Information seeking behaviour of early-career translators in Chinese to English and English to Chinese two-way translation

by

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Declaration

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Summary

This research aims to investigate early-career professional translators' information-seeking behaviour in translating into and out of one's A language. As information seeking is regarded as a key competence for professional translators, a focus on information-seeking behaviour has recently gained a more central place in literature. Few, however, have discussed the relationship between directionality and information-seeking behaviour.

Considering the fact that in the Chinese context, it is a common practice for a professional translator to do either Chinese-English or English-Chinese translation, this research focuses on early-career professional translators' information-seeking behaviour in two-way translation. With its exploratory nature, this research employs mixed methods by triangulating think-aloud protocols, screen recordings and interviews to investigate native Chinese translators, who are working based in China. The research combines quantitative analysis and qualitative analysis, exploring main categories of their information seeking behaviour, including information seeking triggers, resources, seeking strategies and seeking paths as well as seeking outcome and self-perception. According to the experiments, this research provides empirical evidence to the different presences of directionality during the process of information seeking.

Under a dynamic framework, three dimensions of information-seeking behaviour and their connection with directionality are mainly analysed in the study. Consistent with existing literature, this research finds that, in the text dimension, translators place more emphasis on production over comprehension in both translation directions. In the resource dimension, the categories of resources are similar in both translation directions; instead, translators' individuality in resource selection is more evident. Finally, in the translator dimension, it is shown that translators' familiarity with their A
language and their prior knowledge about its culture lead to a more cautious use of equivalents they sought. The finding is different from the view that the familiarity with one's A language helps simplify the translation process.
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1. Introduction

Information seeking is not only perceived to be an essential ability for a professional translator (e.g. European Master’s in Translation (EMT) expert group, 2009) but also an essential stage of problem-solving in the translation process (e.g. Hunziker Heeb, 2012). However, recently EMT (2017) published a new version of translation competence framework, in which information seeking seems to be understated as information seeking was not identify as a specific competence as information mining. Instead, such a part of strategic, methodological and thematic competence. In contrast, translation technology including tools and application form a large section of the competence framework. Do these changes imply that information seeking behaviour is less important than tools in the new era? In understanding this question, research needs to be focused on translators' information seeking behaviour.

So far there are only a few limited studies that have shed light on how translators seek relevant information required to solve any problems that arise especially in the two-directional translation process of a pair of languages – English and Chinese. To understand a translator’s information seeking behaviour, it is necessary to understand what they are attempting to do and the mental process that they undertake during this exercise. At the same time, to explore the patterns of a translator’s information seeking behaviour in problem-solving in two ways (English-Chinese and Chinese-English). In order to achieve this, this research will explore four key aspects of a translator’s information behaviour:

- Text-related information triggers
- Resources
- Information-seeking paths
- Translators self-perception
This study will attempt to integrate models of information seeking from information science to assist in the understanding of such activities and mental processes. By using various methods; screen recording, thinking aloud, protocol and follow-up interviews. For this the author will collect and analyse comprehensive data from the information seeking behaviour displayed by three professional translators. This will enable patterns of information seeking behaviour in each translation direction to be detected and compared.

1.1 Rationale

Seeking aid from resources forms an integral part of the translation process – from consulting printed dictionaries and encyclopaedias as well as consulting experts in the early days to the present age where everything is digitalised and easily accessible. The way that translators utilise the available resources has changed dramatically due to the various resources available. Therefore, an investigation into a translator’s information seeking behaviour and how they interact with the resources during the translating process in the new age is necessary.

However, so much focus has shifted to resources with newer features coming into being. Firstly, a variety of new resources are emerging every day. In addition to the traditional resources such as dictionaries, Gough (2016: 94), identified ten frequently used resources amongst which are new types, e.g:

- Terminology databases
- Concordances
- Machine translation engines
- Search engines
- Knowledge-based resources, such as Wikipedia and Encyclopaedia Britannica.
- Web pages
- Online documents
This expansion of resources has provided translators with more accessible information and the division of the types of resources enabling translators to seek information based on different needs. For this reason, newer research examines the development of resources and how these resources help and enhance the performance of translation task. For example, an investigation has been made into the establishment and implications of corpora (Bowker, 2000; Granger, 2010; Véronis, 2013), terminology databases (Wright and Budin, 2001) and others.

Owing to the Internet and the development of computer science, resources have become more readily available. Translating has become easier due to the ease of access to information online, as all it takes is a click on the computer instead of having to look through heavy dictionaries. Moreover, with the emergence of mechanical translation tools, software and translation platforms' and the merging of resources, including dictionaries, terminology databases and corpora, integrating new information has become an automatic process.

Under such circumstances, it seems that a translator’s role in information seeking turns out to be less important. Translators will have to change their habits in order to fit in with new technology and not vice versa (Ehrensberger-Dow and Massey, 2014: 80). One could question the role of a translator in interacting with the process of accessing resources. To answer this question, it is vital to adopt a user-based and dynamic perspective to observe the behaviour of translators whilst seeking information. Instead of investigating what information is available and how passively the information is received, it is more important to explore whether translators use their own initiatives to actively seek information to solve any problems. To this end, the present study attempts to explore both behavioural and cognitive aspects to see how translators make decisions in the quest of seeking information. It does not only focus on the 'actions' that a translator takes at every stage of seeking information, but also looks at the rationale and factors in supporting their decisions, which have not yet been addressed sufficiently by the current research communities.
Another focus of the present research is that it sets out to discuss translators’ information seeking behaviour in two directions of a language pair – English and Chinese. It is worth noting that translating into both language directions is a reality in the translation industry, although translating into one's mother tongue is more common. For example, translators in the United Nations are required to translate into their mother tongue with the exception of Chinese and Arabic languages and sometimes for highly specialised text. However, the majority of available research is still focusing on one type of translation – into one's mother tongue.

So far, little is known that how translation has been carried out in the other direction and whether there is a difference in the translation process of the two ways. Especially regarding the process of information seeking, the question of whether translators display the same type of behaviour in two translation directions in a language pair such as Chinese and English still needs further investigation. The present study will attempt to bridge this research gap and contribute to a deeper understanding of the translation process regarding information seeking.

1.2 Structure of the thesis

This thesis is divided into seven parts. Chapter Two is a review of previous studies. It will firstly outline the setting of the study of information seeking. Then it will present some key relevant concepts and models. After explaining the importance of studying information seeking behaviour of a profession, the review will discuss different information seeking models and try to integrate those models into the current study. By identifying this gap, this study will adopt a user-based and dynamic view towards the process of information seeking. It also states the problem of directionality in the study of translation, and it is expected to look at how a translator seeks information to problem-solving in translating, into and out of the mother tongue.
Chapter Three begins by stating the aim of the research and the questions proposed. It will then describe research designs and the methodology used.

Chapter Four will focus on the results of this research. It will include an introduction to the experiment, data collection and an analysis of the data. Analysing this data will show how the information seeking pattern in two-way translation emerges from the experiments.

Chapter Five is a focus on the critical analysis of the results of the current research compared to previous research. The discussion follows the research questions with an aim to invite further exploration on the behaviour of translators in relation to translation directionality.

Chapter Six is the concluding chapter where the research and findings will be summarised. As well as presenting the preliminary results, implications and limitations will also be discussed with some suggestions for future studies.
2. Literature Review

This chapter will provide a review of all the relevant literature and discuss the main issues in translation studies in regard to information seeking and information seeking models. It aims to identify the gap in current studies about which aspects of information seeking are currently under-researched in translation studies. In this review, initially all the relevant concepts of information-seeking and translation will be explored. The relationship between the two will be illustrated to lay a foundation for integrating information studies with translation studies. By locating information seeking within process-oriented translation studies, this review will also explore methods for studying the translation process with the purpose in identifying all possible methodology and tools for examining a translator’s process of information seeking.

2.1 Setting the scene

There are two ways of describing translation, a product or a process. Translation product refers to a piece of translation from an original text. Whereas translation process refers to how a text is translated from the original text. A number of process-oriented studies were text-based, revealing the relations or changes between source text and target text. However, this view tends to overlook the importance of the role that the translator plays. By looking at these definitions, people might wonder at who is making the changes and who is 'producing' the text? Other studies of the translation process focus on the actual translator. Holmes claims that the translation process deals with "what exactly takes place in the ‘little black box’ of a translator’s mind" (Holmes, 2000: 177). This definition sheds light on the mental processes that a translator will go through in the translation process, thus, he or she becomes the focus of process-oriented translation study.
Indeed, such definitions offer people different angles to view the translation process as it is so complex involving 'everything that happens from the moment the translator starts working on the source text until he finishes the target text' (Hansen, 2003:25). Because of it being so intricate, researchers study the translation process through practical research to facilitate the understanding of translation.

The first method of studying the translation process would be to break it down into phases and then examine each phase in detail. Research by Lauffer (2002:59-74) evaluated research methods to investigate the 'understanding and reasoning', 'searching' and 'revising'. In her view, these are all components of the translation process. The translation process can be examined as a whole, but a more detailed examination looks several aspects of translation at the same time. Some researchers go even deeper, examining only one phase during the process. For example, Kussmaul (1997) investigated the mental process of a translator at the comprehension stage; whilst Carl (2011) focused on text production in the translation process.

Some studies in process-oriented translation are issue oriented. In over twenty years of research a variety of issues have been discussed. For instance, Mossop (2001) addressed the issue of revision. Kussmaul (1997) discussed a translator’s creativity in the translation process. He states that 'translation is a creative activity which can be reflected by a translator’s comprehension process'. For example, if a translator does not know how to translate a certain word, he/she might check it in a dictionary and then by associating to the context and creating a translated version which is not shown in a dictionary or encyclopaedia. Without process-oriented research, such creativity cannot be known. Other issues include factors that can influence the translation process within a particular context. This could be a translator’s own competence (Séguinot, 1989; Jääskeläinen and Tirkkonen-Condit, 1991) and time pressure (Jakobsen, 1999: 9-20; Hansen, 2006). Discussions on such issues have broadened the scope of process-oriented translation studies.
Various other studies have examined two aspects including both procedures and issues. The study on phases of the translation process can be concerned with a specific issue, such as the speed of translation (Iakobsen, 2003) and the unit of translation (Alves and Vale 2009). Investigating the translation process as 'problem-solving' is another issue to be discussed. Scholars such as Mackenzie (1998) view problem-solving as an inherent aspect of the translation process. The issue of problem-solving is complex one, as it may involve stages one of which is identifying the problem, doing research or seeking information, decision-making and evaluation (Wilss, 1996; Hunziker Heeb, 2012). Although many studies have attempted to explain the translation process as problem-solving and decision-making. Some process-oriented translation studies actually go into the way that a decision is made and how translation problems are solved. As discussed in Section 2.2, information seeking is an approach to solving translation issues, which allows a translator to solve problems by consulting available resources. However, it has not received much attention from the academia. Therefore, there should be more research into this subject.

It is worth mentioning here that while more dimensions of process-oriented translation studies are being investigated at the macro to micro level; at the same time, new technology and new methodologies have been introduced to facilitate the study, which will not only stimulate the researcher's interest in this regard but will also help the researcher to collect more supportive data. Methodologies like keystroke logging and eye-tracking (see Section 2.6) enables the researcher to have a closer observation of a translators’ behavioural activity.

However, information seeking behaviour, which is generally considered to be an essential part of the translation process, has not attracted enough attention from the research community. Although it has been acknowledged in the translation industry as a key skill to have for a translator. In practice, translators obtain the information they require from the information systems that are available. These include many resources,
such as dictionaries and encyclopaedias and more digital resources. Both of these systems provide a translator relevant information that can be used in practice.

As information seeking is common in the practice of translation, several translators and translating institutions regard it as a key component of gauging the competence of the translator. For example, Massey and Ehrensber - Dow (2011), and Gouadec (2007) state that information seeking is a crucial part of the translation process. In addition, 'Information acquisition and processing' is enlisted in the European standard EN 15038 (2006) as the measure of research competence for professional translators. It points out that experience is vital in the use of research tools and the ability to develop suitable strategies as well as the ability to develop suitable strategies for the efficient use of the information source available (ibid.).

It also indicates that translators need not only rely on their own knowledge and translation skills but can also fall-back on external sources that are available to them. However, to apply these tools to extract information, translators need to adopt some strategies but what strategies have been adopted to this end has not really been sufficiently explored in previous research.

This study will seek to shed further light on a translator’s information seeking behaviour. The study will observe a translator's physical activity while performing a translation task and look into the cognitive processes by the triangulation method from information science and the retrospective method. This method involves a verbalised report of the translator’s mental process in line with their translating process (O'Brien and Saldanha, 2014: 107), along with the screen recording technology. Next, based on the recorded and analysed data, the research will identify the pattern of a translator’s information seeking to solve a particular translation problem. The following section offers definitions of the main concepts used in the present study.
2.2 Integrating information seeking as problem-solving in translation

Problem solving is an important concept in process-oriented translation studies. Many researchers look at it as problem-solving, decision making or an uncertainty in the management process. Gaddis Rose asserts that 'in plain words, translation is problem-solving.' (Gaddis Rose, 1979: 20-21). Machenzie views 'translation as a problem-solving process' and 'the translator’s skill is in the ability to use appropriate problem-solving strategies' (Machenzie, 1998).

An inter-related concept of problem solving is uncertainty management. Tirkkonen-Condit (2000:124) believes that during the translation process, problems will lead to uncertainty in the production of the target text. From this perspective, uncertainty is an inherent nature of the translation process. She holds that “the potential for ambiguity is also an inherent feature of translating, and thus it seems reasonable to expect this shows in translation process as uncertainty”.

Although uncertainty management is similar to problem solving, there are subtle differences between the two as uncertainty serves more as an indicator of problems in translation, which is because uncertainty identification is always accompanied with 'a cognitive state of indecision' (Angelone, 2010). It shows a status or feeling when people realize a problem. In other words, uncertainty acts as an indicator of problem identification. Therefore, uncertainty management refers to how people resolve problems.

Another related concept to problem solving and uncertainty management is decision making. Wilss (1996) includes decision making as a component of his model of translation to problem solving:

1) Problem identification

2) Problem clarification (description)
3) Research on, and collection of, background information

4) Moment of choice

5) Post-choice behaviour (evaluation of translation results)

In this model, it not only explicit that decision making is part of problem-solving, but also reveals that although such decisions may not be made through translators' own knowledge; there might be occasions when the translator knowledge will not meet the requirement to achieve their goal. External support would not be needed, as demonstrated in the model of Hunziker Heeb (2012). According to Hunziker Heeb, the step 'of the actual use of the chosen resources' includes 'either internal (e.g. the translators mind) or external (e.g. dictionaries of the internet)'. However, this process is based on the former two steps: problem identification and problem analysis as shown in Figure 2.1. In Hunziker Heeb’s opinion, the need of using resources is the need to solve the problem. Using resources is solving problems.

![Figure 2.1 Model of problem-solving process (Hunziker Heeb, 2012: 30)](image)

In terms of the translation process, uncertainty management, decision making and problem solving are three different but intertwined concepts. Uncertainty shows a
feeling or a psychological state of mind of people when encountering a problem, thus indicating the need to solve problems and mark the beginning of the process of problem solving.

Simon (1987:11-13) reveals the difference between these two concepts. He believes that problem solving is a series of activities:

- Choosing issues that require attention
- Setting goals
- Finding or designing suitable courses of action

Whilst decision making is connected to 'evaluating and choosing among alternative actions'. Problem solving pertains to the whole process from identifying a situation to finding a solution, while decision making is only a means to an end namely the solution, mostly dealing with choices. Suffice it to say, decision making is an important step in solving problems.

In information science, uncertainty reveals the need for information and motivates a person to seek information. The underlying reason for that is that people are faced with an imbalance between their existing knowledge and what they need in order to understand something or achieve a goal. When people find the difference between their existing knowledge and what remains to be known, a gap is created (Dervin, 1983). Under these circumstances, the two situations tend to be compared to ascertain how much compensation is needed to reach the goal. One way of fulfilling the gap is by sourcing the required 'information'. This would reduce the imbalance between the information world and knowledge, which in turn would lead to the reduction of uncertainty and problem solving.

Similarly, Belkin (1980) holds the concept of 'anomalous state of knowledge (ASK)', which assumes that the initiation of seeking information occurs when people come across an anomaly or uncertainty in their knowledge whilst dealing with a specific
situation.

According to Belkin, ASK is not a one for all process, on the contrary seeking or sourcing information may involve a series of ASKs, by identifying the first hurdle and resolving it to then moving onto the next one. That is to say, the process of information seeking is the process of constantly identifying gaps and bridging those gaps.

However, during this process, people not only receive information from the outside world, they are choosing information from the systems too and deciding which would assist them in resolving their problem.

In a nutshell, the process of information seeking is when uncertainty occurs, it indicates that it is necessary to identify the problem first. When a problem is not resolved by using the information user's existing knowledge alone, there is a need to extract information from the information systems to bridge the knowledge gap. During this process, the information user may have a lot of information to choose from, but the user needs to decide which information would be best to resolve their problems. Such characteristics are also vital features for the whole translation process, since a translator would also feel some uncertainty when faced with a translation problem and adopting decision making to resolve the said problems.

2.3 Adopting a dynamic view towards information seeking

This section will attempt to examine the different concepts that have been used when referring to the process of sourcing information and give the reason why the present study chose information seeking as the core concept. Different models of information seeking behaviour in the science of information are discussed. It is believed that there is a need to adopt a dynamic attitude, which is required to investigate a translator’s information seeking behaviour in a practical manner.
2.3.1 Resolving terminology issues in the information seeking behaviour

Various different terms are used to refer to the process of information seeking behaviour in the science of information along with other disciplines. There does not seem to be any consistency in the use of terminology. This section will discuss the different notions and concepts and will attempt to address the confusion and offer an explanation as to why information seeking is adopted in the present study.

The notion of seeking information has become a field of information science over nearly five decades and it has been widely accepted as a perception in the science of information. Other relevant concepts have also emerged which include:

- Information searching (Kuhlthau, 2004);
- Information retrieving/retrieval (Chang et al., 2005; Goker and Davies, 2009: xxii);
- Information mining (EMT expert group, 2009);
- Research (European standard EN 15038, 2006) within and out with the science of information.

These concepts are closely related and have been used by a variety of academics. However, the mixing of different concepts in the study would only lead to confusion. Therefore, an agreement of a consistent and well-defined concept is essential.

In an attempt to resolve any confusion, Wilson (1999) includes the process of 'searching' for information as a constituent in the process of 'seeking' information and explains that 'the use of the IR (information retrieving) system is only one possible strategy for the collection of information and constitutes a potential sub-stage in the process of information seeking' (Wilson, 1999).

Information searching focuses on a 'micro-level' (Wilson, 2000: 49-56). In terms of
usage, it is found that the term 'information retrieving/retrieval' is closely related to information technology or the strategy of finding information (e.g. Chang et al., 2005; Goker and Davies, 2009: xxii).

This is evident when both the information seeking model and information searching model are examined. Information seeking covers the whole course from identifying a need, which marks the initiation of information seeking to satisfy a need, which concludes information seeking. The focus is not on the act, but on the whole process for fulfilling a certain purpose. Naturally, those who seek information should always keep their end goal in mind and ensure measures are in place to achieve the goal. In addition, it embodies the interaction between users and system, which is a central area for information seeking studies.

On this basis, Wilson states the definition for 'information seeking' as 'the intentional seeking of information as a consequence of the need to satisfy some goal' (Wilson, 2000:49-56). This definition shows two features of information seeking:

1. It is goal oriented, which shows the directionality of information seeking.
2. The user’s role is emphasized, as they are not waiting for information but take the initiative to look for information to fulfil a purpose.

These two features offer two parameters for researchers to identify where the research is within the realm of information seeking. That means when judging which subject is studied within this field, the researcher needs to consider whether these two parameters are shown rather than merely looking at the terms that refer to it.

In all the studies related to translation, although the issue of information seeking has been ascertained as an essential in the translation practice, such as being identified as a competence. One possible reason for causing this confusion is the terminology that is used and maybe the concepts evolve in parallel disciplines information science and translation studies. In spite of information seeking and search (Enriquez
Raido, 2014), terms such as information mining (EMT expert group, 2009) and research (European standard EN 15038, 2006) are rarely found in information science. However different the concepts are, the core issues discussed are identifiable. According to EMT expert group (2009), information mining includes identifying the various needs for information, adopting strategies to search for the information, using information tools and processing information and sifting for the relevant information. Similarly, the European standard EN 15038 (2006) also looks at the 'tools' and 'strategies' for the efficient use of the information source available. In this sense, although the terms used in these two documents are different from what was used in information science, the issues they are dealing with are central to this subject - the pursuit of information. Therefore, the present study has chosen to use information seeking, which embodies the importance of a users' active role in the pursuit of information to solve translation problems. However, very little research actually focuses on the translator as the information user and how they tap into the resources to address specific translation problems. The next section will present a detailed literature review on relevant concepts of information seeking will be given and thus identify the possible research gap.

2.3.2 Models in information seeking

Different models of information seeking reflect a researcher’s understanding of the nature of information seeking and the development of these models is 'reflective of the trends in the theory and practice of information seeking research' (Case, 2012:139). One trend of the information seeking behaviour models is that more studies would shift their focus on users adding more focus on the dynamic change during the process of information seeking.

There are two tendencies in the information seeking behaviour models. The first one focuses on the components in the information seeking process and the relations of these components. From this perspective, the information seeking behaviour is
depicted as a complete and static process. For example, in the early model given by Krikelas (1983), it identifies 13 components of information seeking and all these components operate towards one direction – the extraction of information needed from the preferred source. In Krikelas’ study (1983), information users tend to base on her personal experience in choosing resources, for example, resources that they used for former translation assignments or resources they had knowledge about. For the whole information-seeking process, that is to say, information seeking starts from a need, and the preferred source decides what resources will be involved. This study has identified the importance of information to comply with the need and user’s preferences, which are essential to user-centric studies. However, it only regards information seeking as a linear behaviour, which does not take into account the complexity of information seeking.

Similarly, in Wilson’s (1999) model, 11 components of information seeking have been identified. In this model, Wilson places the user as the centre of information seeking. He believes that the need to seek information arises from a need for information. The success or failure of information seeking relies on a user’s satisfaction with the sources. Success and failure are two sides of the information seeking coin. It can be seen in this model that information seeking depends on a user’s perception of the use of information and the key role a user plays in information seeking. The present study is a starting point that will also focus on the person that is seeking information. It no longer looks at information seeking as a linear process, as there are circular movements in a persons' information seeking behaviour. However, it does not take into account the possibility that information seeking behaviour can change and be affected by different conditions, as mentioned in the limits provided by Wilson himself, who states “it provides no suggestion of causative factors” (1981: 251-252). To fill this gap, the current study is going to take causative factors into consideration. It will not only focus on the procedures, but also considers what factors contribute to the changes and how translators adapt their strategies to calibrate their information seeking behaviour.
Shneiderman *et al.* (1997) has adopted a more user centric view of information seeking. The stages put up by them are more in line with the user's initiatives in solving problems. The study has invested core stages in the performance of information seeking including,

- Problem identification
- Articulation of information needs
- Query formulation
- Results evaluation

Shneiderman *et al.* has linked information seeking to problem solving and see the process of information seeking as a process of problem solving. It is believed that information seeking begins with identifying a problem and information needs responds to find a resolution. In addition, 'query formulation' and 'results evaluation', the study emphasizes more on mental processes rather than research actions. As the present study aims to investigate information seeking as problem solving, procedures have been taken to form the structure for research. However, it will focus more on the mental process of a translator during the formation of a query and evaluation of the results, thus affecting their information seeking patterns.

In an empirical study, Kuhlthau (1991) developed a model (Figure 2.2), based on the grounded theory. In this model, he has examined information seeking behaviour at six stages and at each stage the users’ feelings, thoughts and actions were studied to see the change in the behaviour of the person seeking information. He points out that thoughts and actions not always manifest in one mode throughout the process. At different stages, cognitive state and actions have different tendencies: the cognitive state starts from vague to focus and then becomes more interesting. The actions start from exploring to pertinent documenting (from general to specific). These changes indicate how vigorously it is operated. The present study also aims to outline the dynamism in the process of information seeking behaviour, which is mainly
embodied in the seeking path related to a certain translation problem. However, in addition to describing the feelings, thoughts and actions of the seeking process, the present study will attempt to bring into focus the factors that lead to the degree of change.

![Figure 2.2 Kuhlthau's (1991: 367) Model of the Information Search Process](image)

However, information seeking is not only worked out in a static manner and it is a complex process involving various procedures rather than only one action. In reality, during the whole process of information seeking, seekers constantly interact with information which they absorb to integrate it with their own knowledge, which may in turn generate a need for new information. As a consequence, information seekers have to reassess their demand and adjust their seeking processes. In this sense, information seeking is, as suggested by Bates' (2002:1-15), a dynamic mechanism, 'berry picking' model in Figure 2.3.

Bates compares information seeking to berry picking. Information is like berries that are scattered around the bushes, and the information seeker must pick the relevant berry or information one by one. They pick one berry, then decide where to pick the next one from. This model emphasizes the changes which can occur in information seeking, instead of seeing the process as one involving fixed steps, but rather may contain sets of steps.
In Figure 2.3, the model shows that information seeking is an evolving process with variations rather than a static and single query. Each query (represented by Q) leads to the use of documents or information (represented by $D$) and thought (represented by $T$). Being informed by $D$, information users' $T$ may change and lead to a new Q. Thus the direction and path of information seeking cannot be decided until the exit (represented by E) of the process. All these add up to a dynamic information seeking behaviour. These changes are brought up mainly by two essentials factors:

1. The information system. Information seeking behaviour is influenced by the information system. What available from the system can change the information seeking behaviour.

2. The seeker. It is a seeker’s decision in forming query and choosing the direction heading toward.

On the one hand, whatever has been offered in the information system will
determine the degree a seeker's needs can be satisfied. One the other hand, it is the information seeker who knows whether the information obtained can match their goal and whether there is a need to conduct a further search. This dynamic view contributes to the understanding of the present study, which also tends to see translator information seeking behaviour as a changing one and for different seeking activities, certain seeking paths will emerge according to the changes brought by the information system. However, this study will only exhibit the form of information seeking. The reason behind the change is not clearly articulated.

Dervin (1983:36) points out that different situations will decide the change in information needed. A particular situation within a micro moment of either space or time, where and when the information sought is different from what is desired to be found. This results in the occurrence of a gap between a desired situation and an existing one. In order to fill this gap, the information seeker adopts various strategies and generates new thoughts through the obtained information and then defines the necessity of another step. These steps would lead to the outcome of information seeking – application of the information.

To expound these relations, Dervin develops a sense-making model, see Figure 2.4.

![Figure 2.4 Sense-making model adapted from Dervin (1983)](image)

By the term sense-making, Dervin refers to 'behaviour, both internal (i.e. cognitive) and external (e.g. procedural) which allows an individual to construct and design his/her movement through time-space' (Dervin, 1983: 36).

That is to say, an individual will bridge the gap by making sense of the information.
This requires not only the information seeker to take tangible actions, as stated in stage models, but also to carry out cognitive activities, such as comparing and categorizing. Therefore, to understand how one bridges gaps by sense-making, it is necessary to determine an individual’s specific actions in the process of information seeking as well as their state of mind throughout the whole process. This model integrates both the user-based and dynamic view. On the one hand, it stresses the active role of an information seeker, whilst on the other hand, 'situation' is a dynamic concept, which an information researcher may encounter. Information seekers need to adopt different strategies accordingly, to deal with specific problems that may occur in a specific situation. In regard to the present study, situational factors that lead to the change of information need to be taken into consideration.

The models presented by Bates and Devin provide a way of thinking that applies to information seeking – one should focus on the dynamic nature of information seeking and focus on those factors that may affect the patterns of information seeking, e.g. situations that lead to a need for information, the contribution of information and the updates of knowledge as well as how the outcome of information seeking is yielded in such an environment.

By examining the above models, the user-based and dynamic trend of information seeking behaviour puts a focus of the current research. The framework displayed by these models can be applied to analyse typical information seeking problems. However, the model should be based on a typical context. The relationship between information seeking and context will be discussed in the next section, which will explain why a model should be fixed in a particular context. In the present study, the information seeking process is seen as a dynamic process. The need for information is at the core of the process, which drives the whole information seeking process. As in different situations, information needs will change accordingly, which will result in a change in the seeking path.
Figure 2.5 Modelling on dynamic information seeking models

Figure 2.5 shows the present study’s integration of dynamic information seeking models. In the current study, information seeking behaviour is regarded as a problem-solving process. During the process, situation for solving problems are changing which result in different information needs. With the interaction between the information system and the information seeker - information obtained stimulates new thoughts and thoughts influence how and what information is chosen - different results can be yielded and a new situation develops. Based on such a new situation,
new information need is required. Therefore, information seeking behaviour cannot be seen as a dynamic process. In the context of translation process, information seeking behaviour is vital for solving translation problems. Its dynamic nature is also revealed. The current study, based on this dynamic information seeking model (Figure 2.5), explored the interactions of the translator and the information system as well as translation texts.

2.3.3 Studying information seeking behaviour in a profession

In the initial stages of most studies on information seeking behaviour the focus is always on a specific field. For example, many studies were carried out to examine library users. Spink et al. (2002), Greene et al. (2000), investigated students’ seeking news through different media channels. These studies contrived to shed some light on how a group of people seek information and explore general features among the group, which indicate the early realization of basing information seeking in a context.

As more research is conducted on this subject, some popularity on information seeking appeared. For example, most studies found that information seeking behaviour involves an information users' needs, the process of searching and information uses. For this reason, a number of studies began exploring the universality of information by building models to frame this behaviour (Wilson, 1999; Kuhlthau, 1991; Bates, 2002; Dervin, 1983). These studies tend to build models that are suitable for studying everyday life. According to Johnson (1997:104), these models have four functions:

1. Addressing key issues
2. Providing guidance
3. Conceptualizing information behaviour
4. Identifying the driving force of information seeking.
However, some academics believe universality can only be revealed within a certain context. Vakkari (1999:457) believes that information seeking behaviour is 'seen as embedded in the actions, tasks and situations they are supporting'. That means that all models or theories regarding information seeking cannot develop or be used independently, unless a series of actions, tasks and a particular situation are considered. Talja (1997:74) also argues that there are no 'permanent attitudes or actual behavioural patterns of individuals or groups' and the problem with generalization is that it ignores the role of diverse 'individual's social roles, tasks and identities' and cultural environment. These two views outline the possible factors that may affect an individual’s information seeking behaviour, which forms the basic elements for a context. In line with these two views, Case (2002:279) also claimed that 'information needs do not arise in a 'vacuum' and 'the seeker exists in an environment that particularly determines, constrains, and supports the types of needs and inquiries that arise.' The 'environment', in this case, can be referred to 'context'. Such a context offers a container for information seeking, which defines the 'time-space' (Savolainen 2006: 111) for information seeking.

Based on these views, some researchers have tried to identify a context. For example, Talja et al. (1999:752) used the following:

- Socioeconomic conditions
- Work roles
- Tasks
- Problematic situations
- Communities and organizations

Dervin (1989) focused on demography and Case (2012:281) integrated their view and divided information seekers based on 'work related or non-work-related'. Work-related refers to information seekers, occupations, and social roles. Non-work-related factors like 'demography' can be used as an important parameter. In terms of empirical studies, a large number of researches have been conducted
within a particular occupation, social role and demography.

Such classification of context not only helps to define the nature of information seeking tasks and work settings, but also focuses the researcher, which points to implications for an occupation, a social role and a region. However, little attention has been paid to a particular occupation – translation. Thus, more research needs to be carried out. In view of this, the next section will review previous research on a translators’ information seeking behaviour and identify a research gap for research questions in this study.

2.3.4 Information seeking in translation studies

Information seeking behaviour in translation studies needs to integrate user-based view and dynamic view from information science, seeking the process of information seeking in solving translation problems as a dynamic process, in which, translators are at the core. There is an increasing interest in the process of a translator’s information seeking among the research community and some empirical studies have shifted their focus on processing of information. However, such studies are still in their infancy. More research is needed to investigate this area. The present study aims to contribute some insights into the dynamic process of translator's information seeking.

Scholars have recognized the significance of information seeking and regarded it as a vital part of translation competency. Pym (2003) emphasizes the importance of consulting sources for translators in this electronic age. Shreve (2006: 40) holds that translators should be competent in ‘using strategies and procedures, which are considered to be translation tools and information-seeking strategies'. Regarding the competence gap between novice translators and experts, he also claims that information seeking is an essential component, parallel to a translators linguistic decoding, encoding, message transfer and subject comprehension.
Rather than merely claiming that information seeking is a component of a translators’ competency, Pinto and Sales (2008) regard information seeking as part of information literacy in translation at both the theoretical and practical level. A new information competency model 'INFOLITRANS' has been established – to discuss a translator’s competence in generating information, seeking, retrieving and using skills. In this study, the author will outline three components of information seeking in consistence with knowledge facet, cognitive competence and cognitive skills which should be acquired by translators to enhance their information seeking competence. This research is ground-breaking, because not only does it see the significance of information literacy in translation practice, but more importantly, it integrates information studies into translation studies, seeing translators as information users, processors and producers (Pinto and Sales, 2008: 413). This enables information seeking behaviour to be placed at the centre, which is core to the present study. The three categories have shown three dimensions of the cognitive aspect of information seeking, which can be applied to the present study, in which the translator’s knowledge forms the basis of the problem, how their mental processes evolved around the questions and what corresponding strategies have been taken can be a central issue to be examined. However, when Pinto and Sales were investigating the three components, they did not relate to substantial translation problems, which weaken the reflection of the behaviour of translators as a particular profession. Because the information skills (e.g. understand the information, acquire techniques and distinguish between information) mentioned in the study can be used in dealing with any information issues instead of addressing translation-specific problems. It remains unknown how information seeking is related to actual translation tasks. How translators seek information in real practice? Can the skills shown in the research be used in the translation practice? To answer these questions, more research is needed to probe into translators’ information seeking behaviour.
Another study by Sales (2008) concentrates on translators’ information seeking, furthering the previous study on information competence of translators. This study explores the information skills of two focus groups of translation students, one is at undergraduate level whilst the other is at graduate level. The researcher intended to explore issues that are related to the concerns that translation students have for developing their information skills, including the most used resources, strategic knowledge, reliability of the information, strategic skills, information handling and continuous information skills development. The main focus of this study is on the awareness of information skills in students of translation.

A further study by Sales et al. (2018) investigated the first-year trainee translator’s information behaviour by examining how they approach information in their translation coursework. In the study, translation students’ ability in information planning, management and preferences were investigated, including “approximation to the document” (understand the text including text type, meaning and sources), “identification of information needs” (identify “unfamiliar fragments and context”), “design of the documentation plan” (decide the type of sources), “information search” (use, assessment and availability of sources) and “information storage and management” (prepare for future use) (Sales et al. 2018: 191). This study centres on trainee translators’ information seeking behaviour in solving specific translation problem. However, it regards information behaviour as a structured behaviour without seeking its dynamics. A rigid plan of text analysis and information searching plan can be influenced by possible changes occurred in the translation process. For example, the selection of resources beforehand may lead to recognition of better resources during the translation process. Furthermore, a well-established structure of information seeking may prompt trainee translators to conduct unnecessary searches. Therefore, the current study aims to maximise the ecological validity by allowing early-career translators to expose their authentic information seeking behaviour in solving translation problems.
Gough (2016) made a detailed examination of the translators’ interaction with online resources. She focuses on how the expansion in online resources has brought about changes to their information seeking behaviour. By doing three different studies – a self-study, a global survey with 540 participants and a main study with 16 professional translators. The researcher formulated two taxonomies of translators’ research behaviour: first, the Resource Type User Taxonomy (RTUT) depicts translators’ preference of resources and the influence of resources in shaping translators’ choices, which classified translators into dictionary enthusiasts, the mixed type, the parallel text fan and the MT adopter (Gough 2016: 192); and the second, Taxonomy of Translator Research Styles (TTRS) reflects more about translators’ working styles. In these taxonomies, based on parameters including volume and speed, discovery and perfection, translators with five working styles were identified: the prolific translator, the explorer, the methodical translator, the economical translator and the understated translator (Gough 2016: 235). This study has focused on the changes in the interaction between resources is not fixed and individuality has been a focus of the study. The detailed observation into research unit, research strategies and research paths can be introduced in the current study to examine the behavioural aspect of the translators’ information seeking. It offers an in-depth view into interplay among resources, texts and translators and how it moulds translators as information users. However, the problem-solving process is not exhibited and translators’ cognitive effects on the information seeking process is not fully investigated. The present study will look at both behavioural and cognitive endeavour in solving translation problems.

However, information needs and how translators solve their problems are not at the centre of Gough's study. The study has not included cognition into examination. These two aspects will be the main focus of this study.

Compared with previous studies, Enríquez Raído’s (2011) research is very comprehensive: it investigates information seeking of four students from the field of
translation and two professional translators in Spanish-English translation tasks at four stages:

- Search needs
- Search goals
- Search processes
- Search outcomes

By contrasting the performance of these participants, it was found that a translator’s requirement for information is affected by their expertise and the complexity of the translation task. More knowledge in translation reveals the use of wider range of information resources; the harder the task is, the more complicated and more time-consuming the information seeking behaviour would be. It also suggests that there is a need for more in-depth searches and the more time spent on those searches for a higher quality of translation.

Enríquez Raído’s study relates closely to how translators deal with problems by information seeking in the translation process. However, she regards information seeking as a static and passive behaviour. Firstly, she tends to look at information seeking as a series of static procedures but tends to ignore the dynamic changes during the seeking process. Secondly, from Enríquez Raído’s perspective, translators are passive information seekers and that is because they do not know how to respond to uncertainties in the translation process. Nevertheless, the translator’s active role is not generally not acknowledged as tapping information from external sources and making use of such information to solve translation problems. Therefore, more research needs to be carried out on the dynamic process of translators’ information seeking and translators’ active role in information seeking to solve translation problems.

Drawing on Enríquez Raído's study, Volane (2015) explored the information seeking behaviour of five professional translators. Comparing the results to Enríquez
Raido's study, Volane's study found that professional translators are more efficient in using online sources in terms of time-spent. This kind of behaviour comes from a professional translator's knowledge about translation. However, the study found that professional translators tend to stick to the more basic strategies, for example, focusing on only limited resources for solving problems.

In addition to Enriquez Raído's study Shih (2017) investigated six Chinese translation trainees and examined the comprehensive aspects of information seeking during the process of translation in English to Chinese translation. She used mixed methods combining screen recording and think-aloud protocols, not only observe the external behaviours but also the mental processes of the translation students. It is found that online dictionaries are popular with translation trainees. It is also noteworthy to pointed out that she also identified that individuality also affects participants behaviour as these six participants had different tendency in using resources. Such an influence needs to be further investigated in the current studies, as little is known if professional translators have the same performance or as they are more mature in using resources, such discrepancy in individuality will not be that explicit.

This study tapped into the detailed process of the professional translators' problem-solving strategies and pointed out the importance of knowledge in information seeking. How a translator’s knowledge affects their choice and strategies for information seeking behaviour is still unknown. The present study aims to focus more on the translators' evaluation of resources and how such evaluation leads to decision-making and affect their information seeking pattern.

The study by Shih (2019) was a closer observation of trainee translators’ successful queries and unsuccessful queries in web search. It captured the features that students had the tendency to abandon queries. However, it is suggested in the research that for better web search results, second query is more crucial as a clearer target of
search was found based on the primary search Shih (2019), which is better than repeating primary searches. A focus on the second search reflected the fact that translator’s actions were not independent; instead, there were inter-relationship between actions. However, Shih only explored the first search and the second search. There are more to discover, as depicted in the current study, in which more actions and their relations were investigated.

There has been an increased amount of interest in investigating the translators' information seeking behaviour in the translation process. However, only a few studies focus on translators using information in facilitating problem-solving from behavioural and cognitive point of view. The present study will look at this from a dynamic perspective, investigating how translators' handle translation problems, whose main focus would be on factors that affect the translators' decision in delivering translation outcome.

2.4 Shifting the focus to professional translators

Translation students have been involved in a number of process-oriented translation studies. However, there is still need for more research to shift the focus to professional translators. The present study investigates the professional translators’ information seeking behaviour, hoping to bring translation as a profession into the spotlight and reflect on the methods used by them to address the problems they encounter in the field of translation.

Professional translators and translation students represent two different groups and their behaviours reflect different working styles and capabilities. Existing studies have found a huge difference in the process of performing translation tasks. Fraser (2000), for example identified four key differences between professional translators and language-learners or translation students as revealed by the translation process studies (Fraser 1993, 1996; Henderson, 1987):
(1) Professional translators have more confidence in undertaking tasks and do not need to rely less on external aids

(2) Have a better understanding of translation briefs and tasks

(3) Have a higher standard whilst performing translation tasks

(4) Tend to develop strategies based on professional practice

These differences show that professional translators display a higher standard of performance to that of translation students. The reason for this is that a professional translators’ behaviour is shaped by 'years of deliberate practice' (Shreve, 2006: 151), which enables them to display a consistently high level of behavioural and cognitive performance, such as fluency in the translation workflow and persistency in coping with difficulties. Therefore, as argued by Gough (2016: 37) that a professional translators’ performance “is closer to expert behaviour”. Whereas, the translation students are still at an early stage in accumulating experience and with limited exposure to authentic translation tasks in the market. In addition, their behaviour does not seem too stable either, because they are still trying out new translation strategies. Therefore, research findings on translation students cannot represent much on the professionals’ translation behaviour. There is a need for new research that focuses on professional translators. A large proportion of information seeking is derived from studies where the student is the object of the research itself.

The reason for choosing translation students is purely educational with the focus being on how students perform in the translation process. Frankenberg-Garcia (2005) focused on sixteen translation students (for the purpose of this study they are referred to as language learners in the study). By observing their use of resources, she pointed out that students not only needed resources to aid translation activities but also needed to be trained in how to improve their skills in using resources. The main aim of this study is to identify the strengths and weakness in the learning process so that the teaching objective can be refocused, and a better pedagogy can
be adopted. However, professional translators who are supposed to be more skilful in this regard can exhibit different features. This is an area that is in need of further exploration.

The other reason for involving translation students is that compared to professionals, students are more approachable. Recruiting professional translators as research candidates can turn out to be challenging as not every translator is willing to be engaged in research activities.

Firstly, professional translators who work in translation companies or work as freelancers probably do not have any connection with academic institutions. Therefore, they do not show any interest in academic studies.

Secondly, professional translators in the market are few and far between and usually have rigid schedules, which means they would be unable to take part in a structured and time-consuming research. On the other hand, students do not have any such problems making them more likely to participate in the research in a classroom or laboratory. However, if workplace was chosen as the venue for research, issues like confidentiality and availability would have to be considered. For example, permission would have to be sought on the subject of using source texts from the clients of the professional translators to be used in the research from their clients can receive the permission to be used in researches; and whether the workplace would allow for data collection software to be installed on the work computers. This could prove to be inconvenient for the professional translator.

All these challenges set limits to studies on professional translators. However, there still is an increasing amount of interest being shown with a number of studies having been carried out among professionals at their workplace (e.g. Nord, 2009; Lauffer, 2002; Hébert-Malloch, 2004; Karamanis et al., 2011; Gough, 2016). These studies are also helpful in providing an insight into the professional translators' real work...
conditions, working style and work process, showing "actual practices of a working translator, not artefacts of experimental settings and tasks" (Ehrensberger-Dow and Massey, 2014).

However, only a few of them have attended to professionals' cognition - how the internal sources are employed in the translation process. The present study is an attempt to bridge this gap and combine both behaviours and cognitions to investigate the translators' information seeking. Moreover, the aforementioned studies (see Section 2.3) either focused on trainee translators or experienced professional translators. Little research was focus on early-career professional translators. Considering that early-career professionals serve as a linking stage for a student translator to become an experienced translator, there is an urgent need to do exploration on the behaviours of this cohort.

2.5 Translation working in two directions

Despite the focus on a dynamic process of the translators' information seeking in solving problems that crop up, another aspect that is considered in the present study is the directionality of translation. Translation can work in various directions as a language pair, i.e. from one's A language and one's B language (see explanation later in the current section). However, the investigation into two directions is mostly ignored, as most studies only focus on one language direction. The present study aims to fill this gap and deepen the understanding of directionality from a translators' information seeking behaviour.

According to Pavlović (2007: 3), directionality in translation shows the relationship between the source language and the target language, i.e. which language is the translation coming and which language it is going to. Usually it reflects the transference between one's A language and B language. There are many terms brought up here, such as L1 and L2 mother tongue and non-mother tongue.
Various concepts have been introduced to differentiate between the languages involved in a translation, which may lead to confusion. It seems that 'first language', 'mother tongue', 'native language' and 'language of habitual use' are very similar, since all of them imply a language that the translator has grown up using. In contrast, 'second language' (non-mother tongue, non-native language, foreign language) refers to a language that was learnt at a later stage.

However, Anderman and Rogers (2004:15) argue that these dichotomous notions can be equivocal. As the interchange of languages becomes more and more frequent as a result of globalization and increased communication, more and more people are becoming bilingual and multilingual. The languages they use cannot be labelled as 'native' as they may have had exposure to several languages at almost the same time and their competence in these languages may be similar.

Considering this, Rothman and Treffers-Daller (2014) claim that being 'bilingual/multilingual' means that a person has command over more than one language but 'native' should not only be related to 'monolingual' but should include a diversity of situations such as language, culture and knowledge. This means that a language is a native language for someone not only because it is acquired from naturalistic exposure, early childhood and in an authentic social context speech/community (Rothman and Treffers-Daller, 2014: 93-98). It also depends on the level of knowledge and familiarization with the culture one possesses. With such clarifications, it becomes clear on when to adopt the term of 'native language' and what it means. However, the present study does not concur with this because for a translator, it is necessary to take the working conditions into considerations into account. This means translators need to be competent in the use of both their native language and non-native language in performing translation task. For this reason, the current study will use the terms 'A language' and 'B language' provided by AIIC (2016). According to AIIC, A language is the 'mother tongue (or its strict equivalent)'
and B language is not the mother tongue but fluency in it is essential. For this reason, the subjects in the present study need to be sufficiently competent in their B language.

There is a rule in the translation industry that translation should be carried out from B language to A language, even though the reverse direction also exists. The main argument for the feasibility in translating into A language is that people are more competent in their A language. This view seeks to decide which direction is more accepted. Some statements tend to determine a dominant language which leads a translator towards it. For example, Newmark (1988:3) stated that 'translating into your language of habitual use is the only way you can translate naturally, accurately and with maximum effectiveness'. This belief highlights the legitimacy of one direction, thus in the Institute of Translation and Interpreting Code of Professional Conduct (2013), it is accentuated that translators translate into 'their mother tongue or language of habitual use'. It also offers the reason behind the rule: this direction will ensure the highest quality of translation in terms of fluency, accuracy and efficiency. This is supported by Marmaridou (1996:60), who claims that 'translating into one’s mother tongue generally yields better results than translating out of it', because a translators' competence in the mother tongue avoids problems in the target language (Neubert, 1981). This view of translating into mother tongue exerted great influence on the translation industry and is advocated by many translation agencies and organizations. For example, according to Pavlović (2007), it was found that some translation agencies required their employees to only translate into their mother tongue or advised clients to choose 'professional translators to work into their native languages' (The Institute of Translation and Interpreting (ITI), 2016). These views in the industry reinforce the legitimacy of translation only being one direction.

In reality, surveys show that the rule of A-B translation is also challenged by an increasing amount of practice conducting B-A translation in the industry. Therefore, more attention needs to be focused on A-B translation. This shows that there is a large number of translators who work out of their mother tongue, which is demonstrated in
the Campbell (1998:22) research. This states that translating into a second language was common in 'the post-colonial society in the developing world'. This view is further supported by a recent survey by IAPTI's Ethics Committee (2015), which states that 54.5% of the participants translate out of their mother tongue. One reason is that some languages are hardly acquired by other language users, so translators speaking those languages need to assume the responsibility of translating out of their mother tongue. This is particularly true for the minority languages. For example, in Finnish context, McAlester (2000: 292) argued that translation in either way must be taken by Finnish translators, as 'the volume of work exceeds the number of available translators who are major language native speakers'. Campbell (2004:33) gives two more examples of translators who do not speak English in Australia and Laos who translate from A language to B language.

Some studies do indicate that B-A translation is not necessary to compromise its fluency. For example, Pokorn (2005) analysed the fluency of the translation of Ivan Cankar’s prose by a non-native speaker and he found that the translation was well accepted by the readers in the target language. Translators can be trained to improve their proficiency in B language and produce quality translation. For this reason, in the statements of directionality by both United Nations Educational, Scientific and Cultural Organization (UNESCO) and AIIC (2016) there is space for two directions, provided the quality of translation into non-mother tongue can be guaranteed. As stated by UNESCO (1976) 'a translator should, wherever possible, translate into his/her, mother tongue or into a language of which he or she has equal mastery over' (Picken 1989: 245). Similarly, AIIC allows an 'A language' to be a working language (strict equivalent) to mother tongue. Both UNESCO and AIIC acknowledge the possibility that a translator can have similar command over two or more languages.

In effect, translating into B language is common practice for Chinese translators. Wang and Wang (2014) offered a summary of the history in translating into foreign languages in China from 2nd century A.D. to the present time. They outlined four
trends in the Chinese translation industry, from preliminary translation period, to the 'inward' translation trend (translating from other languages into Chinese). The first 'outward' translation trend (translating Chinese into other languages) and the new 'outward' trend. Since 1926 when the first English version of a Chinese novel The True Story of Ah Q, written by Lu Xu, a pioneer of modern Chinese novels, the 'outward' trend was mainly led by native English speakers, such as Edgar Snow, Sidney Shapiro, Gladys Yang. However, some Chinese native translators also participated in translating Chinese literature to English. Amongst them were - the renowned translator Lin Yutang translator for Su Dongpo’ verses, Zhang Peiji who translated more than 100 Chinese essays and Xu Yuanchong, who focuses on Chinese literary classics. More recently, some translation institutes and universities in China have begun to launch programs to translate Chinese works. For example, the Translators Association of China has set up the Society of Chinese Classics Translation, whilst the Guangdong University of Foreign Studies established the Centre for Translating Chinese Literature and Culture. Apart from translating literature, there are many other fields that require translation from English to Chinese by Chinese translators, and that is due to the growth of diplomatic, business and academic exchange. This is why the universities choose to educate their students to be capable of translating in both directions and China Accreditation Test for Translators and Interpreters (CATTI) introduced tests including Chinese to English and English to Chinese.

The trend of A-B translation is prevalent in the translation industry. However, studies of translation in A-B and B-A directions are limited. Researchers that are attracted to the topics include translation strategy (Krings, 1986), time-spent (Ferreira, 2012), and translation style (de Lima Fonseca, 2015). Translation problems are also getting more attention. Pedersen (2000:110) stresses on the similarity in the two directions of translation that both directions of translation involve understanding and producing. However, Campbell (2014) suggests translating from B language requires more energy in 'comprehending' the source text,
whereas translating into a second language creates a problem in 'productivity'. These contradicting findings require more in-depth studies to provide a practical solution to the problem. It is worth noting that the direction that translation takes in different language pairs may display different features. For example, a language pair like French and English share common words and expressions may be less difficult to translate compared to English and Chinese. Therefore, there is a requirement for more investigation in this language pair.

Although research into translation problem-solving is on the increase, not many studies have investigated translators' information seeking behaviour in different translation directions. Mutta (2014) considered the possible effects that may be brought into information seeking behaviour in using A language and B language. Their research focussed on two studies that were reported because of the students’ digital literacy in 'relevant and critical use of the material found on the internet' (Mutta, 2014: 228). The first study investigated how translation students sought information in either A language or B language to answer simple questions like 'what is the height of the tower of Pisa?', or 'where in France can bog rosemary be found?' (Mutta, 2014: 231). In the first study, it is found that less time was used when searches and queries were conducted in the A language as they were able to use more keywords. The main focus of the second study was to explore if increasing awareness affects the search process.

The second study required students to translate ten words from B language to A language. These subjects were then given training on the critical use of digital media to find words or compare information. They were then asked to translate a 168-word text into B language. The second study focused on the use of resources, number of queries, the relationship between a successful search and the complexity of the task and the information seekers' profile. The results showed that raising awareness improved the students’ digital literacy. Students are not restricted with the search
results and reliability of resources.

It is admitted in the investigation by Mutta (2014) that the study of resources, queries and seeking paths are essentials for information behaviour. However, translation was in effect not placed at the centre of the study. In their first study, answering the simple questions can only reflect normal information seeking behaviour in daily life. What was actually explored was the effectiveness of using A language and B language whilst conducting searches. Although the researchers claimed that seeking information in A language had less time-spent and tended to be more efficient, what is noteworthy is that the proportion of information contained in the system can differ, which may affect the user's efficiency in searching in a different language. For example, more resources may be available in English than in Finnish as Finnish is a lesser spoken language. The second study would be more relevant to both the subject of translation and the present study. For example, the use of resources and the formulation of search phrases in A language and B language can reflect information needs in the translation process. However, the study did not go into too much detail on how the use of resources and search words go towards helping to solve translation related problems, which is the main focus of the present study.

The two translation tasks are not balanced either, which may create a great divide in the search performance. Since the process of seeking information to assist in translating ten words from B to A cannot be the same as translating a passage of 168 words to B language.

In the present study, a more careful selection of texts will be used to maintain a better balance in the difficulty of the tasks and also offer more insight into the information seeking behaviour in two directions.
In summary, the practice of translating in the A-B and B-A scenarios refutes the view that translation can only be performed from B to A language. However, due to the different level of competence required in the A and B languages and the nature of two, the translation process in two directions may show different features, which need more attention from the translation research community. As information seeking is embedded in the translation problem solving process, more practical evidence is required. The present study aims to fulfil this need and investigate information seeking behaviour in Chinese - English translation and English translation.

2.6 Methods for studying translation behaviour

The present study on the behaviour of translators is embedded in process-oriented translation studies. Translation behaviour can be seen as the combination of cognition (Wilss, 1996) and actions (Dam-Jensen and Hein, 2009).

For example, when Wilss (1996) investigated the knowledge and skill aspect of a translator’s behaviour, the core issues discussed centred on the translation process, procedures and the role of the translator. However, Wilss' (1996) study was conducted when Internet was not available as a tool for translators. With the aid of computers and Internet, a translator's behaviour has transformed dramatically. Therefore, it is necessary to investigate the translator’s behaviour in the present time.

The present study seeks to explore translators' information seeking behaviour in exploiting online resources to solve translation problems.

Two methods are designed to investigate a translators' psychological status and attitude.

1) Written reports, which would include questionnaires and translation diaries. By using this method, translators will be required to finish questionnaires (e.g. Orozco and Hurtado, 2002), 'translation diaries' (e.g. Fox, 2000), 'recording sheets' and
'answer sheets' (Atkins and Varantola, 1998; Frankenberg-Garcia, 2005) to document any problems or decisions (Gile 2004) that they have made during the translation process. According to Fox (2000), these written reports can raise a translators’ awareness of the translation process (Gile 2009) as well as offering a good record for investigators to have a better understanding the process. However, there are certain disadvantages of using such methods. When answering questionnaires, participants are often 'led' by the questions and options offered by the researcher, which does not offer them an opportunity to express their own attitude. Besides, questionnaires, diaries and answer sheets require participants to spend too much time on recalling the process, which may lead to distorting or restructuring their thinking process.

The second method is the think-aloud protocol (TAP). This method requires participants to report their thinking process orally during or immediately after a translation work. At the end of their reporting process, the researcher will transcribe the report into texts to be studied. Compared to questionnaires and translation diaries, the data collected by means of TAP can be more efficient and more accurate, as it is able to extract 'active information' from a participant’s working memory which allows the participants to express their thoughts directly (Ericsson and Simon, 1980). Due to the merits of TAP, it has been used widely to examine translation issues such as translation strategies (Gerloff 1987, Lörscher 1989, and Tirkkonen-Condit, 1992), translation competence (Jääskeläinen 1997, Tirkkonen-Condit, 1991; PACTE, 2003; Anelone and Shreve, 2011) and the translation speed (Tirkkonen-Condit, 1991; Jääskeläinen, 1997). TAP, however, also has its disadvantages. Some scholars are worried that it will affect a translators’ working process as they will need to make an extra effort to verbalize their thinking process (Krings, 2001). Besides, 'automaticity in expertise' (Ericsson 2010) may lead to the loss of information, because participants may overlook the necessity of reporting an issue which could contain essential data for the researcher.
Considering such weakness, the present study is to set up a regime to reduce interference for participants while they are reporting and give them cues to help them put into words their thinking process as completely as possible.

First. Before the experiment, all participants are made aware of:
- The purpose of the research
- The procedures of conducting the research
- General introduction to the materials

Second. Participants will be given training of TAP, which includes a demonstration video, explanation by the researcher and two initial TAP tasks before they officially begin the translation tasks.

Third. Participants will be encouraged to report anything related to the translation process, with the focus being on information seeking in order to elicit sufficient data. However, the researchers main focus will be on all aspects of information seeking.

Admittedly, there are many ways for researchers to extract the information they require which in this case is what is on the translator’s mind and how aware they are of their thoughts. This can be done through written and verbal reports however, how translators act is also worth an investigation, as it can also be a reflection of the translation process. Moreover, translators may react to translation problems automatically and unconsciously. That is why a number of tools have been introduced to help the investigators to observe the process and collect data as a complementary to translators’ self-reports. Two main methods that are used in studying the translation process is eye tracking and key stroking.

Eye tracking is a method which displays and records the movement and gaze point of the eye with onscreen interaction (O’Brien, 2006: 85). Applied in translation studies, it is often used to investigate cognitive effort in input, transferring and output of the translation process (e.g. Pavlović and Jensen, 2009), different working patterns and
habits between professional translators and novice translators (O’Brien, 2006), as well as translation unit (Jakobsen, 2011).

Keystroke logging relies on programmes such as Translog and Input log to reveal interaction between the computer and its user. It can record certain computer activities, including keyboard actions, scrolling and cursor navigation. There are four main strengths for keystroke logging:

1. Computer actions are recorded and attached with a timestamp, which allows the experimenter to have quantified data;
2. Compared to direct observation of the researcher or a video recorder, keystroke logging is less obtrusive to run in the background, which would also add to the ecological validity of research
3. The generated data files are exported to other statistical software such as SPSS and SAS for further analysis
4. Data obtained by other methods such as TAP and eye tracking can also be integrated with keystroke loggers for cross examination. Because of such features, it has been implemented in aiding researchers to observe and analyse writing since it 'offers an opportunity to capture details of writing ... (and of) how language users navigate through the task of producing or understanding text' (Spelman Miller and Sullivan, 2006: 1-2).

As text comprehension and text production are also important stages of the translation process, keystroke logging has also been employed in translation studies, especially with the advent of Translog, which has been specifically designed for translation studies. It has two main functions: record and replay. The record function and helps to document and log files of all keystrokes during editing a text (typing, backspace, cut-and-paste, cursor movement etc.) as well as pauses. All these activities can be replayed in three modes including user view (the view of the window that the translator has worked on), linear view (demonstrated with plots) and pause plots (visualized by a 2D graph). These features enable researchers to 'acquire objective,
digital data for human translation processes' (Carl, 2012). That is why a number of studies have emerged with the support of Translog. For example, the presentation with time lines added to the accuracy of the translators' time and effort allocation in different stages of the translation activities (e.g. Jakobsen, 2002). The pause function has been implemented to indicate translation problems and translation units (e.g. Dragsted, 2005; Buchweiz and Alves, 2006; Alves and Vale, 2009). These features are strengthened further with synchronisation and cognitive processes, because straightforward explanation for the actions can be provided by the participants instead of indirect interference from researchers. Therefore, combining both keystroke data and cognitive report obtained from think-aloud and retrospective theories may offer more accurate evidence for the present study.

However, Translog has some shortcomings which may be responsible for inefficiency in the present study.

First. Translog focuses mainly on text production, the interaction between resources and texts cannot be recorded, which happens to be the core of the present study. Second. 'Translators have to translate into a program they do not normally use' (Lauffer, 2002: 67), which decreases the ecological validity of the study. Third. The present study involves the Chinese language, which is not compatible with Translog. Fourth. The present study needs to replay recordings to give participants a nudge to recall the information seeking process during a retrospective interview. However, because Translog only replays backwards and forwards at different speed rates and does not take you to the required session directly, it will make the interview less efficient as it will be too time consuming.

An alternative programme for keystroke is Inputlog. This is a less commonly used tool in translation studies, for it is designed mainly for the writing process. However, because of its versatility, it has attracted a lot of attention from translation researchers.
For example, Schrijver et al. (2016) investigated the writing training relationship with trans editing in translation.

Inputlog has five modules: record, pre-process, analyse, post process and play. The record module helps the researcher to collect data from computer activities such as typing in Microsoft Word, windows changes, keystrokes, mouse movement and clicks. The pre-process module is for screening and recoding data based on events (keyboard, mouse and speech), time, or window changes (Microsoft Word or browsers such as Chrome, Firefox or Internet Explorer) and report on the sources used in the writing process. The analysis module is to generate data regarding text, source and workflow. Post process is used to merge data files from the analyse module for further data analysis such as SPSS. The last module allows a replay of the output process on word under high speed and low speed mode.

Unlike Translog, Inputlog has several advantages in supporting the present study. Firstly, Input log allows users to work on MS word, which more translators are familiar with, thus increasing the ecological validity of the research. Secondly, it can reflect on a translators' interaction with resources. Search actions are documented in log files of focus and resources, with each time lengths counted. By examining the log files, the researcher can easily retrieve the relevant data in relation to the search queries, urls and time lengths. By examining the data, the researcher can trace the translators' search terms, websites and the duration of the focus on a resource. However, as the replay function is based on data and not video, the replayed data may differ from what is presented on the screen during the actual translation process. For example, when a website is updated, the image can only show the new version rather than the original one seen by a participant. In addition, the replay function does not allow pauses, which also makes it difficult to use during the interview. Thirdly, although the new version claims to be compatible with the Chinese language, it still fails to capture some Chinese language characters using Chinese input methods that have not been developed by Microsoft. Considering these drawbacks, keystroke
logging does not seem to be a very efficient way for data acquisition for the current study. Screen recording is where software such as Blueberry’s BB, FlashBack or TechSmith’s Camtasia Studio is used to capture all the translators' activity on the screen. For example, how translators use web sources (Raïdo 2014) and translation revision habits (Shreve, 2006). It can be applied to study translators’ competence (Göpferich, 2009) and training (Angelone 2012). Compared to video recording, it focuses more on the activities on the computer and displays how translators interact with texts. In Angelone’s (2012) study, screen recording is combined with TAP to capture both the translator's behaviour on screen and their mental processing when completing a translation assignment. The record and reflection are used to help translators to identify translation problems. With the help of screen recording, translators are able to observe this process directly and relate to it during their concurrent verbalization and find the difference from professional translator’s video. This means that students can easily identify their problems in the process. This study uses screenshots to demonstrate how screen recording can be used to provide tangible and practical evidence to support the evidence of TAP verbalization. However, this study does not go into detailed analysis of the data.

In a recent study, Angelone (2016) triangulated screen recordings and TAP and a follow-up interview to investigate the translators’ intercultural competence. He introduced Byram’s (1997) Intercultural Communicative model, which acts as a theoretical framework for classifying the translator’s behaviour. Thus, video recording and screen recording enables researchers to identify any problems whilst observing the behaviour of the translator' at the same time. Moreover, with the replay function, researchers are able to take a closer look at the data. In the present study, screen recordings have been selected as it is less intrusive than video recording and will be less disruptive to the participant as well as lessening their unease.

In conclusion, various methods can help to enhance a researchers' question raising and data collection in studying different topics regarding the translators' behaviour.
However, when the same methods are applied in translation process-oriented studies, it was found that little research was conducted with a firm theoretical foundation. The majority of studies that are available only investigate some phenomena without providing a solid theoretical framework. To improve this, the present study will bring several models of information seeking behaviour from information science to help form the theoretical foundation of the study.

Chapter 2 discussed previous literature on information seeking as a solution in solving problems in translation studies. Although information seeking was seen as a key competence for translators, limited research was conducted on how translators’ information seeking behaviour performed in the translation process. In exploring what information seeking process is, various information models were reviewed. Some models tend to look at information seeking behaviour as a static and system-oriented process; whereas dynamic models centre around the changing status and the interaction between information users and information system.

Although dynamic models were proposed, few empirical data have been gathered to provide further support. Translation studies, in particular, have been on the preliminary stages. In terms of participants, large number of studies were conducted among student translators, not many focused on professional translators, especially early-career professionals.

As translation is related to language pairs, directionality can result in different information seeking behaviour based on the features of different translation directions. Due to common practice for Chinese translators in working into both directions, there is a need to explore information seeking behaviour in two-way translation.

It is on such basis, an empirical study over early-career translator’s information seeking behaviour was undertaken. Informed by former information seeking models
and previous process-orientation translation studies, several questions were asked to understand translator’s information seeking patterns. The next chapter (Chapter 3) presents research questions and how it related to the aim of the current study.
3. Methodology

As so much importance is given to exploring the translators’ information seeking behaviour in Chapter two, this chapter first proposes five research questions to investigate translators’ information seeking pattern (Section 3.1). Then it sets out to clarify key terms used in the current studies (Section 3.2). In order to explore the information behaviour, an experiment is designed including selecting participants (Section 3.3), following a series of procedures and data collection (Section 3.4) and confirm the translation source texts (Section 3.5). An analysis framework (Section 3.6) is also provided to guide the research.

3.1 Research aim and research questions

With an increase in awareness of the importance of information seeking as part of the translation process, there is still very limited research on solving translation problems. Especially for the two directions of translation in a language pair. The present study explores the manner in which translators interact with information sources and solve translation problems by forming a pattern of information seeking in A-B translation and B-A translation – Chinese to English and English to Chinese translation.

The present study adopts a user-centric view placing the translator at the core of problem-solving. Its main focus is on investigating how translators utilize information resources to help solve translation problems. For this purpose, the relationship between the three dimensions are examined: texts, information sources and the translator. It also responds to the dynamic nature of information seeking. Therefore, it not only examines information seeking at different stages but also look at the translators' reactions to a change in situations by examining both their behavioural and mental activities.
To achieve such a research aim, five research questions need to be addressed:

RQ1: What text-related information-seeking triggers do translators identify?
RQ2: Through what process of information seeking do translators manage these information-seeking triggers?
RQ3: How do translators perceive the effects of their information seeking result?
RQ4: What factors can be identified that affect a translators’ perception in seeking the result?
RQ5: In what ways do translation directionality affect the issues in RQ1, RQ2, RQ3 and RQ4?

These five research questions are interrelated. The first four questions together form the whole information seeking process and reflected the three dimensions of information behaviour including texts, resources and behaviour. The interaction among the three is continuous throughout the whole process, although there is a specific focus for each question. For example, the first question mainly focuses on information-seeking triggers which are text-based. However, it is also closely related to the translator and the resources. Since it is the translator who propose a need and the use of resources reflect the types of information need. In addition to the first four questions, the last question reflects the relationship between translation directionality and information seeking behaviour, which is the core of the current study.

In order to address all the above questions, the study investigates both the English-Chinese translation process and the Chinese to English process. The methodology includes mixed methods eliciting data via TAP protocols, screen recordings, and interviews. It is necessary to be as close as possible to the natural working environment of professional translators in response to ecological validity. It is the choice of the participant as to where he/she would like to perform their
translation task, at home or work. At the same time, the observation tools are selected keeping in mind the need to keep intrusion to the translators work to a minimum.
3.2 Key terms

In this section, key terms are provided to clarify key concepts involved in this research and help to define the scope of the current study. Considering that the present study integrates two disciplines – information science and translation studies, concepts from both subjects that are deemed to be relevant to the present study are discussed.

Information seeking

The confusion of information seeking is often brought by synonyms such as information searching, information retrieving (see Section 2.3). As this study is focused on the users' role and the dynamism in problem-solving, the relationship between knowledge, information system, problematic situations are taken into account. For this reason, this study has adapted the definition from Case (2012: 386) and presented it as behaviour eliciting information from the information system. This is when a user experiences a problem, but their knowledge is not sufficient to solve the problem. For the scope of the present study, only translators’ online information seeking is investigated.

Information seeking triggers

An information trigger in translation terms refers to anything related to the task that prompts the translator to identify a need for seeking information. It can be the background information to enhance their understanding of the source text or 'a particular point in the source text' (Gough, 2016). According to Gough (2016), the second type of information seeking trigger is similar to the research unit, a lexical item (a single word, part of a word, or a chain of words that acts as a unit of meaning). However, the result of such triggers in certain information need not only be at the
semantic level, it may also involve other levels such as spelling, grammar and collocation.

In the present study, two methods have been devised to identify the triggers: through TAP, participants report the triggers whenever they suffer a difficulty. For example, in a study, the participants reported, 'search for 西红柿炒鸡蛋 (scrambled eggs with tomatoes)'. In this case, "西红柿炒鸡蛋 (scrambled eggs with tomatoes) " was identified as the trigger. If the participant does not report a trigger, the screen recording offers the researcher evidence to identify it, such as interruptions at a particular point in the translation work flow followed by a series of search actions. What is worth noting is that the information seeking trigger may not follow the point where the translator stops immediately. It is quite possible that it can be several words or one or two sentences away from the point, because the translation unit is not always word by word. To facilitate the identification of the triggers, eye-tracking could prove to be a good supporting tool, especially with the measurement of point of gaze. However, to be more accurate, the present study focuses on the related search actions, such as the use of search terms and the information contained in the browsed web pages. For example, in the English translation of the study, participants did not report any search activities for revamp. Yet screen recording show that participants stopped the translation process before revamp.

The information seeking triggers can be found this way. To strengthen the evidence, it is still necessary to have it confirmed by participants later in the follow-up interview. In the case of revamp, participants were asked if they were searching for the word and why they need to take the search actions. A participant in the study confirmed that there was a trigger for information need by acknowledging the fact that he/she did not know what the word meant.

The study exhibits that the majority of information seeking triggers are lexical items based and others are related to the whole text. The present study tends to focus on
lexical triggers, but other triggers are also discussed in the overall information seeking performance of the participants.

**Information need**

A need for information occurs when the translator encounters a difficulty in the translation process, which is anticipated to be resolved by finding answers through external sources. As stated by Enríquez Raído (2011: 152), an information need "is motivated by the desire to solve a translation problem". Such expectations and the predilection of the type of information that is needed. However, it is worth noting that Enríquez Raído (2011:152) claims that information needs to integrate two aspects: recognising a need (search need) and formulating a need (search goal). However, the interchangeable use of information needs and search needs used in her study to describe a specific need caused confusion. To avoid this kind of confusion, in the present study search is replaced with the information seeking trigger, which implies a "recognition of an information need as perceived within the context of translation problem-solving", while using information needs to specify what "type(s) of information is required" (Enríquez Raído, 2011: 152). This is also in line with research need provided by Gough (2016: 65), showing "the nature of information required".

In relation to the studies by Enríquez Raído (2011) and Gough (2016), types of information need are classified into two categories: comprehension-oriented and production-oriented, the former focusing on understanding the text and the latter focusing on expressing it in the target language. These two categories are used as the main codes for information need. Under each category, there are sub-codes that are recognised in the study. For comprehension-oriented information need, to find meaning, to enhance knowledge and to resolve a misunderstanding.

Under the category of production oriented, there are:
To find possible equivalents
To confirm a hunch
To learn to use the equivalent
To look for a better expression

As information seeking is a dynamic process and the need of the information user is constantly changing due to the interaction between the information sought and existing knowledge. For each information seeking trigger, the type of information needed may alter from one sub-code to another, which may also change the comprehension-nature or the production-nature. If there is one trigger to cover both categories of information needs are involved, the third category emerges as a 'hybrid'. The identification of information need is based on the oral report given by the participant and the follow-up interview would help to substantiate the evidence.

It is arguable that the information need for comprehension and production are closely intertwined and can hardly be distinct. What may elude from the research is that the translator did some comprehension or production unconsciously, as according to Taylor (1962), information needs can exist unconsciously, consciously, expressed and on an anticipation based on the prediction of the available information from the system. The present study only investigated the consciously stated information needs. For unconscious information needs, it may be necessary to incorporate Electromyography (EMG) in future studies.

**Information system**

When discussing research that is focused on the information system, Case (2012: 6) points out that the research questions are concerned with the 'artefacts and venues of information seeking: books, journals, newspapers, radio and television broadcasts, schools, universities, libraries, professional conferences, and such like'. Such artefacts and venues have two main functions – storing information and distributing
information. Therefore, the information system can be rendered as a network of information which can be accessed by anyone. This network would include, printed materials (e.g. books, newspapers and magazines), online databases and human beings.

**Internal Resources**

Internal resources include knowledge and memory. According to Bernecker (2011), it is difficult to differentiate knowledge and memory as someone maintains that memory only retains or preserves knowledge but does not produce new knowledge. Whereas the opposite view believes that a person first comes to know by remembering or retrieving knowledge from their long-term memory (Alves 1995; PACTE 2005). In this study, both memory and knowledge are regarded as internal resources.

**External Resources**

External resources refer to information, from data contained in the information system. During the problem-solving process, when internal resources are not sufficient for the problem at hand, external resources are needed.

**Translation process**

Broadly speaking, the translation process can be understood as a workflow of translation services starting from receiving a text, preparation, translating, proofreading and finally delivering with or without feedback from the customer. Among these stages, translating is the core. It involves everything that happens from the moment the translator starts working on the source text until he finishes the target text (Hansen, 2003: 26). The present study not only focuses on the process of translating, from understanding a source text to producing a piece of translation for
the text. During the process, both behavioural and cognitive aspects are taken into account.

**Translation problems**

Translation problems mean difficulties causing interruptions during the translation process. According to the broad definition of a translation problem, it can arise at any stage. However, as this study is focused on the whole translation process, problems only refer to those triggered by source text and lead to an information need.

**Translation directionality**

Translation always involves a language pair, and translation directionality deals with transferring from one language to another.

The problem of translation directionality only emerges when one is dealing in a language that is not native to them and would probably cause a disparity. Simply put, the present study uses A language to refer to one’s mother tongue and B language to describe a foreign language (International Association of Conference Interpreters (AIIC), 2016). So it is safe to say that, translating from A language to B language is called A-B translation; and the reverse is called B-A translation respectively (Pokorn 2005: 37). The present study follows this classification of directions for translation.

**Search cycle**

Search cycle refers to the whole process of information seeking used to solve a translation problem. It begins from identifying an information trigger to the rendering of the target text in relation to the trigger or the suspension of translation problem, "encompassing the selection of an information source up to reaching the destination or destinations in the information source" (Bergenholtz and Gouws, 2010). It
corresponds to research sessions provided by Gough (2016: 65), trying to address certain research unit-information needs trigger in the present study, "whenever a research unit is researching at different times during the translation process". This indicates that a search cycle may not consist of a series of continuous search steps. Instead, it may combine different search steps from other search cycles. In the instance when the participant in the study searched for "Ritz hotel" and "palm court", P3 first searched for them respectively. However, the participants searched for the Chinese version of the Ritz official website both for "Ritz hotel" and "palm court". In this case, the search step for the website should be accounted for the search cycle of "palm court" and the cycle of "Ritz hotel".

In the present study, search cycle is introduced, because it tries to resolve the confusion caused by the inconsistent use of the concept of research session (Gough, 2016) and search session (Enríquez Raído, 2011). In Enríquez Raído' (2011: 362) research, she claimed that this concept concerns "locating relevant information that addresses a single information need". However, as mentioned earlier in the introduction to information needs, Enríquez Raído used a different system by stating information seeking triggers, or research unit by Gough (2016) as information need. Therefore, the search cycle in the present study is consistent with the meaning of research session and search session.

Taking into account the difference in connotations of information needed and keeping the search cycle in mind, this study deems that a search cycle may contain one or more search steps in response to different information needs. This is initiated by an information seeking trigger and information available from external resources. This reflects the dynamic change in the process of information seeking.

The recognition of search cycle is mainly supported by screen recordings. After identifying an information seeking trigger, the researcher moves on to examine all the search actions involved in addressing it. At the end of each cycle it is denoted as being
successful or unsuccessful production in the target language with no more relevant search actions. The search cycle examined in the present study is examined to understand the complexity of information seeking behaviour in the process of solving translation problems. When a search cycle contains more search steps and more types of information need, it means the information seeking behaviour tends to be more complex.

**Search action**

The term search action is used in the present study, which aims to describe a translators’ operations related to accessing information. As the present research only investigated a translator's online information seeking, search actions here include “click” (e.g. click a hyperlink; click a tab), “type” (type a keyword), “enter” (input what has been typed), “scroll” (move the screen to change the display of information) and other computer operations. Search action is similar to but not equal to the concept of research steps provided by Gough (2016: 64). Unlike research step which only counts clicks, search action covers all computing activities adding another search step. The introduction of search action is to help clarify what actions are used to define search step, as mentioned earlier. However, other search actions cannot be ignored, as they may reflect translator's translation process. A typical example in the study is that the P1 highlighted some parts of the source text, which can also serve as indicators of translators' recognition of information seeking triggers and the identification of information need.

**Search result**

Search result in the present study refers to any information generated in response to a search step being a picture, a text, a document and etc. The search result can be either used or not used by the translator. Ways of employing search results includes the use of equivalents found in the search result, understand the meaning of a word by
reading the information provided in the search result. For example, in Search Step 1 for searching *Dolce & Gabbana éclair*, P3 looked at Bing and found a series of pictures of the pasty éclair. Such pictures appeared on the screen are search results.

**Seeking outcome**

Seeking outcome may be confused with the term search result. However, the meaning of these two terms are different. While search result concentrates on the availability of information resulted from a search cycle, search outcome refers to how a translator make use of the search result and produce the translation for an information seeking trigger. In the example of *crustless cucumber*, P3 had a few guesses and she consistently searched for the Chinese expression, pictures and English explanation for the term. Although, she had a basic understanding of the meaning, she did not find a satisfactory equivalent from the searches. As a consequence, she decided not to use any equivalents in the search result and adopted her own version 黃瓜三明治 (Cucumber Sandwich), which omitted the meaning of crustless in her translation. In this case, the participant did not use the equivalent, making the search outcome to "come up with an equivalent". There are four seeking outcomes explored in the current study - "direct use of an equivalent", 'modification of equivalents', "come up with an equivalent", "no relation to the search result".

The structure of information seeking behaviour is demonstrated in Figure 3.1, which reflect the relations among information seeking trigger, search cycle, information need, search step, search action, search result and seeking outcome.

The structure of information seeking behaviour is demonstrated in Figure 3.1, which reflect the relations among information seeking trigger, search cycle, information need, search step, search action, search result and seeking outcome. The boxes include the elements of information-seeking behaviour and the brackets demonstrate the affiliation of these elements. For example, search cycle is formed by information need,
search step and search result. Search step can be one or more search steps and each search step can have various search actions.

![Diagram of information seeking behaviour]

**Figure 3.1 The structure of information seeking behaviour**

Information seeking trigger, search cycle and seeking outcome indicate three stages of information seeking behaviour as indicated by the arrows. At the first stage, when translators encounter information seeking triggers, which originate from the source texts, they have questions around the trigger and hesitate to translate it into another language. To answer the questions, they move to the next stage and begin a search cycle. After the identification of information seeking triggers, translator enter the second stage – search cycle.

A search cycle is consisted of information needs, search steps and search results. An information need marks the beginning of a search cycle. Such information need is corresponding to managing the information trigger. Once an information need is formed, a translator begins to take search steps to find certain information. If an
information need changes, such as from understanding to production in the current study, a second search cycle begins. Search steps are a unit of search cycle. A search step is linked to the information has been searched. One search step needs to focus on one specific piece of information, such as the use of one search term in a search engine or a navigation of one website. The search step ends when the information searched is changed to another one and the second search step is carried out. In this case, a search cycle can be made of a series of search steps. A search step can involve a lot of search actions, such as mouse clicking, scrolling, typing and deleting. Through one or more search step, an information need can be either fulfilled or not. Such fulfilment or failure is called search result, which marks the end of a search cycle.

After one or more search cycles, a translator may decide the translation for the text related information seeking triggers. The relationship between the translated text and the information searched is the seeking outcome, for example, adopt equivalents as they were found in resources or come up with a new translation version. Seeking outcome indicated the final solution to managing the information seeking triggers and it is the last stage of information seeking behaviour.

In the case of P3, the information seeking behaviour for translating gentlefolk was investigated. When P3 encountered gentlefolk, which was the information seeking trigger, she had the first need to find further information about a meaning. Then the first search cycle begins. The first search cycle involved only one search step – using Youdao pop-up look-up function for a better understanding of the text. The search actions for this search step including moving mouse over the English word, typing “gentlefolk” in Bing search engine and clicking on the “search bottom”. She did not decide any translated version for this search cycle, though she became clearer about the meaning after the search result was shown to provide several meanings for gentlefolk. Then she changed her information need to find possible equivalents. For
this cycle, she had two search steps: (1) searching “上流社会 (upper society)”, (2) searching “英国的上流社会和下午茶 (British upper society and afternoon tea)” in Baidu. For each search step, search actions were taken such as typing the search terms and clicking on bottoms. She also got search results, like expressions of "upper society" and “elite”. However, she did not adopt these equivalents. Instead, she used 上流阶层 (upper-class). Therefore, the search outcome was come up with a new translation version.

This figure exhibits a complete process centring around information seeking behaviour. Each element involved was used for detailed analysis of the data in the current study.

3.3 Participants

In recruiting the participants, ethical issues were considered. An ethical self-assessment in comply with University of Surrey was done. All participants in the current study agreed to take part in the current study on a voluntary basis. A letter of consent was issued for each participant to sign and make sure that the participants understand the purpose of the current study, their engagement and the outcome of the current study. According to the letter of consent, all participants understood the structure the EN-ZH translation and the ZH-EN translation tasks. They had the awareness that during the tasks, a screen recorder was set up to record their computer activities and audio recorder was used to record translator’s verbal report in TAPs and interviews. They understood that they had the right to know every step of the research. Participants have right to withdraw from the research at any time. If a participant decided to withdraw, data regarding this participant need to be deleted completely. It is also stated in the consent letter that any record of the participation will be stored anonymously and confidentially. Records that may reveal participants’ identities will not be available to the public; TAP and interview record were transcribed and
translated into English. The data were analysed and the results were reported in the form of research thesis without showing the participant’s identity. During the whole study, there was no risks in harming the participants’ physical health and mental health. There were no financial costs and payment involved in the study. If the participants have any questions and concerns about this research, they can contact the researcher for further clarification. After the pilot study, more than 20 emails with detailed explanation of the current study have been sent to early-career professional translators, including in-house translators and freelance translators. Most of them are my colleagues at former university in China and some others are working partners during my freelance translation tasks. At last, I received 16 responses and 8 agreed to participate in the research. However, as the research was carried out between December 2017 and February 2018, before the Chinese Lunar New Year, 5 candidates were too busy to do the research. At last, three participants were involved in the current study.

All participants for the present study are early-career professional translators. All of them hold a master's degree in translation studies or interpreting. They have been working as either in-house translators or freelancers for at least two years. The education and working background information of five participants are shown in Table 3.1:

<table>
<thead>
<tr>
<th>Participants</th>
<th>Occupation</th>
<th>Working place</th>
<th>Types of translator</th>
<th>Translation working experience</th>
<th>Area of expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>English Teacher</td>
<td>Tianhe Foreign Language School</td>
<td>Freelancer</td>
<td>Six years</td>
<td>International business and trade</td>
</tr>
<tr>
<td>P2</td>
<td>English Teacher</td>
<td>Guangzhou Number One Junior High School</td>
<td>Freelancer</td>
<td>Five years</td>
<td>Political, economic, cultural translation</td>
</tr>
</tbody>
</table>
Since the study attempts to examine the work in a two-way translation – English to Chinese and Chinese to English, all participants needed to have work experience in translating into and out of their A language. All five participants speak Chinese as an A language and English as their B language. As mentioned in Chapter two, it is common that Chinese translators are required to work into and out of Chinese in the industry. A typical reason for this phenomenon is that the number of non-native Chinese speakers who are competent in Chinese cannot meet the massive demand of the Chinese industry.

This study requires all participants to have competence in using computers and online source handling translation tasks. This is because the study aims to investigate the translators’ information seeking behaviour on a digital platform, and screen recording software is used to capture their behaviour to help elicit and analyse data. If the participants are not comfortable about working with computers and use online sources, it may lead to the failure of completing the tasks. Thus, the process may turn out to be interrupted or invalid.

3.4 Research materials

As the present research explored two translation directions, two source texts were used for the experiment: one in Chinese (Appendix A) and the other in English (Appendix B). The theme of both the texts was food culture. The Chinese source text was an excerpt of the article – 'Who is to blame when scrambled eggs with tomatoes do not taste good anymore? ' (2016). It was taken from Sanlian Life Weekly, a weekly magazine that focuses on news, culture and lifestyle. This article presented an outlook on the reason why a typical Chinese food dish, scrambled eggs
with tomatoes, was somehow not tasting as good. The English source text was about the afternoon tea tradition in the UK containing three paragraphs of the article 'Some Enchanted Teatime' (2011), which was published on October 29, 2011 on The Economist.

Selecting appropriate texts is essential for process-oriented practical experiments. According to Krings and Geoffrey (2001: 74), when choosing a document, txt type, length and difficulty should also be taken into account.

In terms of text type, the question is specialised text or non-specialised text, as they may bring different levels of difficulty for translators. As Jääskeläinen (2010: 216) argued, if texts are not from one's expertise it can lead to performance failure from professionalism. Therefore, the texts should not be from a category that is beyond the participants’ capability then it could lead to failure. To comply with this, participants' expertise needs to be taken into account for text choice.

A case in point is Krings and Geoffrey's (2001) study, which utilised 11 technical texts for technical translation studies to explore technical translation students' translation process with and without machine translation. As the participants were trained in translation skills in technical translation, the texts that were selected would not cause much deviation from their normal behaviours. A study among translators specialised in different areas, texts with more general content were preferred. For example, both Enríquez Raído (2014) and Gough (2016) opted for popular-science related text, which is comprehensible, informative and at the same time had "a balanced amount of everyday language with potential translation problems" (Gough, 2016: 70). Texts like these are of a more general information help type to reveal general information seeking behaviour, rather than a special area. The current study also follows such rules to keep the source texts characterised by such features. However, considering that there are more many genres to be explored...
apart from popular-science articles, the current study aims to reveal how a translators’ information-seeking behaviours are revealed by culture-specific texts.

The two texts chosen for the current study give a general introduction to one typical food in either the Chinese or English culture. The choice was made only after consulting with the three participants to get their approval. It was found that all these translators had previous experience in culture-related translation. The selected texts were authentic articles from two popular magazines in China and the UK, one of which covers the Chinese lifestyle whilst the second one covers the Western lifestyle. In addition, The Economist is also gaining popularity within the Chinese community with a large number of translators doing articles voluntarily for the Chinese readers.

Both texts followed a writing style that reflected its country of origin and a balanced mix of daily language and interesting language points which may bring about potential translation problems to prompt information seeking. For example, the Chinese source text contained terminologies (e.g. 西红柿炒鸡蛋 - scrambled eggs with tomatoes; 后熟型 - post-mature), idiomatic expressions (e.g. 死敌 – deadly enemy) and catch phrase, basically Internet slang (e.g. 淘宝买家秀 – picture reviews presented by customers on Taobao, an online shopping website in China). The English source text also contained potential translation problems, for instance, words for describing actions and movements (e.g. sip, nibble and crustless), and proper nouns (Savoy, Berkeley, Dolce & Gabbana). There is some food related jargon in the English source text. However, such jargons did not cause great difficulty and cease the translation process. Learning from all the participants, for both translations, such jargons can be resolved by information seeking.

The length of the text is another factor to be taken into consideration for the present study. The text should be sufficiently long to expose enough translation problems, but at the same time be sufficiently short not to tire the participants. This is
particularly important when TAPs are implemented, these may have a slow-down effect on the translation processes.

Usually the length of an experiment text ranges from 200 to 500 words. For example: Schrijver et al. (2011) used a 250-word long text for his Spanish to Dutch translation test; Gough (2016) used text that was 412 words; Zheng (2014) used two texts that were 178 and 222 words respectively. Although the first text was slightly less than 200 words, the total number fell into the range.

It is thought that a text that is less than 200 words does not provide enough translation problems whereas a text with over 500 words may overburden the participant in a research, thus causing fatigue. Following these rules, the Chinese source text used in the current study has 324 Chinese characters and the English source text has 249 words.

When the length of texts was considered, there was a concern of incomparability between Chinese word counts and that of English. Such difference mainly results from different word account system: a Chinese text is counted by Chinese characters and English is counted by words, when looking at the comparability of length this needs to be taken into account. However, no literature has to date provided a systematic way to figure out the compatibility of length for Chinese and English texts. Only one researcher Li (2010: 21), touched on this specific aspect and calculated the ratio of the number of Chinese characters against English words to be 1.3 based on the Report on the Work of the Government (Zhengfu Gongzuo Baogao)\(^1\) in the two languages. This means that to achieve such compatibility, the number of Chinese characters of a Chinese text needs to be 1.3 times of the English words in an English text.

\(^1\) Report on the Work of the Government (Zhengfu Gongzuo Baogao) is an official document delivered by the Premier on the National People’s Congress of the People’s Republic of China.
However, it seems that the ratio can fluctuate, as pointed out by Li (2010: 21) too that a higher ratio of 1.7 was also possible, based on writing style and document type. In addition, the United Nations Parallel Corpus offered statistics for the number of tokens in English and Chinese parallel texts, according to which, the ratio of the number of English tokens against Chinese tokens approximate at 1.12:1. However, as Chinese text was tokenized by words, which may consist more than one Chinese character, it means that the ratio between Chinese characters and English words can be larger than this.

By calculating the word count of the English translation of the Chinese source text carried out by the researcher as well as the participants of the current study, it found that the ratio varied from 1.03:1 to 1.16:1. Based on three sources of calculated ratio, the current study allow ration between the number of Chinese character in the Chinese source text and the number of English words in the English source text to range from 1.0 to 1.7, meaning that the word count for the English source text can be 190 to 314. Taking this as a benchmark, the word count of the three selected paragraphs of the English source text added to 249, which was within the range of 190 to 314 and happened to be 1.3 times of that of the Chinese source text, corresponding to Li's (2010: 21) estimation.

In addition to the ratio of word count, the current research also attempted to calculate the number of semantic units in terms of phrases. However, as the types of phrases in Chinese are different from those in English, the segmentation of Chinese phrases can be more complex blurring the boundary meaning it is not as clear as English. Unlike English, the relationship between words is established by the frequent use of function words, such as prepositions and conjunctions; whereas Chinese relies more on word order (Lian, 1-15). Moreover, Chinese phrases tend to be embedded in other phrases to form a longer phrasal structure. It can be seen in the example of "一直保存在 20 摄氏度的室温环境下的对照组", translated as "the control group which are stored under a room temperature of 20 degrees centigrade".
As illustrated in Figure 3.2, English phrases tend to be connected in a linear fashion by means of prepositions such as "of", "under" and a clause. However, Chinese phrases can be linked together almost by situating phrases within phrases (Woo, 2004). For this reason, neither the type nor the number of the phrases in the Chinese text can be consistent with those in the English text.

Figure 3.2 Phrasal structures in Chinese and in English language

Therefore, instead of using the Chinese source text, the present study tentatively compared the number of phrases in its English translation with the English source text. 62 phrases and 63 phrases are found respectively, which also indicated the comparability of the two source texts.

The third aspect for text selecting is the difficulty level of the source texts. According to the findings of Dragsted (2005), when dealing with a difficult text, the behaviour of a professional was like a novice translator. Therefore, it is necessary to maintain the text difficulty to be at a level that is reasonable enough to reflect the professional behaviour. This has been explored in some studies - for example, Frankenberg-Garcia (2005) mentioned in her study with advanced English learners that the difficulty of the text was similar to texts used in translation classes for translation students.
However, not many studies have worked out a statistical way to measure the difficulty of the text. It is only recently that, some translation researchers have begun to integrate readability tests in calculating the difficulty of source text (Pavlović and Jensen, 2009; Liu and Chiu, 2011; Sun and Shreve, 2014; Gough, 2016). Readability tests are used as an indicator based on readability formulas, which generated statistical results of readability scores and grade level (the number of years of education). For the English source text in the present study, the average readability grade is 11.8 and the text was deemed as being difficult to read. However, the problem with the Chinese source text is that it is written in Chinese. As the study on readability measurement is still at its initial stages (e.g. Pang, 2006) and no authoritative formulas are available, the present study seeks to calculate the readability of the English translation of the Chinese source text. It was found that the grade for the Chinese source text is 11.0 and was also deemed as being difficult to read. As can be seen from these results, the Chinese source text and the English source text showed an equal level of difficulty in readability.

However, Sun and Shreve (2014) argue that "readability only partially accounts for its translation difficulty level". But Baker (2011) suggests, translation difficulty is not only influenced by text difficulty, the equivalence situations (e.g. non-equivalence, one-to-several equivalence, and one-to-part equivalence) as well as translator factors (e.g. expertise, cognitive capabilities and experience). It is still necessary to identify those translation difficulties. In spite of using a translation difficulty predictor given by instruments, expert judgement can be different to assessing difficulty level of the source text. However, intuition can vary from one individual to another, which may result in a disagreement in assessment as Hale and Campbell (2002: 30) argued that "to this day there is not a single acknowledged procedure for grading texts used for translation teaching, or for measuring the

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2 Based on the score provided by Flesch Reading Ease, Gunning Fog, Flesch, Kincaid Grade, The Cole man, Liau Index, The SMOG Index, Automated Readability Index, Linsear Write Formula.
reliability of translation examinations”. However, every effort was made to ensure that the ZH source text and the EN source text were as comparable as possible.

Enríquez Raído (2014: 96) suggested task descriptions such as translation briefs to be used. Real translation tasks used in the industry usually come with one such brief attached to it, which includes source files, target language, requirements, and deadlines. Therefore, participants in the present study are also provided translation briefs for both tasks (see Appendix C and Appendix D). These briefs include a general introduction to the content of the selected text and major considerations (e.g. subject matter, language, function, audience, place of reception and cross-cultural communication). Such instructions would enable participants to view the task more clearly and help to maintain the quality of the translation.

3.5 Pilot study

To test the feasibility of the research design, the research instruments and analytical framework (Doody and Doody, 2015), a pilot study was conducted with a translation PhD candidate, who was not recruited as the participants for the main study. The pilot study used one female participant, who was in her second year of doctoral study in translation studies. She was born in China where she lived for 22 years. She received her BA in English literature at a university in Beijing before coming to the UK. She obtained her MSC in translation at a UK university and commenced her doctoral programme at University of Surrey. At the time of the pilot study, she was working for translation companies as a freelancer for four years working in both directions for Chinese and English. She is a native Chinese speaker and have been studying English for 14 years. She obtained the English Certificate for Test for English Majors (TEM 8) – the highest level of English test for English major students in China. As the main study aims to investigate information seeking behaviour using computers as the platform, it was important that the participant in the pilot study was sufficiently competent in using computer and online sources.
As the research attempts to explore translator’s behaviour in both directions in a language pair, the pilot study was divided into two parallel sessions. In the first section, the participant was required to translate a Chinese text to English, and in the second section, translate an English text to Chinese. The entire process of translation in each direction was screen-recorded with the software Screen2Exe. At the same time, the participant verbalised her thinking processes. This verbalization was also recorded by a voice recorder for the researcher to annotate and analysis. Based on the participant’s report and initial data processing, the researcher conducted a semi-structured interview with the participant ‘to complement the screen recording the screen recording and the TAP. After the tests and interviews, all data were analysed.

For the pilot study, the two tasks took place in different settings. The participant translated the Chinese text into English in the university’s language lab alone without the presence of other people including the researcher. When translating this text, the participant worked alone to avoid any interruption from other people.

After receiving the content of the participant, the researcher gave a four-day gap for the translation tasks and their follow-up interviews. The gap between the two translation tasks were fourteen days. This gap was left deliberately, considering that the possibility for the participant to feel overwhelmed if the second task is too close to the first one.

In order to ensure all the equipment to work properly, the researcher had tested the computer, screen recording software, audio recorder as well as checked the availability of Internet of the lab. In the main study, these procedures were done by the participants with the instructions from the researcher under remote mode.

Before each task, the participant was informed of how the tasks would be carried out
by the researcher in person and a printed information pack including source texts (see Appendix A and B), TAP experiment description (see Appendix E) and translation briefs (see Appendix C and D). Those experiment instructions demonstrated the setting of the computer, software and audio recorder and how they would be used for performing translation task and how they could capture the participant’s behaviour and record TAP. TAP experiment description gave a brief introduction of the length of source texts, the two-hour time limit of the tasks. A training on producing verbalisation was also showed in the description. This included a demonstration video on Youtube3 (this was changed to a demo video recorded by the researcher). For trial, there are a Chinese sentence and an English sentence for the participant to translate and verbalize the process. In the translation brief. The translation brief was to explain in details the texts’ subject matter, style, and the factors needed to be considered by the participant, such as the subject matter, language, function and both readership of the source text and the target text.

For the pilot study, the first task was conducted on 18 November 2016 and the follow-up interview was on 20 November 2016. It took one hour and nine minutes for the participant to translate the Chinese source text into English in accompany with TAP. After the task, the researcher began to process the data by aligning the screen recording to the verbalisation to see how the translator report her information seeking during translation. The researcher annotated each action of information search taken by the participant and wrote down a detailed description of the actions. A transcript of the participant’s verbalisation was also produced. Then the researcher examined each action and the corresponding verbal report, seeing how each search was explained by the participant. If there was any unreported search or any search not fully explained, the researcher wrote down some questions for the interview so that the participant could give further clarification. The semi-structure interview was conducted between the participant and the researcher based on an interview guideline. Task Two was taken on 3 December 2016 with the interview on 4 December 2016. It followed the same procedures in Task One. There was a 14 days' gap between the dates of doing

3 https://www.youtube.com/
the two tasks, which enabled the participant to have some rest and avoid being tired by the task.

According to the screen recording and the TAP, it was shown that the overall workflow of the participant was: (1) read the title of the article and had a scan of the whole excerpt. (2) clicked the link that was offered in the source text and tried to find the original article; (3) tried to grasp the flavour of the style of the task; (4) began translating sentence by sentence. This workflow, on the one hand, demonstrated the participant’s working habits such as the factors that the participant would consider in doing a translation task; and on the other hand, could show the working setting, such as the availability of the internet and software. This workflow was closely related to the participant’s information seeking behaviour in terms of the sequence of searching and decision-making in using a piece of information.

The workflow of the second task was similar to Task 1 but also had some difference: (1) read through the whole task including the title; (2) clicked the link to find the original task; (3) highlight words that may need search; (4) began to translate the text sentence by sentence. This time, the participant highlighted some parts of the text in Task 2, which was not the case in Task 1. This may be due to the fact that the participant did not meet any problems that affected the understanding of the task. However, as the source text in this task is in English, which was not the A language of the participant.

The pilot study investigated the information seeking behaviour in translating a Chinese text and an English text. The results of both directions of translation were compared. Although the pilot study was conducted with only one participant, it provided preliminary results which form the basis for the categorisations in the main study.

Firstly, most information seeking triggers found for both translation directions were at
lexical level. However, the triggers for the Chinese translation were only terms and common words. Whereas the English translation also has proper nouns and phrases in addition to the first two types. Combining these results with the categorisation of Gough (2006: 65), who indicated general language (e.g. a word) and specialised language (a term) in need of search, the current research investigated specialised terms that used in a subject field and non-specialised terms in daily use.

Secondly, two orientations of information need were identified – comprehension-oriented and production-oriented. Within the category of comprehension-oriented, finding meaning and enhancing knowledge are two sub-categories. The needs under production-orientation include finding possible equivalents, confirming proposed solutions and looking for a better expression. It is found that both translation tasks witnessed more production-oriented need. The participant also demonstrates a large amount of need in looking for better expression. This categorisation also applied to the main study. However, the sub-categories are modified (see Section 4.1.2).

Third, three types of resources were used in the study - dictionaries, search engines and webpages. Both tasks have the same patterns in using resources, with majority need addressed by dictionaries, following by search engines and webpages. However, the main study examined more categories of resources.

Fourth, information seeking strategies were twofold. The first fold is the association with the direct use of ST or TT as a search term. There is a discrepancy between the two translation tasks in this regard. In the Chinese translation, both directions were employed. However, in the English translation, only ST direction was found. Another fold of seeking strategy is about how the participant initiate a search session. In the pilot study, the participant took either core search and periphery search. Strategies adopted in periphery search are ST/TT extract, ST/TT extension, ST/TT partially replaced, using ST/TT related concepts and adopting no research terms. These results
derived the categories of information seeking strategies in the main study.

Fifth, in terms of search results, the participant tends to evaluate the search result based on three factors: existed knowledge, reliance of resources and textual factors. Unlike the Chinese translation which mainly focused on existed knowledge and reliance of resources, the English translation depended more on textual factors. These categories were also explored in the main study. However, instead of merely seeing the numbers, detailed factors were investigated in the main study.

Finally, with the interaction of resources, information needs and search results, for seeking paths were identified for both tasks: one-off seeking, pending seeking, repetitive seeking and progressive seeking. In the main study, not only the types were explored, but also the combinations of these types of seeking paths were found.

Overall, the pilot study was successfully operated. In terms of the experiment procedures, the whole workflow was smooth. The texts chosen for the current study exposed enough information needs which led to translator’s information seeking behaviour. With the experiment guidance, the participant for the pilot study could complete the translation tasks step by step. There were no technical problems occurred during the tasks. Data from screen-recording, TAP and interviews were collected and integrated for analysis. It verified the need to gather data by three methods: complementary data from each method supported the identification of information seeking behaviour, such as information need, resources, seeking strategies and seeking paths, and seeking results. There were from three resources – the computer activities observed from screen recording, the participant’s self-report and the follow-up interview.

The data analysis and the results from the pilot study informed the main categories for analysing translator’s information seeking behaviour in the main study. Firstly, information need was investigated as the initial of translator’s information seeking
behaviour. It was categorised based on the original texts and the purpose of information seeking. It was categorised as either comprehension-oriented or production-oriented. This categorisation follows Frankenberg-Garcia’s (2005) study and based on it, sub-categories were also investigated under the two basic categories:

- comprehension-oriented:
  - finding meaning
  - enhancing knowledge
- production-orientation:
  - finding possible equivalents
  - confirming proposed solutions
  - looking for a better expression

The second aspect for information-seeking behaviour was resources that the participant used in the translation tasks. According the pilot study, three categories of resources were used by the participant, including dictionaries, search engines and website, which were reported in the studies of Gough (2016) and Shih (2017). However, these categories were to be expanded in the main study, considering more participants were involved and the knowledge levels, availability of resources and individual preferences.

The pilot study also offered insight into translator’s seeking strategies – how translator conducted a search. The categories identified in the current study derived from the query types of Enríquez Raído (2014) and Shih (2017). The main focus of the current study was to explore the what were the relationship between search terms and source text or target text. In the pilot study, it was found that both source text and target text were used in forming search terms. Therefore, with source text and target text as the focus, the categories of seeking strategies reflect such relations and thus were divided into core search and periphery search. If a search term only adopted source text or target text as, it was identified as a core search; if a search term was partially or not formed by source text or target text, it was deemed as a periphery
search. Seeking strategies were also related to seeking paths, how the use of search terms and other search actions.

Search results (modified and referred as seeking outcome in the main study) showed how the participant in the pilot study used information she searched to do the translation; if the equivalents she found were adopted as her versions of translation. Observations from the pilot study as well as the verbalisation during TAP and the follow-up interview, two categories of use of information were drawn: (1) equivalents adopted and (2) new version of translation proposed. In responding to search results (modified and referred as seeking outcome), the participant’s perception of information behaviour was investigated. Regarding the reason of the satisfaction level, categories on knowledge, reliance of resources and texts related factors were the main contributors.

The pilot study largely tested that the research the process worked to elicit data and obtain the results. It also provided a basis for identify the main categories of translator’s information seeking behaviour. However, some improvements were made so that the main study could progress more efficiently. Firstly, the length of the English source text was shortened to an extent that a more balanced amount of information triggers for both translation directions. Secondly, more detailed instructions were provided for participants to understand the research procedures including how to use the screen recorder and how to give verbal report during translation. In particular, a demo video was used to explain the TAP process. Moreover, some categorisations were modified to ensure a better investigation of translator’s information seeking behaviour. For example, regarding resources, six categories of resources were explored. One reason could be the number of participants involved. More translators could result in a larger variety of resources.

Despite these changes, the pilot study on the whole played a vital role in ensuring the progress of the main study.
3.6 Research procedures and data collection

As the present study is attempting to investigate how translators solve problems via information seeking channels in two language directions (English to Chinese; Chinese to English), an experiment is conducted to tap into the process. The experiment includes two tasks:

1. Translating an English text (Appendix A) into Chinese and
2. Translating a Chinese text (the English source text).

The computers that the participants used have been equipped with a screen recorder and an audio recorder.

While doing the translation, participants were required to verbalise their mental processes. The screen recorder documented all their computer actions on screen, such as:

- Using search engines such as Google and Baidu
- Opening and browsing web pages
- Typing and pauses

Their verbalisation was recorded simultaneously by an audio recorder. The audio recording was then synchronised with the screen recordings. As the screen recording software did not have the voice recording function, the voice and screen needed to be recorded separately and then synchronised. The data from both the computer activities and verbalisation was processed and analysed by the researcher. At this stage, the researcher replayed the recordings and identify those problems that have not been reported or not clearly stated by the participant.

A semi-structured interview was then conducted with the participant. The interview included general questions about the translators’ working habits regarding
information seeking in their workplace, opinion of the texts used for the study, evaluation of their overall performance, supplement of unreported information seeking behaviour during the tasks and clarification and explanation for the seeking. If their mind goes blank and they are unable to recall details, the participant was allowed to have the recordings replayed.

The next step on completion of the experiment was to transcribe and code all verbalised data further quantitative and qualitative analysis. The whole design for the study is illustrated in Figure 3.3:

![Figure 3.3 Research procedures](image)

**Figure 3.3 Research procedures**

The next step on completion of the experiment is to transcribe and code all verbalised data further quantitative and qualitative analysis. To maintain both the ecological and external validity in the present study, the following two aspects need to be adhered to:

1. The experiment settings. The present study focuses on professional
translators (see Section 3.2 for more) and it aims to reflect their natural work behaviour. Therefore, participants are allowed to choose their normal work settings instead of laboratory condition. In this case, participants were not too keen on working in an unfamiliar environment. In addition, the translators can work on their own computers which are installed with all the necessary software, such as e-dictionaries and web browsers, so as to avoid any time spent in adapting themselves to laboratory computers. Participants are also allowed to use any mechanic translation tools such as Google Translate Toolkit, Trados, or MT which they use in their daily routine as translators. Having tested the source texts with the use of such tools, the researcher found that they were of little or no help for this task.

2. Data collection. the present research has attempted to minimise the obtrusiveness of the instruments in data collection. During the translation tasks, TAP and screen recording have been chosen for obtaining data. Although, TAP has been questioned a lot in process-oriented studies for possible disruption of translators' thinking process, argued with empirical results that TAP only caused slow-down effect. In order to ensure the fluency of the translation process while implementing TAP, participants are allowed to use any language they feel comfortable in to produce the report, such as English, Chinese or a mixture of both. After the initial consultation with the participant, the author of the current study found that no disruption had occurred in TAP. In addition, as the selected screen recorder can be simply operated in the background, participants would not be aware of its presence. The researcher was not present during the whole process. Only when there is a problem with the computer can participants ask the researcher for remote-assistance. Therefore, participants do not need to be distracted by thinking that they are under some kind of surveillance. More about data collection instruments.
There are several types of software available to capture a translators’ computer activities such as key-stroking, eye-tracking, screen recording. This research uses screen recorder to capture the translators’ behaviour on screen. Screen recording involves using the Screen2Exe, this is a specifically designed software system which is used to capture the activities on the computer screen. These include typing, searching on the internet and cursor movement. This tool provides the researcher a more comprehensive perspective into the translators’ on-screen actions as compared to other software like key-stroking or translog which only look at a specific area of computing activities.

Key-stroking is used mainly for recording the translators’ writing process, but it captures behaviour like web-browsing in the form of data. But with the replay function of the screen recording, it can also serve as a reminder for translators to recall their actions and mental process, which will improve the competence of the data. Thus, it can help to achieve the principal aim of this study which is to demonstrate how translators seek information and how they process source texts. As this study is computer-based and online information is readily available for translators, the main aim of this study is to find out how translators seek information online. In addition, most screen recording can operate behind the scenes. Thus, the translating process will not be interrupted, and translators will feel less stressed.

Even though Camtasia Studio is the most commonly used screen recording software, for the purpose of this study, a different screen recording software - Screen2Exe4 will be used. Screen2Exe is more accessible to most users as it is easier to install than Camtasia Studio, its operational interface is very simple and it is an open source software that can be downloaded for free. Specifically for this study, a familiar work platform is important for translators to ensure the workflow does not suffer, so they translators are allowed to use their own computers. Screen2Exe seems to be more effective. Undoubtedly, the screen recording function of Microsoft PowerPoint the

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2016 version and above is another option. But we have to consider the possibility that not many Chinese users may not have the software installed and perhaps prefer to use an alternative such as WPS (Word Processing System), PowerPoint or earlier versions of Microsoft office software, this method of screen recording may not be suitable for the current study. After talking to the participants, the researcher found that none of the three participants had used Microsoft PowerPoint 2016 or above. Therefore, the decision to use Screen2Exe for the current study was made.

In order to capture a translators’ mental process, this research is adopting both the think-aloud protocol (TAP) and interview. TAP, which has been frequently used in process-oriented translation studies, requires participants to verbalize their mental process relating to the translation process. For this study, translators need to focus more on the process of seeking information, for example, explaining their expectations about information, searching steps, reasons for choosing a particular piece of information over another and the final results. The merit of TAP is that it enables participants to relate their mental process to their actions without any delay. In this way, their thoughts can match their actions, and this will offer authentic and effective data for this research.

However, there are pitfalls (see 3.2) in this method as well, i.e. translators might not report an action as they have not noticed it. Secondly, translators may be too stressed to reflect, which will result in inadequate data collection. To minimise these dangers and to ensure the adequate collection of data (for this study), translators will be trained in verbalization before undertaking the real tasks.

The third method used in this study will be interview. This will be used as a follow-up to TAP, during which a recorded screen will be played back to the participant who will be asked firstly to explain those actions that have not been reported and clarify some doubts from the researcher. Then the participants will present their impression of the difficulty and their satisfaction or dissatisfaction with the tasks. These data will
supplement data collected from the TAP process.

Data from screen-recordings, TAPs and interviews were collected, transcribed for further data preparation. The data coding system were largely based on Enríquez Raído (2014) and Gough (2016) coding system. For example, as for screen recording and TAP, a time-frame, window and URL were used. Moreover, participants’ query and consulting times were also added. These data at the first stage were coded for further questions used in follow-up interviews, especially specific questions for the understanding of each participant. These data together with interview data were coded for categorisation of translator’s information seeking behaviour. For example:

<table>
<thead>
<tr>
<th>Table 3.2 Sample for data coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
</tr>
<tr>
<td>Translation Direction</td>
</tr>
<tr>
<td>Information-Seeking Trigger</td>
</tr>
<tr>
<td>Translation for The Text</td>
</tr>
<tr>
<td>Information Need</td>
</tr>
<tr>
<td>Number of Resources Used</td>
</tr>
<tr>
<td>Number of Search Steps</td>
</tr>
<tr>
<td>Type of information need</td>
</tr>
<tr>
<td>Seeking Outcome</td>
</tr>
<tr>
<td>Self-Perception</td>
</tr>
<tr>
<td>Factors for self-perception</td>
</tr>
</tbody>
</table>

In Table 3.2, the left column displays the coding system which covers the four aspects of the information seeking behaviour: information need, resources, seeking strategies and paths as well as seeking outcome and self-perception. The right column is individual information seeking behaviour. All the categories were both informed by
previous studies (Frankenberg-Garcia, 2005; Enriquez Raido, 2014; Gough, 2016; Shih, 2017; 2019), the pilot study and the main study. The aim of the coded data was prepared for further analysis to achieve the research objective an answer the research questions. The next section provided the analysis framework for delivering the research results.

3.7 Analysis framework

Upon a relevant literature review in Chapter 2, a research framework (see Figure 3.5) is established based on problem-solving and information seeking models. This research framework is implemented for both language directions: Chinese to English translation and English to Chinese translation.
In this framework, information seeking in translation is regarded as a problem-solving process. The information seeking starts from the identification of a translation problem. By analysing the problem, the translator starts the seeking path by pointing out the first information need. Such a need initiates the first search cycle, involving search actions, the use of resources and thereby delivering a search result. Then translators evaluate the search result and decide if they need to carry out the
next search session. A seeking path can consist of several search cycles. It ends when it gets to a seeking outcome when translators cease their search actions. Throughout the whole process, translators’ active role in solving problems and the interaction of texts, resources and translators integrate to lead the information seeking behaviour. Therefore, the present study uses such a dynamic framework, not only examining translators’ external behaviour but also the mental process to investigate how translation directions influence information seeking.

This framework is correspondent to the research questions in the present study, including translation problems (RQ1), resources (RQ2), information seeking paths (RQ3) and factors for translators to make decisions (RQ4). After examining translators' information seeking behaviour in two language directions: A-B and B-A. A comparison is to answer RQ5. With this research framework, translators' information seeking behaviour can be examined and practical evidence can be derived accordingly.

The present research uses a mix of methods, including screen recording, TAP and interviews, to investigate the information seeking behaviour. For translation problems, both screen recordings and verbal reports are examined for problem indicators. Problems manifest when translators start to search or are reported by the translator. If there is a confliction between the two, for example, translation problems shown in the screen recording but unreported by the translator, translators are required to clarify it in the interview session. The information seeking path is demonstrated by screen recordings, including search actions, information resources used in the process and the search results. However, the need for information is obtained through TAP or an interview. The search outcome is also shown by screen recording. The TAP and interview data also provide information about the mental process - identifying, analysing, evaluating and deciding. These three methods help to cross examine the data, which can generate solid and practical evidence for the present study.
Both qualitative and quantitative methods are adopted in the present research. In terms of qualitative analysis, all the relevant categories and concepts are provided to describe translators' information seeking behaviour regarding translation problems, seeking path and decision-making. Such data are recorded and mapped into the translator information seeking programme. Quantitative data is mainly used to provide descriptive support in explaining the process and support to the qualitative analysis.

Next chapter is going to have detailed examination of the participants' information seeking behaviour in the current study. Relevant data are discussed to provide some evidence for the information seeking framework.
4. Empirical results

This chapter presents a description of the data for the main studies conducted with three participants. As the research attempts to explore translators’ information behaviour in both ZH-EN translation and EN-ZH translation, the data regarding the whole information-seeking process were illustrated in relation to translation directionality. Under the dynamic framework of information seeking, three dimensions of information seeking behaviour are analysed, including texts, resources and translators. It needs to be emphasised that these three dimensions are not separate in the information-seeking process. Instead the interactions with each other forms the whole information seeking process. Therefore, in this Chapter, the analysis centres on these three dimensions and the chapter is divided into five sections. Section 4.1 demonstrates information-seeking triggers derived from the source texts and the translation needs initiated by such triggers. Section 4.2 explores the resources used by the participants in both translation directions. Section 4.3 is about translators’ seeking strategies and seeking paths. Section 4.4 examines the seeking outcome and participants’ self-perceptions.

4.1 Translation triggers for information seeking

This section answers what translation triggers were found and how they initiated information-seeking behaviour in the ZH-EN translation and the EN-ZH translation. As discussed in the methodology chapter, information-seeking triggers in the source text marked the beginning of the whole information-seeking process. The information-seeking triggers reflected triggers in the source text and needed to be managed by translators. There are three dimensions to this- the number, the spread and the types of information-seeking triggers to be explored in both ZH-EN translation and into Chinese. The number of information-seeking triggers demonstrates how many information-seeking triggers are identified in a translation.
assignment; the spread of those triggers shows where the triggers are located in the source text; while the types of information-seeking triggers indicate whether a trigger is formed in non-specialised terms or specialised terms. These three aspects will be discussed in detail next. Information needs are initiated by information seeking triggers and at the same time reflect translators’ connection with source texts and resources. In this section, information needs are mainly explored according to their comprehension orientation or their production orientation.

4.1.1 Information-seeking triggers

As Section 3.4 pointed out three data collection methods are used. Information-seeking triggers in the present study are captured in three ways: TAP, screen recording and interviews. Figure 4.1 illustrates the process of identifying information-seeking triggers.

![Figure 4.1 Process of identifying information-seeking triggers](image)

TAP was the translators' report of the seeking process centring on an extract of the source text. A clear affirmation of the involvement of a trigger involved participants'
reporting a word or a string of words in the source text. For example, when translating 后熟型水果 (post-mature fruit), P2 pointed out that "for 后熟型水果 (post-harvest fruit), I have to use Youdao". If the participant had an idea about the equivalent to the trigger, the equivalent was also regarded as a clue. In the case of crustless cucumber sandwiches, the participant knew a possible way to translate it and thus reported the situation that "just check 无硬皮的黄瓜三明治 (cucumber sandwiches without the hard-outer layer)". Information-seeking triggers were identified from these two statements. However, to confirm these triggers, it was necessary to check whether there were actual information-seeking activities related to the reported trigger. In the last two examples, P2 consulted the Youdao once for each trigger. Therefore, it was confirmed that 后熟型水果 (post-harvest fruit) and crustless cucumber sandwiches were the information-seeking triggers.

In another scenario, the participant did not report which part of the text led him to the seeking behaviour. Under these circumstances, it was necessary to take the evidence from the screen recordings to see whether a series of information-seeking activities directed to an information-seeking trigger. The clues that were found in such activities included the use of search terms or the content of webpage. Normally, a participant initiated a search term based on an information-seeking trigger and then it was used in an e-dictionary or a search engine. For example, P3 used the search term 低温 (low temperature) in the Baidu search engine. When comparing the search term with the source text, 低温 (low temperature) was identified as a potential trigger for information-seeking. To verify this, the participant was asked in the follow-up interview to confirm if this was what needed to be searched. The relativity of the search term and the information-seeking trigger was revealed specially by the initial search term used by the participant.

However, a combination of screen recordings and follow-up interviews were necessary to confirm an information-seeking trigger when the initial plan did not generate any clear results. Participants could either modify the search term in various
different ways, e.g. adding new words; replacing parts of the words; reducing words; formulating other search terms (more discussion on the selection of search terms will be presented in Section 4.2).

Continuing with the theme of search terms, an information-seeking trigger was proposed, and then needed to be confirmed by the participant. If the participant did not use any search terms and began with a webpage, then the content of the webpage was examined to see what part of the source text it was related to. The participant was also asked to recognise an information-seeking triggers by answering the following question:

"Which part of the text you felt the need to look up?"

However, in the current study, it was found that all the information-seeking activities involved the use of search terms. Therefore, the identification of information-seeking triggers was based on the participants' TAP report and a combination of the use of search terms as well as the confirmation provided in the follow-up interview.

By analysing the results of TAP reports, screen recordings and follow-up interviews, it was found that the number of average information-seeking triggers in a Chinese source text was 11, whilst the average number in the English source text was 16.3, as shown in Table 4.1. This means the mean of information seeking triggers identified by each participant. The average of information-seeking triggers in the EN-ZH translation text were almost double that of the ZH-EN translation text. This indicates that participants were confronted with more translation triggers when they were translating into their A language.
Table 4.1 Number and ratio of information-seeking triggers in the two source texts

<table>
<thead>
<tr>
<th>Participant</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of information-seeking triggers in the Chinese source text</td>
<td>13</td>
<td>7</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Number of information-seeking triggers in the English source text</td>
<td>18</td>
<td>13</td>
<td>18</td>
<td>16.3</td>
</tr>
<tr>
<td>Ratio</td>
<td>1:1.38</td>
<td>1:1.85</td>
<td>1:1.38</td>
<td>1:1.48</td>
</tr>
</tbody>
</table>

This difference was also due to the participants' individual situation. Both P1 and P3 had 13 Chinese information-seeking triggers, 1.38 times higher than the English ones. P2 had fewer translation triggers in the ZH-EN translation, as only 7 information-seeking triggers were identified. However, the number for English information-seeking triggers was a huge 13, making the ratio 1.85. Such excess in English information-seeking triggers was consistent with the overall performance of all participants.

Despite the texts being of the same length, there was an imbalance in the spread of information-seeking triggers in the source texts. However, it was found that for all three participants, a similar pattern of information-seeking triggers could be identified in both ZH-EN translation and EN-ZH translation. Figure 4.2 and Figure 4.3 show how the information-seeking triggers are spread across the passages of ZH-EN translation and EN-ZH translation.
Figure 4.2 Spread of information-seeking triggers in the ZH-EN translation
Some enchanted teatime

For more than a century, the Palm Court at the Ritz hotel in London has resonated with the clink of fine china, as gentlefolk sip afternoon tea and nibble cucumber sandwiches beneath glittering chandeliers. The silver tea service and strains of Chopin bespoke a bygone era. But a revamped version of afternoon tea is thriving.

Since 2004, the Ritz has served “afternoon” tea from 11:30am to 7:30pm; it hosts nearly 150,000 people a year. Saturday slots at the Savoy are booked up three months in advance. The Berkeley hotel in Knightsbridge changes its tea menu (cakes and other goodies are typically part of the package) every six months; recent offerings have included a “Valentino Dutch cake” and a “Dolce & Gabbana éclair”. The economic doldrums have not hit demand; they may even have enhanced it.

When tea leaves were first imported to Britain in the 17th century, only a few could afford them. By the 18th century it had become the democratic drink of everyone; but afternoon tea as a distinct ceremony, complete with pastries, was a Victorian invention. A “mania for thinness” sent it into decline after the Second World War, says Helen Simpson, author of a book on the subject. The gradual infiltration of American coffee culture also played a part, as did the rise of women in the workforce (less time for sipping), the widening array of social haunts and the ebb and flowing of formality (the Ritz still bans jeans and “sports shoes”).

Figure 4.3 Spread of information-seeking triggers in the EN-ZH translation
Table 4.2 Spread of information-seeking triggers

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Para 1</th>
<th>Para 2</th>
<th>Para 3</th>
<th>Para 4</th>
<th>Para 5</th>
<th>Para 6</th>
<th>Para 7</th>
<th>Para 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0/50</td>
<td>15.4/50</td>
<td>7.7/50</td>
<td>13.1/50</td>
<td>0/50</td>
<td>12.3/50</td>
<td>5.9/50</td>
<td>0/50</td>
<td>0/50</td>
</tr>
<tr>
<td>P2</td>
<td>0/50</td>
<td>15.4/50</td>
<td>5.1/50</td>
<td>0/50</td>
<td>0/50</td>
<td>0/50</td>
<td>3.2/50</td>
<td>0/50</td>
<td>0/50</td>
</tr>
<tr>
<td>P3</td>
<td>11/50</td>
<td>30.8/50</td>
<td>12.8/50</td>
<td>3.9/50</td>
<td>0/50</td>
<td>9.2/50</td>
<td>5.9/50</td>
<td>0/50</td>
<td>0/50</td>
</tr>
<tr>
<td>Mean</td>
<td>3.7/50</td>
<td>20.5/50</td>
<td>8.5/50</td>
<td>5.7/50</td>
<td>0/50</td>
<td>7.2/50</td>
<td>4.0/50</td>
<td>1.1/50</td>
<td>0/50</td>
</tr>
</tbody>
</table>

The spread of information-seeking triggers was displayed differently from one paragraph to another. In the Chinese source text (see Figure 4.4), the participants had the most information-seeking triggers in Paragraph 1 (15.4 triggers per 50 words for P1 and P2, and 30.8 for P3) and none in Paragraphs 4 and 8. Paragraph 2 was second behind Paragraph 1 based on the mean calculated and it was consistent with P2 and P3, even though P1 had found more triggers in Paragraph 5. The spread of information-seeking triggers shows more individuality in the Chinese source text, as Paragraphs 3, 5 and 6 had them spread more randomly for all three participants. In the English source text (see Figure 4.5), most information-seeking triggers were found in Paragraph 1 by all the participants with the least being found in Paragraph 3.

Table 4.3 Ration of information-seeking triggers in paragraphs

<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Para 1</th>
<th>Para 2</th>
<th>Para 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0/50</td>
<td>32.1/50</td>
<td>12.5/50</td>
<td>1.8/50</td>
</tr>
<tr>
<td>P2</td>
<td>0/50</td>
<td>21.4/50</td>
<td>12.5/50</td>
<td>7.2/50</td>
</tr>
<tr>
<td>P3</td>
<td>0/50</td>
<td>17.9/50</td>
<td>17.5/50</td>
<td>9/50</td>
</tr>
<tr>
<td>Mean</td>
<td>0/50</td>
<td>23.8/50</td>
<td>14.2/50</td>
<td>6/50</td>
</tr>
</tbody>
</table>

Despite the difference, there was a tendency for greater density in the first half as compared to the second half. In both the Chinese and English source texts, 20.5, 8.5,
5.7 and 0 information-seeking triggers per 50 words were available in Paragraph 1 to Paragraph 4 respectively as opposed to 7.2, 4.0, 1.1 and 0 from Paragraph 5 to Paragraph 8. Similarly, the English source text showed more information-seeking triggers in Paragraphs 1 and 2 with 23.8 and 14.2 per 50 words which, on average is 6 more than Paragraph 3.

One reason for this problem could be that participants had put in different amounts of effort in the translation processes. For example, translators may have concentrated more on the first place and losing focus as they continued on. This was the case in the pilot study, in which a participant claimed that she felt tired when she did the EN-ZH translation. However, the participants in the main study did not report any such feelings.

Another possible reason could be attributed to the uneven spread of non-specialised terms and specialised language working as potential prompts for translation triggers, for example, food-related terms. As the two translation texts were authentic texts from *Sanlian Life Weekly* and *The Economist*, the use of language was decided by the authors of the original texts and not manipulated by the researcher. Moreover, the difference in the spread of information-seeking triggers can reflect the participants' own different needs for information for non-specialised terms and specialised terms. However, without an analysis of the data, it may be wrong to speculate if it is only a specialised language that concerned most of the participants. In addition, whether they had the same type of information-seeking triggers in the ZH-EN translation and the EN-ZH translation.

### 4.1.2 The types of information-seeking triggers

An analysis of the data revealed that both the non-specialised terms and specialised terms were taken as information-seeking triggers in the EN-ZH translation and in the EN-ZH translation (see Table 4.4). In the EN-ZH translation, an average of 5.7
information-seeking triggers were generated by non-specialised terms, such as 冷藏 (refrigerated), 孽缘 (doomed relationship), 成列柜 (display shelf), among which some were culture-specific, such as 农夫集市 (farmers market). These words were used quite commonly in the Chinese language. The main reason that the participants had difficulty in expressing them in English will be discussed further in the next section 'the understanding information-seeking needs'. Whereas, the number of information-seeking triggers resulted in specialised language was 5.3 per person. These triggers contained terminology of a subject, such as biology (e.g. 后熟型水果 post-mature fruits), chemistry (e.g. 芳香成分 aroma compounds), logistics (冷链 cold-chain), thermology (e.g. 室温 room temperature) or a terminology widely used in sciences (e.g. 对照组 control group). In addition, specific language also alluded to Internet slang, such as 变身淘宝买家秀 (discrepancies between the real product and the picture presented by the seller), which was used to explain how the taste changed in tomatoes in a humorous way. From the performance of all 3 participants', specific language accounted for the main information-seeking triggers in the EN-ZH translation.

<table>
<thead>
<tr>
<th></th>
<th>Number of non-specialised terms as information-seeking triggers</th>
<th>Number of specilised terms as information-seeking triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1</td>
<td>P2</td>
</tr>
<tr>
<td>ZH-EN translation</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>EN-ZH translation</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

In contrast, EN-ZH translation saw an even bigger difference between the two types, as 10 information-seeking triggers were found for non-specialised terms, compared to 7.7 for specialised terms. The non-specialised terms information-seeking triggers identified in this task ranged from culture-specific words (e.g. crust less cucumber
sandwich, words depicting movement (e.g. sip, nibble and served) as well as other expressions.

Specialised terms in the EN-ZH translation contained all proper nouns, also covering proper nouns of a place (e.g. the Ritz Hotel, the Savoy, Knightsbridge). Also included were proper nouns related to food (e.g. Valentino Clutch Cake, Dolce & Gabbana éclair), a proper noun of a name (e.g. Helen Simpson), and a proper noun of a time period (e.g. Victorian).

The recognition of specialised terms and non-specialised terms depends on the specification of the types of resources. For specialised terms, there are two ways to identifying if they fall into the category or not. Firstly, if a term is tagged by a specialised field in the resources, the term was regarded as a specialised term. For example, when P2 was looking for 后熟型水果 post-ripening fruit, the term appeared in Youdao Dictionary was tagged with “biology”; and 冷链 cold chain, it was tagged with “logistics”. “Biology” and “logistics” in the resources indicate that the term was used in a subject area. Therefore, such terms were identified as specialised terms. The second type of specialised was proper nouns which shows an identity of a person or an entity. These terms were easily identified bearing the features of proper nouns. The rest of the terms as information seeking triggers were deemed as non-specialised terms.

4.1.3 Common information-seeking triggers and individual information-seeking triggers

This difference in the types of information-seeking triggers between the EN-ZH translation and translation in Chinese reflected that the participants encountered different levels of difficulty in translating non-specialised terms and specialised terms in the two language directions. Figure 4.4 and Figure 4.5 (NS for non-specialised terms; S for specialised terms) shows individual reactions to non-specialised terms
and specialised terms in the two translation directions. Common information-seeking triggers and individual information-seeking triggers were summarised for Participants 1, 2 and 3. Common information-seeking triggers referred to information-triggers that were shared by all three participants or two participants; whilst individual information-seeking triggers meant that only one individual regarded them as information-seeking trigger.

The number of non-specialised terms information-seeking triggers was balanced with that of specialised terms in the EN-ZH translation. However, for common information-seeking triggers, 6 were specialised terms and only 2 were non-specialised terms. The 2 information-seeking triggers shared by all participants were specialised terms. In contrast, non-specialised terms occurred more frequently in individual information-seeking triggers, where 5 were found for P1, 2 for P2 and 3 for P3, although P1 had 1 and P3 had 2 within the category of specialised terms.
Figure 4.4 Common and individual information-seeking triggers in EN-ZH translation
Corresponding to the EN-ZH translation, most individual information-seeking triggers were from non-specialised term, with 6 for P1, 2 for P2 and 4 for P3. Besides, P1 had only 1 information-seeking trigger in specialised terms. Specialised terms occupied the largest portion with 4 information-seeking triggers shared by the three participants in the EN-ZH translation, despite having only 1 for general language. However, for common information-seeking triggers shared by two translators, 8 out of 9 were general language, which is much higher than that of the EN-ZH translation.

Based on these results, a conclusion can be drawn that specialised terms were the

---

5 The extract of common information-seeking triggers was not entirely overlapping. Regarding "the Berkeley Hotel in Knightsbridge", P2 looked the phrase up as one information-seeking trigger. However, both P1 and P3 searched "the Berkeley Hotel" and "Knightsbridge" in two search cycles.
main type of information-seeking trigger in both translation directions and was more likely to be identified by all participants. However, when it comes to general language, in the EN-ZH translation, participants shared more common information-seeking triggers in translation than when it was into English. This was the case in spite of the fact that participants tended to have different information-seeking triggers for general language for both texts. The reason of these differences can be further explained by the type of information need.

4.1.4 Information need

According to the chapter on methodology, information need is crucial to problem-solving, as it reflects a participant's knowledge and motivation behind the information seeking process. The main focus of the present study will be investigating three orientations of information need: comprehension, production and hybrid (meaning transitions made between comprehension and production). The indications of information need to match up with the TAP reports and the follow-up interview.

For the comprehension orientation, two specific information needs are 'to look up a meaning from scratch and to find further information about a meaning'. As shown in Example 4.1, the participant claimed that she did not know the meaning at all, which indicates that the following search actions were about looking up a meaning for the source text. This was supported by the search actions as the participant searched "冷链 (cold chain)" in the Youdao dictionary for the meaning.

In Example 4.2, the participant needed to find some pictures to provide more evidence of what she had in mind. In this case, the information need was classified as to find further information about a meaning. Corresponding to this need, the participant then searched "the silver tea service" in Google, where pictures of silver teapots were displayed.
Example 4.1:
Source text: 冷链 (cold chain)
Verbalisation: I didn't know the meaning for "冷链".

Example 4.2:
Source text: the silver tea service
Verbalisation: I am not familiar with this...What "silver tea service" is like? I'd like to see some pictures to see if it is silver teapot set.

In respect to production, three specific information needs are finding possible equivalents, confirming proposed solutions, and looking for a better expression. Example 4.3 demonstrates the identification of finding possible equivalents. The participant pointed out clearly that she needed to use the Youdao dictionary to find the translation.

Example 4.3:
Source text: Savoy
Verbalisation: I have heard about this Hotel ... I don't know how it is called in Chinese. Therefore, my first goal is to find the translation with Youdao.

In Example 4.4, the participant also stated her need for the confirmation of what in her mind.

Example 4.4:
Source text: 裸卖 (sold loose)
Verbalisation: Then "loose" occurred to me, because I remembered when I put something on the scale in a supermarket. It showed "loose". I also looked it for confirmation.
Example 4.5 shows a need for a better expression. In fact, the participant had a translation in mind. However, she thought that it could be elaborated on and continued to search for other equivalents.

Example 4.2.5:
Source text: *sip*
Verbalisation: This word is common. However, the only Chinese I came up with is "小口喝" (drink by a small amount). I don't think it is good. I need to look up for other Chinese expressions.

Table 4.4 displays a summary of the information needs in terms of the orientation of comprehension, production and hybrid with the sub-categories of specific information needs. For both translation directions, more production-oriented information needs were elicited than comprehension-oriented needs, which on average were 6.4 against 2.3 in the ZH-EN translation and 10.4 against 12.0 in the EN-ZH translation. These patterns remained the same for P1, P2 and P3 individually.

Regarding the direction of comprehension, the EN-ZH translation had 4.1 fewer than the EN-ZH translation. To be more specific, all comprehension-oriented information needs fell into the category of 'to find further information about a meaning'; whereas for the EN-ZH translation, each participant found more need 'to look up a meaning from scratch', as 4.7 were found, compared to the 1.7 'to find further information about a meaning'.

For hybrid information need, there was a transition between comprehension-oriented and production-oriented. The participant has both comprehension and production information need. The category of hybrid information need is confirmed if a participant either expressed in TAP reports or interviews.
Example 4.2.5:
Source text: Volentino Clutch Cake
Verbalisation: Because I wanted to find out what "clutch cake" is. I know these are pastries, but I don't know how to translate them.

When P1 was translating Volentino Clutch Cake, she had no idea about the meaning of the term. Therefore, she searched the meaning of “clutch” trying to find out a meaning that could help her understand the meaning of the whole term. In this case, this part of search was to find a meaning from scratch, which belongs to the category of comprehension. After she found out that “clutch” could refer to a kind of handbag, she began to explore possible equivalents, which shifted the need to find possible equivalents. The specific information need changed from comprehension to production. Therefore, the information need was hybrid.

Table 4.5 Number of specific information need for each participant in the two tasks

<table>
<thead>
<tr>
<th>Specific information need</th>
<th>ZH-EN translation</th>
<th>EN-ZH translation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1</td>
<td>P2</td>
</tr>
<tr>
<td>Comprehension-oriented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To look up a meaning from scratch</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>To find further information about a meaning</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Production-oriented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To find possible equivalents</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>To confirm a hunch</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>To find a better expression</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
A marked difference was also seen in the orientation of production. For both directions, 'to find possible equivalents' ranked first among three subcategories, accounting for 4.7 and 6.7 on average. However, on average there were 3.7 needs 'to confirm a hunch' in the former, where the latter was 2.0, which meant that participants tended more towards proposing a solution in the ZH-EN translation. In contrast, for 'to find a better expression', 3.3 per participant were found in the EN-ZH translation and only 2.0 were find in the ZH-EN translation. Specifically, all these 6 needs came from P1 whilst the other two participants had no such needs. However, for the EN-ZH translation, all participants felt it necessary to refine their translation in the EN-ZH translation.

Based on the information needs orientation, the types of translation triggers that were identified are shown in Table 4.6. Both translation directions had most production-oriented triggers, as an average of 8.7 generated in the ZH-EN translation and 10.0 in the EN-ZH translation. A similar trend for the overall performance was also found for individual participant. All participants encountered more production triggers in both translation directions. This was unexpected, as the assumption was that, translators would have more difficulty in comprehension triggers for translating into one's A language and more production triggers for translating into one's B language.

<table>
<thead>
<tr>
<th>Type of translation problem</th>
<th>ZH-EN translation</th>
<th>EN-ZH translation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1</td>
<td>P2</td>
</tr>
<tr>
<td>Comprehension</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Production</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Hybrid</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
In terms of comprehension and hybrid triggers, less consistency of the trend was shown. Although P1 and P2 resembled each other in these two categories, with a slightly larger number of comprehension triggers than hybrid ones. However, P3 displayed slightly different characteristics, as it had more hybrid translation triggers in the ZH-EN translation than EN-ZH translation.

4.2 Resources

This section analyses the types of resources available to the participants in the present study and the frequency of consultation in the ZH-EN translation and the EN-ZH translation. The main method for data retrieval was screen-recordings. Resources generated by any research steps were recorded. For example, from a screenshot from ZH-EN translation of P1 (Figure 4.6), it can be seen that she searched "后熟型水果 post-mature fruit + fruit" in the search engine Baidu. The search engine was registered as one type of resource for the current study.

Figure 4.6 Example of identifying type of resource in screen recordings

In total, 38 resources were used by the participants, which can be grouped into six
categories:

- Dictionary portal
- Search engine
- Webpage
- News archive
- Encyclopaedia
- Official government website (see Figure 4.7)

**Table 4.7 Types of resources**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dictionary Portal</strong></td>
<td>The Free dictionary (monolingual comprehensive dictionary)</td>
</tr>
<tr>
<td></td>
<td>Iciba (multilingual comprehensive dictionary)</td>
</tr>
<tr>
<td></td>
<td>Youdao dictionary (multilingual comprehensive dictionary)</td>
</tr>
<tr>
<td><strong>Search engine</strong></td>
<td>Baidu</td>
</tr>
<tr>
<td></td>
<td>360so</td>
</tr>
<tr>
<td></td>
<td>Bing</td>
</tr>
<tr>
<td><strong>Webpage</strong></td>
<td><a href="http://www.hujiang.com">www.hujiang.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.dox88.com">www.dox88.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.chinadaily.com">www.chinadaily.com</a></td>
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<td></td>
<td><a href="http://www.scientificamerican.com">www.scientificamerican.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.chinanews.com.cn">www.chinanews.com.cn</a></td>
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<tr>
<td></td>
<td><a href="http://www.ctrip.com">www.ctrip.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.dianpin.com">www.dianpin.com</a></td>
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<td></td>
<td><a href="http://www.wikipedia.org">www.wikipedia.org</a></td>
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<tr>
<td></td>
<td><a href="http://www.savoyhotel.com.au">www.savoyhotel.com.au</a></td>
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<tr>
<td></td>
<td><a href="http://www.yicai.com">www.yicai.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.for68.com">www.for68.com</a></td>
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<tr>
<td></td>
<td>down.24en.com</td>
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<tr>
<td></td>
<td><a href="http://www.wenku.com">www.wenku.com</a></td>
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<td></td>
<td><a href="http://www.fruitinfo.com">www.fruitinfo.com</a></td>
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<td></td>
<td><a href="http://www.answers.com">www.answers.com</a></td>
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<td></td>
<td><a href="http://www.culinarylore.com">www.culinarylore.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.baike.baidu.com">www.baike.baidu.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.encyclopedia.com">www.encyclopedia.com</a></td>
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<td></td>
<td><a href="http://www.huaxia.com">www.huaxia.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.zhihu.com">www.zhihu.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.shelive.net">www.shelive.net</a></td>
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<td></td>
<td><a href="http://www.sohu.com">www.sohu.com</a></td>
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<td></td>
<td><a href="http://www.booking.com">www.booking.com</a></td>
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<td><a href="http://www.360doc.com">www.360doc.com</a></td>
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<td><a href="http://www.mafengwo.com">www.mafengwo.com</a></td>
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<tr>
<td></td>
<td><a href="http://www.shopstyle.com">www.shopstyle.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.wiki.mbabli.com">www.wiki.mbabli.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.groupon.com">www.groupon.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.audioenglish.com">www.audioenglish.com</a></td>
</tr>
</tbody>
</table>

*Here only list websites include the webpages consulted by participants.*
(1) Dictionary Portals

Normally, dictionaries can be classified based on the language in use, such as monolingual dictionaries, bilingual dictionaries and multilingual dictionaries. What is noteworthy is that today's dictionaries have become more complex with increasing types of functions and features. For example, Merriam Webster adds video clips, which enable users to learn English words in a live scenario. It was found in the present study that the three dictionaries used by the participants all contained more than one features. Thus, the three types of dictionaries can be described as monolingual comprehensive dictionary, bilingual comprehensive dictionary, and multilingual comprehensive dictionary.

The Free Dictionary\(^7\) was the only monolingual comprehensive dictionary used in the present study. It is an all-encompassing English online dictionary with features such as thesaurus, medical dictionary, legal dictionary, financial dictionary, acronyms, idioms, encyclopaedia and Wikipedia encyclopaedia; This dictionary was used by only P1 for both ZH-EN translation and EN-ZH translation.

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Example 4.7

Source text: 芳香成分 aroma-compounds
Orientation of information need: production-oriented

In Example 4.7, the participant used the monolingual dictionary - to confirm a hunch. She attempted to use the Free Dictionary for clear meaning for the words she had in mind.

\(^7\)https://www.thefreedictionary.com/dictionary.htm
Aiciba\(^8\) is a Chinese-English bilingual comprehensive dictionary, which not only has built-in dictionaries such as Collins dictionary, Oxford dictionaries, offers collocations, dictionary of synonyms and antonyms, but also has examples of usage taken from the Internet. It also has examples of sentences taken from past papers of Chinese College English Test. This dictionary was only consulted once by P3 for the ZH-EN translation. In translating 陈列柜 display shelf, P3 used Iciba for a better expression.

Example 4.6

Source text: 陈列柜 display shelf

Orientation of information need: production-oriented

In Example 4.6, the participant stressed the need of find the meaning by using the monolingual dictionary (Dictionary\(^9\)). She stated that "I know this word, but I can't figure out the exact meaning. I need to look up the dictionary to get a clearer explanation".

Youdao Dictionary\(^{10}\), is a multilingual dictionary, and was the most frequently used dictionary in the current study with the total consulting times for the three participants adding up to 102. Youdao Dictionary provides eight language pairs:

- English-Chinese
- French-Chinese
- Korean-Chinese
- Japanese-Chinese
- German-Chinese
- Russian-Chinese
- Portuguese-Chinese
- Spanish-Chinese

\(^8\)http://www.iciba.com/
\(^9\)www.dictionary.com
\(^{10}\)https://www.youdao.com/
A closer look at these features, it also has built-in dictionaries such as the Collins Dictionary, Longman Dictionary and 21st Century Dictionary. By using this dictionary, translators can look up the English and Chinese meaning of the words and phrases at the same time. Additional functions automatically enabled are bilingual examples of sentences, definitions and related articles extracted from the Internet.

Youdao Dictionary has a webpage version and an application version. In the present study, P1 and P2 used the application version, whereas P3 adopted the webpage version. The major difference between the two versions is that after installing the application, the user can start using the 'Screen Word Fetching' function to capture words or phrases on screen by pointing mouse pointer at a word or a phrase for automatic look ups. Both P1 and P2 had used this function. However, it seems that P2 preferred it more.

In Example 4.6, P1's information need was to look up the meaning of 冷链. Although Youdao Dictionary did not provide an explanation in English, the participant found an abundance of information including equivalents, examples and definitions. The definition from Baidu Encyclopaedia could offer some hints for the translator.

---

Example 4.6

Source text: 冷链 (cold chain)

Screen recording description: Search "冷链 (cold chain)" in Youdao Dictionary. Translation given by the dictionary is cold chain. There are phrases and sentence examples, such as cold chain logistics, cold chain management. There is also a definition of "冷链 (cold chain)" extracted from Baidu online encyclopaedia, which is similar to Wikipedia.

Verbalisation: I don't know what is "冷链" (cold chain). Cold chain is ... to keep the product under a low temperature, to maintain the quality of food ..." (the participant
read the definition out).

(2) Search engine
Based on the functions employed by the translator, search engines can be characterised as either tools or resources. As tools, the main function of search engines is to connect all the resources, including electronic dictionaries and web pages from other websites. As a resource, the focus of the translator is on the content of search results. For production purposes, the search results serve as a collection of examples within a specific context.

On the other hand, on the search results page, various other multi-media information can be found, such as images and videos which all contribute to the understanding of a source text.

As mentioned in the methodology section, a search engine can be used as a tool for generating other resources and it can also be used as a resource when the content of the search result snippets was used in the translation process. However, there are no clear-cut boundaries distinguishing between the two. Without a look at the content, it is impossible to use it to access other information. Furthermore, how it was used needs to be signalled by not only what information was generated by the search engine, but also what information was taken by the translator. Therefore, search engines are regarded as a source in the current study.

There are two main usages in the translation process, based on participants' motivation of using search engines and the information generated:

Search engine used for navigation:

1) The participant was trying to find further information, such as an explanation, documents, and background information, and thus useful information is
generated, such as a website;
2) The participant aimed to find parallel text, but no examples were shown in the results;
3) The participant aimed to find parallel texts and examples were shown, but the participant did not notice that.

Search engine used as corpora:
1) The participant was trying to find extra information; however, there happens to be parallel texts in the snippet which can be used.
2) The participant aimed to find parallel text and examples shown on the snippet; however, it is quite possible that the participant continues to click on links for complete information relating to the example.

For the corpora purposes, the indicator was based on whether the parallel examples were found, and participants declared that the examples helped to generate the translation. These two criterions need to be met, since the function cannot be achieved without either factor. The rest of the usage was for navigation. Through an analysis of the screen recordings, TAP and follow-up interviews. It was found that all participants used search engines in two ways.

There were three search engines identified in the present study: Baidu11, 360so12 and Bing13. The Baidu search engine is owned by the Baidu Technology Company. It is one of the two largest search engines in the world (Vaughan. and Chen, 2015) which targets users mainly from China. This search engine was visited by both P1 and P3. However, P2 only used 360so, maybe because she was using the 360 Browser, as 360 so was an embedded search engine in the browser. This search engine is operated by a Chinese company in Beijing. Another search engine is Bing, which was accessed by P3. This was developed by Microsoft. For the Chinese users, two versions are

\[11 \text{ www.baidu.com} \]
\[12 \text{https://www.so.com/} \]
\[13 \text{https://www.bing.com/} \]
available: the Chinese version and the International version. The content generated from these two versions may be different, as the Chinese version contains more Chinese webpages, whilst the international version is linked to English webpages. According to the TAP by P3, she used Bing as an alternative to Google search engine for more English content.

(3) Webpage

Webpages in the present study were those generated by search engines. In total 29 web pages were observed. The main reason that the participants looked at these websites was for more detailed information. For example, P2 clicked on the Savoy Hotel website for the official Chinese name. To be specific, the webpages can be further grouped into categories according to the content.

a. Language learning webpage
   (e.g. www.hujiang, www.audioenglish.com)
b. Newspaper and magazine webpage
c. Tourism webpage
d. online shopping webpage (www.shopstyle.com; www.groupon.com)

Despite the aforementioned three types of resources, there were also (4) News archives (e.g. www.chinadaily.com, and www.bbc.co.uk), (5) Knowledge-based resources (e.g. www.wikipedia.com), (6) Government official website (e.g. bjfao.gov.cn). These resources were regarded as individual types is to the fact that they were not generated by search engines. Instead, participants used these websites' as internal search engines for information or documents.
These six types of resources had different presence in the two different translation directions carried out by the three participants. Table 4.7 summarised types of resources used by each participant as well as their consulting times.

Dictionary portals were frequently used for all participants. However, there was a discrepancy in using monolingual dictionary portal, bilingual dictionary portal and versatile dictionary portal. With a combination of the functions of monolingual dictionary, bilingual dictionary, corpora and encyclopaedia, versatile dictionary portal, Youdao Dictionary emerged as the most popular. It contributed to the largest number of consultations across all types of resources. P1 seemed to have an equal tendency to use Youdao Dictionary for both directions, since it was consulted 23 and 19 times for the Translation into English and the Translation into Chinese. P2 had a greater preference for the Youdao Dictionary with only three consultations made using other resources. P3 had the least inclination in using Youdao, consulting it only once in the translation into Chinese. However, she still used Youdao 12 times for translating into English. The monolingual and bilingual dictionaries were consulted even less, especially for P2 and P3. P2 did not use these two dictionaries at all; whilst P3 looked at a bilingual dictionary only once in the Translation into English. P1 showed the most interest in the monolingual dictionary, as she approached the Free Dictionary 8 times in the translation into English and 3 times in the Translation into Chinese dictionary. However, no bilingual dictionary consultations were made by her.

Regarding search engines, all participants used them more in the EN-ZH translation than the ZH-EN translation for either usage of search engines. P1 visited Baidu 14 and 13 times as corpora or navigator in the ZH-EN translation, more than 0 and 6 for the other direction. P2 only used 360so engine for once in the EN-ZH translation, while she did no engine search for the ZH-EN translation. Compared to P1 and P2, P3 used search engines more often in both translation directions with 97 and 64 for ZH-EN translation and EN-ZH translation respectively, with navigation purpose dominating search engine uses in both directions, with 69 against 7 for the ZH-EN
translation and 71 against 26 for the other direction.

In terms of using news archives, knowledge-based resources and governments own official website, this was the least popular type of consultation compared to others. Both P1 and P3 accessed a certain website for the purpose of using the internal data, but mainly for accessing English content in parallel texts. For example, P1 consulted www.chinadaily.com 5 times, www.wikipedia.org 2 twice and www.bbc.co.uk 12 times for the Translation into English. P3 also adopted the same method as she consulted www.wikipedia.org 9 times, 4 times in the two translation directions respectively. However, P3 also used websites for certain documents, as she visited bjfao.gov.cn, the official website of Foreign Affairs Office for an English menu for Chinese cuisines in translating 'Scrambled eggs with tomatoes'.

Although 6 categories with 38 resources were used by participants in the current study, each participant has preferences and habits for using resources. On individual basis, the preferences and habits showed different features according to translation directions. In the ZH-EN translation direction, P1 used dictionary portals for most lookups with limited use of search engines. She also used website a lot, especially for the production information need. In the EN-ZH translation direction, although dictionary portals were still consulted frequently, more visits to search engines were observed. The use of website was much less common. For P2, the use of resources for both translation directions were not distinctive, as P2 prefer to use dictionary portals for either way, despite several uses of website. P3 used most amount of resources with a balance distribution across ZH-EN translation and EN-ZH translation. These three types of resource preferences demonstrate translators’ individuality in shaping information seeking behaviour.

4.3 Seeking strategies and seeking paths

Sections 4.1 and 4.2 analysed the information-seeking triggers and information needs
of the participants and the resources they consulted, which reflected the participants' own knowledge and understanding and interaction with the information system. However, how these information needs, and resources are connected needs further exploration. To address this issue, which also links to RQ2 (Through what process of information seeking do translators manage these information-seeking triggers?) and RQ3 (How do translators perceive the effects of their information seeking result?). This section will in turn focus on the participants' seeking strategies and paths. To be specific, it will look into the relationship between search cycles, steps used in the search process, language used for the search, as well as factors considered during the seeking processes.

As defined in Section 3.5, search steps reflect the level of complexity of the information-seeking process, as a search step shows the change of lookups.

4.3.1 Search steps

The search steps taken by participants displayed commonality and individuality at the same time. For all participants, more triggers were required for 1 search step in the EN-ZH than the other way around, with 9 against 4 for P1, 9 against 5 for P2 and 3 against 0. For the second category with 2 to 5 search steps, the numbers varied, as each participant showed their own features. In addition, the third category of above 5 search steps, only a few found limited numbers of triggers, as P1 and P2 had less than 3 triggers to search for both directions, but P3 who more steps for both translation directions.

In spite of such a trend in conducting search steps, the three participants had their own leaning in the information seeking behaviour. Unlike P1 and P2 who conducted most one-step search for the EN-ZH translation, P2 carried out the least searches with 2 to 5 steps for this direction. P1 and P3 had most triggers requiring 2 to 5 search steps for the ZH-EN translation. However, P2 only used this kind of search twice. Regarding
triggers with more than 5 search steps, P1 had 1 in ZH-EN translation and 2 in EN-ZH translation; P3 had 3 and 2 for each direction respectively. However, no such triggers were found for P2 in either direction.

Figure 4.7 The number of triggers for different number of search steps per
The number of search steps used by a participant can reflect the complexity of the information seeking activities around a particular trigger. However, to explore what languages were used in conducting such searches and the formulation of search terms or the use of websites can further explain the participants’ information-seeking strategies.

### 4.3.2 Language used in information-seeking

When it comes to the language used in the search process, it was found that all participants used Chinese, English and a mixture of Chinese and English. For each translation direction, it is necessary to see if participants preferred to use the source language to conduct the searches, or the target language or even both. Table 4.8 demonstrates the language used by P1, P2 and P3 for the two translations.

<table>
<thead>
<tr>
<th></th>
<th>ZH-EN translation</th>
<th>EN-ZH translation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SL</td>
<td>TL</td>
</tr>
<tr>
<td>P1</td>
<td>16</td>
<td>38</td>
</tr>
<tr>
<td>P2</td>
<td>17</td>
<td>0</td>
</tr>
</tbody>
</table>

TP: translation problems
SL: source language
TT: target language
M: mixed

Analysis of the table reveals that P1 had the same distribution of use of languages with 16 uses of the source language, 38 uses of the target language and 4 of a mixture of both ZH-EN and EN-ZH translation. She has a penchant for using the target language for search in both directions. It is similar to P3, the number of search terms
in the target language outweighed that of the source language in the two directions. However, P2 tended to use the source language all through the translation assignments, as 17 were used for ZH-EN translation and 30 for EN-ZH translation. She did not have a leaning towards the use of mixed method and only two searches in the target language for the EN-ZH translation.

Although the use of source language and target language varied, all the participants generally used source language to begin a search for both translation directions. Table 4.9 shows languages used in formulating the first search term for ZH-EN and EN-ZH translation. It is clear from the table that both P2 and P3 relied only on source language for their first search terms in the two translation directions. Even for P1 who had more tendency in using the target language, source language was still a dominant factor in both translations.

Table 4.9 Language of the first search term

<table>
<thead>
<tr>
<th></th>
<th>ZH-EN translation</th>
<th>EN-ZH translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP</td>
<td>SL</td>
<td>TL</td>
</tr>
<tr>
<td>P1</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>P2</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>P3</td>
<td>13</td>
<td>0</td>
</tr>
</tbody>
</table>

TP: translation problems
SL: source language
TT: target language
M: mixed

4.3.3 Search types

As mentioned in Section 3.5, the current research, is based on Enríquez Raído (2014)'s four methods of search (direct address searches, navigational queries, search engine queries and browser searches). Gough (2016)'s top-down and bottom-up theory,
tends to look at the searches in three layers (Shih, 2017; 2019):

- Core search
- Middle circle search
- Periphery search

These three categories of search types are also manifested in the current study. It relates to the change of search terms and reflected the relationship between search terms and information seeking triggers. In the current study, core search means the fact that the search term is only formed by the information seeking trigger or its equivalents. For example, when P1 was searching “clink”, she used the search word “clink” which equalled to the trigger. Under these circumstances, a core search was conducted. This is also the case, when P3 used the target language for search, like looking up 金光闪闪 giving off gold light, for searching “glistening”.

The second category of search type is middle circle search, which means that the information seeking trigger is partially used as the search term. When searching the “Knightsbridge”, P3 specified the address in the search term, which means that the search term was formed by the information seeking trigger and other information. This kind of search is Middle circle search.

Periphery search is also shown in the current study when no parts of information seeking trigger was used as the search term. Instead, other related search terms were used. For example, when P3 was searching the dish 西红柿炒鸡蛋 scrambled eggs with tomatoes, she did not type in the trigger. The search term she used was 北京市人民政府 Beijing municipal government. The reason she did this search was that she wanted to find a menu and then from the menu, a Chinese-English parallel texts for the English translation.

All of this indicates how close the relationship of the search is to an
information-seeking trigger. By observing the screen recordings, six different formulation of search terms were identified and divided into the three layers of search according to their deviation from the original trigger:

(1) *Trigger equivalent* is a type of formulation that uses the exact trigger as the search term, a proposed translation for the trigger or a mixture of both. For example, whilst searching for gentlefolk, P3 used "gentlefolk" as the search term, which is exactly the same as the information-seeking trigger. However, P1 searched a term with a combination of the trigger itself and its proposed translation "gentlefolk 名流".

(2) *Trigger extract* means that part of the source text is extracted to serve as the search term. This usually happens when part of the text was already understood, or the translation was in the participant's mind. For example, all P1, P2 and P3 used this type when translating 后熟型水果 *post-mature fruits*. As they were sure about *fruit*, but had to search for part of the trigger 后熟 *post-mature*.

(3) *Trigger extension* means that additional words to the trigger are used to formulate the search terms in order to find more relevant information. For example, in the search for 'the Ritz Hotel', P1 tried to specify the location by adding in 'London' to form the search term. She also used it when she translated the word 'clink'. As one was to describe the clink of china, P1 added the Chinese expression to make the whole term as 餐具的 clink, which means the clink of utensils.

(4) *Trigger partly replaced* means that a part of the trigger is replaced by other words. This type was only employed by P3. A typical example was when she was translating for 'hit the demand', she was trying to find the correct translation for 'hit'. However, she initially searched for the antonyms for translating hit. As she was sure of the translation for demand, she kept the word and replaced 'hit' with 'improve', 'increase and influence'.
(5) Trigger related information means that a search term does not contain any part of the trigger; instead, other relevant information was used to form the search term. This search type was used more frequently put a lot of effort into searching for a menu with both Chinese names and English names. Another search of this type was carried out by her was to translate 'strains of Chopin', instead of finding the Chinese name for Chopin, she first looked for what music was played to accompany English afternoon tea.

(6) No search term referred to when a participant does not use any search term and starts to visit relevant website. This kind of search takes two forms by either typing the website or by searching the website's name. For example, P1 visited BBC and Wikipedia directly for parallel English texts for 后熟型水果 post-mature fruits, and P3 searched for scrambled eggs with tomatoes, she knew that there was an official document launched by the Foreign Affairs Office of the People’s Government of Beijing Municipality. Therefore, she searched the official website for the office before conducting an internal search for the document.

Table 4.10 presents the formulation of search terms for P1, P2 and P3. For all participants in any translation directions, core search accounted for the largest number. Middle circle search, P1, P2 and P3 all adopted trigger extracts. However, for P1 and P2, this type of formulation ranked the 2nd most frequently used search term, whereas P3 carried out slightly fewer trigger extracts (8 and 20) than trigger extension (9 and 23) in the two translation directions. Unlike P3, P1 had only 2 trigger extensions for both translation directions and P2 had no such kind of search. Regarding trigger partly replaced, apart from P3 who had five searches in this category, P1 and P2 did not conduct any formulations. For the last formulation - a trigger was used more times by P3 in the ZH-EN translation, as 19 were found. Periphery search was not used too much, with 4 for P1 for either translation direction, and 3 for P3 for the ZH-EN translation direction.
### Table 4.10 Formulation of search terms

<table>
<thead>
<tr>
<th>Type of search term formulation</th>
<th>Formulation of a search term</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZH-EN translation</td>
<td>EN-ZH translation</td>
<td>ZH-EN translation</td>
<td>EN-ZH translation</td>
</tr>
<tr>
<td>Core search</td>
<td>Trigger equivalent</td>
<td>35</td>
<td>34</td>
<td>8</td>
</tr>
<tr>
<td>Middle circle search</td>
<td>Trigger extract;</td>
<td>21</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Trigger extension;</td>
<td>(16, 2, 0, 3)</td>
<td>(16, 2, 0, 3)</td>
<td>(0, 0, 0)</td>
</tr>
<tr>
<td></td>
<td>Trigger partly replaced;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trigger-related information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periphery search</td>
<td>No search term used</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 4.3.4 Seeking paths

Such changes in seeking strategies combined with the need for information and the interaction with resources leads to a different combination of search cycles, which promotes the formation of seeking paths. There are four patterns of information seeking paths: one-off seeking, pending seeking, repetitive seeking and progressive seeking.

*One-off seeking* refers to those problems which are solved by only one search session. This contains only one information need. Once the information need is addressed, the
translation problem is solved. For example, in translating "gentlefolk", the participant had to conduct only one search session to meet the need of understanding the meaning of the word. This is in line Gough’s (2015:166) “one-step research episode”.

Pending seeking is caused by the failure in turning out the desired search result for the translator. For example, P2 expected to use the Youdao dictionary to look for a better expression for "crustless", since she had already known one available solution. However, the dictionary only offered the same expression as the one that she had. Therefore, the search session ended without meeting the need of the participant.

Repetitive seeking shows the effort in repeatedly conducted searches with the same resources or different resources for the purpose of addressing one information need. For example, P3 used three sources such as Baidu and www.wikipedia.org to repetitively search the term 低温 low temperature with the aim of finding a possible equivalent.

Progressive seeking constitutes continuous search sessions, with each search result contributing to the next one. The best example of this is the information seeking process for "the Savoy Hotel" by P1. Firstly, the participant used Baidu and found a potential Chinese equivalence – 萨伏伊酒店. Then she used both the English name combined with the Chinese name as the search term "Savoy 萨伏伊酒店" to confirm the translation. These four types of information seeking paths can be mixed and one seeking behaviour may contain one or more types.

In the current study each participant took similar paths for addressing both ZH-EN translation and EN-ZH translation, even though P2 had two less - the repetitive path and repetitive plus progressive path for the ZH-EN translation and the EN-ZH translation. Such result would indicate that directionality has little influence on the seeking paths.
4.4 Seeking outcome and self-perception

This section is intended to answer RQ3 (how do translators perceive the effects of their information seeking outcome) and RQ4 (what factors can be identified that affect translators’ perceptions in the seeking outcome). It will first analyse what seeking outcome is displayed in the participants' information-seeking behaviour in the ZH-EN translation and the EN-ZH translation. Then it will try to analyse the level at which participants consider a search to be successful.

4.4.1 Seeking outcome

Seeking outcome shows how translators use the information they sought in generating the translation. Two types of seeking outcome are displayed:

1. Adopt equivalents as they were found in resources. This means that the translator uses equivalents as the translation without any modification.
2. Come up with a new translation version. This means that the translator either figure out the translation alone or by modifying the equivalent obtained from information seeking.

The first one means that the translator simply uses what they find from the resources. The second one means that instead of using an equivalent from look-ups, the translator will come up with a new version themselves.

Figure 4.8 shows the percentage of usage of the two types of seeking results in ZH-EN translation and EN-ZH translation. The percentages were calculated based on the number of the two types of seeking outcome against the total number of information-seeking triggers. In Figure 4.8, the blue represents the percentage of direct uses, and orange stands for the percentage of a new version which was put forward by the participant, rather than adopting equivalents from lookups.
It can be seen from Figure 4.8 that for each participant, the ZH-EN translation witnessed more direct uses. However, in the EN-ZH translation, participants were more inclined to use their own versions. This trend was most evident for P3, with 69% direct uses over 31% new versions in ZH-EN translation. In contrast, only 35% direct uses for ZH-EN translation and 65% new versions for EN-ZH translation. P2 had a similar figure in ZH-EN translation with 69% direct uses to 29%. Compared to the performance of P1 in the EN-ZH translation, direct uses accounted for a higher percentage of 46%. However, it is still lower than that of new versions. P1 had the closest figures for the ZH-EN translation, with 54% in direct uses, 9% higher than the 45% in new versions. However, this discrepancy between the two types in the EN-ZH translation is larger with 39% direct uses against 61% new versions.

![Figure 4.8 Percentages of direct use of equivalents and new translation version in ZH-EN translation and EN-ZH translation](image-url)
4.4.2 Self-perception

Self-perception is about whether translators regard their information seeking activities to have been successful. In the current study, participants were asked to evaluate each method of seeking on a scale from 1 to 5, where 1 stands for 'not at all helpful' to 5 for 'very helpful'. Table 4.9 Summarisation of the perceptions of P1, P2 and P3 on this regard.

Table 4.11 Self-perception of the success of seeking outcome

<table>
<thead>
<tr>
<th></th>
<th>P1</th>
<th></th>
<th>P2</th>
<th></th>
<th>P3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZH-EN translation</td>
<td>EN-ZH translation</td>
<td>ZH-EN translation</td>
<td>EN-ZH translation</td>
<td>ZH-EN translation</td>
</tr>
<tr>
<td>Scores</td>
<td>Number</td>
<td>Average score</td>
<td>Self-perception</td>
<td>Number</td>
<td>Average score</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>-----------------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>4.08</td>
<td>5</td>
<td>7</td>
<td>4.11</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td></td>
<td>5</td>
<td>7</td>
<td></td>
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<td>3</td>
<td>4</td>
<td></td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td></td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td></td>
<td>2</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

132
From Table 4.11, it is evident that participant, gave a mark of five for most information seeking in both translation directions. To be specific, P1 had 5 out of 13 marked 5 in the ZH-EN translation, 7 out of 18 marked 5 in the EN-ZH translation. That number for P2 and P3 were 5 out of 7 and 9 out of 13 in the ZH-EN translation and 5 out 13 and 12 out of 17 in the EN-ZH translation. The participants seemed satisfied with most of the seeking activities. However, when it comes to an average mark, it is interesting to find that P1 and P3 had higher satisfaction with the result in the EN-ZH translation, which is not consistent with the seeking outcome, as both of them had more direct uses from the ZH-EN translation. In particular, the average mark for P3 in the EN-ZH translation was 0.66 higher than that in the ZH-EN translation. The average marks for P1 were closer with the average mark only 0.03 in the ZH-EN translation than the other. In contrast, P2 marked ZH-EN translation (4.69) higher than EN-ZH translation (3.62), which is more consistent with the seeking outcome. The different factors considered in identifying the success of information seeking could be the cause of this.

4.4.3 Factors considered in evaluating information seeking

The factors considered in evaluating information seeking by the participants in the current study fall into four categories: resource factors, discourse factors, personal factors, the efficiency of information-seeking factors. Resource factors show the level of trust in a resource. For example, for the search of 后熟型 (post-mature), to strengthen the use of Google Scholar, remarks such as "this is more reliable" was stated.

Discourse factors show the evaluation of how an equivalent can fit into the target text. A typical example is that the purpose of searching "sip" is for a better expression. The participant conducted two search cycles. However, in the first cycle, she said "what I found from the dictionary is too colloquial, which sounds not good in this text". The
main elements for textual factors include diction, explicit delivery of message and context.

Personal factor is mainly about the translator's existing knowledge and whether the participant relies more on themselves or the available resources; the information-seeking process factors involve the efficiency of the process in terms of time and procedures. In the current study, when a participant was faced with several different solutions, she tended to make the decision based on such factors. For example, for personal factors, when translating 死敌 (deadly enemy), the translator came up with a word which she learnt not long ago, she decided to use it after checking it in the Dictionary, despite the fact that other options were given such as 'opponent' or 'rival'. She said 'I know it's right. I would not choose another one'.

Information-seeking efficiency factors examined the time consumed and the steps taken in conducting a search. The current study brought up the fact that the more time a translator spent on or more steps were taken for seeking information around a trigger, such information-seeking would be given lower scores. For example, both P1 and P3 has a lower score for the information-seeking trigger when they took more than 10 search steps over 'Valentino Clutch Cake'. According to TAP and interviews, the factors considered by P1, P2 and P3 can be categorised as following:

- Trust in resources;
- Fitting with the target register;
- Confidence in prior knowledge or experience;
- Efficiency of information seeking.

<table>
<thead>
<tr>
<th>Table 4.12 Factors considered for evaluating search results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1</strong></td>
</tr>
<tr>
<td>ZH-EN</td>
</tr>
<tr>
<td>EN-ZH</td>
</tr>
<tr>
<td>---</td>
</tr>
</tbody>
</table>
| • Specialised dictionary;  
  • Comparable texts about a related theme.  
  • Information consistency in different resources | • Official websites;  
  • Frequency of a search term in search results  
  • Better versions of a translation found from resources  
  • Simplicity of a translation  
  • Fitting in the context. | • Official websites;  
  • Example sentences.  
  • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation. | Trust in resources  
  Fitting with the target register  
  Confidence in prior knowledge or experience  
  Efficiency of information seeking |
| • Better versions of a translation found from resources.  
  • Fitting in the context. | • Better versions of a translation found from resources.  
  • Fitting in the context.  
  • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation. | | • Official websites;  
  • Specialised field labelled in a resource (e.g. specialised dictionary);  
  • Example sentences.  
  • Fitting in the context.  
  • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation.  
  • The number of search steps or the amount of time. |
| • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation. | | | • Official websites;  
  • Specialised field labelled in a resource (e.g. specialised dictionary);  
  • Relevant pictures.  
  • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation.  
  • The number of search steps or the amount of time. |
| • The number of search steps or the amount of time. | | | • Official websites;  
  • Comparable texts about a related theme.  
  • Specialised field labelled in | • Better versions of a translation found from resources.  
  • Fitting in the context.  
  • Prior experiences consolidating the production of a translation;  
  • The translator's own effort in producing the translation.  
  • The number of search steps or the amount of time. |
The listed factors show that P1, P2 and P3 had similar considerations for the ZH-EN translation and the EN-ZH translation. Websites, and specialised resources are common factors for resource. P1 also considered the consistency of information and P3 tried to seek pictures to support a search. Regarding textual factors, all participants stressed the importance of dictation, context and exploring expressions new to them. On the personal side, personal experience and personal solutions are common factors. For other factors, all participants took the level of complexity into account.

However, when factors for the ZH-EN translation direction were compared with those of the other way around, there were more factors for the EN-ZH translation. This is more evident for textual factors, as all participants seemed to ponder more on it in the EN-ZH translation than the ZH-EN translation.

In conclusion, this chapter describes and analyses the translators’ information seeking behaviour in terms information-seeking triggers, resources, seeking paths and seeking outcomes in relation to translation directions. According to the results, the first main finding is that the number of information-seeking triggers in ZH-EN translation is smaller than that of EN-ZH translation. However, for both directions, the information needs regarding production outweigh comprehension. The second finding main finding is that little difference is shown in using resources in both directions. The third main finding demonstrates that each translator has her own information-seeking strategies which also reflected to different information seeking pattern in two translation directions. The last main finding is that when translators do ZH-EN translation and EN-ZH translation, they deal with the information seeking outcomes differently. In the ZH-EN translation, they adopted the equivalents than in the other way around. These findings demonstrate different level of influence of translation directionality on information seeking behaviour. In the next chapter, a detail
discussion over the results will be provided.
5. Discussion

Based on the results found in Chapter four, the purpose of the current chapter is to reflect on what information-seeking behaviours were unfolded during the translation process and how these behaviours are related to translation directions (from A language to B language or from B language to A language). Although previous studies have already touched on information-seeking behaviours and translation directions, few studies have delved into the relations between the two. The current study attempts to close this gap and provide empirical evidences for a further understanding of the translation process.

Guided by five research questions, the discussion is divided into four sections, drawing on the results presented in Chapter four and linking them to previous studies. Firstly, the discussion will centre on the information triggers (Section 5.1), which is in response to RQ1 (What text-related information-seeking triggers do translators identify?). Then the discussion will move to resources and paths (Section 5.2), which showing how translators address information-seeking triggers as stated in RQ2 (Through what process of information seeking do translators manage these information-seeking triggers?) Section 5.3 will discuss RQ3 (How do translators perceive the effects of their information seeking result?) and RQ4 (What factors can be identified that affect translators’ perceptions in the seeking result?) As RQ5 (In what ways do translation directionality affect the issues in RQ1, RQ2, RQ3 and RQ4?) is reflected in the former four questions, the discussion on this research question will be carried out all the way through the current chapter.

5.1 Directionality in information-seeking triggers

In exploring translators' information-seeking behaviour, the first research question is about information-seeking triggers. Information-seeking triggers refer to segments of
source texts that lead translators to search information so as to produce the corresponding target texts. They represent the first element of the dynamic translators' information-seeking framework - text, and they also reflect translators' interaction with text. From the results, three main findings around information-seeking triggers were explored - the number of information-seeking triggers, the type of information-seeking triggers and the information need arise from information-seeking triggers. As the study is carried out from ZH-EN and EN-ZH directions, the relationship between information-seeking triggers and directionality will also be discussed.

The number of information-seeking triggers were found uneven for the Chinese source text and the English source text, with more information-seeking triggers identified in the English source text.

Such a finding is divergent from Enríquez Raído's study (2014). Although Enríquez Raído's did not place special emphasis on two-way translation, it is revealed in the research that more information-seeking triggers (referred as information needs) were identified when translators translate into their B language (from Spanish to English). Such difference was exposed as the participants of her study were chosen from translators with different A languages (four of them with Spanish as their A language and English as their B language). Enríquez Raído's believed that the reason why translators encountered more information-seeking triggers were because they lack confidence of their B language.

However, in the current study, a lack of confidence of one's B language may lead to a more cautious production in one's B language, which would increase the number of production-related information-seeking triggers. Considering that the genre, length and difficulty of readability of the Chinese and the English source texts were kept balanced at its most effort in the current study, one possible explanation to the differences in the number of information-seeking triggers could be that translating
into one's B language is more difficult than into one's A language. In addition, translators may have more awareness of the translation problems while they are translating into their A language. Another possible reason is that translators pay more attention to the beauty of expression they use in their A language.

The current study also tapped into the type of information-seeking triggers in terms of non-specialised terms (language used in everyday life with no special labels in resources) and specialised terms (terms used in a special field with labels of its specialty in resources). It is found that for both translation directions, all participants encountered information-seeking triggers in non-specialised terms and specialised language. However, an interesting finding is that for the EN-ZH translation, participants saw more information-seeking triggers in non-specialised terms than that in the ZH-EN translation. Combined with the results shown in the number of information-seeking triggers, a cautious assumption thus arises that non-specialised terms contributed to the number of information-seeking triggers in translating into one's B language. This finding can be explained by the Kroll and Stewart’s (1992:198) model, which illustrates that A language has stronger links with vocabulary and concepts. Therefore, it is easier for the participants to associate their A language with general matters.

Another unexpected finding in the current study was about the type of information need, which shows the comprehension orientation and the production orientation. Although many studies discussed the comprehension orientation and production orientation of translation, few studies identified a third category – the hybrid. The current study discovered that there was not always a dichotomy in terms of information need, as the third category was observed and reaffirmed by the participants. It was common for the participants in the current study to either have a need for information to understand a text first, followed by a need to give a better translation or vice versa.
Despite a hybrid of both comprehension and production, it is found that all participants had more production-oriented information need in both ZH-EN translation and EN-ZH translation. This may provide empirical evidence to contradict the statement that translators' find more difficulty in producing the target text translating into one's B language, whereas have more difficulty in comprehending the source text when translating into one's A language. Admittedly, factors regarding text type may influence the results, as a general text my lead to fewer comprehension issues, whereas specialised texts or semi-specialised texts may raise more comprehension issues (Shih, 2017; 2019). Therefore, the results from the current study may not be generalised to a wide scope of studies.

In order to have a further understanding of the information need, the current study conducted a further exploration into the types of comprehension-oriented information-seeking triggers and production-oriented information seeking triggers. From the perspective of specific information need, translators experienced more to find possible equivalents and to find a better expression in the EN-ZH translation. However, ZH-EN translation showed more need to confirm a hunch. Such difference may lend support to the reason that translators may be more aware of the quality of and stricter with translation production when translating into their A language. Such sub-categories looked into more detailed information need by a translator in terms of comprehension and production rather than merely regard information need as comprehension oriented, production oriented or the mixed (Gough 2016). It is also unlike Frankenberg-Garcia's study (2005), which nevertheless examined five purposes of look-ups (finding an L2 equivalent, confirming a hunch, find a suitable collocate, choosing the best alternative, checking spelling) which mainly focus on the production end of translation. Further to Frankenberg-Garcia’s (2005) study, it is found that comprehension-orientation is twofold – to look up a meaning from scratch, which indicated that the participants had no knowledge about a trigger. The second level is to find more information about a meaning, which means that the participant may have a vague idea of a trigger and need to have supplementary information to
make it clearer. In the production orientation, three levels of detailed information need were identified. On the first level, participants intended to find the equivalents available from the resources, when they did not have their own translation. On the second level, the participants had their versions in mind, but they needed to confirm their ideas. The last type showed translators’ dissatisfaction with their translation versions and the need to search information for improvement. Such results demonstrated that translators’ information need is more complex than previously deemed, thus deepening the understanding of translators’ information seeking behaviour.

5.2 Directionality in resources and seeking paths

This section sets out to discuss the result drawn on the second research question - through what paths do translators solve information-seeking triggers. The discussion will start with resources used by translators and then it will focus on the paths. This responses to the second dimension of the dynamic information seeking framework - the interaction with resources.

Based on the results in the current study, only 38 resources in 6 categories were consulted by the three participants in total and these resources fell into 6 categories: dictionary portals, search engines, webpages, news archives, encyclopaedia, and official government website. Such limited number of resources used by translators in translation tasks were similar to what were reported by Shih (2017). In Shih’s (2017: 6-7) research, four main categories of tool and resources were used by trainee participants: search engines (e.g. Baidu and Google), dictionaries (e.g. Iciba, Youdao and Lingoes), machine translation tool (Youdao fanyi) and web resources. It is very similar to the main categories of the current study, which also covered search engines, dictionary portals and web resources. However, in the current study, machine translation tool was not included in the categories as it was identified as a translation tool. In addition to machine translation, one usage of search engine was regarded as a
tool in the current research, only when the snippet exhibited in a search engine was used for eliciting information, the search engine was deemed as a resource. This distinction was also made in Gough’s (2016) study, which clarified when search engine was used for parallel texts. Furthermore, it is noteworthy that in the current study, dictionary portals were the categories for Youdao and Iciba as more functions are built in. There are also other categories were found, including webpage, new archives and official government websites, which were missing in Shih’s research. One possible reason is that based on the type of source texts and individual translator, differences can be made in different translation assignments.

Comparing to the number of types of resource identified by Gough (2016), which is 17 including both online resources and offline resources or Frankenberg-Garcia (2005) which reported 12 resources. Either result of the current study or that of Shih’s study (2017) indicate that these translators only limited number of resources. Compared with the research conducted by Gough (2016), much fewer categories of resources were identified. Some of the resources in the current study overlapped the categories of those in Gough’s study (2016), for example, dictionaries, webpages and search engines. However, news archives and official government websites were regarded as typical resources rather than webpages. This is because, they were not generated by search results generated by a search engine. Instead, translators used them as resources for particular information as a content. For example, in P1’s search, BBC website was explored as a special resource for English content. The same usage applied to P3 who searched the official website of Beijing Foreign Affair Organisation for English menus for Chinese dishes in PDF format. These categories all reflected translators’ purposes of using resources. Two possible reasons may lead to these results. Firstly, not enough training was provided to professional translators and they were not aware that there were that many resources available, such as corpora.

This is further supported by the report in answering the question regarding training received on using resources in the follow-up interviews, as all participants said that
they did not receive much formal training on using resources. For example, P1 said she know about some dictionaries, because she watched some videos about resources frequently used by translators; P2 said she only had training on how to use SDL Trados, not online resources; P3 had some training on using translation tools such as Snowman Computer Assisted\textsuperscript{14} Translation and skills to improve the efficiency of conducting web searches such as locating an information. However, she did not mention any training on the resources that can be used by translators. Such lack of training can limit a translator’s knowledge of the existence of resources and consequently reduce the variety of resources adopted by a translator.

In the current study, seeking strategies were mainly manifested as the usage of search terms and such usages finally added up to forming different seeking paths. In this way, the dynamics of information strategies were revealed. The discussion of formulation of search terms based on how the source text and target text were used in forming search terms. The relation of search terms with source text and target text contributed to the types of search: core search, middle circle search and periphery search. For core search, search terms were only formed with source text, target text or a mixture of them. Under the middle circle search type, a variety of formulations was adopted, which indicated the combination of source text, target text and other information. Regarding periphery search, zero search term was used. Such categorisation unveil different information seeking behaviour compared to Shih’s (2017: 9-11), who discovered four types of query formulation: (1) using source text and its corresponding target text; (2) using target term and some questions words in the B language; (3) using source text term and the name of target language; and (4) do not use any search terms but searching the original text with the title. Unlike Shih’s (2017) study, the participants in the current study tended to propose more versions of search terms. However, the search of the whole passage and using the name of a target language were not adopted.

\textsuperscript{14} \url{http://www.gcys.cn/} Snowman Computer Assisted Translation is a translation software designed by a Chinese company based in Guangdong. Its main functions include translation memory, alignment and terminology management functions.
Enriquez Raido (2014) also examined query, but she focused on if a query was formed with syntax, if it was simple or complex and if it was effective. She did not only consider the formulation, but also the function of it. Although search terms have drawn attention from researchers. In previous studies, searches were regarded as disconnected activities until the recent study by Shih (2019) who discussed the primary search and the second search. It is asserted in her study that second search is more important than primary search as it reveals the fact that translators become more clearer about what to search. Further to the relations of the searches, the current study investigated the relations of different searches. It is found that each search was essential to the whole information seeking behaviour, which either pointed to the next search step or a new search cycle by initiating a new search need. The relation of search terms with source text or target text is also important. It is found in that translators were more likely to consider source text as more source text was used as a search term. Although the source text-oriented search (bottom-up search), target text oriented (top-down search) and a mixed type were identified in Gough’s (2016) study, there was not stated that translators have the tendency opting for source text in different translation directions.

The pattern of the participants' seeking paths is not evident in relation to directionality in the current study, as three participants exhibited their own individuality. With each participant, information seeking paths were created by a combination of information-seeking types including one-off, pending, repetitive, and progressive. The variety of combination displays that translators' information-seeking behaviour is not a linear process. This is in line with the non-linear nature of the translation process, as suggested by Kiraly (1995: 50) that "translation processing does not proceed in an orderly, step-by-step fashion". Such a feature is also manifested in the interaction between translators' mental process and the resources. As participants proceed with search steps, they had consulted both resources and their existing knowledge; their decisions with each search step added to a seeking path.
Such tendency in the present study, as reported in the TAPs and interviews as well as behaviours observed, can be attributed to the available resources, previous experiences in using online resources and the personality of the translator. For example, P3 conducted one progressive, repetitive and pending seeking path for translating "Crustless Cucumber Sandwich". As P3 did not understand the meaning of "crustless", she used search engine and followed the clue by provided by the online resources, trying to figure out the meaning and equivalents. Even though she had found some equivalents from the resources, she still kept questioning it as the information provided by the resources were not quite consistent with her knowledge, which led to a pending at the end. In this case, information obtained from resources and the knowledge were used by the participant to reach an agreement between the two. If it was not reached, the participant discontinued the search. This is different from Enriquez Raído's research (2014) which indicated that all her participants started inferring meaning first and then consult a dictionary. However, individual idiosyncrasy exists between translators, which shape translators’ information seeking behaviour.

This trend may also be influenced by translators' individuality, as each participant has different preference in using resources, ways of conducted searches and efforts put in their searches. To be specific, each participant has their own habit of using the kind of resources. For example, P1 has a more balanced use of dictionaries and websites. However, P2 much prefer online dictionaries, while P3 has a greater tendency to using websites. Such habits seem to overweight the influence of directionality. Another point needs to be made based on the findings is that there is not evident if the satisfactory level of translators' information seeking behaviour is closely linked to the translation directions, as not a particular pattern was discovered for all the participants in doing the ZH-EN translation and the EN-ZH translation.

Such deviations seem to be brought by individuality that is each participant's
preference towards the resources and attitudes to the standard of successful searches. This can be further explained by Gough's (2016: 213; 235) types of individual translators, which is divided into five categories: economical, prolific, moderate, understated and explorative. In her study, 16 styles were identified and mapped onto the type of translators. Specific to the current study, P1 can be more like a methodical translator; P2 tends to be the economic translator; while P3 seems to be a prolific translator. Similarly, Shih (2017) also examined different preferences in conducting information seeking among translators.

5.3 Directionality in the seeking results and self-perception

Seeking results and self-perception is related to the third dimension of the dynamic information-seeking framework - translator. They are investigated to answer the third research question and the fourth research question: How do translators perceive the effects of their information seeking result? What factors can be identified that affect translators’ perceptions in the seeking result? The findings enable a further understanding of how translators process the information attained from resources to generate target texts as well as their thoughts of their behaviours.

In the current study, it is found that the information-seeking results are characterised by the directionality, as for the ZH-EN translation, participants tended to adopt equivalents as they are from the resources. However, in the EN-ZH translation, participants had a preference to come up with their own translations in spite of the equivalents they already found. One possible reason for this is that as Chinese is the participants' A language, when they are translating into this language, they may be more aware of their language ability; while in the other direction, they become less able to notice the problem and thus have greater acceptance of the equivalents found on other resources.

Despite this difference in directionality. The participants' score of the satisfactory of
their information-seeking behaviour has little connection with directionality. For both directions, major factors considered by participants are resources, discourse, personal experience and information-seeking efficiency. Such factors considered during the translation tasks are quite limited compared to the number and the types of factors provided by Enríquez Raído’s research (2014). Under the framework of PACTE (2005), six participants named 15 types of knowledge and skills regarding translation. Some of these knowledge and skills identified were closely related to the current study, such as context, register, resources, source cultures (Enríquez Raído, 2014: 276). However, in Enríquez Raído’s study, participants only reported such knowledge and skills for a general translation context, not for a specific translation task. From the results given by the current study, when translators were asked to comment on the seeking information for an information trigger, one or two major considerations may have an influence translators' degree of satisfaction. For example, when P2 were assessing her information-seeking for "冷链" (cold chain), the only factor contribute to her satisfaction level was the example sentences provided by Youdao Dictionary. It is possible that translators have other factors in mind. However, during a specific translation task, it is likely that translators only think about the ones have closer relations to the translation. Another possible reason is that this research has its focus on information-seeking behaviour. Translators would incline to have considerations associated with this regard. Therefore, the factors presented in the current research would have more implications with the information-seeking regard.

Although not much evidence was found in directionality, two factors given by the participants were slightly different: In the EN-ZH translation, translators place more emphasis on coming up with a better translation to fit in the register of the source text and at the same time, they thought that they relied more on their personal efforts rather than the resources.
6. Conclusions

In the translation profession, information seeking is not only recognised as a phase of the translation process (Gouadec, 2007: 22) but also a key competence of a translator (EMT, 2009; 2017; Scarpa and Orlando, 2017). Such importance has been reinforced in emerging literature by identifying the components of information seeking as a translation competency (e.g. Pym, 2003; Shreve, 2006; Pinto and Sales, 2008; Sales, 2008), exploring the uses of resources (Gough, 2016), and investigating the information seeking procedures (Enríquez Raído, 2014). However, limited studies have concentrated on translators’ information seeking as a dynamic process which is established on the basis of the active role of the information user, the translator in the present study, as well as constant interactions among texts, resources and translators.

Furthermore, most of the previous studies have only investigated one translation direction, normally translating into one’s A language. It seems to be a norm for translating into one’s A language in the translation industry (Institute of Translation and Interpreting, 2013) and this norm was advocated by a number of scholars (Neubert, 1981; Newmark, 1988; Marmaridou, 1996). However, a doubt has been raised when evidence is presented that for some languages, working in two directions is inevitable in the translation profession, as few users speaking these languages as a B language have an equal command as their A language. In the Chinese context, in particular, translating into and out of one’s A language are both common practices (Wang and Wang, 2014). The question of how translation directionality affects translation needs to be answered. Although some explorations have been conducted regarding translation time consumption (Ferreira, 2012), translation strategy (Krings, 1986), translators’ cognitive status (Campbell, 1998), few studies have focused on the relationship between directionality and information seeking.

In addition to information seeking and directionality, another focus in this research is
exploring translation as a profession, seeing how professional translators behave in the translation process. However, extensive research has been carried out on translation students (Frankenberg-Garcia, 2005; Enríquez Raído, 2014; Shih, 2017). Data delivered by such studies are hardly sufficient to reflect professional translators’ working practice due to differences in confidence, understanding ability, delivery standard and translation strategies (Fraser 1993, 1996; Henderson, 1987) between student translator and professional translator. Therefore, there needs more investigation into behaviour “close to expert” (Gough, 2016: 37).

To address these gaps, the current study has focused on professional translators’ information seeking behaviour while performing Chinese-English translation and the other way around. By using mixed methods, the current study has elicited empirical data through TAPs, screen recordings and interviews. The main purpose of using TAPs was to record the participants’ immediate responses to their inner activities; the screen recordings made it more explicit to observe translators’ information seeking activities, for example, dealing with source texts and the uses of resources; interviews were designed to retrieve translators’ thinking process and also to receive comments on their behaviour. Given the integrated data from these three sources, stronger evidence was provided.

In order to maintain the external validity, the current study selected authentic texts as the source texts and a natural setting was allowed for conducting the translation. While ensuring the authenticity of the selected texts, factors such as length, genre, difficulty level and their comparability in the Chinese source text and the English source text were considered. Thus, the selected texts were able to expose translation problems and at the same time not to deter the participants. With regard to setting, no language laboratory was used in the current study. Instead, participants were allowed to arrange the translation activities according to their own routine. The experiment was also set up with minimum intruding, for example, using invisible screen recording software, for the purpose of ensure the work flow of the translators.
Although there was concern about possible intervening in the process, as TAP was not a normal procedure in the translation process, according to the follow-up interviews, no report on any interruptions caused by TAPs.

Combining these data and drawing on the analysis framework of dynamic information-seeking behaviour, the current study has examined directionality in relations to information seeking in texts, resources, and translators throughout the whole information-seeking process. The results have revealed the main findings that some aspects of information-seeking behaviour such as information-seeking triggers and information needs is highly associated with translation directions; whereas for resources and seeking paths, the link between the two is not that evident. It has been found that for production-oriented information triggers dominate in both translation directions, which is contradictory to the argument that translating into A language requires more comprehension than production (Campbell, 1998). On the other side, when little connection has been discovered between directionality and the aspects of information-seeking behaviours, individuality proposed by Gough (2016) seems to be a possible explanation to the situation. With such findings, the understanding of the professional translators’ information-seeking process in two-way translation is enhanced which can bring strong implications for the translation studies and the translation practice.

6.1 Main implications of the current research

Since the current research is one of the few studies aiming to explore professional translators' information-seeking behaviour in two translation directions: from A language to B language and from B language to A language, its findings based on new data can provide practical implications for process-oriented translation studies, the development of resources and the translators' information-seeking training.

The current study especially focused on the information-seeking behaviour within the
process-oriented translation studies and provides empirical data for a better understanding of how translators use online resources to undertake translation tasks. More specifically, it will arouse more interest in the exploration of the process of translation in two directions. Instead of situating the research in a laboratory, the current study investigated how professional translators doing translation in a natural setting, which adds to the understanding of translation as a profession. Methodologically speaking, the data collected from the current research relying not only on one type of method. Instead, TAPs, screen recordings and interviews were triangulated to provide more evidence for investigating the information seeking process. Such evidence unveils not only translators' performance, but also their mental process during the translation activities, which will offer a deeper understanding of translators’ “black box”, which is conducive to the active role of a translator in information seeking.

Since another focus of the current study was to investigate how translators interact with online resources during the translation activities, the findings can also shed some light on the development of resources for translators. This can be carried out by a further integration of resources if necessary, which is developed from Gough's (2016: 257) perspective that customised resources are needed for translators. Considering the fact that a number of searches carried out by the participants with the purpose of finding parallel texts, it would be a benefit for translators if bilingual or multilingual parallel texts can be automatically generated in various resources. For example, when a translator is searching for 西红柿炒鸡蛋 in a search engine, the Chinese equivalence will be suggested. In addition, owing to the individuality demonstrated in the current research, another translation resources can be customised which will enable a translator to set up their own translation toolkit to integrate resources frequently in use.

Furthermore, translator training can also benefit from the current study. Firstly, differences exhibited in the information seeking behaviour in the two translation
directions requires suitable training approaches to improving the translation skills and competences in translating into A language and into B language. As suggested in the information-seeking triggers of the current study, more efforts may be needed to be focused on generating the equivalents for specialised languages in the ZH-EN translation; whereas efforts need to be made for both specialised language and non-specialised terms for translating into Chinese. As both translation directions witnessed great production-oriented information need, training on effective searching and selecting equivalents using online resources need to be emphasised. Secondly, a self-monitor system to track translators' behaviour and perceptions can be established, which can be used to enhance their understanding of their information seeking process, especially when individuality is involved, for example, a dashboard generated to track translators’ information seeking activities. This is because within a system integrating TAPs, screen recordings, and follow-up interviews, translators will have a chance to understand key issues concerned during the translation process so as to adjust their translation strategies.

6.2 Limitations of the current research

As the current study is a single study of translators' information seeking behaviour in two translation directions, the findings are only based on the current research scope and research questions. Therefore, they cannot be generalised before a large quantity of data is collected.

To be more specific, one of the limitations of the current study is a small number of participants. Therefore, the current study can only represent a small group of professional translators within a similar education background, industrial experiences and a similar access to online resources. On one hand, selecting participants with a similar background can help to control the variables that may affect information seeking behaviours. However, the result may not apply to other translators from another background. For example, when comparing the study results with those of the
pilot study, a great discrepancy in resources and seeking paths emerged for the two groups of participants. One possible reason may be no access to the Google search engine for translators situated in mainland China. In addition, a long-term stay at an English-speaking country may reduce the difficulty in translating British culture-specific terms. This may explain why in the pilot study the participant has less common information-seeking triggers related to the English source texts. In addition, information seeking patterns may also change when a larger number of participants were examined, considering the influence of individuality. However, taking into the time constraint and the quantity of data analysed, the current study focused on the depth of exploration and sought to provide a detailed analysis.

Apart from the group of translators, admittedly, the use of different source texts may affect the result of the findings. In the current study, two well-balanced source texts were selected in terms of the difficulty level, lengths and genre so as to reflect directionality's influence on information seeking behaviour. Same results may not be reached if text types, lengths and difficulty level are altered.

Furthermore, when ecological validity is concerned, the current study was not carried out under a laboratory setting, which purports to reflect professional translators' authentic translation activity to the most. However, some limitations emerged to compromise the results delivered from the data. As it is more difficult to monitor translators' behaviour in a natural setting than in a language laboratory when the researcher was not present, and it was more likely for a participant to be interrupted, thus leading to the inefficiency of data collection. A typical issue was the TAP process. Although all the participants were informed of the procedures of doing verbal reports during the translation process, limited data were generated. One factor is that P1 and P2 reported that they are not used to do verbal reports while doing a translation. Another factor is that unexpected health issue suffered by P1 almost prevented her from generating anything in the EN-ZH translation. This can also be one explanation to why follow-up interviews needed to be devised. When there was a lack of data
generated in TAPs, complementation can be made and used as a support for the insufficient data.

6.3 Suggestions for further research

Despite the limitations of the current research, the contributions of the current research to translation directionality and information seeking behaviour can bring more research interest into these two areas. Thus, a few suggestions are provided here for the future studies.

Firstly, more language pairs need to be involved in studying translation directionality. The findings of the current study can only offer empirical evidence for Chinese and English translation. As different languages have different features, it is worthy of investigation to see if the findings of the research can be applied to other language pairs.

Secondly, more text types can be used in addition to culture-specific general texts, which were not within the specialised areas unfamiliar to participants. Beyond the scope of the current study, it remains unknown if translators will have the same behaviour when dealing with the different text types that required domain knowledge which the participants do not possess.

Thirdly, there is a need to adopt more efficient research methods to improve the validity of the research, while ensuring the authenticity of the data and at the same time avoid any invalid data by optimising the structure of future studies.
References


[Accessed 14 December]


听说西红柿炒鸡蛋不好吃了，这口锅该谁背？ 后熟型水果的死敌，是低温。

研究者发现，当把西红柿放到 5 摄氏度的环境中冷藏 4 天后，与一直保存在 20 摄氏度的室温环境下的对照组相比，42 种与风味相关的芳香成分中有 25 种大幅度减少，而西红柿总体的挥发性香气降低了 68%。

而另一项相关研究显示，即便是把冷藏过的西红柿重新放在室温下自然熟化，那些与风味相关的基因也已经关闭，不会再发挥作用，变身淘宝买家秀。

由此得来的教训？

想吃好吃的西红柿炒鸡蛋，那就得趁当季，尽量在菜市场和农夫集市上完成采购。如果非去超市不可，奔常温区裸卖的陈列柜去，专挑特价的西红柿买，多半没错。

只有这样，你才能尽可能地拆散西红柿和冰箱的孽缘。因为赚头通常不够付冷链钱。

买回家之后，别洗（摧毁果蔬风味的另一大杀手），室温，敞开晾着，至少两到三天。

时间自会让你见证自然的奇迹。
Back translation:

Post-harvest fruits are subject to the injuries from low temperature.

According to researchers, when tomatoes are put at five degrees centigrade for four days, 25 out of 42 Aroma-compounds reduce sharply, compared with the control group which are kept at 20 degrees centigrade. The overall volatile aroma drops by 68%. They taste much worse even they look the same, just like how picture of a product offered by a seller is different from that by a buyer.

Another research indicates that even refrigerated tomatoes are put at room temperature to undergo a natural ripening process, their genes relate to aroma will stop functioning.
So how do we learn from this?

If you want to have tasty scrambled eggs with tomatoes, you should try to buy tomatoes in the vegetable market or farmers market in its season. If supermarket is your only choice, go to the display cabinets with no cooling system and pick up those tomatoes on sale, you will find the right ones. Only in this way can you prevent tomatoes being affected by refrigerator.

Because the price for those tomatoes on sale is not able to cover the costs for cold chain services.

Once you bring them home, do not wash, keep them detached under room temperature for at least two or three days.

Time will tell.
Appendix B The English Source Text

http://www.economist.com/node/21534819 Retrieved on 28 November 2018

FOR more than a century, the Palm Court at the Ritz hotel in London has resonated with the clink of fine china, as gentlefolk sip afternoon tea and nibble crustless cucumber sandwiches beneath glistening chandeliers. The silver tea service and strains of Chopin bespeak a bygone era. But a revamped version of afternoon tea is thriving.

Since 2004, the Ritz has served “afternoon” tea from 11.30am to 7.30pm; it hosts nearly 150,000 people a year. Saturday slots at the Savoy are booked up three months in advance. The Berkeley hotel in Knightsbridge changes its tea menu (cakes and other goodies are typically part of the package) every six months: recent offerings have included a “Valentino clutch cake” and a “Dolce & Gabbana éclair”. The economic doldrums have not hit demand; they may even have enhanced it.

When tea leaves were first imported to Britain in the 17th century, only a few could afford them. By the 18th century it had become the democratic drink of everyman; but afternoon tea as a distinct ceremony, complete with pastries, was a Victorian invention. A “mania for thinness” sent it into decline after the Second World War, says Helen Simpson, author of a book on the subject. The gradual infiltration of American coffee culture also played a part, as did the rise of women in the workforce (less time for sipping), the widening array of social haunts and the ebbing of formality (the Ritz still bans jeans and “sports shoes”).
Appendix C Translation brief for the Chinese translation

The Chinese source text is an excerpt of the article – Who Should Be Responsible for The Bad Taste of Scrambled Egg with Tomato, which is taken from Sanlian Life Weekly, a weekly magazine especially focused on news, culture and lifestyle. This article demonstrates the author’s perspective on the reasons that a typical Chinese cuisine – scrambled egg with tomato is becoming less tasty.

For translators who translate this except into English, the following factors should be taken into consideration:

Subject Matter – The subject matter is about food research. However, as this text is aiming at general readers, the author tries to explain it in a simple way rather than something too technical.

Language – The source language is in Chinese and the translator needs to translate it into British English.

Function – According to the slogan of Sanlian Life Weekly which is “a magazine and the lifestyle it proposes” (Zhao, 2006), it contains the mainstream perspective of lifestyle in the Chinese context. While the target English speakers. For this purpose, when translators translate it into English, they need to focus on the perspectives contained in the article and how it reflects the life of Chinese people.

Audience – Sanlian Life Weekly boasts a wide range of topics including life has a wide range of audience, as stated by Wei Zhu, its former chief editor that this magazine attempts to build a “comparatively lower platform to accommodate the general intellectual” (Zhao, 2006). Correspondently, the targeted audience of the target text should be similar group in the target social context.
Place of Reception – The target audience of the target text is in English speaking country.

Cross-cultural communication – The source text has a flavour of cultural specific expressions and buzz words to result in a resonance among the current readers and arose the readers’ interest in reading it. In translating into English, the translator needs to try to preserve this flavour, while at the same time, provide the recipient with sufficient information to help them understand the Chinese culture.

Writing style – The articles in the magazine follow a tradition by focusing on detailed description and narration. Therefore, when translating the article, the translator needs to try to maintain as many details in the source text as possible. In addition, the language used in the magazine is plain and easy to understand, which requires the translator to avoid using obscure expressions. Regarding the selected article, it contains some colloquial expressions and some of them are characterized by Beijing dialect to add a sense of humour in the text. However, when it comes to explaining the rationale of reduced flavour in the dish, the language tends to be in a more serious tone. Therefore, the translator should not only keep consistent in the overall writing style in the target language, but also need to notice the change of style for some part of the text.

Auxiliary information – as the source text is an excerpt, the information contains in this passage may lack of information contained in the original text such as illustrations, context. The translator may go to the website for the complete text.
Appendix D Translation brief for the English translation

The English translation source text is an excerpt from the article Some Enchanted Teatime published in the Economist. This article introduces the origin and tradition of English afternoon tea as well as the trends for its development.

For translators who translate this except into English, the following factors should be taken into consideration:

Subject Matter – The subject matter is about an introduction to an English food culture.

Language – The source language is British English and the translator needs to translate it into Chinese.

Function – The selected article is from the Britain Section of The Economist and the purpose of this section is to report latest news, introduce culture and spread ideas of Britain.

Audience – Although the main target audience of The Economist is the general intellectual. Correspondently, the targeted audience of the target text should be similar group in the target social context.

Place of Reception – The target audience of the target text is Chinese reader.

Cross-cultural communication – The source text has a flavour of cultural specific expressions and buzz words to result in a resonance among the current readers and arose the readers’ interest in reading it. In translating into Chinese, the translator needs to try to preserve this flavour, while at the same time, provide the recipient with
sufficient information to help them understand the English culture.

Writing style – According to the Style Guide of The Economist, the writing style keeps to a rule of “writ(ing) as anyone would speak in common conversation” (The Economist, 2016). Therefore, the language used in the target text should also use everyday language rather than something obscure and hard to understand.

Auxiliary information – as the source text is an excerpt, the information contains in this passage may lack of information contained in the original text such as illustrations, context. The translator may go to the website for the complete text. http://www.economist.com/node/21534819
Appendix E TAP experiment description

In this experiment, there are two texts need to be translated, one from English to Chinese and the other one from Chinese to English, each around 250 to 300 words. During the translation process, please verbalize and report the whole process including whatever you have in your mind. This process will not be timed, so please take your time to use any references and constantly check your translation work until you are satisfied with it.

Working language for verbalising can be English, Chinese or a mix of them that you are comfortable with. All the verbalisation will first be transcribed and then be translated into English.

To familiarise you with the think-aloud protocol, for a demonstration of TAP, please visit:
(https://www.youtube.com/watch?v=gyXOe0J1-fl&list=PLwzfobEFAFM8YGcaS0mYM0USniDAzNeAQ&index=7)

Then please do two warm-up exercises below:

Please translate the two sentences using think-aloud protocol:
(1) 早在 1979 年的时候，美国加州大学戴维斯分校的研究小组就已经成功培育出了与传统西红柿品种产量不相上下、但甜度、酸度和总体风味均超出两到三倍的杂交品种。
(2) “The Great British Bake Off”, a television program devoted to cupcakes and crumpets, recently ended a second series.

Please note that while you are translating, screen recording software and a voice recorder will run to capture any action shown on the screen and whatever you report.
Appendix F Question Guidelines for follow-up interviews

1. About the translation tasks:
   - Have you ever tried Scrambled eggs with tomatoes/English afternoon tea?
   - What do you find the terminologies in the source text affect your translation process?
   - In what way this translation, your translation behaviour is different from those when you are doing other translation that you received from your clients?

2. About the verbal report:
   - How often do you use tools and resources such as dictionaries, translation tools, web in performing translation assignments that you received from your clients in terms of the times per assignment? (1. every time. 2. often; 3, sometimes; 4, never or almost never.)
   - Have you ever been trained on how to use tools and resources such as dictionaries, translation tools, web in accomplish translation assignments? What kind of training?

3. About the screen recording software:
   - To what extent, your translation process was interrupted by the screen recording software?
   - Did you experience any difficulty in using the screen recording software (e.g. no responding; failure in saving the document)?

4. About verbal report:
   - How much do you think verbal report affect the speed of the translation process?
To what extent do you think that TAP affect the quality of your translation?

Please look at the screen. You searched this word, but you did not report it. Can you please explain why you searched this word?

Can you explain why you used this search term?

Can you explain why you visited this website?

Can you explain why you used this feature of the search engine?

I have noticed that you change the search term. Why did you change it?

I found that you used several resources. What information from the resource did you find it useful?

Why did you use this resource?

Can you explain how you decide to translate this part like this?

Were you satisfied with the search result? How do you assess the level of satisfaction on a scale from one to five (one means the least satisfied and five represents the most satisfied)?
Appendix G TAP transcript (Sample)

The TAP for the Chinese translation task

I am searching for “西红柿炒鸡蛋” (scrambled eggs with tomatoes). I have already known the translation – ‘tomato with scrambled eggs’. I want to confirm that. It’s ‘scrambled eggs with tomatoes. I need to rearrange it.

Here is a term ‘后熟型’ (post-harvest/ post-mature). We need to verify ‘后熟型水果’ (post-harvest/ post mature fruit) in Youdao, but there is not an entry. Then let us google it. Enter this keyword to see if there is a result. There are 14,600,000 entries and it shows in Wikipedia and other websites. Let’s click on ‘The incomplete garden book’ or ‘basic harvest and post-harvest handling considerations’. I think these websites are all about gardening and agriculture.

I need to check on that. It is proper. I just learned this word from a movie.

Let’s look at ‘冷藏’ and see what is the English for ‘冷藏’ in the fridge. Refrigerator types. Stored in the freezer.

‘芳香成分’ (aroma compounds). There is ambiguity in the expression. So aroma compounds are in food? So I think ‘aroma’ is the proper word. But in food…let’s look at it by quotation mark to specify it. Aroma constituent of tomato. There are only four results. So, it cannot be a good translation. Do I need to use ‘flavour’? Let’s look up it in google scholar. Aroma. You can see, there is compounds in foods, so compounds are more accurate. Let’s do a reverse search – ‘aroma compounds.’

It is not clear by ’25 kinds of aroma compounds are reduced’. What exactly is reduced? Aroma? Compounds? I want to use density. I think this is correct. Because as it says,
‘flavour compounds by low-density’. I think Chinese does not describe it clearly. Actually, it should be the density or existence of the 25 kinds aroma components are reduced.

‘挥发性香气’ (volatile aroma). I don’t know this word. Volatile.

‘自然熟化’ (natural ripening) is a word needs to search. Let’s look at ‘熟化’. I think ‘ripening’ is better. Let’s check it in google scholar. No problem, ripening of fruits.

To be ‘淘宝买家秀’ (picture scams), I don’t understand. Why does he mention it? Does it mean the quality of the product is not as good as it seems to be, right? So I need to modify it to convey it in the same way. Taobao, I can use Amazon or … to replace it. If I use Amazon, and I still need to explain ‘买家秀’ (picture provided by a customer). The point made here is even it looks the same, the quality – the taste-related gene is not the same. So it means they are similar superficially, but actually they are not. So I want to use picture scam of Amazon sellers and make a complement after that – where the quality is not the same.

Let’s see how we can say ‘当季水果’ (fruit in season). Ok. Of the season, in season. I remember it should be in season.

‘裸卖区的成列柜’ (non-refrigerated stalls, where tomatoes are sold loose), wait. Supermarket. Is t stalling? That means we put goods on the shelves or, it should be stalling. Let’s find stalling in this article. Only this one. Ok.

“裸卖” (sold loose), where tomatoes are not pack-sold. Because I think it means there is no packaging. So let’s read it again. Or, it is tricky, non-refrigerated, non-refrigerated stalls, … Oh, I find another way, loose sold, let’s see, loose sold tomatoes. Yes, there is. Loose, sold loose. Ok, no problem.
The TAP for the English translation task

First problem I need to resolve is "enchanted". "Immersed" may be a solution. But I think "fascinated", "enthralled" may be better.

Let's look at "palm court. Let me open the relevant webpage. “棕榈阁” (Palm Penthouse), I think is better. Let's leave it here. Maybe it will be useful. I think 庭 (court) is better.

For more than one century. Ritz Hotel.

Let's go back. Are there any better expressions? Resonate, resonated with. Here, yes, it means producing a sound in the Palm Court.

Gentlefolk, upper classes.

What is the difference between clink and click?

"Sip afternoon tea". I don't like this word. How to pronounce this?

Nibble means taking a small bite. But what is the Chinese?

Crustless. It means without the hard part of the surface. How to use express it in an elegant way? Here is an English menu. Will it be useful?

Glistter, means...

Silver tea service turned out to be tea set made of silver.
I cannot find it. It must be a brand name. Strains of Chopin. Oh, not a brand.

I want to check if I can find the opening hours for afternoon tea in 2004.

Let's look up Savoy first.

Berkeley Hotel. Is it Knightsbridge?

Is there any better translation for package menu?

What is "clutch cake"? I don't know the Chinese name for these brands. Let me see what a clutch cake is. Is it a cake with the shape of handbag?

I don't know the Chinese word for éclair. It means a cookie.