Examining the Roles of Cognitive and Metacognitive Activities in Translation Performance: Think Aloud Protocol (TAP) Analysis

Kurnia Saputri[1], Farnia Sari[2], Amaliah[3]

[1] Universitas Muhammadiyah Palembang, Palembang, Indonesia
[2] FKIP, Universitas Tridinanti, Palembang, Indonesia
[3] Doctorate program of Applied English Linguistics, Universitas Katolik Indonesia Atma Jaya, Jakarta, Indonesia

Corresponding Email: farnia_sari@univ-tridinanti.ac.id

Abstract. The purpose of this study is to investigate the cognitive and metacognitive strategies implemented by an English teacher at a Senior High School in Jakarta to understand the cognitive and metacognitive processes used in translating English text into Indonesian text, and vice versa, within a time frame of about 25-30 minutes. This qualitative study aims to explore how cognitive and metacognitive activities may impact students' translation process and help them develop sub-competencies by guiding them through the translation process and identifying strategies used to complete the task. The translation tasks involve translating English text into Indonesian text and vice versa. The tasks provide source text (ST) and Google translation (GT) output as references to assist in translating the texts that are put in post-editing. Each ST consists of 10 sentences that are translated using cognitive and metacognitive activities. The analysis used was the Think Aloud Protocol (TAP) based on Waden's theory (1991). TAP was used to analyses the taxonomy of cognitive and metacognitive strategies. As the results of the study revealed, the frequency of cognitive strategies used in the Source Text (ST) is higher, indicating a higher complexity that requires additional cognitive effort. On the other hand, the use of cognitive activities decreased, affecting cognitive knowledge and reading strategies that influence cognitive activities. Additionally, metacognitive strategies were found to be more frequently associated with translational problems.

Keywords: Cognitive Strategy, Metacognitive Strategy, Think Aloud Protocol (TAP), Translation Performance

Introduction

Cognition refers to second-order cognition, that is a knowledge about knowledge that reflects the action (Congjun, 2005). Cognition covers the thinking process about an individual's perceiving, understanding, remembering, etc. Basically, cognition relates to mental processes, such as problem-solving, making a plan, monitoring, and comprehension, that are controlled by the person who has active control of his cognition. Moreover, the person who has the higher-order cognitive process is aware of the cognitive process. For example, the students write the paper. The cognitive process would allow them to complete the task. However, the metacognitive process would control that reflect the action by planning, making, revising and editing, and evaluating. In this case, the process of cognition reflects the mental process and deals with the mental process that generates new knowledge and uses the knowledge. The person who can control his cognition means he has a higher-order cognitive

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

process called metacognition. Metacognition allows the individual to complete the task by following some steps: planning, monitoring, evaluating, and comprehending.

Furthermore, metacognitive strategies comprise three distinct types of metacognitive awareness: declarative, procedural, and conditional knowledge. Declarative knowledge pertains to the individual's awareness and one's performance, including self-efficacy and motivation, which affects one's task performance (Schraw & Moshman, 1995; Schraw, Crippen, & Hartley, 2006). In a broader sense, this knowledge refers to the self, task, and applicable strategies for accomplishing a particular task (Bahrein). The second type of knowledge is procedural knowledge, which refers to the knowledge about how to use strategies such as monitoring, regulation, and other thinking processes. Examples of strategies include note-taking, slowing down for important information, skimming unimportant information, using mnemonics, summarizing main ideas, and periodic self-testing (Schraw et al., 2006). The third type of knowledge is conditional knowledge, which refers to the awareness of the appropriate or effective strategies, procedures, and skills that are more effective than another. Additionally, it concerns one's knowledge about when, where, and why to use particular cognitive actions or strategies. Furthermore, metacognition encompasses components and skills. Metacognitive regulation defines metacognitive activities that help control one's thinking or learning (Schraw & Moshman, 1995, p. 354). Metacognition experiences can manage cognitive processes and ensure that a cognitive objective has been reached (Livingston & Cooper, 2013).

The regulation of cognition is comprised of three primary elements: planning, monitoring, and evaluating. These components aid learners in adjusting and managing their learning process by planning and monitoring cognitive activities. Additionally, metacognition regulation pertains to the regulation of cognitive activities and experiences that enable individuals to control their learning. Procedural knowledge, including metacognitive skills, is a type of knowledge that controls the cognitive process. Task orienting involves comprehending task requirements, planning involves identifying the steps necessary to achieve goals or complete tasks, monitoring involves overseeing activities while implementing strategies, and evaluating and regulating involves checking the outcome of cognitive processing and modifying it as necessary. These activities are conscious, systematic, and purposeful (Efklides, 2006; Schraw, 1998; Efklides, 2008).

Furthermore, cognitive and metacognitive activities can be implemented across different subject areas or mental processes. Richards and Schmidt (1985) argued that the learners could activate their mental process or cognition. This study focuses on a translation subject that was conducted by an English teacher, whereas 'expert' translators could misinterpret or fail to interpret the ST (Gile, 1995). Moreover, many language teachers invest their efforts by learning some exercises and journals that are resources to develop their ability in translation (Sager, 1994). In other words, the students or 'expert' translators are emphasised to analyse what they are doing and what they can learn from it and to acquire sub competences by giving the direction to the process of translation, and strategies that they use to complete the translation task.

However, the previous studies used TAP analysis concerning on higher order thinking as a self-reflection tool to make strategic decisions in revising the text (Tabari, Sato, & Wang, 2023), meaning making process in translation process (Michelson, Lee, & Abdennebi, 2022), translating a text from English into Persian (Fereydouni, & Karimnia, 2016). Overall, the research focused on using TAP analysis, highlighting the importance in contributing to the fundamental restructuring of learner's interlanguage system and identifying cognitive and metacognitive strategies in translation performance.

Thus, the writers would like to investigate the cognitive and metacognitive activities that were implemented by one of the English teachers of a Senior High School. The present study examined selecting the teacher of a Senior High School in Jakarta to recognize the cognitive and metacognitive strategies that are used to translate English text into Indonesian

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

text and Indonesian text into English text for 25 – 30 minutes. Specifically, the study focused on the following research questions:

1. What is the extent of selecting the English teacher's cognitive and metacognitive activities used in translating the texts (English-Indo Text and Indonesian-English Text)?
2. To what extent does the English teacher use cognitive and metacognitive activities when translating the texts?

Hopefully, the teacher could become a competent translator by activating the cognitive and metacognitive abilities that lead them to become autonomous translators. The activities were chosen to record the activities and how the teacher solves the problems while translating the text. Moreover, the translation process includes cognitive and metacognitive strategies (Wenden, 1991).

Theoretical Framework

According to Wanden (1991), the cognitive and metacognitive strategies Wenden mentioned in her article are summarised as described in the table below;

Table 1.
An Analysis of Taxonomy of Cognitive and Metacognitive Behaviour

Behaviors	Components	Possible Subcomponents
Cognitive	Conjun (2005): Generating ideas Elaborating Revising Elaborating Clarification Retrieval Rehearsing Summarising	Repeating, lead-in, inferencing, etc. Making changes in plans, written text Extending the contents of writing/cultural term Disposing of confusions Getting information from memory Trying out ideas or language Synthesising what has read
	Wenden (1991) Clarification Retrieval Resourcing Deferral (Delaying) Avoidance Verification	(Self-question, Hypothesizing, defining terms/equivalence, Comparing) (Rereading aloud or silently what had been written/post edited, writing in a lead-in word or expression, Rereading the assigned question, Self-questioning, writing till the idea would come, summarising what had just been written (in terms of content or of rhetoric), Thinking in one's native language) (Ask researcher, refer to dictionary)
Metacognitive	Planning	Finding focus Checking and identifying problems Reconsidering written text, goals
	Monitoring	Checking and verifying their process in the post-editing process and when identifying oncoming problems.
	Evaluating	Questioning Revising Editing (Reconsidering the written text, previous goals, planned thoughts, as well as changes undertaken to the text)
	Comprehending	

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

Translation Process

The researchers admitted that the combination of cognitive psychology, behaviour approach, and technology give an impact on the process-oriented of translators that can be used to collect data and explore the translator's mind (Shreve & Angelone, 2010) One of the technologies that can be applied is Google Translation to assist to translate one language (SL) into target language directly in the form of words, phrases, and sentences.

The process of translation involves a cognitive approach where information is produced from mental events, such as perception, problem-solving, and memory (Bergen, 1999). According to Bergen (2009), the process of translation covers three nodes, taking into consideration that the meaning of the source text is plausible, and the second is the target text produced, whether it is acceptable or not. The process of translation starts from the unit level and then at the level of longer sections of text. In addition, the process of translation comprises the knowledge and the ability to recall and apply certain transfer operations (shift), which frequently lead to acceptable target language equivalents (Gopfreich, 2009).

The process of translation has some factors that affect the quality of the produced text. First, the meaning of the terms and idioms that the translation had unknown the meaning of target text. The second is the subtleties of the ST or the ambiguity of the text. Moreover, in translating the text, the translator does pair or group work to create the cognitive conflict. Thus, the teacher should be involved in assisting the students in finding the knowledge and strategies to interpret the text successfully. The strategies that can be applied by the teachers are to give the direct answer to questions about the source text or ask the students how they have understood the text and suggest they find another source to assist their translation task (Bergen, 2009).

Cognitive Theory of Translation

Metacognition and cognition are not easily distinguishable (Tarricone, 2011). Cognition involves the development of learning, while metacognition entails the evaluation of the logical grouping of ideas. Flavell's (2024) model of metacognition suggests that these two concepts differ in their content and function but are similar in form and quality. According to Flavell (2024), both can be acquired, forgotten, and expressed in external formulations, with the information being either correct or incorrect, subjective, shared, or validated, just like cognition.

Krashen (2003) acknowledged that the cognitive process involves monitoring, which has three conditions that can activate the language learner's cognitive process: rules, correctness, and time. The learner must have sufficient time to understand the grammar rules and forms of the target text through reading, listening, speaking, and listening. Metacognition has two major dimensions: metacognitive knowledge and metacognitive strategies, which are interdependent (Metcalfe & Shimamura, 1994).

Metacognitive knowledge pertains to the awareness of cognitive resources, such as conscious grammar or other generalizations (Krashen, 1981). Metacognitive strategies involve active and conscious processes that learners use to monitor their progress towards achieving goals. In essence, knowledge is considered metacognitive if it is actively and strategically used to achieve a goal or complete a task (Bergen, 1999).

Metacognitive Strategies

Metacognitive strategies are processes that involve attention, motivation, learning, memory, and understanding (Apriani et al., 2024; Bao, 2024). These strategies are used to monitor the writing process consciously and evaluate writing actions, while cognitive strategies are employed for the actual writing process. Metacognitive strategies encompass planning, self-monitoring, and self-evaluating (Wenden, 1993). Planning strategies involve self-questioning, the recognition of purposes, activation of prior knowledge, and organization of ideas. Self-monitoring pertains to the process of monitoring or consciously controlling the writing process (Flavell, 2024; Angelina et al., 2022). It involves controlling, directing, and sequencing the composing processes and one's progress in the task. Moreover, self-

monitoring focuses on how and when to check the outcomes of problem-solving processes and strategically regulate them according to cognitive goals (Mayer, 1999). In self-evaluating, the writer assesses the weaknesses of the completed task and makes evaluations and revisions. This process allows learners to develop their perception of the task.

Material and Method
Research Design
This study conducted a qualitative study to explore the extent to which cognitive activities and metacognitive activities might influence students' translation process. The analysis used was the Think Aloud Protocol (TAP). According to Ericson & Simon (1984), participants are instructed to express their thoughts, opinions, decisions, likes, and dislikes as they work on the task.

Data Sources
The focus of this research is on an English as a Second Language (ESL) teacher in Junior High School. The teacher holds a Bachelor's degree in English literature from Strata 1, graduated in 2014, and has been teaching for almost a decade. The participant, selected through accidental sampling, was required to translate the text into Indonesian and English in under thirty minutes. He was allowed to use online dictionaries or websites to find potential translation solutions and equivalents. The translator was instructed to verbalize their thoughts, such as the words they were searching for and their opinions on the translations available in the raw output. In collecting the data, TAP analysis based on Walden's model (2019), cognitive and metacognitive strategies were conducted by counting the frequency of each TAP strategy to determine if there were any statistically significant differences. If the participant believed the raw output generated by Google Translate was correct, they were not required to verbalize their thoughts, although they were not prevented from doing so.

Data Collection
Frequency of occurrences
Based on the data of cognitive strategies that the participant did the cognitive activities as described in Table 3. Based on the results of the TAP analysis that can be found that the cognitive strategies are occur are as follows:

Table 2.
Identification of Cognitive Strategies

Clarification	Post Editing (EN–IND)	Post Editing (IND–EN)
Self-questioning	2	4
Hypothesizing		
Defining terms	1	1
Comparing	1	1
• Rereading aloud or silently what had been written		
• Writing in the lead-in word or expression		
• Rereading the assigned question	8	1
• Self-questioning		
• Writing till the idea would come	2	3
• Summarizing what has just been written		
• Thinking in one's native language		
• Ask researcher		
• Refer to dictionary	2	

Identification of Metacognitive strategies

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

Based on the data of cognitive strategies that the participant did the cognitive activities as described below:

Table 3.
Identification of Metacognitive strategies

Clarification	Post Editing (EN–IND)	Post Editing (IND–EN)
Self-questioning	2	4
Hypothesizing		
Defining terms	1	1
Comparing	1	1
• Rereading aloud or silently what had been written		
• Writing in the lead-in word or expression		
• Rereading the assigned question	8	1
• Self-questioning		
• Writing till the idea would come	2	3
• Summarizing what has just been written		
• Thinking in one's native language		
• Ask researcher		
• Refer to dictionary	2	

Data Analysis

The data was analyzed using quantitative data analysis procedures. Frequencies were used to display the occurrence of cognitive and metacognitive strategies. Verbalizations were transcribed and analyzed as collected data using frequency analysis and thematic analysis. In the frequency analysis, the collected data showed the frequency of cognitive and metacognitive strategies occurring during the translation performance process.

Thematic analysis was used to present the theme and describe the data in detail (Braun & Clarke, 2006). Thematic analysis is employed to investigate the cognitive and metacognitive strategies used by the participants. The thematic analysis consists of six steps as follows: (1) familiarizing oneself with the data, (2) generating initial codes from the data, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. Verification and audit are employed to review conformability.

Results and Discussion
Result

Based on the number 2, GT output and Post editing, there is no significant difference. However, the translator changed the word "social" into "sosial" in Indonesian. The translator practices cognitive and metacognitive strategies that can be seen in Excerpt 1.

Excerpt 1:
Metacognitive- Planning - Finding Focus
● *"oke, Eeee…for number one"*
Cognitive - Retrieval - Rereading aloud what assigned question
• *"E…let me check …constructivism sees the world and know what we can know about the world, as socially constructed (reading)"*
Cognitive-Resourcing (1) refers to Google translation, defining constructivism
● *"kalau dari eee….Google translation"* ("from eee....Google translation")
Metacognitive - Monitoring - Checking and identifying their process in the post editing process
● **"**N*ow using GT, Kita lihat* ("Now using GT, we see)
Cognitive - retrieval - rereading aloud what had been written

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

- "konstruktivisme melihat dunia dan apa" ("constructivism sees the world and what it is")

Cognitive - rereading and hypothesizing
- "sebagai konstruksi sosial, yang dapat kita ketahui tentang dunia" ("as a social construction, what we can know about the world")

Cognitive rereading aloud what had been written
- "sebagai konstruksi sosial" ("as a social construction")

Table 4.
Cognitive and Metacognitive strategies used in translation performance

Source Text	GT Output	Post-Editing (Oxford Online Dictionary)	Cognitive	Metacognitive
Constructivism sees the world, and what we can know about the world, as socially constructed.	Constructivism sees the world, and what we can know about the world, as a *social* construct.	Constructivism sees the world, and what we can know about it, as a *social* construct.	Rereading the assigned question Resourcing refers to Google Translate, defining constructivism. Rereading aloud what had been written (2) (C-retrieval)	Planning (Finding focus) Monitoring: Checking and identifying in the post-editing Monitoring: Checking using GT Hypothesizing

Based on Table 6, the translator used cognitive skills such as rereading the assigned question, resourcing that refers to GT and defining ***constructivism***, rereading aloud what had been written, and hypothesizing. Meanwhile, metacognitive strategies used planning, monitoring by checking identifying in the post editing and checking by using Google translation. It shows that the cognitive is more occurrence rather than metacognitive. In addition, metacognitive planning, used before cognitive strategy.

Based on the number 3, GT output and Post editing, there is no significant difference. However, the translator changed the equivalent "menawarkan" into " memberikan' in Indonesian. The translator practices cognitive and metacognitive strategies that can be seen in Excerpt 2.

Excerpt 2:
Metacognitive - checking and identifying problems
- Alexander Wendt (1995), menawarkan …. (Alexander Wendt (1995), offering ....)

Cognitive - hypothesizing
- "Oh kayaknya kurang tepat ini menawarkan" ("Oh I don't think this is the right offer")

Metacognitive - evaluating - editing
- "Lebih tepat e…Oke memberikan...memberikan" ("More precise e...Okay give...give")

Cognitive - Writing till the idea would come

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

- "memberikan contoh yang sangat baik" ("set an excellent example")

Cognitive - retrieval - rereading aloud what had been written
- "yang mengilustrasikan konstruksi sosial dan realitas" ("that illustrates social construction and reality")

Metacognitive - comprehending
- " Oke number 3, I think that's okay"

Table 5.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING (Oxford online dictionary)	Cognitive	Metacognitive
Alexander Wendt (1995) offers an excellent example that illustrates the social construction of reality when he explains that 500 British nuclear weapons are less threatening to the United States than five North Korean nuclear weapons.	Alexander Wendt (1995) offers an excellent example illustrating the social construction of reality when he explains that 500 British nuclear weapons are less threatening to the United States than five North Korean nuclear weapons.	Alexander Wendt (1995) provides an excellent example illustrating the social construction of reality when he explains that 500 British nuclear weapons are less threatening to the United States than five North Korean nuclear weapons.	Hypothesizing

Writing till the idea would come

Rereading loudly | Checking and identifying problems

Reconsidering the written text

Evaluating to reconsider the written text |

Based on Table 7, cognitive strategies include hypothesizing, writing until the idea comes, and rereading aloud. In contrast, metacognitive strategies involve checking and identifying problems, reconsidering the written text, and evaluating it for potential revisions.

Excerpt 3:
Cognitive - Retrieval - rereading aloud
- **"these** identification….(Read a text fully)"

Metacognitive - planning - finding focus
- "*Kita lihat dulu apa itu 'ideational structure"* ("Let's first look at what an 'ideational structure' is)

Cognitive - Comparing - Defining terms of *ideational*
- "*Kita lihat from the Oxford ehm..ideational oh, ideation merupakan fungsi bahasa untuk mengkonstruksi atau mengemukakan gagasan atau informasi* " ("We see from the Oxford ehm..ideational oh, ideation is the function of language to construct or express ideas or information")

Metacognitive - reconsidering the written text
- "*Ok, kita lihat di sini from Google translation kita pindahkan ke post editing*"("Ok, we see here from Google translation we move it to post editing")

Metacognitive - evaluating - planned thought as well as changes undertaken in the text

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive Activities in Translation Performance: Think Aloud Protocol (TAP) Analysis

- "*But, eh…aplikasi ini identifikasi, identifikasi ini*, write more than one word of identifikasi, ya oke" ("But, uh...this application is identification, this identification, write more than one word of identification, okay")

Table 6.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING (Oxford online dictionary)	Cognitive	Metacognitive
These identifications are not caused by the nuclear weapons (the material structure) but rather by the meaning given to the material structure (the deational structure)	This identification is not caused by nuclear weapons (material structure) but by the meaning given to the material structure (ideational structure).	These identifications are not caused by nuclear weapons (material structures) but by the meanings given to material structures (ideational structures).	Retrieval-rereading aloud Defining the term of ideational Comparing the term of "ideation" by using Oxford dictionary and GT Rereading aloud what had been written Writing till the idea would come	Planning-finding focus Monitoring, checking, and verifying their problems Reconsidering the written text-evaluating

In Table 8, the first stage employed by the translator involves the cognitive dimension, which encompasses retrieval and reading aloud. The translator identified issues while perusing the text and then concentrated on delineating the ideational structure. To accomplish this, the translator utilized an Oxford dictionary and Google Translate, and then revisited the text until the idea became lucid. Finally, the translator assessed what had been written. In this instance, the occurrence of the cognitive dimension significantly surpasses that of the metacognitive dimension. It inferred that the translator practiced the cognitive dimension and metacognitive to translate the text.

In number 7, the translator attempted to translate the source text. The translator replaced the word "kaum" with "para". Additionally, the translator did not make many changes to the GT output. The strategies used by the translator were cognitive in retrieval, metacognitive in evaluating, and comprehending. This can be observed in Excerpt 4 and Table 9.

Excerpt 4:
Cognitive - Retrieval - hypothesizing - writing till the idea would come
- "*Kita lihat di sini dari GT ini lebih lanjut kali ini hal ini lebih lanjut*" (We see here from GT this further this time this further thing')

Metacognitive - evaluating - editing - reconsidering the written text
- "Menunjukan bahwa kaum, kalau saya menunjukan bahwa para konstruktivis melampaui realitas material dengan memasukan pengaruh…"(Showing that people, if I show that constructivists go beyond material reality to include influences...")

Metacognitive - comprehending

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

- "*Iya, kalau saya menurut saya kaum diganti para konstruktivis*". (Yes, I think the constructivists are being replaced).

Table 7.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING (Oxford online dictionary)	Cognitive	Metacognitive
It further demonstrates that constructivists go beyond the material reality by including the effect of ideas and beliefs on world politics.	This further shows that constructivists go beyond material reality to include the influence of ideas and beliefs on world politics.	This further shows that constructivists go beyond material reality to include the influence of ideas and beliefs on world politics.	Hypothesizing

Retrieval-writing till the idea would come | Editing

Reconsidering the written text

Comprehending |

Moreover, the translator incorporated cognitive dimensions while brainstorming and constructing ideas. The translator refrained from modifying the Google Translate output during the post-editing process, suggesting that cognitive proficiency has a negligible impact on post-editing. This can influence the metacognitive procedure as it entails stages like editing, reconsidering the written text, and comprehending.

Translating the Indonesian text into English text

The translator practiced translating Indonesian text into English text. The translator found that the numbers 2, 3, 4, and 5 are different between GT output and post editing. It can be seen in Excerpt 5.

Excerpt 5:

Cognitive - Retrieval - rereading the assigned question

- "*Kita lihat constructivist menyatakan negara dapat* .. (read full text) (We see that constructivist states can…)

Cognitive - Hypothesizing - Comparing
Metacognitive - editing - comprehending

- "*oke saya akan mencoba menganalisa dan kalau menurut saya "states" disini lebih cocok ke "Country". Setahu saya kalau "states" negara bagian kalau "country" negara itu*" ("okay I'll try to analyze and see if I think the "states" here are more suitable for "Country". As far as I know, "state" is the state while "country" is the country").

Table 8.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING (Oxford online dictionary)	Cognitive	Metacognitive
Constructivists argue that states can have multiple identities that are socially constructed	Constructivists argue that states can have multiple identities that are socially constructed	The constructivists argue that the country can have multiple identities that are socially	Retrieval-rereading the assigned question	Evaluating - editing

Reconsidering the written text |

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

		constructed through interactions with other actors.	Comparing states and countries
through interactions with other actors.	through interactions with other actors.		
			Hypothesizing

In Table 10, the first stage is cognitive. Participants reread the assigned question and hypothesize whether the words "states" or "countries" have the appropriate equivalent in the target language. Metacognitive dimensions, such as evaluating, editing, and reconsidering the written text, are used in this stage. The participant is dominant in using cognitive strategies to translate the text. During the translation process, he used cognitive strategies by rereading the assigned question and hypothesizing the Google Translate output to determine the focus of the translation. In this case, participants had trouble comparing the words "states" and "countries." He made post-editing changes by replacing "states" with "countries" and adding the article "the" before "constructivist." Ideas emerge during metacognitive activities. Moreover, the hypothesizing can be employed while reading the full text to find the assigned.

In number 3, metacognitive is the initial stage. The participant found problems in finding the appropriate equivalent, such as "which in turn signals their interests" changing into "in turn signals their interests." The process is affected by planning - finding focus, checking and identifying problems, as well as cognitive activities like writing until ideas come. This can be seen in Excerpt 8 and Table 11.

Excerpt 6:

Metacognitive - Planning - finding focus

"*Identitas adalah representasi pemahaman aktor*… (Identity is the representation of an actor's understanding…)

Metacognitive - Checking and identifying problems

"*Kita baca from GT output, identity is a representation of actor's* …*"* (We read from GT output, identity is a representation of an actor's")

"Oke saya pindahkan ke post editing kalau saya coba menganalisa,...*"*identity is a representation…(Okay, I moved it to post editing if I try to analyze, ... "identity is a representation …)

Cognitive - Retrieval - writing till the idea would come

"yang mana memberikan dimana memberikan sinyal terhadap minat mereka, oke kalau menurut saya itu lebih baik". (."...which gives a signal of their interest, okay I think that's better"

Table 9.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING	Cognitive	Metacognitive
Identity is a representation of the actor's understanding of who they are, which in turn signals their interests.	Identity is a representation of actors' understanding of who they are, which in turn signals their interests.	Identity is a representation of actors' understanding of who they are; in turn, it gives signals to their interests.	Hypothesizing Retrieval writing till the idea would come	Planning-finding focus Checking and identifying problems

In this case, metacognitive activities involve planning, finding focus to check and identify problems, hypothesizing, writing until ideas come, and editing by omitting "which" words. **This infers that metacognitive activities are the initial stage,** followed **by cognitive strategies**.

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive Activities in Translation Performance: Think Aloud Protocol (TAP) Analysis

In Excerpt 7 and Table 12, the translation process involves planning, finding focus, checking, and identifying problems in the initial stage, followed by checking and identifying problems in the raw output. In the next stage, cognitive strategies are employed in hypothesizing after placing the raw output in the post-editing column. Then, I check and verify the problems in the post-editing stage. After verifying the problems, evaluating and revising the word "states" to "countries" to ensure the equivalent is appropriate in the text.

Excerpt 7:

Metacognitive – Planning - finding focus
- "*number four, identifikasi identitas mereka*" (number four, identify their identity)

Metacognitive - checking and identifying problems
- *"Negara-negara penting bagi peneliti konstruktivis karena para pendukung konstruktivis berpendapat bahwa identitas akan menentukan kepentingan dan tindakan yang akan dilakukan oleh negara-negara"* (States are important to constructivist researchers because constructivists argue that identities will determine the interests and actions that states will take).

Cognitive - Hypothesizing
- *"Oke saya pindahkan dari GT ke post editing saya mencoba menganalisa"* (Okay I moved it from GT to post editing I tried to analyze it)

Metacognitive - Checking and verifying their problems in the post editing
- identifying there. (Read full text)

Metacognitive - evaluating – Revising
- *"Saya ganti dengan state dengan country"* (I replace with state with country)

Metacognitive - Comprehending
- *"Karena country lebih tepat karena menyatakan bukan negara bagian"* (Because country is more appropriate because it is not a state)

Table 10.

Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING	Cognitive	Metacognitive
Identifying their (the countries') identities is important for constructivist researchers because constructivist proponents argue that identity will determine the interests and actions that countries will take.	Identifying their (states) identity is important for constructivist researchers because constructivist proponents argue that identity will determine the interests and actions to be taken by states.	Identifying their (countries) identity is important for the constructivist researchers because the constructivist proponents argue that identity will determine the interests and actions to be taken by the countries.	Hypothesizing	Planning Finding focus Checking and identifying problems Evaluating - revising Comprehending

It implies that only one stage of the cognitive process is involved. Meanwhile, metacognitive strategies were much more prevalent. It suggests that the participant only identified one word that needed to be changed from "states" to "countries." **Furthermore, the underlying issue is the same as the previous one.** It did not take many activities to find the appropriate equivalent in the text, especially cognitive strategies.

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

In Excerpt 8 and Table 13, metacognitive strategies such as finding focus, checking for, and identifying problems were employed in the first stage. Following this, cognitive strategies were implemented, including hypothesizing concepts like "small-state identity" and "big-state identity" in relation to "country's identity" and "big country's identity". The final stage involved writing until the idea emerged, which was achieved by adding the article "the" before "small country's identity". As a finding revealed, without metacognitive activities, the idea would only emerge if the sentence is familiar and has a cognitive background.

Excerpt 8:

Metacognitive - Finding focus

- *sebagai contoh identitas negara kecil menyiratkan serangkain kepentingan yang berbeda dari yang tersirat oleh identitas negara besa*r…. oke (read full text). (For example, the identity of a small state implies a different set of interests than those implied by the identity of a large state.... okay (read full text).

Metacognitive - checking and identifying problems

- *Oke from GT kita lihat hasilnya kita pindahkan ke post-editing* (Okay from GT we see the result we move it to post-editing), "For example, a small state…"

Cognitive - Hypothesizing

- "*Oke, disini saya akan mengganti kata state dengan country*" ("Okay, here I will replace the word state with country")

Cognitive - writing til the idea would come

- "Baik kalau disini saya akan tambahkan artikel sebagai contoh identitas" …("Well, here I will add an article as an example of identity" ...")

Table 11.
Cognitive and Metacognitive strategies used in translation performance

SOURCE TEXT	GT OUTPUT	POST-EDITING	Cognitive	Metacognitive
For example, small-state identity conveys a different set of interests than that implied by large-state identity.	For example, a small-state identity implies a different set of interests than that implied by a big-state identity.	For example, the small country's identity implies a different set of interests than that implied by the big country's identity.	Hypothesizing Writing till the idea would come	Finding focus Checking and identifying problems

Discussion

In translating English text into Indonesian text, cognitive strategies frequently occur, such as self-questioning, rereading the assigned question, and writing till the idea comes. According to Sun, Li, & Zhou (2020) and Amaliah (2023), levels of ST difficulty exert an influence on cognitive effort. The translator employed a resourcing strategy, which refers to the online dictionary, especially for searching unfamiliar terms, such as "constructivism". According to Ahmed & Fathi (2024), the translator compared and contrasted the words or texts between the source text (ST) and target texts (TT) by utilizing resources to determine whether the translators conveyed the same effect of these resources or made shifts. If there was a shift in engagement, such as addition, omission, and modulation, appropriately conveyed messages were employed.

Meanwhile, some metacognitive activities, such as planning-finding focus and editing, are dominant in translating English into Indonesian text. Moreover, rereading aloud the assigned question is much more practice in translating English text into Indonesian text and refers to resources such as a dictionary or website to find out the appropriate equivalent and discover the meaning of terms, for example, ideational structure. In brief, the translation process incorporated a cognitive dimension while brainstorming and contracting ideas.

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

Meanwhile, the metacognitive dimension can activate while editing, reconsidering, and comprehending the written text.

In translating Indonesian into English texts, hypothesizing can be employed while reading the assigned question to check and identify problem, such as "states" that can be changed into "countries" (See Excerpt 5) to match the appropriate equivalent in the TL (Target Language) and omitting the equivalent "which" (See Excerpt 6). It implies that only one stage of the cognitive process is involved. Meanwhile, metacognitive strategies were much more prevalent. It suggests that the participant only identified one word that needed to be changed from "states" to "countries." Furthermore, Moreover, the fundamental problem remains unchanged from the preceding one. It emerges finding the correct equivalent in the text requiring minimal effort, especially when using cognitive strategies. The idea would only emerge if the sentence is familiar and has a cognitive background. In line with Michelson, Lee, & Abdennebi (2022), the activities are decreased due to the previous knowledge, genre knowledge, and reading strategies.

Furthermore, translating English text and Indonesian text, including much more using cognitive strategies rather than metacognitive strategies. It is found that rereading the assigned questions occurs eight times rather than translating Indonesian text into English text. According to Zhou & Jiang (2012), the silent condition is increased when the level of ST difficulty increases. Meanwhile, in the process of translating Indonesian and English texts, checking and identifying problems is more common than translating English texts into Indonesian texts. According to Fereydouni & Karimnia (2016), the most frequent occurrence tends to negative solution to a translational problem.

Conclusion

Based on the findings that the majority of the participants did, the cognitive activities were "rereading aloud or silently what had been written". The participant confirmed the original text before translating it into the target language (TL). The second activity implied was hypothesizing that the participant clarify the meaning of terms and then he hypothesizes the meaning of terms that is suitable meaning for TL. In defining the terms, the participant searches for the meaning through one online dictionary resource provided on the website, such as the Oxford Dictionary or Google Dictionary. And, if necessary, uses Wikipedia to confirm the meaning of terms that are appropriate in the context of TL. Moreover, the participants are still using GT output that was placed in the post editing column without any change from the participant. Even so, the participant makes sure that GT outputs are the appropriate meaning of the TL. Based on the findings, in cognitive parts, hypothesizing in translating English and Indonesian occurs more frequently than translating Indonesian into English. The defining terms occur when translators translate English into Indonesian, such as the word "ideational structure". In this case, the translator found it difficult to understand the meaning in Indonesian. However, in post editing Indonesian and English, the translator did not find difficulty in defining the terms that he found in the text. Moreover, comparison is also conducted by the translator, in post editing (Eng-Indo) and (Indo-En) is not significantly different. Furthermore, the cognitive dimensions are more dominant in translating Indonesian text into English than English into Indonesian text. The cognitive strategies used are defining terms and writing till ideas would come. Meanwhile, metacognitive strategies used in translating Indonesian text into English text are finding focus and checking and identifying their process in the post editing. In English and Indonesian text in metacognitive strategies, the translator is dominant in editing. Three times used by the translator to edit the post-editing. And cognitive strategies used are rereading aloud or silently what had been written. Since most students have training to activate their cognitive and metacognitive strategies. The cognitive and metacognitive are interconnected. The cognitive controls the metacognitive that reflects in action in translation. The translator should consider the training in how to learn. According to Bergen (2009), the exploration of translation exercises develops their translation competence. However, the trainer of translation can be a resource that assists the learner to

activate self-reflection in the form of learning journals that can accelerate the process of translation.

Acknowledgement

References

Ahmed, S. S., & Fathi, S. Y. (2024). Translating engagement resources in English political texts into Arabic. *Theory and Practice in Language Studies*, *14*(5), 1517-1524. https://doi.org/10.17507/tpls.1405.25.

Amaliah. (2023). Identifying the cognitive and metacognitive approaches using post editing techniques toward English-Indonesian and Indonesian-English text. *International Journal of Science and Society*, *5*(5), 151-160. https://doi.org/10.54783/ijsoc.v5i5.874.

Angelina, M., Apriani, E., & Gusmuliana, P. (2022). *Students' Metacognitive Strategy in Learning Writing Paragraph at Third Semester of English Tadris Study Program* (Doctoral dissertation, IAIN Curup).

Apriani, E., Cardoso, L., Obaid, A. J., Wijayanti, E., Esmianti, F., & Supardan, D. (2024). Impact of AI-Powered ChatBots on EFL Students' Writing Skills, Self-Efficacy, and Self-Regulation: A Mixed-Methods Study. *Global Educational Research Review*, 1(2), 57-72. https://doi.org/10.71380/GERR-08-2024-8.

Bao, L., Soh, K. G., Mohd Nasiruddin, N. J., Xie, H., & Zhang, J. (2024). Unveiling the impact of metacognition on academic achievement in physical education and activity settings: A comprehensive systematic review and meta-analysis of qualitative insights. *Psychology Research and Behavior Management*, *17*, 973-987. https://doi.org/10.2147/prbm.s444631.

Bergen, D. (2009). The role of metacognition and cognitive conflict in the development of translation competence. *Across Languages and Cultures*, *10*(2), 231-250. https://doi.org/10.1556/acr.10.2009.2.4.

Brunette, L. (1998). Gile, Daniel (1995): Basic concepts and models for interpreter and translator training, Amsterdam/Philadelphia, John benjamins, 274 P. *Meta: Journal des traducteurs*, *43*(2), 320. https://doi.org/10.7202/002162ar.

Congjun, M (2005) A Taxonomy of ESL writing strategies. In *Proceedings redesigning pedagogy: Research, policy, practice*, pp. 1-10.

Díaz Larenas, C., Ramos Leiva, L., & Ortiz Navarrete, M. (2017). Rhetorical, Metacognitive, and cognitive strategies in teacher candidates' essay writing. *PROFILE Issues in Teachers' Professional Development*, *19*(2), 87-100. https://doi.org/10.15446/profile.v19n2.60231.

Efklides, A. (2006). undefined. *Educational Research Review*, *1*(1), 3-14. https://doi.org/10.1016/j.edurev.2005.11.001.

Efklides, A. (2008). Metacognition: Defining its facets and levels of functioning in relation to self-regulation and co-regulation. 13(4), 277-287. *European psychologist, 13*(4), 277 - 287. https://doi.org/10.1027/1016-9040.13.4.277.

Ericsson, K. A., & Simon, H. A. (1984). *Protocol Analysis: Verbal Reports as Data.* Cambridge: MTT Press.

Fereydouni, S., & Karimnia, A. (2016). Process-oriented translation studies: A case study based on Lörscher's model. *Theory and Practice in Language Studies*, *6*(1), 102. https://doi.org/10.17507/tpls.0601.14.

Flavell, J. H. (2024). Metacognitive aspects of problem solving. *The Nature of Intelligence*, 231-236. https://doi.org/10.4324/9781032646527-16.

Kurnia Saputri, et al., 2025

Examining the Roles of Cognitive and Metacognitive
Activities in Translation Performance: Think Aloud
Protocol (TAP) Analysis

Gile, D. (1995). Basic concepts and models for interpreter and translator training. *Benjamins Translation Library*. https://doi.org/10.1075/btl.8(1st).

Göpferich, S. (2009). Towards a model of translation competence and its acquisition: the longitudinal study TransComp. In S. Göpferich, A. L. Jakobsen, & I. M. Mees (Eds.), *Behind the mind: Methods, models and results in translation process research* (1st ed., pp. 11-37).

Krashen, S. D. (2003). *Explorations in language acquisition and use: The Taipei lectures*. Heinemann Educational Books.

Livingston, G., & Cooper, C. (2013). The need for dementia care services. *Designing and Delivering Dementia Services*, 3-16. https://doi.org/10.1002/9781118378663.ch1.

Mayer, R. E. (1999). (1999). *The promise of educational psychology: Learning in the content areas* (1st ed.). Pearson Educación.

Metcalfe, J., & Shimamura, A. P. (Ed.). (1994). *Metacognition: Knowing about knowing*. Massachusetts; MIT press.

Michelson, K., Lee, J. F., & Abdennebi, M. (2022). Textual thinking as evidenced through think-alouds: Designing meanings in interpreting authentic L2 web texts. *Language Teaching Research*, 136216882210967. https://doi.org/10.1177/13621688221096782.

Sager, J. C. (1994). Language engineering and translation. *Benjamins Translation Library*. https://doi.org/10.1075/btl.1.

Schraw, G. (2001). Promoting general Metacognitive awareness. *Metacognition in Learning and Instruction*, *26*, 3-16. https://doi.org/10.1007/978-94-017-2243-8_1.

Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broader perspective on learning. *Research in Science Education*, *36*(1-2), 111-139. https://doi.org/10.1007/s11165-005-3917-8.

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review*, *7*(4), 351-371. https://doi.org/10.1007/bf02212307.

Shreve, G. M., & Angelone, E. (2010). Translation and cognition. *American Translators Association Scholarly Monograph Series*, 1-13. https://doi.org/10.1075/ata.xv.01shr.

Sun, S., Li, T., & Zhou, X. (2021). Effects of thinking aloud on cognitive effort in translation. *Linguistica Antverpiensia, New Series – Themes in Translation Studies*, *19*. https://doi.org/10.52034/lanstts.v19i0.556.

Tabari, M. A., Sato, M., & Wang, Y. (2023). Engagement with written corrective feedback: Examination of feedback types and think-aloud protocol as pedagogical interventions. *Language Teaching Research*. https://doi.org/10.1177/13621688231202574.

Tarricone, P. (2011). *The taxonomy of metacognition*. London: Psychology Press.

Wenden, A. (1991). *Learner strategies for learner autonomy: Planning and implementing learner training for language learners*. Englewood Cliffs: Prentice Hall.

Xiao, Y. (2016). *An explanatory investigation into the metacognitive knowledge and metacognitive strategies of university EFL writers in China* [Unpublished doctoral dissertation]. Program in Teaching English to Speakers of Other Languages Department of Teaching and Learning. Doctor of Philosophy in the Steinhardt School of Culture, Education, and Human Development New York University.

Zhou, Y., & Jiang, X. (2012). An investigation on translation strategies based on think-aloud protocols. *Journal of Language Teaching and Research*, *3*(4). https://doi.org/10.4304/jltr.3.4.707-715.