Summary of Course C.8-5: Elements of Logic (the Theory of Thinking).

General

This course provides a thorough, classically inspired introduction to formal and applied logic, rooted in an ontological and phenomenological foundation.

Starting from the basic scheme of a problem (the given phenomenon and what is sought) and its solution, arguments are understood as conditional statements ("if, then") that express relationships within reality.

Logic rests on two cardinal axioms: the law of identity (together with the principle of non-contradiction and the law of the excluded middle) and the law of sufficient reason, which make explanation and understanding possible.

Through a carefully developed theory of unity and order (henology and harmology) and an analysis of figurative language (tropology), the course builds a coherent system comprising the theory of concepts, the theory of judgments and the theory of reasoning.

By defining concepts precisely in terms of their comprehension and extension, analyzing judgments within their context, and systematically examining forms of reasoning (such as deduction, reduction and the lemma-based analytical method), logic provides a universal set of tools for critically testing claims and pursuing truth through reasoned inquiry.

Summary

1: Ontology and the Structure of Logic

Ontology, or the theory of reality, forms the necessary foundation of classical logic. Logic is essentially "ontology expressed in conditional sentences": deriving a sought reality from a given reality through the "if, then" structure. The central concept of 'reality' or 'being' is defined ontologically as "everything that is not nothing, and is therefore something". This includes not only physical objects but also dreams, utopias, mathematical symbols and abstract signs as distinct forms of being. Every being exhibits two inseparable dimensions: existence (actual existence, "how real is it?") and essence (the mode of being, "what is it really like?").

Two fundamental axioms govern this framework of thought:

- *The Law of Identity*: "Whatever is (so), is (so)" or A is A. From this follow the law of non-contradiction (something cannot simultaneously be itself and not itself) and the principle of the excluded middle (something is either so or not so).

- *The Law of Sufficient Reason* (the Law of Intelligibility): "Everything that exists has a reason or ground, either within itself or outside itself." Without this axiom, reasoning and the explanation of phenomena would be impossible.

Traditional logic consists of three interdependent layers: the *theory of concepts* (terms that designate realities), the *theory of judgments* (sentences in which predicates are attributed to subjects) and the *theory of reasoning* (complete statements expressing conditional inferences).

2: Phenomenology, the Search for Meaning and Interpretive Capacity

Where logic demonstrates propositions, phenomenology focuses on purely observing and describing what presents itself immediately. A logical problem always divides into the given (the phenomenon that appears) and the question (what must be demonstrated through reasoning). Direct knowledge of the phenomenon is the first step towards indirect or mediated knowledge.

According to Kruithof, human meaning-making manifests itself at three levels: cognitive (signifying or judging), axiological (evaluating) and praxeological (acting). The mind's capacity for interpretation varies according to the intentionality of the subject. Whereas sound common sense processes disappointments and facts in a considered manner, a neurotic or ideological mind adds an 'exclusive axiom' to its model of thought ("only these factors explain everything"), thereby narrowing its field of perception and ignoring facts.

Every judgment also reflects the intentionality of the person making it: a proposition always states that subject A, according to person C, corresponds to predicate B. Language moves along semantic levels: from the presemantic object (the zero level) to object language and metalanguage (language about language, as in theories or the mental constraints involved in lying).

3: Order, Harmology and Tropology

Logic rests on a comprehensive theory of order. Following Plato, henology (the theory of unity) distinguishes two ways in which a multiplicity is brought into unity:

- *The Set* (*totum logicum*): members that resemble one another on the basis of a common property (a distributive concept).
- *The System or Structure* (*totum physicum*): components that are interconnected within a whole (a collective concept).

Harmology (the theory of order and configuration) builds on this and, following Augustine, defines ordering as "arranging similar and dissimilar things in their proper places". Through combinatorics and basic differentials

(totally identical, partially identical/analogous, totally non-identical), data are placed into configurations, as illustrated by the logical square.

Human thought often expresses partial identities through tropology (figurative language):

- *The Metaphor*: partial identity based on resemblance within a set (e.g. “that woman is a reed”).
- *The Metonymy*: partial identity based on association within a system (e.g. “apples are healthy”).
- *The Synecdoche*: naming a part to refer to the whole, or vice versa, which forms the transition to generalization (induction within sets) and totalization (induction within systems).

4: The Theory of Concepts, Definition Techniques and the Logic of Judgments

A concept is the presence of a reality in the mind and is expressed in a term. Every concept is characterized by its comprehension (comprehensio, the set of defining characteristics) and its extension (extensio, the domain of applicable cases). The richer the comprehension, the smaller the extension. Extensions may be singular (unique), particular (a subset), universal (the entire set) or transcendental (all-encompassing, as in ‘being’).

To delineate concepts precisely, logic employs:

- *The five predicables* of Porphyry: property (idion), accident (sumbebèkos), genus (genos), specific difference (diafora) and species (eidos).
- *The categories of Aristotle*: the primary substance (ousia or substance) and the relations or secondary determinations (quantity, quality, place, time, action, affection, situs and habitus).

Definitions are classified as semiotic, operative (algorithmic), praxeological (describing an action, as in culinary definitions), cumulative (converging indicators) and legal definitions. In antiquity, an extended development of a concept followed the schema of the *chreia*.

A judgment has a nominal component (the subject) and a verbal component (the predicate). Judgments are analyzed according to quantity, quality and modality (necessary, possible, impossible).

Judgment always relies on comparison. Four forms of negation are distinguished: correlative, contrary, privative and contradictory. A

contradictory proposition introduces an absolute impossibility (such as the "square circle"), which refers to absolute nothingness.

5: The Theory of Reasoning, Syllogistics and Methodology

The theory of reasoning forms the culmination of logic. A distinction is made between immediate inferences (such as summative induction, mathematical induction, a fortiori reasoning and the conversion of judgments) and mediate inferences (syllogisms). A syllogism connects three terms (major, minor and middle term) through two premises to reach a conclusion. Of the 256 theoretical combinations (divided into 4 figures and 64 moods), only 19 are valid.

Since Plato, two fundamental types of reasoning have been distinguished:

- *Deduction* (*sunthesis*): "If A, then B. Now, A. Therefore, B." The inference is necessary and proceeds from the general to the particular.
- *Reduction* (*analusis*): "If A, then B. Now, B. Therefore, A." The inference is not necessary and functions as a hypothesis.

Special forms of reasoning include the polysyllogism, the sorites (chain reasoning), the epicheirema (a syllogism incorporating a proof), the dilemma and the argument from authority. A crucial exploratory form of reasoning is lemma-based analytical reasoning, formulated in Peirce's pragmatic maxim ("you will know them by their fruits"): a provisional hypothetical model ('X', or lemma) is introduced and tested against reality through systematic analysis.

When arguments rest on unproven assumptions, one falls into fallacies such as *petitio principii*, *circulus vitiosus* or axiomatic induction. Finally, methodology shows how scientific knowledge develops dynamically through the empirical cycle (observation, hypothesis formation, deduction of testable consequences, experimental testing and evaluation).