A Formalization of Topical Logic

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The Logic of Ramus

Rodolphus Agricola (1444 – 1485) was an early Renaissance humanist who had a revolutionary impact on later writers. He revised and reorganized the system of topics that had been handed down by Aristotle, Cicero, Quintilian and Boethius. The topics were defined as the universal aspects of things - such as genus, whole and part - which apply to all things and enable us to categorize and talk about things.

Petrus Ramus (1515 - 1572) presented Topical Logic as a challenge to Aristotle’s Term Logic. He moved invention from its traditional location in rhetoric (the study of persuasive speech) into the division of dialectic (the study of arguments). He also added an emphasis upon method, proposing an organization of material from general to particular. The technique of dichotomies for classifying species and subspecies was aided by the new technology of printing. His approach offered a shorter, simpler approach for teaching and a practical technique for organizing and memorizing information. This led to a revolution in the traditional curriculum of many universities in Europe and influenced the Puritans who founded Harvard in colonial America. Many logic books using this approach were printed in the 16th and 17th century.

The art of invention, according to Ramus, embraces the following ten general topics:
causes, effects, subjects, adjuncts, opposites, comparisons, names, divisions, definitions, witnesses and judgment.

Marcus Wendelin wrote a textbook (Logicae Institutiones Tironum Adolescent), first published in 1648, that explains Ramus’ logical method and brings extensive examples, mainly from religious sources. He presents twenty-one topics, most of them occurring in pairs. Using Prof. Manekin’s translations of the terms, these 21 topics are:

cause and effect, subject and adjunct, whole and part, genus and species, denotation and denotandum, definition and definitum, conjunction and conjunction, division and divisum, comparables, [things that are] diverse, opposites, testimonies and that which is attested.

Rabbi Moshe Chaim Luzzatto (the Ramchal) wrote Sefer HaHiggayon (The Book of Logic) in 1742 for his students in Amsterdam (it was not published until the 1890’s in Warsaw). It is an abridgement and rendering into Hebrew of Wendelin’s book, with the examples modified for Jewish sensibilities. He removed the examples from the body of the work and collected them in a supplement called Knaf Hekeshim. Ramchal refers to the 21 topics as “the terms that are used in logic.”

The Ramchal also published in 1742 Sefer Derech Tvunos (The Ways of Reason) in which he presents twenty-four hauchanos, general logical aspects by which we can distinguish subjects:

Essence, Parts, Quality, Quantity, Material, Form, Action, Consequence, Genus and Species, Cause, Means, Motivation, Purpose, Result, Attribute, Location, Position, Movement, Time, Relation, Subject, Comparison, Difference, Contrast.

Our research involves analyzing the Topical Logic presented in the Ramchal’s Book of Logic and presenting a formalization of Topical Logic.

References


The Formalization

The Ramchal uses the 21 terms in four ways:
1. building simple statements – by identifying in a subject one of the topics, we build a statement. For example, in the subject ‘the world’ we identify the active cause, which is HaShem. We build from this the statement ‘the world is the creation of HaShem.’
2. building compound statements – by identifying a reason for affirming or denying a predicate in a subject, we build a compound statement that has the strength of a syllogism. Given the statement ‘humility is good’ that affirms goodness of humility and a proof of the affirmation, “because it is the product of straight reason” we build the compound statement “Humility is good because it is the product of sound reason” which contains the following syllogism:
   Anything that is the product of straight reason is good
   Humility is the product of straight reason
   Therefore, humility is good
3. analyzing simple statements – given the statement ‘The head is part of the body’ we identify the subject ‘the head’ and the predicate ‘part of the body’ which is further analyzed into the term ‘part’ and the correlate ‘the body.’
4. analyzing compound statements – given the statement ‘Humility is good because it is a product of straight reason’ we identify the affirmation ‘humility is good’ and the assertion that it is good because it is the product of sound reason. We expand that into a syllogism (as above).

The Ramchal’s uses of the Topics of Invention can be abstracted as follows. The topics of invention are relational terms. They can be identified in the internal structure of statements in the following ways:
1. A simple statement ‘A is R of B’ that contains a topic in the predicate can be analyzed into its components – subject A and compound predicate with relational term R and correlate B.
2. A compound statement with a justification clause ‘A is Z because R of A is Y’ can be analyzed into its components – subject A and compound predicate with relational term R and correlate B.
3. The compound statement ‘A is Z because R of A is Y’ contains the following syllogism: All X such that R of X is Y, is Z, R of A is Y. Therefore A is Z.

This logical system opens new vistas of logical exploration. Classical term logic has the limitation that the subject and predicate terms of the categorical statements treated are indivisible and their internal structure cannot be modeled. The logical system presented here overcomes this limitation.