

COGNITION VERBS IN PHYSICS TEXTS
FOR THE SECOND GRADE OF SENIOR HIGH SCHOOL:
A FUNCTIONAL GRAMMAR APPROACH

Oleh :

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Abstrak

Penelitian ini membahas salah satu dari metafungsi bahasa dalam klausa sebagai representasi. Dalam penelitian ini, penulis berfokus pada verba-verba dalam proses mental, salah satunya adalah verba kognisi, yang menjelaskan suatu proses berdasarkan pikiran. Penelitian ini menggunakan metode kualitatif dengan analisis deskriptif. Data diambil dari buku fisika *Elementary Particle Physics* untuk kelas dua Sekolah Menengah Atas. Penulis menganalisis verba-verba kognisi pada proses mental didalam teks-teks fisika. Tujuan dari penelitian adalah untuk menunjukkan bahwa proses mental adalah proses perasa yang menjelaskan suatu proses; penglihatan, pikiran, emosi, dan keinginan. Verba-verba kognisi yang ditemukan di dalam teks-teks fisika pada penelitian ini adalah *know, believe, understand, realize, thought, show, recognize and consider*, dengan berbagai pola struktur di dalamnya.

Kata kunci: klausa sebagai representasi, proses mental, verba kognisi, senser, phenomenon.

Introduction

The English is one of international languages used worldwide. This language develops globally and, hence, gives opportunity for the emerging of new theories. Functional grammar is one example. Functional grammar is first stated by Halliday, especially in his book *An Introduction to Functional Grammar*. In this book, he proposes that functional grammar, also called systemic functional linguistics, views language as a tool to convey meaning. Furthermore, Eggins (2000: 3) states that functional grammar is the kind of grammar most likely to have useful things to say to language learners and teachers. In other words, functional grammar not merely sees grammar as the construction of language, of how language is structured, but also

sees how language, of how language is structured, but also sees how language is used to deliver meaning.

The rationale discusses the reasons for choosing *Functional Grammar* as the main theory. The writer would like to start with the term *functional grammar* itself. The term *functional grammar* is used to refer to the kind of grammar that has been developed by systemic functional linguists, the scholars who devoted themselves in the field of Systemic Functional Linguistics (SFL). Functional grammar is also known as Systemic Functional Grammar (SFG). According to Halliday and Matthiessen (2004: 29), language is a system of meaning. That is to say that, when people use language, their language acts are the expression of meaning.

The clause, as a grammatical means of encoding patterns of experience, conceptualized as a situation type, is then the most significant grammatical unit. It is the unit that enables us to organize the wealth of our experience into a manageable number of representational patterns or schemas. Our personal of each individual situation is then selected from these patterns. Situation types comprise three main types. They are Material, Mental, and Relational.

There are three meanings discussed in functional grammar, textual meaning, interpersonal meaning, and experiential meaning. In experiential meaning, transitivity becomes the main issue with six processes involved, for examples, mental process. Process is realized by verbs. In other words, the unit of analysis that will be discussed in this research is verb and how to differentiate them from the verbs that are used in other processes. To understand more about the intensive cognition verbs in physic texts, the present writer tries to do the research based on the two following questions:

- (1) What are cognition verbs in physic texts?
- (2) What participants are used to indicate cognition verbs occurred in physic texts?

This condition makes the writer curious of and interested in investigating in events and especially in human verbs and participants involved, what they do or say, with the assumption that researcher will be able to see different styles of writing, and therefore the writer believes that the analysis will be helpful as the basic clues to further understanding the complexity of the different ideas in English Grammar especially in Traditional and Functional approach.

To analyze this process, researcher took some data from the Physics Texts for The Second Grade of Senior High School which are written by Erryn Grice in 2002. Based on the rationalization, the writer entitled this research “Cognition Verbs in Physics Texts for The Second Grade of Senior High School.”

The Research Method

The method applied in this research is qualitative method, in which the research based on descriptive data. Therefore, the writer believes that a quality research of the researcher is the central of the study (Bogman and Biklen, 1992). To gain reliable data, it is searched in the physics book “Elementary Particle Physics” which is written by Paolo Franzini. Elementary Particle Physics is the first edition, which is designed to provide comprehensive coverage of all physical sciences. In doing this research, the researcher does library research to expand the theories and references to sustain the analysis. The collected data are analyzed in accordance with theories chosen, and described based on the systemic functional grammar points of view.

In line with the study, only the data related to mental process analyzed, as follows:

(1)

| Senser | Mental Process | Phenomenon |
|--------|----------------|-------------|
| They | remembered | the formula |

(2)

| Senser | Mental Process | Phenomenon |
|--------|-------------------|-----------------|
| I | do not understand | the calculation |

In sentence (1), we have *they* as Senser and *the formula* as Phenomenon. The verb used, *remembered*, is in positive form. On the other hand, in sentence (2) we can see the word *do not understand* as the verb used is in negative form. Therefore, we have *the calculation* as Phenomenon and *I* as Senser.

Theoretical Outline

The researcher obtains the theories from the linguists of functional grammar. There are numerous theories used, as the grand theories are from Halliday and Matthiessen (2004), and the supporting theories are from Bloor and Bloor (1995), Gerot and Wignell (1994), Lock (1996), Thompson (1996), Eggins (2000).

Discussion

Three Lines of Meaning in The Clause

According to Halliday and Matthiessen (2004: 58-59), there are three lines of meaning in clause. First, the theme functions in the structure of the clause as a message. A clause has meaning as a message, a quantum of information; the Theme is the point of departure for the message. It is the element of the speaker selects for 'grounding' what he is going on to say. Second, subject functions in the structure of the clause as exchange. A clause has meaning as an exchange, a transaction between, speaker and listener; the Subject is the warranty of the exchange. It is the element the speaker makes responsible for the validity of what he is saying. Third, the actor functions in the structure of the clause of the representation. A clause has meaning as a representation of some process on human experience; the Actor is the active participant in that process. It is the element the speaker portrays as the one that does the deed.

Clause as Representation

According to Halliday and Matthiessen (2004: 172), there are seven different Process types in clause as representation.

Process Types in Clause as Representation

| | | |
|------------|----------|-------------------------------------|
| Material | Doing | Bodily, physically, materially |
| Behavioral | Behaving | Physiologically and psychologically |
| Mental | Sensing | Emotionally, intellectually |
| Verbal | Saying | Signally |

| | | |
|----------------|------------|--------------------------------|
| Relational | Being | Equal to, or some attribute of |
| Existential | Existing | There exists |
| Meteorological | Weathering | |

Mental Processes

Mental processes are ones of the six processes proposed by Halliday and Matthiessen (2004: 197). Each process has its own characteristic about which verbs are included. So does mental process. In general, there are four types of verbs used in mental process, namely verbs of cognition, perception, affection, and volition. In this research, the writer will explore more which verbs of cognition can be used in mental process for physic texts. Cognition verbs include the verbs of thinking, knowing, and understanding. Cognition verbs are verbs that slightly deal with clear action because they involve mental or cognition processes. There are three main elements in mental processes, Process, Senser, and Phenomenon.

For examples:

(1)

| Senser | Process: mental | Phenomenon |
|--------|-----------------|------------|
| She | forgot | him |

(2)

| Phenomenon | Process: mental | Senser |
|------------|-----------------|--------|
| The quiet | puzzles | me |

There is also one more element that occurs in mental processes, which is Circumstance, but this element is optional. In other word, the element of Circumstance does not always have to exist in mental processes, different from three elements that have been mentioned before. In general, there are two participants in mental process, namely Senser and Phenomenon. Senser is someone that senses something, and Phenomenon is something that is sensed.

As stated earlier, a senser is someone who is feeling something. Specifically, it means that senser is a person because it is only person who can feel something. Unlike the senser that should always be an animate participant, Thompson (1996: 83) states that (Phenomenon) can ... be a person, a concrete object, an abstraction ... In other words, as stated in Lock (1996: 105), Phenomenon is the thing, idea, or fact which is thought, seen, liked, wanted Phenomenon in mental processes can be a thing or a fact. Thing is represented by a noun group and fact can be realized by the word fact itself, which functions as a head of a noun group.

Besides as a thing and a fact, phenomenon in cognition verb can also be a thought. The notion of thought can be realized by different entities. Though can be realized by a finite clause beginning with *if-clause* or *whether* clause if related to question.

Data Analysis

The data of participants are used to indicate which cognition verbs occurred in mental processes:

Data 1

We realized that this scattering backwards must be the results of a single. (Page 13)

The sentence (1) consist of clauses, the cognition verb is signified by verb realized, there is a participant who is realize and projecting a subjectively thought, or conceived, idea.

| | | |
|-----------|------------------------------|-----------------------------------------------------------------------|
| Senser | Mental Process: Cognition | Phenomenon: Fact |
| We | realized | that this scattering backwards must be the results of a single |
| NG | VG | Fc-Clause |

The first participant, senser, is presented by pronoun *we*, and of course is a noun group. The second participant is phenomenon, which is realized by the clause *that this scattering backwards must be the results of a single*, as a fact. In Oxford dictionary verb *realize* means *be fully aware of or accept (something) as a fact*; refer to cognitive processes.

Data 2

The ancient Greek believed that nothing smaller that an atom could exist. (Page 18)

| | | |
|--------------------------|------------------------------|------------------------------------------------------|
| Senser | Mental Process: Cognition | Phenomenon: Fact |
| The ancient Greek | believed | that nothing smaller that an atom could exist |
| NG | VG | Fc-clause |

In this data, mental process is indicated by verbal group *believed*. The role of senser is represented by noun group *The ancient Greek*. The clause *that nothing smaller that an atom*

could exist functions as something that is being sensed, or phenomenon, especially phenomenon or fact. In Oxford dictionary verb *believe* means *feel sure of the truth of (something); accept the statement of (somebody) as true*, refer to cognitive processes.

Data 3

Yet we know they must be there,... (Page 24)

| | | | |
|------------|-----------|---------------------------|--------------------------------|
| | Senser | Mental Process: Cognition | Phenomenon: Fact |
| Yet | we | know | they must be there,.... |
| | NG | VG | Fc-clause |

In this data, mental process is realized by verbal group *know*. The first participant, senser, is represented by the pronoun *we*, and of course is a noun group. The second participant is phenomenon, which is realized by the clause *they must be there*, as fact. This embedded clause represents a fact because if we insert the words the fact that, as an indication of fact clause, the meaning of the clause does not change. In Oxford dictionary verb *know* means 1) have (something) in one's mind or memory as a result of experience or learning or information ; 2) feel certain, refer to cognitive processes.

Data 4

You must understand the smoke cell apparatus. (Page 30)

| | | |
|------------|---------------------------|---------------------------------|
| Senser | Mental Process: Cognition | Phenomenon: Thing |
| You | must understand | the smoke cell apparatus |
| NG | VG | NG |

In this data, mental process is realized by verbal group *must understand*, with the word *understand* as the head of the group. The role of senser is realized by noun group *you*. On the other hand, phenomenon of thing is realized by noun group *the smoke cell apparatus*, with the word *cell apparatus* as head. In Oxford dictionary verb *understand* means 1) grasp the meaning

of (words, a language, a person, etc), 2) perceive the explanation for or cause of; be sympathetically aware, refer to cognitive processes.

Data 5

As for them, some people thought if the pollen might be moving according to its part.

(Page 32)

| | | | | |
|---------------------|--------------------|---------------------------------|--------------------------------------|------------------------------|
| Circ: Location | Senser | Mental Process: Cognition | Phenomenon: Thought | Circ: angle |
| As for them, | Some people | thought | if the pollen might be moving | according to its part |
| PP | NG | VG | <i>If</i> -clause | Circ: Angle |

Here, we have the main clause ***some people thought*** as mental process. Senser is realized by noun group ***some people***, and process is realized by verbal group ***thought***. On the other hand, something that is being sensed by some people or phenomenon is the *if-clause* ***if the pollen might be moving***.

From the data, we have two circumstances, ***according to its part*** and ***as for them***. ***According to its part*** functions as circumstance of angle because it indicates the question of source and view point. On the other hand, the clause ***as for them*** functions as circumstance of cause because it answers the question of who for. In Oxford dictionary verb ***thought*** means 1) thinking, 2) way of thinking that is characteristic of a particular period, class, nation, etc , refer to cognitive processes.

Data 6

You show that the sort of thermometer you use in a laboratory. (Page 36)

| | | | |
|------------|------------------------------|---------------------------------------------|------------------------|
| Senser | Mental Process: Cognition | Phenomenon: Fact | Circ: Location |
| You | show | that the sort of thermometer you use | in a laboratory |
| NG | VG | NG | PP |

This data consists of one clause. From the clause, we can see that mental process realized by verbal group *shows*. The role of senser is filled with noun group *you*. The clause *that the sort of the thermometer you use* functions as something that is being sensed, or phenomenon of fact. The role of circumstance of location is filled by prepositional phrase *in a laboratory* because it answers the question of when. In Oxford dictionary verb *show* means 1) use the mind in an active way to form connected ideas; 2) have as an idea or opinion, refer to cognitive processes.

Data 7

We knew the equation. (Page 39)

| | | |
|-----------|---------------------------|---------------------|
| Senser | Mental Process: Cognition | Phenomenon: Thing |
| We | knew | the equation |
| NG | VG | NG |

In this data, mental process is realized by verbal group *knew*. The role of senser is filled by noun group *we*. Then, noun group *the equation* functions as phenomenon of thing. In Oxford dictionary verb *knew* means 1) know; 2) have (something) in one's mind or memory as a result of experience or learning or information, refer to cognitive processes.

Data 8

Again, beta particle recognized them to leave the nucleus. (Page 44)

| | | | | |
|---------------|----------------------|------------------------------|-------------|-----------------------------|
| Circ: Extent | Phenomenon: Thing | Mental Process: Cognitive | Senser | Circ: Cause |
| Again, | beta particle | recognized | them | to leave the nucleus |
| AG | NG | VG | NG | PP |

In data (8), mental process is realized by verbal group *recognized*. The noun group *beta particle* functions as phenomenon of thing that senses something. The role of senser is presented by noun group *them*. Prepositional phrase *to leave the nucleus* realizes the circumstance of cause because it answers the question *what for?* The word *again* represents the role of extent as circumstance because it answers question how many time. In Oxford dictionary verb *recognize* means 1) be willing to accept somebody/something as valid or genuine; 2) be prepared to admit or be aware, refer to cognitive processes.

Data 9

We must consider that ulcer caused by a high dose of radiation. (Page 53)

| | | |
|-----------|------------------------------|------------------------------------------------------|
| Senser | Mental Process: Cognition | Phenomenon: Fact |
| We | must consider | that ulcer caused by a high dose of radiation |
| NG | VG | Fc-clause |

In this mental process, senser is realized by noun group *we*, process is realized by verbal group of *must consider*, with verb *consider* as the head. On the other hand, phenomenon of fact is realized by noun group *that ulcer caused by a high dose of radiation*.

This noun group can be accepted as a fact since if we put the fact that, as the indication of fact, there will be no change in meaning happened. In Oxford dictionary verb *consider* means 1) think

about somebody/something; 2) somebody/something as something of the opinion, refer to cognitive processes.

Conclusion

Based on the research, the present writer can conclude the findings as follows: First, cognition verbs revolve around knowledge, comprehension, and thinking through a particular topic. From the data above, the verbs *know*, *believe*, *understand*, *realize*, *thought*, *show*, *recognize*, and *consider* can be classified into cognition verbs in physic texts. The participants in physic texts that contain cognition verbs by mental process are: Senser, Phenomenon of Thing, Phenomenon of Fact, and Phenomenon of Thought.

According to the data, there are six positions of participants and process namely, *Senser + Process + Phenomenon: Fact* in data 1, data 2, data 3, and data 9, *Senser + Process + Phenomenon: Thing* in data 4, *Circumstance: Location + Senser + Process + Phenomenon: Thought + Circumstance: Angle* in data 5, *Senser + Process + Phenomenon: Fact + Circumstance: Location* in data 6, *Senser + Process + Phenomenon: Thought* in data 7, and *Circumstance: Extent + Phenomenon: Thing + Process + Senser + Circumstance: Cause* in data 8.

Abbreviations and Symbols

| | |
|------|------------------------|
| AG | : Adverbial Group |
| Circ | : Circumstance |
| Fc | : Fact |
| NG | : Noun Group |
| Ph | : Phenomenon |
| PP | : Prepositional Phrase |
| Pr | : Process |
| Se | : Senser |
| Thg | : Thing |
| Tht | : Thought |
| VG | : Verbal Group |

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