
THE TRANSLATION STRATEGIES AND APPROACHES USED BY TRANSLATORS OF SCIENTIFIC TEXTS FROM ENGLISH TO MALAY

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Abstract

The participants in this study comprised five experienced Malay part-time translators from the University of Malaya who were asked to translate different English language science texts to the Malay language using the Think-Aloud Protocol or TAP technique. The transcriptions of their TAPs were analysed and then matched against the Direct and Indirect language learning strategies proposed by Oxford (1990) and O'Malley and Chamot (1990). It was found that all the main Direct and Indirect strategies were used by the participants while translating. Besides these, three new strategies were also used. First, they used their own beliefs based on experience on how to translate. Second, they found their own solutions to the problems identified and carried them out. Lastly, they used the discrimination strategy to find an equivalent term in the target language from two or three alternatives identified based on the contextual meaning in the text and the culture of the target readers. From the findings, the researcher proposed her own translation strategies taxonomy. The translation approaches used by the participants were found to be generally the same as those proposed in the translation models by Bell (1991), Sager (1994), and Darwish (1989, 1999).

Definitions of Translation Strategy

According to Darwish (2003:117), a translation strategy is the overall plan employed by a translator to achieve a specific translation goal and it consists of techniques, procedures and methods that bear on the translation product as it develops. Darwish (2003:118) suggests that "the ultimate goal of any translation strategy is to solve the underlying problem of translation mediated communication and to remove the external and internal constraints imposed on the translation process in order to unlock potential alternatives"

Lorscher (1991 in Darwish 2003:118) defines a translation strategy as "a global procedure that consists of a series of minimal problem-solving steps which the translator employs in making certain considerations about the text" and these steps are combined in specific ways to build up structures which partly determine and partly delimit the decisions which are to be made on the hierarchically lower levels, such as syntax and lexis. Viewing strategies as problem-solving mechanisms, Lorscher argues that translation strategies have their starting point in the realisation of a problem by the translator who employs these strategies to solve the problem. However, he suggests that a problem is first identified, then a solution is devised, implemented, monitored and controlled. Within a framework of decision-making, Darwish (2003:118) argues that the starting point of a translation strategy is in the solution phase since selecting a strategy involves a decision to choose a solution from among alternatives.

However, Seguinot (1991 in Darwish, 2003:118) views strategies as both the conscious and the unconscious procedures and to both overt tactics and mental processes.

On the other hand, Snell-Hornby (1988 in Darwish, 2003:118) believes that translation strategies consist of identifying and creating multiple relationships in both cultural association and language at the semantic and phonological levels.

The researcher agrees with the suggestions on translation strategies proposed by the translation authorities such as Darwish, Lorscher, Seguinot and Snell-Hornby and also supports the suggestion given by Honig and Kussmaul (cited in Munoz 2000:129) that translation strategies are the main link between theory and practice. The researcher suggests that translation is a problem-solving task and translation strategies are needed by translators to find solutions to the problems that arise while translating scientific texts from English to Malay

Aims of the Study

The aims of the study were as follows:-

- 1 to find out the direct and indirect strategies used by the participants in their TAPs based on the Taxonomy on Language Learning proposed by Oxford (1989) and O'Malley and Chamot (1990)
2. to find out other strategies used by the participants' besides those provided in the Language Learning Taxonomies proposed by Oxford (1989) and O'Malley and Chamot (1990)
- 3 to find out the percentages for each of the strategies used by the participants
4. to find out the most used strategy by the participants
- 5 to find out what translation approaches are used by the participants in their internal translation process according to the translation models by Bell (1991), Sager (1994) and Darwish (2003)

Participants of the Study

The participants for this case study comprised five experienced Malay part-time translators of scientific texts from English to Malay from the University of Malaya. They were as follows

- Case 1.** A female lecturer from the Biochemistry Department, Faculty of Medicine who has translated seven science books and has 15 years of experience in translating and editing.
- Case 2.** A male lecturer from the Department of Zoology, Faculty of Science who has translated three science books and has four years of experience in translating.
- Case 3.** A female lecturer from the Department of Pharmacy, Faculty of Medicine who has translated many medical brochures and has seven years of experience in translating.
- Case 4.** A female PhD student from the Department of Zoology, Faculty of Science who has translated six short science books and has two years of experience in translating.
- Case 5.** A male lecturer from the Department of Pharmacology, Faculty of Medicine who has translated eleven science books and has 19 years of experience in translating.

Procedure of the Study

A case study approach was used whereby the participants were asked to translate different English language science texts to the Malay language using the Think-Aloud Protocol or TAP technique. Their TAPs were transcribed, analysed and then matched against the SILL, that is the Strategy Inventory for Language Learning proposed by Oxford (1989) and O'Malley and Chamot (1990). The purpose was to find out the strategies that they used while translating. For this study, O'Malley and Chamot's strategies were subsumed under Oxford's (1989) Direct and Indirect Strategies and will be referred to as Oxford's SILL. Oxford's (1990) SILL is given in **Table 1**. Oxford's SILL has been used for the analysis of many language tasks, for example the CALLA project by Chamot and O'Malley which is used for reading and understanding content subjects like science and engineering, the Language Learning Disk by Joan Rubin, an instructional tool for training in the use of language learning strategies for various tasks and the CRAPEL Model by Henri Holec for self-directed language learning.

Oxford's SILL was used in this study because translation involves the use of two languages besides dealing with other disciplines like linguistics, culture, concepts, communication etc. According to Oxford (1989:11), these strategies are tools that can be used for solving problems, accomplishing tasks, meeting objectives or attaining goals.

Table 2 shows an excerpt of the TAP analysis for Case One participant. The left column shows the transcription of the TAP. The right column shows the analysis of the TAP by the researcher. In this column, the researcher wrote down all the strategies used by the participant while translating. This process was done for all the five cases. The strategies used by the five participants in their TAPs were mapped on to Oxford's SILL. This is shown in **Table 3**.

Table 1
OXFORD'S SILL

DIRECT STRATEGIES	INDIRECT STRATEGIES
<p>1. Memory Strategies</p> <ul style="list-style-type: none"> • Creating mental linkages (e.g. grouping, associating, elaborating) • Applying images and sound (e.g. using imagery, semantic mapping) • Reviewing well (structured reviewing) • Employing action (e.g. using physical response or sensation) <p>2. Cognitive Strategies</p> <ul style="list-style-type: none"> • Practising (repeating, formally practicing with sounds and writing systems, recognising and using formulas and patterns recombining and practicing naturalistically. • Receiving and sending messages (getting the idea quickly, using resources for receiving and sending messages.) • Analysing and reasoning (reasoning deductively analysing expressions, analysing contrastively (across languages), translating, transferring. • Creating structure for input and output (taking notes, summarising, highlighting) <p>3. Compensation Strategies</p> <ul style="list-style-type: none"> • Guessing intelligently (using linguistic clues, using other clues) • Overcoming limitations in speaking and writing (switching to the mother tongue, getting help, using mime or gesture, avoiding communication partially or totally, selecting the topic, adjusting or approximating the message, coining words, using a circumlocution or synonym) 	<p>1. Metacognitive Strategies</p> <p>Centering your learning (overviewing and linking with already known material, paying attention, delaying speech production to focus on listening)</p> <ul style="list-style-type: none"> • Arranging and planning (finding out about language, organising, setting goals and objectives, identifying the purpose of a language task, planning for a language task, seeking practice opportunities) • Evaluating (self-monitoring, self-evaluating) <p>2. Affective Strategies</p> <ul style="list-style-type: none"> • Lowering your anxiety (using progressive relaxation, deep breathing or meditation, using music, using laughter) • Encouraging yourself (making positive statements, taking risks wisely rewarding yourself) • Taking your emotional temperature (listening to your body using a checklist, writing a language learning diary discussing your feelings with someone else) <p>3. Social Strategies</p> <ul style="list-style-type: none"> • Asking questions (asking for clarification or verification, asking for correction) • Cooperating with others (cooperating with peers, cooperating with proficient users of the language) • Empathising with others (developing cultural understanding, becoming aware of others thoughts and feelings)

Taken from Oxford (1989:37-51 and 135-148). *Language Learning Strategies – What Every Teacher Should Know* New York: Newbury House Publishers

Table 2
An Excerpt of a Think-Aloud Protocol (TAP)

Think-Aloud Protocol Transcribed for Case 1	Analysis of TAP by Researcher
<p>First I'll read the text (reads text to herself loudly). The main content of this paragraph is transport of amino acids into cells. Now, I'll type everything into the computer. Transport is <i>pengangkutan</i> so, <i>Pengangkutan asid amino ke dalam sel</i> That being the title I've made it bold. Now I go to the main text (reads the first sentence - The concentration of free amino acids in the extracellular fluids is significantly lower than that within the cells of the body). This means that the concentration in extra-cellular cells is lower than in body. Concentration is <i>kepekatan</i>, so: <i>Kepekatan asid amino di dalam cecair luar sel adalah</i> (significantly lower is <i>lebih</i> <i>di dalam sel tubuh</i>. Let me read the sentence in the text again and now I'll read the translated version (reads and is satisfied). Now, the next sentence (reads it The concentration gradient is maintained because active transport for</p>	<p>Planning and organising – making a decision and implementing it. Summarising. Planning and organizing making a decision and carrying it out. Thinking – translating.</p> <p>Highlighting. Planning and organising Reading of source text Comprehension of meaning – thinking and paraphrasing</p> <p>Analysing and reasoning – translating Repetition-pausing reverting to English phrase-thinking and continues translating.</p> <p>Production evaluation: rereads English sentence and compares with translated version in Malay – displays contentment. Planning and organisation. Reads source text in English</p>

Table 3
Strategies Used by the Five Participants in their TAPs

Strategies Used by the Participants	Case 1	Case 2 (Two Texts)	Case 3	Case 4 (Two Texts)	Case 5
No. DIRECT STRATEGIES					
A Memory Strategies					
1 Using imagery	/	/	x	/	x
2. Reviewing	/	/	/	/	x
B Cognitive Strategies					
1 Reading and comprehension	/	/	/	/	/
2. Summarising	/	/	/	/	/
3. Highlighting	/	x	x	/	x
4. Analysing and Reasoning – translating	/	/	/	/	/
5. * Choosing equivalent terms based on the contextual meaning in the text (situation) and the culture of the target readers by using the discrimination strategy to choose the closest equivalent term in the target language from two or three alternatives identified.	/	/	/	/	/
6. Academic Elaboration	/	/	/	/	x
7 * Finding their own solutions to the translation problems and carrying them out.	/	/	/	/	/
8. Repetition	/	/	/	/	/
9. Resourcing	x	x	x	/	x
C. Compensation Strategies					
1 Overcoming limitation in writing – paraphrasing	/	/	/	/	/
2. Overcoming limitations in writing: switching to the source language.	x	x	x	/	x
II INDIRECT STRATEGIES					
A Metacognitive Strategies					
1 Planning and organisation – Making decisions	/	/	/	/	/
2. Selective attention – attending to one sentence at a time.	/	/	/	/	/
3. * Stating own beliefs on how to translate – giving reasons to support the beliefs and carrying them out.	/	/	/	/	/
4. Problem Identification	/	/	/	/	/
5. Comprehension monitoring	/	/	/	/	/
6. Ability evaluation	/	/	x	/	x
7 Self-monitoring/Production monitoring	/	/	/	/	/
8. Performance evaluation	/	/	/	/	x
B Affective Strategies					
1 Encouraging yourself: making speech acts to denote end of a paragraph and end of a task.	x	x	x	/	/
C. Social Strategies					
1 Empathising with others	/	x	x	/	x
2. Asking questions	/	/	/	/	x

According to Robinson (1997: 51), the translator is a learner and translation is a learning process and he proposes that "translation is an intelligent

activity, requiring creative problem-solving in novel textual, social and cultural conditions” In addition, he suggests that it involves complex processes of conscious and unconscious learning and the translator as a learner is always learning while working with two languages through trial and error. The participants for this study were all graduates. They had completed tertiary education and were thus advanced language learners. They were dealing with two languages in their translation task, that is English (the source language) and Malay (the target language). While translating, they were learning the two languages further because translation involves finding accurate equivalents and reproducing the original message from the source language to the target language in as accurate, clear and natural a manner as possible.

From the data presented in Table 3, the research questions were answered. These are discussed below.

The Direct and Indirect Strategies used by the Participants

From the mapping of Oxford's SILL on to the transcriptions of the five TAPs, it was seen that all the main direct and indirect language learning strategies were used by the participants. The direct and indirect strategies that were used were as follows:

Direct Strategies Used by Participants

1. Memory strategies: creating mental linkages, applying images and sounds, and reviewing well.
2. Cognitive strategies: practicing, receiving and sending messages, analysing and reasoning - translating, creating structure for input and output.
3. Compensation strategies: guessing intelligently, overcoming limitations in speaking and writing.

Indirect Strategies Used by Participants

1. Metacognitive strategies: centring your learning, arranging, planning and evaluating.
2. Affective strategies: lowering your anxiety, encouraging yourself and taking your emotional temperature.
3. Social Strategies: asking questions, cooperating with others and empathising with others.

Additional Strategies Used by the Participants

Based on the data given in Table 3 on page 8 which was derived from the matching between Oxford's SILL and the researcher's own analysis of the transcriptions of the five TAPs, it was discovered that three additional strategies were used by the participants which are not found in Oxford's SILL. These three strategies are **highlighted in Table 3** and the researcher feels that these are the real translation strategies. These strategies are discussed below.

(a) Stating own beliefs on how to translate and giving reasons for supporting the beliefs. This is a metacognitive strategy

Here, the participants have their own schema about how to go about translating and they verbalise these beliefs as a reminder on how to go about the task of translating. Some examples taken from the TAPs transcriptions are as follows.

Case One: "Translation should not be literal, it should be more of understanding so that the Malay version would not sound funny"

Case Two: "Now that I know the meaning in my head, I shall translate it using my own words in Malay so that the original meaning is not lost. I do not believe in word-for-word translation as this is not good. I never translate word-for-word as it is bad. I prefer understanding first before translating"

Case Three: "I don't translate word-for-word. Being a Malay, I have the intuitiveness of the language and upon further reading, I always refine my translated work"

Case Four: "Usually after translating, I read the whole passage twice again to ensure that the language flow is right. I always translate as though I am explaining something to someone"

Case Five: "Now, I'm going to translate line by line into *Bahasa* - what I'll do is I will look at the English text and straightaway do my translation in *Bahasa*" (Malay language).

(b) Finding their own solutions to the problems identified and carrying them out. This is a cognitive strategy

Problem identification comes under the metacognitive strategy but here the participants move one step forward in coming up with a solution to their problem. Here it is the metacognitive and the cognitive strategies working together. All the participants found that some sentences in English were complex so they decided to divide them into two shorter sentences to make translating easier, more comprehensible and manageable.

- (c) **Using the discrimination strategy to identify and choose the most accurate and natural equivalent term from two or three alternatives identified in the target language based on the contextual meaning in the text and the culture of the target readers This is a cognitive strategy**

A word has many meanings in different situations. Therefore, the participants had to decide and choose the most accurate term from two or three alternatives identified on the basis of the contextual meaning of the text and the culture of the target readers. They did this by using the discrimination strategy to identify and choose the closest, natural equivalent term in the target language from two or three alternatives identified in the target language. Some examples taken from the TAPs transcriptions are as follows.

- Case One:** For the word “responsible”, the participant had to decide between the two Malay terms *tanggungjawab* and *berperanan* and she chose *berperanan* as it suited the context in science whereas *tanggungjawab* is used for people in a social sense.
- Case Two:** For the term “steel”, the participant had to decide to choose between the Malay terms *besi keluli* or just *keluli* and she chose the latter which suited the context of the situation.
- Case Three:** For “emotional response”, the participant had to decide to choose between the Malay terms *gerakbalas* or *tindakbalas* and she chose the former as it suited the contextual meaning in the text whereas the latter is used in a chemical reaction.
- Case Four:** The participant had difficulty in the plurality, that is whether to retain the original English term “flagella”, or to choose the Malay term *banyak flagellum* in the context of the science text and she chose the former but decided that she needed to confirm by resourcing later.

Percentages of Direct and Indirect Strategies Used by the Participants

From the TAPs analysis, the percentages of the direct and indirect strategies used by the participants while translating were determined. The findings are presented in Table 4. From the data presented in Table 4 based on the five TAPs analysis, it is seen that all the main direct and indirect strategies were used, although in different percentages. From Table 4, the case by case analysis of the strategies used in the TAPs by the five participants were as follows.

Table 4
Percentages of Direct and Indirect Strategies Used by the Participants

Strategies Cases	Direct Strategies			Indirect Strategies			TOTAL
	Memory	Cognitive	Compensation	Metacognitive	Affective	Social	
Case One	7 10.14%	38 55.07%	2 2.90%	16 23.19%	4 5.80%	2 2.90%	69 100%
Case Two Text One	2 4.0%	21 42.00%	1 2.00%	23 46.00%	1 2.00%	2 4.00%	50 100%
Text Two	0	9 52.94%	1 5.88%	6 35.29%	1 5.88%	0	17 100%
Case Three	1 4.55%	7 31.82%	0	11 50.00%	3 13.64%	0	22 100%
Case Four Text One	1 1.72%	31 53.45%	1 1.72%	20 34.48%	1 1.72%	4 6.90%	58 100%
Text Two	2 10.0%	10 50.00%	1 5.00%	6 30.00%	0	1 5.00%	20 100%
Case Five	0	28 68.29%	0	12 29.27%	1 2.44%	0	41 100%
Average Overall use of Strategies	13 4.69	144 51.99	6 2.17%	94 33.94%	11 3.97%	9 3.25%	277 100%

Case One: The participant used the highest number of strategies - a total of 69 compared to the rest. She used a total of 38 or 55.07% cognitive strategies (the second highest among the participants, being an experienced translator) and a total of 16 or 23.19% of metacognitive strategies. She is a very conscientious, accurate translator and took pains to think on how the target readers would perceive her translation as she tried her best to ensure proper understanding of the source text in English and performed a further meticulous task of communicating the information as accurately as possible in the Malay language.

Case Two: For Text 1, the participant used more metacognitive than cognitive strategies for his translation task (46% against 42%). This meant that the participant had problems in his task and

had to redo his translation after thinking over it and realising that the meaning was not conveyed accurately. Therefore, his metacognitive strategies were more. However, in Text 2 which he translated, he used more cognitive than metacognitive strategies (52.94% against 35.29%).

Case Three: Here the participant used more metacognitive strategies - 50% against only 31.82% cognitive strategies. She really made sure that the content conveyed was accurate and thought about it very carefully and was very meticulous of her presentation even though she was not in the mood to translate and thus used the most number of affective strategies, that is, 13.64%

Case Four: Here the participant used more cognitive strategies than metacognitive strategies for both the texts that she translated. For Text 1, she used 53.45% cognitive strategies against 34.48% metacognitive strategies and for Text 2, she used 50% against 30%. She spent a lot of time analysing expressions and phrases, analysing contrastively between the two languages, therefore, she spent more time on cognitive strategies than on how to translate - the metacognitive aspect.

Case Five: This participant performed his task almost effortlessly as he had 17 years of experience as a translator. He just translated automatically and therefore his cognitive strategies were the highest among the participants, that is, 68.29% as against only 29.27% metacognitive strategies.

Overall, the most used strategy was the cognitive strategies which were used a total of 144 times or 51.99% by the participants. According to Darwish (2003:127), "the internal translation process is in fact the cognitive process that takes place during the act of translating". To realise the cognitive process, the most important tools are the cognitive strategies. Brown and Palincsar 1982 claim that (in O'Malley and Chamot 1990:8), "cognitive strategies are more directly related to individual learning tasks and entail direct manipulation or transformation of the learning materials" and this statement has been proven to be true from this study.

The second were the metacognitive strategies which were used on the average a total of 94 times or 33.94% of the time. These strategies were important in the translation process because they involved making decisions on how to manage the translation task, such as, making decisions on planning and organising, monitoring and reviewing the translation process and evaluating their performance in the translation task. In other words, it involved making

and implementing the decisions made. According to Darwish (2003:93), data derived from empirical research pioneered by Jumpelt, Levy, Toury, Seguinot, Wilss, Lorschler and other researchers have "highlighted the significance of decision making as the backbone of translation"

The third were the memory strategies which comprised 13 or 4.69% of the time as the participants had to resort to their memory for visualising certain concepts and elaborating. For case five, there was no overt use of this strategy as he did not verbalise using this strategy. In fact this is one disadvantage of TAP as sometimes participants forget to verbalise aloud as the translation process has become automatic and thus subliminal.

The fourth were the affective strategies which comprised 11 or 3.97% of the time as the participants were also affected by their moods due to other commitments and they thus expressed these feelings.

The fifth were the social strategies which were used 9 or 3.25% of the time. Here, the participants asked for help and did some self-talking for confirmation.

Finally, came the compensation strategies which were used 6 or 2.17% of the time when the participants had to use paraphrasing, linguistic clues etc. to help them in their translation process.

All these strategies are operations employed by the learner (in this study, the translator) to aid acquisition, storage, retrieval and use of information. These strategies are "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective and more transferable to new situations" (Oxford, 1989:8).

Approaches Used in the Translation Process

From the analysis of the five transcriptions of the TAPs, it was seen that the syntactic, semantic and pragmatic approaches proposed by Bell (1991) and the cognitive, linguistic, communicative and pragmatic approaches proposed by Sager (1994) were used by the participants while translating. Darwish's (2003) cognitive approach which proposes the use of visual sensory perception to comprehend the source language text using short and long-term memory was also used by the participants. Here, they deconstructed the source language text, found matching equivalents in the target language, made and implemented decisions and finally reconstructed or produced the translated target language version. The participants had in their minds two sets of parallel linguistic and cultural repertoires, that is the source and target languages as proposed by Darwish (2003:24), moving constantly to match and replace lexis, grammar, stylistics, phonology, cultural and situational equivalents. This process, according to Darwish (2003:24) is a 3-dimensional activity consisting of text

analysis (meaning, register, style, rhetoric), translation and rearrangement. The participants worked at the linguistic units of the word, phrase and clause. The semantic approach was used when the participants tried their best to convey the meaning as accurately, clearly and naturally as possible in the target language. The pragmatic or communicative approach was used by the participants when they ensured that the translated product suited the language proficiency level and intellect of the target readers. In this study, the five participants were translating scientific texts from English to Malay for the first year undergraduate university students. They made sure that the language used in the translated version as seen in the TAPs analysis was accurate, clear and natural and at a level which will be easily understood by the target readers as the participants of this study had the *skopos* or the aim of the translation in their minds while translating. In other words, they used simple equivalent terms and communicated the source language content in simple target language which could be understood by first year undergraduate university students. Most of the translation authorities do not believe in word-for-word or verbatim translation and this is seen to be true in the case of the participants in this study who while translating kept in mind not to translate word-for-word so as not to produce an unnatural, awkward translation.

Conclusion

This study showed that all the main direct and indirect strategies in Oxford's (1989) SILL were used by the participants in their TAPs while translating. The most used strategies were the cognitive strategies followed by the metacognitive strategies. Besides these, three additional strategies which were discovered from this study were also used.

The four approaches used, that is the cognitive, linguistic, communicative and pragmatic, were basically the same as proposed by Bell (1991), Sager (1994) and Darwish (2003) in their translation models.

From the analysis of the TAPs, the translation process is seen to be cascaded, integrative, iterative and interactive, that is, analysis at one stage need not be completed before the next stage is activated and revision is expected. It was seen that the participants actually revised and corrected their translation product continuously until the final draft was reached. This study supports Bell's, Sager's and Darwish's view that the translation process is not linear. While translating, the participants did repetitions, performed structured reviewing, identified problems and found solutions and practiced revision of their structures to suit the target language norms.

The *skopos* or aim of the translation was always kept in mind by the participants while translating. They made sure that their translation suited the language proficiency level and intellect of the target readers.

Future researchers can experiment and find out whether these strategies and approaches as proposed and discovered by the researcher in this study are used by their participants while translating other types of texts using other pairs of languages found in this world.

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