EXPLORING ONLINE GROUP TRANSLATION: INTERFACE DESIGN FOR HUIJI TRANS

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EXPLORING ONLINE GROUP TRANSLATION: INTERFACE DESIGN FOR HUIJI TRANS

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LIST OF SYMBOLS AND ABBREVIATIONS

G&J	Gawen & Janos (Beijing) Network Technology Co.
CAT	Computer Aided Translation
UI	User Interface
MT	machine translation
QQ	A widely used instant message software in China
HuijiTRANS	灰机 TRANS, the online group translation platform developed by G&J

SUMMARY

As the world increasingly becomes more and more globally connected through the Internet, people all over the world have more chances to access information in foreign languages. As the population of language learners and multilingual people increase throughout the world, so do translators and the need for collaborative translation tools.

Alongside professional translation, there are a great number of non-professional translators actively working all over the world. They translate to practice their language skills, to spread information in foreign languages, and to assist others to learn languages.

Many of these translators, both professional and non-professional, work collaboratively with one another. Some of them even work together remotely online with the help of the Internet. However, these online collaborations are mostly performed with poor efficiency. Translation collaborators share documents via email or a shared cloud drive, and they then translate their part of the document offline on their own device. Later the partially complete documents are manually merged, also offline. This is not only inefficient, but also brings about many version control problems whenever changes are made.

To alleviate this inefficiency, we intend to support the design and development of HuijiTRANS, a web-based application to support collaborative translation that allows translators to work together on the same document online. HuijiTRANS is developed using MediaWiki, a free and open source software for creating online wikis. Specifically, HuijiTRANS is built upon an extension for MediaWiki, the Translate Extension, which is an open source crowd translation application primarily used for translating the

MediaWiki software and documentation itself. Our work focuses on design improvements to better support group translation, in which translators collaborate even more closely together.

This thesis presents research on the user needs and user activities in group translation, and efforts to design, prototype, and user test the interface of the web-based group translation product 灰机 TRANS (HuijiTRANS).

CHAPTER 1

INTRODUCTION

Problem Statement

Translation has always been a highly professional task. It requires the translator to have advanced skill in at least two languages and cultures. However, in our current environment of globalization and information technology development, the speed of information travel across different countries and cultures is also much faster and at a much larger scale than the early days of the Internet. The current translation practices developed to suit the needs of the publishing industry do not fit the demands for information in other languages of people all over the world.

Due to globalization, the number of foreign language learners and multilingual people continually increases. Many of them join in non-professional or amateur translation activities, translating and localizing a massive sum of knowledge, news, and entertainment products every day. These amateur translation activities are now, at least in scale, no smaller than professional translation, yet they have developed their own distinct methods and communities.

The non-professional translation activities are deeply rooted in the Internet and online social networks. The online communities allow remote collaboration with shared outputs worldwide. A large part of this community belongs to fan translation, which is the unofficial translation of various forms of written or multimedia products made by fans (O'Hagan 2008). Disregarding the questionable legal status, fan translation contributes a large part to worldwide localization of cultural artifacts. Also amateur translators actively work in many other areas such as the multinational collaboration for open source software development. Amateur translation is even considered by some researchers, to be the demolisher of language barriers (Zhang 2009).

Compared to traditional and professional translators, amateur translators working through online communities do much more online collaboration (O'Hagan 2009). However, during our interview with amateur translators, we realized that they have been using a mixture of inefficient tools to do this. They use online chat groups to communicate, cloud drive or email to share documents, and offline text editing software to do the actual translation. Each of these different and separate tools and processes make the collaboration inefficient and fallible.

We worked with the company, Gawen & Janos (Beijing) Network Technology Co., Ltd (G&J), to plan the development of a web-based service that allows collaborative translators to work synchronously online. The service is called HuijiTRANS, for which "Huiji" roughly means "Air plane" and "TRANS" means "Translation Redesigned As Network Service". We intend to save collaborators from manual distribution and merging of documents, to allow translation and proof reading on different devices, and to provide version control support while editing.

We found that most translators do not use Computer Aided Translation (CAT) tools. CAT is a form of language translation in which a human translator uses computer software to support and facilitate the translation process. The CAT softwares are actually sufficiently mature today but surprisingly not widely used, especially among amateur translators. Price and accessibility seem to be the main drivers behind this (Bowker and Fisher 2010). HuijiTRANS addresses these issues by being free to all registered users and has the intention to provide some CAT key features to help improve translation efficiency.

Today the vast majority of online activities are about human socialization(O'Hagan 2011). Translation is no exception. An active and open online society have been shown to promote art and literature (Salah 2010), therefore, it is reasonable to expect the same to occur within translation communities. Translators increase their chances to share and collaborate when they belong to a community. Most amateur translators we interviewed currently work in closed groups. We aim to support communities that bring these groups

together and enhance open communication. Through this, we desire to create a social network that promotes cultural transmission, information localizing, and language learning.

Target User

Since G&J is located in Beijing and registered in China, the HuijiTRANS service will be first launched in the Chinese market. Additionally, China may have the most amateur translators in the world (Zhang 2013).

China continues to be increasingly culturally open. With the largest population in the world, China also has the largest number of foreign language learners. According to statistics collected by Wei's team in 2012, there were 415.95 million people in China who had studied one or more foreign languages. Among them, 390.16 million studied English. This is even more than the population of the United States. People who studied languages other than English were much fewer, but there were still 1.2 million that studied French, 29 million that studied Russian, and 11 million that studied Japanese (Wei and Su 2012).

Table 1: The reported proficiency in reading English among those who had studied English

	Able to read books and periodicals freely	Able to read books and periodicals with the aid of dictionaries and other tools	Able to understand simple reading passages	Able to understand simple sentences	Able to recognize a few words
Mainland China	3.26%	12.67%	12.80%	43.23%	28.04%
Beijing	6.85%	21.89%	13.69%	31.59%	26.31%
Shanghai	7.61%	17.26%	12.69%	23.35%	39.09%
Tianjin	4.51%	21.81%	21.47%	29.15%	23.05%
Chongqing	4.37%	13.79%	11.62%	40.48%	29.74%

Table 1 summarizes the reported English skill among people who had studied English. Among English learners, those whose reading proficiency is above "Able to read books and periodicals with the aid of dictionaries and other tools" can be considered able

to perform non-professional English-to-Chinese translation. This includes more than 62 million people in China alone. Of course only a small part of these people are actually doing translation, but clearly this is a large potential user group.

Nowadays fan-translation groups play an important role in localizing foreign cultural products and information in China. By researching through Chinese social networks, we found a rough count of more than 500 currently active fan-translator groups. We classified a group as ‘active’ if the group had released at least one translated work per week. These groups vary in size. Some groups contain hundreds of members, while others only have a handful. Some larger groups produce more than one hundred translated works per week.

Objective

This thesis intends to explore the user needs and solutions for collaborative translation, and also evaluate user interface designs for HuijiTRANS. By allowing multiple translators to work collaboratively on one online document, we intend to enhance the efficiency and quality of group translation.

With the consideration of development costs and G&J’s technical expertise, HuijiTRANS is being developed based on the open source software extension of Mediawiki, called Translate Extension. Translate Extension is designed for large scale open source translation collaboration, currently used primarily for the translation of open source software and documentation. From the design perspective, HuijiTRANS focuses on improving the usability of group translation, which has different user needs compared to just crowd translation. Also the layout and User Interface (UI) was redesigned to make the whole system more pleasing to the eyes and easier to use.

With a functional prototype provided by G&J developers according to the design presented in this thesis, we performed a usability test to compare the following three conditions of collaborative translation: the way translators collaborate currently, the way

translators collaborate using the original Translate Extension of MediaWiki, and the way translators collaborate using the new functional prototype of HuijiTRANS.

Through this comparative study with usability testing, we report on how the tools lead to different performance and draw conclusions on why the quality and efficiency of group translation with the new design for the HuijiTRANS service is an improvement over current available solutions. We also offer suggestions for future development and studies.

Thesis Outline

This thesis is organized into four main parts：

- **Chapter 1-2 Introduction and Background**

  Problem statement and user research, current literature and products on the translation community and collaboration.

- **Chapter 3-5 Design approach and prototyping**

  User experience and interface design based on conclusions from the background section.

- **Chapter 6-7 Usability test and Data Collected**

  Method and protocol of the usability test and comparative study. Data and analysis from the study.

- **Chapter 8-9 Refinement and Conclusion**

  Refinement of the design based on results from the usability study. Discussion and conclusion.

CHAPTER 2

LITERATURE REVIEW

We conducted this literature review using various sources concerning several perspectives related to the topic. The digital databases searched included ERIC, IEEE.org, Georgia Tech library and Google scholar search.

We used the following search keywords: “online collaboration”, “group ware usability”, “translation + collaboration”, “collaborative translation”, “collaborative editing”, “translation community”, “machine translation”.

Relevant topics explored included:

- Asynchronous and Synchronous Online Collaboration
- Crowdsourced/Wikified Translation
- Translation Community
- Computer Aided Translation

We also mention some existing products and services related to the aforementioned topics.

Asynchronous and Synchronous Online Collaboration

The Internet began facilitating collaboration since its very beginnings (Hathorn and Ingram 2002). Here we use the narrower definition of ‘online collaboration’: a system or software that allows multiple people to work together on the same digital content through the use of the internet.

The early days of online collaboration came as an asynchronous system (Tammaro, Mosier et al. 1997). Wikis were one of the most widely used such systems (Leuf and Cunningham 2001). A wiki allows a large number of users to create and edit content

collaboratively. The main distinctive feature wikis use to support this is enhanced version control. A wiki saves all of the changes and keeps a log of all of the historical versions on the server. So users can compare versions or even 'roll back' to an earlier version. However, with this system, collaborators typically do not work at the same time or it may cause version conflicts to arise (Dishaw, Eierman et al. 2011). For example, in MediaWiki, the wiki software used by Wikipedia.org, when one user saves an edition to an article which happens to already be changed after this user had begun this user's edition, the user can notice a conflict and the user's edition cannot be saved. The system requests a manual merge of the difference in the change.

To solve this limitation and fulfill people's need for collaboration in real-time, related technology has evolved rapidly with synchronous collaboration. In 2000, Yang and his team created a prototype to provide real-time responsiveness in collaborative writing (Yang, Sun et al. 2000). This system reduced the response time of changes that appear on every screen at an unnoticeable level. Nowadays these type of real-time collaborative group-wares are mature and widely accessible (Xue, Orgun et al. 2002).

Concerning real-time collaboration usability, researchers believed that in addition to the response speed, the most important factor is group awareness (Khairuddin 2014). With features that improve the group awareness, groupware achieves a much better solution to conflict than through technical means alone. When users can see exactly where their co-workers are looking at and what they are doing, they can actively avoid conflict (Mendoza-Chapa, Romero-Salcedo et al. 2000). In widely used collaborative document tools such as Google Docs, the other group members' cursors are visible. In Prezi, a web-based presentation tool, users can even see their collaborators' explorer view area rectangle on the page.

However, translation is a task of a different nature. It is not like co-creating a document, chart, or presentation. Translation always comes with a prescribed element, which is the original text. A translation's output is highly predictable. It will be text in

another language that is very similar to the original text in length and structure. Since the task can be subdivided and more clearly distributed, the requirements on real-time group awareness in translation may be lower than other creative collaborative work.

Translation Community

Nowadays online activities are all about socializing, and that includes translation (Kelly, Ray et al. 2011). Translators and researchers have discussed the influence of online translation community since at least the 1980s. It was back then that fan-based translation emerged (Cintas and Sánchez 2006). Beginning in the 1990s, a specific type of fan-based translation, 'fansubbing' or 'fansub', originated from organized online group translation of subtitles for anime, primarily Japanese animation, by fan clubs of various anime.

Compared to the traditional translation industry, community translation has two main distinctions. Firstly, the translators are mostly non-professional individuals (O'Hagan 2011). Many of them translate numerous information into various languages without financial payment. Mostly they translate to localize and spread information and knowledge, and some do it to practice their language skills or to help other foreign language learners.

Fan translation, also called user-generated translation, refers to the unofficial translation of various forms of written or multimedia products made by fans, comprises a large part of online translation activities. It has grown increasingly across the world despite its dubious legal status (O'Hagan 2009). A large part of fan translation is done collaboratively in groups organized through online community (O'Hagan 2008).

Secondly, when they work collaboratively, they do so in a very different workflow. Traditional translation is geared toward the needs of publication work mostly in a Translate-Edit-Proofread model (MAKOUSHINA and KOCKAERT). The translation step is typically done by one person, and the whole process, including editing and proofreading, proceeds step-by-step. However in a translation community practicing online, there are at

least a few people, but sometimes even a large number of translators working together. Through the convenience provided by the Internet, the community creates a completely different workflow model (Beninatto and DePalma 2008). Figure 1 shows Depalma's description of this model:

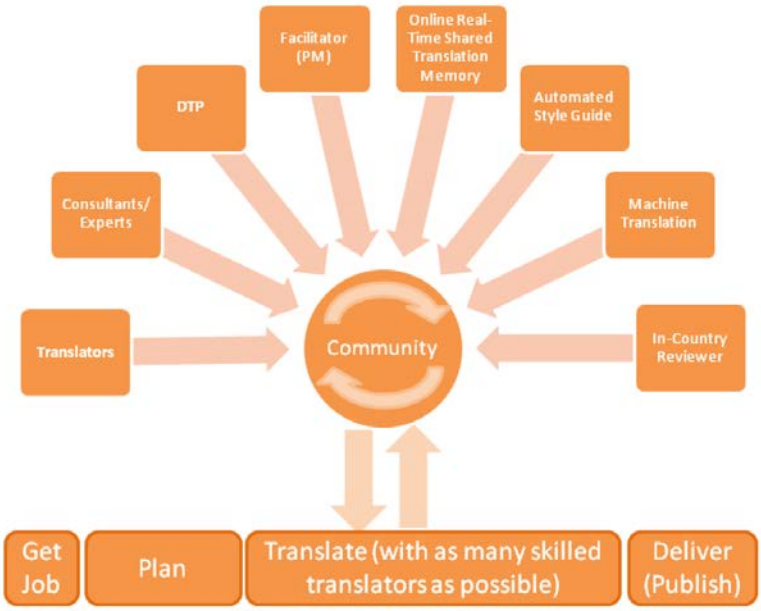

Figure 1 Timeline for Collaborative Translation

However, especially in a non-profit community translation scenario, collaboration can be quiet loose, with no defined deadlines and sometimes no one in particular to work on reviewing or proofreading. This is why the quality of the output of community based translation is still questioned by some professionals (Petras 2011).

The amateur translators' main purpose may be simply language learning, and the translation community is definitely helpful for them for this purpose. For example, the language learning platform Duolingo.com lets users translate content to practice language skills.

Compared to loosely arranged crowd translation, translators working in groups may have a lot more communication. For example, in fan translation, people usually work in tight groups, and there are even strict tests for people who want to join (Boyko 2011). That makes these communities tight but also closed. Since the intention is to build this online service for group translators, we hope it could bring more translation groups together and form communities that are both active and open.

Crowdsourced/Wikified Translation

In searching the literature upon collaborative translation, it appears that there is much more research and literature on crowd translation than group translation. Though group translation has some different user needs, we can still glean some insight from the technical approach and usability of crowd translation.

Crowd translation or crowdsourced translation, refers to large scaled online collaboration to translate contents, that are mostly open sourced (Désilets, Gonzalez et al. 2006). Désilets describes a new frontier to content translation (Désilets 2007). In this type of collaboration, a large number of translators collaborate in a rather loose way. They do not have to know each other and usually, work on their own timetable.

Even in this way, massive collaborative translation has proved its power. After the earthquake in Haiti on January 12, 2010, a large number of text messages were translated by volunteers collaborating online, and were a great help to responders (Munro 2010).

The technical approach to crowdsourced translation is quite simple; the content to be translated is divided into small pieces, and each translator only deals with one piece a time. For example, Translatewiki.org is a crowdsourced translation platform that allows any registered user to help translate open sourced content. It is based on MediaWiki and organizes the collaboration in a wikified way; namely that a user translates one piece of content at a time, and all changes and historical editions are saved (Translatewiki 2015).

Still researchers do have concerns for the quality of crowd translation output. The loose method of collaboration may lead to a lack of consistency in translation (O'Hagan 2009). Also, contents translated in this way are often crowdsourced too, so when the original content is updated frequently by multiple contributors how could the translated content keep up well (Désilets 2007)?

Translatewiki.org gives some features to help solve these problems. Users can proofread one another's translation. Also when the original content changes, the translation is marked as outdated. Still this system requires more features to support the group communication and awareness required for tighter group collaboration.

Computer Aided Translation

People have been working to provide easier and quicker translation with the help of computers since the 1960s (Bowker and Fisher 2010).

Even up until today, the output of fully automatic machine translation (MT), with even the best in the industry such as Google Translate, still does not match the quality of a human translator's work. However researchers have indeed proved post-editing MT could help human translators do a better and quicker job in controlled experiments (Green, Heer et al. 2013). Green and his team's experiment conducted in 2013 showed that among three pairs of language translations, human post-edition both reduced translation time and also improved the quality.

Also computer technology provides other tools to aid translators. The most widely used tools are translation memory tools (TM) that allow users to store previously translated texts and then easily consult those texts for potential reuse (Bowker and Fisher 2010). Project management is another benefit that translators gain from CAT software.

CAT software is widely commercially available since the 1990s (Bowker and Fisher 2010). However, the Internet and cloud technology in the 21st century gave it an

evolutionary great-leap-forward. Crowd translation is recognized as the best resource for machine learning translation algorithms ever since the field emerged (Désilets 2010). Now the TM database is populated by numerous translators all over the world. Also what could help improve the consistency of collaborative translation more than a shared CAT environment (Baraniello, Degano et al. 2016)?

CHAPTER 3

DESIGN INPUT AND DESIGN CRITERIA

The user inputs described below are mostly derived from the literature of amateur translation in China, observations of these translators' public activities on Chinese social media, and anonymous interviews from some translators by G&J. From these data we intended to better understand the user needs and specify the design criteria.

User Behavior Analysis

As HuijiTRANS focuses on the user group of the large number of amateur translation groups in China, here we provide a better understanding of how these groups function.

As amateur groups gather through social networks and with online communication, these translation groups typically have a surprisingly tight organizational structure (Rong 2015). When joining a translation group, people are asked to do certain qualification tests to ascertain their language and translation skill level. The typical test is a short paragraph to be translated. In some groups people even have to get through a probationary period before becoming a formal member. Sometimes translation works are required to maintain their membership.

Unlike some open sourced crowd translation projects, these translators usually collaborate in smaller scale teams and have a much higher standard in terms of speed and quality (Boyko 2011). Figure 2 is a visualization of a funsub group's operational state by Boyko.

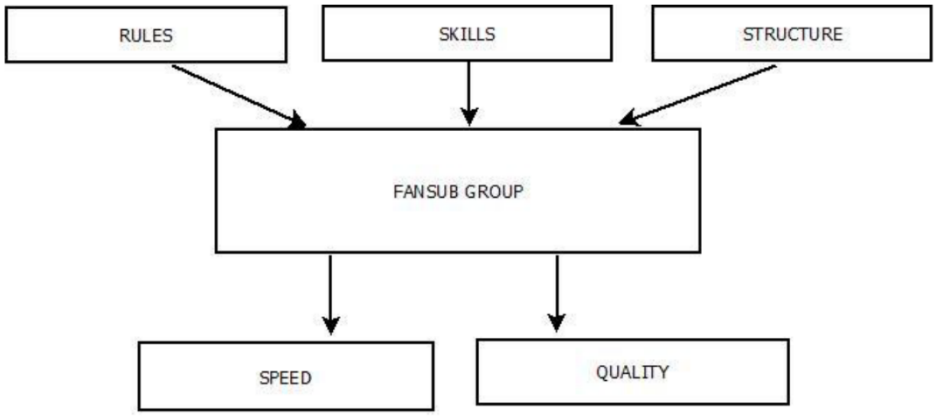

Figure 2 Fansub groups' operational state

As to the specific workflow in these translation groups, normally 3-5 people would collaborate on translating each document and after that, 1-2 people would do the proofreading. The proofreaders are usually more experienced in translation so that they can improve the quality and consistency of the translation. Usually the more experienced members are also responsible for management of the project and for the distribution of the translation tasks. As each of the collaborators has their own part of the translation and documents on their own devices, version control problems occur frequently. Figure 3 shows a flow diagram of the workflow of group translation using current methods.

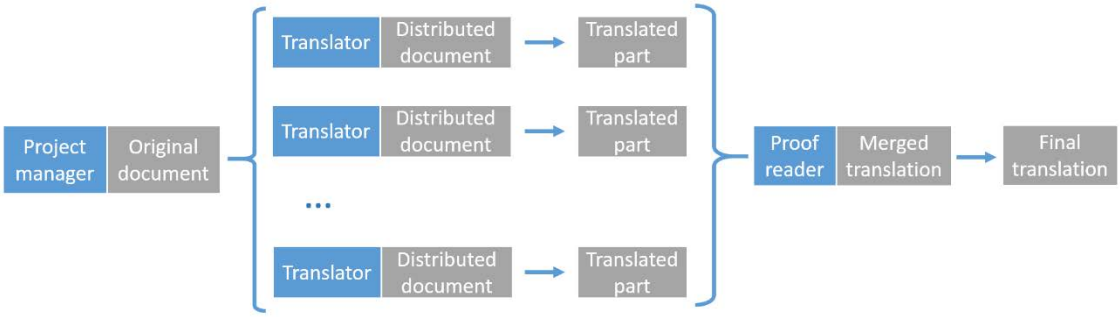

Figure 3 Workflow of current translation groups

During each of these steps, translators use a combination of the most commonly used software. As most other online groups, translation groups normally communicate with QQ, a highly popular instant messaging software service in China, groups and share documents through the same software.. The QQ service also provides powerful group chat and group collaboration features such as group shared cloud drive access. Group members usually use text editing software like Notebook or MS Office Word to do the translation itself. While translating, they search through a digital dictionary or the Internet to solve small unit language problems. We also noticed that some translation groups keep their own database of proper name lookups, and they barely use any CAT software to do this. In most cases, the database of proper name lookups is just in the form of a file shared within the QQ group, and every member has to download the file to check it when performing translation.

From the socialization perspective, almost all of the translation groups have an official account on public social media outlets like Weibo.com, and some larger groups have their own websites. They share news and post their completed translation works here. Members in the same group constantly communicate with each other about their translation tasks or simply chat in their QQ groups. However, there is not much communication across groups.

Idea of Online Collaboration

The current collaboration mode of translation groups uses the Internet just for communication and document sharing. Most of the tasks are performed offline. The result of this is that every collaborator has a different version of the file on their own device. Collaborators have no track of the progress of the entire project. Within the back and forth of file exchanges, some data is lost in the process, since there is no version control. Figure 4 shows the roll of the internet in current method of collaborative group translation. It is primarily used just for communication and file sharing.

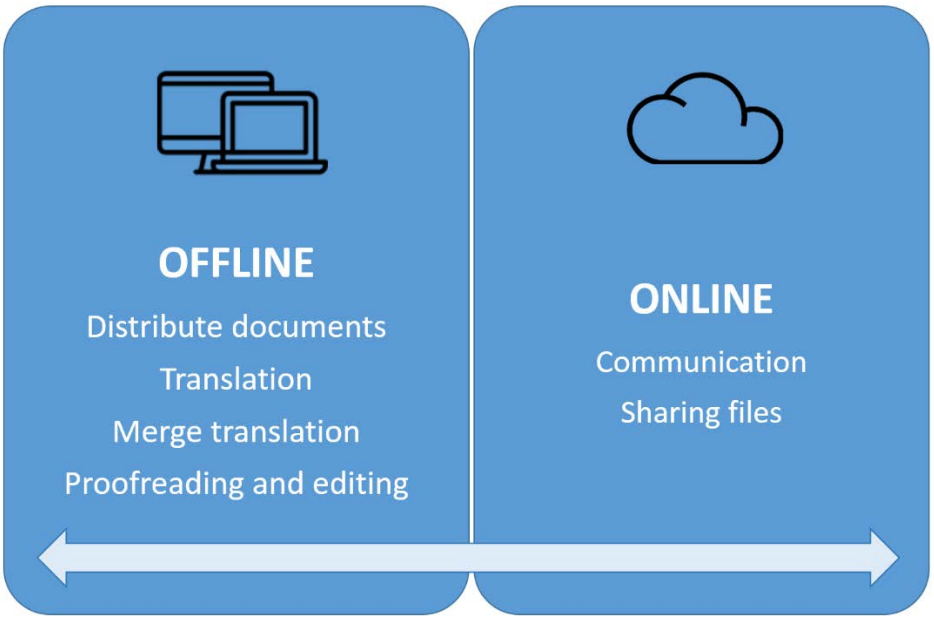

Figure 4 Current way of collaborative group translation

Figure 5 Online collaborative translation workflow

Figure 5 shows the intended workflow of HuijiTRANS to move all the translation and proofreading tasks online so as to greatly simplify the entire workflow. In this workflow model, there is only one document, which is saved on the cloud server, where all of the translators can access it through a web browser.

Design Criteria

Based on the above background and user research, we summarize the design criteria of the HuijiTRANS application below：

- **It should allow multiple users to work on the same document online to perform translation.**

  The system is able to separate documents into small units so that multiple users can distribute their task based on these units. To keep the translation content safe, all of the translation and editing are saved, and users can access all of the history. This is also helpful in reducing conflicts and preventing version control problems.

- **It should allow users to create and manage consistent translation groups.**

  Most collaborative group translation happens in organized groups with the same members. These translators are not professional, but they rarely collaborate with random people. It best suits their working procedure to let them maintain this group dynamic within HuijiTRANS.

- **It should provide CAT features to aid users with translation.**

  Since we provide HuijiTRANS as an online service, many CAT features are also provided, such as machine translation suggestion and translation memory. These improve the quality and efficiency of translation without requiring users to purchase or install additional software. Also the users' translation practice can be integrated into the system's mass translation memory database.

- **It should provide a community environment to promote communication between translators.**

HuijiTRANS is not only an online translation tool, but also a platform on which translators socialize. Users are allowed to share their translation work on this platform both as a group and as an individual translator.

- **It should present all the features in a concise and easy to use interface**

  Online collaborative translation is a complex task. As a web application, the interface design of HuijiTRANS should organize all of the features in a simple way to make the product easy to learn and to use.

CHAPTER 4

TRANSLATE EXTENSION

Translate Extension and Crowd Translation

In consideration of the technical strengths of the G&J developers and to reduce the development costs, HuijiTRANS will be developed based on the Translation Extension of Mediawiki, which is an open source software for online collaborative crowd-source translation. Since G&J's main product is a Wikifarm site also using Mediawiki, this provides a more consistent user experience between the two products.

The Translate Extension was originally designed for the translation of the open-sourced wiki software Mediawiki into other languages. The online crowd translation community tranlsatewiki.net was built with this extension by Nike and Siebrand (Translatewiki 2015). On this platform, any user can join in the translation of various open source projects. Users can also upload their own open sourced work. Currently it allows users to translate between up to 207 languages. Most of the projects are originally in English, so most translation is performed by users from other countries to localize the content.

Analysis on the Usability of Translate Extension

The core feature Translate Extension provides for supporting collaborative translation is that the system can separate the document into lines and all of the users can input their translation onto each line.

Translators can filter by "Untranslated", "Translated", "Outdated" lines, or in the Review view, they can also filter the "Unreviewed" lines. "Outdated" means that the original text of this line is updated and the translation needs to be updated accordingly.

This happens frequently in crowd sourced content. Figures 6 and 7 show screenshots from the translatewiki.net to demonstrate the interface of the Translate Extension.

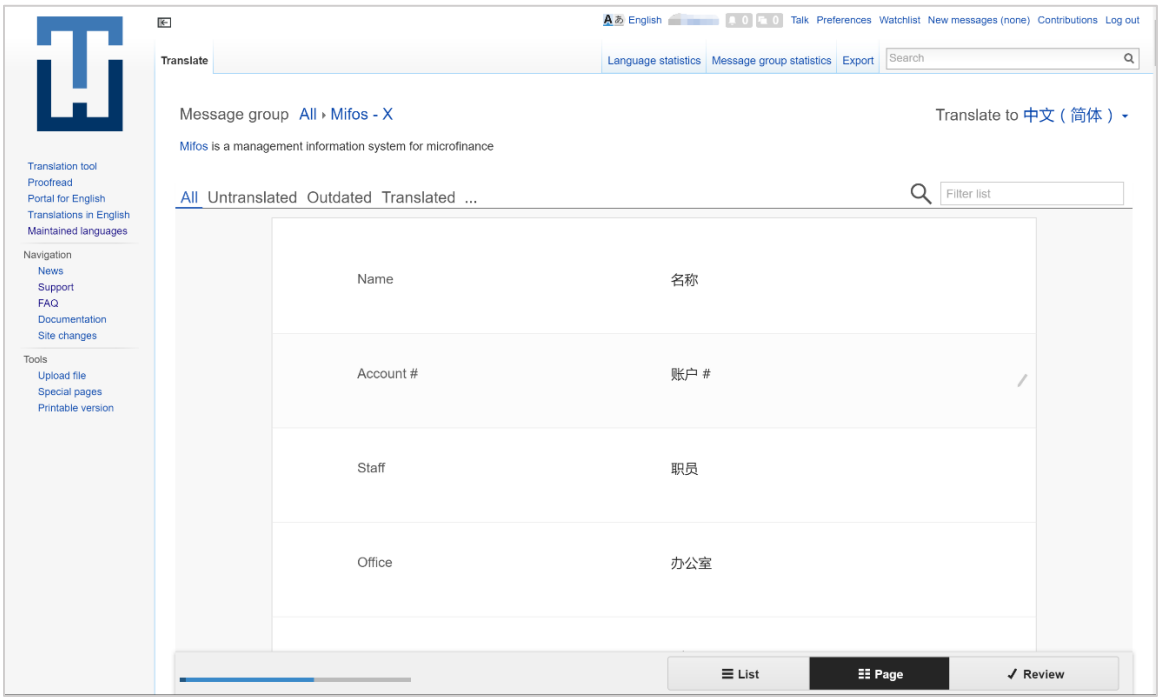

Figure 6 Screenshot of Translate Extension - Page view

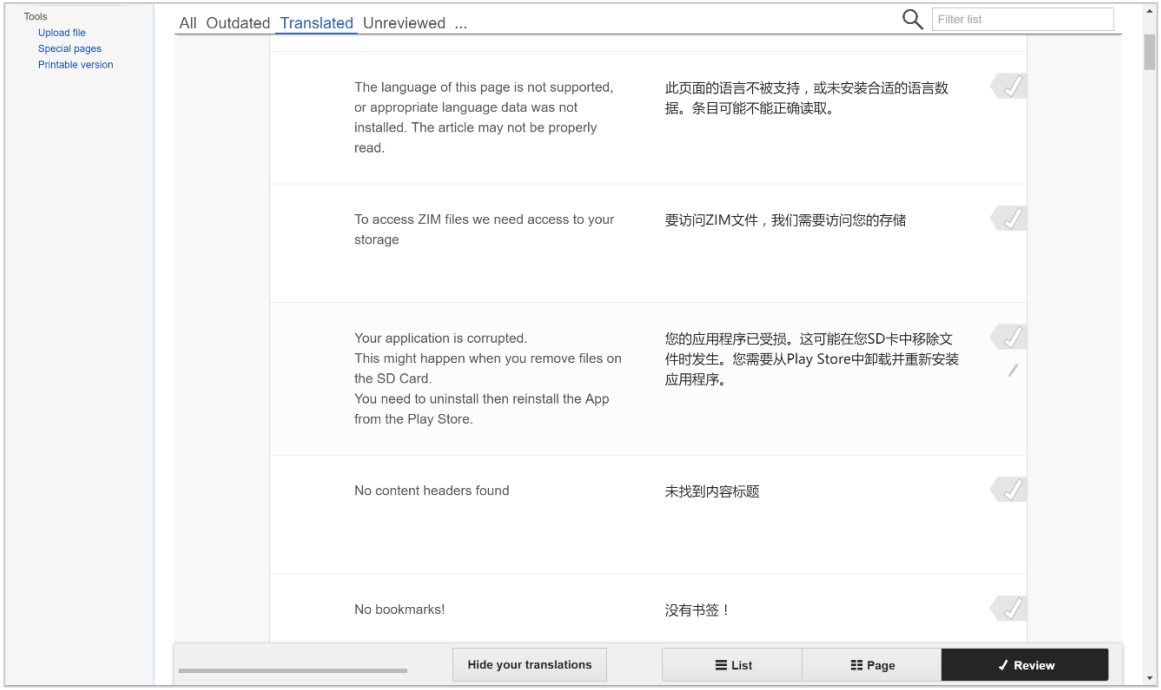

Figure 7 Screenshot of Translate Extension - Review view

The process bar at the bottom of the screen (see Figures 6, 7, or 8) communicates the translation and review rate of the whole document. All users can review (i.e. mark it as checked) lines that are translated by others, but not their own translation. The lines can be checked multiple times.

When performing translation, Translate Extension also provides some supporting features. Users can paste the original text into the translation input box with one click of button. Also it can automatically provide some free machine translation services from Google and Microsoft. Also if someone has translated a similar sentence on the site, the system will also use those to provide suggestions.

Users can also add notes to each line, as a way to communicate with co-translators. Figure 8 is a screenshot of Translate Extension showing the interface of the single line translation window.

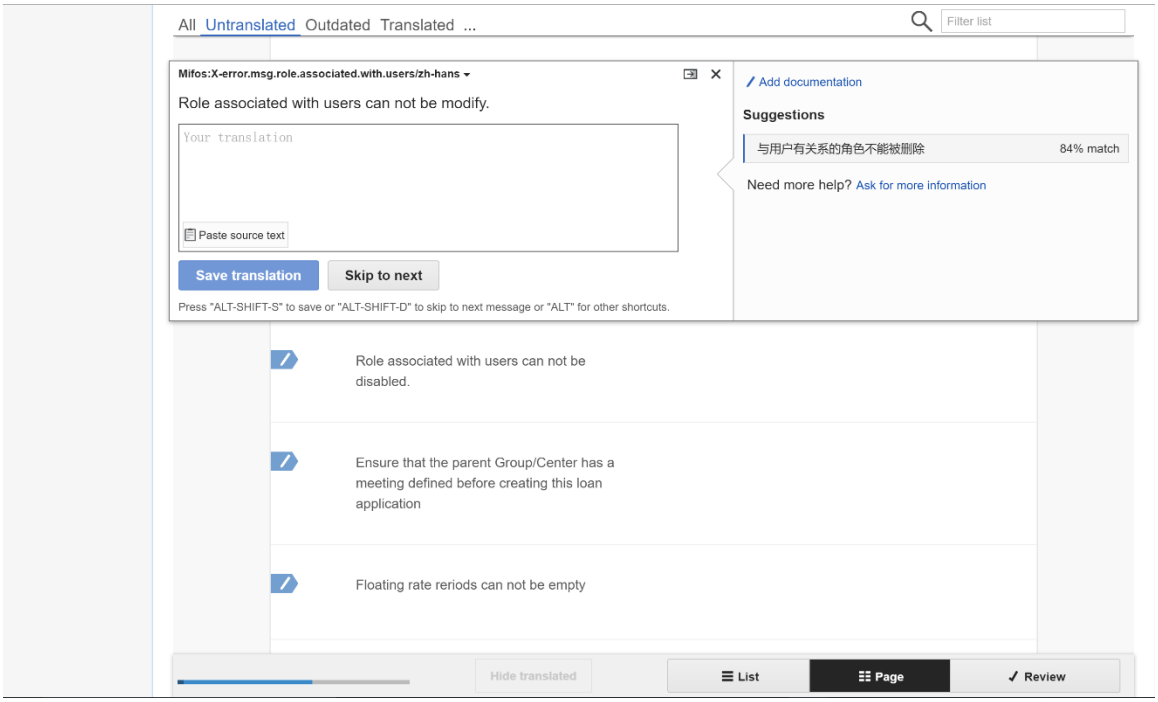

Figure 8 Screenshot of Translate Extension - Translating one line

Just like Wikipedia and every over site based on Mediawiki, all of the changes are saved in Translate Extension, and all of the historical versions of the translation is accessible. So, even if some conflict or version control problem arises, it is easy to resolve.

Difference in User Needs between Translation Extension and HuijiTRANS

Translate Extension is designed for open and crowd source collaboration to which everyone can contribute. So there usually not a specific number of translators or a certain time that they will work on the translation. They do not necessarily collaborate synchronously.

However, in a more closed group collaboration context, it is a lot more likely that multiple users work on the same document at the same time. Also, there are more specific demands to the speed and the quality of the translation.

There is also a difference between the content to be translated. The Translate Extension is designed as a translation software, which when separated into lines, are relatively isolated snippets of text. But when translating literature content, the isolated text may be just beyond understanding. So the sequence of parts must be kept or at least showed in a translation tool suitable for the broader content.

The design of Translation Extension does have its usability issues though. Features are dispersed around the entire interface. The switch between the three views (see bottom right of figures 6, 7, or 8) is actually unnecessary. In the design of HuijiTRANS, we intend to create a more concise interface and reduce the learning cost of this entire system.

Technical Limitations and Solution

One of the most vital defects of Translate Extension is that like every software based on Mediawiki, the collaboration of the translation is asynchronous. To update each piece of data to the server, users need to click the ‘save’ button. For users to see the updates

from other users in the browser, each user needs to refresh their page in their browser. This technical limitation makes real-time group awareness an unachievable goal.

In the current state of online group collaboration methods, real-time group awareness is one of the most evolutionary features. A good example is Google Docs in which users can see their collaborators' cursors. This makes remote collaboration a lot easier, and users can avoid editing conflicts themselves and do some simple communication within the document itself.

However, translation has a different nature compared to documentation. The tasks are pre-defined and can be pre-distributed in a way that is possible for collaborators to take on tasks in an organized manner. This is exactly how Translation Extension solves the task distribution problem. Conflicts would not be a problem if collaborators can do real-time communication. In addition to that each time a user clicks the save button, the contents are saved as the latest version of the translation, and all of the historical versions can also be accessed and retrieved.

However, group awareness can still be improved to fit the needs of much tighter group translation. Especially in proofreading, the proofreader typically wants to see the latest translation. On the backend of Translation Extension, each line of text is saved on the wiki page. Our idea to solve this is to pull the data from the server and partially refresh a user's page whenever that user clicks a line to expand that line for editing.

CHAPTER 5

DESIGN SCHEMES

Based on previous research on group translation and usability analysis of the Translation Extension, in this chapter we propose the interface design of the group translation web service HuijiTRANS.

The Overall Site Structure

As mentioned before, according to the current activities of amateur Chinese translation groups, we decided that HuijiTRANS users should be able to keep their closed group structure within a larger open community. Ongoing translation projects must keep private data in a group to itself. Only when the translation is completed, it is releasable to the public. If the content can be freely shared according to the copyright license between the translators and the copyright holder of the original document, then the group can also publish the whole translation or offer a download of it on HuijiTRANS. Since development is based on the Translate Extension of Mediawiki, every edit is saved and is able to be counted so that we can calculate individual translators' contributions to the work and credit them in publishing the work.

To support more complex content for translation, for example a long, continuously updating article with multiple chapters, we think it is a good idea to allow several sortable documents within one translation project. Each document can be resorted or deleted and the user can always upload more to the project. Figure 9 shows a diagram of the content of the data structure in HuijiTRANS.

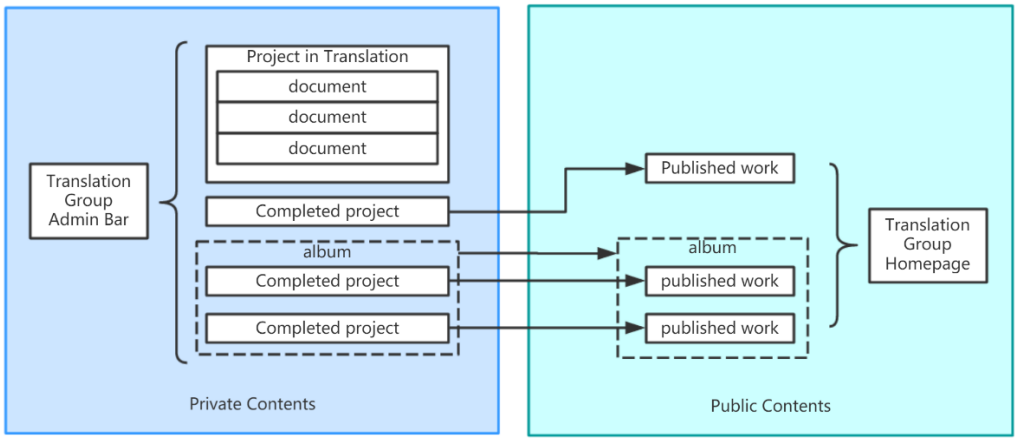

Figure 9 Data structure of HuijiTRANS

Based on this structure, Figure 10 shows a basic overview of the site map structure of HuijiTRANS with a representation of the different features and information provided on each page. The color of the box indicates the information and features for different user permissions. A white box indicates a visitor, who can only see and search all of the published information but cannot perform any further actions. A grey box indicates a registered user, a blue box for group members, and a green box for group administrators.

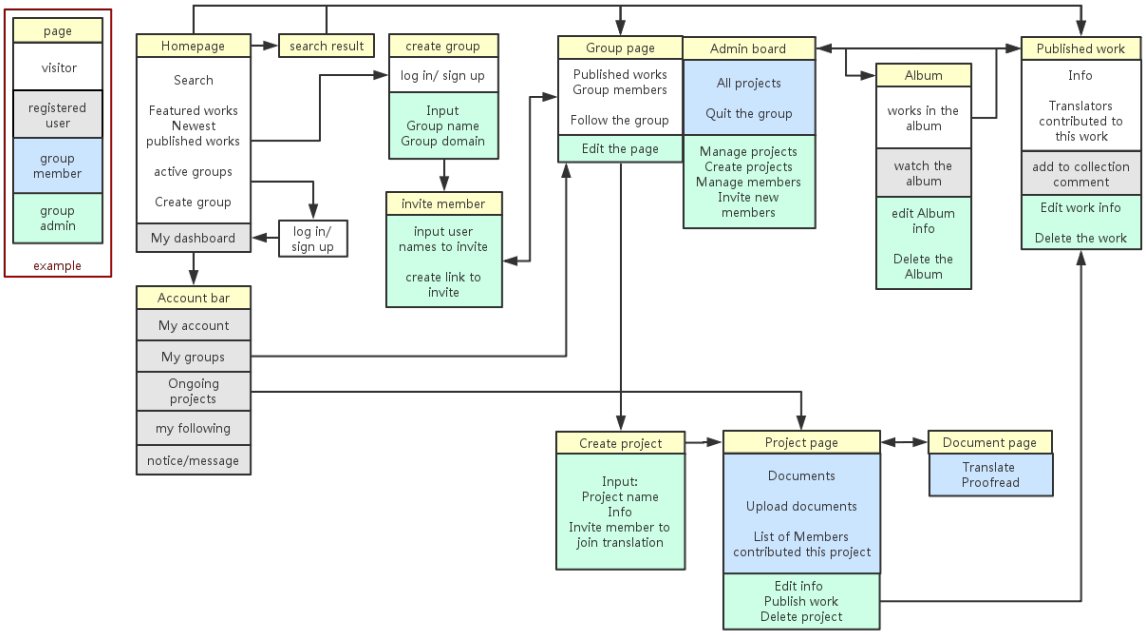

Figure 10 Sitemap of HuijiTRANS

Interface Design of the Translation Tool

The collaborative translation tools are the core service provided by HuijiTRANS, based on Translate Extension. In the usability test we focused on evaluating the design of the translation tools. In this section, we show the design scheme with explanations about the details of the design decisions. The other part of the HuijiTRANS interface design can be found in the Appendix Q of this thesis.

We designed the overall interface to be as simple as possible for the translators. Figures 11 and 12 show the comparison of the translate page of the new interface of HuijiTRANS to the original interface of Translate Extension. Note that the HuijiTRANS interface design is wire-framed using Adobe Illustrator while the Translate Extension interface is a screenshot from a web browser.

We included some features to help users keep track of the sequence of lines. When uploading the file, each line is numbered and keeps that number regardless of filtering so that users do not lose track of where in the article a particular sentence belongs. Also we included a scroll bar to help users keep track of their location within the whole document. When collaborating, people can distribute work simply by specifying a range of lines, such as 100 lines from 400 in total, and users are able to know and access exactly where to begin and end.

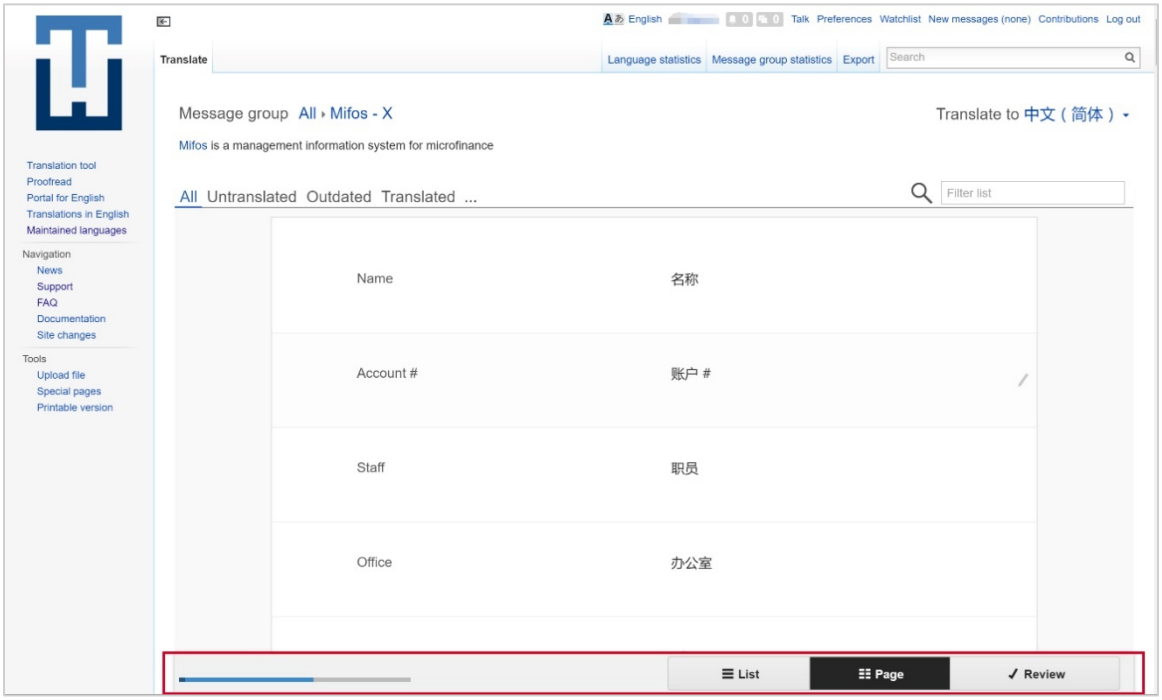

Figure 11 Interface of Translate Extension – Translate Page

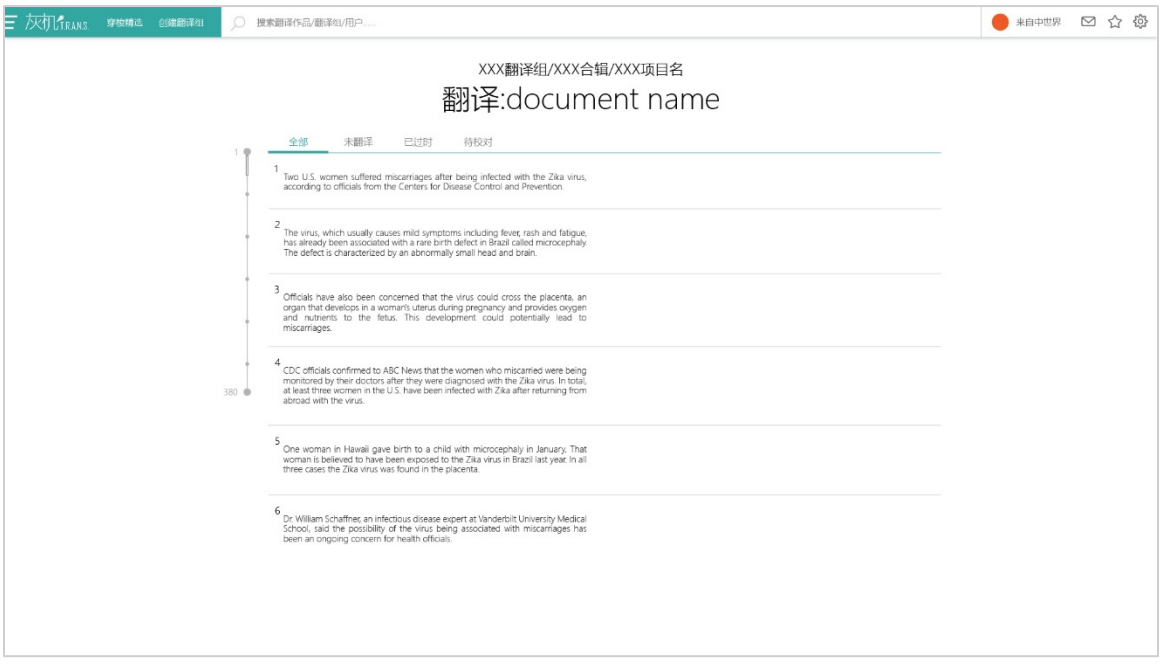

Figure 12 Designed Interface design of HuijiTRANS – Translate page

To simplify the interface, we removed the shaded background and the inner content area box in Translate Extension. We also removed the unnecessary margins on both sides of the content box to allow for more room for the content itself. We removed the view switching function among three different views along with the entire bottom bar (see the red box at the bottom of Figure 11). Since all features could be provided in the same view, the three view switching is unnecessary and confusing. We kept the progress percentage bar, but moved it to the top of the translation area.

Figure 13 and 14 shows the comparison of the translate page of the new interface of HuijiTRANS to the original interface of Translate Extension with an expanded translation box. Again, the original interface is a screenshot from a web browser, while the new design is wire-framed using Adobe Illustrator. We designed more improvements specific to the editing extension box (see Figure 14), it emerges when a user clicks on one line.

In the Translate Extension interface, the translated text jumps from the input box on the left side to the right side after being saved (Figure 13 - box A). We moved the input box to the right side (Figure 14 - box A) so that it stays at the same relative position to the original text both during and after editing. We also moved the machine translation suggestion section under the original text (Figure 13 and 14 - box B). The user can paste all of the parts on the left side into the input box with the click of a mouse button. A scroll bar was added to help users keep track of their current location within the whole document, which is useful for long article translation.

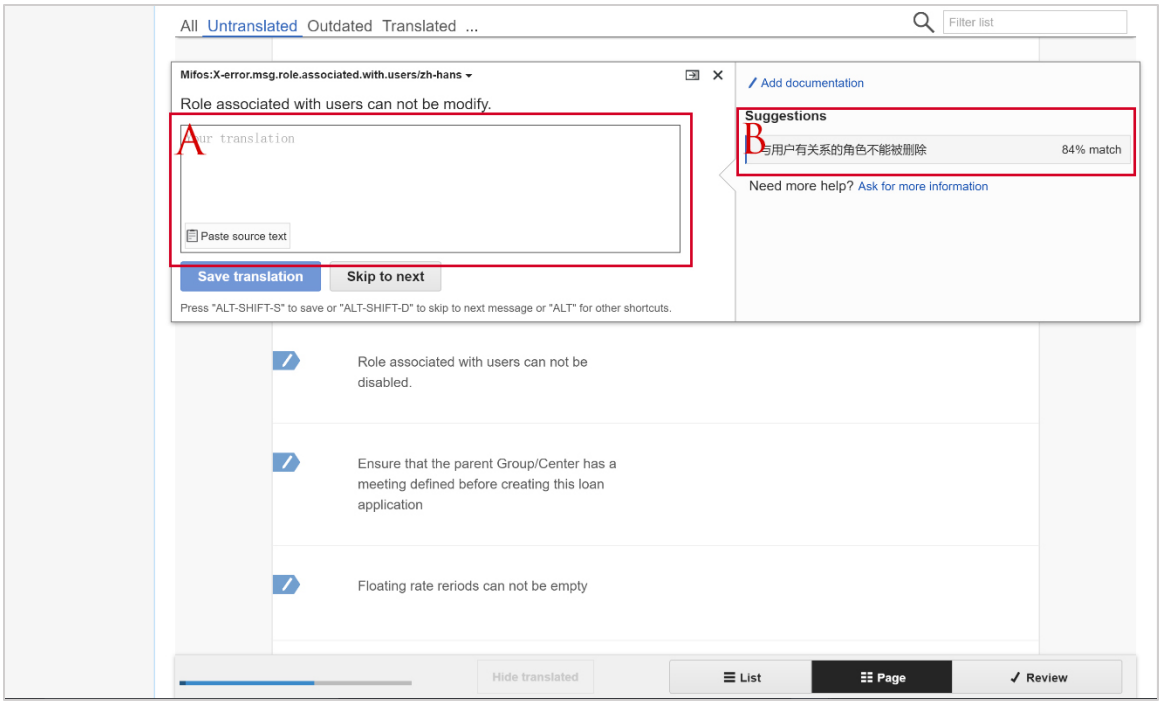

Figure 13 Interface of Translate Extension – Translate box expanded

Figure 14 Designed Interface of HuijiTRANS - Translate box expanded

Figure 15 Interface design of HuijiTRANS - Document page – Translated

Figure 16 Interface design of HuijiTRANS - Document page - In Proofreading

Figures 15 and 16 show the interface design of HuijiTRANS after translation and during proofreading, respectively. Again these are wire-framed using Adobe Illustrator. In Translate Extension, individual lines can be proofread multiple times, without an upper

limit. However it is unnecessary to proofread a translation too many times, especially when there are time demands on a project, so we enforce an upper limit of just two proofs.

Since group translators are highly likely to keep in constant communication through their QQ groups when collaborating, we did not provide additional text-based communication features within HuijiTRANS. This is because we realized from the user activity that we observed in the Wikifarm product that users are so used to QQ group communication that even if we provide a group chat in this tool, they will likely still use QQ instead.

We maintain a consistent color scheme throughout the entire HuijiTRANS site, including the translate page. Aqua green is the theme color of the whole site, and it indicates completed proofreading. Blue is a supporting color that always means that something is translated but not yet proofread. To reduce the complication in the management of the project, we require users to proofread twice, no more, no less. Once a line is checked twice it changes color to the green check mark meaning the translation of the line is complete.

CHAPTER 6

USABILITY TEST

The purpose of this study is to evaluate the usability of the web-based collaborative translation service that HuijiTRANS provides. Since this service is designed based on the Translate Extension of MediaWiki for solving problems associated with group translation. We focused on testing on the comparison of our interface design of HuijiTRANS to both the current method people in group translation employ and to the original design of Translate Extension.

Through the comparison to the current method of translation, we expected to find whether synchronous online collaboration helps improve group translation efficiency. Through the comparison to the original design of Translate Extension, we expected to find if the redesign of the interface improves usability further.

Subjects

To produce a credible result from a manageable number of participants, we decided to make all the translation tasks be English-to-Chinese. We recruited bilingual students as subjects and randomly assigned them to groups of three. Each group performed all three translation tasks in a randomized order and with randomly ordered translation texts.

We sought up to 30 participants to be randomly assigned into up to 10 groups of 3. Each group of participants performed 3 different methods of collaborative translation in random order. This design ensured that each method was tested equally often, and that any order or individual group effects were distributed. Evaluation of the translation quality and speed was performed at the group level, but we also collected subjective usability data from each participant individually. Ideally we would want around 40 samples per unit of analysis

to offer a reasonably tight confidence interval, but due to time and budget constraints we accepted a lower number of samples. Since we needed groups of 3, we chose to target 30 subjects for this study to form 10 groups.

The study is about translation, so the inclusion criteria for participants was:

1. Their age is from 18 to 69 years old;
2. They are a native Chinese speaker with a high level of English proficiency. (TOEFL score higher than 100 or have been an international student in the US for more than 6 months.)
3. They have some sort of English-to-Chinese translation experience. (They do not have to be professional translator, but should be no stranger to translation.)
4. They have normal or corrected to normal vision.

The exclusion criteria for participants was:

They have an upper limb disability, preventing them from efficiently using a computer in a group.

Usability Trials

The three methods to be tested were:

Current Method (CM)

Participants in a group of 3 used group chat software, group cloud drive, and offline text editing software to translate an English language news article into Chinese.

Translate Extension (TE)

Participants in a group of 3 used Translate Extension to translate an English language news article into Chinese.

HuijiTRANS (HT)

Participants in a group of 3 used our new HuijiTRANS to translate an English language news article into Chinese.

The participants sat in the same computer lab, so that this study could be managed by one researcher. However, to simulate distributed user collaboration online, the participants were asked to not talk to each other directly. Also their seats were on the same row of the computer lab with foam-board partitions blocking line of sight between them, so that all of their communication is handled exclusively through the online tools.

Data Collection

Subjective user experience measures were gathered via timing their translation, NASA-TLX survey, and the USE Questionnaire. The study focused on measuring the translation efficiency, quality, and user experience. Efficiency data was collected by recording the participant groups' translation time. The quality was measured by up to three other bilingual people who were not participants themselves, and who were given only the translated texts without knowing the identity of the translators or the translation method. Each evaluator was asked to score the translated texts by fluency, accuracy, and consistency. The individual user experience was measured by a NASA-TLX survey and the USE Questionnaire. Overall individual evaluation was measured by an evaluation Questionnaire.

The translation trial included 3 translation tasks for each subject group lasting up to 3 hours. The subjects participated in the trial in groups of 3. Each trial contained the following steps:

1. A brief about the study was given to the participants
2. The participants performed collaborative translation tasks using 3 different methods in randomized order. Before each of the 3 translation tasks, an introduction to the tools and a practice task was given to the subjects. After each translation task was

completed, the subjects were asked to complete the NASA-TLX survey and the USE Questionnaire.

3. After the completion of all three translation tasks, the participants were given an overall evaluation Questionnaire.

Set Up of the Usability Test

To perform the usability test, we installed Translation Extension on a test server of G&J's. We also installed a functional HuijiTRANS prototype as developed. Figures 17 and 18 show screenshots of the Translate Extension and HuijiTRANS prototypes, respectively, as actually viewed by participants in the study.

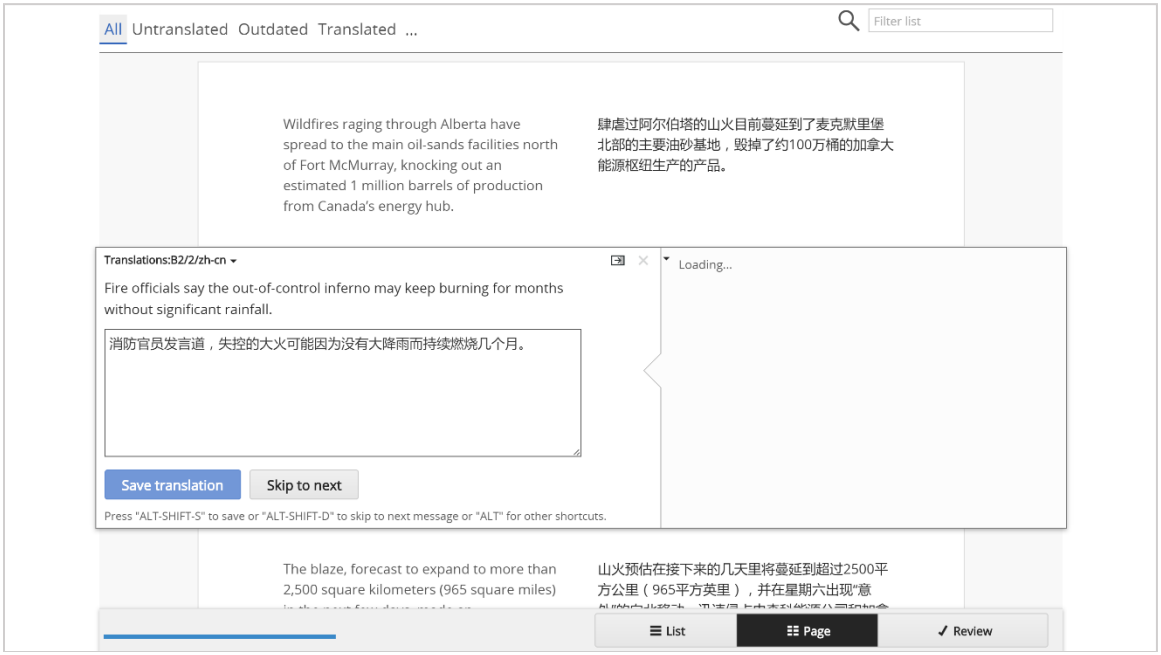

Figure 17 Screenshot of the Translation Extension in the study

Figure 18 Screenshot of the functional HuijiTRANS prototype in the study

Three articles were selected for this test. The articles were all pieces of news about a massive wildfire in Fort Mcmurray, Canada. All three of them contained around 450 words and 15 paragraphs. The three articles are referred according to the last name of the first author of each article as Ellis Article (Article 1), Tuttle Article (Article 2), and Simon Article (Article 3) (Appendix N).

For each trial, the group of three was asked to collaboratively translate all three articles into Chinese using each of the three different methods. To distribute order effects, the order of the three methods was randomly assigned for each group. The order of each article, however, was kept the same for all groups to more consistently match and distribute articles across the three different randomly assigned methods for our small sample size.

Table 2 shows the arrangement order for each group. CM, TE and HT represent the three methods, while Ellis (1), Tuttle (2), and Simon (3) represent the three articles. The order of the articles was the same as the order of each translation task.

Table 2 Translation task article and method order for each group

Group No.	Ellis (1)	Tuttle (2)	Simon (3)
1	CM	TE	HT
2	TE	HT	CM
3	HT	CM	TE
4	CM	TE	HT
5	TE	HT	CM
6	HT	CM	TE
7	CM	TE	HT

CHAPTER 7

RESULT AND ANALYSIS

As mentioned in the previous chapter, a usability tested was performed. In this chapter we report the results and our analysis. Seven groups with 3 participants in each group participated in the study. Each group completed three translation tasks and evaluations as described in the previous chapter. The data collected from these trials included completion time of each translation task in each group, two questionnaires (NASA TLX Questionnaire and USE Questionnaire) for each translation task from each participant, an overall evaluation questionnaire after all three translation tasks were completed, and the translated articles along with external evaluations of each translation.

Completion Time Result

Table 3 summarizes the completion time results from the tests run through the 7 groups of participants. The chart in Figure 17 provides a visualization of the same data. From these data, we can tell that in each group, the current method took the longest time to complete. In 6 out of the 7 groups, users completed the translation tasks faster using the HuijiTRANS method than using the Translate Extension method. We remind the readers that the order of the CM, TE and TH methods were randomized to distribute order effects.

Table 3 Completion time (minutes) of each task by each group

Group No.	CM	TE	HT
1	44	33	26
2	35	22	17
3	57	48	37
4	51	49	34
5	47	46	35
6	35	25	27
7	92	44	26

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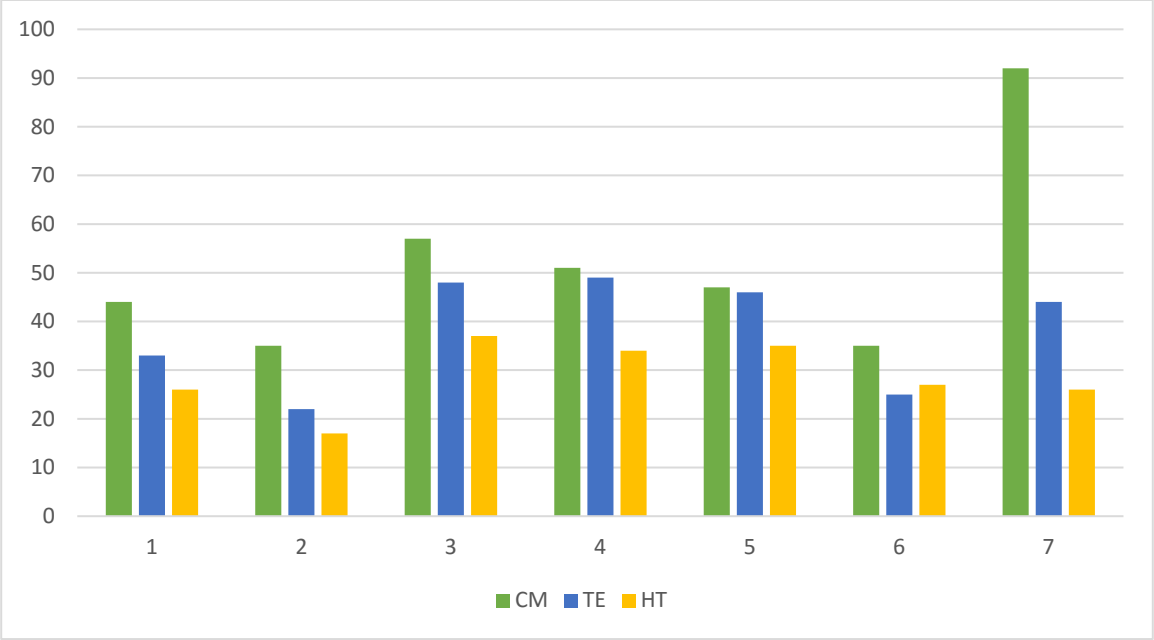


Figure 19 Bar chart of the completion time (minutes) of each task by each group

We applied a one-way ANOVA to these same data (Appendix F). There was a statistically significant difference among the three translation task methods as determined by the one-way ANOVA ($F=4.9001$, $p=0.0200$). Then we applied Tukey HSD tests to find out where the differences occurred between each pair of translation task methods (Appendix F). The results of the Tukey HSD tests show that there was a statistically significant difference between the new design of HuijiTRANS and the current method of performing collaborative translation ($p=0.0157$). There was no significant difference between HuijiTRANS and the Translate Extension ($p=0.4295$), or between the current method and the Translate Extension ($p=0.1849$).

USE Questionnaire Result

Table 4 shows the USE Questionnaire (Appendix B) results from the CM (i.e. the current method of collaborative translation). Table 5 shows the result from the TE (i.e. using the original design of Translation Extension). Table 6 shows the results from the HT (i.e. using the new design of HuijiTRANS).

Note that in this questionnaire, users are asked to score their experience as how well they agree to certain statements on a Likert scale, with 1 (strongly agree) to 7 (strong disagree). All statements are positive; thus higher scores imply a better experience.

Table 4 USE Questionnaire results of CM

USE - CM		Group1			Group2			Group3			Group4			Group5			Group6			Group7			
Participants		101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603	701	702	703	mean
USEFULNESS	1	1	1	1	3	2	1	2	3	6	2	5	1	2	1	3	1	4	2	4	1	4	2.38
	2	2	1	1	3	2	1	3	4	6	5	3	1	3	1	2	1	4	1	3	1	2	2.38
	3	1	2	1	3	2	1	3	4	5	6	4	1	2	2	2	4	4	2	4	5	2	2.86
	4	3	4	1	3	2	1	1	4	5	4	3	1	1	2	4	1	4	2	6	4	1	2.71
	5	3	3	1	3	2	1	1	5	4	2	3	1	2	2	4	2	4	1	5	1	3	2.52
	6	1	1	1	2	2	1	2	4	4	2	2	1	2	1	1	1	4	1	3	1	3	1.90
	7	1	7	1	2	2	1	3	5	6	4	3	1	3	2	3	2	4	1	5	6	2	3.05
	8	2	7	1	2	2	1	1	4	3	2	2	1	3	1	3	2	4	1	2	1	1	2.19
Total (Usefulness)		14	26	8	21	16	8	16	33	39	27	25	8	18	12	22	14	32	11	32	20	18	20.00
EASE OF USE	9	6	1	1	3	6	7	3	4	6	2	4	1	3	1	4	6	4	5	7	1	4	3.76
	10	6	7	1	3	6	7	4	4	5	2	4	1	5	2	4	6	4	3	7	2	3	4.10
	11	7	2	1	2	2	7	2	2	3	3	5	1	4	2	4	3	4	3	7	2	3	3.29
	12	3	1	1	3	6	7	3	3	2	1	2	1	3	1	1	7	4	2	2	1	3	2.71
	13	5	3	4	4	2	7	3	4	5	1	3	1	4	2	4	2	7	4	6	1	3	3.57
	14	2	1	1	3	2	7	1	5	1	1	3	1	2	2	5	6	4	2	4	1	3	2.71
	15	6	1	7	5	7	7	5	3	7	7	2	1	6	5	5	7	4	6	7	6	3	5.10
	16	3	1	1	5	7	7	4	4	4	2	4	1	3	1	3	2	4	4	3	1	3	3.19
	17	2	1	1	5	3	7	2	5	2	2	3	1	3	2	3	6	4	2	3	1	2	2.86
	18	1	1	3	5	7	7	3	3	6	1	2	1	6	2	4	4	4	4	2	3	5	3.52
	19	7	1	7	5	7	7	4	6	7	2	2	1	6	4	5	6	4	3	4	2	3	4.43
Total (Ease of Use)		48	20	28	43	55	77	34	43	48	24	34	11	45	24	42	55	47	38	52	21	35	39.24
EASE OF LEARNING	20	7	3	7	5	7	7	6	3	6	7	4	1	6	5	5	7	4	6	7	7	3	5.38
	21	7	6	7	5	7	7	5	3	6	7	4	1	6	5	6	7	4	7	7	7	5	5.67
	22	7	6	7	5	7	7	7	3	3	7	4	1	6	5	6	7	4	7	7	7	5	5.62
	23	3	6	7	5	4	7	7	3	7	7	4	1	1	6	7	7	4	6	7	5	5	5.19
Total (Ease of Learning)		24	21	28	20	25	28	25	12	22	28	16	4	19	21	24	28	16	26	28	26	18	21.86
SATISFACTION	24	2	1	2	3	4	1	3	4	6	3	4	1	3	1	1	2	4	2	6	2	4	2.81
	25	1	1	1	2	4	1	1	3	5	2	3	1	1	2	3	1	4	2	5	2	3	2.29
	26	1	1	1	2	4	1	2	3	3	4	6	1	2	2	3	1	4	1	3	3	2	2.38
	27	1	1	1	2	2	1	2	1	4	4	2	1	2	2	1	7	4	3	4	1	2	2.29
	28	2	1	1	2	4	1	2	2	4	3	3	1	2	1	2	3	4	1	4	1	2	2.19
	29	1	1	1	2	4	1	3	3	6	4	4	1	2	2	2	3	4	1	3	1	2	2.43
	30	2	1	1	3	4	1	2	2	2	2	4	1	2	1	2	3	4	2	2	1	3	2.14
Total (Satisfaction)		10	7	8	16	26	7	15	18	30	22	26	7	14	11	14	20	28	12	27	11	18	16.52

Table 5 USE Questionnaire results of TE

USE - TE		Group1			Group2			Group3			Group4			Group5			Group6			Group7			
Participants		101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603	701	702	703	mean
USEFULNESS	1	5	3	5	4	7	4	6	5	5	6	6	3	5	4	7	4	5	6	2	1	5	4.67
	2	4	3	5	4	7	4	6	5	6	5	4	2	4	4	7	3	5	6	2	1	3	4.29
	3	5	3	5	4	7	3	6	5	5	6	4	3	5	3	7	6	5	6	2	6	4	4.76
	4	4	2	5	4	4	4	6	5	4	6	3	4	4	5	6	4	5	5	4	4	1	4.24
	5	4	5	5	4	6	4	6	6	6	6	4	3	5	2	7	4	5	5	3	5	4	4.71
	6	5	6	6	4	6	5	6	5	5	6	2	4	4	4	7	5	5	5	3	5	5	4.90
	7	4	5	5	4	5	4	6	3	5	5	3	4	5	2	7	5	5	5	3	6	3	4.48
	8	3	6	4	4	4	3	6	3	2	4	2	3	5	2	6	5	5	4	2	3	2	3.71
Total (Usefulness)		34	33	40	32	46	31	48	37	38	44	28	26	37	26	54	36	40	42	21	31	27	35.76
EASE OF USE	9	3	3	5	5	6	5	7	7	5	5	4	3	5	4	7	6	6	5	6	4	5	5.05
	10	3	5	4	5	6	6	7	7	5	5	2	3	5	4	6	6	6	5	5	4	4	4.90
	11	2	4	5	4	6	5	7	7	2	3	5	2	5	3	7	6	6	4	6	4	3	4.57
	12	4	6	5	5	6	4	7	5	4	6	4	3	6	2	7	7	6	4	4	5	4	4.95
	13	4	4	5	6	4	4	7	7	3	6	4	2	5	4	7	6	6	4	4	6	4	4.86
	14	4	6	4	5	6	4	7	5	1	5	4	2	4	3	7	6	6	5	4	3	4	4.52
	15	5	6	5	6	7	6	7	7	4	6	4	3	6	6	7	7	6	6	1	6	4	5.48
	16	3	2	3	6	7	5	7	7	5	5	4	2	4	3	7	3	5	5	3	1	4	4.33
	17	3	1	5	6	6	5	7	6	3	5	3	3	4	4	7	6	5	6	3	3	2	4.43
	18	5	2	5	6	4	4	7	3	5	3	5	5	3	4	6	6	5	6	2	3	6	4.52
	19	4	2	4	4	7	4	7	4	7	5	4	4	4	1	6	6	5	6	4	2	4	4.48
Total (Ease of Use)		40	41	50	58	65	52	77	65	44	54	43	32	51	38	74	65	62	56	42	41	44	52.10
EASE OF LEARNING	20	4	5	5	6	7	5	7	7	6	7	5	3	5	6	7	7	6	6	5	7	5	5.76
	21	5	6	5	6	7	5	7	7	6	7	5	4	5	6	7	7	6	7	7	7	5	6.05
	22	4	6	5	6	7	5	7	7	5	7	5	4	5	6	7	7	6	7	6	7	5	5.90
	23	4	6	5	6	5	4	7	6	7	7	5	3	6	6	6	7	6	7	7	6	5	5.76
Total (Ease of Learning)		17	23	20	24	26	19	28	27	24	28	20	14	21	24	27	28	24	27	25	27	20	23.48
SATISFACTION	24	3	4	5	4	7	5	5	3	5	5	4	3	5	3	7	6	6	6	7	5	4	4.86
	25	4	4	4	4	7	4	5	5	4	5	4	4	5	3	7	6	5	4	5	6	5	4.76
	26	3	4	4	4	5	3	5	6	4	5	6	3	4	4	7	5	5	4	4	4	3	4.38
	27	4	4	3	4	5	3	4	6	3	4	2	2	5	3	7	7	5	4	5	3	4	4.14
	28	5	4	3	4	7	4	5	7	4	7	3	2	5	4	7	5	5	4	4	5	2	4.57
	29	4	4	3	4	6	3	4	5	5	7	3	2	5	4	7	5	5	3	4	5	3	4.33
	30	4	4	3	4	7	5	4	6	5	7	4	3	5	4	7	5	5	5	5	5	3	4.76
Total (Satisfaction)		27	28	25	28	44	27	32	38	30	40	26	19	34	25	49	39	36	30	34	33	24	31.81

Table 6 USE Questionnaire results of HT

USE - HT		Group1			Group2			Group3			Group4			Group5			Group6			Group7			
Participants		101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603	701	702	703	mean
USEFULNESS	1	7	6	6	5	7	5	6	6	5	6	6	6	6	7	7	2	6	6	1	5	6	5.57
	2	7	6	6	5	7	5	6	6	6	6	5	5	4	7	6	2	5	6	1	5	6	5.33
	3	7	7	6	5	7	4	6	7	5	7	6	6	6	7	7	5	5	7	2	6	6	5.90
	4	5	7	6	5	4	5	6	5	6	6	4	7	5	6	6	2	6	6	2	6	1	5.05
	5	6	6	6	5	7	5	4	6	5	7	5	6	6	6	7	3	6	7	2	7	6	5.62
	6	6	5	6	6	7	5	7	7	5	7	6	7	6	6	7	4	6	7	2	7	7	6.00
	7	6	6	6	6	6	5	5	6	5	5	5	7	6	6	7	2	6	5	3	6	6	5.48
	8	5	7	6	5	6	4	4	4	4	6	4	6	4	5	4	5	5	4	2	6	5	4.81
Total (Usefulness)		49	50	48	42	51	38	44	47	41	50	41	50	43	50	51	25	45	48	15	48	43	43.76
EASE OF USE	9	5	6	6	5	7	6	7	3	6	7	5	6	7	7	7	6	5	6	7	7	6	6.05
	10	5	5	7	6	7	6	7	7	7	7	5	6	6	7	6	6	5	7	5	7	5	6.14
	11	6	5	7	5	7	5	7	4	5	6	5	6	4	7	7	6	5	5	6	7	5	5.71
	12	5	6	7	5	7	5	7	7	6	7	2	5	6	7	7	7	6	6	5	7	5	5.95
	13	5	7	7	5	5	5	7	7	3	7	4	5	5	7	7	5	5	5	4	7	5	5.57
	14	6	5	7	5	7	6	7	7	1	6	5	5	6	7	7	6	5	6	4	6	6	5.71
	15	6	5	7	6	7	6	7	7	3	7	2	6	6	7	7	7	5	7	1	6	6	5.76
	16	5	6	6	5	7	5	6	7	2	7	4	5	3	5	6	2	4	5	6	6	6	5.14
	17	7	6	7	5	7	5	5	6	4	7	4	6	4	6	6	6	5	6	3	6	5	5.52
	18	7	6	7	6	7	4	3	3	5	6	5	6	5	6	7	6	5	6	2	6	6	5.43
	19	6	6	7	5	7	5	6	4	7	6	4	5	6	6	7	6	5	6	3	6	6	5.67
Total (Ease of Use)		63	63	75	58	75	58	69	62	49	73	45	61	58	72	74	63	55	65	46	71	61	62.67
EASE OF LEARNING	20	6	7	7	6	7	5	7	7	6	7	6	6	5	7	7	7	7	7	6	7	6	6.48
	21	6	7	7	6	7	5	7	7	7	7	6	6	5	7	7	7	7	7	7	7	6	6.57
	22	6	7	7	6	7	5	7	7	7	7	5	6	6	7	7	7	7	7	6	7	6	6.52
	23	5	7	7	6	6	6	7	6	7	7	5	5	6	7	7	6	7	7	7	5	6	6.29
Total (Ease of Learning)		23	28	28	24	27	21	28	27	27	28	22	23	22	28	28	27	28	28	26	26	24	25.86
SATISFACTION	24	6	5	7	5	7	5	4	3	5	7	6	5	5	6	7	5	6	6	7	7	6	5.71
	25	7	5	7	5	7	6	5	5	2	7	5	6	7	7	7	5	6	6	5	7	7	5.90
	26	5	6	7	5	6	4	4	6	6	5	6	6	5	7	7	6	6	5	5	7	5	5.67
	27	5	7	6	4	6	5	5	6	3	6	5	5	5	6	7	6	6	4	6	7	4	5.43
	28	6	6	7	5	6	4	5	7	1	6	5	6	5	7	7	6	6	5	7	7	4	5.62
	29	6	7	7	4	7	5	4	5	3	7	4	5	6	7	7	4	6	5	6	7	6	5.62
	30	6	6	7	4	7	5	6	6	4	7	5	6	5	7	7	6	6	5	7	7	5	5.90
Total (Satisfaction)		41	42	48	32	46	34	33	38	24	45	36	39	38	47	49	38	42	36	43	49	37	39.86

Usefulness

To compare the Usefulness results, we selected the total score in the Usefulness section for each participant for each of the three translation methods and listed them in Table 7.

Table 7 USE Questionnaire – the total scores from Usefulness section

Participants	CM	TE	HT
101	14	34	49
102	26	33	50
103	8	40	48
201	21	32	42
202	16	46	51
203	8	31	38
301	16	48	44
302	33	37	47
303	39	38	41
401	27	44	50
402	25	28	41
403	8	26	50
501	18	37	43
502	12	26	50
503	22	54	51
601	14	36	25
602	32	40	45
603	11	42	48
701	32	21	15
702	20	31	48
703	18	27	43

We applied a one-way ANOVA to these data (Appendix G). The results show that there was a statistically significant difference among the three translation task methods ($F=40.3769$, $p=0.0000$). Then we applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix G). The results show there were statistically significant differences between each pair of translation task methods. The difference is more significant in the CM vs TE ($p=0.0010$) and CM vs HT ($p=0.0010$) tests, implied by p values less than 0.01.

Ease of Use

We applied the same analysis techniques to scores in the Ease of Use section. Table 8 shows the total score in the Ease of Use section for each participant for each of the three translation methods.

Table 8 USE Questionnaire – the total scores from Ease of Use section

Participants	CM	TE	HT
101	48	40	63
102	20	41	63
103	28	50	75
201	43	58	58
202	55	65	75
203	77	52	58
301	34	77	69
302	43	65	62
303	48	44	49
401	24	54	73
402	34	43	45
403	11	32	61
501	45	51	58
502	24	38	72
503	42	74	74
601	55	65	63
602	47	62	55
603	38	56	65
701	52	42	46
702	21	41	71
703	35	44	61

We applied a one-way ANOVA to these data (Appendix H). The results show that there was a statistically significant difference among the three translation task methods ($F=18.7509$, $p=0.0000$). We then applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix H). The results show that there were statistically significant differences between each pair of translation task methods. The difference is more significant in the CM vs TE ($p=0.0010$) and CM vs HT ($p=0.0010$) tests, implied by p values less than 0.01.

Ease of Learning

We applied the same analysis to scores in the Ease of Learning section. Table 9 shows the total score in the Ease of Learning section for each participant for each of the three translation methods.

Table 9 USE Questionnaire – the total scores from Ease of Learning section

Participants	CM	TE	HT
101	24	17	23
102	21	23	28
103	28	20	28
201	20	24	24
202	25	26	27
203	28	19	21
301	25	28	28
302	12	27	27
303	22	24	27
401	28	28	28
402	16	20	22
403	4	14	23
501	19	21	22
502	21	24	28
503	24	27	28
601	28	28	27
602	16	24	28
603	26	27	28
701	28	25	26
702	26	27	26
703	18	20	24

We applied a one-way ANOVA to these data (Appendix I). The results show that there was a statistically significant difference among the three translation task methods ($F=4.2565$, $p=0.0187$). We then applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix I). The results show that there was a statistically significant difference between HuijiTRANS and the current method of group translation ($p=0.0142$). There was no significant difference between

HuijiTRANS and the original Translate Extension (p=0.4750), or between the current method and the Translate Extension (p=0.2040).

Satisfaction

We applied the same analysis to scores in the Satisfaction section. Table 10 shows the total score in the Satisfaction section for each participant for each of the three translation methods.

Table 10 USE Questionnaire – the total scores from Satisfaction section

Participants	CM	TE	HT
101	10	27	41
102	7	28	42
103	8	25	48
201	16	28	32
202	26	44	46
203	7	27	34
301	15	32	33
302	18	38	38
303	30	30	24
401	22	40	45
402	26	26	36
403	7	19	39
501	14	34	38
502	11	25	47
503	14	49	49
601	20	39	38
602	28	36	42
603	12	30	36
701	27	34	43
702	11	33	49
703	18	24	37

We applied a one-way ANOVA to these data (Appendix J). The results show that there was a statistically significant difference among the three translation task methods (F=58.8229, p=0.0000). We then applied Tukey HSD tests to find out where the differences occurred between pairs of trials (Appendix J). The results show that there was a statistically

significant difference between each pair of trials. The p-value of each pair of test was less than 0.01, which shows that the difference is especially significant.

Comprehensive Analysis

For the comprehensive analysis of the result from the USE Questionnaire, we selected the mean score from each statement per participant and compared the three translation task methods. Table 11 shows these data.

Table 11 USE Questionnaire results – mean scores

Method	#	CM	TE	HT
USEFULNESS	1	2.38	4.67	5.57
	2	2.38	4.29	5.33
	3	2.86	4.76	5.90
	4	2.71	4.24	5.05
	5	2.52	4.71	5.62
	6	1.90	4.90	6.00
	7	3.05	4.48	5.48
	8	2.19	3.71	4.81
EASE OF USE	9	3.76	5.05	6.05
	10	4.10	4.90	6.14
	11	3.29	4.57	5.71
	12	2.71	4.95	5.95
	13	3.57	4.86	5.57
	14	2.71	4.52	5.71
	15	5.10	5.48	5.76
	16	3.19	4.33	5.14
	17	2.86	4.43	5.52
	18	3.52	4.52	5.43
	19	4.43	4.48	5.67
EASE OF LEARNING	20	5.38	5.76	6.48
	21	5.67	6.05	6.57
	22	5.62	5.90	6.52
	23	5.19	5.76	6.29
SATISFACTION	24	2.81	4.86	5.71
	25	2.29	4.76	5.90
	26	2.38	4.38	5.67
	27	2.29	4.14	5.43
	28	2.19	4.57	5.62
	29	2.43	4.33	5.62
	30	2.14	4.76	5.90

The chart in Figure 18 visualizes the same data as in Table 11, the mean scores from each of the 30 USE Questionnaire statements for each translation method. We can visually see that HuijiTRANS consistently received the highest mean score, and the current method of group translation received the lowest mean score. In the Ease of Learning section (i.e. statements 20 – 23), all three methods received a relatively high score, but the differences between the scores is less than in other sections.

Only statement 15 received a similar high-scores, low-variance result as in the Ease of Learning section. This statement is: "I can use it without written instructions". Considering that all users successfully completed the all three translation tasks without using written instructions, this result is reasonable.

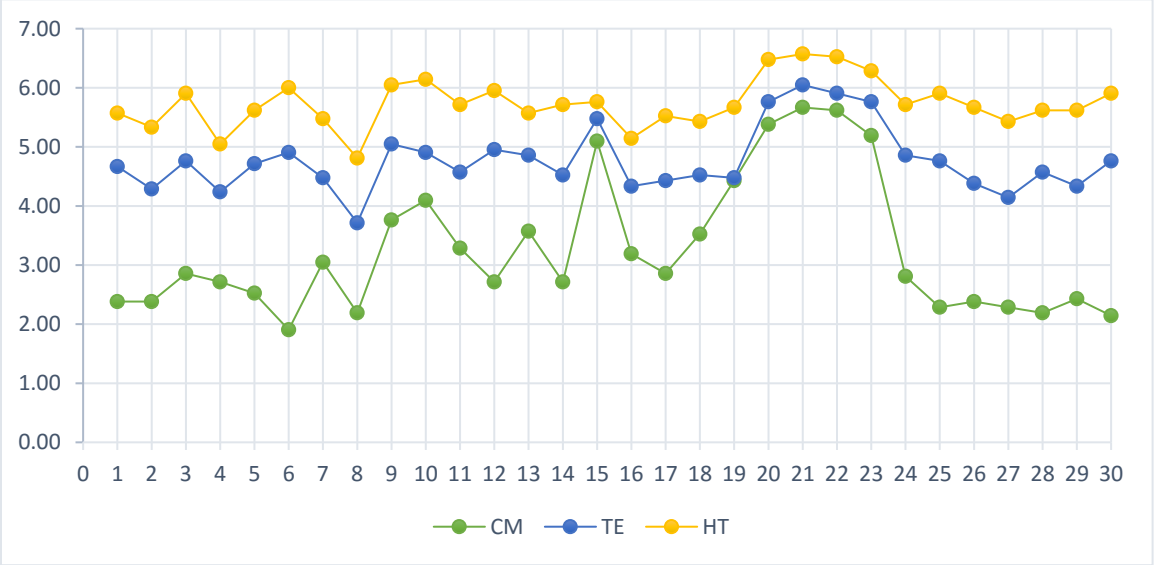


Figure 20 Line graph of USE Questionnaire results – mean scores

We applied a one-way ANOVA to these data (Appendix K). The result shows that there was a statistically significant difference across the three translation task methods ($F=79.7496$, $p=0.0000$). We then applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix K). The results show there were statistically significant differences between each pair of translation task methods. The

p-value of each pair of translation task methods was less than 0.01, indicating that the differences were especially significant.

NASA TLX Questionnaire Result

Table 12 below shows the NASA TLX Questionnaire (Appendix L) result of three translation task methods: CM, TE, and HT. We used the NASA TLX Questionnaire in the form of a rating sheet. To make the questionnaire simpler to use and measure, each scale was presented as a form divided into 20 cells, and subjects were asked to mark each scale at the desired cell. The 20 cells are scored as number from -10 to 10. Thus a lower score means a lower task load or better performance.

Table 12 NASA TLX Questionnaire results

Participants	**101**	**102**	**103**	**201**	**202**	**203**	**301**	**302**	**303**	**401**	**402**	**403**	**501**	**502**	**503**	**601**	**602**	**603**	**701**	**702**	**703**	**mean**
Group No. CM	**1**			**2**			**3**			**4**			**5**			**6**			**7**			**CM**
Mental Demand	4	5	4	-7	10	-2	6	4	9	-1	1	-7	1	10	2	-10	-5	3	-5	10	1	1.57
Physical Demand	-8	5	-3	-10	-1	1	7	6	-6	-5	-8	-10	4	6	-1	-10	-5	-8	-7	1	-3	-2.62
Temporal Demand	-5	10	3	-7	10	-1	1	9	10	2	-1	5	7	5	3	-1	2	-6	-8	-7	-6	1.19
Performance	-6	2	-8	3	-6	-10	6	8	-5	3	2	5	1	-9	-2	-8	6	1	-8	-8	-3	-1.71
Effort	3	2	5	6	10	3	2	-1	6	6	4	-6	5	6	4	-10	-5	4	-8	9	4	2.33
Frustration	-7	1	-3	-7	10	-6	4	5	-2	1	-9	-6	4	-10	-4	-7	-6	2	-9	10	4	-1.67
Group No. TE	**1**			**2**			**3**			**4**			**5**			**6**			**7**			**TE**
Mental Demand	1	1	2	-6	-6	-1	6	5	6	-4	1	-7	4	10	5	-10	-8	-1	-5	10	1	0.19
Physical Demand	-9	-10	-3	-10	-6	-4	4	3	-8	-4	-9	-9	-6	-1	8	-10	-8	-7	-9	1	-3	-4.76
Temporal Demand	-8	4	3	-7	8	-10	3	-5	7	-2	1	4	1	4	8	-1	-1	-6	-9	-1	-2	-0.43
Performance	-3	-5	-8	5	8	1	-7	-8	-8	1	4	3	-10	-7	5	-9	6	-1	-9	-9	-1	-2.48
Effort	-1	-3	2	1	4	-5	3	-1	4	-2	2	-7	2	6	-3	-9	-7	-1	-9	6	4	-0.67
Frustration	-8	7	-3	1	-7	-10	-7	-2	-7	-2	-9	-5	-5	-10	-8	-10	-7	1	-9	6	3	-4.33
Group No. HT	**1**			**2**			**3**			**4**			**5**			**6**			**7**			**HT**
Mental Demand	3	-8	3	-7	3	-4	6	3	6	-4	-4	-7	4	10	5	-9	-8	-1	-8	-7	-3	-1.29
Physical Demand	-10	-10	-5	-10	-7	-7	4	5	-8	-3	-8	-9	-6	1	-4	-10	-8	-9	-9	-1	-5	-5.67
Temporal Demand	-9	-10	1	-7	3	-10	-6	-6	8	-3	-4	2	1	1	5	-1	-1	-6	-9	10	3	-1.81
Performance	-7	-6	-8	5	3	-5	-9	-7	-7	6	2	-6	-10	-9	4	-9	6	-8	-9	-9	-1	-4.00
Effort	-6	-8	-4	3	1	3	1	1	5	-3	6	-7	-1	-10	3	-9	-7	-7	-9	-7	-3	-2.76
Frustration	-5	-7	-6	-7	-8	-10	-7	-7	-4	-4	-9	-8	-1	-10	-8	-10	-7	-7	-9	-3	-3	-6.67

Table 13 NASA TLX Questionnaire results – mean score

METHODS	**CM**	**TE**	**HT**
Mental Demand	1.57	0.19	-1.29
Physical Demand	-2.62	-4.76	-5.67
Temporal Demand	1.19	-0.43	-1.81
Performance	-1.71	-2.48	-4.00
Effort	2.33	-0.67	-2.76
Frustration	-1.67	-4.33	-6.81

To compare the results across translation task methods, we calculated the mean score of for each scale and placed the results in Table 13. These data are also visualized as a line graph in Figure 19. We can visually see that the HuijiTRANS method received the lowest scores on every scale, while the current method of group translation received the highest scores. Also only the HuijiTRANS received negative scores on all of the scales.

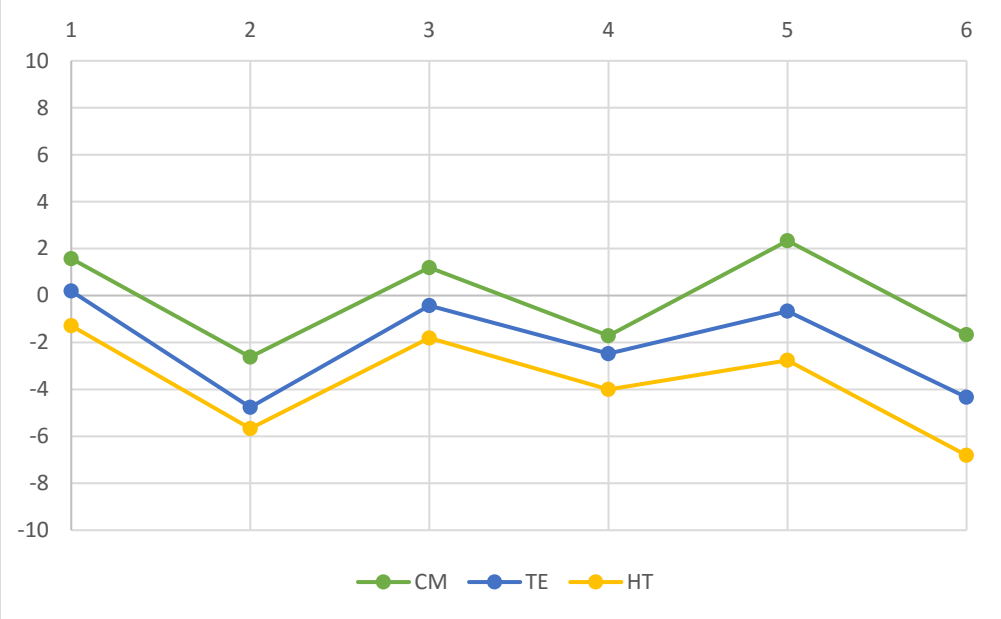


Figure 21 Line graph of NASA TLX Questionnaire results – mean score

We applied a one-way ANOVA to these data (Appendix L). The results show that there was a statistically significant difference across the three translation task methods ($F=4.2347$, $p=0.0349$). We then applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix L). The results show that there was a statistically significant difference between the HuijiTRANS method and the current method ($p=0.0276$). There was no significant difference between HuijiTRANS and the original Translate Extension ($p=0.2886$), or between the current method and the Translate Extension ($p=0.3971$).

Overall Evaluation Questionnaire

As mentioned in previous chapters, participants were asked to do an Overall Evaluation Questionnaire after completing all three translation tasks. In this questionnaire, participants ranked the three translation methods from their most preferred to least preferred. To analyze this data, we convert the method preference rankings into a weighted rank sum. The task method ranked as most preferred received a weighted score of 3, the second received a 2, and the least preferred received a 1. These were then summed together to form the weighted rank sum score. Table 14 shows these ranked scores from all 21 participants.

Table 14 Overall Evaluation Questionnaire result – Weighted Scores

Participants	101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603	701	702	703	Sum
CM	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	23
TE	2	2	2	2	2	2	3	2	2	1	2	2	3	2	2	2	2	2	2	2	2	43
HT	3	3	3	3	3	3	2	3	3	3	3	3	1	3	3	3	3	3	3	3	3	60

Eighteen out of the 21 participants ranked HT first (3), TE second (2), and CM last (1). There were 19 out of 21 participants that ranked HuijiTRANS as their most preferred method (3). However participant 301, 401, and 501 had different preferences. Participant 301 ranked TE first (3), HT second (2), and CM last (1). Participant 301 left a comment: "I expected to find a software which enables me to communicate with the other translators online instead of just revising the others' work directly. Yet we cannot explain our choice of words toward each other before our works get retranslated while using both softwares. But they do help me save some time." It seems that this participant desired more integrated communication tools rather than using external communication tools such as QQ, and did not see much difference between TE and HT. Participant 401 ranked HT first (3), CM second (2), and TE last (1). They commented: "The third method (i.e. HuijiTRANS) is the most useful and I like its auto translation. I think it can have an add-on which can support instant communication among teammates so that they needn't switch to another window to discuss, it's very inconvenient and waste a lot of time." Participant 501 ranked TE first

(3), CM second (2), and HT last (1). Unfortunately, participant 501 did not leave a comment about their preference ranking, so it is difficult to know the specific reasoning for their response.

The weighted rank sum scores of each translation task method is visualized in Figure 20. We can easily tell that the new design of HuijiTRANS is the most preferred method with a score of 60, followed by TE with a score of 43, and CM with a score of 23.

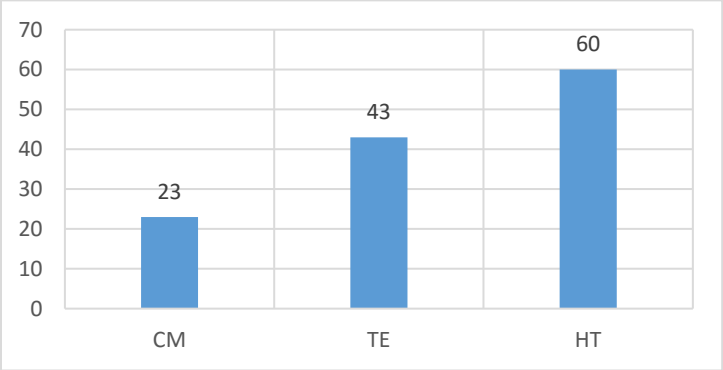


Figure 22 Bar chart of the weighted rank rum scores

The Overall Evaluation Questionnaire also allowed participants to give subjective comments about the tasks, this part of result and findings are discussed in the later chapter.

The Translated Texts

For evaluation of the quality of the collaborative translation from each translation task, a Chinese speaker with a high level of English skill and experience in translation was invited to score the translated texts. This person was given only the translated texts without knowing the identity of the translators or the translation method, and was asked to score the translation by fluency, accuracy and consistency on a scale of 0-10. A higher score means a better translation quality. Table 15 contains the raw translation quality scores for each of the 3 translated texts for each group. All of the translations have a relatively high quality. We use the mean score in each task to create the bar chart in Figure 21 to visualize the results. We can see from the bar chart and table that HuijiTRANS received slightly higher scores in all three quality criterion.

Table 15 Translation quality scores

Translation	CM			TE			HT		
Evaluation	accuracy	fluency	consistency	accuracy	fluency	consistency	accuracy	fluency	consistency
Group 1	7	8	10	6	7	10	9	8	10
Group 2	8	9	8	7	7	8	8	8	9
Group 3	7	7	8	6	6	7	7	8	8
Group 4	8	8	8	7	8	8	8	7	9
Group 5	7	9	9	7	8	9	9	10	9
Group 6	7	6	7	8	9	8	9	8	9
Group 7	7	7	5	7	8	8	8	9	8
mean	7.29	7.71	7.86	6.86	7.57	8.29	8.29	8.29	8.86

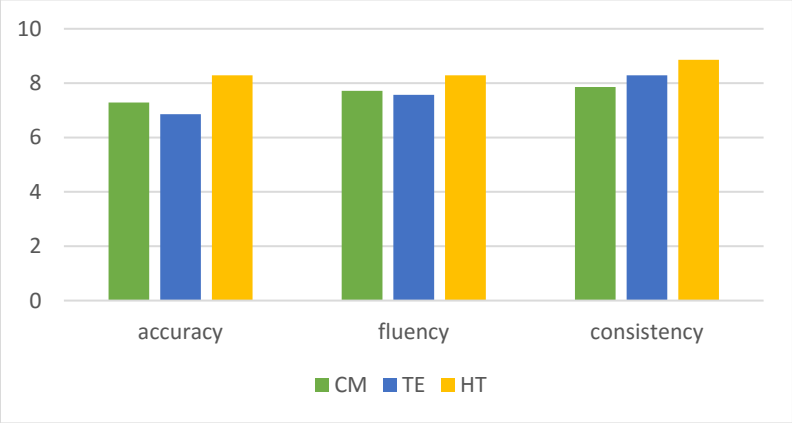


Figure 23 Bar chart of the translation quality mean scores

We applied a one-way ANOVA to these data (Appendix M). There was a statistically significant difference across the three translation task methods as determined by one-way ANOVA ($F=5.5056$, $p=0.0064$). We then applied Tukey HSD tests to find out where the differences occurred between pairs of translation task methods (Appendix M). The results show that there was a statistically significant difference between the new design of HuijiTRANS and the current method ($p=0.0189$) and also between the new design of HuijiTRANS and the original Translate Extension ($p=0.0125$). There was no significant difference between the current method and the Translate Extension.

For each article, a translated version with the highest combined score from this usability test is included in Appendix O.

Summary

For a better understanding of all of the results and data analysis presented in this chapter, we summarize all of the Tukey HSD test results in Table 16. In this table light blue indicates a statistically significant difference at the 0.05 alpha level ($p<0.05$), dark blue indicates a statistically significant difference at the 0.01 alpha level ($p<0.01$), and no color indicates no statistically significant difference at the 0.05 alpha level ($p>0.05$). All of the one-way ANOVAs were statistically significant at the 0.05 alpha level, and so there is no need to summarize the results.

Table 16 All ANOVA and Tukey HSD results

	CM vs TE	CM vs HT	TE vs HT
Completion time			
Usefulness			
Ease of Use			
Ease of Learning			
Satisfaction			
Task Load			
Translation quality			

CHAPTER 8

FINDINGS AND DISCUSSION FROM USABILITY TEST

Our hypothesis was that online tools like the Translate Extension of MediaWiki could improve collaborative translation efficiency and that our new design of HuijiTRANS could further improve the user experience specifically in group translation. The results from the usability test positively support this hypothesis.

We describe the purpose and method of the usability test in Chapter 6. The results from the usability test in Chapter 7 indicate that the new interface design using HuijiTRANS is significantly more efficient and has significantly higher satisfaction compared to the original interface using Translate Extension. More detailed findings and discussion from the results of the usability test are listed below.

Findings from Usability Test Results

Finding 1: Translate Extension improves the efficiency of online group translation, and the new design of HuijiTRANS improves the efficiency even more.

From the completion time results reported in Chapter 7, the average completion time in the translation tasks using Translate Extension was 35.2% shorter than the current method, and the average completion time using HuijiTRANS was 32.2% shorter than Translate Extension. The data analysis shows that there is no statistically significant difference between the completion time in CM vs TE and TE vs TH. However, there is a significant difference between CM vs TH.

When using the current method, users seemed to spend a lot of time on the proofreading stage, because they had to collect and merge everyone's translation and then redistribute them for proofreading. In both the Translate Extension and HuijiTRANS, users

saw other collaborators' work simply by refreshing the webpage, making it a lot easier to begin the proofreading stage. The current HuijiTRANS prototype does not support synchronous collaboration yet, but we hypothesize that synchronicity will further improve the translation efficiency.

Finding 2: Translate Extension significantly improves the usability of online group translation, and HuijiTRANS improves the usability even more.

From the results of the USE Questionnaire reported in Chapter 7, we see that Translate Extension received significantly better results than the current method of online group translation in both the Usefulness and the Ease of Use sections. Also HuijiTRANS received even better results than Translate Extension in these sections. This supports the hypothesis that the new interface design using HuijiTRANS further resolved usability issues lingering in the Translate Extension interface for online group translation.

Finding 3: Web-based collaboration translation tools like Translation Extension and HuijiTRANS are easy to learn.

All of the participants in the 7 groups successfully performed three group translation trials with only the researcher briefly explaining the task verbally. This suggests that the online collaboration translation tools are easy to understand and easy to learn. Also the results from the USE Questionnaire supplement this conclusion. All three tasks received relatively high scores in the Ease of Learning section. Still when comparing HuijiTRANS and the current method, our new interface design demonstrated significant improvement in the ease of learning.

Finding 4: The new interface design of HuijiTRANS significantly improves the user satisfaction in online group translation.

In the USE Questionnaire results reported, the satisfaction section shows the most significant difference. Also in the Overall Evaluation Questionnaire, 19 out of the 21 participants reported that their most preferred method is HuijiTRANS. These support the hypothesis that the new interface has higher satisfaction that the other methods.

Finding 5: The new interface design of HuijiTRANS helps improve the quality of online collaborative translation.

From the evaluation of the quality of translated text sections from the user test, the results show that although Translate Extension did not make a significant improvement, the new interface design did. This is probably related to the better user satisfaction scores of HuijiTRANS, which allow users to achieve better translation quality. Also the participants reported that the machine translation suggestion in HuijiTRANS was performing better than in Translate Expansion. This could be one of the factors that helped improve the translation quality as well.

Feedback Received from the Participants

In the Overall Evaluation Questionnaire, we also asked for subjective feedback and suggestions from participants. Some frequently mentioned issues are summarized below. The comment section was not required in the questionnaire, so not every participants left comments. The comments received are quoted in Appendix P.

Although participants used QQ group to do real-time group chat, participants frequently reported a need to have built-in communication features. For example, participant 703 said: “I think if we can exchange our thoughts and opinions directly through the software instead of QQ or anything else, it will be better.”

In HuijiTRANS, we provide a feature to allow users to copy and paste the original text or the machine translation suggestion into the input box by just clicking on the text area. This design feature is mean to simplify the interface and remove superfluous buttons.

However, the participants' feedback suggest that there is a user need to directly select and copy subparts of the text in these areas.

Also one bug about which participants frequently complained in these comments is that when a user clicks on the original text area, it not only copies and pastes the text, but also completely replaces the partial translation already in the input box. This bug is now already fixed in the system.

CHAPTER 9

CONCLUSION AND FUTURE WORK

Conclusion

This thesis presented a comparative evaluation of the interface design of HuijiTRANS, a web-based groupware for online group translation collaboration. With HuijiTRANS we intend to help translators improve their efficiency and quality by allowing multiple translators to work on one document collaboratively together online.

We presented a testing method to evaluate the user experience during collaborative group translation and to compare our interface design to the current method of group translation along with the Translate Extension software. Twenty-one participants successfully completed the user test trials and the results strongly supported our hypothesis. Efficiency and quality of group translation are improved by using HuijiTRANS, compared to both the current method of collaborative group translation and the original design of Translate Extension.

The interface design of HuijiTRANS received positive feedback from the study participants. The results from the analysis of the usability questionnaire show that user satisfaction is significantly improved by the new interface design.

Limitations of the Study

The data analysis above shows that this study produced successful and meaningful results. However, there were a few limitations of the study. The limitations are mainly due to the prototype of HuijiTRANS. The prototype used in the user study was not completely functional as intended by the interface design scheme. For example, the scroll bar function did not exist. It could be a significant feature if the text to be translated is very long.

However, the text length of the articles we used in the study were short. So, the lack of such a feature did not bother participants.

Nevertheless, there was one bug in the prototype that caused some trouble. We provided a feature to copy and paste the original text or the machine translation suggestions into the input box in one click of the text area. However, the pasted text replaced all of the content in the input box even if participants had partially filled in some translations of their own. This has already been fixed in the most recent versions of HuijiTRANS, but was not fixed for the user study.

Another problem was due to some Internet connection issues to the machine translation providers (Microsoft, Google, and Youdao.com). Therefore, the machine translation section did not always load successfully.

Future Study

The future work of this study would involve developing the HuijiTRANS to better meet the design intention of the wireframes so as to eliminate the limitations discussed above. Some design refinement have already been made from the feedback received in the user study. More of the interface design and wireframes can be found in Appendix Q of this thesis.

Future studies would also involve another perspective of the design of HuijiTRANS. In our study, we only tested the usability of the collaborative translation web tools, not the whole website and system of HuijiTRANS. The intention of this product is to provide not only a groupware but also a platform for translators to build an open online community. To study how the user experience and interface design of HuijiTRANS works in this respect would require the site to be fully built and evaluated with a corresponding methodology. To study whether and how this online community promotes amateur translation activities would require the site to be launched and populated with real-life users.

APPENDIX A

CONCENT FORM

CONSENT DOCUMENT FOR ENROLLING ADULT PARTICIPANTS IN A RESEARCH STUDY

Georgia Institute of Technology

Project Title: Collaborative Translation Interface Design and Evaluation

Principal Investigator: Matthew Swarts

Co-Investigator: Menghui Li

You are being asked to participate in a research study.

Purpose

This project intends to explore the user need and solutions in collaborative translation and design interface for a web based group translation software. By allowing multiple translators working on one project collaboratively online, we intend to enhance the efficiency and quality of group translation. This study means to test the interface to evaluate whether the design meet its criteria. Please be aware that your language or translation skill is not being judged.

Exclusion/Inclusion Criteria

Participants will be included if:

- Be 18 to 69 years old;
- Be native Chinese speaker.
- Have a TOEFL score higher than 100 or have been an international student in the US for more than 6 months.
- Have a minimum once English-to-Chinese translation experience.
- Do not have upper limb disabilities and have normal or corrected to normal vision.

Procedures

If you decide to take part in this study and sign this consent form, you will be asked to participate in an experiment study with two collaborators, and fill a post-test questionnaire.

The experiment will be organized in 3 sessions. Each session will last less than one hour. You will be allowed to have a 10-minute break between sessions, and the whole experiment will take around 3 hours.

For each session, a short paragraph of English text will be given to you. You will be asked to translate it into Chinese along with your collaborators with given software. Since we need to mimic remote online collaboration, you should not talk directly with your collaborators. You can communicate with co-translators online with the software you are given.

You will decide by yourselves how you distribute the translation work. The translated text should be proofread for at least once. Please inform the researcher when you finish.

After finishing each session of translation, you will be asked to complete a questionnaire. After you complete all three sessions you will be asked to overall evaluate the software and collaboration methods in all three sessions.

Risks/Discomforts

The risks involved are no greater than those involved in daily activities like using computer and surfing the internet. To minimize the risks, there will be a 10-minute break between trials. The questionnaire in this study is voluntary and you may skip any questions that you are uncomfortable answering.

Benefits

You may not directly benefit from being in this study. However, your feedback will help us to further understand the user need in collaborative translation and to improve our design of collaborative translation software. Later this software will be launch to public and any translator that work collaboratively could benefit from it. Conclusion from this study could also be valuable for other online groupware design.

Compensation

You will be given a 20-dollar gift card for participating in this study. Full compensation will be given immediately after completing all procedures. The gift card is provided by Gawen & Janos (Beijing) Network Technology Co., Ltd to encourage participation.

Confidentiality

We will keep information about you strictly confidential to the extent required by law. Only people associated with this research project will have access to your study records. However, we may be required to release your record if we receive a subpoena or a court order. In addition, to make sure that this research is being carried out in the

proper way, the Georgia Institute of Technology IRB and The Office of Human Research Protections may review study records.

To protest your privacy, no video or audio records will be taken during the study. Your written records will be kept in locked in a file cabinet in a private office. Electronic records will be kept in a pass-coded file on a computer in a private office. Only study staff will have access to the records. We will use a code rather than your name to identify study records. The code will be kept in a separate locked file from the data. Your translation will be reviewed and scored, but the reviewer will not get name or other identifying information. Your name and other facts that might point to you will not appear when we present this study or publish its results. Any surveys that might have inadvertently included names or other identifying information will be immediately destroyed. Once the survey data has been input into an electronic database, the original survey forms will be destroyed along with any information linking the electronic data with the original survey.

Costs to You

There will be no costs for participating in this study.

In Case of Injury I Harm

If you are injured as a result of being in this study, please contact the Principal Investigator, Matthew Swarts, at email matthew.swarts@coa.gatech.edu.

Neither the Principal Investigator nor Georgia Institute of Technology has made provision for payment of costs associated with any injury resulting from participation in this study.

Participant Rights

- Your participation in this study is voluntary. You do not have to be in this study if you don't want to be.
- You have the right to change your mind and leave the study at any time without giving any reason, and without penalty. However, should you choose to leave the study prior to completion, any compensation due you will be reduced.
- If you decide not to finish the study, you have the right to withdraw any data collected about you. Your paperwork will be shredded.
- Any new information that may make you change your mind about being in this study will be given to you.
- You will be given a copy of this consent form to keep.
- You do not waive any of your legal rights by signing this consent form.

Questions about the Study

If you have any questions about the study, you may contact the Principal Investigator, Matthew Swarts, at email matthew.swarts@coa.gatech.edu.

Questions about Your Rights as a Research Participant

If you have any questions about your rights as a research subject, you may contact: Ms. Melanie Clark, Georgia Institute of Technology, Office of Research Compliance at (404) 894-6942 or Ms. Kelly Winn, Georgia Institute of Technology Office of Research Compliance, at (404) 385-2175.

If you sign below, it means that you have read (or have had read to you) the information given in this consent form, and you would like to be a volunteer in this study.

_____

Participant Name (printed)

_____ _____

Participant Signature Date

_____ _____

Signature of Person Obtaining Consent Date

APPENDIX B

USE QUESTIONNAIRE

USE Questionnaire: Usefulness, Satisfaction, and Ease of use

Based on: Lund, A.M. (2001) Measuring Usability with the USE Questionnaire. STC Usability SIG Newsletter, 8:2.

Group Number:

Participant Code:

Method tested:

USEFULNESS			1	2	3	4	5	6	7		NA
1	It helps me be more effective.	strongly disagree								strongly agree	
2	It helps me be more productive.	strongly disagree								strongly agree	
3	It is useful.	strongly disagree								strongly agree	
4	It gives me more control over the activities in my life.	strongly disagree								strongly agree	
5	It makes the things I want to accomplish easier to get done.	strongly disagree								strongly agree	
6	It saves me time when I use it.	strongly disagree								strongly agree	
7	It meets my needs.	strongly disagree								strongly agree	
8	It does everything I would expect it to do.	strongly disagree								strongly agree	
EASE OF USE			1	2	3	4	5	6	7		NA
9	It is easy to use.	strongly disagree								strongly agree	
10	It is simple to use.	strongly disagree								strongly agree	
11	It is user friendly.	strongly disagree								strongly agree	
12	It requires the fewest steps possible to accomplish what I want to do with it.	strongly disagree								strongly agree	
13	It is flexible.	strongly disagree								strongly agree	
14	Using it is effortless.	strongly disagree								strongly agree	

15	I can use it without written instructions.	strongly disagree								strongly agree	
16	I don't notice any inconsistencies as I use it.	strongly disagree								strongly agree	
17	Both occasional and regular users would like it.	strongly disagree								strongly agree	
18	I can recover from mistakes quickly and easily.	strongly disagree								strongly agree	
19	I can use it successfully every time.	strongly disagree								strongly agree	
EASE OF LEARNING			1	2	3	4	5	6	7		NA
20	I learned to use it quickly.	strongly disagree								strongly agree	
21	I easily remember how to use it.	strongly disagree								strongly agree	
22	It is easy to learn to use it.	strongly disagree								strongly agree	
23	I quickly became skillful with it.	strongly disagree								strongly agree	
SATISFACTION			1	2	3	4	5	6	7		NA
24	I am satisfied with it.	strongly disagree								strongly agree	
25	I would recommend it to a friend.	strongly disagree								strongly agree	
26	It is fun to use.	strongly disagree								strongly agree	
27	It works the way I want it to work.	strongly disagree								strongly agree	
28	It is wonderful.	strongly disagree								strongly agree	
29	I feel I need to have it.	strongly disagree								strongly agree	
30	It is pleasant to use.	strongly disagree								strongly agree	
			1	2	3	4	5	6	7		NA

APPENDIX C

NASA TASK LOAD INDEX

NASA Task Load Index

Group Number:

Participant Code:

Method tested:

Mental Demand How mentally demanding was the task?

Very low																				Very high

Physical Demand How physically demanding was the task?

Very low																				Very high

Temporal Demand How hurried or rushed was the pace of the task?

Very low																				Very high

Performance How successful were you in accomplishing what you were asked to do?

Perfect																				Failure

Effort How hard did you have to work to accomplish your level of performance?

Very low																				Very high

Frustration How insecure, discouraged, irritated, stressed, and annoyed were you?

Very low																				Very high

APPENDIX D

OVERALL EVALUATION QUESTIONNAIRE

Collaborative Translation Interface Design and Evaluation

Overall Evaluation Questionnaire

Group Number:

Participant Code:

Please rank the three method/software you have used in the test, from the most preferred to the least preferred. You can also add comment to each method.

1.

2.

3.

Please give us any comment or suggestion you have about collaborative translation software design:

Thank you!

APPENDIX E

RECUITMENT SCRIPT

Hello,

My name is Menghui Li and I'm a graduate student from Georgia Institute of Technology. We are looking for participants to be in a research study.

This project intends to explore the user need and solutions in collaborative translation and design interface for a web based group translation software. By allowing multiple translator working on one project collaboratively online, we intend to enhance the efficiency and quality of group translation. This study means to test the interface to evaluate whether the design meet its criteria.

We are reaching out to you because you are over 18 years old, a native Chinese speaker and have high level English skill. If you have any sort of English-to-Chinese translation experience (you do not have to be professional translator or in language and literature major), you fit our inclusion criteria.

The experiment will be organized in 3 sessions. Each session will last less than one hour. You will be allowed to have a 10-minute break between sessions, and the whole experiment will take around 3 hours. The risks involved are no greater than those involved in daily activities like using computer and surfing the internet. You will be asked to collaboratively translate three short paragraphs of English text into Chinese with two co-translators. Please be aware that your language or translation skill is not being judged.

Your participation will be appreciated and a $20 gift card will be provided as compensation. Your feedback will help us to further understand the user need in collaborative translation and to improve our design of collaborative translation software.

Thank you.

APPENDIX F

ANOVA TEST ON COMPLETION TIME DATA

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	7	7	7	21
sum ∑xi∑xi	361.0000	267.0000	202.0000	830.0000
mean x¯x¯	51.5714	38.1429	28.8571	39.5238
sum of squares ∑x2i∑xi2	20,909.0000	10,955.0000	6,120.0000	37,984.0000
sample variance s2s2	381.9524	128.4762	48.4762	258.9619
sample std. dev. ss	19.5436	11.3347	6.9625	16.0923
std. dev. of mean SEx¯SEx¯	7.3868	4.2841	2.6316	3.5116

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	1,825.8095	2	912.9048	4.9001	0.0200
error	3,353.4286	18	186.3016		
total	5,179.2381	20			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	2.6030	0.1849005	insignificant
CM vs HT	4.4029	0.0157051	* p<0.05
TE vs HT	1.7999	0.4295053	insignificant

APPENDIX G

ANOVA TEST ON USE QUESTIONNAIRE – USEFULNESS

RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	21	21	21	63
sum ∑xi∑xi	420.0000	751.0000	919.0000	2,090.0000
mean x¯x¯	20.0000	35.7619	43.7619	33.1746
sum of squares ∑x2i∑xi2	10,022.0000	28,211.0000	41,803.0000	80,036.0000
sample variance s2s2	81.1000	67.6905	79.2905	172.5981
sample std. dev. ss	9.0056	8.2274	8.9045	13.1377
std. dev. of mean SEx¯SEx¯	1.9652	1.7954	1.9431	1.6552

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	6,139.4603	2	3,069.7302	40.3769	0.0000
error	4,561.6190	60	76.0270		
total	10,701.0794	62			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	8.2839	0.0010053	** p<0.01
CM vs HT	12.4884	0.0010053	** p<0.01
TE vs HT	4.2045	0.0116342	* p<0.05

APPENDIX H

ANOVA TEST ON USE QUESTIONNAIRE – EASE OF USE

RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	21	21	21	63
sum ∑xi∑xi	824.0000	1,094.0000	1,316.0000	3,234.0000
mean x¯x¯	39.2381	52.0952	62.6667	51.3333
sum of squares ∑x2i∑xi2	36,866.0000	60,060.0000	84,118.0000	181,044.0000
sample variance s2s2	226.6905	153.3905	82.4333	242.4516
sample std. dev. ss	15.0562	12.3851	9.0793	15.5709
std. dev. of mean SEx¯SEx¯	3.2855	2.7026	1.9813	1.9617

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	5,781.7143	2	2,890.8571	18.7509	0.0000
error	9,250.2857	60	154.1714		
total	15,032.0000	62			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	4.7452	0.0038841	** p<0.01
CM vs HT	8.6468	0.0010053	** p<0.01
TE vs HT	3.9016	0.0206740	* p<0.05

APPENDIX I

ANOVA TEST ON USE QUESTIONNAIRE – EASE OF LEARNING RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	21	21	21	63
sum ∑xi∑xi	459.0000	493.0000	543.0000	1,495.0000
mean x¯x¯	21.8571	23.4762	25.8571	23.7302
sum of squares ∑x2i∑xi2	10,797.0000	11,889.0000	14,159.0000	36,845.0000
sample variance s2s2	38.2286	15.7619	5.9286	22.0712
sample std. dev. ss	6.1829	3.9701	2.4349	4.6980
std. dev. of mean SEx¯	1.3492	0.8664	0.5313	0.5919

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	170.0317	2	85.0159	4.2565	0.0187
error	1,198.3810	60	19.9730		
total	1,368.4127	62			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	1.6602	0.4749838	insignificant
CM vs HT	4.1015	0.0141916	* p<0.05
TE vs HT	2.4414	0.2040033	insignificant

APPENDIX J

ANOVA TEST ON USE QUESTIONNAIRE – SATISFACTION RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	21	21	21	63
sum ∑xi∑xi	347.0000	668.0000	837.0000	1,852.0000
mean x¯x¯	16.5238	31.8095	39.8571	29.3968
sum of squares ∑x2i∑xi2	6,867.0000	22,312.0000	34,173.0000	63,352.0000
sample variance s2s2	56.6619	53.1619	40.6286	143.6948
sample std. dev. ss	7.5274	7.2912	6.3741	11.9873
std. dev. of mean SEx¯SEx¯	1.6426	1.5911	1.3909	1.5103

One-way ANOVA

source	sum of squares SS	degrees of freedom vv	mean square MS	F statistic	p-value
treatment	5,900.0317	2	2,950.0159	58.8229	0.0000
error	3,009.0476	60	50.1508		
total	8,909.0794	62			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	9.8914	0.0010053	** p<0.01
CM vs HT	15.0990	0.0010053	** p<0.01
TE vs HT	5.2076	0.0014256	** p<0.01

APPENDIX K

ANOVA TEST ON USE QUESTIONNAIRE – COMPREHENSIVE RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	30	30	30	90
sum ∑xi∑xi	97.6200	143.1200	172.1200	412.8600
mean x¯x¯	3.2540	4.7707	5.7373	4.5873
sum of squares ∑x2i∑xi2	355.4404	691.3920	992.3928	2,039.2252
sample variance s2s2	1.3029	0.2970	0.1684	1.6326
sample std. dev. ss	1.1415	0.5450	0.4103	1.2777
std. dev. of mean SEx¯SEx¯	0.2084	0.0995	0.0749	0.1347

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	94.0167	2	47.0083	79.7496	0.0000
error	51.2821	87	0.5894		
total	145.2988	89			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	10.8200	0.0010053	** p<0.01
CM vs HT	17.7163	0.0010053	** p<0.01
TE vs HT	6.8963	0.0010053	** p<0.01

APPENDIX L

ANOVA TEST ON NASA TLX QUESTIONNAIRE – MEAN SCORE RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	6	6	6	18
sum ∑xi∑xi	-0.91	-12.48	-22.34	-35.73
mean x¯x¯	-0.1517	-2.0800	-3.7233	-1.9850
sum of squares ∑x2i∑xi2	21.8873	48.2268	107.0828	177.1969
sample variance s2s2	4.3499	4.4537	4.7807	6.2513
sample std. dev. ss	2.0856	2.1104	2.1865	2.5003
std. dev. of mean SEx¯SEx¯	0.8515	0.8616	0.8926	0.5893

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	38.3516	2	19.1758	4.2347	0.0349
error	67.9212	15	4.5281		
total	106.2729	17			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	-1.9283	0.2886	insignificant
CM vs HT	-3.5716	0.0276	* p<0.05
TE vs HT	-1.6433	0.3971	insignificant

APPENDIX M

ANOVA TEST ON TRANSLATED TEXTS SCORE RESULT

Descriptive statistics

Treatment →	CM	TE	HT	Pooled Total
observations N	21	21	21	63
sum ∑xi∑xi	160.0000	159.0000	178.0000	497.0000
mean x¯x¯	7.6190	7.5714	8.4762	7.8889
sum of squares ∑x2i∑xi2	1,244.0000	1,225.0000	1,522.0000	3,991.0000
sample variance s2s2	1.2476	1.0571	0.6619	1.1326
sample std. dev. ss	1.1170	1.0282	0.8136	1.0642
std. dev. of mean SEx¯SEx¯	0.2437	0.2244	0.1775	0.1341

One-way ANOVA

source	sum of squares SS	degrees of freedom νν	mean square MS	F statistic	p-value
treatment	10.8889	2	5.4444	5.5056	0.0064
error	59.3333	60	0.9889		
total	70.2222	62			

Tukey HSD results

treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inferfence
CM vs TE	0.2194	0.8999947	insignificant
CM vs HT	3.9499	0.0188978	* p<0.05
TE vs HT	4.1694	0.0124546	* p<0.05

APPENDIX N

THE ARTICLES USED IN THE TESTS

Eillis Article, 1

By Ralph Ellis, Steve Almasy and Ray Sanchez, CNN

Source http://www.cnn.com/2016/05/07/americas/fort-mcmurray-fire-canada-duplicate-2/

The massive wildfire that forced almost 90,000 people to evacuate in Alberta is growing and approaching the neighboring province of Saskatchewan, Canadian officials said Saturday.

Dry and extremely windy conditions are fueling the blaze, which has already scorched more than 1,560 square kilometers (602 square miles) and ravaged the city of Fort McMurray, Public Safety Minister Ralph Goodale said Saturday.

"The situation remains unpredictable and dangerous," he told reporters.

Alberta is "tinder dry," he said, adding there was a possibility of a drop in temperature and a slight chance of rain early next week.

A downpour is needed to tame the fire that is the size of Hong Kong and almost 25% bigger than New York City. It has displaced about 88,000 people, wiped out at least 1,600 structures and sent plumes of smoke as far away as Iowa. The fire may double in size, Goodale said.

The blaze is moving in a northeast direction and could reach the border with Saskatchewan by the end of Saturday, Alberta Premier Rachel Notley said in a news conference.

The response has been massive. Notley said more than 500 firefighters are battling the blaze around Fort McMurray, with the help of 15 helicopters and 14 air tankers. More than 1,400 firefighters and 133 helicopters are fighting blazes across the province.

Notley said the Suncor and Syncrude oil companies to the north of Fort McMurray are evacuating personnel. Officials stressed that the company properties don't appear to be in danger from the fire.

The premier said the human suffering is heartbreaking. "I met families who had picked up and evacuated on a few hours' notice, who are understandably worried and anxious about what is going to happen next, about their children's schooling, about their belongings," she said.

One bit of good news: No fatalities directly related to the fire have been reported.

Fort McMurray has been devastated. Besides the fire damage to structures, the power grid has been damaged, and the water is currently undrinkable, Notley said.

"I want to underline again that no one who is not a trained first responder with a specific job to do should be in Fort McMurray," she said.

Many Fort McMurray residents first evacuated north of the city to oil company camps. They were forced to move again as supplies ran low and the oil companies decided to evacuate their own employees.

Thousands of people who drove through Fort McMurray on Friday and Saturday in evacuee convoys headed to Edmonton and other cities witnessed the devastation.

"It was something like Armageddon," said Morgan Elliott, who traveled with his fiancee, Cara Kennedy, and their baby, Abigail. "Everything was burnt, houses gone. Leaving the city, it was like a scene out of a movie.

Tuttle Article, 2

By Robert Tuttle and Rebecca Penty

Source: http://www.standard.net/World/2016/05/08/Alberta-s-vicious-wildfires-spread-to-Suncor-oil-sands-site

Wildfires raging through Alberta have spread to the main oil-sands facilities north of Fort McMurray, knocking out an estimated 1 million barrels of production from Canada's energy hub.

Fire officials say the out-of-control inferno may keep burning for months without significant rainfall.

The blaze, forecast to expand to more than 2,500 square kilometers (965 square miles) in the next few days, made an "unexpected" move to the north Saturday, rapidly encroaching bitumen mining operations run by Suncor Energy Inc. and Syncrude Canada Ltd. The fires may soon cover an area the size of Luxembourg.

"It is a dangerous and unpredictable and vicious fire that is feeding off an extremely dry Boreal forest," federal Public Safety Minister Ralph Goodale told reporters Saturday in Regina, Saskatchewan. He said the swirling fire is not yet a threat to any additional communities.

The wildfires have led to combined production cuts equal to about 40 percent of the region's output of 2.5 million barrels, based on IHS Energy estimates.

The cuts, and the mass exodus of more than 80,000 people from the fires raging in Fort McMurray, represent another blow to an economy already mired in recession from the oil price collapse.

Syncrude, a joint venture controlled by Suncor, shut down its Aurora mine and Mildred Lake operation about 40 kilometers north of the city and has evacuated about 1,200 workers. Syncrude has a capacity of 350,000 barrels of oil a day.

The fires are expected to reach the southern edge of Suncor's main oil-sands base on Saturday, said Chad Morrison, a wildfire manager for the Alberta government. Morrison said the oil facilities are highly resistant to fire with their buffer zones.

"While there is no immediate threat from fire, smoke did reach our Mildred Lake site this morning," said Syncrude spokesman Leithan Slade, in an e-mailed statement. "We will bring operations back online only when it is safe to do so."

There is no damage to any of the Suncor assets or operations in the Fort McMurray region, spokeswoman Nicole Fisher said.

The Calgary-based company is using firebreaks, water sprinklers and pumps to protect the facilities, she said.

Suncor, Canada's biggest energy company, Phillips 66 and Statoil ASA have declared force majeure on supplies from the region.

Husky Energy Inc. said Saturday it was shutting down its Sunrise facility, which has a capacity of 60,000 barrels a day and was producing about half that.

The fire reached Cnooc Ltd.'s Nexen operation to the south of the city, forcing a shutdown of that facility, which has a capacity of 92,000 barrels.

Officials haven't been able to assess if there was damage, due to the clouds of smoke. The facility is "probably OK," Morrison told reporters Saturday in Edmonton.

Simon Article, 3

By Mallory Simon and Paul Vercammen, CNN

Source: http://www.cnn.com/2016/05/06/americas/canada-wildfire-what-they-took/

Michel Chamberland took a look outside his home in Fort McMurray and saw that the flames and smoke were unnervingly close and rapidly approaching. He knew he had only a few minutes to escape.

"Everything you want to take," he says. "But I just thought, wallet, passport, I picked up a bag, threw some clothes in and a small box of a few important papers and yeah, gone."

He got in his car, capturing dramatic dash-cam footage of flames engulfing his hometown. Winds whipped sparks and fires engulfed the trees.

It was "like driving through hell," he says.

Chamberland is one of more than 88,000 people who fled the Fort McMurray wildfires and made an exodus of sorts to safety in Edmonton. Some came straight here, others sought refuge closer to home, only to have to pick up and flee again as the fire scorched more nearby towns.

Many have ended up at the Edmonton Expo Centre, where they've been given supplies, a place to sleep and offered assistance. Though many of them have nothing and do not know what remains of their homes, they mostly walk around with smiles, offering to share the little water or food they do have.

Car after car pulls over when they see someone walking, with those inside asking if they need anything: food, directions, a blanket.

Rob Brekke, the emergency response support coordinator at the expo hall, gets emotional when speaking about those he's met here and how they've kept their spirits up in the face of sheer destruction.

"They have nothing," the former law enforcement officer of 26 years says, choking up. "I was a counter sniper for nine and a half years, I've been through extreme critical situations... it starts to get to you."

Brekke says in addition to the support among evacuees, the donations from citizens across Canada and the world -- as well as from corporations -- means they have everything they need to try to bring some stability to the Fort McMurray evacuees.

"We're trying to bring back a certain level of well-being, but also a certain level of norm back to their life as much as we can," he says. "We're trying our best."

For some, what they're getting at the evacuation center is all they have. Many escaped with barely any of their belongings after being forced to make heartbreaking, split-second decisions: When you only have a few moments, what do you save?

Morgan Elliott and his fiancée Cara Kennedy fled to the Syncrude oil sand camp north of Fort McMurray with their baby, Abigail, but not much else.

"Her clothes, diapers, wipes, just necessities and some food," Kennedy says, pointing to her little girl.

The couple also grabbed a few home insurance documents and birth certificates and hopped in the truck.

APPENDIX O

TRANSLATED ARTICLES

Ellis Article, 1: Translated by participants in Group 6

加拿大官方于周六发布消息，造成阿尔伯塔省近九万居民被迫疏散的大规模野火的火情进一步扩大，正在接近临省萨斯喀彻温。

公共安全部长拉尔夫·古德尔于周六表示，干燥而极为多风的环境条件助长了火势，火焰焚烧面积超过了一千五百六十平方千里（六百二十平方英里），摧毁了麦克默里堡市。

他告诉记者：“目前情势仍然无法预测，且十分危险。”

“阿尔伯塔的天气‘干燥易燃’”，他称，并补充说目前有一些降温的可能，下周早些时候也有微小的可能会降雨。

火势面积已与香港等大，比纽约市约大25%，急需一场将于将其扑灭。火焰已使约八万八千人被迫疏散，毁灭了至少一千六百座建筑，烟雾最远蔓延至爱荷华州。古德尔表示“火势面积有可能成倍增加”。

大火正在向东北方向移动，周六晚些时候就将到达萨省边境。阿尔伯塔省长瑞秋·诺丽在新闻发布会上这样说。

对火灾的响应规模极大。诺丽说超过 500 名消防员正在与麦克穆兰堡的大火战斗，15 架直升机和 14 座空气坦克正在协助。超过 1400 名消防员与 133 架直升机正在与越过省界的大火战斗。

诺丽称，麦克穆兰堡以北的森科尔和合成原油两家石油公司正在疏散员工。一些官员强调说，公司的财产目前看来并没有受到大火的威胁。

省长称，人们的遭遇令人心碎。“我与几小时前获得通知被疏散的家庭谈过话，这些家庭对未来将会发生什么非常焦虑不安，关于孩子上学的问题、以及他们的财产问题，”她说。

有一条好消息是：大火没有直接导致人员伤亡。

诺丽表示：“麦克穆里堡被摧毁了。不仅仅是建筑被火烧毁，电网也被破坏，水源目前不可饮用。”

她说：“我希望重申，没有受过救灾专业训练的人员，现在都应该离开麦克穆里堡。”

很多麦克穆里堡的居民一开始被疏散到北边的石油公司营地，但很快由于补给不足，加之石油公司决定疏散自己的员工，他们被迫再次迁移。

数千居民在周五和周六从麦克默里堡被疏散到埃德蒙顿等大城市，他们在路上目睹了火灾的毁灭。

“这简直像世界末日，”摩根·埃利奥特说，他和他的卡拉·肯尼迪、他们的孩子阿比盖尔一起离开，”一切都被烧毁，房子没了。离开城市时看到的景象就像是灾难片一样。”

Tuttle Article, 2: Translated by participants in Group 5

在艾伯塔省肆虐的大火已经蔓延到了麦克默里堡北部的主要油砂处理厂。造成加拿大能源中心减产约 100 万桶。

据官方称，如果未来没有大规模降水出现，已失控的可怕火灾可能还要持续几个月。

根据预测在接下来的几天内，大火会持续蔓延，受影响的区域面积达到 2500 平方公里(965 平方英里)。火势会在周六“造访”北部，迫近森科尔能源公司和加拿大辛克鲁德有限公司的沥青开采区。届时火灾的燃烧面积可能会有整个卢森堡这么大。

联邦公共安全大臣拉尔夫·古德尔于周六在萨斯喀彻温省的里贾纳告诉记者“北方干燥的森林是这场大火变得极其危险、难以预料并且危害无穷。”。他还声称这场大火并没有威胁到其他地区。

根据 IHS 能源咨询公司的估算，该地区石油产量将累计减产 40%，约合 250 万桶。

除了产量的缩减，80000 人被迫从大火肆虐的麦克默里堡撤离。对于饱受油价下跌之苦而在萧条中挣扎的当地经济无疑又是一记重击。

由森科尔控股的合资公司辛克鲁德关闭了距离城市北部约 40 公里的奥罗拉矿井，停止公司在米尔德里德湖的一切生产活动，疏散约 1200 名工人。此前，辛克鲁德每天能产出 35 万桶石油。

艾伯塔省的火灾负责人查德·莫里森表示，根据推算，大火将在周六蔓延至辛克鲁德的主要油砂基地，他同时声称，因为有缓冲区的存在，石油设施能够高度耐火。

“尽管目前火灾并没产生直接威胁，但是今早浓烟已经飘至米尔德里德湖。”辛克鲁德发言人雷森·斯莱德在一份邮件声明中称，“在排除险情后，我们会重新投入生产。”

发言人尼克·费舍说，森科尔在麦克默里堡地区的财产和生产活动并没遭受任何损失。

她表示，总部设于卡尔加里的公司动用了防火带、洒水装置和水泵来保护所有设施。

作为加拿大最大的石油公司，森科尔与菲利普 66、挪威国家石油公司同时宣布因为不可抗力的外因，公司决定削减本地区的石油供给。

赫斯基能源公司表示已经关闭本公司在桑莱斯的石油设备，那里每天能开采 60000 桶石油，并加工其中的一半。

火势蔓延到了城市南部的中海油有限公司的尼克森工厂，并导致这一日产 92000 桶油的设备被迫关闭。

由于烟雾太浓，官方无法评估火灾是否对设备产生了损伤。莫里斯星期六在埃德蒙顿告诉记者，设备“或许都还好”。

Simon Article, 3: Translated by participants in Group 6

米歇尔 • 尚柏朗从他在麦克默里堡市的家中往外望去，他看见火焰和浓烟近到令人不安并且还在迅速靠近。他知道他只有几分钟的时间逃离。

“你想要带走一切，”他说，“但我只想到了钱包、护照，我拿起一个包，扔进去几件衣服和一个装了几份重要文件的小盒子，然后我就走了。”

他钻进他的车里，他的行车记录仪里记录下了火苗吞噬他的家乡的戏剧性一幕。风煽动着火星，大火吞没了树林。

那就像“开车穿过地狱”，他说。

尚柏朗是 88000 多个居民中的一个，他们从麦克默里堡市的野火中逃离并在埃德蒙顿寻求安全的庇护。有些人是直接来这儿的，其他人期初寻找离家近的避难所，最后随着火势蔓延到更多附近的村庄，他们不得不重新收拾行李再次逃离。

许多人最终呆在了埃德蒙顿展览中心,在那里他们已经得到供给,有睡觉的地方和并且有人提供援助。尽管许多人什么都没了，也不知道他们家里还剩下什么,他们大多都还带着微笑来回走动,主动分享他们所拥有的一点水或食物。

一辆又一辆的车为那些走在路边的人停下，询问他们是否需要任何东西:食物、方向或者一条毯子。

在世博会上大厅里，当谈到那些他在这里见过的人以及他们是如何打起精神面对彻底的毁灭时，应急响应支持协调员罗伯 • 布莱克变得激动起来。

“他们一无所有,”这位任职 26 年的前执法官员哽咽着说，“我做了九年半的反狙击手,我曾经经历过极端危急的情况……它开始找到你。”

布莱克说,除了来自疏散人员的支持，来自加拿大和世界各地人民以及企业的捐款意味着他们拥有一切他们所需要的来给麦克默里堡的撤离人员带来一些稳定和支持。

“我们尽自己所能给他们的生活带回一定程度的幸福感,同时带回一定程度的规范，”他说，“我们正在尽自己最大的努力。”

对于一些人来说，他们带到疏散中心的是他们的全部财产。许多人逃脱时几乎没有带任何财物，他们被迫做出令人心碎的、瞬间的决定 ： 当你只有几分钟时，你要拯救的是什么？

埃利奥特 • 摩根和他的未婚妻卡拉 • 肯尼迪带着他们的孩子阿比盖尔逃往位于麦克默里堡北部的中石化油砂营地，但是没有带很多财物。

“我们带了她的衣服、尿布、湿巾，只是生活必需品还有一些食物”肯尼迪指着她的小女儿说道。

这对夫妇还匆忙带了一些家庭保险单据和出生证明然后跳上了卡车。

APPENDIX P

COMMENTS FROM PARTICIPANTS

Participant 201

It's may be better to add a function in HuijiTRANS to show the suggested translation of selected words

Participant 203

I particular like HuijiTRANS's "translation instruction" part, because I just hate copy the word and paste into google translate, then copy and paste the translation back. If the software can have internal dictionary, that would be a huge plus from my side. However, HuijTRANS has a little…I don't know, bug? I'm not sure whether it is just me or a universal problem: when you copy an English word, the translation I'm working on will disappear and is replaced with the English paragraph itself – in another word, you will see the 2 English paragraph appear side by side.

I have to say overall HuijiTRANS is good and more user-friendly and efficient!

Participant 301

I expected to find a software which enables me to communicate with the other translators online instead of just revising the others' work directly. Yet we cannot explain our choice of words toward each other before our works get retranslated while using both softwares. But they do help me save some time.

Participant 302

My English translation is replaced by the original content when I click on it.

Participant 401

I think it can have an add-on which can support instant communication among teammates so that they needn't switch to another window to discuss, it's very inconvenient and waste a lot of time.

Participant 402

HuijiTRANS is very efficient, but there is a small bug that it will auto copy and paste the word when the user double-click the sentence， and cover the translation. That' s REALLY ANNOYING!

Participant 502

The translation-suggest section is really helpful for users!

Participant 702

Make it possible that we group members can see who have modified which sentence.

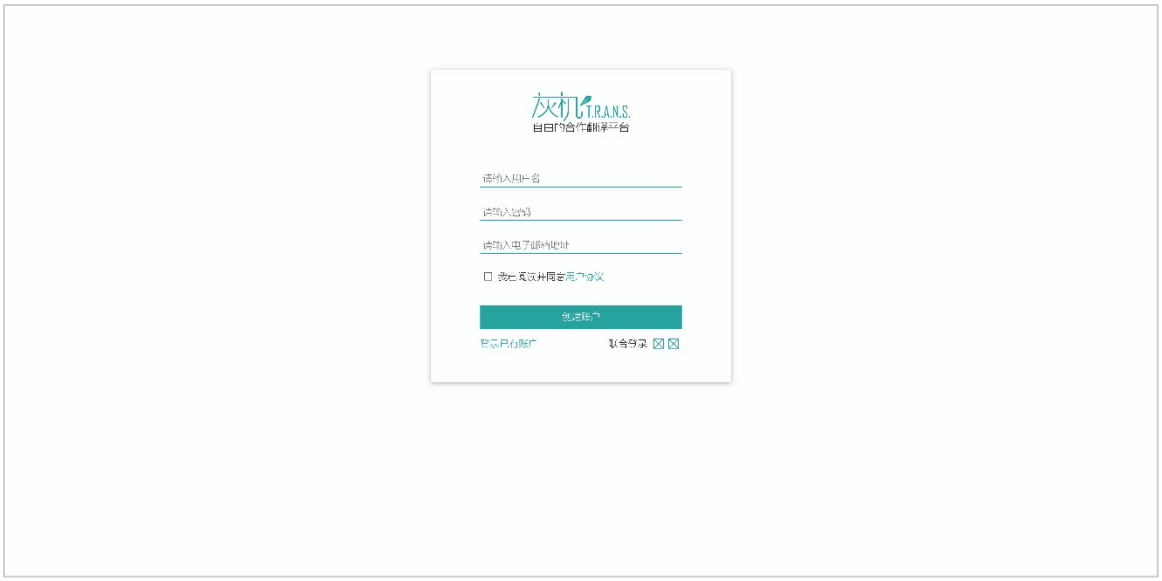
Participant 703

I think if we can exchange our thoughts and opinions directly through the software instead of QQ or anything else, it will be better.

APPENDIX Q

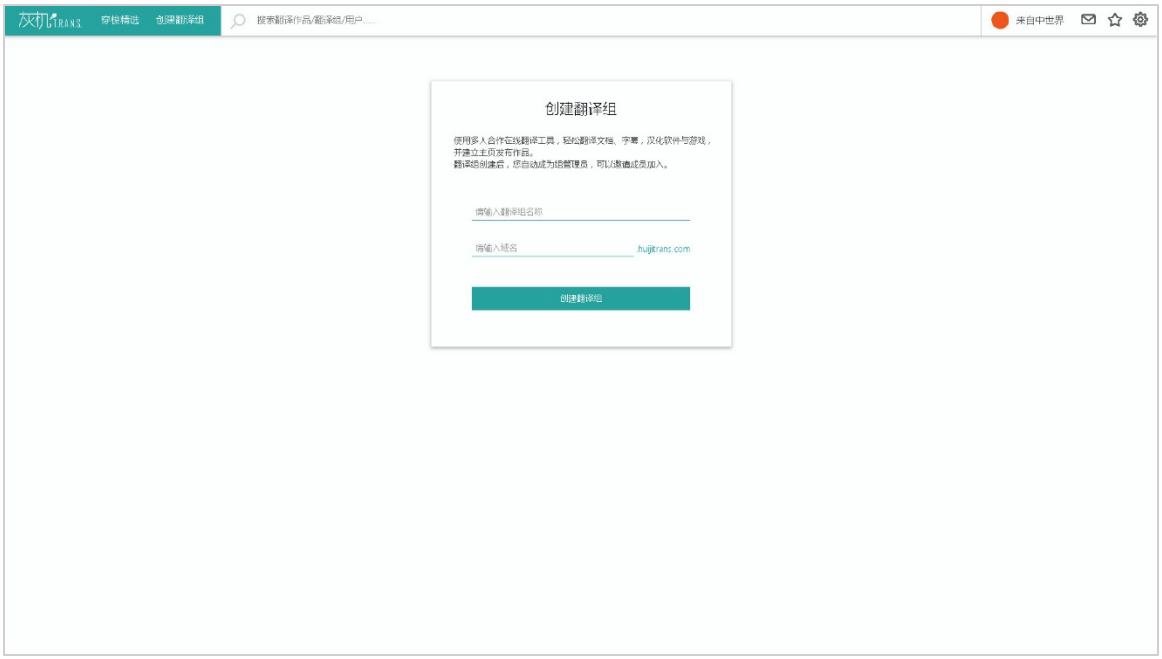
USER INTERFACE DESIGN OF HUIJITRANS

Note that these figures are design sketches or wireframes made with Adobe Illustrator. These are not screenshots of the functional web pages.



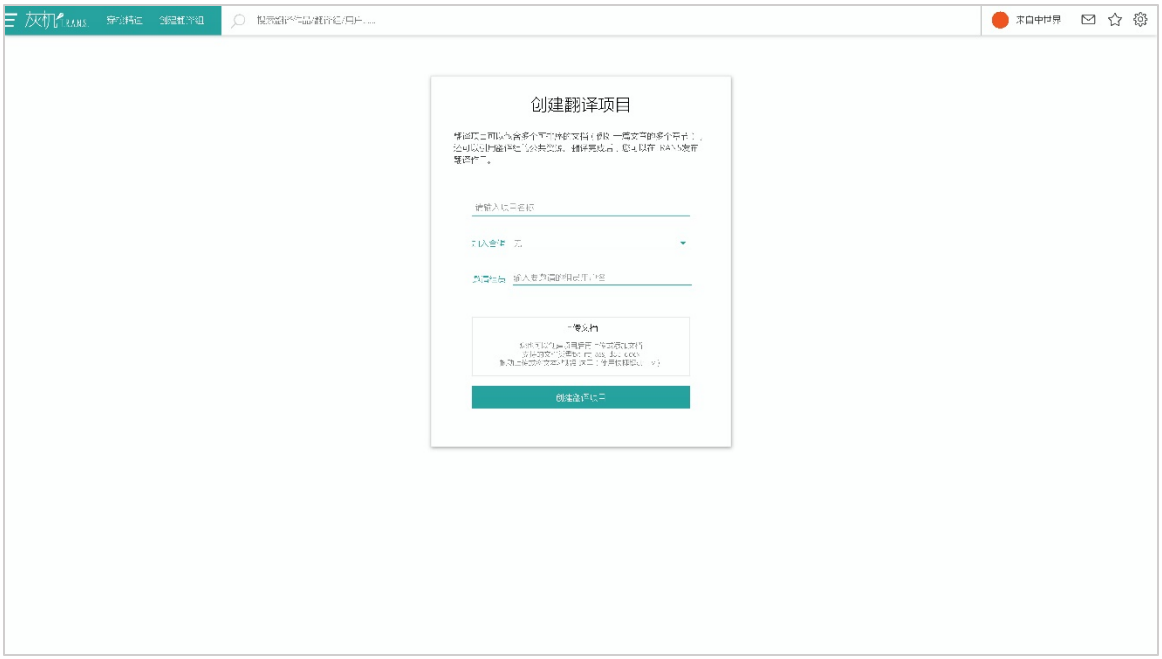
Log in

Sign up



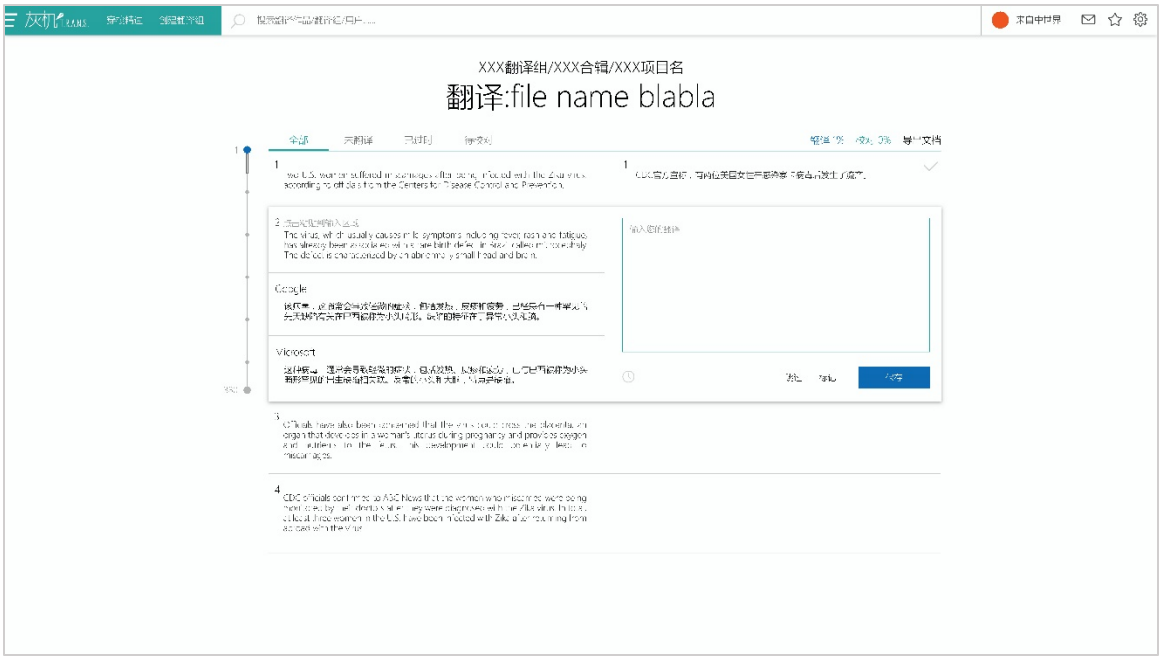
Create a translate group page

The group admin board



Create a project.

Project page



Translation Page

Translation Page – completed

Publish translated work

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