مجلة إكليل للدراسات الانسانية
التصنيف الورقي: العدد 23 /ايلول/2025
المجلد(6)- العدد(3)-الجزء(3) IASJ-Iraqi Academic Scientific Journals

Propositions and Logical Equivalence: A Logical Semantic Study

Assistant Lecturer. Manahil Salman Owaid

Directorate of Education in Thi-Qar

Ministry of Education

Keywords: semantics, logic, logical semantics, an argument and a proposition

Summary:

The study uses a descriptive-analytical approach in order to investigate basic ideas in logical semantics and assess how they are used to evaluate logical structures and linguistic meaning. First, it shows the meaning of semantics as the study of the meaning of human language and then shifts to explain logic as the study of truths based completely on the meanings of the terms they contain. Consequently, logical semantics is a branch of semantics that studies the meaning or interpretation in formal and natural language using logic as an instrument. Logic is a process for making a conclusion and a tool we can use. This depends on an argument and its proposition is either accurate (true) or not accurate

(false). Then it builds on premises that lead to inference, and finally, a conclusion is drawn. The four basic types of logic are explained, too. The opposite terms, inductive and deductive reasoning, are compared, and logical equivalence and properties are mentioned. The study aims at showing how logical semantics can be used in real life, focusing on inference to conclude the truth values and using deductive reasoning because it is true and accurate. The researcher sets up five questions and tries to answer them throughout the theoretical and practical use of logical semantics in real life. Finally There is a relationship between semantics and logic, the former concerns with meaning and the later concerns with truth and any difference in truth value implies a

difference in meaning. Also, semantics deals with relations, and all relations between components are logical relations. The sentence is composed of elements, but proposition deals with the meaning of these elements. According to logical semantics, the meaning and the truth depend on an inference, and deductive reasoning is more accurate, and its conclusion is always true and correct. Finally, the practical side is explained: how you can use logical semantics to solve many daily problems as ambiguity.

1. Introduction

Semantics is a significant area of linguistics that focuses on the interpretation of spoken language. In other words, it is the study of how words, phrases, and sentences make sense in language. Phrasal or sentential semantics deals with the meaning of syntactic units larger than a word, while lexical semantics studies words (Fromkin, 2007:174).Generally speaking, an expression's linguistic meaning is only its meaning or meanings in the language. However, depending on whether the speaker is speaking literally or nonliterally, the speaker's meaning may differ from the linguistic one (Akmajian, 2001: 229). According to O'crady (2005: 201), semantics is the study of meaning in human language, and some research in this challenging field of Significant understanding of other fields, especially logic, mathematics, and philosophy, is required for language analysis.

What is Logical Semantics

The study of meaning or interpretation in formal and natural languages with the use of logic is known as logical semantics. Both formal and logical languages are viewed as collections of statements for which the truth conditions must be defined in relation to a model, or an abstract depiction of reality. Thus, truth-conditional semantics and model-theoretic semantics are two ways to characterize logical semantics (Davies and Elder, 2006: 50). A semantical system is a set of rules that specify the conditions under which the sentences in an object language must be true in order for those sentences to have meaning. Rules of formulation, which define "sentence in S," Rules of designation, which define "designation in S," and Rules of truth, which define "true in S\" can all be found in a semantical system S. The metalanguage statement is accurate. S' and the sentence S have the same meaning. The sufficiency of definitions of truth is contingent upon this attribute. A semantical system, also known as an interpreted system, is a set of rules that are expressed in a metalanguage and apply to an object language. These rules establish a sufficient and necessary condition for each sentence in the object language to be true. This is how the rules interpret the words, making them understandable, since understanding a statement is the same as knowing what it asserts and under what circumstances it would be true. To put it another way, the rules decide what the sentences signify or make sense of. The truth-values of sentences are defined as truth and falsehood. Although understanding a sentence's truth-condition often requires significantly more work than understanding its truth-value, understanding a sentence's truth-condition is the first step toward determining its truth-value (Carnap, 1959). The methodical assessment of arguments for internal cogency is the task of logic. And deductive validity is the type of internal consistency that should particularly worry us (Smith, 2003: 1).

Logical is a system that seeks to infer plausible conclusions from the data provided. This suggests that the purpose of logic is to draw conclusions from data without requiring direct proof or admission of guilt. The study of inferences and inferential relations is known as logic. In any event, using logic to reason correctly and make valid conclusions is its practical application. A rule of inference governs how ideas flow from one or more premises to the conclusion. An inference is considered legitimate if it follows the relevant rule.

Inference rules are frequently regarded as the foundational principles of logic. Deductive inferences are inherently truth-preserving, whereas ampliative inferences are not necessarily truth preserving. Philosophers generally consider deductive reasoning as the paradigmatic type of inference (Hintikka & Sandu, 2007: 13).

Semantic analysis can be performed, presented, and understood more easily with the use of logic. It attempts to decipher the meaning of language in nonlinguistic interactions in the actual world. The study is not descriptive, but prescriptive. It makes it possible for us to pinpoint the specific ontology that our semantics assumes and what understanding of various entity types and their interactions best accounts for our capacity for language. It enables us to precisely connect the ontology to the syntax. Plus, it lets us explain the semantic relationships between sentences using the mathematics of logical consequence. According to Lepore, E., & Stone M. (2005: 18–19), this mathematics demonstrates how human decisions may be based on calculations made over representations of knowledge of meaning. Logic separates legitimate arguments from flawed ones and is the study of valid arguments. A conclusion and one or more premises make up an argument. We stated that an inference step is legitimate if the output conclusion is positively assured to be true if the input premises are true (Smith, 2003: 9).

Philosophical semantics studies how language expressions relate to the real-world occurrences they describe, as well as the circumstances that determine whether an

expression is true or untrue and the variables that influence how language is understood in practice. The study of it dates back to Plato and Aristotle, and in the 20th century, philosophers and logicians like Charles Peirce (1839–1914), Rudolf Carnap (1891–1970), and Alfred Tarski (1902–83) contributed to its history especially under the categories of language philosophy and semiotics. Formal semantics, also known as logical or pure semantics, is more closely related to formal logic or mathematics than to linguistics since it examines the meaning of statements in terms of logical systems of analysis, or calculi (Crystal, 2003: 410). Logicians are more interested in propositions than in sentences as they are spoken. They comprehend and identify the aspect of meaning that interests them. It is possible to argue that logic is employed in everyday reasoning and argumentation as well as in the organization of scientific information (Kleene, 2013: 3).

Why does logic matter to semantics? There are at least two reasons:

1. Semantics is concerned with meaning, while logic is concerned with truth. At the very least, these two ideas are connected by what Cresswell has named the Most Certain Principle: Different truth values imply different meanings (Cresswell, 1982)

2. A semantic theory's task—or only task—is to accurately predict the sense relations or meaning relations between utterances. However, all meaning relations can be reduced to, or exist as variations of, logical relations (Semantic Theory, n.d.).

2. Literature Review

The study of sound thinking is known as logic in science. It is essential to many academic fields, including computer science, mathematics, and philosophy. Logic has historical roots, much like philosophy and mathematics. More than 2000 years have passed since the writing of the first treatises on the subject of sound thinking. More than 2300 years ago, some of the most eminent Greek philosophers discussed the nature of deduction in their writings, and roughly the same period, Chinese philosophers wrote on logical paradoxes. Even so, logic is still a lively area of study today, despite having its origins in antiquity. The most well-known pupil of Plato (c. 427–c. 347), the great Greek philosopher Aristotle (384–322 bce), is credited with creating modern reasoning. bce) and among the greatest minds in history. The Greek Stoic philosopher Chrysippus of Soli (c. 278–c. 206 bce), who created the foundation of what is now known as propositional logic, made further advancements in the field.

For numerous years, the majority of the focus in the study of logic was on various interpretations of Aristotle's writings, with comparatively less attention paid to the works of Chrysippus, whose contributions were largely overlooked. But the logic that was in place lacked a formal foundation. Every argument form was expressed in words and lacked the formal tools necessary to produce an understandable logical calculus of deduction. Gottfried Wilhelm Leibniz (1646–1716), a renowned German mathematician and philosopher, was one of the first to recognize the importance of formalizing logical argument patterns. Leibniz envisioned a global symbolic language of science that would recast the logic in philosophical arguments, reducing them to a matter of simple calculation. This universal formal language of science would do just that. In the mid-1800s, English mathematician George Boole made the first significant advancements in this field. Boole created an algebraic framework for explaining logic in his 1854 book An Investigation of the Laws of Thought. After Boole's work, logic underwent a revolution that was carried out by Augustus De Morgan, Charles Sanders Peirce, Ernst Schroder, along with Giuseppe Peano. The renowned German mathematician and philosopher Gottlob Frege took the next crucial step in this revolution in logic. In addition to proposing that formal logic serve as the foundation for the development of mathematics as a whole, Frege devised a potent and remarkably innovative symbolic system of logic that gave rise to the well-known school of logicism. The groundwork was laid by Russell and Whitehead at the beginning of the 20th century for their seminal work Principia

Mathematica, which provided a contemporary explanation of logic and the principles of mathematics (Bezhanishvili, & Fussner, 2013:1-2).

Logic is an approach to conclusion-making and a useful tool.

1. The proposition, or statement, is the foundation of a logical argument.
2. Depending on accuracy, the proposition is either true or false.
3. The foundation of the argument is made up of the statements that make up its premise.
4. The argument is then developed using premises.
5. The premises are then used to form an inference.
6. Finally, a conclusion is made (Nordquist, 2019).

2.1. Argument and Proposition

An argument is a series of statements where one or more of the statements—known as the premises—are made in order to support a different statement—known as the conclusion. There can be multiple premises in an argument, or just one. When we argue in person or in paper, we usually strive to persuade the other person by providing arguments or supporting data. In order to think on how we could support a claim that we already believe, we can also formulate and evaluate arguments. As in the phrase "The parents got into so many arguments over the mortgage that they finally stopped living together," the word "argument" can also refer to a disagreement or quarrel. In casual conversation, this usage of the word arguments very typical. Nonetheless, the word "argument" is not used to describe a battle or disagreement in this essay. An argument, on the other hand, is a well-reasoned attempt to support a claim with reference to other statements. debates between people are a common source of conflict for both reasoned debates and conflicts. We are attempting logical persuasion in response to conflicts when we utilize arguments in the sense of providing justification for our beliefs. When an argument turns into a fight, we turn to different strategies, which frequently involve the use of physical force. It's critical to distinguish between the two meanings of the word debate. An argument is a set of claims from which one claim (a conclusion) is shown to adhere to a presumption or set of premises (Govier, 2010: 1-2).

The proposition values the facts. While sentences can represent the world of assertions but cannot have truth values, propositions can describe the world in terms of assertions and have truth values. The only characteristics of a proposition are truth and falsity, i.e., they can be true or untrue. Propositions are truth value bearers. Proposition explains how the world is organized in an orderly fashion and reflects the world. It looks at the world (or object) and is made up of atomic facts that are encountered and can be examined to form hypotheses. Logic's fundamental building blocks are propositions. The qualities of the propositions are truth (affirm) and falsity (nego), and their quantities are particularity and universality (generality). A proposition can be interpreted abstractly or concretely (as in, as in, as ink or sound).(sentence-based statement) that may or may not be true. Tantra (2016). Sentences in a natural language (English, Italian, etc.) can clarify propositions. "John is a rock singer," "John is a teacher," and "John is rich" are a few examples of propositions. Keep in mind that the terms "sentence" and "proposition" are not the same. A sentence is a group of words that states a claim. That is, a sentence's meaning is a proposition.(Serafini, 2023: 11).

A premise is a statement that is asserted to be true or logically consistent. A premise is a proposition that is accepted as true or reasonable. Similar to other assertions made by persons are premises. The use of them to bolster a conclusion is the only distinction. In essence, evaluating in conclusion. In essence, evaluating premises is just like evaluating statements found in reports, descriptions, or explanations. We need to consider the evidence that supports these assertions and assess the likelihood that they are accurate in light of that evidence. The premises of a particular argument might need to be defended. It is possible to build a counterargument in this situation. Furthermore, the subargument will contain premises. Its premises can also be justified in a subsubargument if necessary. We could also request a defense of the subsubargument's premises, and so forth. However, an argument must begin somewhere, and this circumstance raises the possibility of an infinite regression, as philosophers refer to it. An endless regress indicates a problem with an account since it necessitates the completion of an unlimited number of stages, which is not feasible. It will be hard to justify anything by reason if we challenge every assertion and demand an explanation for anything we disagree with. The process must come to an end at some time because not every assertion

can be refuted by citing other assertions. Certain claims have to be accepted. without further support (Govier, 2010: 116-117).

Acceptability of Premises

A premise in an argument is acceptable if any one or more of the following conditions

1. It is backed up by a convincing subargument.
2. It is mentioned that the arguer or another individual has persuasively supported it elsewhere.
3. Its truth is recognized from the outset.
4. It is a widely accepted fact.
5. Appropriate testimony backs it up. (In other words, the assertion is limited in content to the expertise and skill of the person making it, and it is not improbable or supported by untrustworthy sources.)
6. It has the backing of a suitable

7. It is not recognized to be inappropriate and can be used as a temporary foundation for an argument.

Not Acceptable Premises If any one or more of the following criteria is satisfied, the premise of the argument is unacceptable:

1. They are refutable on the basis of common knowledge, a priori knowledge, or reliable knowledge from testimony or authority.
2. They are known, a priori, to be false.
3. Several premises, taken together, can be shown to produce a contradiction, so that the premises are inconsistent.
4. They are vague or ambiguous to such an extent that it is not possible to determine
what sort of evidence would establish them as acceptable or unacceptable.
5. They could not be rationally accepted by someone who does not already accept the
conclusion. In such cases, the argument raises the questions (Govier, 2010: 145)

Propositions that are assumed to be true for the sake of argument but are not stated to be true are known as assumptions. There seem to be widespread notions that assumptions can serve as "implicit premises" for cognition and behavior, that people can consciously attend to them, that they may be unconscious or at least unrecognized, and that people are able to intentionally focus on them (Fuller, 1994: 115).

1- If john is a crooked lawyer, then he will hide evidence premise.
2- John is a crooked lawyer. premise
3- therefore, John will hide evidence. Conclusion

Another example shows proposition that is not claimed to be true:

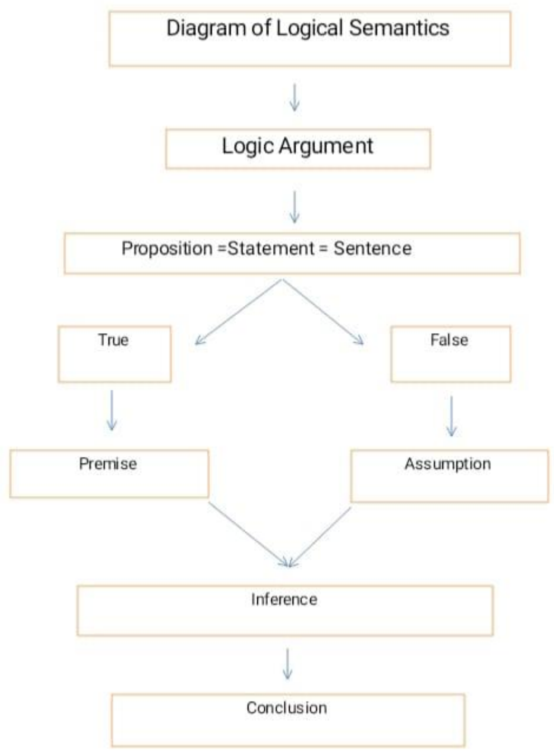
Assume that God exists. Assumption

If God exists then there will be no evil in the world.

Thus, from above , there is no evil in the world.

But there is evil in the world.

Therefore, God does not exist. Conclusion



2.2. Types of Logic

Four categories of logic exist:

1- Informal Logic is an effort to develop a logic appropriate for this goal is known as informal logic. It integrates justification, evidence, proof, and argument accounts with an instrumental perspective that highlights their use in the examination of actual arguments. According to Blair (2015), the informal logician has two main responsibilities: (i) trying to figure out how to recognize (and "extract") arguments from the interactions in which they occur, and (ii) trying to come up with techniques and standards for judging the cogency and strength of those arguments. In everyday reasoning, one often uses informal logic. This is the logic and arguments you present in private conversations with other people. (Groarke, 1996). Example,

* Premises: There is no evidence that penicillin is bad for you. I use penicillin without any problems.
* Conclusion: Penicillin is safe for everyone.
* Explanation: The personal experience here or lack of knowledge isn't verifiable (YourLogicalFallacyIs, n.d.).

2- Formal Logic

The premises must hold in formal logic, which employs deductive reasoning. To arrive at a formal conclusion, you must adhere to the premises. Although "formal logic" is not the only term used to describe the new logic, it is quite common and frequently used—possibly because it can mean multiple things at once. There are at least five distinct meanings that we may consider:

1-Formal logic, which holds that conclusions' admissibility is determined by their form rather than their content or meaning.

2- Formal logic, as contrast to empirical science, is a formal science.

3- A formalized theory, to be understood in connection with the formalist program advanced by Hilbert, Curry, and others, is known as formal logic.

4- Formal logic is symbolic logic, a science that employs symbols in place of words.

5- Formal logic, often known as formal logic, is logic that is created using mathematical ideas or the logic of mathematics. (Béziau, 2008:1-2).

Examples:

Premises: Every person who lives in Quebec lives in Canada. Everyone in Canada lives in North America.

* Conclusion: Every person who lives in Quebec lives in North America.

* Explanation: Only true facts are presented here (Cavite State University, n.d.).

3- Symbolic Logic

Symbolic relationships between symbols are the subject of symbolic logic. It uses a mathematical approach to attach symbols to verbal reasoning so that the claims' truth may be verified. This kind of reasoning is commonly applied in calculus. Developed in the previous century, symbolic logic, also known as mathematical logic or logistic logic, is the modern version of logic. It is a language based on a system of symbolic logic rather than a theory, or a set of claims about things, (or, a set of guidelines for the use of indicators in a system). As long as certain signs in the language have been assigned specific interpretations that serve to identify the fundamental ideas of the theory under question, this symbolic language can be used to translate the sentences of any given theory concerning any kind of object. As long as, we continue to be domain pure logic, meaning that the signals in our language stay uninterpreted as long as we are focused on creating this language and applying and interpreting it in accordance with a particular theory. In technical terms, what we create is actually a language's skeleton rather than a language itself. From this schema, we may create the necessary language, which is thought of as a means of communication, by deciphering specific signs (Carnap, 2012).

*Propositions: If all mammals feed their babies milk from the mother (A). If all cats feed their babies mother's milk (B). All cats are mammals(C). The Λ means "and," and the ⇒ symbol means "implies."

* Conclusion: $A \wedge B \Rightarrow C$

* Explanation: Proposition A and proposition B lead to the conclusion, C. If all mammals feed their babies milk from the mother and all cats feed their babies mother's milk, it implies all cats are mammal. (Hurley, 2015).

4-Mathematical Logic

Formal logic is applied to mathematics in mathematical logic. The logic employed in computer sciences is partially based on this kind of reasoning. Put differently, it indicates that mathematical techniques are applied to reasoning. Logic is used in all mathematical developments. Symbolic logic and mathematical logic are frequently used interchangeably. (Kleene, 2013:3).

2.3. Inductive Reasoning VS Deductive Reasoning

Inductive reasoning: is "bottom up," which means that specific data is used to draw a broad generalization that is deemed likely, accounting for the possibility that the conclusion may not be correct. This kind of reasoning usually results in the establishment of a rule from a sequence of observed occurrences.

Example,

* Premises: Red lights prevent accidents. Mike did not have an accident while driving today.

* Conclusion: Mike must have stopped at a red light.

* Explanation: Mike might not have encountered any traffic signals at all. Therefore, he might have been able to avoid accidents even without stopping at a red light.

Deductive reasoning: offers comprehensive proof for the veracity of its findings. It starts with a precise and accurate assumption and ends with a precise and accurate conclusion. This kind of argument has verifiable and valid conclusions when the premises are correct. Deductive arguments are legitimate arguments that bolster the conclusion. For instance:

* Premises: All squares are rectangles. All rectangles have four sides.
* Conclusion: All squares have four sides.

Deductive reasoning is considered a vital life skill by some. It enables you to combine data from two or more assertions to arrive at a conclusion that makes sense. From generalities, deductive reasoning leads to precise conclusions. The requirement that the assertions from which the conclusion is derived be true is arguably the largest one. The conclusion should be sound and accurate if they are accurate. Let's look at some instances of deductive reasoning. Find out if you would have come to the same conclusions on your own. In both science and daily life, deductive reasoning is a sort of deduction. It occurs when a conclusion is formed using two true statements, or premises. For instance, A and B are equal. B and C are also equal. Deductive reasoning allows you to deduce that A and C are equal given those two statements. Let's now examine a real-world example.

* Dolphins are mammals all.

*Kidneys are found in all mammals. You can determine that every dolphin has kidneys by applying logical reasoning. Recall that both claims must be true for this to operate. (Betts, J : 2022).

The fact that inductive arguments by their very nature do not seek to offer convincing evidence in support of their conclusions is one of the main distinctions between deductive and inductive thinking. There is always a gap between their premises and their intended conclusion. At most, the probability of the conclusion's truth can be somewhat supported by the joint truth of all the premises. The inductive argument will be stronger if the premises provide more evidence. A strong inductive argument, however, can only ever produce a very high degree of probability and never provide unambiguous support. (Chakraborti, 2007: 25).

Inductive Reasoning	Deductive Reasoning
1- It is based on a series of repeated experiences.	It is based on evidence
2- It uses specific information that is probable.	It uses specific and accurate premises.
3- No (2) leads to a conclusion that may not be accurate.	No (2) leads to specific and accurate conclusion.
4-The conclusion may be true and correct and may not be.	The conclusion is always true and correct.

2.4.Logical Equivalence

If two statements express the same idea, that is, if they are true in the same universe, then they are comparable. In mathematics and logic, assertions p and q are said to be logically equivalent if all models have the same truth value or can be proven from each other using a set of axioms, then they are considered provable. Stated differently, every one of them follows logically from the others. Depending on the notation being used, the logical equivalency of {p} and {q} can also be represented as {p ≥q}, {p::q}, or {p⇔q}.

The following statements are logically equivalent:

* Lisa is in Denmark , then she is in Europe (a statement of the form e) d

If Lisa is not in Europe, then she is not in Denmark (a statement of the form . e d) (Copi, Cohen, &McMahon, 2016; Mendelson, 2015).

If converting an equation system into its simpler counterpart is a basic approach of solving a system of equations. The concepts that were just provided make it easy to discuss logical consequences and equivalency. When we have two CNF formulas, F and G, we claim that G follows logically from F if α is appropriate for both assignments: if α |= F, then α |= G. Equivalency in logic. The two CNF formulas F and G are equivalent (logically) in symbols F ≡ G, if the identical assignments that work for both satisfy them. Stated differently, every one of them follows logically from the others. Two equivalent formulas seem to indicate the same thing intuitively. Saying that a conjunction is commutative—that is, that C1 ∧ C2 ≡ C2∧C1—will not cause any misunderstandings. Additionally, we will state that "conjunction is associative," which implies that C1∧(C2∧C3) ≥ (C1∧C2)∧C3. In addition, conjunctions are idempotent, meaning that C ∧ C ≡ C. In contrast, disjunction is idempotent, commutative, and associative. (Mundici, 2012:8-9).

Crystal (2005: 164) defines semantic equivalency as synonymy and describes equivalence as a power equality between grammars.

2.5.Logical Properties

There are three properties for individual sentences:

1. Validity: a statement is only considered valid if every truth assignment satisfies it. As an illustration, the sentence (p ∨ ¬p) is true. The first disjunct and the disjunction as a whole are true if a truth assignment makes p true. An explanation of validity is that an argument or inference is legitimate if it upholds truth by logical necessity. Any total function that assigns T to each of the argument's premises and follows standard compositional principles from the language's phrases to the values of T and F is considered sententially legitimate if it also assigns T to the argument's conclusion. (Field, 2015: 33-34).

2. Unsatisfiability: A sentence can only be considered unsatisfiable if no truth assignment can make it so. As an illustration, the sentence (p **M** ¬p) is not satisfactory. The statement is always untrue, regardless of the truth assignment we choose.

3- Contingency If and only if there are truth assignments that both support and refute a certain sentence, then that sentence is contingent. The statement (p A q), for instance, is dependent. It is true if both p and q are true. It is false if both p and q are false. If there is a relationship between the accepted beginning point and adopted terminus that can be denied, then the conclusion is considered dependent. In this instance, the premise is insufficient to support and warrant the conclusion. To put it simply, we replace the premise with the conclusion in a contingent inference in part because of factors that aren't stated in the premise. The premise that "the sky has begun to darken" leads to the conclusion that "it will rain" because some contingent principle—such as "if the sky darkens, there will be rain"—is applied." (Weiss, 1942).

3. Research Questions

The study tries to answer the following questions:

1.What is the relationship between semantics and logic?

2.What do we mean by a proposition and a sentence and what is the difference between them?

3.Does the truth condition depend on an inference or evidence?

4.Which logic is more accurate, inductive or deductive.

5. Do we need logical semantics in understanding ambiguous sentences?

4. The Descriptive Analytical side of logical semantics

The benefit of logical semantic is to use it in practical way to solve some problems in studying meaning. By illustrating how propositions, truth conditions, scope ambiguity, and logical inference function within a few chosen linguistic instances, this section applies fundamental ideas of logical semantics to the study of natural language. It is demonstrated how logical semantics can be used practically to clarify meaning by looking at how quantifiers and sentence structure interact.

4.1 A Case Study of Quantifier Scope Ambiguity:

Examine the following sentence:

" Every student read a story"

Although this sentence seems simple in surface, the interaction between the existential quantifier "a" and the universal quantifier "every" creates an incoherent scope ambiguity. Using first-order predicate logic, logical semantics offers a framework for examining the two potential interpretations of this sentence.

The first reading: Distributive Reading (Wide Scope of Every), according to this interpretation, every students read a story, though they might not have all read the same one. It can be expressed formally as:

(1a) A x (student(x) $\longrightarrow$ Ey (story(y) ^ Read (x,y))).

When various students read different stories, this reading is accurate and true.

The second reading: Collective Reading (Wide Scope of 'A')

According to this reading, each student reads the same book. The logical form that corresponds to this is:

(1b)Ey (Story (y) ^ A x (student (x) $\longrightarrow$ Read (x,y)))

According to this understanding, every student must have access to the same story.

4.2 **Semantic Consequences and Truth Conditions:**

According to the truth-conditional semantics, these differences show how quantifier scope directly affects how a proposition is interpreted; a recipient (a listener or a reader) who is unaware of this ambiguity may misinterpret the speaker's intention. The above two reading in (No1) are not logically equivalent because they have different truth conditions:

1- (1a) is true even if each student read a different story.

2- (1b) is true only f there is one story that all students read.

4.3. Inference and Validity (Deductive Structures):

Well-known forms such as Modus Ponens can be used to evaluate logical reasoning or inference. As an example:

Premise 1: If you study hard, you will pass the exam. n p n q.

Premise 2: You study. n p.

Conclusion: You will pass the exam. n q.

A key concept in logical semantics is the validity of reasoning, which is illustrated by this deductive pattern. Furthermore, truth tables can be used to show logical equivalence (p → q = -q → -p) in order to confirm the correctness of inferences.

P	Q	p → q	-q	-p	-q → -p
T	T	T	F	F	T
T	F	F	T	F	F
F	T	T	F	T	T
F	F	T	T	T	T

p → q and –q → -p have the same truth values so they are logically equivalent.

4.4. Analysis of Negation and Logical Contradiction

A. Negation in logical Semantics:

Negation has an essential role in logical semantics since it immediately modifies a proposition's truth conditions. If and only if a proposition is false, then its negation is true. For any proposition p, its negation is –p.

Example:

Proposition: " The earth is round" n

Negation: " The earth is not round"

P	-p
T	F
F	T

This demonstrates how negation flips a proposition's truth value.

B. Logical Contradiction:

When a statement and its negation are made at the same time, a logical contradiction results. Regardless of truth assignment, this leads to a statement that is always untrue (false).

Example:

Proposition: " It is sunny and it is not sunny."

Formalization: p ^ -p

P	-p	p ^ - p
T	F	F
F	T	F

As the table clarifies, p ^ - p is always false or untrue, resulting in contradiction.

C. Semantic Insight

Contradictions are unsatisfiable from a semantic standpoint since they cannot be made true by any model or universe; they are impossible according to logic. In contrast, contingencies rely on truth assignments, while tautologies are always true (e.g. p v – p).

4. 5. **Tautologies and Contingent Statements in Logical Semantics:**

Tautology is a logical claim that holds true under every feasible truth assignments. It illustrates a scenario in which the sentence makes sense regardless of the veracity of its constituents parts.

Example:

Proposition: "It is windy or it is not windy."

Formalization: p v – p

P	- P	P v –p
T	F	T
F	T	T

The disjunction p v – p is a tautology since it is always true. Although they represent logical necessity rather than describing the world, such sentences are grammatically correct but lack informational meaning.

B. Contingent Statements: Truth Relays on Circumstance:

A contingent statement is one that depends on the truth value of its constituent parts. It is true in some situations and untrue in others. In natural language, these the most prevalent kinds of assertions.

Example:

Proposition: " It is raining and the ground is wet."

Formalization: p ^ q

p	q	p ^ q
T	T	T
T	F	F
F	T	F
F	F	F

The truth of the conjunction depends on actual circumstances (real-world conditions) since it is contingent, it is true only when both p and q are true. Contingent statements are essential to both daily and scientific reasoning because they are logically feasible and instructive.

5. Conclusions

The researcher concludes the following:

1. There is a relationship between semantics and logic, the former concerns with meaning and the later concerns with truth and any difference in truth value implies difference in meaning. Also semantics deals with relations and all relations between component is logical relation.
2. The sentence is composed of elements but proposition deals with the meaning of these elements.
3. According to logical semantics, the meaning and the truth depends on an inference.
4. Deductive reasoning is more accurate and its conclusion is always true and correct.

6. Logical semantics has an essential role in understanding the meaning of ambiguous sentences.

7. Suggestions for further studies

The following points are suggested by the researcher:

1. Make a descriptive qualitative study to other types of semantics as formal or conceptual semantics.
2. A comparative study between logical and formal study.
3. A quantitative study shows the application of corpus semantics in a special field.
4. A descriptive research to the conceptual semantics and conceptual metaphor and show the relationship between them.

● References

-Akmajian, A.,R. A. Demers, A. K. Farmer and R. M. Harnish (2001). Linguistics: An Introduction to Language and Communication (5^{th}ed). Cambridge: The MIT Press.

-Betts, J. (2022). Deductive Reasoning Examples. Your Dictionary. https://www.yourdictionary.com.

- Bezhanishvili, G., & Fussner, W. (2013). An introduction to symbolic logic. Convergence.

- Béziau, J. Y. (2008, July). What is 'formal logic'. In Proceedings of the XXII world congress of philosophy (Vol. 13, pp. 9-22). Seoul: Korean Philosophical Association.

-Carnap, R. (1959). Introduction to semantics and formalization of logic. Harvard University Press.

- Carnap, R. (2012). Introduction to symbolic logic and its applications. Courier Corporation.

-Chakraborti, C. (2007). Logic: Informal, symbolic and inductive. PHI Learning Pvt. Ltd.

- Cavite State University. (n.d.). Logic example. Studocu. https://www.studocu.com/ph/document/cavite-state-university/logic/logic-example/21660879

-Chakraborti, C. (2007). Logic: Informal, symbolic and inductive. PHI Learning Pvt. Ltd.

- Copi, I. M., Cohen, C., & McMahon, K. (2016). Introduction to logic (14th ed.). Pearson.

- Cresswell, M. J. (1982). The Most Certain Principle. Semantics Archive. https://semanticsarchive.net/Archive/mExYTMxN/day1.pdf

-Crystal, D(2003). A Dictionary of Linguistics and Phonetics. (5th ed). - Oxford: Blackwell Publishing

-Davies, A. and C. Elder (2006). The Handbook of Applied Linguistics. Oxford: Blackwell Publishing Ltd.

- Field, H. (2015). What is logical validity. Foundations of logical consequence, 33-70.

-Fromkin, V., R. Rodam and N. Hyams (2007). An Introduction to Language.(8th ed). Massachusetts: Thomson Wadsworth.

-Fuller, S. (1994). What is an Assumption?. Informal Logic, 16(2)

-Govier, T. (2010). A practical study of argument. Belmont, CA: Wadsworth. https://www.quora.com

-Groarke, L. (1996). Informal logic.

-Hintikka, J., & Sandu, G.(2007) What is logic? In Philosophy of logic (pp.13-39). North-Holland.

-Hurley, P. J. (2015). A concise introduction to logic (12th ed.). Cengage Learning.

- Kleene, S. C. (2013). Mathematical logic. Courier Corporation.

-Lepore, E., & Stone, M. (2005). Logic and semantic analysis. In Philosophy of Logic (pp. 173-204). North-Holland.

- Mendelson, E. (2015). Introduction to mathematical logic (6th ed.). CRC Press.

-Mundici, D (2012). Logic: a Brief Course. Springer.

-Nauhardt , A (2009). Logic :Sentence Relations and Truth :GRIN verlay.

- Nordquist, R.(2019, August 27). Premises and Conclusions: Definitions and Examples in Arguments. thoughtCo. Retrieved from https://www.thoughtco.com/premise-argument-1691662.

-O'Grady, W., J. Archibald, M. Aronoff and J. Rees-Miller (2005). Contemporary Linguistics: An Introduction.(5th ed). New York: Bedford/st. Martin's.

- Semantic Theory - an overview. (n.d.). ScienceDirect Topics. https://www.sciencedirect.com/topics/computer-science/semantic-theory

-Serafini, L. (2023). Logic for Knowledge Representation, Learning, and Inference serafini@fbk.eu Version August 28, 2023.

-Smith, P. (2003). An introduction to formal logic. Cambridge University Press.

-Tantray, M. A. (2016). Proposition The foundation of logic. International Journal of Social Science and Humanities. Invention3.(2): 1841-1846.

- Weiss, P. (1942). The logic of semantics. The journal of philosophy, 39(7), 169-177.

- YourLogicalFallacyIs. (n.d.). Your logical fallacy is anecdotal. . https://yourlogicalfallacyis.com/anecdotal.

المقترحات والتكافؤ المنطقي: دراسة دلالية منطقية

م.م. مناهل سلمان عويد
مديرية تربية ذي قار- وزارة التربية
mnahelalmnhilwy@gmail.com

الكلمات المفتاحية: الدلالات، المنطق، الدلالات المنطقية، الحجة والطرح

الملخص:

اعتمد البحث على منهج وصفي تحليلي لاستكشاف الأفكار الأساسية في الدلالات المنطقية وتقييم كيفية استخدامها لتقييم البنى المنطقية والمعنى اللغوي. أولًا، تُبيّن معنى الدلالات كدراسة لمعنى اللغة البشرية، ثم تنتقل إلى شرح المنطق كدراسة للحقائق استنادًا كليًا إلى معاني المصطلحات التي تحتويها. وبالتالي، فإن الدلالات المنطقية فرع من فروع الدلالات يدرس المعنى أو التفسير في اللغة الرسمية والطبيعية باستخدام المنطق كأداة. المنطق عملية للوصول إلى نتيجة وأداة يمكننا استخدامها. يعتمد هذا على حجة، وتكون قضيتها إما دقيقة (صحيحة) أو غير دقيقة (خاطئة). ثم يبني على مقدمات تؤدي إلى الاستدلال، وأخيرًا، يتم التوصل إلى نتيجة. كما يتم شرح الأنواع الأساسية الأربعة للمنطق، ومقارنة المصطلحات المتضادة، الاستدلال الاستقرائي والاستنتاجي، وذكر التكافؤ المنطقي وخصائصه. تهدف الدراسة إلى إظهار كيفية استخدام الدلالات المنطقية في الحياة الواقعية، مع التركيز على الاستدلال لاستنتاج قيم الحقيقة واستخدام التفكير الاستنتاجي لأنه صحيح ودقيق. يطرح الباحث خمسة أسئلة ويحاول الإجابة عليها من خلال الاستخدام النظري والعملي للدلالات المنطقية في الحياة الواقعية. وأخيرًا، هناك علاقة بين الدلالات والمنطق، حيث يتعلق الأول بالمعنى ويتعلق الثاني بالحقيقة وأي اختلاف في قيمة الحقيقة يعني اختلافًا في المعنى. كما تتعامل الدلالات مع العلاقات، وجميع العلاقات بين المكونات هي علاقات منطقية. تتكون الجملة من عناصر، لكن القضية تتعامل مع معنى هذه العناصر. ووفقًا للدلالات المنطقية، يعتمد المعنى والحقيقة على الاستدلال، ويكون التفكير الاستنتاجي أكثر دقة، ويكون استنتاجه دائمًا صحيحًا وصحيحًا. وأخيرًا، يتم شرح الجانب العملي: كيف يمكنك استخدام الدلالات المنطقية لحل العديد من المشكلات اليومية مثل الغموض.