participant and four from the Japanese participant. The whole process is visualized in the following graphic:



Figure 1: Study procedure for participants from condition group 1.

Condition Group 2

The participants from the second condition group received an objective feedback in the form of a PDF with graphs. The graphs were calculated by a text analysis tool that is described in a later section. Every participant had to write four emails like in condition group 1. The emails were split into two rounds. Mail one and two counted for round one and mail three and four counted for round two. After each round, both participants received an objective feedback based on their emails. The feedback is described in a later section. The process is visualized in the following graphic:



After you finish the above steps, please email helen.he@ifi.uzh.ch and she will inform you of the next steps.

Figure 2: Study procedure for participants from condition group 2.

Condition Group 3

The participants from condition group 3 received the same objective feedback like participants from condition group 2 plus a subjective feedback in the form of a self-reflection questionnaire that was filled out by their partner. The participants had to write four emails each that were split into round one and round two like in condition group 2. After each round, the participants firstly received the objective feedback. Participants then had to write a self-reflection on their objective feedback. This self-reflection was shared when both participants had filled it out and served as a subjective feedback. Participants had to read the self-reflection from their partner before they started to write emails again. The self-reflection questionnaire can be found in the appendix. The process is visualized in the following graphic:

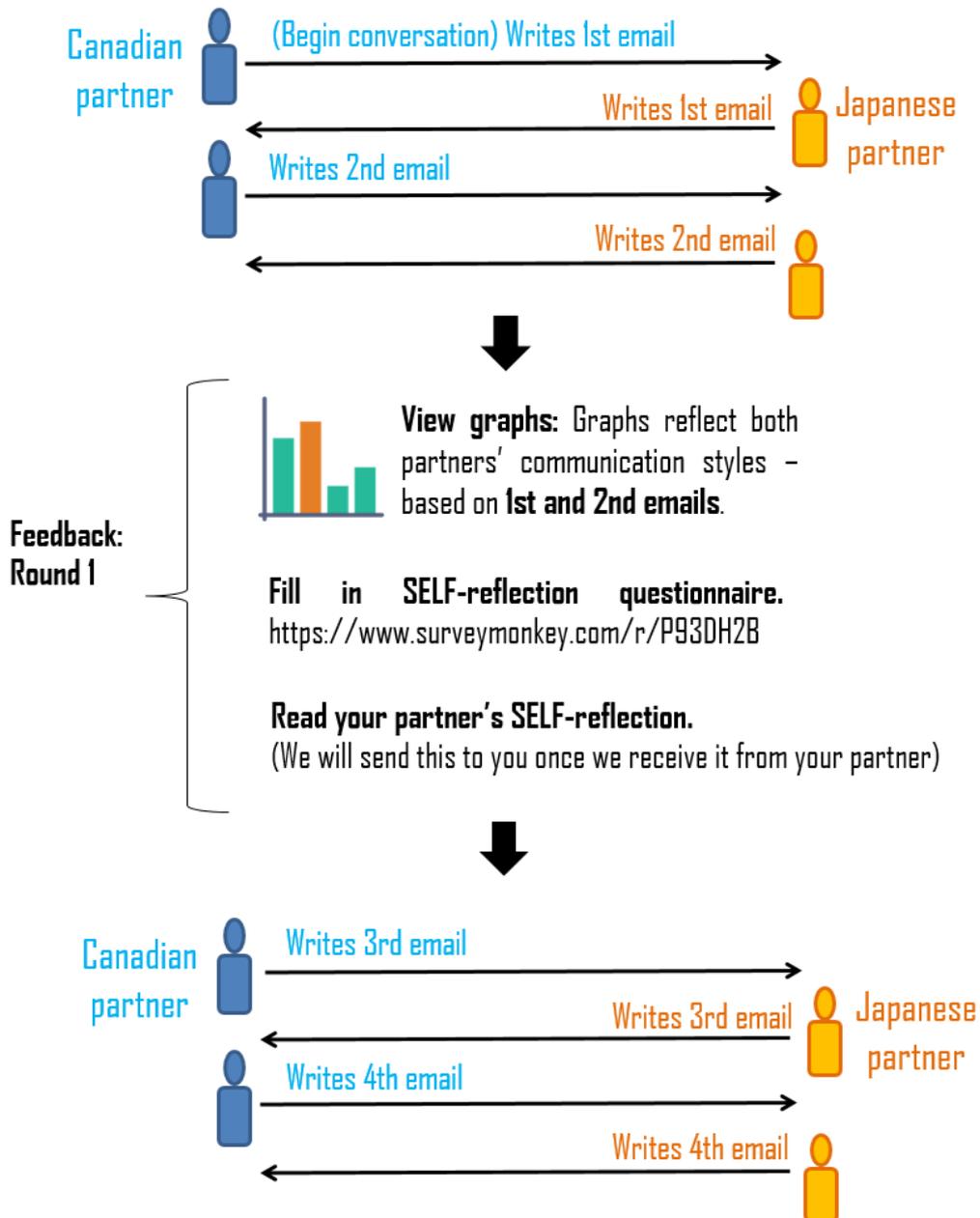


Figure 3: Study procedure for participants from condition group 3.

Collaborative Decision-Making Task

The participants had to complete a collaborative decision-making task via email. The task was adapted from the legislative dilemma task such that it was relevant for Canadian and Japanese people. The original task is only relevant for US people. The collaborative decision-making task is of type 4 (Decision-making task) or type 5 (Cognitive conflict task) in the Circumplex Model from McGrath (McGrath, 1984). A task was chosen that was ambiguous for different cultural interpretation, to evoke maximum conflict and maximum cultural difference in the experiment. The collaborative decision-making task also allowed that participants could discuss their choices over several emails because the task did not have right or wrong answers. This ensured that participants would write enough emails with a sufficient amount of text for the text analysis tool.

For the task, a funding allocation task was chosen. Five different funding programs were presented to the participants. Each of these programs could be funded by the participants. In total, participants could assign a sum of \$1,8 million to different programs. Firstly, participants had to rank the programs individually. In a second step, participants had to discuss the funding possibilities with their partner over email. Both participants should convince their partner that their own ranking was the best one. Participants had to jointly decide which program they wanted to fund. Within eight emails, participants had to come to an agreement on their funding plan. The complete instruction that was sent to the participants can be found in the appendix.

For the funding possibilities, current topics were taken that were frequently in the news. Some funding possibilities were more relevant for Canadian participants, other were more relevant to Japanese participants. This setup was chosen for evoking as many cultural differences as possible.

The five funding programs are described more detailed in the appendix.

For the experiment, participants had to fulfil the following conditions for their emails:

- They had to write at least four emails
- Each email should include 1-2 paragraphs, for ensuring that there was enough text for the data analysis
- All emails must be in English because the text analysis could only be done in English
- The emails should only contain the participants own writing. This means participants should not copy text from external sources. This ensured that the text analysis was not biased with content that participants had copied from external resources.

In the case that participants finished the task in less than eight emails, they had to do another funding decision with the same conditions for a subsequent year.

Pre-Task Questionnaire

All participants had to fill out a pre-task questionnaire prior to the experiment. In this questionnaire, the participants had to rank the different funding programs from 1 to 5. This data was used for analysing which funding program was chosen by which participant and who yielded from the initial proposal during the study. Additional to the ranking of the funding, participants had to do a personality analysis. Each participant had to rank his or her own personality for ten different categories on a scale from 1 (strongly disagree) to 7 (strongly agree). The ten categories were standard categories that are used in psychology personality models and that were taken from the TIPI test (Gosling et al., 2003):

- 1) Extroverted, enthusiastic
- 2) Critical, quarrelsome
- 3) Dependable, self-disciplined
- 4) Anxious, easily upset
- 5) Open to new experiences, complex
- 6) Reserved, quiet
- 7) Sympathetic, warm
- 8) Disorganized, careless
- 9) Calm, emotionally stable
- 10) Conventional, uncreative

Thirdly, participants had to do an analysis on their own metacognitive cultural intelligence (metacognitive CQ). This included four questions about cultural knowledge where participants had to rate on a scale from 1 (strongly disagree) to 7 (strongly agree) how much four different statements applied to them. This metacognitive CQ model was taken from Van Dyne et al. (Van Dyne et al., 2008).

All participants had to fill out the same questionnaire prior to the start of the collaborative decision-making task. The whole pre-task questionnaire can be found in the appendix.

Post-Task Questionnaire

After the completion of the collaborative decision-making task, every participant had to fill out a post-task questionnaire. This questionnaire included the same metacognitive CQ analysis as the pre-task questionnaire with four additional open-text questions. Additionally, participants had to do a rating of their partner's personality. The questions and the scale were exactly the same as in the pre-task questionnaire.

All participants had to fill out the same questionnaire after the completion of the collaborative decision-making task. The whole post-task questionnaire can be found in the appendix.

Interviews

After the completion of the collaborative decision-making task, participants were interviewed. The interviews were semi-structured interviews and lasted around 15 – 45 minutes. Japanese participants were interviewed in Japanese; Canadian participants were interviewed in English. All interviews were conducted via Skype. The interviews were recorded and partially transcribed. Sample interview questions can be found in the appendix.

Self-reflection Questionnaire

Only participants from condition group 3 had to fill out a self-reflection questionnaire. This questionnaire served as subjective feedback that was shared among the participants from one dyad. For the self-reflection questionnaire, participants had to reflect on the graphs that they did receive as feedback. They had to explain the five different graphs in open-ended text fields. The questions from the self-reflection questionnaire can be found in the appendix.

Text Analysis

The study was conducted for capturing behaviour that is related to culture. Therefore, a text analysis was done with the emails from the participants that detected different cultural dimensions (Hofstede, Hofstede, 2001).

A text analysis program called Linguistic Inquiry and Word Count (LIWC) was used for the study. This tool was developed in 2010 and its purpose is to count words in a text that belong to different psychologically meaningful categories. The LIWC has its origin in the field of psychology and is commonly used in psychology for text analysis. The tool consists of two components: the dictionary and the processing component. It analyses to high-level categories of words: Function words, and content words. The LIWC is based on the fact that words are rarely normally distributed and therefore don't fit in a questionnaire. The LIWC has so far more than 80 categories of words and can help analyse different kinds of text (Tausczik, Pennebaker, 2010).

The emails from all condition groups were analysed but only participants from condition group 2 and 3 received feedback. Participants from condition group 2 received feedback in the form of a PDF with graphs and explanations on it. Participants from condition group 3 received feedback in form of a PDF with graphs and explanations and a self-reflection. The feedback PDF is described below.

Feedback PDF

The following figure shows an example of a feedback PDF that a participant from condition group 2 and 3 received after round 1 emails during the study:

FEEDBACK ABOUT YOUR COMMUNICATION STYLE - ROUND 1

The 5 graphs below show the communication styles of you and your email partner. Each graph reflects **common differences in communication styles between different cultures**. However, the graphs can also be affected by factors other than culture, such as personality, mood, environment, language fluency, etc.

The graphs are calculated using a **text analysis tool**. The calculations are based on the **first 2 emails you sent** to your partner, and the **first 2 emails your partner sent** to you.

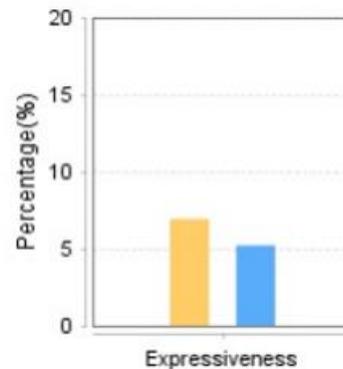
Please take a moment to **look at the graphs**. <http://helenaihe.com/experiment-3.html>

PARTNER1 [REDACTED] emails are shown in orange

PARTNER2 [REDACTED] emails are shown in blue

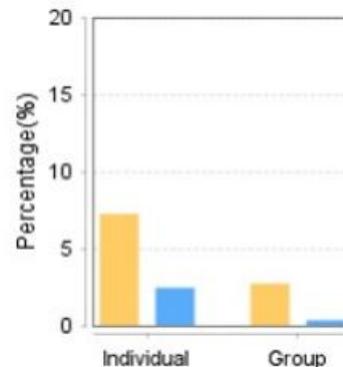
GRAPH 1: Emotional expressiveness

Emotional expressiveness can vary greatly between cultures. Some cultures do not tend to express significant positive or negative emotions, where being able to control the display of one's emotions is highly valued. Other cultures tend to freely express both positive and negative emotions, where consistency between what one feels and what one displays is valued.



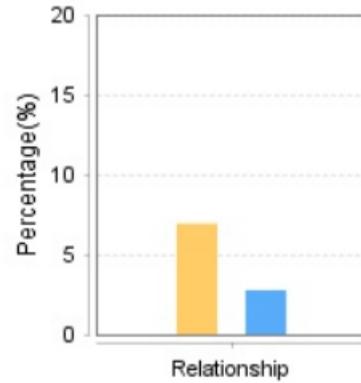
GRAPH 2: Individual or Group Focus

Cultures differ with regards to whether the interest of the group is more important than the interest of the individual. In individual-focus cultures, people are expected to take care of only themselves and their immediate families. In contrast, in group-focus cultures, people expect their relatives or members of a particular in-group (e.g. extended families, companies) to look after them.



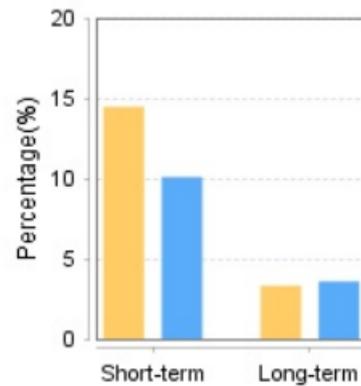
GRAPH 3: Level of Relationship Focus

Cultures differ in terms of working styles. Relationship-focused cultures prefer to develop close-knit relationships between team members, believing that close relationships are essential for successful teamwork. In contrast, task-focused cultures prefer to focus on the task and get to know team members socially through task-related interactions. Such cultures do not necessarily believe close relationships are mandatory to achieve the task effectively.



GRAPH 4: Short-Term or Long-Term Focus

All cultures have to maintain some links with its own past while dealing with the challenges of the present and the future. Cultures prioritize these two goals differently. Short-term focus cultures tend to value the importance of profits of the current year. In contrast, long-term focus cultures tend to value the importance of profits 10 years from now.



GRAPH 5: Level of Informality

Cultures differ in how formal or informal communication is. Hierarchical cultures may use more formality, depending on the relationship between two people. Egalitarian cultures may use less formality (in other words - be more informal), regardless of the relationship between two people.

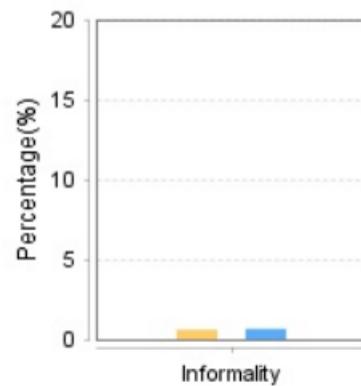


Figure 4: Sample feedback PDF from one of the participants.

This example was chosen randomly. It shows the structure of the feedback PDF. Scores from Canadian participants are always shown in blue, scores from Japanese participants are shown in orange.

The first part is a general description of the PDF. It describes on what the graph calculations are based and explains that the graphs reflect common differences in communication styles between different cultures. A conscious decision was made that neither the general description nor the explanations for each graph should say anything about the Canadian or Japanese culture or what can be typical for one culture. This allowed for more interpretation by the participants when they received the graphs.

After the general description, each graph is shown together with a small explanation. The explanations are adapted from the descriptions of the cultural dimensions by Hofstede, Laroche and Rutherford (Hofstede, Hofstede, 2001) (Laroche, Rutherford, 2007). All graphs refer to a cultural dimension by Hofstede, Laroche and Rutherford that were described in chapter 2 (Hofstede, Hofstede, 2001) (Laroche, Rutherford, 2007).

Graph Calculation and LIWC categories

The LIWC offers a wide variety of different categories for a text analysis. When analysing a text, the LIWC counts for every category, how often the words in the category appear in the text. It returns a list of scores for every category. The scores are always percentages (Pennebaker et al., 2015).

For the study, different categories from the LIWC were chosen that could have a relation with the different cultural dimensions (Hofstede, Hofstede, 2001). These categories were then subdivided into five different groups that represented the five different cultural dimension (Hofstede, Hofstede, 2001). The groups were used for calculating scores that were presented to the participants in the form of graphs.

In total, five different graphs were calculated, each of them was related to one cultural dimension (Hofstede, Hofstede, 2001). All graphs were calculated based on the same formula. In general, calculated was the percentage of words from certain categories in relation to all of the words that are in the LIWC dictionary (dictionary words) (Pennebaker et al., 2015). This resulted in scores in the form of percentage numbers. For example, for the graph emotional expressiveness, the percentage of emotional expressiveness words in relation to the dictionary words was calculated. The formula for each graph can be found in the following sections. The calculations and representations of the scores in the graphs were tested in the pilot study. Every category from the LIWC that was not related to one of the cultural dimensions was omitted.

The calculated scores were represented in bar charts, one bar chart for every group of categories. In one bar chart, the scores for the Canadian participant and the Japanese participant were shown. An example can be found in the sample feedback PDF from above.

Due to the many facets of culture, we chose to analyse a small sample of cultural aspect. The chosen samples are by no means exhaustive – rather, they represent a sampling of cultural aspects, which we believe might elicit different cultural behaviour by Canadian and Japanese participants.

Calculations

As the scores from LIWC are always percentages (for example a LIWC score of 0.05 for the family category means that 5% of the words are family words), they were always multiplied with the total word count. This return an intermediate result, the number of words for a certain category. In a second step, this number was divided by the total number of dictionary words. This returned as a

result the percentage of a word from a certain category in relation to the total number of dictionary words.

The dictionary words are calculated like the following: In the LIWC score, there is a category called dic that indicates the percentage of words from a text that are stored in any of the LIWC categories (Pennebaker et al., 2015). The dic score multiplied with the word count returns the total number of dictionary words:

$$\text{dictionary words} = \text{dic} * \text{word count}$$

In the following sections, the calculations for each graph are described in detail.

Emotional Expressiveness

This graph contains only one bar for each person, the bar for the range of emotional expressiveness. This category is related to the culture dimension of “individualism versus collectivism” from Hofstede (Hofstede, link) and the “range of emotional expressiveness” tension from He and Huang (He, Huang, 2014). The categories used for this graph are posemo and negemo and they belong to the category of psychological processes, affective processes (Pennebaker et al., 2015). The scores for these two categories are added up, multiplied with the word count and then divided by the number of dictionary words:

$$\frac{(\text{posemo} + \text{negemo}) * \text{word count}}{\text{dictionary words}}$$

The bars for both participants were shown in the same graph. A sample graph can be found in the sample PDF from above.

Individual or Group Focus

This graph contains two bars per person, one for individual focus and one for group focus. They also belong to the cultural dimension of “individualism versus collectivism” from Hofstede (Hofstede, link). The first bar is individual focus and shows how often a participant uses first personal singular pronouns. For this bar only the score for ‘I’ is used (Pennebaker et al., 2015):

$$\frac{I * \text{word count}}{\text{dictionary words}}$$

The second bar is for group focus and shows how often a participant uses first person plural pronouns. It contains the score for ‘we’ from the LIWC (Pennebaker et al., 2015):

$$\frac{\text{we} * \text{word count}}{\text{dictionary words}}$$

Both scores for both participants were presented in the same graph. A sample graph can be found in the sample PDF from above.

Level of Relationship Focus

The third graph contains only one bar per person, the bar for relationship focus. It is related to the culture dimensions “Masculinity versus femininity” from Hofstede (Hofstede, link) and the tension “task versus social orientation” from He and Huang (He, Huang, 2014). For this bar, the following categories are used: family, friend, male, female, leisure, home, and affiliation (Pennebaker et al., 2015). All scores are added up:

$$\frac{(\text{family} + \text{friend} + \text{male} + \text{female} + \text{leisure} + \text{home} + \text{affiliation}) * \text{word count}}{\text{dictionary words}}$$

A sample graph can be found in the sample PDF from above.

Short-Term versus Long-Term Focus

This graph contains two bars per person, one for the short-term focus and one for the long-term focus. The graphs are related to the “long-term versus short-term orientation” dimension from Hofstede (Hofstede, link) as well as to the “‘Fixed’ versus flexible appointments” tension from He and Huang (He, Huang, 2014). The first bar is the short-term focus and the category focuspresent is used for this bar (Pennebaker et al., 2015):

$$\frac{\textit{focuspresent} * \textit{word count}}{\textit{dictionary words}}$$

The second bar is for long-term focus. It contains the scores for focusfuture and focuspast (Pennebaker et al., 2015):

$$\frac{(\textit{focusfuture} + \textit{focuspast}) * \textit{word count}}{\textit{dictionary words}}$$

All bars for both participants are shown in the same graph. A sample graph can be found in the sample PDF from above.

Level of Formality

The last graph contains only one bar for informality. It is related to the tension “level of formality” from He and Huang (He, Huang, 2014). The following categories are used for this bar: swear, netspeak, nonflu, filler, and assent (Pennebaker et al., 2015).

$$\frac{(\textit{swear} + \textit{netspeak} + \textit{nonflu} + \textit{filler} + \textit{assent}) * \textit{word count}}{\textit{dictionary words}}$$

A sample graph can be found in the sample PDF from above.

Participants

For the study, a total of 60 participants was recruited, 30 from Canada and 30 from Japan. All participants were between 18 and 27 years old. 30 participants were male and 30 participants were female. The participants were paired to dyads, containing one Canadian participant and one Japanese participant. This setup was chosen because it allowed to evoke cultural differences between Japanese and Canadian culture as well as language differences because the Canadian participants were native English speaker and the Japanese participants were non-native English speaker. The dyads were split up into three different condition groups, 10 dyads for each group. Participants were randomized over the condition groups.

A detailed list of the teams can be found in the table below. ‘CN’ stands for the Canadian participants, ‘JP’ stands for the Japanese participants, and ‘CD’ stands for condition group.

Group	CD	CN age	CN gender	CN birth city	JP age	JP gender	JP birth city
01	1	19	Male	Calgary, CN	22	Male	Yokohama, JP
02	1	20	Female	Winnipeg, CN	21	Male	Saitama, JP
03	1	21	Female	Halifax	21	Female	Sapporo, JP
04	1	22	Male	North Battleford, CN	22	Female	Oita, JP
05	1	20	Male	Winkler, CN	22	Female	Tokorozawa, JP
06	1	18	Male	Winnipeg, CN	21	Female	Saitama, JP
07	1	22	Female	Vancouver, CN	22	Female	Hamamatsu, JP
08	1	20	Male	Winnipeg, CN	21	Male	Tokyo, JP
43	1	21	Female	Hamilton, CN	24	Male	Kobe, JP
44	1	19	Male	Vancouver, CN	22	Male	Mihama, JP
11	2	23	Male	Moose Jaw, CN	24	Male	Ogi, JP
12	2	23	Female	Calgary, CN	22	Male	Saitama, JP
13	2	20	Female	Duncan, CN	20	Male	Suginami, JP
14	2	21	Female	Winnipeg, CN	21	Female	Kanagawa, JP
15	2	23	Female	Winnipeg, CN	21	Male	Sapporo, JP
16	2	22	Male	Winnipeg, CN	20	Female	Tondabayashi, JP
17	2	22	Female	Owen sound, CN	22	Male	Chiba, JP
19	2	19	Female	Swan Lake, CN	19	Female	Sakai, JP
31	2	27	Male	Calgary, CN	20	Female	Katano, JP
42	2	20	Male	Ottawa, CN	22	Male	Tokushima, JP
21	3	22	Male	Calgary, CN	20	Female	Yokohama, JP
22	3	18	Female	Surrey, CN	20	Female	Nara, JP
23	3	23	Female	Calgary, CN	19	Female	Fukushima, JP
24	3	22	Male	Winnipeg, CN	21	Male	Kobe, JP
25	3	20	Male	Winnipeg, CN	22	Female	Yokohama, JP
26	3	21	Male	Winnipeg, CN	20	Male	Kawasaki, JP
27	3	22	Male	Fort Frances, CN	23	Female	Shizuoka, JP
30	3	20	Female	Winnipeg, CN	19	Female	Daito city, JP
40	3	21	Female	Saanichton, CN	23	Male	Nara, JP
41	3	19	Female	Owen Sound, CN	23	Male	Kyoto, JP

Table 1: Overview of all participants from the study.

Participant Recruiting

Participants were recruited with the help of recruiting posters. The study was advertised to participants as a study to “explore how Email tools can support different communication styles”. The posters were placed at Canadian and Japanese Universities and can be found in the appendix.

Participants had to fulfil three preconditions for being able to participate in the study:

- 1) The participants had to be undergraduate students between ages 18-30
- 2) Participants had to be born in Canada (or in Japan for Japanese participants respectively)
- 3) Participants must not have lived outside of Canada for more than one year (or outside of Japan for Japanese participants respectively)

Participants had to fill out a demographic questionnaire prior to their participation. The questionnaire guaranteed the participants had the right prerequisite.

For their participation in the study, participants from Canada received \$100 and participants from Japan received ¥10000. The recruiting for participants started in November 2016.

Infrastructure Overview

For conducting the study, a tool was needed that could process and analyse the emails from the participants and generate the feedback PDFs. The whole infrastructure that was used during the study consists of four different parts: The culture tool, an Oracle database, a Gmail account, and a LIWC account.

The following figure gives an overview of the components:

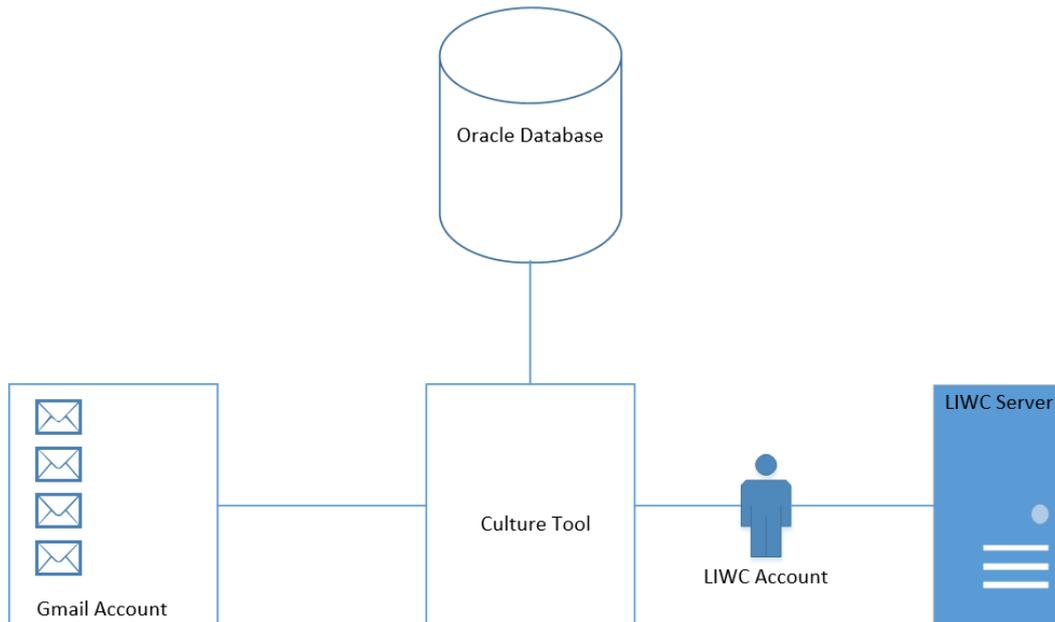


Figure 5: Infrastructure overview.

Culture Tool

The culture tool is the core of the whole infrastructure. It is a programmed tool that was used for accessing the Gmail account, the LIWC Server, and the Oracle database. It was written in pure Java

Code. Everything was stored in a private Git Hub Repository. All graphs and PDFs were calculated and created with the help of the culture tool.

Database

An Oracle database was used for storing all the information about participants as well as the data from the study. This was needed because of the big amount of data that was generated during the study. It allowed an easier storage and maintenance of participant information, the emails, and the LIWC scores.

The database contained the tables for the participants, the emails that they've sent, the LIWC users, the different kind of scores that were returned from the LIWC, and some helper tables. The database was accessed by the culture tool with JDBC.

Gmail Account

A Gmail account was used that was created specifically for this study. All participants were asked to send the emails that they did write during the study to this account. Gmail offers a Java API for accessing a Gmail Account. With the Gmail API, it is possible to check emails, send emails, label emails and much more. The culture tool connected to the Gmail account and accessed all emails. The emails were stored in the database.

For sending feedback to the participants, the same Gmail account was used.

This approach was chosen because it allowed participants to use their own Email program that they are familiar with. Additionally, participants did not have to give access to their own private email account. This was especially important for privacy and security reasons.

LIWC Server

The LIWC server can be used for text analysis. A LIWC account with two keys is needed. A text can be sent to the server for an analysis. The server returns the LIWC scores. For accessing the LIWC server, a REST interface can be used. The LIWC scores were parsed and stored in the database. Later, some additional calculations were made with the scores (Pennebaker Conglomerates, Inc., link).

Text Analysis Process

During the study, participants had to write a total of eight emails. They had to forward all emails to the Gmail account of the study. The emails were accessed from the culture tool and stored in the database. When both participants of a dyad had sent two emails, the first text analysis was done. For that, email one and two from one participant were concatenated and sent to the LIWC server. The LIWC server returned the raw LIWC scores. The scores were stored in the database.

If the participants were from either condition group 2 or 3, the culture tool calculated the graphs and created the feedback PDF. This PDF was sent to the participants via email.

In condition group 3, an additional link was sent to the participants for the self-reflection questionnaires. When both participants had filled out the self-reflection questionnaires, the questionnaires were shared via email.

This procedure was exactly the same for round two.

The process of accessing and storing the emails and scores is visualized in the following graph:

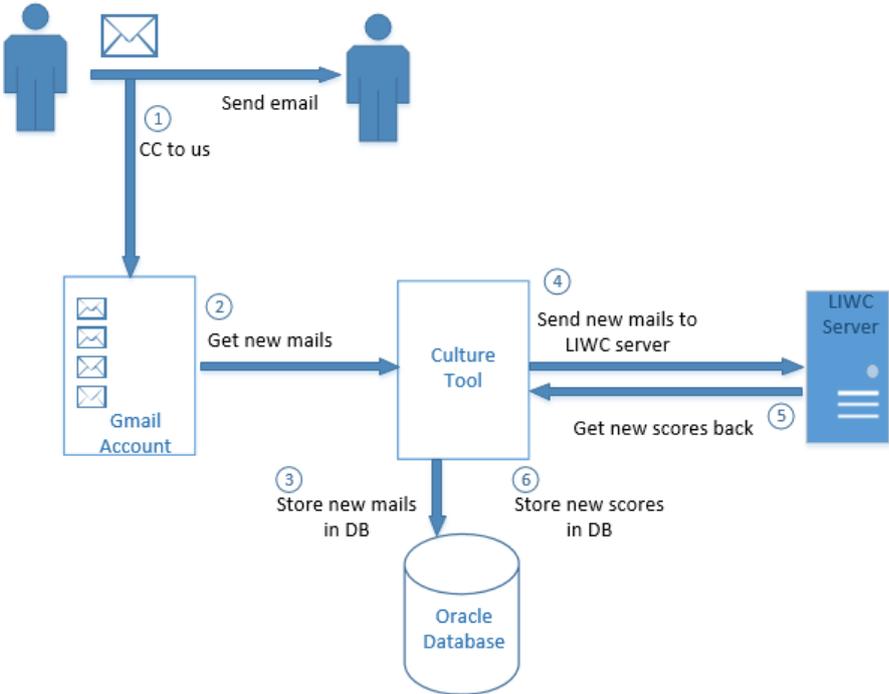


Figure 6: Text analysis procedure.

Chapter 4 Findings and Discussion

In this chapter, all findings from the qualitative and the quantitative data analysis are presented. The data analysis is still in a very early stage and all the presented findings are initial findings that are not conclusive. At the time of writing this thesis, the Japanese interviews were transcribed but not yet translated into English. As such, I only present the initial findings based on the Canadian participant data.

Firstly, all results and findings from the quantitative data analysis are presented. This includes the analysis of the LIWC data and the pre- and post-task questionnaires. Secondly, the findings from the qualitative data analysis are presented. This consists of the analysis of the interview data. All findings are discussed in this chapter and possible causes for the findings are explained.

Quantitative Analysis

The quantitative data analysis was done by Professor Andrea Horn from the department of psychology at the university of Zurich and Professor Chat Wacharamanotham from the department of informatics at the university of Zurich. The quantitative data analysis consists of two parts: Firstly, the analysis of the LIWC categories, and secondly, the analysis of the pre- and post-task questionnaires.

LIWC Data

The LIWC data analysis was done by Professor Andrea Horn. The different categories from the LIWC dictionary were always analysed for each round (meaning that mail 1 and mail 2 count together for round 1 as well as mail 3 and mail 4 counted together for round 2) and for every single mail.

The following list shows which categories were used for the analysis from the LIWC (Pennebaker et al., 2015):

Category name in LIWC	Category Meaning	Belongs to:
Affect	Affective processes	Emotional expressiveness
Posemo	Positive emotions	Emotional expressiveness
Negemo	Negative emotions	Emotional expressiveness
Anx	Anxiety	Emotional expressiveness
Anger	Anger	Emotional expressiveness
Sad	Sadness	Emotional expressiveness
Funct	Total function words	Individual VS group focus
Pronoun	Total Pronouns	Individual VS group focus
Ppron	Personal pronouns	Individual VS group focus
You	2 nd person	Individual VS group focus
Shehe	3 rd person singular	Individual VS group focus
They	3 rd person plural	Individual VS group focus
Ipron	Impersonal pronouns	Individual VS group focus
Social	Social processes	Level of Relationship focus
Family	Family	Level of Relationship focus
Friend	Friends	Level of Relationship focus
Female	Female references	Level of Relationship focus
Male	Male references	Level of Relationship focus
TimeOrient	Time orientations	Short-term VS long-term orientation
Focuspast	Past focus	Short-term VS long-term orientation
Focusfuture	Future focus	Short-term VS long-term orientation
Informal	Informal language	Level of formality
Swear	Swear words	Level of formality
Netspeak	Netspeak	Level of formality
Assent	Assent	Level of formality
Nonflu	Nonfluencies	Level of formality
Filler	Fillers	Level of formality
WC	Word count	Summary categories
Analytic	Analytical thinking	Summary categories
Clout	Clout	Summary categories
Authentic	Authentic	Summary categories
Tone	Emotional Tone	Summary categories
WPS	Words/sentence	Summary categories
Sixltr	Words > 6 letters	Summary categories
Dic	Dictionary words	Summary categories
Cogproc	Cognitive processes	Extra category, not related to graphs
Insight	Insight	Extra category, not related to graphs
Cause	Causation	Extra category, not related to graphs
Discrep	Discrepancy	Extra category, not related to graphs
Tentat	Tentative	Extra category, not related to graphs
Certain	Certainty	Extra category, not related to graphs
Differ	Differentiation	Extra category, not related to graphs
Percept	Perceptual Processes	Extra category, not related to graphs
See	See	Extra category, not related to graphs
Hear	Hear	Extra category, not related to graphs
Feel	Feel	Extra category, not related to graphs
Drives	Drives	Extra category, not related to graphs
Affiliation	Affiliation	Extra category, not related to graphs
Achieve	Achievement	Extra category, not related to graphs

Power	Power	Extra category, not related to graphs
Reward	Reward	Extra category, not related to graphs
Risk	Risk	Extra category, not related to graphs
Work	Work	Extra category, not related to graphs
Leisure	Leisure	Extra category, not related to graphs
Home	Home	Extra category, not related to graphs
Money	Money	Extra category, not related to graphs
Relig	Religion	Extra category, not related to graphs
Death	Death	Extra category, not related to graphs

Table 2: Chosen categories from the LIWC dictionary.

More information for each category as well as example words can be found in the LIWC language manual (Pennebaker et al., 2015).

Additional to these single categories, also the scores for the graph calculations were analysed for every round and every email. This contained the following scores:

Name	Contains scores for:	Belongs to culture dimension:
Graph 1: Emotional Expressiveness	Posemo, Negemo	Emotional expressiveness
Graph 2: Individual Focus	I	Individual VS group focus
Graph 2: Group focus	We	Individual VS group focus
Graph 3: Level of Relationship	Family, friend, male, female, leisure, home, affiliation	Level of Relationship focus
Graph 4: Short-term focus	Focuspresent	Short-term VS long-term orientation
Graph 4: Long-term focus	Focuspast, Focusfuture	Short-term VS long-term orientation
Graph 5: Level of formality	Swear, netspeak, nonflu, filler, assent	Level of formality

Table 3: Categories from the LIWC that belonged to the feedback graphs.

The LIWC data analysis did not return any statistically significant findings across the three experimental condition groups, Japanese or Canadian participants, or based on the LIWC data. As such, the non-statistically significant findings are not discussed further.

Pre- and Post-Task Questionnaires

The quantitative analysis of the pre- and post-task questionnaires was done by Professor Chat Wacharamanotham.

The first analysis was a personality analysis. Participants had to rate their own personality in the pre-task questionnaires and the personality of their partner in the post-task questionnaire. The analysis shows the difference in the discrepancy between the participants self-rating and their partners' rating of their personality across different condition groups. The analysis was done for exploring whether personality assessments were more accurate in condition group 2 and 3 compared to condition group 1.

The second analysis was an analysis of the metacognitive cultural intelligence (metacognitive CQ) of participants. In both the pre-task questionnaire and the post-task questionnaire, participants had to do a self-rating of their own metacognitive CQ. The metacognitive CQ refers to the level of awareness or consciousness when interacting with people from different cultures. The analysis was done for exploring whether the Metacognitive CQ increased between round 1 and 2 for all three condition groups (Van Dyne et al., 2008).

The quantitative analysis of the Pre- and post-task questionnaires did return statistically significant findings. As such, only these findings are presented. In this section included are the findings for firstly the personality analysis, secondly the metacognitive cultural intelligence and thirdly the funding choices.

Personality Analysis

Participants had to rate their own personality and their partner's personality for the following five standard categories that are used in psychology personality models and that were taken from the TIPI test (Gosling et al., 2003):

- Agreeableness
- Conscientiousness
- Emotional Stability
- Extraversion
- Openness to Experiences

The difference between a participant's self-rating and the rating from the partner was calculated with the formula:

$$\text{score} = \text{partner's rating} - \text{selfrating}$$

The scores were visualized in box plots and summary plots. Only the summary plots are shown in this section. The results were compared between the different condition groups and the different nationalities. Only the findings for conscientiousness, emotional stability and extraversion were statistically significant. For all figures, the Canadian side is shown in blue and the Japanese side is shown in orange.

Conscientiousness

The score for conscientiousness shows a nationality difference but no difference between the condition groups. Japanese participants perceived the Canadian participants accurately in all conditions. The Canadian participants perceived Japanese participants to be more conscientious than Japanese participants rated themselves in all three condition groups. This is shown in the following graph:

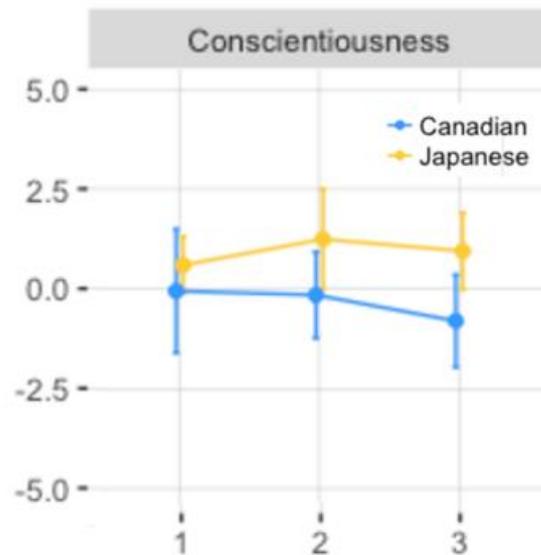


Figure 7: Results of the conscientiousness score for the three different condition groups.

Possible interpretation:

Due to the missing Japanese interview transcripts, these findings cannot be interpreted based on evidence from interviews.

Emotional Stability

The score for emotional stability shows a statistically significant difference between the condition groups for the Canadian score. In condition group 2, the Japanese perception of Canadian participants was significantly less accurate, compared to the Canadian self-rating.

For Japanese participants, the Canadian perception of them was constant in all three condition groups. This can be seen in the following graphic:

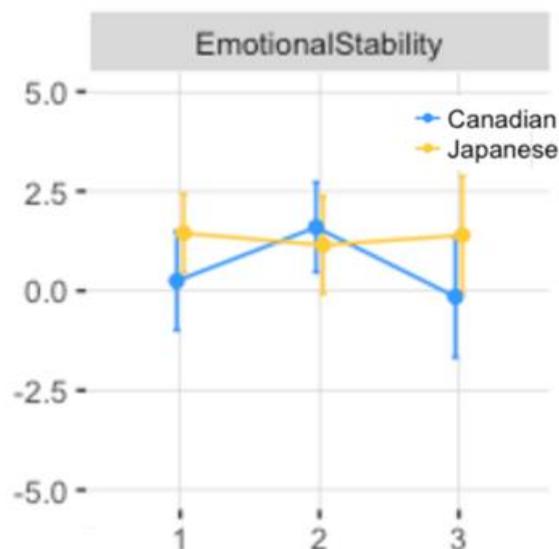


Figure 8: Results of the emotional stability score for the three different condition groups.

Possible interpretation:

A possible cause could be that adding the feedback graphs led the Japanese perceptions to be to less accurate. Adding the reflections seemed to restore the Japanese participants' perception of Canadian participants to be accurate compared to Canadian self-perception. Due to the missing Japanese interview transcripts, these findings cannot be interpreted based on evidence from interviews.

Extraversion

The score for extraversion shows a statistically significant difference between condition groups for the Canadian score. In condition group 1 and 2, Japanese participants rated the Canadian participants significantly less accurate than in condition group 3:

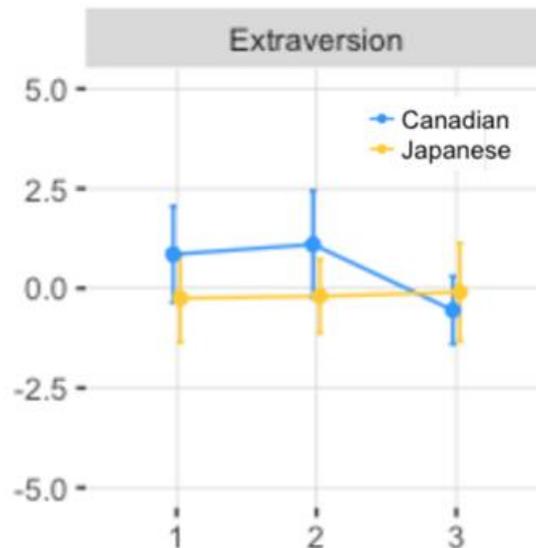


Figure 9: Results of the extraversion score for the three different condition groups.

Possible interpretation:

Having a self-reflection led Japanese participants to rate their Canadian partner more accurately for extraversion. It seems like the self-reflection questionnaires helped the Japanese participants for rating their partner more accurately.

Metacognitive Cultural Intelligence

Participants had to do a self-rating of their own metacognitive CQ before and after the completion of the task (Van Dyne et al., 2008). The difference in a participants rating of the metacognitive CQ was calculated with the following formula:

$$Score = MetacognitiveCQPostTask - MetacognitiveCQPreTask$$

The scores were visualized in box plots and summary plots. Only the summary plots are shown in this section.

There was a significant difference between the different condition groups for the Canadian participants. In Condition group 2 and 3, Canadian participants rated their own metacognitive CQ in the post-task questionnaire lower than in the pre-task questionnaire.

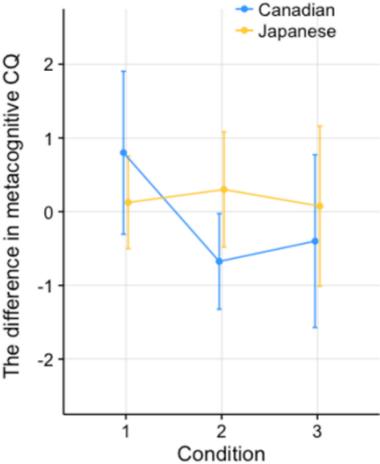


Figure 10: Results of the metacognitive CQ score for the three different condition groups.

Possible interpretation:

A cause for this appearance could be that Canadian participants in condition group 2 and 3 realized that they might not be as self-aware and conscious about cultural differences as they originally thought after seeing the feedback. In condition group 1, Canadian participants were not confronted with any feedback and therefore did not see any differences in communication styles. Seeing the differences in the graphs in condition group 2 and 3 could have led the Canadian participants to the conclusion that they were not as culturally aware as they thought in the beginning.

Funding Choices

The analysis of the funding choices was done by Professor Chat Wacharamanotham. Participants had to make an initial funding proposal prior to the task. This analysis explores how much participants yielded between their initial proposal and the agreement that they found with their partner in the end. The analysis was done for exploring whether the yielding score was higher in condition group 1 compared to condition group 2 and 3. The score was plotted for the different condition groups and the different nationalities:

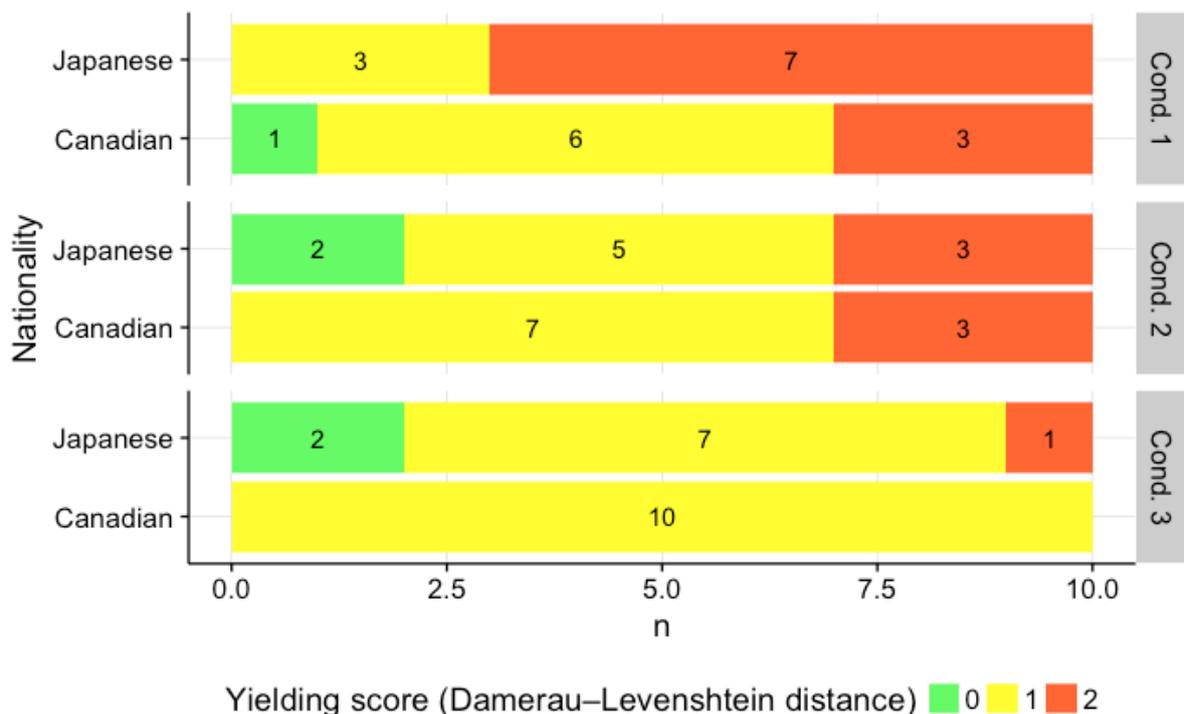


Figure 11: Overview of the yielding of funding.

The plot shows that Japanese participants from condition group 1 yielded the most. Seven Japanese participants out of ten changed their funding proposal completely in condition group 1. In condition group 2 and 3, the yielding is more balanced.

Possible interpretation:

A possible cause could be that the feedback helped the Canadian participants to better understand their Japanese partners in terms of what Japanese partners wanted to fund and why. If Canadian participants understood their Japanese partner's argumentation better, they probably were more willing to compromise with them.

Qualitative Analysis

The qualitative analysis consists of the analysis of the interview data. Due to time constraints, the analysis of the self-reflection questionnaires is not a part of this bachelor thesis. The semi-structured interviews were analysed in a qualitative data analysis. Due to time constraints and lack of access to translated Japanese interviews, only the interview data from Canadian participants was analysed. An affinity analysis was done for the interviews. High-level topics were discussed with Helen Ai He.

Interview Data

In total, 30 interviews from Canadian participants were recorded and partially transcribed. In the following sections, findings from the interviews are described that were surprising or outstanding. For all participants quotes, I refer to the condition group in brackets, the group number followed by the nationality of the participant as CN or JP (e.g.[CD1] G05-CN).

The following sections discuss the findings from the qualitative data analysis. Firstly, the findings of the funding proposals and the yielding of funding proposals are analysed. Secondly, the findings for language barrier and the writing styles are discussed. Thirdly, all findings related to the graphs and

the feedback PDF are described. Fourthly, the findings for the pre- and post-task questionnaires are discussed. And lastly, all findings that are related to writing and reading the self-reflections are presented.

Yielding of funding proposal

The quantitative analysis showed that the number of participants that yielded from their initial funding proposal was higher in condition group 1. Especially Japanese participants changed their funding proposals stronger and more often. Evidence for this appearance can also be found in the interviews, for example:

[CD1] G06CN: "She [the Japanese participant] wanted to put 0 dollars and I wanted to put 1 million, so I thought we'd have to get to a compromise of 500,000 or something. She completely changed her funding. [...] She seems to be influenced by what I said easily. She started off with her own opinions but then when I said something, she said oh yeah I'll look into it."

[CD1] G04CN: "[...] Just the fact that I was the one who initiated, put me a bit in the leadership role. So that may have affected things. With the way emails are back and forth and are longer, that adds a bit of a leader-follower dynamic. I was able to get my ideas out there, and she [Japanese participant] was kind of responding and putting out her ideas."

[CD1] G44CN: "[...] He [the Japanese participant] went along with everything I said. He wasn't very critical I guess. Let's say I had one idea and he'd just go along with it. Rather than having a totally different idea and fight for his beliefs."

This appearance was mostly found in condition group 1. From the interviews, it appears like the Japanese participants in condition group 1 could be influenced and convinced more easily by their Canadian partner than the Japanese participants from condition group 2 and 3. When asked about the reasons behind this, Canadian participants answered as follows:

[CD1] G06CN: "Probably due to personality. From what I could tell, if u said something, she changed her mind quite easily"

[CD1] G44CN: "But I guess it's partially my fault because I didn't really think about him, not understanding what I was writing. So I was kind of, writing how I would to a professor. As I was doing an assignment for school or something. Maybe it was hard for him to completely understand, hard for him to rebuttal with a lot of ideas."

The Canadian participants mostly blamed this appearance either on language barriers or personality.

Possible interpretation:

The yielding of the funding proposal did appear the most in condition group 1 for Japanese participants. In condition group 2 and 3, the yielding was much more balanced and weaker. This evidence could lead to the suggestion that the feedback that participants received in condition group 2 and 3 led to a better compromise and that Japanese pushed through their opinions more. However, these are only assumptions of the cause of this appearance.

Language barrier for Japanese participants

Most of the Canadian participants from condition group 2 and 3 did not mention any problems with understanding the emails from their non-native English speaking Japanese partners. Only in condition group 1, some of the participants mentioned problems when reading the emails from the Japanese participants:

[CD1] G07CN: “Yeah I think that’s why we ended up with mine [Canadian’s proposal], because I wasn't understanding where they [Japanese participant] were coming from. It was hard for me to understand where they want to spend the money, why they think it would help, where they think it would help best.”

The same participants also stated that language barriers should not be a problem:

[CD1] G07CN: “If I were sent a message I didn’t necessarily understand, I could easily go online and translate it. So I’m not sure if that was necessarily a barrier with what we were saying. I wouldn't feel limited if someone was speaking a language I didn't fully understand. Because I feel like there's a lot of options out there for understanding it.”

Many of the Canadian participants perceived that their Japanese partners did not have any problems with language:

[CD2] G16CN: “At first I was kind of concerned. The English I was using was fairly advanced. I was using a bit more technical terms. [...] If [the Japanese partner] had any questions, I would clarify that. but [it wasn't an issue, she seemed to understand everything I wrote].”

[CD2] G11CN “[...] Once I saw his [Japanese participant] first email, I was like, 'oh this guy writes really good English.' I may had used a couple weird words where he had to look them up what it meant but I definitely did not keep my English to a lesser degree. [...] And he never made a comment on whether I was using weird words or not. Either he understood it or google allowed him to understand it.”

Another interesting aspect that was shown in the interviews is that many Canadian participants expected the English of their Japanese partner to be bad but they were surprised by the English skills by their Japanese partner:

[CD2] G14CN: “I feel like there wasn't going to be good communication. Since English is not their [Japanese participant] first language. But her English was pretty good. I understood everything she said.”

[CD2] G13CN: “Partner's English was better than I expected.”

There were Participants from all three condition groups that were surprised by the English level of their Japanese partner.

Possible interpretation:

Because of the missing interviews from the Japanese side, we cannot conclusively say whether Japanese participants had problems with understanding and writing English or not and to what degree.

Unclear is, why many of the Canadian participants expected the English of their Japanese partner to be bad. It could be that Canadian participants assumed that the English of the Japanese participants would be bad because the Japanese participants are non-native English speaker, but this is only an assumption and not based on interview data. This could also be the reason why Canadian participants perceived that their Japanese partners did not have any language problems. The Canadian might be surprised about the fluency of the Japanese participants and therefore perceived, that the Japanese participants did not have any language problems.

Mimicking of emails

During the study, it could have been possible that some participants from Japan had problems with the language. In condition group 1, three of the Canadian participants mentioned that their Japanese partner did mimic their email structure:

[CD1] G01CN: "I realized that he [the Japanese participant] really took to how I greeted him and how he replied back to me was really similar to the way I formatted it. [...] I think he was copying my style because that style of greeting and closing email followed through the whole email chain, so it was really... It took me by shock initially."

[CD1] G08CN: "I noticed that the format of the email was getting mimicked. My assumption was, not having a strong English background, it'd be easier to mimic someone who does..."

[CD1] G07CN: "They just responded [to the first email], basically mirroring my email but with their point of view and why they chose it."

This observation was made by three participants from condition group 1. In condition group 2, none of the participants mentioned this behaviour and in condition group 3, one participant slightly touched the topic of mimicking for one email:

[CD3] G25CN: "In the first one [the first email], she [the Japanese participant] tried to mirror my first email a bit. For getting started. Because the level of fluency was significantly higher in that one. And in most of the sentences matched mine in a lot of ways."

The email mimicking and mirroring was mostly noticed in mail 1. In mail 2, 3 and 4 it was detected less often.

Possible interpretation:

As one participant already mentioned, the email mimicking could be due to language problems from Japanese participants. It seems reasonable that participants with a less fluent English would copy the email structure of their native English-speaking Canadian partners.

On the other hand, it could be the case that especially the first email could have been the easiest to mimic due to its structure. Participants had to propose their funding to their partner and explain why they did want to fund the chosen options. This structure could have been easy to imitate for Japanese participants.

Because of lacking interviews from the Japanese side, these assumptions cannot be supported by Japanese participants' statements.

Judgements about graph scores

The graph explanations that participants received during the study were ambiguous. It was consciously decided that the explanations should not be very detailed and that they should not say anything about Japanese and Canadian culture. This led more room for interpretation from the participants. Some participants had judgements about certain graph score. For some graphs, they perceived a high score as something bad, and for other scores, they perceived a high score as something good. For example, one participant in condition group 2 did value a low score in the level of informality graph:

[CD2] G17CN: "In today's and age, I find the informality is ever increasing and it shouldn't be. Like we should be remaining formal in our emails and it should be a professional form of communication."

Whereas another participant found that a high score on informality was preferable:

[CD3] G26CN: "The only thing that shocked me is level of informality - we were both pretty low. [...] I just mean, we may have got to a solution faster [if informality was higher], or maybe we would get new ideas, or just..."

Also for the individual versus group focus, there were some participants that valued a certain score. Many Canadian participants perceived a high score in group focus as something good. For example, two participants from condition group 2 wanted to have a higher score in round 2 for the group focus because they thought it was important to think about groups for the funding task:

[CD2] G12CN: "I was happy my group focus went up [in round 2] because that's what I was trying to do."

Interviewer: "Why did u try to make group focus higher?"

[CD2] G12CN: "Because I really wanted to focus on the larger population and the benefit to them, not just single people here and there. I thought it was a stronger argument."

[CD2] G31CN: "Group focus: I feel like if your communication style is - without even noticing it, very individually focused – it's important for you to recognize that. The way you communicate can inform a bit of your thinking patterns, your thinking patterns should be more group-focused since programs - the money you are allocating - affect groups. That's one item I tried to correct. I tried to improve my group focus"

For the relationship focus, many participants thought that it was not so important. They thought that a lower score in relationship focus was ok because this score was in their opinion not really important for getting the task done:

[CD2] G15CN: "Relationship focus: I agree with the graph that we were both under 5%. We kind of got focused on the task at hand and didn't really focus on trying to get to know each other. It was like, what's the fastest way we can figure out where the money should go. So I guess both of us are in task-based cultures."

The value emotional expressiveness was different across participants. Some valued a high score in emotional expressiveness while other participants didn't want to be too emotional:

[CD3] G24CN: "I really realized in this experiment that yeah, CAD culture, we tend to take it everything emotional. It's just that we express emotions, and they are highly valued here [in Canada]. Whereas maybe his [Japanese] culture it's different."

[CD2] G17CN: "Emotional expressiveness: [...] I found it good that we weren't being overly emotional about it [...]."

For the short-term versus long-term focus, most participants interpreted a high long-term focus and a low short-term focus as something good because it showed that they did think further.

[CD2] G42CN: "[The graph] shows I'm not thinking to the best of my ability. I'm not thinking far enough ahead. I wish short-term was lower and long-term was higher."

Possible interpretation:

A possible cause for this appearance could be that participants valued the graphs differently. This could be due to personality. For example, some participants valued a low score in informality just because they thought that the task was a formal task while other participants valued a high score in informality because they believed that it would help for solving the task.

Relationships between graphs

Some participants draw relationships between different graphs. They expected that a high score in one graph should result in a high score in another graph as well. For example, one participant drew a relation between the graph for relationship focus and the graph for emotional expressiveness:

[CD3] G30CN: "Relationship: I found confusing. Because my emotional expressiveness was lower than hers [Japanese partner's] but then the relationship focus was higher. I wasn't sure how those two [graph for emotional expressiveness and relationship focus] were related. I feel like the level of relationship, should be more influenced by the emotional expressiveness."

The Canadian participant from group 31 related emotional expressiveness with the level of informality.

Possible interpretation:

A possible interpretation could be that participants saw some connections between the graphs. For example, if they connected emotional expressiveness and level of informality they've probably seen a connection of the concepts or the values of these graphs and therefore connected them.

Influence of graphs on participants

The five graphs did have a diverse influence on participants. Firstly, there is a distinction between participants that did understand the graphs and participants that didn't. For example, one participant could not interpret some of the graphs:

[CD3] G22CN: "I was very confused as to why the graphs were why they were. [...] and I didn't know why the results were what they were, so I didn't know why."

Another participant was even offended by the graphs:

[CD3] G23CN: "I think I was kind of offended by your graphs actually! At first, I was like 'I don't understand! What kind of text analysis are they using to graph this? It didn't make any sense to me, so I was a little upset because I didn't understand what emotional expressiveness meant - like what qualifies as that..."

Although both participants did not understand the graphs, one of them still was influenced by the graph:

Interviewer: "So even though you weren't sure exactly what the graphs were about, it seemed to influence how you were writing?"

[CD3] G22CN: "[yes], because I wanted to improve on the gap difference to minimize the gap."

When participants felt influenced by the graphs it mostly resulted in the wish to change. For example, one participant felt that after looking at the graphs, he wanted to change his communication style on different aspects:

[CD2] G31CN: "I don't really know how to compare my culture in relation to JP culture in this regard. But just looking at the graphs in general - not necessarily looking at what the outcome was - but just looking at the metrics that were used to assess the communication styles - that did get me to think about the way I communicated. [...] My level of informality was so low and my emotional expressiveness was quite low compared to [Japanese partner's]. So I felt like it could be improved. It made me think maybe I'm very unemotional and formal and it didn't need to be at that level. And group and individuality - I realized I could change how I thought my programs to less individualistic and more group focus."

When participants wanted to change it was mostly because they wanted to match the score of their partner better or decrease the gap between their and their partner's score.

Possible interpretation:

The graphs seemed to have a medium to strong influence on most participants. As many Canadian participants said during their interviews, they did want to change for matching their partner's score better. A reason for this could be that participants interpreted similar scores as something good. One participant, for example, stated that different scores would make it harder for coming to a good decision. When asked, why matching her partner's scores was important for her she answered:

[CD3] G30CN: "Because I feel that if our focuses and the different ways we talk to each other are too different - I feel like it would have been hard to come to a good decision together. So I wanted to match the same amount of energy and expressiveness and focus that she was putting in as well."

It could possibly be that participants interpreted that similar graph scores are better for the communication. On the other hand, as already mentioned in an earlier section, participants did sometimes value a high/low score in a certain graph. It could possibly be that the participants wanted to change their score in one graph if they did not match their own interpretation of a good score.

Perception of Metacognitive CQ

The qualitative analysis showed that there was a significant difference between condition group 1 and the other two in how Canadian participants rated their own metacognitive CQ in the pre- and the post-task questionnaire. Participants from condition group 2 and 3 rated their own metacognitive CQ higher in the pre-task questionnaire. Evidence for this can also be found in the interviews. One participant explained for example that the feedback had an influence on the perception on his own metacognitive CQ:

[CD3] G24CN: "For me it was so eye-opening. For me, I thought I was so culturally aware and sensitive. And to be completely honest with you, I learned that I wasn't, as much as I thought I was. I learned things that I never really thought of. So the graph kind of opened my eyes to be more understanding for sure."

Several other participants from condition group 2 and 3 said that they'd learn new things about Canadian and Japanese culture for example:

[CD2] G17CN: "I learned that Canadians are definitely more individualistic. Even though we pretend not to be and we pretend to care about everyone."

Possible interpretation:

The feedback seemed to have an impact on how participants perceived their own metacognitive CQ. It could be the case that some participants realized that they were not as culturally aware as they thought in the beginning when looking at the feedback. Another possible reason for the lower scores for metacognitive CQ in the post-task questionnaire could be that participants felt like they did learn about Canadian and Japanese culture during the study. This possibly made them realize that they did not know as much about Japanese and Canadian culture as expected in the beginning.

Value of the self-reflections

Participants from condition group 3 were not in agreement on the value of the self-reflections. While some participants mentioned that the reflections were not useful at all, other reported that they'd needed the reflections for better understanding their partner:

[CD3] G24CN: "I think I needed the reflections. because I needed to see the intentions behind his emails and mine as well, to reflect on - what was my intention."

[CD3] G24CN: "When I read this [the self-reflection from the Japanese partner], I didn't have a reaction at all... I was more surprised at their last name than all of responses. [...] [the experiment with only the graphs and without reflections] would have the same effect."

In addition, many participants mentioned that the graphs were slightly or much more important than the self-reflections:

[CD3] G30CN: "For me, I think the graphs would have been enough. But I guess trying to explain why you felt a certain way or why your results were the way they were, helped you understand your own personal habits. For me, I feel like the graphs would have been enough for you to reflect with, but the self-reflection kind of made you put it into words."

Possible interpretation:

It could be the case that for some participants, filling out the reflections felt unnatural and forced. Some participants expressed that they did not understand the graphs in the section above. For some of these participants, it was also hard to fill out the self-reflection questionnaire.

Additionally, one participant mentioned that she was used to reflect on herself and fill out reflections:

[CD3] G41CN: "I'm used to doing self-reflection. I know myself pretty well. [...] I know what my strengths and weaknesses are. It wasn't too bad to write [the self-reflection]."

It could possibly be that some of the other participants were as well more experienced with reflecting on themselves and therefore found the self-reflection questionnaires not really useful.

Influence of reading the self-reflections

The influence of the self-reflection questionnaire seemed to be much weaker than the influence of the graphs as already stated above. However, some participants found that reading the self-reflections had an impact on the relation between them and their Japanese partner.

One Canadian participant said the following when asked about what he did learn from the self-reflection of his partner:

[CD3] G21CN: "The biggest thing I noticed is that she [Japanese participant] noticed she wasn't going to score as high on certain areas like the same way I was. It made me feel like we were very similar - we both didn't realize that we were going to score as high as we did on certain areas and as low as we did in certain areas."

[CD3] G26CN: "It [the self-reflection] just helps us relate to each other more, that we were able to understand each other a lot better [...]."

It seems that reading the self-reflection questionnaire did have a positive impact on the relationship between the two participants at least for some groups.

Possible interpretation:

The self-reflection questionnaire was an additional feedback that was given to the participants. It gave them more insight into their partner because the partner had to explain the own graph data. It could be possible that this helped Canadian participants to better understand their Japanese partner or to get a better impression of their Japanese partner.

Influence of writing the self-reflection

Writing the self-reflection was difficult for many participants. Some felt uncomfortable when writing the self-reflection or did not know what to write for the self-reflection:

[CD3] G21CN: "It was kind of difficult because I didn't know exactly why I was scoring high in some of the areas, or why not. So I kind of had to make my best guess based on the graph, and the explanation paragraph beside it. It was difficult to explain why I was writing one way and even more difficult to explain she [Japanese participant] was writing a different way."

[CD3] G23CN: "I really didn't like the [reflections] after. I felt like it was very forced. like 'please reflect on this'. I felt very obligated to just make something up, for the sake of answering the questions."

The participants expressed that it was hard for them to explain the graph results in the self-reflections and that they did not know what to write exactly.

Possible interpretation:

Some participants could have had problems with writing the self-reflection questionnaire because they did not understand the graph scores. For example, the participants from group 23 did not really understand what the graphs were about. Another reason could be that the participants were not used to write this kind of self-reflections and that they were a bit lost when they had to reflect on themselves.

All these findings from the quantitative and the qualitative analysis are still in an initial phase. The Japanese side is not transcribed, yet and therefore no statements on the Japanese can be done. The overall findings indicate that the feedback in condition group 2 and 3 had some influence on the participants as there were some statistically significant differences between the condition groups. However, there were some other significant differences between the nationalities. Due to the missing Japanese interviews, it is not clear whether these differences were because of culture, personality or language barriers.

Opportunities for technology support

From the initial findings of the study, different opportunities for technology support and important aspect of the design of CMC tools that support communication in distributed team can be derived. These opportunities and aspects are mostly based on the findings from the interviews with the participants and are further explained in the following sections.

Level of abstraction for feedback

Participants reacted differently when presented with the feedback graphs about their own communication style. The explanations for the graphs were deliberately written with room for personal interpretation. While most of the participants seemed to understand what the graphs wanted to show, there were some participants that could not make sense of the graphs at all. Other participants started to draw relations between the graphs. And some participants were interested in the calculation of the graphs and the algorithms.

These different reactions of participants lead to the question, how the graphs should be presented and how abstract they should be. As stated by several participants, the graphs did have an influence on them. This indicates that the chosen level of abstraction of the graphs was enough for provoking reactions in the participants. However, it is also possible that a different level of abstraction would have been better and clearer for the participants.

Designers should take these points into consideration when designing tools that support communication in distributed teams with the help of feedback. The conducted study from this thesis only explored the effect of objective and subjective feedback but not the effect of different levels of abstraction in objective feedback. Future work could explore this area further.

Self-reflection

The findings of the study indicated that self-reflection is valuable. Reading the self-reflection of their partner let Canadian participants feel more bond with them. The self-reflection of their partner gave them a better insight into their partner.

On the other hand, some participants felt unnatural and uncomfortable when filling out the self-reflection questionnaire or they did not know what to fill in the questionnaire. This could be either because they did not understand the graph data or because they did not know how to reflect on the graph data. For participants that did not understand the graph's data, some technological support opportunities are described in the previous section. For participants that did understand the graph data but did not know how to reflect on it, the self-reflection questionnaire should probably be designed differently. Some participants explained that it was hard for them to explain why their score differed in certain graphs from their partner's score. This could be an evidence that the self-reflection questionnaire was too narrow. For some participants, it could have been better if the questions were broader and if they only had to explain differences in the graphs where they did really see differences and where they also had an explanation for the difference.

Designers of CMC tools should be aware of these findings. They should strive for designing self-reflection questionnaires that feel more natural and comfortable to answer. In general, having the self-reflection questionnaires had a positive impact on several groups.

The conducted study of this bachelor thesis did not explore different types of self-reflections. For future work, the potential and effects of different types of self-reflection could be elaborated further.

Visualizing cultural differences

The decision making-task was chosen such that cultural differences should be as much evoked as possible. However, in everyday communication, cultural differences may not be as much visible. This makes it harder for people to discover these differences, especially deep cultural differences that are not visible. For supporting people to gain more awareness of cultural differences, it could be helpful if these differences are visualized.

Several participants mentioned that they were interested in how the graphs were calculated including the algorithms that were used and the words or phrases that counted for different categories. Some of them explained that this would help them for understanding the graphs better. In terms of the conducted study, a possible implementation for this could be to highlight the words that belonged to certain categories. This could help people in interpreting the scores and understanding the causes for different levels of scores. With highlighted words, participants could also easily count how many words they had in one category and how many their partner had. This would also make the comparison between the graphs much easier.

Highlighting the words that belong to a certain category could also help in raising the awareness of cultural differences in people. The study showed that many participants were interested in the text analysis and the words that belong to certain categories. Designers should think about how they want to visualize cultural differences to the users in an easy and understandable way.

Chapter 5 Conclusion and Discussion

Research question and approach

In this thesis I explored the research question:

What is the potential of providing feedback of peoples' communication styles to mitigate email communication challenges in distributed teams?

So far, no CMC tools exist that support people in communication in distributed teams. For exploring this research question, I took the following approach:

- 1) To understand the challenges that people face in email communication in distributed teams, chapter 2 reviewed related work in communication in distributed teams.
- 2) To explore the research question, a study was conducted with three different condition groups and types of feedback and participants from two different countries.

The findings of the conducted study indicated that feedback could possibly have a positive impact on communication in distributed teams. However, it does not explore why challenges in communication in distributed teams occur.

Research contribution

The findings that are presented in this thesis are initial and inconclusive findings. The interviews from Japanese participants were not yet translated and thus not presented. The following sections summarize the findings from the conducted study.

Firstly, there were significant differences between the condition groups in the yielding of the funding proposals. Japanese participants in condition group 1 yielded the most. It was also mentioned in interviews from Canadian participant's from condition group 1 that their Japanese partners changed their funding proposals quickly.

Secondly, there were significant differences in the pre- and post-task questionnaires in the personality analysis. In the category emotional stability, Japanese participants from condition group 2 did perceive their Canadian partners significantly less accurate than participants Japanese participants from condition group 1 and 3. For Canadian participants, there was no difference. In the category extraversion, Japanese participants from condition group 1 and 2 rated their Canadian partner significantly less accurate than participants from condition group 3. For Canadian participants, there was no difference. In the category consciousness, there was a nationality difference. In all three condition groups, Canadian participants rated their Japanese partner significantly less accurate than Japanese participants rated their Canadian partners.

In the rating of the own metacognitive cultural intelligence (metacognitive CQ), there was also a significant difference between condition groups for Canadian participants. In condition group 2 and 3, the Canadian participants rated their own metacognitive CQ lower in the post-task questionnaire than in the pre-task questionnaire. Only in condition group 1 did Canadian participants rate their own metacognitive CQ higher in the post-task questionnaire. It was mentioned by several participants from condition group 2 and 3 that the study was eye-opening for them and that they realized that they were not as culturally aware than they thought in the beginning.

The interviews with the Canadian participants indicate that the feedback had an influence on them. Many Canadian participants stated that especially the graphs made them think about the differences in cultures and communication style. Many of them wanted to change at least in one category after seeing the graphs. Also the self-reflections did influence some of the participants. Some Canadian

participants felt more bond with their partner after reading the self-reflection of their partner. On the other hand, there were also some Canadian participants that did not understand the graphs or felt uncomfortable when writing the self-reflection questionnaire.

Based on these findings, some areas for possible technology support are identified and important design aspects for the development of CMC tools that support communication in distributed teams are highlighted:

The level of abstractness of the feedback should be taken into consideration by designers of such CMC tools. The graphs that were used in the study were clear for many participants but not for all of them. Many participants mentioned that the graphs helped them and participants from condition group 3 often mentioned that the graphs were more valuable than the self-reflection questionnaires. Some participants felt uncomfortable when filling out the self-reflection questionnaires. Many of them did not know what to write in the questionnaire. Although the self-reflection questionnaires had a positive impact on some groups, designers should try to design questionnaires that are easier to answer for the participants. Lastly, the visualization of cultural differences is an important point. The design of the decision-making task in the study was designed for evoking as many cultural differences as possible. In normal everyday conversation, the differences might be much weaker. Designers should try to find a way for also highlighting these smaller, less obvious cultural differences and differences in communication styles.

Conclusion

This bachelor thesis presented findings from a study about feedback in email communication in distributed teams. The participants were divided into three condition groups that all received a different type of feedback. The findings indicate that feedback is valuable and that it can support people in email communication in distributed teams. However, these findings are only initial findings and not conclusive. The findings point to opportunities for technology support and important aspects of the design of CMC tools that support email communication in distributed teams.

References

- Gosling, S. D., Rentfrow, P. J., Swann, W. B., . A Very Brief Measure of the Big Five Personality Domains. *Journal of Research in Personality*, 37, Pages 504-528. 2003.
- Echenique, A., Yamashita, N., Kuzuoka, H., Hautasaari, A. Effects of video and text support on grounding in multilingual multiparty audio conferencing. *Proc. of 5th ACM International Conf. on Collaboration across Boundaries: Culture, Distance and Technology*, Pages 73-81. 2014.
- Hautasaari, A., Yamashita, N. Catching up in audio conferences: highlighting keywords in ASR transcripts for non-native speakers. *Proc. of the 5th ACM International Conference On Collaboration Across Boundaries: Culture, Distance & Technology*. Pages 107-110. 2014.
- He, H. A., Huang, E. M. A qualitative study of workplace intercultural communication tensions in dyadic face-to-face and computer-mediated interactions. *Proceedings of the 2014 conference on Designing interactive systems*. Pages 415-424. 2014.
- He, H. A., Yamashita, N., Hautasaari, A., Cao, X., Huang, E. M. Why did they do that? Exploring Attribution Mismatches Between Native and Non-Native Speakers Using Videoconferencing. *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. Pages 297 -309. 2016.
- He, H. A., et al. *Facilitating Intercultural Communication: The Role of Technology in Training Culture-General Skills*. Manuscript. 2015.
- Hofstede, G. H., Hofstede, G. *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage. 2001.
- Laroche, L. *Managing cultural diversity in technical professions*. Routledge. 2003.
- Laroche, L., Rutherford, D. *Recruiting, Retaining and Promoting Culturally Different Employees*. 2007.
- McGrath, J. E. *Groups: Interaction and performance*. Vol. 14. Englewood Cliffs, NJ: Prentice-Hall. 1984
- Neuliep, J.W. *Intercultural communication: A contextual approach*. Houghton Mifflin Company. 2000.
- Pennebaker, J.W., Boyd, R.L., Jordan, K., Blackburn, K. *The development and psychometric properties of LIWC2015*. Austin, TX: University of Texas at Austin. 2015.
- Shachaf, P. Cultural diversity and information and communication technology impacts on global virtual teams: An exploratory study. *Information & Management*, 45(2), Pages 131-142. 2008.
- Takano, Y., Noda, A. A temporary decline of thinking ability during foreign language processing. *J. of Cross-Cultural Psyc.* 24(4): Pages 445-462. 1993.
- Tausczik, Y.R., Pennebaker, J.W. The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of language and social psychology*, 29(1), Pages 24-54. 2010.
- Van Dyne, L., Ang, S., Koh, C. Development and Validation of the CSQ. The cultural intelligence scale. In: *Handbook of Cultural Intelligence: Theory, Measurement and Applications*. Pages 16-38. Armonk. 2008.
- Wang, H., Fussell, S., Cosley, D. Machine translation vs. common language: Effects on idea exchange in cross-lingual groups. *Proc. of the 2013 conference on Computer Supported Cooperative Work (CSCW 2013)*, Pages 935-944. 2013.

Yamashita, N., Echenique, A., Ishida, T., Hautasaari, A. Lost in transmittance: how transmission lag enhances and deteriorates multilingual collaboration. Proc. of the Conf. on Computer Supported Cooperative Work (CSCW 2013), Pages 923-934. 2013.

Yamashita, N., Inaba, R., Kuzuoka, H., Ishida, T. Difficulties in establishing common ground in multiparty groups using machine translation. Proc. of SIGCHI Conference on Human Factors in Computing Systems (CHI 2009), Pages 679-688. 2009.

Hofstede, G. Geert Hofstede. <https://geert-hofstede.com/japan.html>, visited at the 15.03.2017 18:00

Pennebaker Conglomerates, Inc. LIWC. <https://liwc.wpengine.com/>, visited at the 18.03.2017 17:00

Appendix

Task description

YOUR TASK: ASSIGNING LIMITED FUNDS TO SOCIAL PROGRAMS

You and your email partner are the financial advisors of a global philanthropic organization, called "Envision Change International" (ECI). This organization has offices around the world and has received recognition for its important contributions to addressing global issues.

ECI has to assign **\$1.8 million** (\$1,800,000) to finance social programs for 2017. Five program proposals are vigorously competing for these funds. (See page 2 for the list of program proposals).

The director of ECI has asked you and your partner to **jointly decide which program proposals to fund**. The partner in Japan is the financial advisor of the Japanese headquarters. The partner in Canada is the financial advisor of the Canadian headquarters. Both of you have the **same** status and decision-making power within ECI.

The director has **two requirements**:

- 1) A program needs (at least) \$0.5 million (\$500,000) in order to be effective.
- 2) At least *one* of the five programs needs to be funded (a minimum) of \$1 million.

While all five programs (listed on page 2) are important, the director has asked you and your partner to select programs that you **personally believe** are worthy of funding in terms of addressing social issues.

The director asked you to follow these steps:

- 1) Communicate your **initial funding proposal** to your partner over email. Your goal is to **CONVINCE YOUR PARTNER** that your proposal is the best option.
 - a. To convince your partner, you can use **personal experiences** or stories - there is no need to do any research on these topics.
- 2) By the end of the task, you and your partner should **come to an agreement** of fund allocation that you are both happy with.

EMAIL REQUIREMENTS:

- To complete the task, please write **4 emails (in total)** to your partner.
- Due to the large time zone difference between Canada and Japan, please **write at least one email per day** (in order to complete the task on time).
- Please **wait for your partner to respond** to before writing more emails to your partner.
- **Each email should include at least 1-2 paragraphs.** (This requirement is to ensure the text analysis program has enough text to analyze).
- All emails should be in **English**.
- Since this study explores personal communication styles in email, **your emails should only contain your OWN writing**. Please:
 - Do NOT copy and paste content from external sources into your email
 - Do NOT attach photos, images, attachments, or links.
 - You can quote text from your partner's email if needed, but try to keep this to a minimum.
 - Japanese participants: You may use translation tools, but please do not copy and paste large amounts of translated text into your email.
- *****IMPORTANT:** Every time you write an email to your partner, **please CC this email uniexperiment2016@gmail.com**. (This gives us access to your emails).

What happens if we finish the task, before we reach 4 emails?

In the rare case this happens, please allocate another \$1.8 million to two different social programs on the list, following the same steps and requirements on page 1. Your discussions will inform the ECI Director's decisions for program funding in 2018.

LIST OF PROGRAM PROPOSALS

If a program is selected, funding will be split EQUALLY between Japan and Canada.

PROGRAM: Prevention and punishment for high-school bullying

If selected, funding will support both the prevention and punishment for high-school bullying. Prevention measures will include mental health counseling for students and their families, awareness campaigns, and community outreach programs. Punishment measures will promote the establishment of stricter laws against high-school bullying.

PROGRAM: Regulations about workplace overtime

If selected, funding will be used to improve current regulations regarding workplace overtime, national awareness campaigns, training programs for leaders about the dangers of overwork, and mental health counseling for company employees.

PROGRAM: Rehabilitation programs for drug addiction

If selected, funding will support the establishment of rehabilitation centers for drug addiction. Such centers will offer detoxification programs, mental and physical health programs, as well as the training of life skills and employment skills.

PROGRAM: Integration of immigrants and refugees

If selected, funding will support the integration of new immigrants and refugees, from various countries around the world. Support will be offered in the form of language classes, training on the cultural customs of the host country, and employment offices to help immigrants and refugees find work.

PROGRAM: Robots to take care of the elderly

If selected, funding will support academic research on robots to take care of the elderly. This is a new and emerging topic - therefore, funding goes towards research to explore the elderly's experiences and attitudes towards such robots, and how they could be improved to provide better care in the future.

Pre-task questionnaire

PRE-TASK QUESTIONNAIRE. Please fill this in BEFORE beginning the task. (January2017)

Matching you with a partner

* 1. Thank you for joining the experiment!

In this experiment, your task will be to prioritize limited money to fund social programs (listed below). Based on your PERSONAL BELIEFS, please rank the social programs below from MOST important (1) to LEAST important (5).

(There is no "correct" answer to this question - your response below will help us match you with an appropriate partner for the study).

<input type="text"/>	Prevention and punishment for high-school bullying
<input type="text"/>	Regulations about workplace overtime
<input type="text"/>	Rehabilitation programs for drug addiction
<input type="text"/>	Integration of immigrants and refugees
<input type="text"/>	Robots to take care of the elderly

PRE-TASK QUESTIONNAIRE. Please fill this in BEFORE beginning the task. (January2017)

Personality Traits

* 2. Select the answer that BEST describes your personality. (Rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other).

	1 (strongly DISAGREE)	2	3	4 (neither agree or disagree)	5	6	7 (strongly AGREE)
Extraverted, enthusiastic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Critical, quarrelsome.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dependable, self-disciplined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxious, easily upset.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open to new experiences, complex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reserved, quiet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sympathetic, warm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disorganized, careless.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calm, emotionally stable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conventional, uncreative.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PRE-TASK QUESTIONNAIRE. Please fill this in BEFORE beginning the task. (January2017)

Intercultural experience

* 3. Select the answer that BEST describes you as you really are.

	1 (strongly DISAGREE)	2	3	4 (neither agree or disagree)	5	6	7 (strongly AGREE)
I am conscious of the cultural knowledge I use when interacting with people with different cultural backgrounds.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am conscious of the cultural knowledge I apply to cross-cultural interactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I check the accuracy of my cultural knowledge as I interact with people from different cultures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Post-task questionnaire

POST-TASK QUESTIONNAIRE. Please complete after you have finished the task.

Intercultural Experience

* 1. Now you have finished communicating with your partner, please select the answer that **BEST** describes you as you really are.

	1 (strongly DISAGREE)	2	3	4 (neither agree or disagree)	5	6	7 (strongly AGREE)
I am conscious of the cultural knowledge I use when interacting with people with different cultural backgrounds.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I adjust my cultural knowledge as I interact with people from a culture that is unfamiliar to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am conscious of the cultural knowledge I apply to cross-cultural interactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I check the accuracy of my cultural knowledge as I interact with people from different cultures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 2. During the experiment, what (if anything) did you learn about **YOURSELF** or your **OWN culture**? How did you learn this? Please explain briefly.

* 3. During the experiment, what (if anything) did you learn about your **PARTNER** or **THEIR culture**? How did you learn this? Please explain briefly.

* 4. Throughout the experiment, **did you ADJUST** how you wrote to your partner? If so, **how** did you adjust and **why**? Please explain briefly.

* 5. Throughout the experiment, **did your partner ADJUST** how they wrote to you? If so, in your opinion, **how** did they adjust and **why**? Please explain briefly.

POST-TASK QUESTIONNAIRE. Please complete after you have finished the task.

Your PARTNER'S Personality Traits.

* 6. Select the answer that BEST describes **YOUR PARTNER**. (Rate the extent to which the pair of traits applies to your partner, even if one characteristic applies more strongly than the other).

	1 (strongly DISAGREE)	2	3	4 (neither agree or disagree)	5	6	7 (strongly AGREE)
Extraverted, enthusiastic.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Critical, quarrelsome.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dependable, self-disciplined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anxious, easily upset.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open to new experiences, complex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reserved, quiet.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sympathetic, warm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disorganized, careless.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calm, emotionally stable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conventional, uncreative.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. Thank you! Please tell us your name:

First name:

Last name:

****** CALL FOR PARTICIPANTS! ******
**MAKE \$100 IN A STUDY EXPLORING EMAIL
COMMUNICATION STYLES**

WE ARE RECRUITING:

- Undergraduate students between ages 18-30.
- You must be born and raised in Canada.
- You should not have lived outside of Canada for more than 1 year.

COMPENSATION: To thank you for your time, you will be compensated **\$100 (CAD)**.

WHAT: We are conducting a study to explore how Email tools can support different communication styles.

WHEN: The experiment will take place during the following dates:

- **January 8-15.** During this time, you will be asked to write **4 emails** (in English) to an assigned partner in Japan and fill in questionnaires about your experience. This will take **2.5 - 3 hours** in total.
- Between **January 16 - 25** (depending on your availability), you will do a **30-minute Skype call** to discuss your experience during the task with a researcher.

I'M INTERESTED! HOW DO I SIGN UP? Please fill out a 3-minute demographic questionnaire. You will be contacted by a researcher from the University of Zurich to confirm your participation. <https://www.surveymonkey.com/r/ZBF5FXT>



QUESTIONS OR CONCERNS? Please contact Helen Ai He at the University of Zurich, Email: helen.he@ifi.uzh.ch.

PRIVACY AND CONFIDENTIALITY: Please note that the interview will be audio-taped. The data will be strictly undisclosed and will be used exclusively for research. All your private information (e.g. name, audio data) will be strictly undisclosed and will not appear anywhere (including reports and presentations of this study). Your data will be anonymized and you will be identified only by a participant number (e.g. P12).

RISKS AND DISCOMFORT: There are no obvious physical, legal or economic risks associated with participating in this study. However, you will be asked questions about yourself and these questions may sometimes make you uncomfortable. You can refuse to answer any questions that you do not wish to answer during the interview, with no penalty, and no effect on the compensation earned before withdrawing.

PARTICIPATION IS VOLUNTARY: Your participation in this study is voluntary. Your participation has no effect on your relationship with any organization or service that may be involved in this research.



**University of
Zurich**^{uzh}

People and Computing Lab
University of Zurich
Department of Informatics
Binzmühlestr. 14, CH-8050 Zürich

Contact person: **Helen Ai He**
Telephone 0041 767858823
helen.he@ifi.uzh.ch

NTT



NIPPON TELEGRAPH AND TELEPHONE CORPORATION
NTT Communication Science Laboratories
2-4, Hikaridai, Seika-cho, Soraku-gun,
Kyoto, 619-0237 Japan.
Contact person: Naomi Yamashita
naomiy@acm.org, yamashita.naomi@lab.ntt.co.jp

Recruitment-poster Japan

****** 日本人の実験参加者、大募集! ******

WHO:

- Undergraduate students between ages 18-30.
- You must be born and raised in Japan.
- You should not have lived outside of Japan for more than 1 year.
- Feel comfortable writing in English (in Email). (No spoken English required).

COMPENSATION: To thank you for your time, you will be compensated **¥10000**.

WHAT: We are conducting a study to explore how Email tools can support different communication styles.

WHEN: The experiment will take place during the following dates:

- **January 9 - 16.** During this time, you will be asked to write **4 emails** (in English) to an assigned partner in Canada and fill in questionnaires about your experience. This will take **2.5 – 3.5 hours** in total.
- Between **January 17 - 25** (depending on your availability), you will do a **30-minute Skype call** (in Japanese) to discuss your experience with a researcher.

HOW TO PARTICIPATE: Please fill out a 5-minute demographic questionnaire. You will be contacted by a researcher from the University of Zurich to confirm your participation.

<https://www.surveymonkey.com/r/ZB25LPW>



QUESTIONS OR CONCERNS? Please contact **Helen Ai He** at the University of Zurich, Email: helen.he@ifi.uzh.ch.

PRIVACY AND CONFIDENTIALITY: Please note that the interview will be audio-taped. The data will be strictly undisclosed and will be used exclusively for research. All your private information (e.g. name, audio data) will be strictly undisclosed and will not appear anywhere (including reports and presentations of this study). Your data will be anonymized and you will be identified only by a participant number (e.g. P12).

RISKS AND DISCOMFORT: There are no obvious physical, legal or economic risks associated with participating in this study. However, you will be asked questions about yourself and these questions may sometimes make you uncomfortable. You can refuse to answer any questions that you do not wish to answer during the interview, with no penalty, and no effect on the compensation earned before withdrawing.

PARTICIPATION IS VOLUNTARY: Your participation in this study is voluntary. Your participation has no effect on your relationship with any organization or service that may be involved in this research.



University of Zurich^{uzh}

People and Computing Lab

University of Zurich
Department of Informatics
Binzmühlestr. 14, CH-8050 Zürich

Contact person: **Helen Ai He**
Telephone 0041 767858823
helen.he@ifi.uzh.ch

NTT



NIPPON TELEGRAPH AND TELEPHONE CORPORATION
NTT Communication Science Laboratories
2-4, Hikaridai, Seika-cho, Soraku-gun,
Kyoto, 619-0237 Japan.
Contact person: Naomi Yamashita
naomiy@acm.org, yamashita.naomi@lab.ntt.co.jp

Self-reflection questionnaire round 1

In a separate window, please **open the PDF** we sent you containing the 5 graphs.

For each graph, please **reflect upon your OWN behavior** in comparison to your partner. While we provide you with example prompts below, please feel free to write freely.

Whatever you write here will be **SHARED with your partner**. (In a later step, your partner's reflections about their own graph data will also be shared with you).

1. GRAPH: Emotional expressiveness

(E.g. My expressiveness was lower than my partner because...)

2. GRAPH: Individual or Group Focus

(E.g. I used more group-focus words than my partner because...)

3. GRAPH: Level of Relationship Focus

(E.g. I used more relationship-focus words than my partner because...)

4. GRAPH: Short-term or Long-Term Focus

(E.g. I used more long-term focus words than my partner because...)

5. GRAPH: Level of Informality

(E.g. I used less informal words than my partner because...)

6. Thank you! Please tell us your name.

First name:

Last name:

Self-reflection questionnaire round 2

In a separate window, please open the PDF (Feedback:Round 2) we sent you containing the 5 graphs.

For each graph, please reflect upon your OWN behavior in comparison to your partner. While we provide you with example prompts below, please feel free to write freely.

Whatever you write here will be **SHARED with your partner**. (In a later step, your partner's reflections about their own graph data will also be shared with you).

1. GRAPH: Emotional expressiveness

(E.g. My expressiveness was lower than my partner because...)

2. GRAPH: Individual or Group Focus

(E.g. I used more group-focus words than my partner because...)

3. GRAPH: Level of Relationship Focus

(E.g. I used more relationship-focus words than my partner because...)

4. GRAPH: Short-term or Long-Term Focus

(E.g. I used more long-term focus words than my partner because...)

5. GRAPH: Level of Informality

(E.g. I used less informal words than my partner because...)

6. Thank you! Please tell us your name.

First name:

Last name:

Interview questions

For all three condition groups

What was your experience with the **task**?

Were there **differences in communication style** between you and your partner?

Anything **difficult or challenging**?

Did you **learn** anything about Japan or **Japanese culture**? If so, how did you learn this?

Did you **learn** anything about Canada or **Canadian culture**? If so, how did you learn this?

How much do you think **language** (English as second language) influenced your partner?

Describe your impression of your partner's **personality**? (if do you feel you don't have enough data?)

For condition group 2 and 3

When you saw the **first** round of graphs, what were your **impressions**?

What did you think about the explanations/**descriptions** beside each graph?

Was there anything particularly **interesting or surprising** about the graphs? Talk about each graph.

Talk about **own** graph data

Talk about **partner's** graph data

Did seeing the graphs influence you in emails 3 and 4? If so, how?

When you saw the **second** round of graphs, what were your **impressions**?

Was there anything particularly **interesting or surprising** about the graphs?

What about when you compared....

Your own data with your **partner's data**?

Differences when you **compare the first and second round of graphs**?

How did the feedback influence you (if at all?) If you didn't see the feedback (just had a normal email conversation), would your conversation have differed? Why or why not?

For condition group 3 only

What was doing self-reflection like for you? Anything challenging or difficult?

What was doing partner-reflection like for you? Anything challenging or difficult?

Were the reflections useful as a probe? Was the graph already enough to probe reflection?

Something you want to see that you didn't get to see in graph?