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INSCRIPTIONS IN PAINTING

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Introduction

By "semantic enclave" I mean such a part of a work of art, which is composed of signs representing different types or different systems of signs than the rest of that work. Different types of signs are e.g. conventional signs and iconic signs. Different systems of signs are e.g. different systems of national spoken languages or different writing systems. The French passages in the Russian novel *War and peace* by Tolstoy are examples of semantic enclaves: phrases from the spoken French, rendered by means of Latin alphabet are placed within a whole composed of phrases from spoken Russian, rendered by means of the Cyrillic alphabet. An enclave in painting may be a musical score, a map, an emblem, a coat of arms, an inscription. This study is dedicated to semantic enclaves in paintings in the form of inscriptions.

When I define inscriptions in paintings as semantic enclaves, I mean to underline that, within the painting, they constitute autonomous entities, they have a different semantic structure, they speak a separate "language". Inscriptions are also a medium for elements of rich and complicated systems of conventional signs — national languages and various types of writing — to penetrate into the painting.

In order to interpret correctly iconic signs in a painting it is necessary to have some knowledge of visible objects, as well as some familiarity with artistic conventions of a given culture in a given time period.[1] In order to

[1]The fact that one is familiar with diverse visually perceptible objects may be insufficient for a correct interpretation of visual iconic signs. A Japanese person, not accustomed with the central perspective, interprets a box drawn in perspective as

correctly interpret an inscription — a phrase in a national language rendered by means of some type of writing, it is necessary to know two systems of conventional signs: that of the particular type of writing and, at least to some extent, that of the national language employed. Often then the viewer may be capable of interpreting the iconic signs of a painting, yet he may fail to interpret the inscription. Therefore, semantic enclaves in paintings in the form of inscriptions are usually meaningful for a narrower audience than the iconic signs of those paintings.

The term "enclave" has no pejorative tinge in this case. It does not mean that inscriptions in painting are always only interpolations which could be removed with no detriment to the work as a whole. In various artistic circles and time periods inscriptions are essential components of paintings.

A painting with a semantic enclave in the form of an inscription is one of many forms of cooperation between image and writing, between iconic signs and conventional signs. A sculpture with an inscription on the pedestal, a coin or a medal, an illuminated manuscript, an illustrated book or an illustrated magazine, an announcement in a periodical or a signboard with an image, a post stamp, a poster — these are all further examples of similar cooperation. In this article I limit the scope of my analysis to inscriptions within paintings. So I do not take into consideration either inscriptions on frames (despite the fact that e.g. in some works of the Late Gothic or Renaissance painting the frame is an important part of the work), or inscriptions on the reverse side of paintings. In my discussion I do not include either the illuminated codices, where word is not an addition to image, but image is an addition to word. Nor do I include graphics, where the relation between image and word is often extremely close. Even when I thus narrow my subject, it still remains quite vast. I will therefore limit the scope of my study to inscriptions in Western painting — medieval, early modern and modern — and to a few remarks about inscriptions in Egyptian painting and Chinese painting.

To my knowledge, inscriptions in paintings have not yet been the object of a systematic study.[2] For lack of sources which could serve as preparatory

distorted. An Indian, not familiar with the common method in Western painting of suggesting a solid shape by means of shadow and light, "sees" a face partly hidden in shade as mutilated. (Both examples are taken from the book: Gombrich 1960: 267-268).

[2]There are even no comprehensive studies dedicated e.g. to inscriptions in medieval paintings. "There is, to my knowledge, no comprehensive study of mediaeval picture inscriptions, in which the practical, formal, and iconographic intent of the inscriptions is considered [...]" (Covi 1963: 12).

material, this study can be no more than an essay, a rough fragmentary sketch.

Inscriptions in medieval painting

The main purpose of medieval paintings was to arouse religious sentiments in the viewer, to raise his soul towards God, to edify or to bring home to him the articles of faith. The role of inscriptions was there especially to facilitate the proper interpretation of those paintings.

There were various methods of introducing inscriptions in paintings. At times, as for example in Byzantine and Russian mosaics, the inscription would be placed on a flat, blank, usually golden background. At times it would be placed as if it was hovering in the air, not connected with the space represented in the painting (Jan van Eyck, *The Annunciation*, Washington, National Gallery of Art; Rogier van der Weyden, *The Annunciation,* Munich, Old Pinakothek; a Netherlandish painter from the early 16^{th} century, *The Allegory of the Immaculate Conception of the Blessed Virgin Mary*, Warsaw, National Museum). We encounter the same method of introducing inscriptions in the early Christian paintings of the catacombs e.g. in the painting *Vibia enters into Paradise.* Sometimes the inscription would be inscribed in the halo around the head of a figure (*Pietà of Villeneuve-lès-Avignon*, c. 1460, Louvre). But perhaps the most common practice was to place the inscription on an object introduced specifically for that purpose and treated schematically — a plate or a ribbon with curling ends, the so-called "banderole" or "phylactery" (Master of Choirs, *The Sending of the Apostles*, the middle piece of the "Triptych from Mikuszowice," c. 1470, Cracow, National Museum).We encounter the same method in early Christian art e.g. in the mosaics in the Santa Maria Maggiore basilica in Rome.

In the 15^{th} century, owing to the growing realistic tendencies in Western art, we observe the effort to combine all the elements of a painting into a most closely unified whole. When an inscription is introduced, its character of an enclave is hidden. It is treated not as a distinctly separate part, but is most closely related with the objects represented in the painting. The presence in the paintings of the objects on which the inscriptions are placed is in the given situation somehow motivated: they are placed on the pages of an open book, on a dress, on a banner, on a sarcophagus, on a wooden beam in the entablature or on the base course of a building etc. These objects are represented in the same realistic manner as the rest of the objects in the painting. The letters are represented as if they were carved in stone, cut in wood, embroidered on a dress. Through foreshortenings and the play of light

and shadow they are made to come forward or draw back, they are partly darkened by shadows or hidden, also partly, behind other objects. Through these techniques inscriptions could become an integral part of the reality represented in the painting. This method has its origins in ancient painting.[3]

In Byzantine painting the language of inscriptions was Greek, in the Russian painting — Church Slavonic, in the West European — Latin, or at times, rarely, also Greek or Hebrew. In the 15^{th} century there appear the first inscriptions in modern national languages — in Flemish ("Als ik kan" by Jan van Eyck), in French (Jean Bellegambe, triptych *Noli me tangere*, Warsaw, National Museum), in German (Master of the Book of Reason, *Uncourtly lovers*, Gotha, Schlossmuseum).

In medieval painting particular attention was paid to the lettering of inscriptions. The aim was to make them evocative through their very layout — the disposition of letters, the ornamental initials etc.[4] Inscriptions were usually placed above the person's head, somewhere near the person or symmetrically on both sides. At times letters, single or in syllables, were written not horizontally one after another, but vertically from top to bottom. At other times they would be placed on a semicircular or a wavy line. Regardless of its meaning, each inscription was a kind of pattern and this pattern was integrated, with great care and skill, into the painting.

In the West, initially, Roman capitals were used or a lettering which resembled them. This endowed the inscriptions with a particularly monumental, solemn character; they evoked the inscriptions from the monuments of the Ancient Rome.

In the 12^{th} century, under the influence of the Gothic forms in architecture, the rounded lines of Roman capitals, constructed on the basis of the square or the circle, were replaced with angular, spikey lines. Especially the vertical lines in letters were stretched. Hans Jensen, a German historian of writing, calls this new type of writing "Bruchschrift" and enumerates its suc-

[3]Covi 1963: 13. —- We observe here a certain analogy with the passage, discovered by Panofsky (1953, chap. V), from "overt symbols" to "disguised symbols."

[4]In the Middle Ages, especially in the Early Middle Ages, the writing and the word alike were attributed with magical powers. Painters tried therefore to endow the inscriptions with special significance and power of expression by means of an unusual graphical aspect of the inscriptions, by differentiation of letters in their pattern, size and colour, by rich decoration e.g. zoomorphic ornaments etc. This is most notable in the illuminated insular Celtic manuscripts from the 8^{th} century, as well as in the Carolingian and Ottonian manuscripts. Hans Jantzen goes as far as to speak of a "Bildwerdung der Schrift" or a "magische Verbildlichung des Wortes" (1940). I owe special thanks to prof. dr Jan Białostocki, who kindly lent the book to me.

cessive stages: "the Gothic minuscule," "the spikey writing" (13^{th} century), "the Gothic texture" (14^{th} century), "the Schwabach writing" (end of the 15^{th} century) and finally "the fracture" (end of the 15^{th}century/beginning of the 16^{th} century) (Jensen 1958: 505-511). Since the subtle differences between these types of "broken script" are of no import for us, we will term all of them together "Gothic script." In Poland this type of script first appears in the 14^{th} century.

Yet Roman capitals, or a script which resembles it, did not disappear entirely from inscriptions. In the Ghent altarpiece by Jan van Eyck (1430 — 1432) the inscriptions in the scene of the Annunciation, as well as those above the figures of the prophets and the sibyls on the external panels of the polyptych, which are there for everyday view, are written in Gothic script. Whereas the inscriptions above the Highest Being, Virgin Mary and St. John the Baptist, Adam and Eve, on the internal panels of the altarpiece, uncovered only for special feasts, are written in Roman capitals.[5]

In the 15^{th} century, an age of humanism and of the renaissance of antiquity, we observe, especially in Italy, a return to the Roman capitals modelled on the inscriptions from the times of the Roman Empire. A hierarchy of different styles of lettering is introduced. Texts from the consummate in respect of form literature of ancient Rome are written in bright, spaced out Roman letters. For texts in vernaculars, or in the contaminated Latin of the Middle Ages Gothic, script seems to be more appropriate (Covi 1963: 12). In Northern painting we still encounter the Gothic script in the first half of the 16^{th} century, as e.g. in the triptych by an unknown Netherlandish master with *The allegory of the Immaculate Conception of the Blessed Virgin Mary* (Warsaw, National Museum) or in *Vanitas* by Barthel Bruyn the Elder (1524, Otterlo, Rijksmuseum Kröller-Müller).

The grammatical and logical structure of the inscriptions in medieval paintings is extremely diverse. There are names — nouns ("Maximianus," "iustitia") and nominal phrases ("Sancta Barbara," "speculum sine macula"); expressions which are sentences in logical terms: with a verb in the indicative, in all three persons, singular or plural, in various tenses; and expressions which are not sentences in logical terms: commands or demands with a verb in the imperative ("Ite in universum orbem et predicate" — the words of Christ to the apostles in the painting of the Master of Choirs *The Sending of the Apostles*; "Ave, gratia plena" — the words of the Angel to the Virgin Mary in the scene of the Annunciation); wishes in the optative ("Fiatmihi

[5]I owe this remark to Aleksander Wallis.

secundum verbum tuum" — the words of the Virgin Mary to the Angel in the scene of the Annunciation).

Longer inscriptions in medieval paintings are rarely original inventions of the painter, the founder or the instigator of an iconographic programme. They are usually quotations from the New and Old Testaments, from Church songs e.g. from the hymns of St. Ambrose, from liturgical texts e.g. from the grief of Christ on Good Friday or from the Litany of Loreto etc. At times we even find a quotation of a quotation. Thus, for example in the work of Ghirlandaio *Madonna with Saints* (Uffizi) Thomas Aquinus holds in his hands an opened book, where we read "Veritatem meditabitur guttur meum et labia mea detestabantur impium." This is a quotation from the beginning of St. Thomas's work *Summa contra gentiles.* This passage, however, is in itself a quotation from the Proverbs of Salomon (Prov. 8, 7).

Since inscriptions are usually quotations, and the artist or his adviser may expect that an educated viewer will know the source text, the inscription, therefore, is often there not to communicate something new, but to recall something familiar, and so it is sometimes presented in a shortened form. The dialogue between the Angel and the Virgin Mary in the scene of the Annunciation, which in the Gospel of Luke takes a dozen of lines (1, 28-38), is usually given in a more or less shortened form. In *The Annunciation*, a work of "szkoła sądecka," a Polish school of Gothic painting from the second half of the 15^{th} century (Łopuszna, parish church), the Angel says: "Ave gratia plena Dominus tecum benedicta" and Mary responds: "Ecce ancilla Domini fiat mihi secundum verbum tuum." Whereas in *The Annunciation* by Jan van Eyck the Angel says only: "Ave gratia plena" and Mary responds "Ecce ancilla Domini." Sometimes it is only the Angel who says: "Ave gratia plena." Apparently the painter believed that these words would be enough to recall from the viewer's memory the entire dialogue. At times the sentence in the inscription even breaks off in the middle. We find an extreme example, though in fact dating from the 16^{th} century, in the inscription on a ribbon carried by angels: "Ecce agnus Dei qui" in *The Rest on the Flight into Egypt* by Denis Calvaert (Warsaw, National Museum). Of course a sentence cannot end with "qui." The artist probably expected that the viewer will complete for himself the rest of the sentence: "tollit peccata mundi" (John 1, 30). The letters "I. N. R. I." are of course also an abbreviation, standing for "Ihesus Nazarensis Rex Iudeorum" in the scenes of the Crucifixion.

From the point of view of their function the inscriptions in the medieval painting may be divided in four groups:

I. Inscriptions which give information about the represented persons,

allegorical figures, objects and events, and which are placed by them. We can distinguish here three subgroups:

1) Inscriptions, usually names, which facilitate the identification of the represented person, allegorical figure, object or event: "S(ancta) Barbara," "iustitia," "stella maris," "He anastasis," "annuntiatio." Saints are sometimes characterized in a twofold manner: by means of their attribute (i.e. an iconic sign functioning as a conventional sign) and by means of an inscription (i.e. a conventional sign or a group of conventional signs), e.g. Saint Barbara is characterized by a tower and the inscription "S(ancta) Barbara." This is what theoreticians of information call redundancy.

2) Inscriptions which put in relief a certain feature of the represented person e.g. the inscription by the figure of Christ: "rex regum et dominus dominantium" (Rev. 19, 16); by the Virgin Mary depending on the circumstances: "Mater Dei" (Domenico Veneziano, *Madonna with Saints*, c. 1440, Uffizi), "Virgo Mater" (*Pietà of Villeneuve-lès-Avignon*), "Regina celi letare alleluya" (Polish Gothic school "szkoła sądecka," *The Coronation of the Virgin Ma*ry, second half of the 15^{th} century, Łopuszna, parish church).

3) Inscriptions naming a particularly significant event from the life of the represented person. Thus for example in *The Braque Family Triptych* by Rogier van der Weyden (c. 1450, Louvre) by the figure of St. Mary Magdalene we find a short description of an event from her life, as it is recounted in the Gospel of St. John: "Maria ergo accepit librum unguenti nardi pistici pretiosi et unxit pedes Jesu" (John 12, 3).

Outside the domain of sacred art, we find the inscriptions-information above all in portraits. They often give not only the first and last name, but also the age, position and titles of the person in the portrait. These kinds of inscriptions were of particularly great importance in early medieval portraits, when individualization in the art of portrait still left a lot to be desired and an inscription with the name and the coat of arms largely helped to decipher the identity of the person.

II. Inscriptions meant as statements of the represented persons and placed by them.

Most often a person represented in a painting addresses another person or group of people represented in that work. The words of the Angel "Ave, gratia plena" are addressed to Mary, the words of Mary: "Ecce ancilla Domini" — to the Angel. The models were certainly drawn from medieval mystery plays.[6] Sometimes, though, the represented person addressed the assumed

[6]On the influence of the medieval liturgical theatre on painting: Mâle 1908; Réau 1955.

viewers. Herein we can distinguish two types. Sometimes the represented person addresses the assumed witnesses of the event; this is the role of the apostrophe of Mary in *Pietà of Villeneuve-lès-Avignon*, which shall be discussed later. At other times the statement of the represented person is addressed to everyone. It is to everyone that Christ says: "Ego sum lux mundi" (John 9,5) in Cimabue's painting *Christ between St. Peter and St. James Major* (Washington, National Gallery of Art).

The statements of the represented persons could also be categorized differently.

It will be of use to now introduce the distinction between the representational and the narrative works of sacred art. The representational works present saints or divine persons in an indefinite moment of their existence, as if lingering in a timeless reality, static, standing or sitting. Whereas the narrative works present events from the lives of saints or divine persons, which occur in a definite moment of their life. Christ in Majesty, Madonna with Child, Sacra Conversazione — these are examples of representational works. The Annunciation, the Last Supper, the Deposition from the Cross are examples of narrative works. The narrative works may compose of a series representing for example the life of a person — Christ, Mary or a saint. At times it is difficult to set a clear-cut boundary between narrative and representational works. Thus e.g. the Crucifixion or the Lamentation, which constitutes episodes from the life of Christ or Mary and happen in a precise moment of time, seem to freeze within the frame, turning into fixed groups of persons — in the case of the Crucifixion, it is a group with Christ on the Cross in the middle, Mary and St. John the Baptist on either of His sides; in the case of the Lamentation — a group of Mary with the dead corpse of Christ in her lap. They become groups of figures existing as if out of time. This is how the works initially conceived as narrative turn into representational.

In narrative works the statements of the represented persons are the statements they make in a particular situation. These statements are part of the represented action. For example, the words, which have already been quoted many times, of the Angel to the Virgin Mary in the scene of the Annunciation and the response of Mary. In representational works the statements of the represented persons are detached from any particular situation; they constitute as if the leading motive of the person, is to grasp a concise formula of his or her role in the history of the world. When in the painting of Cimabue, which has been mentioned above, Christ holds an opened book with the inscription: "Ego sum lux mundi," these words

are not Christ's statement in a given moment, but they express His role in the universe. When for example in Filippo Lippi's painting *The Adoration of the Child* in Berlin, St. John the Baptist is represented with a streamer containing the inscription: "Ecce agnus Dei qui tollit peccata mundi" these words are not uttered at a given moment, but they express something as in the essence of his future speeches, determining his role in the sacred history, which will be to recognize, in his adult life, that Christ is the future Savior.

III. Inscriptions which are invocations — requests or prayers — of the assumed viewers to the divine person or the saint represented in the painting. Thus e.g. in the painting of Giovanni del Biondo, active in the years 1356 — 1392, *Madonna enthroned with St. John the Baptist and St. Peter* (Los Angeles, County Museum), a supplication to Madonna is placed at the bottom: "S. Maria Mater Dei ora pro nobis."

IV. Authorial statements, unrelated with the subject of the painting. To this group of statements belong the maxims and mottos of painters, short sayings expressing their artistic credo e.g. the inscription "als ik kan" in Jan van Eyck's paintings. Signatures indicating the authorship belong to the same group of statements. In most cases we are only given the name of the author and we are supposed to guess what the missing end of the sentence would be, in this or another language, "made this" or "painted this." Sometimes, along with the name, there appears other information, such as the date when the work was created.

Signatures can be found as early as in the Hellenistic painting. In *Itinerant musicians*, a mosaic decorating the so-called villa of Cicero in Pompeii (Naples, Museo Nazionale), the artist signed his work in the left top corner in Greek letters: "Dioskourides Samios epoiese" (repr.: Maiari 1953: 96). In the Early and High Middle Ages signatures are rare. They gained popularity as late as in the 15^{th} century. One of them is the famous signature of Jan van Eyck on the portrait of Arnolfini couple: "Johannes de eyck fuit hic/1434," which can be translated both as "Jan van Eyck was here" and as "Jan van Eyck was the one [we are to understand: the one who painted it]." Sometimes the signature accompanied the self-portrait of the painter, who painted himself amidst the persons participating in some event represented in the painting. We can name the following examples: inscription "Is perfecit opus" on the ribbon next to the figure of a kneeling clergyman in *The Coronation of the Virgin Mary* by Filippo Lippi (1447, Uffizi), or the inscription "Opus Benotii" on the beret of one of the persons in Benozzo Gozzoli's fresco *The Procession of the Magi* (1459, Florence, Palazzo Riccardi). Not only the name, initials or a monogram could serve

as the author's signature, but also his emblem, a geometrical figure etc. In those cases, however, it was no longer an inscription.

In narrative works the inscriptions would sometimes serve as guidelines for the viewer to establish the chronological order of the represented events. Beginning with the Renaissance, in Western painting the principle of simultaneity of all events within one painting was generally accepted, a fact which was later so strongly emphasized by theoreticians of art e.g. by Lessing. This, as it is generally known, was not a principle of medieval painting. Within one painting a series of successive events one after another would often be represented (there is a painting in St. James Church in Toruń, where we even find, within one composition, twenty two scenes from the life of Christ: from the Entry into Jerusalem to the Ascension) (Kruszelnicki 1968). Inscriptions were then an aid for the viewer to establish the chronological order of the represented events. When in the scene of the Annunciation to the Angel's greeting: "Ave, gratia plena," Mary responds: "Ecce ancilla Domini," the action represented in the painting is divided in two consecutive phases: the anterior — the Angel's greeting, and the posterior — Mary's response. As a result, the introduction of inscriptions transforms the simultaneous coexistence of two persons into an action in two phases, turningsynchrony into diachrony.[7] Another example: in a painting which has already been mentioned in this article, *The Sending of the Apostles* from the circle of the Master of Choirs, on the banderole surrounding Christ's head we read the following words: "Ite in orbem universum et predicate," and on the banderole

[7]Lucien Rudrauf in his book *L'Annonciation. Étude d'un thème plastique et de ses variations en peinture et en sculpture* (1943) (a summary and extracts can be found in Rudrauf 1948-49) distinguishes, in respect to the factor of time, seven variations of the scene of the Annunciation: I. The Angel arrives — Mary has hardly had the time to realize his presence. II. The angel has arrived —- Mary is surprised by his presence. III. The Angel speaks — Mary listens. IV. The Angel has spoken — Mary hesitates. V. Mary responds — the Angel listens. VI. Mary has responded — the Angel has received her answer. VII. The Angel speaks — Mary responds. Commenting on the last variation, he writes: "It occurs at times that the artist, in order to condense into one moment two important stages of the drama, synchronizes the annunciation and the response. In theatre and on the screen, which employ real time, such a synchronization would be absurd. In plastic arts a simultaneous representation of two successive moments is a very logical way of using the real time. The speaking Angel attracts our attention. Once we have understood what he meant to communicate, our attention turns to Mary, who responds. The real time is the time of our attention, which focuses first on the Angel, then on Mary. There is here no true synchronization, but a succession of action and reaction" (Rudrauf 1948-49: 334). The inscriptions make us realize that we are not dealing here with two events happening simultaneously, but with two successive events.

in the hands of St. Peter: "Petrus Romam adyt [adiit]," which may signify: "Peter goes to Rome" or "Peter went to Rome;" on other banderoles held by the Apostles we read: "S. Johannes in Asyam," "S. Thomas in Indiam" etc.; in each case we are expected to guess that the Apostle "goes" or "went." The inscriptions introduce here differentiation of time; the fact that Peter goes or went to Rome was posterior to Christ's words: "Ite [...] et predicate."

Inscriptions had yet another function in medieval art.

One of the basic statements of Christian theology is, as it is generally known, that the Old and the New Testaments are linked by a close correspondence: "concordia Veteris et Novi Testamenti." The people and the events from the Old Testament are foreshadows, "types," "prefigures" of the people and the events from the New Testament. Adam is one of the prefigures of Christ, the three angels hosted by Abraham — a prefigure of the Holy Trinity, the sacrifice of Isaac — a prefigure of the sacrifice of Christ etc. This is called a typological conception.[8] Now, quotations from the Old Testament in the paintings representing the people and the events from the New Testament were supposed to raise in the faithful the consciousness of this close correspondence between the two parts of the Bible. Let us look at a few examples. In *The Assumption* from the Cathedral of Włocławek in Poland (c. 1470), attributed to Francis of Sieradz, the inscriptions on the banderoles, referring to the Virgin Mary, are taken from the *Song of Songs*: "Quae est ista quae ascendit de deserto deliciis affluens" (Song 3, 6), "Veni de Libano sponsa, veni coronaberis" (4, 8), "Quae est ista quae progreditur quasi aurora consurgens" (6, 9) (Walicki 1961, tab. 90: 314-315[9]). Similarly in the triptych with *The Allegory of the Immaculate Conception of the Blessed Virgin Mary* by an unknown Nederlandish master from the early 16^{th} century in the Warsaw National Museum, we read on the top of the middle panel words from the *Song of Songs*: "Tota pulchra es, amica mea, et macula non est in te" (Song 4, 7).

A contemporary viewer displays generally little interest for the inscriptions in medieval paintings, just as he cares very little about the symbolical meaning of flowers, fruit and insects in Dutch still life from the 17^{th} century, or the cosmic symbolism of the Pantheon or a Gothic cathedral. Only rarely does he try to interpret them and the effort he makes is at best cursory. In medieval paintings he looks for the same qualities he seeks in the works of contemporary art: the beauty of composition and colour, creative ingenuity, atmosphere or powerful expression. Every epoch has the right to develop

[8]On the typological conception: Mâle 1948: 133-141; Réau 1955: 192-222.

[9]The inscriptions in the painting have "que," instead of "quae."

its own way of interpreting and experiencing the works of art of the past periods. But a historian and a theoretician of art has to make the effort to reconstruct, as far as it is possible, the aesthetic experience aroused in the people for whom they were first intended. Any reconstruction of this kind is of course always conjectural, although it is also indispensable.

For the educated people who could read and knew the language of the inscription, the inscriptions in medieval paintings must have worked powerfully. A number of factors combined to this effect.

The value of the word was different in the Middle Ages than for today, when we are not only ceaselessly flooded with the spoken, written and printed word, but also with the word transmitted through radio or television, in short, when we deal with inflation of the word. Hans Jantzen says: "The őWordź, as an act of conveying a message, had in the Early Middle Ages a far different weight than in our wordy era. Its sound was deeper, it was suffused with meaning and had the capacity to contain ultimate truths" (Jantzen 1959: 100)[10] The Gospel of St. John identified, as we know, Christ with "Logos," translated in the Vulgate as "Verbum" — "Word." Over centuries people would attribute magical powers to the word. They believed in the existence of a mysterious connection between the name of an object and the object itself, between the word and the object which it denotes; they also believed in the possibility of exerting influence on the object by means of that word. Whereas writing was an act of preservation of word. In the Early Middle Ages word was valued much higher than image, literature or painting. This opinion found a particularly keen expression in the words of Hrabanus Maurus in the 9^{th} century:

Nam pictura tibi cum omni sit gratior arte
Scribendi ingrate non spernas posco laborem,
Psallendi nisum, studium curamque legendi,
Plus quia gramma valet quam vana in imagine forma
Plusque animae decoris praestat quam falsa colorum
Pictura ostentans rerum non rite figuras.
Nam scriptura pia norma est perfecta salutis,
Et magis in rebus valet, et magis utilis omni est,

[10]A similar thought was expressed a hundred years earlier by Karol Libelt: "The power of man, as spirit, used to lie in the word. Upon the word rested the omnipotence of truth, its power was mighty and dreadful. Once pronounced, it was sacred like religion; unchangeable like the past. Even now there still exist dreadful words, and poetic in their dreadfulness, though in general the power of the word has grown somewhat stale" (Libelt 1854: 116-117).

Promptior est gustu, sensu perfectior atque
Sensibus humanis, facilis magis arte tenenda,
Auribus haec servit, Iabris, obtutibus atque,
Illa oculis tantum pauca solamina praestat.
Haec facie verum monstrat, et famine verum,
Et sensu verum, iucunda et tempore multo est.[11]

Longer inscriptions in medieval paintings were mostly quotations from the Bible, i.e. from the books containing divine revelation, which in itself was enough to arouse sentiments of veneration. Finally, one more thing: in Byzantine painting the inscriptions were in Greek, in Russian painting — in Church Slavonic, in Western painting — in Latin and also, though rarely, in Greek or Hebrew. In the Middle Ages none of these languages was an everyday spoken language. They were languages of the holy books, of the liturgy, of science, law and diplomacy. Hence the phrases in these languages had a ceremonial, solemn ring, just as all archaic or outdated phrases do.

For educated people, therefore, the inscriptions in medieval paintings must have worked powerfully. However, in the Middle Ages there was only a narrow group of the faithful who could read, and of those even fewer knew Latin or other languages of the inscriptions. But even on those who could not read the inscriptions might have had a strong emotional effect. For they had a presentiment that those inscriptions conveyed meanings of great significance, the articles of the holy faith, and this awareness alone could make the incomprehensible, mysterious signs an object of veneration. Similarly the sound of the Latin words in the liturgy arouse in the faithful feelings of veneration, even if they do not understand their meaning.

T. S. Eliot once said that Shakespeare's plays have several layers of meaning: for the simple viewers there is "the plot, for the more thoughtful the character and the conflict of character, for the more literary the words and phrasing, for the more musically sensitive the rhythm, and for the auditors of greater sensitiveness and understanding a meaning which reveals itself gradually" (Eliot 1975: 153). Similarly we could say that medieval paintings could have had a different effect on various circles of viewers. The simple folk

[11] Hrabanus Maurus, *Carm.* 30; quoted in: Tatarkiewicz 1960: 122-123. A similar thought is expressed in the so-called "Charlemagne's books" (c. 800): "O imaginum adorator [...] tu luminaribus perlustra picturas, nos frequentemus divinas Scripturas. Tu fucatorum venerator esto colorum, nos veneratores et capaces simus sensuum arcanorum. Tu depictis demulcere tabulis, nos divinis mulceamur alloquiis" *Libri Carolini*, III, 30, quoted in: Tatarkiewicz 1960: 122. Only as late as in the 13^{th} century William Durandus wrote: "Pictura [...] plus videtur movere animum quam scriptura" *Rationale Divinorum Officiorum*, I, 3, 4; quoted in: Tatarkiewicz 1960: 127.

was scared of the punishment of hell, and hushed with the hope of paradise; this is exemplified in the famous stanza from the prayer that Villon composed for his mother. The more subtle viewers were moved by the motherly joys of Mary or the Passion of Christ. The educated people interpreted the symbols, they realized the deeper meaning of the presented things and saw in the correspondence between the New and the Old Testaments a confirmation of the supernatural origin of those writings. The symbols and inscriptions were the esoteric part of the paintings, the images, the iconic signs — their popular part.

I would like to show on the basis of another example how we should imagine the role of the inscriptions in medieval paintings. In the so-called *Lamentation from Avignon* (*Pietà of Villeneuve-lès-Avignon)*, a masterpiece of late Gothic expressionism, the atmosphere of overwhelming sorrow infects the viewer without the aid of any inscription. It is evoked by a number of means: by the bleak symphony of colours — the large patch of dark blue of the Virgin Mary's dress, the dark flaming red of Mary Magdalene's dress, the brown of the earth and the golden background; by the jagged rhythm of the contour of Christ's dead body curved like a bow; finally, by the expression of suffering in the faces and figures of the two women: the quiet and composed suffering of Mary, the vehement and uncontrollable suffering of Mary Magdalene. And still the painter decided to add an inscription at the top, which is meant as a statement by the Virgin Mary addressed to the assumed viewers: "O vos omnes qui transitis per viam, attendite et videte si est dolor sicut dolor meus." Now, these words which Mary uses to express her grief are not her own: these are words of Jeremiah lamenting over the fall of Jerusalem (Lam 1,12). Through this inscription and the typological conception of two great eras in the history of the world — the era under the rule of Grace (*sub gratia)* and the era under the rule of Law (*sub lege*) — are inextricably bound together, two great sorrows — that of Mary after the death of Christ and that of Jeremiah after the destruction of Jerusalem — merge into one piercing sorrow. Image and word, "imago" and "verbum," iconic signs and conventional signs merge here into one unified whole.

Inscriptions in paintings from the 16^{th} — 19^{th} centuries

The development of each of the various kinds of inscriptions ran a different course in history.

The inscriptions-information maintained their place almost uniquely in portraits. In the Renaissance, mannerist and Baroque portraits they would sometimes grow into long panegyrics. Thus, for example, Antonis Mor put

in his official self-portrait (1558, Uffizi) a long Latin panegyric written in Greek letters on a piece of paper, which is attached to the canvas in front of the figure of the painter. The panegyric was composed in honour of Mor by the humanist Lampsonius. The content of this panegyric could be translated as follows: "O heavens, whose likeness is this? It was made by the most famous painter of all, who, surpassing Apelles, the ancient and his own contemporaries, with his own hand painted himself in front of the mirror. O, noble artist! Moro is portrayed here. Lo, he shall speak unto you" (Benkard 1927: 24). Laudatory inscriptions abound in Polish portraits from the 17th and 18th centuries, the so-called Sarmatian portraits. This is for example an inscription from the portrait of Stanisław Rewera Potocki (c. 1750, Cracow, National Museum, Osławski's gift): "Stanisław Potocki of Podhajce, the voivode of Cracow, the castellan of Kamień, born of lady Piasecka, the great Crown hetman, the above mentioned Rewera, [who] in Paniowce turned a Lutheran church into a stable and himself withdrew from the Lutheran church; having gathered his relatives and friends and common people the royal voi[vode] marched across the town, where he utterly destroyed a great crowd of Tatars which was preparing to invade Poland. 15 000 Polish prisoners he set free. As he rode to Lviv, a common peasant, who while ploughing his ground dug out an iron baton, brought it to the chariot and gave it to him. Then a great many of hetmans advanced, until the third one [of the hetmans' batons] was given to him, after the defeat of hetman Kalinowski, who was killed in the battle of Batowo. He beat Bazyli Szeremeta at Cudnowo, the Swedish at Lublin, Rakoczy in the mountains. He passed away in 1667. My great grandfather on my mother's side" (Dobrowolski 1948: 186-188, tab. 132, 134). In the portraits from the second half of the 18^{th} and 19^{th} centuries inscriptions gradually disappear or shrink to a short mention of the age of the person.

The inscriptions meant as statements of the represented persons, so common in the medieval sacred paintings, disappear completely in the 16^{th} century. Painters tried to express the emotions of the persons exclusively by means of gestures and facial expressions. It was not until the 20^{th} century that inscriptions of this kind underwent a revival in the so called "bandes dessinées" or comic strips in the journals, which later spread to Pop Art paintings.

Quite popular, however, in the paintings from the 16^{th} — 18^{th} centuries were inscriptions expressing some general thought, the inscriptions-mottos.

The painting of that period was, no less than the medieval painting, saturated with thoughts, it sought to edify, to preach, to stimulate reflection

on human life. To that end, it developed, just as the medieval painting did, a whole apparatus of conventional signs, symbols, personifications, allegories etc. Inscriptions-mottos, expressing the core idea of the painting, were also one of the means to achieve that end. They were usually given in Latin, which in the Western world was still the language of the church and of science, and remained a necessary element of the education of the privileged social groups. Some of those inscriptions were quotations from the Bible in its Latin translation, or passages from Roman writers. Indeed, they only had meaning for the educated people, but at least educated people of different nationalities. Often the painter would create the illusion that they constituted an integral part of the represented reality, placing them e.g. on a piece of paper attached to the wall, on a musical instrument, a sarcophagus etc.

Inscriptions-mottos can be found in many paintings which treat the subject of "vanitas" — the transience and vanity of all things, the universal power of death.[12] Barthel Bruyn the Elder in his still life with symbols of death — a skull and a nearly burnt out candle (1524, Otterlo, Rijksmuseum Kröller-Müller), put a quotation from Lucretius: "omnia morte cadunt, mors ultima linea rerum." In the painting by Bartholomeus Spranger (1546—1611) *Putto with a skull and an hourglass* (Cracow, Wawel) the inscription reads: "Hodie mihi cras tibi" (repr.: Białostocki, Walicki 1955, tab. 152). Juan de Valdes Leal in his painting presenting three dead corpses in open coffins, each at a different stage of decomposition (1672, Seville, Hospital de la Caridad) introduced the inscription: "Finis gloriae mundi," a paraphrase of the saying "Sic transit gloria mundi," which has its origins in the sentence "Oh, quam cito transit gloria mundi" from *Imitatio Christi* by Thomas à Kempis (I, 3, 30; 1441), who in turn refers to the words from one of the letters of St. John: "Et mundus transit et concupiscentia eius" (1 John 2, 17) (Büchmann 1919: 452). We also find the inscription "[S]ic transi[t glor]ia mundi" e.g. in a beautiful painting attributed to Jan Verkolje, *A youth with a viola da gamba* (c. 1672, Cracow, Wawel) (Białostocki, Walicki 1955, tab. X and p. 524). In *The Dance of Death* by an unknown painter from the 17^{th} century, hanging in the Observantine Franciscan monastery in Cracow, within a composition of one larger canvas and fourteen smaller ones, there is a poem in Polish proclaiming in sixteen quatrains the equality of the members of all social groups and professions in the face of death. In all these cases the inscriptions repeat that which is suggested — literally or symbolically — by the objects

[12] About paintings on the subject of "vanitas" see Białostocki 1961.

in the painting, so their character is redundant.

The theme of death, so common in the period of Baroque, haunted with the obsession of transience, returns in yet another inscription: "Et in Arcadia ego." The phrase appears in the painting by Giovanni Francesco Guercino painted between 1621 — 1623, and in two paintings by Poussin, the earlier of which was probably painted around 1630 (currently in the Devonshire Collection in Chatsworth), the later one — around 1635 (currently in the Louvre). In Guercino's painting two shepherds notice with terror a huge human skull lying on the top of a crumbling wall with the inscription "Et in Arcadia ego," while a fly and a mouse are playing around the skull. All those elements are popular symbols of decay and all-devouring time. In the first version of Poussin's painting a group of shepherds makes a similar terrifying discovery. Poussin transformed the crumbling wall into an ancient sarcophagus, added the god of rivers, Alpheus, and a shepherdess to the two shepherds, but he decided to leave the skull on the sarcophagus, although he shrank it and made it less conspicuous. As it was in Guercino's painting, the assumed speaker who pronounces the words "Et in Arcadia ego" is Death and the meaning of those words is "I am even in Arcadia, the utopian land of happiness." In the second and final version of Poussin's painting instead of three people approaching from the left, we have four of them, placed symmetrically at either side of the tomb, absorbed in a peaceful conversation and meditating upon the beautiful past of the man buried in the tomb. The skull is altogether done away with. Instead of terror and dismay, the painting is filled with an elegiac atmosphere, breathing with mild sorrow. After the suppression of the skull, together with the change of composition, of postures and gestures, the inscription "Et in Arcadia ego" took on an entirely different meaning. From a statement made by Death it turned into a statement of the deceased man in the tomb. Instead of a proclamation of the omnipresence of death, it is now an expression of sorrow and grief after the loss of an immeasurable happiness (Panofsky 1955). We observe here how an inscription — a set of conventional signs — may completely change its meaning when its situational context is changed.

Quite different is the character of the Latin motto in Vermeer's painting *The Music Lesson* (London, Buckingham Palace). In a spacious, sunlit room, decorated with refined taste two young people in elegant clothing stand at a spinet. The lady, with her back towards us, but whose reflection shows partly in the mirror on the wall, bends slightly over the instrument, surely to listen for the right pitch. The man, with his profile towards her, is watching and listening intently. There is a cello standing on the floor paved

with large tiles. And on the spinet's lid we read the inscription:

MVSICA LETITIAE CO[ME?]S
MEDICINA DOLOR[IS?][13]

As in other Vermeer's paintings, he managed here to catch the charm of a transient moment, a moment which one would love to address in Goethe's words: "Verweile doch, du bist so schön!"

The charm of the represented persons and the interior, the beauty of the bright light which softly envelops all the objects, and the toned down colours make for the subtle harmony of the scene. Yet the inscription, though it expresses a praise of music, brings also to that scene another element: we ask ourselves whether the music played by the lady is there to accompany a moment of happiness, or rather to serve as a remedy for suffering?

A peculiar phenomenon are the long and often enigmatic Latin inscriptions in ceiling paintings in the Polish monastic churches. Hardly visible from a distance, they could only serve "ad maiorem Dei gloriam."[14]

The greatest success of all the types of inscriptions in the post-medieval painting enjoyed the authorial statements in the form of signatures. From the 16^{th} century they gained currency in Western art, often combined with information about the date and place of creation or with a dedication. At first the letters in those signatures were meticulously calligraphed and imitated the letters in books or on monuments. Later on, the individual character of the painter's handwriting began to be highly prized as an expression of his personality. Rembrandt was perhaps the first painter whose signature in paintings was the same one he used in everyday life.

Particularly meaningful is the dedication combined with signature in David's painting *The Death of Marat* (1793, Brussels, Musées Royaux des Beaux-Arts):

À MARAT
DAVID
L'AN DEUX

The painter emphasizes thereby that his work is a homage paid to the man whose death it presents, the great Marat. The succinct character of the inscription and the shape of letters refer to Roman inscriptions. This is

[13]Others conjecture that the words on the lid of the spinet, partially covered by the young woman, should be read as "CONSORS" (a companion, a comrade) and "DOLORUM" (in suffering). *Catalogue of the Exhibition of the King's Pictures 1946 — 47* 1946: 108. For our discussion this is of no great importance.

[14]I have this information by word of mouth from prof. dr Władysław Tomkiewicz on 17 XII 1969; it is based on the study by Magadalena Witwińska.

connected with the cult of the Roman civic virtues, which prevailed at that stage of the Revolution.[15]

In the 19^{th} century the whole large apparatus of conventional signs, symbols, personifications, allegories etc. which dominated in the painting of the 16^{th} — 18^{th} centuries, especially in the painting of the Counter-reformation and Baroque, was gradually falling apart. In its place more and more visible was the desire to represent reality in a most faithful, unbeautified manner. Around 1850 "realism" became the catchphrase of the day. If a realist paints an inscription, it can only be something which already belongs to the reality such as the painter perceives it and aims to represent in his painting. When Aleksander Gierymski in his painting *The Old Town Gate in Warsaw* (1883, Łódź, Museum of Art) includes a signboard with a bilingual inscription in Polish and Russian: "M. Taszyńska — locksmith services," then the inscription together with the entire signboard belongs to the reality as it appears to him and so he strives to render it with the same meticulous care which he applies to other elements — the architecture of the gate, the figures of fruit vendors and merchants, the children etc.

Inscriptions-mottos, also interwoven as part of the reality which is to be rendered, can only be encountered in the works of painters who stand outside of the mainstream of realistic painting, such as Arnold Böcklin in his *Vita somnium breve* (1888, Basel, Kunstmuseum), a work presenting three stages of human life.

The Impressionists in turn, more or less from the year 1870, strived to suppress from the painting all that goes beyond visual impressions, all that is not a pure visual perception. Hence, they rejected not only, as realists did, allegories and symbols, but also all types of "literature," anecdote, story. They wanted to render above all the fleeting effects of light and colour, especially those in the open air. So if they included in a view of a street an inscription on a signboard, then it appears there only as a colourful impression caught in a passing glimpse, usually blurred, indistinct and illegible.

The Impressionists fulfilled the demand of Delacroix that a painting should be above all "a feast for the eyes." In this conception of painting there was no room for inscriptions. The entire idea of painting had to change before

[15]David put in this painting two more inscriptions. On the piece of paper which Marat is holding in his hand there is the false account by Charlotte Corday and on the scrap of paper on the pedestal by the bath — a request to pass the enclosed banknote to a mother of five children, whose husband died for his country. These inscriptions serve a closer characterization of Marat (Alpatov 1963: 326).

inscriptions could be reintroduced. This occurred when the reaction against Impressionism began. Gauguin put in his paintings from Tahiti inscriptions in the language of the natives, rendered in Latin alphabet: "Ia orana Maria" (*Ave Maria*, 1891, New York, Metropolitan Museum), "Ta matete" (*A Market*, 1892, Basel, Kunstmuseum), "Nave, nave mahana" (*Delightful Day*, 1896, Musée de Lyon). For most viewers such an inscription was incomprehensible without an appropriate explanation. But even without such explanation, the inscription had a certain effect on the viewer: it enhanced the exotic atmosphere of the painting.

Inscriptions in 20^{th}-century painting

In the painting of the 20^{th} century two fundamentally different attitudes to inscriptions developed (apart from signatures). Some movements, like Post-Impressionist Colourism, (Bonnard, Kapists in Poland), Fauvism, various kinds of non-objective art, worked on the basic assumption that the art of painting should employ only the resources which are proper to it. So, on principle, they exclude from the painting all non-iconic semantic elements, if not all semantic elements in general, inscriptions as well. While other movements, which strived to broaden and enrich the resources employed in the art of painting and attached little importance to traditional barriers between different types of art, had no objections to inscriptions and introduce them in their works — in various manners and for various purposes.

The Futurists, e.g. Gino Severini (*Nord-Sud*, 1912, Milan, collection Emilio Jesi) presented inscriptions on signboards or street boards as part of the constantly moving, restless, if not chaotic city landscape.

In the years 1911—12 Picasso, in order to expand the artistic resources employed in painting, which had been impoverished by analytical cubism, inscribed in a number of his paintings the words "Ma jolie," taken from a popular song of the day. In several other paintings from the years 1912—14 he introduced fragments of the title of the Paris "Journal." It enriched the painting with a certain black-and-white pattern, while at the same time it brought to mind a journal popular at that time, which harmonized with other objects from everyday life of artistic bohemia — guitars, bottles, playing cards. In those years Georges Braque, Juan Gris, Louis Marcoussis also introduced into their works fragments of journals painted in a similar manner with large black letters on a white background. Later on Picasso, instead of painting them, would take scraps of an ordinary newspaper and glue them on the painting. This was one of the sources of the so-called papiers collés, the "collages."

Chagall introduced Hebrew inscriptions in his fantastical visions of the life of the Jews in godforsaken little towns in Belarus. Just as the inscriptions in the language of the natives of Tahiti in Gauguin's paintings, they enhanced the peculiar exotic aura of those works. In the paintings of Georg Grosz or Bronisław Linke inscriptions brought in the element of pungent social or political satire, of irony or grim humour.

In Dada and Surrealist paintings the deliberately absurd texts constituted one of the means to stun and shock the viewer. Thus e.g. in Max Ernst's collage *The Mystery of the Central Europe* (1920, Brussels, private collection) with fantastical vessels and flowers, there are two inscriptions across the top. One verse reads: "always the best man wins," the other: "sodaliten schneeberger drückethäler rosinen und mandeln schlagen die eingeborenen mitteleuropas." The inscription in the bottom finishes the last sentence: "zu meerschaum und eilen nach stattgehabter denudation den ereignissen in bester Absicht voraus."[16] Inscriptions of this kind, which were composed out of word clusters or words from colloquial speech and built according to the rules of syntax, but absurd in themselves as a whole, worked together with the fantastically absurd sets of objects towards the same effect of astounding or shocking the viewer.

A separate group form those inscriptions which the painter for some reasons made deliberately hard to read. To this group belong the inscriptions in mirror writing, which can be read only with the aid of a mirror. Apart from the desire to make it harder for the viewer to read them, the artists may also seek to bring out of the reversed shapes of letters some peculiar graphic or atmospheric effect. To this group also belongs the diversely divided and broken texts or the texts inscribed in various geometrical figures, inscriptions in rare languages etc. It may be that a deliberate hindering of the reception of an inscription has the only purpose to give the viewers a greater satisfaction when they actually manage to read it. At other times the aim may be to limit the reception of the work, to endow the inscription with an esoteric, perhaps even secret character, accessible only to a narrow group of the initiated.

Finally, we find in contemporary painting graphic compositions which we could call "pseudo-inscriptions." They are a series of tiny drawings

[16]Catalogue: *L'art en Europe autour de 1918* 1968: 132, repr.: no. 5. About the inscriptions in the Dadaist collages of Max Ernst, Werner Spies says: "Die Bildinschrift ist Teil der Komposition. Die kleine Schrift, die am oberen und unteren Bildrand mitläuft, rahmt die visuelle Darstellung mit Sätzen ein. Die Zusammenstellung von Wörtern scheint zunächst ebenso wichtig zu sein wie die Zusammenstellung von Bildfetzen, die an ihren Nahtstellen Funken aus Sinn und Unsinn sprühen" (Spies 1969).

resembling letters of various alphabets, numbers etc., some of which are but a free invention of the artist. They create the illusion of an inscription, but they are none. It is impossible to read them and this is why they trouble and excite our imagination with their mysterious aura; just as for many centuries the Egyptian hieroglyphs or inscriptions in cuneiform troubled scientists; just as, up to this day, the Peruvian ropes with knots, which we cannot interpret, excite our imagination. Contemporary painters — Klee, Zbigniew Makowski — sometimes mae use of such half-comprehensible or entirely incomprehensible graphic compositions in order to arouse certain emotional reactions. Let us take the example of Klee's aquarelle *A Document* (1933, Lucerne, Angela Rosengart's collection) (repr.: San Lazzaro 1957: 184). On a pink empty background we see a yellowed piece of paper, covered from top to bottom with series of tiny drawings. We recognize in some of them letters, in others we see numbers, but the whole remains to us incomprehensible. Such illegible, incomprehensible texts can be interpreted as symbols of the "illegible," incomprehensible world, as an expression of the artist's doubt whether it is possible at all to know the world.

Inscriptions in Egyptian painting

The most beautiful Egyptian paintings cover the walls of sepulchral chapels in the tombs of the pharaohs and their wives, of high ranking dignitaries of the state, priests and scribes. Most of them date from the beginnings of the New Kingdom, from the early period of the 18^{th} Dynasty (15^{th} century BC).

A considerably large space in those paintings take the form of inscriptions. They usually give names and titles of the represented persons. Sometimes they contain the story recounted by the dead person about his past life and addressed to posterity, whom he expects to pray and offer sacrifices. At other times they are short sayings of the represented persons: humorous, full of affection or rage, pompous, commanding, courteous or — bawdy. Usually they are magical formulas.

Egyptians loved life and wished not only that the deceased continued an existence after death, but that they enjoyed all the pleasures they had known in this life. Therefore, in the paintings in the sepulchral chapels they would represent not only the deceased one and the funeral rites, but also sumptuous tables filled with food and drink, feasts, minstrels and dancers, hunting and fish catching, finally scenes of rural life painted in rich detail: sowing, reaping of the harvest, grape-picking, baking of bread, beer brewing, cattle slaughter. Yet it was not sufficient in itself to paint those people,

animals, food. By means of special gestures and words, by "charms" and "incantations," the painted people and things had to be transformed into living beings and real things; the represented objects into their designates. This was the role of the inscriptions: they were incantations which gained permanence through writing. The inscriptions were there to prevent a second, ultimate death of the deceased and to make sure he would be leading a life similar to the one he had known, and perhaps even more joyous and happy.

Painted in hieroglyphic writing, they were composed of numberless miniature images of human figures and bodily parts, mammals, birds, snakes, various equipment and tools, diverse lines and figures. They were usually painted with black paint, which symbolized the posthumous rebirth and eternal permanence, and sometimes also with blue, red, green, yellow, and white. The small images of human figures, mammals or birds differed in scale from similar images in paintings themselves, but they were drawn according to the same artistic conventions and with the same mastery.[17] Arranged in horizontal bands or in columns on a flat background, these writings harmonized with the objects represented in the painting. "In the best Theban tombs, in the underground royal mausoleums and in the temples of great epochs" they are "a genuine feast for the eyes" (Mekhitarian 1954: 22).

The paintings of the Egyptian sepulchral chapels strike with their colourful jollity, their cheerful atmosphere. They do not present a ghastly posthumous existence, but the charming pleasures of life. The role both of the iconic signs and of the inscriptions was to preserve life.

Plunged deep in the darkness of the chapels, in most cases these inscriptions were only visible in the light of a torch. Yet they did not have to be seen or read at all. It was enough that they were there and worked through their very presence (Mekhitarian 1954; Posener, Sauneron, Yoyotte 1959, especially the articles: *Art, Biographie, Couleurs, Dessein, Magie, Nom, Peinture, Textes funéraires).*

Inscriptions in Chinese painting

From the Han Dynasty to the end of the Tang dynasty (2^{nd} centuryBC — 9^{th} century AD), in Chinese painting, developed in the climate of Confucianism, the human figure reigned supreme. But from the 11^{th} century, especially

[17] Jean Capart says that in the Egypt of the pharaohs "the art of writing did not differ from the art of drawing." "On the same tomb we often find an animal represented both in its natural form and as a writing sign: both images are identical" (J. Capart, *Propos sur l'art égyptien;* cited in: Etiemble 1962: 89).

under the influence of Taoism, it was the landscape that began to dominate. Sky-high mountains and rocks, often seen through a veil of mist, forests, waterfalls, streams, blooming trees and shrubs, birds, at times the rising moon; hues and moods of nature in different seasons of the year; a man, alone or in a circle of friends, tiny and insignificant in the face of the immensity of the sky and the earth, of the vast expanse of the universe, but finding comfort, tranquility, inner equilibrium in the close community and loving unity with nature, in the life of harmony with its order and rhythm, with the Tao — these were for centuries the main themes of Chinese painting.

Painted with aquarelle or ink on a horizontal or vertical scroll of silk or paper, Chinese paintings were usually elitist, addressing a relatively narrow group of the educated, the "literati." They were usually kept in chests and occasionally, for a short time, they would be taken out for contemplation — in solitude or in a small group. An inscription would often be introduced in the painting and that inscription was its essential part.

Chinese writing was initially pictographic. Later on the pictographic character to a large degree wore off, the schematic iconic signs became purely conventional signs. But they retained their peculiar picturesque and decorative nature.

The Chinese exhibited extremely fine sensitivity to the aesthetic values of particular strokes composing the characters of their writing, to the aesthetic quality of the characters themselves and to their arrangement. This sensitivity is reflected, among others, in their theoretical treatises on calligraphy. In the book *Seven mysteries (of calligraphy)* we read that the horizontal stroke (heng) is "similar to a very long cloud, which breaks off suddenly;" the dot (dian) resembles "a rock, falling suddenly from a height;" a diagonal stroke from the left to the right (pie) — is "the horn of a rhinoceros;" the vertical stroke (shu) is "a vine a thousand years old, but still vigorous;" the deeply curved stroke (wan) resembles a bow; the diagonal stroke from top to bottom and from the left to the right (na) is a wave of a certain shape. In another treatise, *Eight Methods of the Character Yong (permanence)*, Wang Hsi-chih discerns thirty-two variants of the eight basic strokes, which he compares to a hook, a duck's beak, a tiger's tooth, a ram's paw, a drop of dew, a hanging needle, a leaf of an orchid, a knife, a javelin, a phoenix' wing, a dragon's tale, a swimming swan, a playful butterfly etc. No less diverse are the associations evoked by the characters themselves. Wang Hsi-chih says: "Once you have finished writing a character, it is necessary that the character has the look of a caterpillar gnawing a leaf of a tree or of a tadpole swimming in water; sometimes it is a warrior with a sword or a girl in an elegant dress." Souen

Kouo-t'ing at the end of the Tang Dynasty claimed: "In the writing of great calligraphers one can see characters straight like hanging needles and dots round like drops of dew. One can also see characters curved like a sudden lightning or like blocks of rock, which are falling. The sloping characters like birds flying away or galloping predators. The characters resemble dancing phoenixes, crawling serpents, hanging cliffs, steep mountain peaks. Some are heavy like thick clouds, others are light like the wings of grasshoppers. There are characters charming like the moon rising on the horizon, splendid like the stars suspended in the firmament" (Etiemble 1961: 350-352). Painting and the art of beautiful writing, calligraphy (without the negative undertone which the word sometimes carries), were in China most intricately bound, they formed a unity, which was called "shu-hua" (calligraphy-painting). The same brush served to paint and to write, each painter was a calligrapher, and each calligrapher was a painter. Arranged in vertical columns, read from top to bottom and from the right to the left, placed usually asymmetrically in one of the top corners of the painting, the beautiful characters of Chinese writing harmonized perfectly with iconic signs. While in medieval paintings of the West the inscriptions would be written in a writing as even as possible, as if impersonal, the Chinese always highly appreciated the charm of the individual character of the writing in their inscriptions, for it was yet another means of expression of the painter's personality.[18]

As for the content, the inscriptions in Chinese paintings are usually authorial statements. At times they are personal confessions of the painter. Thus, for example, Chao Meng-fu in the painting *Autumn colours on the Qiao and Hua mountains* (1295) describes in a long inscription the circumstances in

[18]For some contemporary painters, such as Mark Tobey or Henri Michaux, the beautiful shapes of the Chinese ideograms were an inspiration to compose original arrangements of lines and colour patches. This is why some spoke of the influence of oriental calligraphy on contemporary painting (Read 1959: 252-253; Seitz 1962). According to Seitz, the moment when Mark Tobey introduced oriental calligraphy to American abstract art was the summit in the history of artistic tightening of relations between the West and the East, which began with Chinese trends of the 18^{th} century and found its continuation in Impressionism (Seitz 1962: 86, footnote 99). There is, however, a fundamental difference between the paintings of Tobey or Michaux and the works of Chinese calligraphers. For Chinese artists the ideograms of their language are not only beautiful shapes, but also signs, semantic compositions, and it is through the combination of the graphical shape and the conveyed meaning that they gain their aesthetic value. Whereas in contemporary Western abstract art and non-objective art the compositions of lines and colour patches inspired by Chinese ideograms have a decorative and expressive value, yet are void of meaning, asemantic (this difference is strongly emphasized by Etiemble 1961: 355-356).

which the painting was composed (Cahill 1960: 103). At other times they are small lyrical poems. In Ma Yuan's (active c. 1190—1230) ink and aquarelle painting *Walking on a mountain path in Spring* a scholar or a poet in the company of his servant is taking a walk along a stream, watching birds on a branch of a wind-blown willow. Beside there is the inscription: "Brushed by his sleeves wild flowers dance in the wind; birds, fleeing from him, hide and cut short their chant" (Cahill 1960: 80-82). Chen Tcheou (1427—1509) in his painting *Watching the Mid-Autumn Moon* put the following melancholy poem:

> When we are young, we look blithely at the moon in mid-Autumn;
> This time of the year seems to us no different from any other.
> But reverence grows with age.
> Our eyes are no longer distracted
> And we raise a deep cup to honour the feast.
> How many mid-Autumns does an old man have the right to see?
> He knows he cannot retain this fleeting brightness. (Cahill 1960: 128)

A painter from the 17th century wrote in his painting the following poem:

> I pour the ink to make it take the shape of mist and haze.
> The flowers of lotus of the Tai-hua Mountain are wet with moisture;
> On the roads, in the mountain gorges, there is no man to be seen.
> The waves of autumn are hasting on to disappear in the endless distance,
> The waters are murmuring and humming over the hidden rocks,
> The haze is winding playfully in the transparent air...
> An inventive mind can thus
> Grasp the power of creating with spare means.
> With ink I try to render
> The breath of the life of nature.
> From the depths of the mountains the streams flow down.
> What lies beyond the mountains, the clouds conceal.
> (Contag 1940: 69; cit. in. Lützeler 1963: 644-645)

Sometimes, under the inscription of the author, scholars added their comments. They constituted an essential part of the painting, they testified to the aesthetic thrills which the work aroused in its lovers over the centuries.

From the comments on the painting by Wang Tingyun (1151—1202) *Secluded Bamboo and Withered Tree*, most important is the comment of a theoretician of art from the 14^{th} century, Tang Hou. It consists of a passage in prose and the following poem:

> Show your heart, without reserve,

And your brush will be inspired.
Writing and painting serve one purpose:
To reveal inner goodness.
There, you see two companions:
An old tree and a soaring bamboo.
The hand which drew them transformed them freely.
The work was finished within a moment.
The incarnation of a single glimpse —
Here lies the treasure of a hundred centuries.
And, as we unroll this scroll, our hearts grow tender,
As if we saw the maker himself. (Cahill 1960: 96)[19]

In the West, especially in the Early Middle Ages, literature was more appreciated than painting. In China they were both equally esteemed. I repeat two verses from the Tang Hou's poem quoted above:

Writing and painting serve one purpose:
To reveal inner goodness.[20]

Conclusion

In different cultures and time periods semantic enclaves in the form of inscriptions had various functions in paintings and their significance for the interpretation and reception of those works was diverse.

Some inscriptions, like e.g. signatures, dedications or artists' mottos, could be interesting for many reasons; generally, though, they contributed nothing to the interpretation of the painting. Others, like the names of saints in medieval paintings or mottos in the Baroque allegorical paintings, repeated what the painter already said by means of iconic signs, symbols etc., in other words they were redundant. Quite often, however, inscriptions were an essential part of paintings.

In medieval paintings they sometimes helped to identify the represented persons or they put in relief one of their features. They were part of the represented action or they helped to establish its successive stages.

[19]This article is an extended version of the paper *Form and function of inscriptions in painting,* which was presented at the meeting of Polskie Towarzystwo Semiotyczne [Polish Semiotic Society] in Warsaw on 12^{th} December 1969 and repeated, in a slightly altered form, as *Inscriptions in paintings*, at the meeting of the Committee on Art Studies of the Polish Academy of Sciences in Warsaw on 17^{th} December that same year.

[20]All the Chinese poems quoted in this section of the article were translated from German or French. They are, therefore, only approximations of the original content.

They helped to create a connection between the persons represented in the work and the viewers. They brought home to the viewers the perfect correspondence between the New and the Old Testaments. Their sole presence endowed paintings with a solemn atmosphere arousing reverence.

In the 20^{th} century, inscriptions in painting had also various and often significant functions. In some paintings, they enhanced the exotic aura. In other works, they would bring a note of pungent social or political satire, of irony or ghoulish humour. In yet other works they contributed to the effect of shock and astonishment. When they were made scarcely legible, they endowed some parts of the painting with an intriguing or mysterious character.

In many Chinese paintings from the 11^{th} — 17^{th} centuries the atmospheric visions of nature and intellectuals who cherished close contact with it harmonized with the inscriptions, which contained subtle lyrical poems composed by the painters or their personal confessions.

In medieval, Egyptian and Chinese paintings the inscriptions, through their highly decorative character, enhanced also the aesthetical side of the paintings.

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Włodzimierz Ławniczak

REMARKS ON THE CONCEPT OF ICONIC SIGN

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1

In her work *Pojęcia znaku* [*The concept of sign*] Janina Kotarbińska presents the following definition of iconic sign: "Object A is an iconic sign of object B on the basis of convention K if and only if object A possesses such feature F and is similar to object B on such account W that (1) due to the similarity, the fact that object A possesses feature F is an indicate of that object B possesses feature F; (2) on the basis of convention K, objects which possess the feature F are eligible to express thoughts about objects similar to them on account of W" (Kotarbińska 1957: 120-121).

The above quoted definition may be regarded as quite representative on account of the fact that its definiens includes a condition demanding that there is an analogy between a given particular iconic sign and the object to which it refers. In the quoted paper, this requirement is a necessary condition for the object to be an iconic sign. It is worth adding that in many other cases it is even a sufficient condition.

The aim of the present considerations is to show that (1) the similarity between a particular iconic sign and the object to which it refers (a relevant similarity, that is sharing those features on account of which a particular iconic sign supposedly refers to a particular object) is not a necessary condition for accepting the particular object to be an iconic sign, (2) what is necessary is a specific similarity between the reference of a particular iconic sign and a certain object which is not identical with a particular sign, although the pertinent sign is to some extent related to the object.

2

In order to continue further considerations, it is necessary to explicate the concept of analogy. I would like to relate this concept to a two-element relation of a parametric nature, that is — the relation shall occur between objects A and B on account of a third factor C represented by the so called parametric variable. Further, I assume that the domain as well as the codomain of the relation are specific relational systems which I shall call structures in the course of this paper.

We[1] shall say that two relational systems $S_1 = <U^1; R_1^1, \ldots, R_n^1>$ and $S_2 = <U_1^2; R_1^2, \ldots, R_n^2>$ are ANALOGOUS — on account of TERTIUM COMPARATIONIS in the form of system $S_3 = <U^3; R_1^3, \ldots, R_n^3>$ if and only if $U^1 \subset U^3$ and $U^2 \subset U^3$ and $R_1^1 \subset R_1^3$ and $R_1^2 \subset R_1^3$ and ... and $R_n^1 \subset R_n^3$ and $R_n^2 \subset R_n^3$.

The concept of analogy specified in this way is extremely general; it can refer to two individual objects, and also to two relations in the broad sense of the word — that is when properties are understood as one-element relations. A single relation can be understood as a structure whose universe is the field of the relation, however an individual object can be treated as a set whose only element is the above mentioned object. It seems needless to say that the relation, and in particular the feature (a one-element relation) here are understood extensionally (as a set of ordered n-tuples, and in particular, sets of individual objects).

Because in my opinion iconic signs are always structures whose universes are sets of elementary states of affairs, that is states of affairs of the type: the fact that object a possesses feature W, the fact that there is relation R between a and b, etc. — the analogy between an iconic sign and its reference I shall understand further as an analogy between so understood structures. Also, I would like to emphasize that I shall call the structure which is the object reference of an iconic sign — the represented structure (i.e. represented by a given iconic sign).

Assuming that a particular iconic sign, and also its references, are structures composed of certain elementary states of affairs is by no means an arbitrary decision. Although the term "object" refers as a rule to concrete iconic signs, and is also applied to the references of these signs, it is possible to show that the so called objects in fact are always specific structures composed of elementary states of affairs. Thus, an object for example in the form of a certain fragment of the painting *Winter* by Bruegel is a structure composed of elementary states of affairs such as: $\langle \subset , \{\langle$*this portion of black*

[1]Kmita, Ławniczak 1970 p. 75

paint which has an ellipsoidal shape, *this portion of white and black paint which has a lengthened, branched shape*⟩}, relation of being on⟩ and also the object which refers to this structure is a structure composed of elementary states of affairs such as: ⟨⊂ , {⟨*this silhouette of a black crow*, *this silhouette of a tree branch*⟩}, relation of being on⟩.

3

Semantics differentiates conventionally between the sign-type and the concrete sign (”type” — ”token,” or in C. S. Peirce’s terminology ”legisign” — ”sinsign”). This differentiation seems to be undoubtful to such an extent that various handbooks and dictionaries of philosophical, logical or semiotic terms adopt and cite it. Thus, for example *The Dictionary of Philosophy* by D. D. Runes reads: ”The words *token* and *type* are used to distinguish between two senses of the word *word*. Individual marks, more or less resembling each other (as ”cat” resembles ”cat” and ”CAT”) may (1) be said to be ”the same word” or (2) so many ”different words.” The apparent contradiction thereby involved is removed by speaking of the individual marks as tokens, in contrast with the one type of which they are instances.(...) The terminology can easily be extended to apply to any kind of symbol, e.g. as in speaking of token- and type-sentences” (Runes 1942: 324).

Similarly, C. W. Morris writes that Peirce differentiates between what he calls ”sign” and ”legisign:” ”a sinsign is a particular something functioning as a sign, while a legisign is a ”law” functionign as a sign. A particular series of marks at a specific place such as ’house,’ is a sinsign; such a specific set of marks is not, however, the English word *house*, for this word is ”one,” while its instances or replicas are numerous as the various employments of the word. It is a law or habit of usage, a ”universal” as over against its particular instances” (Morris 1947: 48).

Although at first sight there is no direct relationship between the issue of the validity of the Peircean differentiation and the matter of the method of defining iconic signs, a critical analysis of assumptions which are the foundation of this differentiation — as I shall attempt to show — to a great degree applies also to the generally accepted way of defining the concept of iconic sign which was presented in the introduction.

Let’s raise the question then if the specific similarity between written words (the so called shape equivalence) or between uttered words (the so called sound equivalence) can indeed be understood as an equivalence relation whose abstraction classes — the so called type-signs — can be understood as adequate equivalents of what is called a sentence, a word, a

morpheme, a phoneme of a given language? In other words — what is meant is whether a similarity (understood in a specified way) between two concrete written words or between two concrete sounds is a sufficient and at the same time necessary condition to regard them as two concrete exemplars of the same sentence, word, morpheme or letter or phoneme? This question will be most conveniently considered on the basis of sounds which exemplify the same phoneme. The research in acoustic phonetics conducted by Liberman, Delattre, Cooper, or Schatz have proved, among other things, that the exact similarity between sounds which have the same acoustic features is not sufficient to regard these sounds as phonetic representations of the same phoneme; at least in some contexts sounds which represent various phonemes, namely *p*, *t*, *k* possess the same acoustic characteristics. The identity of acoustic features then is not sufficient to regard these sounds as phonetic equivalents of the same phoneme. What also follows from this is that the same phoneme can be represented phonetically by two sounds which are different in terms of acoustics; for example, the phoneme *t* has a different phonetic representation in such contexts as *writer*, and a different phonetic representation in contexts such as e.g. *toke*. Thus in general, the identity of acoustic features is neither a sufficient nor necessary condition for two concrete sounds to represent the same phoneme. If we apply additional restrictions on the condition of acoustic similarity, then perhaps we will arrive at a sufficient condition of representing the same phoneme by two sounds, however, it will definitely not be the necessary condition. If we weaken the condition of identity of acoustic features, then perhaps we will arrive at similarity which constitutes the necessary condition, however it will surely not be the sufficient condition.

By analogy — it is possible to show that no specific similarity between sounds or series of sounds constitutes the sufficient and at the same time necessary condition for two concrete sounds or series of sounds, respectively similar to each other, to represent the same morpheme, the same word, the same sentence of a given language.

4

Thus it is not possible to define the concept of phoneme, morpheme, word, or a sentence of a given language by means of sound equivalence relation understood one way or another. It is obvious that the same — *mutatis mutandis* — arguments support the claim that it is impossible to define the mentioned concepts as denoting classes of written words. It seems

however that the pertinent concepts can be adequately dealt with as — respectively — ideal types of written words or series of sounds.

The concept of ideal type was introduced by Jerzy Kmita in his *Wykłady z logiki* (*Lectures on logic*) in the following way: Let there be a certain set X and relation R which is a partial order in set X (Kmita 1970: 132). Using relation R as a definiens, it is possible to characterize the following relation S:

$$xSy \equiv \sim xRy \wedge \sim yRx$$

So defined relation S is an equivalence relation in set X if only it is transitive in this set. In such a case, relation S divides set X into subsets whose family can be called the systematization of set X. Elements of the systematization are ordered by the relation of being earlier in the following way:

$$X_i \text{ is earlier than } X_j \equiv \bigwedge_{x \in X_i} \bigwedge_{y \in X_j} (xRy)$$

When the systematization is a finite family of subsets of set X, and also in a few other cases, it is possible to distinguish the earliest and latest element of this systematization. Both of them can be called extreme elements.

Now, let there be a given law which belongs to the specific system of empirical knowledge W of the most general shape:

$$\bigwedge_{x,y,\ldots} [f(x, y, \ldots) \rightarrow g(x, y, \ldots)]$$

This law is an idealization law on the grounds of knowledge W if: (1) the predicate "$f(x,\ y,\ \ldots)$" denotes an extreme element of a certain systematization, (2) what follows from knowledge W is the sentence:

$$\sim \bigvee_{x,y,\ldots} [f(x, y, \ldots)]$$

Thus, according to (2) the denotation of the predicate $f(x,\ y,\ \ldots)$ is empty on the grounds of knowledge W.

What can illustrate the idealization law is Galileo's well-known law of free fall, that is the sentence of the type:

$\bigwedge_x$ (if x falls freely, then the distance x falls = force of Earth's gravity exerted on x, multiplied by the square of the time of x's falling, divided by 2).

The existence of freely falling objects, that is such on which only the force of Earth's gravity is exerted, is eliminated even by mere theorems of classical mechanics (condition (2) of the definition of idealization law), and at the same time a set of objects of this type is an extreme element of the systematization of the set of physical objects (condition (1) of the definition of idealization law).

What relates to the idealization law is the concept of: (1) ideal type, (2) idealization. The ideal type is the denotation of the predicate which is the antecedent of the idealization law, while the idealization is asserting this predicate about a random concrete object or about an ordered n-tuple of such objects. Obviously, both concepts are relativized, so is the idealization law, to a specific system of empirical knowledge W. Thus, the object which falls freely is an ideal type on the grounds of classical mechanics, whereas defining a concrete physical object as a freely falling object is an idealization — also on the grounds of classical mechanics.

It seems that the presented concepts of ideal type and idealization should be expanded by considering rules of cultural interpretation. For these rules, which assign particular senses to particular human activities or their products in a homogeneous way within a given cultural group (Kmita, Nowak 1968), refer not to concrete activities or products of these activities, but precisely to their ideal types, however I shall call the pertinent ideal types relativized to rules of cultural interpretation — in order to distinguish them from ideal types related to idealization laws — cultural ideal types. At the same time, on recognizing in a given concrete activity or its product, a specific cultural ideal type, I shall call it the cultural idealization. I set the cultural ideal type and the cultural idealization against the ideal type of cognitive nature and cognitive idealization, linking the two latter concepts with idealization laws.

The concept of ideal type of cultural nature can be characterized in greater detail as follows: it is the denotation of the expression "activity C" or "product W of activity C" which occurs in a certain rule of cultural interpretation, thus in an utterance which can be phrased as follows: "In order to realize sense S, one needs to do activity C" or "In order to realize sense S, one needs to do activity C which results in product W." Activities or products which are mentioned in rules of cultural interpretation are always extreme elements of certain systematizations, elements which are known — on the grounds of appropriate knowledge — to be empty sets. Exactly this fact entitles us to call these elements — ideal types, and to call acts of recognizing (in a given particular activity or product) an activity or product

mentioned in rules of cultural interpretation — a cultural idealization.

Thus, due to the fact that in a cultural group of users of the English language, there is e.g. the rule of cultural interpretation: "In order to communicate the state of affairs: the fact that it is raining — it is necessary to utter the sequence of words *it is raining*;" the activity mentioned in this rule, which, by the way, is determined by rules of creating words out of specific phonemes, is an ideal type, similarly to this activity's product which is postulated by our rule. On the other hand, concrete activities or products of these types of activities are CONCRETIZATIONS of pertinent ideal types.[2] By recognizing appropriate cultural ideal types in concretizations, we make the act of cultural idealization.

Regarding sentences, words, morphemes, phonemes of a given language as ideal types of concrete written words or sounds or sequences of sounds, thus treating these written words or series of sounds as concretizations of pertinent ideal types, we avoid the difficulties which are caused by attempts of defining the mentioned linguistic units as types, i.e. classes of abstraction of the relation of equivalence or shape equivalence. The source of all these difficulties is the fact that two concrete exemplars of the same linguistic unit can be sometimes less similar to each other — on account of acoustics or graphics, respectively — than two concrete exemplars of different linguistic units. By regarding two concrete exemplars of the same linguistic unit as two different concretizations of the same ideal type, which concretizations belong to different elements of the same systematization, while the elements are in "different distances" from the extreme element, we can explain the fact that acoustically or graphically different objects correspond however to the same linguistic unit. Yet, on the other hand, the fact that a greater similarity (acoustic or graphic) occurs between two concretizations of different linguistic units than between two concretizations of the same linguistic units, can be explained by this that two different systematization series which have different ideal types as extreme elements, can — to put it metaphorically — intersect, thus can possess a certain common systematization element. If this common systematization element is e.g. X_i, then certain elements of this class will concretize ideal type T, while others — T'; obviously there is a greater similarity (acoustic or graphic) between elements of class X_i, which concretize different linguistic units, than between concretizations — say — of ideal type T, which belong to element $X_j (X_i \neq X_j)$ and concretizations of this ideal type which belong to element X_i.

[2]The concept of concretization, however, in a slightly different sense, is used by Leszek Nowak in his work on methodological issues of Karl Marx's "Capital" (1971).

This type of approach to linguistic units as ideal types immediately raises a question about empirical criteria on the basis of which it is possible to know if a given particular expression concretizes ideal type T or rather T'. This question corresponds to a very complicated problem which I shall not consider here. Perhaps it is worth mentioning, however, that criteria of this type need to be structural in nature, that is they would need to make the recognition of a specific ideal type in a given particular expression dependent on prior recognition (in a hypothetical mode) of the nature of context in which the given linguistic unit would need to occur.

5

Let's turn again to the issue of the definition of the concept of iconic sign considered in the introduction. Contrary to the definition of type-signs of a given language there is no claim that the relation of similarity is a sufficient and at the same time necessary condition for an element of the domain of this relation to be regarded as an iconic sign of an appropriate element of the codomain. The similarity between states of affairs is understood here only as a necessary condition for one of them to be able to function as an iconic sign of the other (in some other approaches this issue looks different). What the author of *The concept of sign* most probably meant was not any similarity, thus — of any *tertium comparationis* (for such a similarity occurs between any two structures with the same number of relations which occur in their characteristics). It seems that what is meant is a similarity which we would call relevant, and which is perceived by the addressee who establishes reference of a concrete iconic sign.

Let's consider now if — following the approach applied in the case of the analysis of the definition of expression-type — it would be possible to show that no relevant analogy in the above presented sense can be the necessary condition for a given concrete structure to be an iconic sign of a different appropriate structure.

Let a certain fragment of theatrical decoration A represent (be a concrete iconic sign) — on account of a set of features which in Heinrich Wölfflin's terminology are called painterly (Wölfflin 1962: 51f) — a tree B; A is namely a structure whose universe and particular relations are included — respectively — in the universe and the relations of a certain more general structure, which encompasses all possible cases of occurrence of objects in the shape of a leaved tree — and only these cases. This more capacious structure plays the role of *tertium comparationis*. In particular it encompasses a set of

color stains which are decoration A, which represents a tree in a "painterly" (according to Wölfflin's terminology) way.

Let, in turn, fragment A' of a certain different theatrical decoration to the same play represent (be a concrete iconic sign) — on account of a set of features which in Wölfflin's terminology are called linear (Wölfflin 1962: 51f) — the same tree B; A' is a structure whose universe and particular relations are included — respectively — in the universe and the relations of a certain more general structure, which encompasses all possible cases of objects in the shape of a tree with a regular silhouette which is homogeneous in color and subordinates the arrangement of foliage — and only these cases. This more capacious structure plays the role of *tertium comparationis*. A particular case of such a form is exactly the decoration A' flatly cut in appropriate material (the silhouette), which is to represent a tree in a linear (according to Wölfflin's terminology) way.

It is easily noticeable that both structures which are *tertia comparationis* — respectively for structure A and A' are different from each other; thus, it follows that I — the intersection of features which are the basis for the analogy between structure A and the tree B iconically represented by it, and I' — the intersection of features which are the basis for the analogy between structure A' and the tree B iconically represented by it — are mutually exclusive. However, none of these complex features (intersection of features) is an analogy relevant for establishing the reference of structure A and A'; because they are too general. For feature I can be — on the other hand — regarded as a sum of features, from which every feature corresponds to a special case of "painterly" which has a specific position in the systematization series — from the position which borders with "linearity" to the position which constitutes ideal "painterly" (which results from the fact that the concept of "painterly" is a typological concept). Similarly, feature I', which is a sum of features, from which every feature corresponds to a special case of "linearity" which has a specific position in the systematization series — from the position which borders with "painterly" to the position which constitutes ideal "painterly." What constitutes the relevant analogy are exactly these special cases of "painterly" or — respectively — "linearity." However, hence these relevant analogies are mutually replaceable in their function to assign a concrete structure with its iconic reference, hence none of them is in this respect necessary.

6

I have indicated in the introduction that analogy can be regarded as the

necessary condition of iconicity, however what was meant was not the analogy between a concrete iconic sign and its reference, but between this reference and the object related in a certain way with the pertinent concrete iconic sign. Namely, I believe that, as the distinction between a concrete expression and an expression-unit of a given language is possible only when the latter is understood as an ideal type, and the former — as a concretization of the ideal type, likewise maintaining the principle of analogy as a necessary condition of iconicity is possible only when the iconic sign is understood as an ideal type, while the concrete iconic sign — as its concretization: the analogy would occur between the iconic sign as an ideal type and its object reference, and not between this object reference and the concretization of the iconic sign.

In order to avoid potential terminological misunderstandings, I would like to emphasize that what I have so far called a concrete iconic sign, I shall now call — a concretization of the iconic sign, while the term "iconic sign" shall be restricted to an appropriate ideal type.

Assuming that the iconic sign is always a certain ideal type, may only seemingly seem contrary to common intuitions; in fact it would be easy to reach consensus — e.g. among addressees of paintings — that when they understand a given concrete painting as representing a specific person, landscape or genre scene, etc., they ignore a whole series of features, which are inherent to the surface of the painting, while, on the other hand, introduce to the painting certain features which in fact are not inherent to it, because they follow their hypothetical knowledge of what the painting should represent.

Most importantly is, however, that by regarding the iconic sign as an ideal type, we maintain the principle of analogy as a necessary condition of sign's iconicity as valid, although particular concretizations of the same iconic sign can be radically different from each other. Admittedly, these differences enable raising the troublesome question why so different objects are to represent iconically the same thing, however we can answer this question — and maintain the principle of analogy as the principle of iconic representation — that the different objects are different concretizations of the same iconic sign and on this account represent iconically what the sign represents, thus — the same state of affairs. The mere fact that two concretizations of the same iconic sign can differ from each other more than two concretizations of various iconic signs, may be — generally — explained in the same way as in the case of concretizations of linguistic expressions. In particular, the above example of different theatrical decorations may be characterized as follows: theatrical decoration A and theatrical decoration

A' are different concretizations of the same iconic sign which represents a specific tree (which is fictitious — because it belongs to the represented reality of the theatrical play). It is an ideal type which can be expressed as a set-theoretic sum of extreme elements of the same systematization series; we are dealing here with a systematization series whose particular elements correspond to Wölfflin's "painterly" to a greater and greater degree, and increasingly approach the case of ideal "painterly," while, at the same time, moving away from the case of ideal "linearity." Obviously, this series can also be characterized by adopting as a starting point the reverse of the relation of approaching the ideal "painterly," thus — approaching the ideal "linearity." The set-theoretic sum of both extreme elements of this systematization series represents exactly the iconic sign which is of interest here. According to what has been stated previously with reference to ideal types, this sum — on the grounds of knowledge about art — is an empty set. It is an empty set because there is no piece of art which is ideally "painterly," or ideally "linear."

Let's notice that the iconic sign — ideal type which is of interest here should not be confused on account of its logical construction with ideal type called in chemistry — a perfect gas. Namely, a perfect gas is not a set-theoretic sum, but an intersection of extreme elements of the two following systematization series: the systematization series whose elements are classes of "portions" of gas which have gradually decreasing volumes of particles, and the systematization series whose elements are classes of "portions" of gas which have gradually declining forces of interparticle interaction. The iconic sign which is concretized by the theatrical decoration *A* and *A'* resembles more a phoneme represented by various allophones. The differences that stand out in the case of the previously considered concretizations of the iconic signs of the tree originate from the fact that these concretizations belong to different distant elements of the systematization series which represents a gradual intensification of the feature "painterly," and simultaneous departure from the feature "linearity" (or — the systematization series which represents a gradual intensification of the feature "linearity," and simultaneous departure from the feature "painterly").

Similarly to the case of concretizations of linguistic expressions, one can ask the question about empirical criteria on the basis of which it is possible to establish that we are dealing with a concretization of such-and-such iconic sign in a given situation. This question corresponds to an essential and very complicated problem. I shall only state here, that in my opinion, the solution should be the same as the solution to the matter of empirical recognition of

a specific linguistic expression in its given concretization. It is particularly evident that the basis for such a recognition cannot be only the observed physical features of a given isolated linguistic or iconic concretization, but what also should be considered are the relations between the concretization and its context. However, both assigning specific features to a given concretization, and finding relations which bind it with the context, most probably follow from the initial hypothesis about the nature of the ideal type, which has its representation in a given concretization, and also — the ideal type concretized by the context. Physical features of the concretization and its contexts are empirically evident and either falsify or confirm this initial hypothesis.

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Izydora Dąmbska

ON SEMIOTIC FUNCTIONS OF BEING SILENT

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Language, in all its pragmatic functions, is an important tool by means of which one can fulfill different intentions and desires, especially those which arise on the grounds of man's interaction with other live beings. And thus, language can be analyzed as a tool for objectifying the results of cognition, as a tool for generating information, communicating and manipulating other people, as a tool for expressing own emotional states, and also as a means for creating certain cultural objects equipped with meaning (works of art, science, law, forms of cult, etc.). By operating linguistic signs in a proper way, that is the way determined by linguistic directives and situations we face, we can reach various objectives within the range of the mentioned activities. However, indeed, it is possible — and sometimes needed — to put this operational aspect of language aside in order to examine its formal and structural properties, that is its logical syntax, or to consider exclusively its references to the subject domain it maps, that is examine its semantic properties. However, in the case of the question of what the semiotic functions of being silent are, being silent needs to be considered as a certain phenomenon of human existence in the world that is connected — though it seems paradoxical — to the speech and language in its numerous instrumental functions. It does not mean that being silent is only non-speaking. Supposedly, it is one of the senses of the word "silence." In this sense, a guard who is alone in a tower, a student on a lecture, somebody who is asleep and a deaf-mute are all silent. Being silent thus understood is a certain negative state — a lack of external speech, or more broadly a certain form of silence. But it is possible to discuss silence in the cases when the lack of external speech results from refraining from speaking. This refraining from speaking can

be intended as a means of action (remaining silent on a certain matter in order to keep it secret) or can result from certain external conditions (e.g. refraining from speaking when this is enforced by regulations) or can be dictated secondarily by a certain internal state (when somebody falls silent because of timidity or anger) etc. However, such non-speaking always differs not only from unconscious non-speaking, but also from conscious speaking which is not accompanied by the characteristic moment of restraint which is crucial in the narrower sense of being silent.[1] This being silent as refraining from speaking has two aspects: the content aspect and the functional aspect. In the former, being silent is refraining from talking about certain subjects, in the latter it is refraining from talking as a certain function consisting in communication with others or communicating anything through being silent. What needs to be differentiated in the first case is refraining from talking about certain matters and leaving certain matters unsaid while talking about other things in order to disguise what we do not want to talk about.

Refraining from speaking is sometimes so far-reaching that it leads to the dying out of something which could be called an internal speech, that is to the dying out of discursive thinking by means of words and concepts. This border case of being silent sometimes seems to be postulated by intuitionists and mystics who believe that all conceptual (verbal) cognition distorts the object given in a direct experience. In *Enneads* Plotinus, describing the process of uniting the human soul with the absolute being, writes that the soul is joined "to God present in silence" (*θεού άψοφητί παρόντος* — V. 8, 11) and it looks at him "free of any discourse" (*πάντα λόγον άφείζ* — VI, 8, 10).

"Es gibt allerdings Unaussprechliches" — Wittgenstein will repeat — "Dies zeigt sich, es ist das Mystische." An attempt to transfer these kinds of expressions or intuitions to the language of conceptual elucidations leads to a distortion of the object. For — Wittgenstein adds — "Wovon man nicht sprechen kann, darüber muss man schweigen" (Wittgenstein 1922, 6.522; 7).

This kind of being silent as the dying out of internal speech — provided it

[1] I proposed such an understanding of *being silent* in the draft "Milczenie jako wyraz i jako wartość" [Being silent as an expression and as a value] in 1952, however the article was published eleven years later (Dąbska 1963). The present study is an attempt to elaborate and show more insight into the semiotic part of the draft. Also, Max Scheler comments about the active character of being silent: "Personen können eben schweigen und ihre Gedanken verschweigen. Und das ist ein ganz anderes als bloß nichtreden. Es ist ein aktives Verhalten, durch das sie ihr Sosein (...) verbergen können" (1926: 259). Let's add that refraining from speaking is not understood as refraining from willing to speak; it may result from the need and willingness of non-speaking.

may happen — belongs itself to the category of matters of internal experience which is difficult to communicate, and in any case does not have a sign-character (in the intersubjective understanding) which is characteristic of being silent understood as refraining from speaking and whose semiotic functions I intend to analyze.

Speech theoreticians have written relatively little about being silent. Noteworthily, among the texts devoted to the subject I am familiar with, are F. Kainz's remarks in the third volume of his monumental "Psychologie der Sprache" (1954-1956). It seems, however, that Kainz narrows the concept of being silent too much when he writes: "Innerhalb des Gesprächs gibt es ein sinnvolles Schweigen, ausserhalb des Gesprächs gibt es überhaupt kein Schweigen, sondern nur ein Nicht-Reden." While being silent — as he claims — "ist (...) etwas vom Nicht-Reden total Verschiedenes." Completely agreeing with the statement that being silent is a significant component of conversation,[2] I do not think that being silent, different from non-speaking, does not occur outside a conversation at all. For not all speaking is a conversation (also in Kainz's understanding), but each activity of speaking can be assigned with being silent. Also, I do not understand being silent as something totally different ("total Verschiedenes") from non-speaking, but only — as stated above — in the understanding adopted in this analysis, it is non-speaking determined by the activity of refraining from speaking, or more precisely — a result or product of this activity. Of course every researcher may propose one way or another of defining a term and determining the class of objects intended for analysis. It seems, however, that the convention proposed by Kainz is not efficient enough in language theory, and narrows the scope of the studied area too much. For it is not difficult to show that not only within a conversation but also in other situations in which language is used, refraining from speaking occurs and should be called being silent, also because of properties Kainz assigned to this refraining. Thus it is not surprising that some examples given by Kainz go beyond being silent in a conversation, which in turn, if not inconsistent, broadens the concept of conversation too much.

If we distinguish, in situations we want to examine, a certain state of consciousness of the subject able to speak, a certain activity (this active

[2]Moreover — it is agreeable (as La Rochefoucauld noticed a long time ago) that there is no conversation or sensible exchange of arguments between two people who cannot be silent in appropriate moments. That's why, summarizing his elucidations on the art of conversation he states: "écouter beaucoup, parler peu, et ne rien dire dont on puisse avoir sujet de se repentir" (2013, V).

refraining from speaking) and the product of this activity (being silent in the sense adopted here), then, from the point of view of semiotics, being silent as a sign of conscious inhibition of speech where the situation expects and even demands speaking is especially interesting. This being silent can be called signifying or signitive in a narrower sense.

For the sake of clarity, I shall add that also being silent understood as non-speaking can have a sign-character. And thus non-speaking resulting from certain damages to the nervous system is a symptom, that is a certain sign, of disease for a doctor. Non-speaking about certain events by an author of a chronicle or a diary who should have known about the events if they had occurred, and who should record them if the events were known, is sometimes regarded by historians as a default indicate that the events in the given time did not occur and is called *argumentum ex silentio*.

The border between refraining from speaking and conscious non-speaking is sometimes vague. For example, it is clearly visible in the case of the so called *aphasia voluntaria*, which occurs in children who persist in being silent and refuse to answer any questions. It is sometimes difficult to judge in such cases whether the child refrains from speaking or if it does not speak — even though it would like to — as a result of certain neuropathic disorders.

Even more clearly such as an inability to speak, which is not conditioned by damages to the centers of the nervous system but results from the so called permanent dislike or inability to interact, is visible in pathological forms characteristic of states of depression and often e.g. in various types of schizophrenia is accompanied by autistic behavior and dying out of other non-verbal means of communication. However, also non-speaking in the narrower understanding, that is conscious and even intended refraining from speaking, can be divided into two types: that is a certain way of communicating with others, a means of expression, information or disinformation, and a breakdown of communication. In the former case, being silent is a result of a certain activity of a sign-character, a certain way of "speaking without words," or at least signaling something, in the latter case, a result of refusal to interact, negation in relation to the function of signaling or informing. It could be objected that the presented differentiations, which refer to the internal conditions of being silent, unnecessarily introduce certain unverifiable assumptions of a psychological nature to the semiotic considerations. I do not think it is so. Agreeing that in particular psychological or psychiatric research is sometimes difficult to establish whether we are dealing with the case of intended refraining from speaking of the signifying character, or with a symptom, an internal compulsion of a forced muteness, or lastly, with a form

of negation of interacting, I do not think it is possible — when distinguishing being silent as a subject of semiotic considerations — to put aside its pragmatic sign functions, which reveal the instrumental aspect of being silent in the linguistic system and by their nature can only be understood if we realize what instrumental use being silent may have in general. (Another issue is that the phenomenon of being silent should be analyzed within individual and social psychology, characterology and personality typology. But it is not the focus of our considerations which deal with the semiotic functions of being silent.)

And in semiotics, being silent as a result of refraining from speaking should be analyzed in two sign categories: 1) as an indicate and 2) as a signifying element of language.

The notion of indicate, defined and understood in numerous ways,[3] can be introduced to semiotics through reduction of the concept of ordered set U such that U_{def} $F\{(a \rightarrow b)$ for $S\}$, where S is a conscious subject, a is a certain state of things which is available for perception, such that can be regarded by S as an indicator of another state of things b; a indicates b for S if and only if S perceiving a can accept b because of that there is a characteristic assignment relation between a and b.[4] It seems that a similar concept of indicate was shared by Stoics who defined an indicate as a content of antecedent in a true conditional proposition, in which both clauses are true and in which between the antecedent and the consequent there is such a relation that the content of antecedent contains the content of consequent (Sextus Empiricus 1979, II: 244ff; Dąmbska 1970). However, this approach, which shifts the relation of indicating between the indicate and what is signified to the syntactic level (the relation between clauses of conditional proposition), disregards two important moments of the relation of "indicating to." Firstly, it does not highlight the dual reference of elements of U, that

[3]A review of various conceptions of indicate is presented in e.g. J. Kotarbińska 1957.

[4]This "indicating to" differs significantly from the function of designating or denoting, which speech words have in relation to their assigned denotata. The name *dog* designates a certain species of pet animals as a result of the meaning it has in the English language. However, it does not indicate anything as such, because it is not a state of things which given to subject S in perception would allow the subject to realize on the basis of the relation of the name *dog* and its designate that there is another specified state of things. Only in a certain particular sign and situational context, a name can secondarily become an element of indicate, frequently loosening its proper linguistic meaning. For example, John's shouting at Peter: *You rabid dog* can become an indicate of a row to Paul who witnessed the situation.

a is an indicate of *b* only for *S*, for whom it can indicate this *b*; secondly, it reduces the concept of indicate — against the common understanding — to the concept of linguistic meaning. An indicate — in the understanding proposed here — is not the logical meaning of an antecedent of conditional proposition, but a certain state of things which can be assumed in the antecedent of implication. And the state of things is such that when perceived can be regarded as an indicator of another state of things. In the concept of indicate proposed here, indicates are both natural, spontaneously occurring phenomena or states of things, and are also ones that occur as a result of intended actions, e.g. by installing an appropriate apparatus, in order to be used to indicate something to somebody. Let's call the first kind of indicate — symptoms, the latter — signals. In this understanding, an indicate is: the appearance of a rash which is for a doctor a symptom of a contagious disease, the low flight of the swallow as an indicate of approaching wet weather, the sound of the bell of the fire brigade signaling the outbreak of a fire, a deflection of the manometer pointer indicating a rise in gas pressure. Examples of signals, that is indicates produced intentionally, divide into two possible kinds. Either, as in the example with the manometer, a signal — though established conventionally — as — similarly to a symptom of a disease — a state of things really connected with the state it indicates, or the relationship between the elements of the relation is established on the principle of convention, as in the case of the sound of a bell in the role of an indicate of fire. Also, it is worth noting that signals are very often not only indicates which reveal something to the conscious subject, thus allowing the subject to acquire a certain cognition, but simultaneously have the postulating or order-giving function, which regulates somebody's behavior, order or prohibits something. The bell of the fire brigade indicates that a fire has broken out, but simultaneously calls the fire brigade to put down the fire. The red light on a railway track signals that the track is busy, and simultaneously prohibits crossing the track. Surely it can be noticed that not only signals, but also symptoms have sometimes the postulating function in the sense that interpreting them in a certain way determines the interpreter's behavior. A doctor observes the indicates of a disease in order to prescribe appropriate treatment. But this postulating is only something secondary or intermediate in relation to the symptom, resulting from making it an aim of somebody's action. The same symptom of a disease will induce one person to undergo treatment, another — to avoid contact with the sick (e.g. in the case of fear of infection), another — to stay indifferent. A symptom *sensu stricto*, that is a certain natural state of things regarded as an indicator of another

state of things, neither postulates nor orders, but does it intermediately when the appearance of the symptom is accompanied by certain directives for behavior in the consciousness of the interpreter. Signals, however, are often originally designed as signs postulating certain ways of behavior and action. But not all signals and not always. Functioning of measurement apparatus, similarly to a symptom, is most often meant to only reveal and register what manifests itself through this indicate, though in certain cases the functioning of measurement apparatus is originally designed as an order-giving signal (e.g. the apparatus in the pilot's cockpit). The postulating and order-giving functions are most often characteristic of arbitrary signals. But not all of them. Displaying a black flag on a building of an institution is an indicate for a passer-by that somebody who worked for the institution has died. However, this indicate does not always call for a particular behavior, for example when the intentions behind displaying the flag were to show mourning of bereaved employees. These examples and remarks are intended to show that a sign which is an indicate, except for its characteristic function of indicating, can, but does not have to, have other semiotic functions. It can be a sign with order-giving functions, but also an expressive sign. Frequently among symptoms, such expressive signs are certain indicates of psychological states (as long as they are consciously used to express the state). If the function is missing, such signs remain only indications.

Being silent, analyzed as an indicate, is either a symptom (e.g. for a doctor or psychologist who carries out clinical observations), or a signal. Even being silent in a narrower understanding (that is conscious refraining from speaking) is a symptom, and only a symptom-indication as long as it is not intended to express anything. However, being silent can also be a signal, even an arbitrary signal, if it occurs as an element of a certain code. For example if a religious ceremonial requires silence after specific words of prayer and indicates that the central moment of the mass has come. It can also have the order-giving function — if it simultaneously regulates the behavior of members of the service.

Being silent can also be a means of communicating information, not only as a signal, but also as a communicative component of natural language. It can also be a means of expression, a way of expressing certain psychological states. The latter function can occur in isolation from speech (e.g. when somebody is silent to express the grief after losing someone dear), but may also be used to manipulate others in the context of a language game. And being silent in the context of speech is what I would like to have a closer look at.

When speaking of being silent as a component of speech, I do not mean that every verbal or written context is created from vocal or spaced graphical signs. These "silent" pauses which separate some signs from others establish certain sensible wholes, e.g. sentences and their parts, lines of dialog, etc. Hence they have important semiotic functions, namely within syntax, as they establish the right order connections between words. Without the pauses, there would be no speech, only a constant and incoherent mumbling. What corresponds to silent pauses in speech are spaces between words in writing, and when it comes to separating certain significant wholes and bringing out their syntactic relations, the so called pause (punctuation) marks are used. I shall not, however, call pauses of this kind as being silent. For as a pianist does not stop playing a melody while separating musical phrases and chords, likewise somebody who separates sentences and words does not stop speaking. Only when they make a significant pause, that is to fall silent and refrain from saying certain words or further speaking, or from speaking for a while in order to signal or express a certain content, then this being silent is a significant element of speech or a kind of speech. Also, when I refer to being silent as an element of speech, I do not think of leaving something unsaid in the sense Norwid presented in his essay *Milczenie* ("Being silent"), which, though rather vague in its historiosophical part, assumes that the man is driven to action only by certain "przybliżenia" (approximations) — as Norwid put it — that is an intuitive sensing of truth, and not theorems clearly formulated in language. As a result our speech is full of what is left unsaid. It is always — according to Norwid — "dramatyczna" (dramatic), "i nie ma w niej zdania tak abstrakcyjnego, które nie kryłoby przemilczenia" (and there is no utterance in speech so abstract that it is not underlain by what is left unsaid) (Norwid 1922: 41).

What is left unsaid, "będąc żywotną częścią mowy, daje się naprzód w każdym zdaniu wyczytać, a potem jest logicznym następnego zdania powodem i wątkiem. Tak iż to, co drugie w porządku zdanie głosi i wypowiada, było tylko co pierwszego zdania nie wygłoszonym przemilczeniem, a to, co trzecie mówi zdanie, leży w drugiego przemilczeniu, a co czwarte, w trzeciego... i tak aż do dna treści, która tym dopiero sposobem jest rzeczywiście wyczerpana na mocy logiki w takowym procesie dotykalnie objawiającej się" (being a vital part of speech, first allows itself to be read in each utterance, and then is a logical cause and content of the following utterance. So that what the following utterance concerns was only what the initial utterance left unsaid, and what the third utterance is about, lies in what the previous sentence left unsaid, and what the fourth utterance is about, lies in what

the third utterance left unsaid... and so on until reaching the bottom of the content which only in this way is actually exhausted on the strength of logics revealing itself palpably in such a process) ((Norwid 1922: 41). Norwid transfers his thesis on what is left unsaid in each utterance into literary works — or "umysłowe wyroby wieku" (intellectual products of the century), as he calls them, and states that "to, co było przemilczeniem całego umysłowego ogółu jednej epoki, stawa się wygłosem literatury epoki drugiej, następnego wieku, a co ta przemilcza, wygłosi trzeci, swoje znowu dla następnej przemilczenie ze sobą wnosząć" (what was left unsaid by the whole intellectual entirety of one period, becomes the undertone of the literature of the following period, and what this period leaves unsaid will be said by the next period which will again raise what is left unsaid for the next period) (Norwid 1922: 78). On this basis Norwid attempts to establish the order of appearing literary forms: a "poetical invocation," an epic, a novel, a historiography. Not elaborating on this rather arbitrary historiosophy of literature, let's ask what sense Norwid attributes to the thesis that being silent, which he reduces to what is left unsaid, is a part of speech, that being silent is contained in every utterance. It seems that this thesis may mean that the content of an utterance formulated in words is only a certain limited choice in relation to the contents of consciousness not yet formulated in words which are, so to speak, silently or *implicite* assumed by this explicated content. When meeting a friend and uttering the words: "How are you, my dear?" — Norwid argues — I am silent about many other thoughts such as: "I haven't seen you for a very long time," "I feel that I would like to contact you more frequently," etc. These thoughts left unsaid in the question may become the content of a later utterance (Norwid 1922: 42ff). It seems that Norwid aims at what Marty calls "die innere Sprachform der Rede" (Marty 1940) — language contents which are not uttered but deducible from what the sentence contains *explicite*. If I understand Norwid's elucidations correctly, being silent in his sense does not need to be active refraining from speaking and it is not a sign of something but it itself is something that the uttered words signal and *implicite* express what is left unsaid. Moreover — most often Norwid does not differentiate between what is left unsaid and the content of what is left unsaid without realizing the ambiguity. Here, however, being silent is analyzed as a result of refraining from speaking which has a simultaneous "language" function of communicating something to somebody; the being silent which is said to be more meaningful than words or can even replace words. "Il y a une éloquence qui pénètre plus que la langue ne saurait faire" — reads *Discours sur les passions de l'amour* which is attributed to

Pascal, while an old Latin aphorism states this in a more cautious way:

Saépe tácens vocém, vérbaque vúltus habét

Being silent may be "more meaningful than words" especially for somebody who makes use of it as a word. For the addressee of this word, or a contingent observer of this sign, however, it is less legible and more ambiguous. Somebody who has been asked a question — is silent. Is it a sign of ignorance, hesitation or disrespect for the asker? Being silent as a sign of compassion may be interpreted as a sign of indifference, being silent as a sign of disapproval or disdain — as a sign of fear. It may be said that being silent is not a self-explanatory but indexical expression, that is such that only together with other words and in a specific situation, in a particular "language game" — in Wittgenstein's terms — does it express or communicate something in an unambiguous way. Sometimes its sense depends on a convention. For example when a custom or code of behavior accepted in a certain community considers being silent in certain situations as a sign of a certain content, e.g. "a minute of silence" as a sign of reverence for the dead. Not only as a conventional but also as an indexical expression with a conventionally unspecified meaning, being silent may become an insincere expression — it may be used to suggest contents which do not exist and to hide contents we do not wish to express. Then, similarly to speech, being silent may be a means of disguise and disinformation and happens to be an important tool of human activity in competition or cooperation with others. In this aspect, being silent is also an interesting subject of moral axiology.[5]

If being silent is such an ambiguous expression, how can this property be shared with its so frequently highlighted merits as a means of communication, together with the being silent which is more meaningful than words, or the mutual being silent of people in love, etc. How can this paradox — that by refraining from speaking we do what language in fact is for — be explained? Actually, the paradox that being silent is an element of speech disappears when we realize a few things which anyhow have been signaled over the

[5]But not only in the aspect in which being silent is itself either a positive or a negative moral value. Also being silent as an indication of a certain spiritual attitude on account of its meaning for the inner development of man and for deepening his self-consciousness. "Wahre Ethik — A. Schweitzer once said — fängt an, wo der Gebrauch der Worte aufhört" (quoted after Gauger 1937: 11). I undertook the issue of being silent as a form of action and being in the world in the ethical sense in the above mentioned paper "Milczenie jako wyraz i jako wartość" [Being silent as an expression and as a value].

course of considerations. Firstly, it needs to be remembered that language is a tool of multiple use. Analyzed in its pragmatic functions it turns out to be a very efficient tool for communicating information which concerns states of things available to intersubjective cognition. The word "information" is used here broadly and encompasses contents of questions, descriptive assertions, or even various types of performative utterances. However, language is an inefficient tool when it is meant to convey information which concerns subjective states: sense experiences, feelings, moods, thoughts, etc. Any attempts to communicate them to other people often turn out to be fallible in the speaker's opinion. ("The tongue lies to the voice, the voice lies to the thought" — Mickiewicz 1956.) Language also turns out to be an inefficient tool when it is used to express these numerous inner states. INFORMING about one's subjective states (either in the form of attempts to describe them or assess them, etc.) needs to be clearly distinguished from EXPRESSING them by means of language. In the former case, similarly to events of conveying information about any other states of things, we use language by adopting an objectifying attitude towards our subjective states and by taking into consideration the addressee of the message. In the latter case, we make subjective use of language, we express ourselves by means of language; language is then an element of our present mode of being in the world. A consideration of the addressee may but need not accompany it; what is important is not the meaning of words, but their tone and emotional load. A shout of anger, fear, or despair (for example, "Bloody hell!" — "woe betide me!" — or "woe!"), which comes out of the mouth of a lonely man, insults he hurls in rage express his state — and even when they communicate the state to somebody, they do so not in the form of conveying a verbal message. When this expressive function of language is analyzed, it turns out that meanings of words play an insignificant role here, words lose their normal linguistic sense, and often become even asemantic, they function only as a certain component of the subject's complex living situation. Somebody with a certain level of good manners who wants to control themselves in such situations, suppresses and limits the external indicates of their states and falls silent. Their being silent, in a certain sense, enriches their inner state and becomes for them (and with time, for an intended or contingent addressee) an expression even more meaningful than words.

Similarly in the case of conveying information about subjective states of things, in the face of inadequacy of verbal messages, we sometimes refrain from speaking about them, and it is precisely being silent or leaving something unsaid in an appropriate situational context that can communicate

them to others even more efficiently than words.

When, however, it comes to inter-subjectively available states of things, conveying information concerning them may take place by means of being silent on the basis of convention; moreover, leaving something unsaid about certain statements, refraining from uttering certain words, either inadequate, or imprecise, or unclear, or redundant, is an important factor of proper and sensible speaking. A surplus of words makes the information less clear and efficient and a lot needs to be left unsaid, many words need to be rejected in order to say explicitly what is intended. In this sense, leaving something unsaid that improves the accurate and economic use of speech also has a significant meaning when it comes to semantic functions of language. It is known by the masters of concise style — those who use the laconic style.

Being silent as a means of communication of certain contents and as a means of expression is an important element of art. It used to be and still is regarded as a certain aesthetic quality of a piece of art. Rhetoric, literature, theater all operate with being silent, in the strict sense of the expression, as such areas of artistic creation whose raw material is language. But, in the metaphorical sense, other kinds of art operate within the category of being silent.

Sometimes the speaker operates with being silent, or pauses — which are only apparently silent — in order to highlight the importance of what has already been said, or to prepare the audience to what is going to be said. The speaker falls silent to express real or intended feelings, sometimes leaves unsaid something that is meant to be implied to the audience. Sometimes the speaker states that this or that is left unsaid. In ancient rhetoric, $\alpha\pi o\sigma\iota\acute{\omega}\pi\eta\sigma\iota\varsigma$ (leaving unsaid) is constantly enumerated among rhetorical figures.[6] But also contemporary theoreticians of rhetoric pay much attention to it.[7] In a work of literary art, the author either speaks of being silent and highlights its role in the imaginative world of the work, or, by the skilful signaling of leaving something unsaid, makes refraining from words a direct means of own expression or the expression of a character. Lyrical poetry, and especially the art of drama operate with being silent as a phrase. Silent scenes in theater, the actor's silent acting are sometimes more meaningful than long tirades. It would be interesting to analyze to what extent silent art and silent films use in their artistic effects the expressive merits of being silent.

[6]Cf. Marcus Fabius Quintilianus, *Institutiones oratoriae*, IX, 2, 54.

[7]For example, M. Dessoir in "Rede als Kunst", which is mentioned by Kainz (1954-1956, III: 525).

What has been highlighted in the present paper devoted to considerations about the semiotic functions of being silent is its role as a means of information and expression. Thereby I do not wish to ignore that refraining from speaking may be sometimes a sign of rejection to convey information and an attempt to reduce all, not only verbal, expression; that it is a tool of disinformation, a means of keeping a secret and withdrawing into oneself. Being silent of the oppressed, being silent from members of the underground, being silent of the initiated, being silent in concentration and contemplation — all are also signitive phenomena, signs and sometimes even symbols of human destinies and human presence in the world.

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Leszek Nowak

ON THE CONCEPT OF EXPRESSING

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The aim of this sketch[1] is to explicate the notion of expressing used in sentences of the form: *Utterance U expresses thought T*. Since such a statement, due to the notorious ambiguity of the term "to express," does not unequivocally define our field of interest, let us begin by presenting the main intuitions usually associated with the concept of expressing, which are also of concern to logical semiotics.

1.

There are three main senses in which we can speak of expressing psychological states by means of linguistic utterances. Firstly, it can be said that the sentence *Jan is Polish* expresses the thought that Jan is Polish regardless of when or by whom this thought was experienced. In fact, in accordance with the discussed sense of the term "expressing," we can speak of an utterance expressing psychological states never experienced by anyone. Assume that up until now nobody has experienced the thought that Columbus discovered America in 9653 BC. Nevertheless, this thought has been expressed (in the present sense of the term) by an utterance of English: *Columbus discovered America in 9653 BC*. In the discussed sense of this term, the normative utterance *Every citizen of the Polish People's Republic should refrain from arming a ship with piracy in mind* expresses an imperative experience that it

[1]This paper is a part of my doctoral dissertation *Problemy znaczenia i obowiązywania normy prawnej a funkcje semiotyczne języka* [*Problems of Meaning and Validity of Legal Norms in the Light of Semiotic Functions of Language*], written in 1967 under supervision of Prof. Zygmunt Ziembiński.

should be the case that no citizen of PRL arms a ship with piracy in mind, regardless of the fact that this norm has never been applied, that is to say, no one has had the opportunity to 'seriously' experience the corresponding imperative state.

Secondly, we frequently speak of expressing a psychological state by means of an utterance as revealing those states to other persons (e.g. Ossowska 1928: 145f; Ajdukiewicz 1978: 229; Kmita 1965: 38f). Accordingly, expressing would be a special sort of relation, holding between an utterance and a psychological state, that lets other people figure out the psychological state the author of the utterance is in. To be more exact, the relation of expressing thus understood holds not between an utterance and a psychological state but between the action of formulating the utterance and the psychological state. It is so because the fact that someone has experienced something is brought out by a linguistic behaviour consisting in formulating an utterance, rather than by the utterance itself.

Thirdly and lastly, it is sometimes said that a linguistic behaviour expresses a psychological state in the sense that it belongs to the same relationship as the psychological state of laughter does to joy, a groan to pain, etc.; that is to say, it is brought about by the fact that the person in question is in this psychological state (Ossowska 1931: 216f).

These three concepts of expressing are utterly different. The domain[2] of the relation of expressing$_1$ is a set of utterance-types understood as classes of utterances construable in a given language (Nowak 1968: 4f), while the converse domain consists in the set of general, not particular, psychological states (i.e. the set of *types* of psychological states; see von Wright 1963). Let us illustrate this with the example discussed above. If we assume that no one has ever formulated the utterance *Columbus discovered America in 9653 BC*, or experienced the corresponding thought, then the claim that this utterance expressed this thought even before I had formulated it is possible to maintain only if by utterance we mean the set of utterances of the same form as a particular utterance construable in the given language, whereas by thought we understand the set of thoughts similarly (with respect to content) to a certain possible concrete thought (actualized or not).

The relations of expresing$_2$ and expresing$_3$ are totally different in this respect. They have a common property: their domains consist of concrete, actually exhibited linguistic behaviours, whereas their converse domains

[2]The domain of a relation R is a set of objects that stand in relation R to other objects; the converse domain (the range) of R is a set of objects such that some object bears R to them.

are sets of concrete and actualized (i.e. actually experienced by someone at some time) psychological states. They are distinct in that they are obtained under different conditions. An utterance expresses$_2$ a thought if the fact of formulating this utterance informs somebody that the author of the utterance has this thought. An utterance expresses$_3$ a psychological state if it has been formulated as a result of experiencing this state, in reaction to this experience. It might be said, therefore, that expressing$_1$ corresponds perhaps to what Tadeusz Kotarbiński (1966: 3) called indirect expressing, while expresing$_2$ and expresing$_3$ are two kinds of direct expressing.

It seems that — contrary to appearances — the concept of expressing$_1$ is not pragmatic in nature; that relativizing it to (general) psychological states is, in fact, redundant. To see this, let us restrict the concept of expressing to descriptive sentences. Now it seems that utterances like *Sentence S expresses the thought that p* are simply synonymous with utterances such as *Sentence S says that p*, *Sentence S states that p*, or *Sentence S claims that p*. The ordinary sense of the term "sentence (. . .) claims that (— — —)" requires that we substitute names of descriptive sentences for "(. . .)" and names of propositions for "(— — —)." Propositions can be construed as types (sets) of synonymous sentences (Church 1956: 4f). So, in any case, the sense of the above term should be such that the utterance *Sentence S claims that p* is true when *p* is a set of sentences synonymous with *S*.

The concept of expressing$_3$ is, in turn, a special case of a more general notion, namely the notion of manifestation. For by saying that a scream is an expression of someone's fear, we state the same thing as in saying that running off is a manifestation of fear of a real or apparent danger. We might suggest a general description according to which someone's behaviour at a given time is a manifestation of her psychological state at that time when the fact that she experiences this psychological state is a necessary component of a sufficient condition for exhibiting this behaviour.[3] If we apply this concept of manifestation to the issue at hand, we get what follows: the action of formulating an utterance expresses$_3$ a psychological state of the author of the utterance when the action is a manifestation of that psychological state.

Let us now try to explicate the concept of expressing$_2$. It will require, however, some introductory conceptual analysis.

2.

[3]On the concept of the essential element of a sufficient condition, see Kotarbiński 1965: 15.

According to the initial intuition regarding the concept of expressing$_2$ presented above, an utterance expresses$_2$ a psychological state when the fact that the author of the utterance has formulated this utterance provides someone with the information that the author is in that psychological state. Consequently, the concept of expressing$_2$ depends on the concept of informing. That is why we now need to analyze the notion of being informed of something with a sentence.

It immediately turns out that it is necessary to distinguish potential information from the actuality . Presumably, a sentence S actually informs X that p if X has come to think that p and X would not have thought that p if X had not received (read, heard, etc.) S. S potentially informs us that p if reception of S is a necessary component of a sufficient condition for experiencing the belief that p. The concepts in question, however, require a number of relativizations. The most obvious one is the need for relativization to a particular language: we are not likely to agree that some English sentence is informative for people who do not know English. Equally evident is the need to relativize the concept of informing to empirical knowledge: a sentence providing a lot of information to someone familiar within a given discipline could be extremely uninformative for someone with poor knowledge of the field. Less obvious, however, is the need to relativize the concept of informing to certain rules of inference. And indeed, if the rules used by people in communication could be reduced to the rules of inference based on logical tautologies, then such relativization would be redundant. The actual communicative processes, however, also involve extralogical rules of inference. Accordingly, the sentence *N and M stated that p* conveys the information that p only to someone who endorses the rule that permits one to accept a sentence asserted by two independent informers (given that N and M are independent and trustworthy informers; Giedymin 1961: 58). For someone who does not endorse this rule, or even for someone who just does not use it, the above sentence remains uninformative.

All those requirements are met by the following definition: a sentence S of a language L POTENTIALLY INFORMS that p, relative to rules R and empirical knowledge K, if and only if (1) for any person X proficient in L and acquainted with the system of K: applying R to S by X (and perhaps to some sentences from K) is a necessary component of a sufficient condition for X to experience the thought that p, and (2) some R-consequence of S (i.e. some sentence resulting from applying R to S) states that p. Clearly then, in the light of this definition, if a sentence informs that p relative to rules R, then some R-consequence of S states that p. This reveals the dependence of

the pragmatic notion of informing on the semantic concept of stating.[4] A sentence ACTUALLY INFORMS someone that p at a given time, if and only if it potentially informs that p and if that person has actually thought that p at that time as a result of applying the relevant rules of inference.

Let us return to the initial description of the concept of expressing. An utterance expresses$_2$ a psychological state when the fact that the author has articulated that utterance informs someone that the author is in that psychological state. According to the above understanding of the term "to inform," it is not facts that inform, but sentences. Thus, instead of saying that the fact of articulating an utterance informs of something, we should say that a sentence stating this fact informs of something. Accordingly, the concept of expressing$_2$ could be defined as follows: an utterance U of a person X at a time t expresses$_2$ a psychological state S (relative to a language L, rules R, and empirical knowledge K) when the sentence *X has formulated U at t* actually informs a person Y at a time t' (relative to L, R, and K) that X is in a psychological state of the same kind as S. So, on the one hand, the descriptive sentence *Jan is Polish*, uttered by X, expresses$_2$ X's belief that Jan is Polish, if the sentence *X said* "Jan is Polish" actually informs someone that X thinks that Jan is Polish. On the other hand, X's imperative utterance *Offer your seat to the old lady!* expresses$_2$, say, X's attitude of reverence towards elderly people, insofar as the sentence *X said "Offer your seat to the old lady!"* actually informs (relative to someone's knowledge about X) that X has such an attitude.

3.

Let us now try to determine whether such a concept of expressing$_2$ is indeed the concept we have in mind in saying that a given sentence expresses a certain thought. Presumably, it is slightly too broad. To see this, assume that someone said *Grunwald is a village within Ostróda county* and at the same time thought not only that Grunwald is a village within Ostróda county, but also that it was at Grunwald that Jagiełło defeated Teutonic Knights. The point is that a hearer could figure out not only that the speaker had a belief corresponding to the sentence uttered, but also that she thought that Jagiełło defeated Teutonic Knights at Grunwald. In this case both beliefs would be expressed$_2$ by the sentence in question, although it was formulated

[4]The concept of informing adopted in this article differs from the popular understanding of semantic information as a set of logical consequences of a sentence (e.g. Bar-Hillel 1955: 302f) in that the latter is not relativized to a system of empirical knowledge and only assumes the logical rules of inference.

exclusively in reaction to experiencing the former belief. In general, it could happen that at t X experiences psychological states S_1, S_2, ..., S_k, but it is only in reaction to S_i that X formulates utterance U at that time. There may be a hearer whose knowledge about the speaker is so rich that she can figure out — based on U — that the speaker is experiencing S_1, S_2, ..., S_k. So we should admit that U expresses$_2$ all those psychological states, rather than S_i alone.

To avoid this consequence, we could endorse the following definition of the concept of expressing: an utterance U of a language L expresses$_2$ a psychological state S of a person X at a time t (relative to inference rules R and empirical knowledge K) if and only if (i) the act of formulating U by X at t expresses$_3$ S, and (ii) U itself expresses$_2$ (relative to R and K) S as experienced by X at t.

4.

The concept of expressing introduced above can be easily generalized by means of the following concept of symptom: a state of affairs p is a SYMPTOM of a state of affairs q relative to knowledge K and rules of inference R if and only if sentence p potentially informs — relative to a given language, R, and K — that q.

It is easy to see that the concept of expressing proposed above could be briefly defined as follows: an utterance expresses a psychological state if formulating this utterance is a manifestation and a symptom (with suitable relativizations) of the fact that the author of the utterance is in that psychological state.

The presented concepts of expressing and symptom have a relatively broad and varied domain of application. I will discuss three such applications — in the field of semiotics of natural language, methodology of history, and jurisprudence.

(A) Hector Castaneda (1957) introduced the notion of lalic implication to refer to a special kind of relation between sentences: a sentence p lalically implies a sentence q if and only if the mere fact that p is used requires the truth of q. For instance, X's utterance *I'm hungry* lalically implies the sentence *X exists*. Castaneda (1957: 91) regards the lalic implication as an extralogical ("quasi-logical") relation, typical of natural languages.

Now, it seems that the author's intuitions would be compatible with the following explication: a sentence p lalically implies a sentence q (relative to empirical knowledge K and inference rules R) when for some X, for some time t, the sentence *X formulated p at t*, in conjunction with K, inferentially

entails q with respect to R (i.e. q can be derived from the conjunction in question by applying inference rules R). So the sentence *I'm hungry*, uttered by X_1 at t_1, lalically entails the sentence X_1 *is hungry at* t_1 since the following sentence seems to belong to the universally accepted empirical knowledge: *For any X, for any time t: if X formulated the utterance "I'm hungry" at t, then X exists at t*, while this sentence in conjunction with the sentence X_1 *formulated the utterance "I'm hungry" at* t_1 entails (via ordinary logical rules of inference) the sentence X_1 *exists at* t_1.

By employing the concept of symptom discussed above, we could say that a sentence p LALICALLY IMPLIES a sentence q (relative to empirical knowledge K and rules of inference R) when the fact that someone has formulated the sentence p is (relative to K and R) a symptom of the state of affairs q.

A question arises whether the notion of lalic implication, explicated in this way, is indeed an extralogical relation. The answer is trivial: if by logical concepts we understand only the concepts explicable in terms of logical syntax or logical semantics, then indeed, the concept of lalic implication is not a logical one; if, however, the denotation of the term "logical concept" is extended so that in addition it includes concepts explicable in pragmatic terms, then the concept of lalic implication is a logical concept, because it requires appealing to pragmatic concepts (e.g. the notion of knowledge).

(B) In the methodology of history, there is a well-known distinction between direct and indirect sources (or between tradition and remnants):

> Indirect sources present historical facts by means of conventional signs (writing, language, and other conventional signs) [...]. On the other hand, the direct sources often make do without such conventional signs, [because they are pieces of historical reality in their own right, that is to say,][5] they are themselves historical facts. (Topolski 1978: 393)

This division is not exhaustive, since direct sources are themselves "pieces of historical reality," and the acts of formulating them are historical facts. We shall explicate the notion of direct source in this way: a state of affairs p is — relative to knowledge K and rules of inference R — a DIRECT SOURCEfor the question *Is it the case that q?* if and only if the state of affairs that p is (relative to K and R) a symptom of the state of affairs that q or the state of affairs that not-q. This explication clearly shows that linguistic utterances

[5]Translator's note: although the passage in square brackets has been omitted in (Topolski 1978), I have included it in accordance with the Polish original (J. Topolski, *Metodologia historii*, Państwowe Wydawnictwo Naukowe, Warszawa 1968, p. 270), since Leszek Nowak directly refers to it in the subsequent sentence.

can also be treated as direct sources — insofar as, instead of focusing on their content, we consider that they (or rather the acts of their formulation) are symptoms of certain states of affairs. In particular, those states can consist in the fact that their authors are in certain psychological states — then linguistic utterances are treated as symptoms of those psychological states, that is, they are considered in the light of what they express. As a result, historians can examine historical sources from the following points of view: (a) as purely indirect sources, i.e. as containing signs which communicate something; (b) as both direct and indirect sources, i.e. as involving signs which communicate something and, in addition, the facts of formulating those signs are regarded as symptoms of certain states of affairs (in particular — of psychological states of the authors of those signs); (c) as purely direct sources, i.e. as symptoms of certain states of affairs.

(C) Some legal theorists once took the view that legal norms are true or false in that they are, or are not, reflections of social reality. Remnants of this view can be found in the following statement:

> The concepts involved in the normative material undoubtedly reflect a certain reality. They speak of citizens, goods, organization of state authority, etc. [...] They inform, therefore, about all areas of life that are subject to legal regulation. (Kowalski 1960: 183)

It is, however, immediately evident that this conception rests on confusing the relation of informing with the relation of being a symptom: norms do not state anything (since they prescribe or prohibit), but the acts of establishing them are indeed symptoms, e.g. of some kind of social relations, class interests, and thereby of the class structure of a given society, etc. The norm itself, however, informs of nothing. The impression to the contrary rests on the fact that sentences of the form *The norm prescribing this or that was established at this or that time in this or that society* does indeed — according to our definition of the concept of symptom — inform of something.

Similar misunderstandings, based on mixing up the relations of informing and expressing, occur in the context of semiotic characterization of assessments. We read, for instance:

> Assessments such as "This law is just" [...] differ from descriptive judgements such as "Fish breath through gills" in that the former express our subjective attitude towards the evaluated object. We use them to communicate what we accept, what we like, what tastes good, etc. People often forget, especially in the heat of the fight, that they are talking about their tastes, and not about objective features. (Kowalski 1967: 9)

Again, from the fact that assessments express the attitude of approval or disapproval, it is inferred that they inform us that the subject has this attitude. However, it is not the assessments themselves that inform us about the attitude, but sentences of the form *X formulated at t an assessment A*, which (perhaps together with assumptions regarding *X*'s sincerity) entail that the person formulating the assessment is adopting the corresponding attitude. The assessments themselves can function as symptoms of the attitude of approval (and thereby express this attitude) and communicate something entirely different. For instance, the assessment *Jan is intelligent* expresses the attitude of approval, but at the same time it communicates, say, that Jan has the ability to solve problems for himself. Assessments can also communicate nothing while expressing a certain attitude — e.g. *This law is just.*

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Leon Koj

AN ANALYSIS OF INTERROGATIVES. PART 1 — THE PROBLEM OF PRIMARY TERMS OF THE LOGICAL THEORY OF INTERROGATIVES

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1. THE AIM OF THE RESEARCH

In the period following the publication of *Erotetic Logic* by Mary and Arthur Prior (1953) the issue of the logic of interrogatives has aroused more and more interest. Several new ideas have been introduced. The incompatibility between the different approaches calls for further discussion of the subject.

A logical model of interrogatives ought to be constructed with the same methods that are used in creating any other type of formal logic. The first stage includes listing primary terms, followed by syntactic rules and a characteristic of the primary terms of such logic. The present article aims at determining the starting point for constructing a model for the logic of interrogatives. It also tries to answer the basic question of whether erotetic logic may be reduced to other logical systems and, more importantly, whether it needs to include primary terms unique to this model. The scholars' lack of agreement necessitates a full-length consideration of the mentioned issues.

2. THE RESEARCH METHOD

As specified in the above paragraph, the aim of this research is to construct a formal erotetic logic. Naturally, this system ought to have a practical application. Since at this point the majority of questions are formed in natural languages, erotetic logic has a chance at being practically applied

only if the questions of this logic have their equivalents in natural languages, in the form of ordinary questions. This equivalence enables the interrogatives of one kind to be roughly translated into the other. The condition for translatability imposed upon the logic of interrogatives determines both the choice of terms and the rules of syntax and influences the characteristics of the adopted terminology. Translatability should not, however, be defined too rigorously, as every system of logic needs to be able to extend the possibilities hidden within the apparatus of a natural language. When logic goes beyond the current limitations of a natural language, the expressions of erotetic logic cannot possibly be translated into ordinary questions. The reconstructions made within the logical framework ought not to be overly limited and need to encompass all those questions in a natural language which are appropriately formed and posed in earnest.

The easiest way to make the interrogatives of erotetic logic easily translatable into questions of a natural language and *vice versa*, is to substitute the typically used expressions with symbols and assume that in so doing we also determine the syntactic structure of interrogatives. However, such a method would simply be childish. Firstly, questions with identical meaning may make use of dissimilar expressions and have a diverse form in different ethnic languages. A literal translation of interrogatives occurring in natural languages would, at best, lead to the creation of as many different systems of erotetic logic, as there are natural languages. Moreover, such a simple method of ensuring translatability of colloquial questions into interrogatives of erotetic logic gives us no clue as to how to characterise the terms occurring in the model of erotetic logic in accordance with the requirements of the logic of terminology.

A more effective and frequently used method is, in fact, indirect. It involves seeking paraphrases of the analysed expressions, in this case — interrogatives. The paraphrases also ought to belong to a natural language, but contain only expressions which already have an acknowledged translation into logical terminology. It is therefore assumed that such paraphrases reveal the so-called logical structure of the analysed expressions. If all the expressions used in such paraphrases already have a known translation into a system of formal logic, we can surmise that there are no terms unique for erotetic logic. However, if colloquial language includes questions that do not have a translation into any known language of formal logic, it has to be assumed that specific terms of erotetic logic do exist. These unique terms would then have to be determined by axiomatic methods or using a set of appropriate rules.

When using the method of paraphrasing and translating, it is important to ascertain whether the suggested paraphrase of the analysed expression, i.e. its substitute, can indeed be perceived as its equivalent. To do this, one has to determine whether the substitute may be used interchangeably with the original utterance, also referred to as the analysandum. If there is no substitute that can take the place of the analysandum in all contexts, but there are ones that can be used in some situations, the aim of the scholar is to ascertain in what conditions this may be done, and to formulate conditional or relativised definitions. The basis for determining whether two expressions are interchangeable or not usually comes from our linguistic intuition.

The subjective nature of linguistic intuition and the related arbitrariness do not add to the precision of any research, yet at the stage of discussing the properties of a natural language they are inevitable. To some extent, this method is more exact than it can be surmised at first glance. We need to communicate by means of language in matters which are often very subtle; this makes our linguistic intuition very precise, more so than any terminological equipment we use in our attempts to describe the properties of natural languages. It must be noted, however, that the results of various research projects based on linguistic intuition differ significantly. Some of these nonconformities arise from the fact that the search for exact paraphrases may be discontinued at any point: one might be satisfied with finding one paraphrase or seek paraphrases for some expressions included in the first paraphrase. Further still, one may investigate the possible paraphrases of the expression used in the substitutes of the second degree. In a nutshell, the discrepancies between different studies arise because these analyses have a varying degree of precision.

An even more significant source of arbitrariness may be found in the lack of exact, consciously used criteria of substitution. It is sometimes assumed that two expressions are interchangeable, if using one instead of another does not lead to any changes in the logical value of the context in which the substitution was made. In other frameworks it is the context that ought not to alter the meaning. Others still look at whether the original message and the paraphrase have the same effect on the recipient, etc. A precise definition of these criteria involves determining the meaning. It is therefore understandable that specifying the criteria for interchangeability is of utmost importance. It is equally apparent, however, that this is no easy task. Presenting a full specification of all criteria of substitution and equivalence would not be possible in the course of a single article, yet the

author shall endeavour to achieve maximum clarity of the argument.

3. SUGGESTED METHODS OF PARAPHRASING QUESTIONS

The paraphrases proposed by various authors are surprisingly diverse; at first glance the methods used may even be considered utterly groundless. In the following section the author shall attempt to explain the reasons behind these discrepancies.

A. If we take into consideration only those questions which are asked in earnest, we may assume that a recipient hearing such a question receives at least three pieces of information:

(a) the inquirer knows something;

(b) the inquirer does not know something else;

(c) the inquirer wishes to know something.

In the case of the question: *Who was the discoverer of America?* the recipient learns that the inquirer:

(a') knows that someone discovered America;

(b') does not know that the discoverer's name was Columbus;

(c') wishes to know the name of the discoverer of America.

B. Upon hearing the question, the recipient is given some information. It is not clear, however, how much of this information ought to be included in a proper paraphrase of the question.

It seems that the differences between various methods of paraphrasing advocated by different scholars are caused by three primary factors. Firstly, authors choose to paraphrase different types of utterances. Some decided to paraphrase only questions, whereas others included verbal expressions of all the information conveyed by the original question. Naturally, such substitutes would have to be different from those designed to paraphrase questions only. Some of the additional information received by the listener is not incorporated in the question as such, but inferred on the basis of the context and the communicative situation. In the present section, we shall focus on paraphrasing only the questions, disregarding their situational context. The analysis of the context and the communicative situation shall be presented later, as we shall determine the rules of using questions.

The second reason for the existence of so many dissimilarities between the methods of paraphrasing lies in the fact that some authors wanted to paraphrase the information that the inquirer already had, whereas others focused on paraphrasing the information the speaker lacked. Others still emphasised the pieces of information which the inquirer wished to obtain.

There were also scholars who wished to include more than one type of information in their paraphrases (what the inquirer knows and what knowledge they lack, or what they do not know and want to find out). The large number of dissimilar approaches may explain the variety of proposed methods.

Finally, the authors interested in interrogatives disagreed on the issue of the evaluation of expressions which could act as paraphrases. It has already been mentioned that paraphrases need to be more understandable than the analysanda. In other words, a given paraphrase ought to have a recognised translation into a well-known system of logic, or at least give us some reason to believe that it would be easier to translate into such a language than the analysandum itself. Some authors claim that the best paraphrases are constructed as affirmative sentences containing only extensional functors. Such sentences can be translated into languages of classical systems of logic. Other scholars consider it sufficient to use modal expressions; modal systems of logic are very elaborate. According to other authors, it is possible to paraphrase questions with utterances that contain expressions of probability. There are scholars who paraphrase interrogatives using terms such as 'knows' and 'does not know'. Translations of such paraphrases may only be found in epistemic logic. Finally, there are scholars who prefer to use expressions such as 'it ought to be indicated', 'please indicate', 'please determine', etc. Such paraphrases can be translated only into languages of the logical systems of norms, wishes and commands.

C. The preferences for one kind of term or another are related to the choice of the subject of paraphrasing: it can be defined as the utterances (a) encompassing the knowledge of the inquirer, (b) expressing the inquirer's lack of knowledge or (c) revealing the inquirer's wish to know something. Scholars focusing on type (a) utterances, such as Harrah (1963) and Stahl (1962), use paraphrases which can be translated into the language of classical logic. Authors who prefer type (b) are ready to accept translations into systems of modal logic, languages of the theory of probability, or languages of epistemic logic.

According to the latter group of scholars, the lack of knowledge is expressed by utterances such as 'maybe' or 'probably', or simply by 'I don't know'. This explains why the reconstructions of questions ought to be found in the theory of probability or in systems of modal logic. A 19th-century logician, Friedrich Calker, presents a modal interpretation of interrogatives.[1] Given Sigwart's views, it may be assumed that he would advocate translating

[1] According to Bernard Bolzano (1929, vol. 2: 74) this is what Calker postulates in his work entitled *Logic*, & 98. Cf. Fries 1837: 118.

questions into the language of the calculus of probability. In his opinion an interrogative is nothing but a hypothesis, i.e. an utterance of the 'probably *p*' type (Sigwart 1924, vol. 1: 238-239, 251; vol. 2: 307). Those logicians who claim that translations of interrogatives ought to focus on the wish to obtain information tend to interpret questions on the basis of the logic of imperatives. The advocates of such an approach include Friedrich Jodl (1916: 345) and R. M. Hare (1949: 21). Åqvist may also be counted among them (Åqvist 1965, esp.: 56-60, 85-89, 96, 101), as he looked at interrogatives in terms of epistemic logic — though this logical system also contains terms determining obligation. Most commonly, questions are considered to be manifestations of wishes. Such is the view of Bernard Bolzano (1929, vol. 1: 88; vol. 2: 71-73). The latter approaches may be presented within the framework of optative logic.[2]

What is more, there are scholars who believe interrogatives to be a specific type of utterances which cannot be brought down to any of the previously mentioned linguistic forms. They claim that questions ought to include unique terms of erotetic logic. This approach was represented by Kazimierz Ajdukiewicz (1958: 278, 286), Tadeusz Kubiński (1958; 1959; 1966a; 1966b; 1967) and Nuel Belnap (1963).

The abovementioned approaches to paraphrasing interrogatives and to their meaning and structure differ in their level of complexity. Detailed conceptual frameworks may be found in the works of Kubiński, Stahl, Harrah, Belnap and Åqvist. The findings of this latter scholar were broadly discussed by Kubiński (Kubiński 1966c; 1971; Åqvist1969), therefore there is no need to review them in the present article. The ideas of the pioneers of logic are overly general and do not add anything to the issues discussed in the present section.

4. THE BASIS FOR EVALUATING SUBSTITUTES OF INTERROGATIVES

A. Paraphrases need to be as close in meaning to the analysanda (in this case: to questions) as possible. Particular care ought to be taken to ensure that the relations between paraphrases of various questions are analogous to those between the corresponding interrogatives. This would attest to the similarity of meaning and to the fact that the rules governing

[2]Rescher presents a chart comparing different types of modality (cf. Rescher 1968). According to this chart the qualities of wishes ought to be translated into a separate system of optative logic.

paraphrases resemble the laws used to form questions. One of the most important associations between expressions is the relation of substitution, as it reveals the equivalence or similarity of the two utterances. If the substitutes of questions, i.e. the potential paraphrases, are in the same relation between one another as the original interrogatives, these substitutes may probably be treated as suitable paraphrases. If this is not so, one or more of the substitutes may not be an actual paraphrase for the given interrogative. The present article shall only focus on ascertaining whether the potential substitutes may be as interchangeable as the corresponding interrogatives.

The line of argument described above may be summarised by the following:

(1) x is a paraphrase of $y \cdot x'$ is a paraphrase of $y' \cdot x$ is interchangeable with x' with regard to $W \rightarrow\ y$ is interchangeable with y' with regard to W.

The same theorem may also be presented in a different way, better suited for verifying the accuracy of substitutes:

(2) x is interchangeable with x' with regard to $W \cdot \sim$ (y is interchangeable with y' with regard to W) $\rightarrow\ $ ($\sim x$ is a paraphrase of $y. \vee \sim x'$ is a paraphrase of y')

The expressions may be interchangeable with regard to various qualities. Most commonly the aim is not to change the logical value of the context in which the substitution was made. More generally, the quality in question is often the so-called extension (Carnap 1947, mainly 26-32), or sometimes intension or the meaning of the context of substitution, defined in one way or another. The issue of qualities with regard to which questions may be considered interchangeable shall be discussed in a separate section.

B. If we assume that x and x' from theorem (2) are possible substitutes of questions, whereas y and y' are interrogatives, and ascertain that y and y' are not interchangeable in some respect while, in the same situation, x and x' are, in fact, substitutable, we may claim that at least one of the substitutes is not suitable for a paraphrase. In some cases it may even be justified to say that none of the substitutes are paraphrases. This happens if both the substitutes and the original interrogatives differ with regard to one and the same expression. Let us illustrate this with the following example: We may assume that the sentence x: *John beat Peter* is a paraphrase of the sentence y: *John physically abused Peter*. The sentence x': *John beat Jack*

differs from x only with regard to one expression, namely '*Jack*'. The same is true for sentences y and y': *John physically abused Jack*. On this basis we may assume that y is a paraphrase of y'. If we generalise the above example, we arrive at the following theorem:

(3) x is a paraphrase of $y \cdot$ the only difference between x and x' is the expression $z \cdot$ the only difference between y and y' is expression $z \rightarrow x'$ is a paraphrase of y'.

Now, consider the following situation: If, instead of the word *Peter* we complete the sentence with the expression *the record*, we produce: *John beat the record*. On the basis of theorem (3), the claim that *John beat Peter* is a paraphrase of *John physically abused Peter* and the fact that the sentences *John beat the record* and *John beat Peter* differ only with regard to a single word (*the record/Peter*), it ought to be assumed that the sentence *John beat the record* is a paraphrase of the utterance *John physically abused the record*. This conclusion is obviously false, even though the premises leading to it certainly seem correct. The reason for the problem lies in the fact that the word *beat* has more than one meaning. The meaning changes if it is juxtaposed with the expression *the record*. Thus, the theorem (3) may only be true if neither the analysanda nor the paraphrases contain any polysemantic elements. In the present article we shall avoid using polysemantic terms, yet, if such words do appear and are deemed significant for our research, their ambiguity may be tested by means of theorem (3). Thus, the mentioned theorem ought not to be rejected — it shall have its use in the following analyses.

A combination of (3) and (2) reveals, under what circumstances none of the substitutes may be considered appropriate paraphrases

(4) x is interchangeable with x' with regard to $W \cdot y$ is not interchangeable with y' with regard to $W \cdot$ the only difference between x and x' is the expression $z \cdot$ the only difference between y and y' is the expression $z \cdot x$ is not a paraphrase of $y \cdot x'$ is not a paraphrase of y'[3]

[3] *Proof:*
$(p \cdot q \cdot r \rightarrow s) \cdot (p \cdot t \cdot u \rightarrow q) \cdot (q \cdot t \cdot u \rightarrow p) \rightarrow [\mathrm{r} \cdot \sim s \cdot t \cdot u \rightarrow (\sim p \cdot \sim q)]$.
p/x is a paraphrase of y, $q/x'$is a paraphrase of y', r/x is interchangeable with regard to W z x', s/y is interchangeable with regard to W z y', t/x differs from x' only in the expression z, u/y differs from y' only in the expression z. Separation on the basis of (1), (3) and (3) x/x', y/y'.

C. Our evaluation of substitutes of interrogatives shall be based on one further principle. If we are looking at an utterance which is equivalent to a sentence in its logical sense, the utterance must also be a sentence in this sense. This claim is undoubtedly true, *ergo* if one of these sentences may have a negated form, it must also be possible for the other. We assume that if the paraphrase has a possible negation, the original sentence can also be negated. This line of argument may be summarised by the following formula (which uses Quine's quasi-quotation marks):

(5) x is a paraphrase of $y \cdot \Sigma z(z = \ulcorner\sim x\urcorner) \rightarrow \Sigma z'\ (z' = \ulcorner\sim y\urcorner)$

5. THE INTERCHANGEABILITY OF INTERROGATIVES

A. In order to ascertain whether a suggested substitute is in fact a paraphrase of a given interrogative, we need to employ theorem (4) described above. It is also necessary to specify in what situations the original question may be substituted with the paraphrase. Let us first consider the following interrogatives:

(1) *Did Columbus discover America?*

(2) *Did Columbus discover the continent west of Europe?*

(3) *Did Columbus discover the continent he discovered?*

It seems that question (3) cannot be posed in earnest, even though there are people who do not know whether Columbus discovered America. The answer to question (3) is already known, thus it may only be asked rhetorically. Question (1), however, may be asked in earnest. In other words, (1) and (2) may not be used interchangeably with (3). Interrogatives (1) and (2) are interchangeable for those individuals who know that America is the continent west of Europe. In case on an inquirer who does not possess this knowledge, questions (1) and (2) will be as unsubstitutable as:

(4) *Did Columbus discover America?*

(5) *Did Columbus discover Madagascar?*

Therefore, questions (1) and (2) are interchangeable if the inquirer either knows the answer to both or to neither. This conclusion may be expressed as the following: If the inquirer knows the answer to the first question, he or she must also know the answer to the second. Thus, if p and q are the answers to questions y and y' respectively, then y and y' are interchangeable if:

(6) The inquirer thinks: I do not know (I doubt) whether p = I do not know (I doubt) whether q.

This formula was based on examples of open questions, but it also applies to probe questions.

B. It is now relatively clear which interrogatives may be used interchangeably and under what circumstances is this allowed. A more detailed analysis of this issue is not yet needed. What is more, such an analysis would be impossible to conduct, as it would force us to define both the answers and the questions in much detail. However, we ought to consider the issue of non-interchangeability of interrogatives. Questions (1) and (2) determine answers which are empirically equivalent, and yet these interrogatives may not be used interchangeably. The fact that $p \equiv q$ does not imply that not knowing whether p is tantamount to not knowing whether q. I may not, for example, know the law of the simple destructive dilemma, but instead be familiar with the law of excluded middle, even though these principles are equivalent. This means that interrogatives are not interchangeable on the basis of their equivalence.

The same is true in the case of logical equivalence. Sentences "$2 = 2$" and "$2 = \sqrt[8]{256}$" are logically equivalent, but questions:

(1) Does $2 = 2$?

(2) Does $2 = \sqrt[8]{256}$?

May not be used interchangeably. The first one is practically never asked, whereas in most circumstances the second may be assumed to be earnest. It is so because everybody is likely to know that $2 = 2$, while the number of people aware that $\sqrt[8]{256} = 2$ is significantly smaller. Most language users will not, therefore, claim that not knowing whether $2 = 2$ is equivalent to not knowing whether $2 = \sqrt[8]{\ } 256$. In other words, the logical equivalence of sentences x and x' does not mean that not knowing value x is tantamount to not knowing value x'. This implies that interrogatives may not be interchangeable on the basis of their logical equivalence. Even in the case of utterances equivalent on the basis of a definition, e.g. *John is playing with a whip* and *John is playing with a lash* (and we assume that *whip* = *lash*) questions:

(3) *Is John playing with a whip?*

(4) *Is John playing with a lash?*

Are not equivalent, because the inquirer may not know the definition. In this case, the inquirer's not knowing the logical value of the sentence *John is playing with a whip* does not have to imply not knowing the logical value of the sentence *John is playing with a lash*. To generalise: the equivalence of two sentences based on their definitional equivalence does not imply that not knowing the answer to one of the questions is tantamount to not knowing

the answer to the other. Thus, questions are not interchangeable on the basis of definitional equivalence of the sentences.

The same is true with regard to probe questions. The interrogatives:

(5) *Who discovered America?*

(6) *Who discovered the continent west of Europe?*

May only be interchangeable for an inquirer who does not know the answer to (5) and considers not knowing the logical value of the answer to (6) equivalent to not knowing the answer to (5). If the inquirer knows that it was Columbus who discovered the continent west of Europe, but did not know that it was America, then questions (5) and (6) would not be used interchangeably.

The above conclusion lead to a hypothesis that shall constitute the basis for our further analysis: interrogatives y and y' may only be interchangeable if the inquirer considers that not knowing the answer to y is the equivalent to not knowing the answer to y'.

The provisions for question interchangeability specifically included the inquirer and their lack of knowledge. This involves a level of subjectivity. In the logical system of reconstructing interrogatives, the development of which is the aim of the present analysis, there shall be no mention of the inquirer's lack of information, in order to avoid any subjectivism. The reconstruction of questions shall be constructed within the framework of pragmatics, the basis for the previous analyses. As it has already been mentioned, the logical form of the interrogatives must be as close as possible to the actual method of using questions. However, this factual use may only be described if we include the inquirer. If interrogatives are interchangeable on the basis of the relation towards the inquirer's lack of knowledge, then the same ought to be true for paraphrases and reconstructions. The only problem is finding a way to eliminate the inquirer from the reconstruction while keeping the basis for interchangeability that take the inquirer into account.

The information the inquirer lacks may for example be presented as a set of theorems which are known but not yet acknowledged before a given moment or — which is easier to express in terms of logic — before a given stage in a logical proof. It is possible to completely eliminate the inquirer as a factor if one treats the lacking information as a set of theorems which are written down but not proven beyond a certain point. Such an approach invalidates the subjectivism related to ascertaining the range of the inquirer's lack of knowledge, while keeping the interchangeability of questions similar to that observable in colloquial language.

The range of the lack of knowledge does not need to be specified at

this point. It is sufficient to define the most crucial elements necessary for determining whether the reconstructions of questions contain any terms which cannot be defined within other systems of logic.

The above analysis introduces the concept of an answer to a question and is to a great extent based on this very idea. However, since the concept of an answer has not been clearly defined, the following line of argument is purely intuitive. This course of action seems inevitable. We first base our conclusions on intuition and arrive at first specifications. The conclusions then form the basis for defining the intuition that has brought us to the first specifications. This order of consideration allows us to avoid unjustified assumptions. In this case the intuitive concept of an answer for a question helps us to specify the concept of a question or, to be more precise, to specify the terms a question is composed of. When the concept of an interrogative has been sufficiently defined, it will be possible to characterise the idea of an answer. Despite all appearances, this method is not a vicious circle.

6. EVALUATION OF THE SUGGESTED SUBSTITUTES OF INTERROGATIVES

Harrah (1963: 32, 33, def. 7.2, 7.5, 7.7) divides interrogatives into 'disjunctive questions' and 'which questions'. The former type includes questions such as: *Is Columbus the discoverer of America?*; *Is Magellan the discoverer of America?*; *Is Amerigo Vespucci the discoverer of America?* Examples of the latter type include the following question: *Who is the discoverer of America?*

A. According to Harrah, disjunctive questions are paraphrased with alternatives of the following conjunctions. Assuming that the alternative question includes sentences $p_1, \ldots, p_n$, the conjunctions would be as follows:

$$
\begin{aligned}
& p_1 \cdot \ldots \cdot \sim p_{i-1} \cdot p_i \cdot \sim p_{i+1} \cdot \ldots \cdot \sim p_n \\
\sim\ & p_1 \cdot \ldots \cdot p_{i-1} \cdot \sim p_i \cdot \sim p_{i+1} \cdot \ldots \cdot \sim p_n \\
\sim\ & p_1 \cdot \ldots \cdot \sim p_{i-1} \cdot p_i \cdot \sim p_{i+1} \cdot \ldots \cdot \sim p_n \\
\sim\ & p_1 \cdot \ldots \cdot \sim p_{i-1} \cdot \sim p_i \cdot p_{i+1} \cdot \ldots \cdot \sim p_n \\
\sim\ & p_1 \cdot \ldots \cdot \sim p_{i-1} \cdot \sim p_i \cdot \sim p_{i+1} \cdot \ldots \cdot p_n
\end{aligned}
$$

If the disjunctive interrogative is simply a closed question, e.g.

(1) *Did Columbus discover America?*

and we assume the correct form of this interrogative to be:

(1') *Did Columbus discover America? or did Columbus not discover America?*

then, according to Harrah, the paraphrase of (1) ought to look like this:

(2) $\sim$ *Columbus is the discoverer of America* $\cdot \sim$ *Columbus is the discoverer of America* $\vee$ *Columbus is the discoverer of America* $\cdot \sim \sim$ *Columbus is the discoverer of America.*

which is equivalent to:

(3) *Columbus is the discoverer of America* $\vee \sim$ *Columbus is the discoverer of America.*

In Harrah's view, 'which' questions are paraphrased by existential questions, e.g. the interrogative:

(4) *Who discovered America?*

may be paraphrased with the sentence:

(5) *Somebody discovered America.*

Let us now apply the rules specified in § 4 to consider whether the substitutes of interrogatives suggested by Harrah are indeed paraphrases of questions. In other words, we shall determine whether Harrah's formal framework is applicable to questions.

According to Harrah's suggestions the interrogative:

(6) *Is the morning star the evening star?*

may be paraphrased by the following sentence:

(7) *The morning star is the evening star.* Or *The morning star is not the evening star.*

Due to empirically defined equivalence:

(8)*the morning star = the evening star*

it must be assumed that (7) is equivalent to the sentence:

(9) *The morning star is the morning star.* or *The morning star is not the morning star.*

In extensional contexts it is possible to use (7) and (9) interchangeably, without changing the logical value of the utterance. However, if we consider the closed question which ought to be equivalent to (9) in Harrah's terms, i.e.:

(10) *Is the morning star the morning star?*

We realise that (6) may not be used interchangeably with (10). No language user is likely to ask question (10), as the answer is already apparent. However, many people may pose question (6) in earnest. With regards to these inquirers, not knowing the answer to (6) would not be tantamount to not knowing the answer to (10).

It should be pointed out that (7) and (9) are interchangeable only on the basis of their logical value. What is more, the only difference between these two interrogatives lies in the terms '*evening star*' and '*morning star*'.

Similarly, question (10) differs from (6) only in the fact that in the latter the term '*evening star*' has been replaced with '*morning star*'. All conditions specified in theorem (4) from paragraph 4 are met. We may, therefore claim that (7) is not a paraphrase of question (6) and (9) is not a paraphrase of question (10). Thus, Harrah's framework seems inadequate. The laws and principles of interchangeability of questions, described in his erotetic system, diverge considerably from actual linguistic practices.

What was said about Harrah's method of paraphrasing is also true for all attempts at creating a system of erotetic logic in which the paraphrases of interrogatives are interchangeable on the basis of their logical value alone.

B. Let us consider the following questions:

(1) *Does 2 = 2?*

(2) *Does 2 =* $^{8}\sqrt{256}$*?*

We may assume that these interrogatives can be paraphrased with modal sentences:

(3) *Maybe* $2 = 2$

(4) *Maybe* $2 = {}^{8}\sqrt{256}$

As we know, '$2 = 2$' is logically equivalent to '$2 = {}^{8}\sqrt{256}$'. According to Carnap (1947: 177, theorem 39-7), such sentences may be used interchangeably in modal contexts, which would include (3) and (4) if the contextual intension remains unchanged. What is more, theorems (3) and (4) have the same intension, and thus may be substituted one for the other. The only difference between sentences (3) and (4) and interrogatives (1) and (2) is the appearance of the expression '$^{8}\sqrt{256}$'. Since (1) and (2) are not interchangeable on the basis of their intension, once again the conditions specified in the predecessor for theorem (4) from paragraph 4 are met. This means that (3) and (4) cannot be considered paraphrases of (1) and (2). Carnap's model of interpreting questions is equally inadequate — interrogatives cannot be described in the language of modal logic.

As with the previous examples, the conclusions pertaining to specific substitutes may be generalised to include all paraphrases and reconstructions of interrogatives which use sentences that are interchangeable on the basis of their intension.

C. Let us assume that the definition:

(1) *A human is a creature capable of laughter*

is true and that there is a certain person x who does not know this definition and is not aware of the fact that laughter may be considered a defining characteristic of a human being. In such circumstances person x will not regard the following questions as equivalent:

(1) *Is a human a creature capable of laughter?*

(3) *Is a human a human?*

All conceivable substitutes for questions (2) and (3) that may be interchangeable on the basis of the terms used will not be accurate paraphrases of the interrogatives (2) or (3). This conclusion is reached through the same line of argument which was used in the previous two examples.

D. Are there any substitutes for interrogatives which would not meet the conditions specified in paragraph 4? Finding them does not appear to be difficult, if one realises that earnest questions are asked if the inquirer does not know something, has some doubts or wishes to acquire some information. The interrogatives:

(1) *Did Columbus discover America?*

(2) *Did Columbus discover what he discovered?*

May be substituted e.g. with the following sentences that do not fall into the trap described in paragraph 4:

(3) *I do not know that Columbus discovered America.*

(4) *I do not know that Columbus discovered what he discovered.*

Interrogatives (1) and (2) are not interchangeable, because no language user is likely to pose question (2). Likewise, (3) and (4) are not interchangeable, as nobody would say they do not know that Columbus discovered what he discovered.

Let us assume that set X comprises sentences recognised as plausible or proven within a certain system up to the n^{th}stage of the logical proof. We must also assume that sentences considered obvious (let us imagine that there is a scientific method for ascertaining which sentences are self-evident) are counted among the axioms of the system, and therefore are recognised as true at every stage of the logical proof. Under these preliminary conditions (1) and (2) may be substituted with the following:

(5) $\sim$ *"Columbus discovered America"* ϵ X

(6) $\sim$ *"Columbus discovered what he discovered"* ϵ X

(5) and (6) cannot be used interchangeably, because their value is different. (6) is false, since according to our preliminary assumptions the sentence *Columbus discovered what he discovered* belongs to the set X.

The same applies to the following utterances:

(7) *I wish to know that Columbus discovered America* or that *Columbus did not discover America.*

(8) *I wish to know that Columbus discovered what he discovered* or that *Columbus did not discover what he discovered.*

(9) The sentence *Columbus discovered America* should be included into the set X or the sentence *Columbus did not discover America* should be included into the set X.

(10) The sentence *Columbus discovered what he discovered* should be included into the set X or the sentence *Columbus did not discover what he discovered* should be included into the set X.

The substitutes suggested here have a certain flaw — they may be negated. It is e.g. possible to say: *it is not true that I do not know that Columbus discovered America*; the sentence *Columbus discovered America* or *Columbus did not discover America* should not be included into the set X. However, the negation of interrogatives, or at least the kind of negation observable in the mentioned examples, is difficult to notice. The substitutes presented in this paragraph do not meet the conditions specified in theorem (5) from paragraph 4, which suggests that these utterances are neither declaratives nor imperatives, nor sentences expressing norms or wishes. This fact may have escaped the attention of some logicians, yet it was generally acknowledged. Since the conditions of the mentioned theorem (5) are not met, the final substitutes cannot be considered accurate paraphrases for interrogatives.

We have gradually arrived at the conclusion that sentences expressing the extent of the inquirer's knowledge, the inquirer's lack of knowledge or the inquirer's wish to obtain information are equally unsuitable in acting as paraphrases. This means that it is impossible to paraphrase questions in those systems of logic that enable such sentences to be reconstructed. Interrogatives may not be translated into the language of classical, modal, epistemic, deontic or optative logic. It must therefore be assumed that erotetic logic needs to include terms that are not found in any other logical system — i.e. terms unique and specific to this logic. This conclusion confirms that Kubiński and Belnap were correct in their assumptions. It becomes apparent that the desire to create a simple method of reconstruction can lead to serious mistakes.

The number of these unique terms of erotetic logic is a matter that requires further research, together with the issue of characterising them (or it, if there is only one specific term) in a manner that would enable the new system of erotetic logic to be interpretable into questions of natural language.

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DAVID HUME'S EMPIRISTIC THEORY OF JUDGMENT

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1. THE PUZZLE OF BELIEF

"(. . .) belief is a lively idea produced by a relation to a present impression (. . .) This operation of the mind, which forms the belief of any matter of fact, seems hitherto to have been one of the greatest mysteries of philosophy; though no one has so much as suspected, that there was any difficulty in explaining it. For my part I must own, that I find a considerable difficulty in the case; and that even when I think I understand the subject perfectly, I am at a loss for terms to express my meaning." (Hume 1951: 99)

The most puzzling problems are not those which seem to have no answer at all, but rather ones that produce many answers, each seeming equally legitimate. For all they are, those *aporias* continue to puzzle subsequent generations of philosophers. For Hume, one such puzzle arose with beliefs because, as far as his radical empiricism is concerned, they give rise to peculiar confusion.

Radical empiricism proposes that there is no cognition beyond cognition through senses. One particularly straightforward version of radical empiricism is physicalism. It advances the view that states of the cognizing subject can be exhaustively explained by the laws of optics, acoustics, mechanics, or physiology, with the latter further broken down into the vocabulary of chemistry and physics. This idea of copying, or mapping, can be then phrased in the language of physics and causation — for example, chemical changes of the retina are prompted by light stimuli, electro-chemical changes in the optic nerve are triggered by the impulses sent by the retina,

etc. We can then say that retina maps certain configuration of light stimuli to arrange specific patterns of signals transferred by nerves.[1] Hume was no physicalist, and couldn't be, given the state of natural sciences at the time, but he moved as close as possible to what would eventually crystallize as such. He treated mind states as biological states, even if he never proposed to break down complex (biological) states into simpler states describable in the language of physics and chemistry. This reductionism, prominently featuring in positivist thought, is also present in Comte, eventually culminating in Carnap's physicalism.

Radical empiricism itself, driven by its insatiable hunger for dissolving philosophical mysteries, gives birth to at least three ideas, namely theoretical concepts, cognition errors, and probability. If each concept maps a particular state of things in the physical environment of the subject, then what is mapped by abstract or theoretical concepts like strength, electromagnetic field, biological immunity, social bond, suppression of libido, etc.? The extreme positivist will seek to exorcise these elusive phantoms from science, while the more flexible positivist will resort to responses along the lines of Carnap's reductionistic theories, Peirce's pragmatism, or Bridgman's operationism. Hume was lucky that the problems emerging from theoretical concepts were not yet within sight. Nonetheless, it would be rather reductionists more than hardline empiricists who would find inspiration in Hume, for instance in his suggestion to investigate which impression is the source of the concept that eludes our understanding. Its link with sense impression, says Hume, makes the concept meaningful, but he never specifies how far this linking can go, thus paving the way for interpretation along reductionistic lines. If contemporary reductionism is right, the mystery of theoretical concepts can be solved with the tools of empiricism. However, the mystery itself didn't exist at the time of Hume. Vaguely aware of the problems lurking on the horizon, he could have perceived it as some sort of mystery.

If we perceive the cognizing subject as passive material exposed to external physical stimuli, errors in sense cognition are equally difficult to explain. Certainty of such cognition would match certainty found in the laws of nature, where each cause always has the same effect — so the same stimulus would always prompt the same reaction in the cognizing subject. If something is reflected in the mirror, it must also reflect on the retina, if the acoustic wave must cause the tuning fork to vibrate, it must also

[1] I attempt to give a precise account of this perception in Marciszewski 1963.

affect the eardrum. An attempt to dodge the problem by drawing analogies with the malfunctioning instrument can be only partially successful. It may explain the perception of a colour-blind or hard-of-hearing individual, but it fails to deliver when it comes to explaining why two people with perfect eyesight and hearing can give two entirely different accounts of the same situation. Thus, we are led to assume that data provided by senses are transformed further internally. But if we wished to say that each specific transformation leads to errors, we would disqualify many correct acts of perception. On the other hand, if we were to admit that such transformations are less harmful than useful, we would have to depart from radical empiricism because cognition would have to be redefined as something else than mere copying of the environment. Also, there would be hardly any place left for volition. In that sense, Hume undeniably had passivistic inclinations, as in his view belief "depends not on the will, nor can be commanded at pleasure. It must be excited by nature, like all other sentiments" (Hume 1977: 31) On this account, there's no place for choice between two hypothesis, each competing to become our belief. This epistemological determinism is woven into Hume's radical empiricism, and may lead some to the conclusion that errors in cognition simply don't exist, something which other authors, like Descartes, tried to eschew by implying that assertion is an act of free will (Marciszewski 1971). However, errors in cognition do exist and cannot be easily brushed aside. Hume himself, with his levelheaded skepticism, was particularly sensitive to human erroneousness, which is why reconciliation between natural determinism and errors in cognition amounts to a central theme of his philosophy.

Finally, a third belief-related mystery is probability. If judgment is a product of specific physical causes, what does it mean that judgment can be more or less probable? It would seem that there's only one alternative here, either this product exists, in which case someone judges something as such and such, or it doesn't exist, meaning that the judgment never occurs. It follows the path mapped out by the alternative, either something is reflected in the mirror, or it isn't. Thus, the second major challenge for Hume is to come up with the concept of probability so as to reconcile it with the naturalistic concept of judgment, conceived as an effect of causality imposed by the laws of nature.

Out of three difficulties ensuing from Hume's theory of judgment, two were minutely addressed by the man himself. I shall now present them in two parts that follow.

2. JUDGMENT AS AN IDEA FED BY IMPRESSION

Under the traditional judgment doctrine, advanced by Aristotle, Port-Royal logicians, and the likes of Jan Śniadecki, Alexius Meinong, or Kazimierz Twardowski, judgments are created by the joining and disjoining of concepts. A judging mind may err in cognition, as we're assured by the tradition, in which the voice of Aequinas discussing angelic intellect resonates with the Polish Enlightenment rationalist Jan Śniadecki. Let me quote the latter — the rather underexposed Polish philosopher, deserving, perhaps, of more appreciation at home, — where he discusses "various states of mind in regard to the truth:" "When, within the judgment and sentence joined and disjoined names are in accord with concepts, and concepts with things and phenomena, the result is truth (*veritas*), a product of reason and a goal pursued by reason in its workings. Where within the judgment and sentence joined and disjoined names are neither in accord with concepts nor phenomena, or disjoined are those which shouldn't be disjoined, this gives rise to falsehood (*falsitas*), which is opposite to truth" (Śniadecki 1958: 338). As things stand, truth and falsehood dwell in judgment, to use a past but illustrative turn of phrase, while concepts, or "the output," that being a product of another power - not power of judgment, but the power of intellect (*intellectus*) — are free from error. "But in the absolute consideration of the quiddity of a thing, and of those things which are known thereby, the intellect is never deceived," says Thomas Aquinas (Thomas Aquinas 1886, *Pars prima*, q. 85, a. 6). This infallibility of intellect was attributed to the fact that the concept is created when a proper object (*obiectum proprium*) exercises its influence on the mind; therefore, if there's a concept, there must be an object responsible for its creation. Judgment, in turn, is a result of a more independent activity of the mind, consisting in said junctions and disjunctions, which may ultimately prove to be inconsistent with the reality. Authors discussing judgments in this context meant probably general judgments which, methodologically speaking, are "synthetic judgments." This is because only in general judgments concepts are considered in their full scopes, and two independent concepts appear only in synthetic judgments.

If someone modified those assumptions to treat judgment as some sort of a concept, and accepted the premise that intellectual cognition must relate to *obiectum proprium*, he would be right to conclude that we cannot err in judgment. Precisely this idea was employed by Hume in his effort to escape skepticism: he defined judgment as an idea, understood as a concept that remains in certain relation to impression. Each impression is caused by external stimuli, which are real by necessity. Now, if the idea somehow stems from the impression, the idea itself must also be real.

This, in short, is Hume's strategy. For its comprehensive account, it is perhaps useful to quote the passage from Hume himself, where he elaborates on the meaning of terms "idea," and "impression."

"Here therefore we may divide all the perceptions of the mind into two classes or species, which are distinguished by their different degrees of force and vivacity. The less forcible and lively are commonly denominated THOUGHTS or IDEAS. The other species want a name in our language, and in most others; (...) Let us, therefore, use a little freedom, and call them Impressions; (...) By the term impression, then, I mean all our more lively perceptions, when we hear, or see, or feel, or love, or hate, or desire, or will. And impressions are distinguished from ideas, which are the less lively perceptions, of which we are conscious, when we reflect on any of those sensations or movements above mentioned" (Hume 1977: 10-11). Grouping feelings and impressions into one category will have far-reaching implications for the theory of beliefs as it helps explain the origin beliefs that are false. It is also quite intuitive due to the ambiguousness of such terms as "sensations" or "feelings," which can be easily applied to both sense impressions and various emotions.

Both concepts are introduced to clarify the nature of beliefs: "Thus my general position, that an opinion or belief is *nothing but a strong and lively idea derived from a present impression related to it*" (Hume 1951: 107).

This can be illustrated as follows. Seeing his fishing rod quiver, an angler is convinced he's caught a fish. Since he's not seeing the fish yet, it's not an impression, but an idea of the fish. The idea is nevertheless vivid and forceful thanks to the current impression of the quivering rod. Building on his experience, the angler associates this with the image of the fish writhing on a hook.

It is only the impression that can infuse the idea with such realness, it can never be derived from another idea, however strong the association between those two may ever be. Imagine an amateur angler midweek. Weary from paper-pushing, his thoughts drift towards his eagerly-awaited fishing trip. In his mind's eye, he sees and feels the quivering rod, which immediately evokes the image of a writhing fish. But however real this would feel, he'll never start bragging around about the size of his catch. This is because the image of the rod was not an impression, but an idea, and thus couldn't lend the vivacity and forcefulness required for the idea to become belief.

There are various kinds of impressions and relationships between impressions and ideas. Some lead to rational, while others to irrational, beliefs. Hume prided himself on exposing a universal mechanism behind the creation

of beliefs. If that was indeed the case, we would have to credit him with yet another success: delivery of criterion for rational beliefs. It can be roughly described in two points. First off, it's sense data, not feelings or passions, that shape our correct beliefs (for Hume, feelings that give "illegitimate" rise to strong beliefs include human inclination for mysteriousness which makes us believe in miracles). Second, relation between the object of the impression and the object of the idea must be of causative nature, thereby excluding temporal or spatial relations.[2] One example for correct, i.e. causative, relation is situation, where the current impression (the quivering rod) is caused by the object of the idea (the withering fish). The effect is then correctly inferred from the cause, while the impression of the effect lends realness to the idea of the probable cause. An incorrect relation occurs for Hume when a pilgrim, upon seeing holy lands, is emboldened in his belief that events recounted in the Scripture really took place. This is because the idea of those events is, in the given system of beliefs, associated with the idea of holy lands, and when the latter is enlivened with a vivid image of those grounds, its force and vividness are transposed to the idea of events themselves, strengthening faith that they indeed are real (Hume 1951: 112).

Having commented on the definition of belief, we may now proceed to compare the traditional concept of judgment with Hume's own approach to the matter, thus shedding new light on the criteria governing rationality of beliefs. Hume was acutely aware that his idea was a controversial novelty, as indicated by a polemic footnote in the *Treaty*, section "On the nature of the idea and belief:" "We may here take occasion to observe a very remarkable error, which being frequently inculcated in the schools, has become a kind of established maxim, and is universally received by all logicians. This error consists in the vulgar division of the acts of the understanding, into conception, judgment and reasoning, and in the definitions we give of them. Conception is defined to be the simple survey of one or more ideas: Judgment to be the separating or uniting of different ideas (. . .). But these distinctions and definitions are faulty in very considerable articles" (Hume 1951: 98). He goes on to argue against the traditional conception of judgment, saying that in the existential judgments, such as "God exists," junction or disjunction

[2]While Hume writes that „belief arises only from causation" (Hume 1951: 109-110), he also defines belief as an idea fuelled by impression. Some authors, like Passmore, accuse Hume of inconsistency, since said definition permits beliefs that have nothing to do with causation (e.g. beliefs induced by emotional manipulation). See Passmore 1952: 61-62. However, in the broader context (chapter 9 of the Treaty), causation appears to explain only rational beliefs, not all beliefs falling under said definition. It seems, therefore, that there is no inconsistency between the two.

of concepts does not take place. Hume may have not explicitly exposed the flaws of a traditionalist approach to the subject-predicate sentences, but the argument might as well be reconstructed from various examples provided in the *Treaty* and the *Inquiry*. Such examples always use singular statements, which often happen to be of a perceptual nature. The subject of such a statement is not a predicate, but some sort of a proper name or pronoun, which means that it is not expressing any concept at all. The only concept existing is represented by the predicate, which means that although we're dealing with a subject-predicate statement, it is not a result of the junction or disjunction of concepts. It is only general propositions that, categorized as synthetic propositions, fit the traditional definition of judgment, but these lie outside Hume's interest. It appears, then, that the traditional definition of judgment is too narrow. Nevertheless, unflagging support for this rather patent error doesn't seem so extraordinary given the persistence of even more obvious errors occurring in traditional definitions of induction and deduction (which apply to the notions of "specific" and "general"). Particularly the latter seems to have been misconceived from the very outset, as it is entirely at odds with practical deduction in mathematics. Nonetheless, it has survived for two thousand years, and continues to prosper in dictionaries and encyclopedias.

There's more to Hume's discovery than mere correction of some syntactical theory: it also leads to serious methodological implications. If judgment is not built by a junction of concepts, there's no chance of being in error while doing so. The same pertains to disjunction occurring in general negative propositions. Thus, if concepts are infallible, the same would have to be said of judgments that share their lack of complexity. Hume himself didn't draw this parallel, so using it to shed new light on Hume's thought would be entering grounds of comparative history rather than interpretation.

In scholastic doctrine, concepts are infallible by virtue of being a kind of natural sign. The latter is an irrefutable proof that a particular thing exists, signified via a causal link between the thing and the sign. Some contemporary authors prefer the term "token," or "index," thus associating sign with certain linguistic convention (these, perhaps more fortunate, terms express the same idea, but for historical reasons I shall continue using the term "natural sign"). Treating signs as things has a longstanding tradition, first founded by the immortal Artistotle and preserved for posterity by Porphyry and Boethius. In his commentary to Aritotle's *De Interpretatione,* taking Porphyry for witness, Boethius singles out three types of discourse, each corresponding with a separate type of sign, those being written, oral, and

mental signs. The doctrine inspired intellectual efforts throughout the Middle Ages and penetrated the theory of supposition and theory of signification. Also, combined with the theory of judgment, it became refined enough to the point of being capable of clarifying the difference between the judgment and the concept: concepts are natural signs of things, whereas judgments are effects of operations made on those signs (Bocheński 1961: 153-154, 167-168; Marciszewski 1971: 115-139).

This conception of sign may sit uneasily with interpretations preferred by some contemporary authors, it is therefore important to clarify differences and similarities occurring between those two. The main question that needs to be asked in this regard is whether one wishes to define the sign as a relation consisting of three or rather four elements. In the former, definiendum is structured as follows: x is a sign of a thing y for person z. In the latter: x is a sign of a thing y in a communication between u and z. It appears that the latter has the upper hand today, but the former can be by no means written off, as such is precisely definition of sign proposed by the esteemed author Max Black in Dagobert Runnes' *Dictionary of Philosophy* (let's just add that it's the only definition of sign found in the entire dictionary).[3]

This sign-relation is also of inferential nature, legitimising the conclusion that if there's a sign, there's also the signified, thus promising the existence of the signified object. So, if concept is understood as a sign of a certain thing, the thing itself must exist. If, concepts aside, one chose to treat judgments as signs of certain states of affairs, judgments would be infallible much in the manner of concepts. This would eliminate one source of possible error, namely incorrect composition or decomposition of concepts in judgments. This, of course, would not secure the absolute infallibility, but as such is also beyond the reach of concepts, or any other sign, because along with reliable signs there exist ostensible signs or fakes. According to scholastic doctrine, complex concepts may qualify as objectless signs; this is because they, similarly to propositions, result from the activity of the mind. This does not concern simple concepts, as their origin would be inexplicable if we were to assume that they aren't traces of reality lingering in the mind. For Hume, habits established by causation (following the formula discussed above) produce reliable judgments. Temporal or spatial links, or various passions enlivening the ideas, constitute insufficient title to represent the

[3]The definition goes: „Any event of character A whose occurrence is invariably accompanied by another event of character B may be said to be and index of that event. Any index which is recognized as being such may be said to function as a sign. Thus, as contrasted with 'index', the use of 'sign' presupposes a triadic relation."

reality.

3. PROBABILITY — A PROPERTY OF BELIEF WEAKENED BY INCOHERENCE WITH IMPRESSION

Readers of the *Treaty* may be surprised to discover that Hume splits probability into two varieties. Addressed in two separate sections titled "Of the probability of chances" and "Of the probability of causes," both have an exotic quality about them. Antony Flew sees that as a modern equivalent of difference between probability *a priori* and probability *a posteriori*, with the latter being empirical (Flew 1961: 106). His reading would be useful for handling Hume's idea provided both concepts are first given clear and precise meaning.

Hume's distinction relates to two types of knowledge. Pre-experience knowledge about a certain mechanism, say a dice throw, provides us with some basis to assess the probability of events. This is the probability of chances; it does not involve the actual throwing of a dice, being therefore probability *a priori*. The contingent result shouldn't create an impression that the causes here don't exist at all because — to quote Hume — "unless we allow, that there are some causes to make the dice fall, and preserve their form in their fall, and lie upon some one of their sides, we can form no calculation concerning the laws of hazard" (Hume 1951: 127-128). This isn't probability *a priori* found, for example, in Carnap's confirmation theory, where it's of purely linguistic character, and depends, among others, on the number of predicates in the given language.[4] As a consequence, what we would be inclined to call in Hume probability *a priori* is ultimately empirical. It's *a priori* only in relation to a series of observations that constitutes the basis for what we would now call probability *a posteriori*.

Hume is also strikingly consistent when he insists on explaining probability of chances in empirical and causative terms. The following passage serves well to illustrate this tendency: "the imagination passes from the cause, viz. the throwing of the dye, to the effect, viz. the turning up

[4]Carnap differentiates three probability-related meanings of "*a priori*" and "*a posteriori*." One of them appears to correspond with the distinction made by Hume, where probability *a priori* is defined as conditional probability of hypothesis assessed according to the empirical evidence to date, and probability *a posteriori* is relativized to conjunction of such evidence with results of the experiment or observation. Carnap himself preferred to use those terms differently; in his works, probability *a priori* is based exclusively on logical truths, while probability *a posteriori* is based on facts (Carnap 1951: 308).

one of the six sides; and feels a kind of impossibility both of stopping short in the way, and of forming any other idea. But (...) this principle (...) directs us to the whole six sides after such a manner as to divide its force equally among them." If a dice has the same figure on each of four sides, "it is evident, that the impulses belonging to all these sides must re-unite in that one figure, and become stronger and more forcible by the union." Here's one more example how chances are reduced to causes: "what the vulgar call chance is nothing but a secret and concealed cause" (Hume 1951: 131). This means that Hume's theory is concerned primarily with probability of causes, i.e. probability *a posteriori*, which he goes on to explore in greater detail. I shall follow suit and focus solely on this kind of probability.

Probability *a posteriori* is subjective, based on the objective probability of events, frequency and finite sets. On this account, subjective probability is attributed to singular propositions about events. Such judgments, however, need not be verbalised, they can be expectations or attitudes, something we can observe in animals.

This is Hume's theory of probability in a nutshell. It is an account of the relationship between subjective and objective probability is where it's most resilient. But although Hume repeatedly stressed that beliefs arise objectively, it didn't suffice to quench controversies surrounding his theory. The criticism included for example Reichenbach's objection that Hume failed to embrace the concept of objective probability: "Empiricists, including Hume, have repeatedly studied the nature of probability; but they came to the result that probability is of subjective nature and applies to opinion, or belief (...) Hume might have been led to the discovery of an objective meaning of probability had he studied the mathematics of probability" (Reichenbach 1957: 93-94).

Probable judgments considered by Hume always relate to the prediction of single events, therefore specific judgments take the shape of singular statements, or, as Popper calls them, formally singular probability statements (Popper 2002: 202). These look as follows: *There's an n-degree probability that this ship will sink while at sea; There's a k-degree probability that this citizen will win a lottery; There's an m-degree probability that 1st May will be sunny.* In Popper's nomenclature, "formally singular" is meant to show that although statements are singular in form, their content refers to statements about sets, namely about the frequency with which elements of one set appear in the other set, for example the occurrence of the elements of the set "missing ships" in the set called "ships on distant voyages." Subjective probability of the singular statement will increase with the observed frequency.

This shows how subjective probability depends on the objective probability, expressed by Hume in the following passages.

"It would be very happy for men in the conduct of their lives and actions, were the same objects always conjoined together, and, we had nothing to fear but the mistakes of our own judgment, without having any reason to apprehend the uncertainty of nature. But as it is frequently found, that one observation is contrary to another, and that causes and effects follow not in the same order, of which we have had experience, we are obliged to vary our reasoning on, account of this uncertainty, and take into consideration the contrariety of events." Here, Hume is acknowledging that objective probability does influence subjective probability, and proposes to treat the former as a statistical matter. He offers similar thought here: "When the conjunction of any two objects is frequent, without being entirely constant, the mind is determined to pass from one object to the other; but not with so entire a habit, as when the union is uninterrupted" (Hume 1951: 133-134).

"A wise man (...) weighs the opposite experiments: he considers which side is supported by the greater number of experiments: to that side he inclines, with doubt and hesitation; and when at last he fixes his judgment, the evidence exceeds not what we properly call probability. All probability, then, supposes an opposition of experiments and observations, where the one side is found to overbalance the other, and to produce a degree of evidence, proportioned to the superiority. A hundred instances or experiments on one side, and fifty on another, afford a doubtful expectation of any event; though a hundred uniform experiments, with only one that is contradictory, reasonably beget a pretty strong degree of assurance" (Hume 1977: 73-74).

Taking a cue from those passages, we shall now undertake an in-depth examination of thought processes that lead to probable judgments. One starts with a statement that a B-type fact is accompanied by a fact of A-type variety. The same is said of the fact number two, three, etc. But at the same time it is noted that certain A-type facts or objects are not of B-type variety. What we can say about the next A-type fact is that we can predict that it will be also of B-type variety with the same degree of probability that can be expressed by the relation between the number of A's being simultaneously B's to all A-type objects. Let's mark the observed A-type and B-type objects as A^* and B^*, respectively, and call them representations of classes A and B. We will now use these and other self-explanatory symbols to describe the process of arriving at probable beliefs:

$$(X_1 \in A) \,\&\, (X_1 \in B)$$

$$(X_2 \in A) \;\&\; (X_2 \in B)$$

$$\cdots\cdots\cdots\cdots\cdots$$

$$(X_k \in A) \;\&\; (X_k \in B)$$

$$(X_{k+1} \in A) \;\&\; (X_{k+1} \notin B)$$

$$(X_{k+2} \in A) \;\&\; (X_{k+2} \notin B)$$

$$\cdots\cdots\cdots\cdots\cdots$$

$$\underline{(X_{k+n} \in A) \;\&\; (X_{k+n} \notin B)}$$

$$(1)\ \mathrm{P}\ (X_{k+n+1} \in B) \,/\, (X_{k+n+1} \in A) = \frac{k}{k+n} = \frac{N\ (A^* \cdot B^*)}{N\ (A^*)}$$

Expression N (A^*) stands for the number of objects belonging to class A^*; N $(A^* \cdot B^*)$ stands for the number of objects belonging to the shared part of $A^*$and B^*.

Since Hume doesn't formulate definition of probability as shown in formula (1) (or in any other formula, for that matter), we shall treat (1) as valid until proved otherwise by other findings Hume has to offer on the subject of probability.

Definition (1), as we know, allows deducing, on the grounds of set theory and arithmetic, important laws of probability theory, such as law of addition, multiplication and division of probability, as well as the complement law:

$$(2)\ \mathrm{P}(q) = 1 - \mathrm{P}(\neg q)$$

The idea of such a law seems to be pervading in Hume's statement, that when a proof stands against a proof, the stronger has to prevail, but at the same time it loses the amount of its strength equivalent to the strength of the other proof; as well as in the subsequent: "to every probability there is an opposite possibility (...) Since therefore each part of the probability contributes to the production of the belief, each part of the possibility must have the same influence on the opposite side." This is promptly followed by the remark that "belief which we have of any event, encreases or diminishes according to the number of chances" (Hume 1951: 137). Since the increase of events speaking for q must inevitably lead to diminishing of $\neg q$ events,

it would mean that the higher probability of q the less $\neg q$ events there are. Precisely this correspondence is expressed by (2).

While discussing the projecting of past experiences on future events, Hume often speaks of "proportion." In the cited passage from the chapter where he discusses miracles, Hume writes about certainty that it is proportional to the advantages that some experiences have over others. The following quotes clarify this matter further: "When we transfer contrary experiments to the future, we can only repeat these contrary experiments with their particular proportions" (Hume 1951: 140). "If our intention, therefore, be to consider the proportions of contrary events in a great number of instances, the images presented by our past experience must remain in their first form, and preserve their first proportions" (Hume 1951: 135) Proportions invoked here nicely correspond with (1) when confronted with the following equation:

(3) $\frac{N\ (A^* \cdot B^*)}{N\ (A^*)} = \frac{N\ (A\ \cdot\ B)}{N\ (A)}$

The above formula reads that the relation between the observed cases and the total number of cases remains the same both in the sets that are representations and in the sets in which they are represented. Insofar as this sameness is secured, representation is adequate. The above quotes from Hume seem to suggest that speculation about probability of an event from B occurring in A is only legitimate as long as proportion, i.e. adequacy of representation, is secured.

In what way probability relates to beliefs? The answer is provided in passages, which — as the passage from the chapter discussing miracles — point to the advantage of positive experiences over negative ones. The greater the advantage, the stronger the belief, which originates when said advantage is of the smallest possible margin, i.e. when the probability exceeds 50 per cent. On these baseline conditions Hume writes as follows: "When the chances or experiments on one side amount to ten thousand, and on the other to ten thousand and one, the judgment gives the preference to the latter, upon account of that superiority" (Hume 1951: 140). This can be expressed in a short formula, where Axq will serve as a shorthand for *x believes that q*, while index x standing by P indicates a subjective probability of a person x:

(4) $\mathrm{A}xq = \mathrm{P}_x(q) > 1/2$

The above result (10001 : 20000) is produced when we put Hume's

numbers in (1).

According to Hume, positive cases outnumbering negative ones is not the only factor intensifying the power of belief. In the closing part of the section "Of the probability of causes," he introduces the third type of probability (different from probability *a priori* and *a posteriori*), namely probability "arising from analogy:" "Without some degree of resemblance, as well as union, it is impossible there can be any reasoning: but as this resemblance admits of many different degrees, the reasoning becomes proportionably more or less firm and certain. An experiment loses of its force, when transferred to instances, which are not exactly resembling; though it is evident it may still retain as much as may be the foundation of probability, as long as there is any resemblance remaining" (Hume 1951: 142). This is further illustrated by remarks made in the *Inquiry*, section "Of the reason of animals:" "nor does any man ever entertain a doubt, where he sees a piece of iron, that it will have weight and cohesion of parts; as in all other instances, which have ever fallen under his observation (...) The anatomical observations, formed upon one animal, are, by this species of reasoning, extended to all animals; and it is certain, that when the circulation of the blood, for instance, is clearly proved to have place in one creature, as a frog, or fish, it forms a strong presumption, that the same principle has place in all."

Interestingly, in the *Treaty*, Hume speaks of the third type of probability, differing it from probabilities *a priori* and *a posteriori* discussed above. As both boiled down to the frequency principle, we may ask whether this casually floated "third species" of probability somehow departs from the conception of frequency, which he happens to strongly espouse, or is it some sort of its variation. It would require a separate study to treat the problem at length, here we shall only signal the following.

This "third species" probability depends on two factors: the number of observed cases and degree of similarity occurring between the predicted event and those already observed. The latter can only be determined if there's an *a priori*, i.e. independent from observation, classification that would allow us to measure the degree of probability. One good example for that is zoological systematics. It allows us to predict that there is a greater probability that certain human features will be rather present in monkeys than in reptiles. This is based on the assumption that humans and monkeys are sets that together belong to the greater number of superior classes than, say, sets of humans and reptiles. If there is some similarity between humans and reptiles, this is because they both belong to a superior

set (e.g. the vertebrate). Such comparison of semantic scopes, serving as a basis for assessment of similarity and co-determinant of the extent of "third species" similarity, introduces what may be called *a priori* factor (Keynes) or logical factor (Popper), which frequency theory gives no account of. Linking logical probability with the result of observation to enable the definitive probability of the hypothesis is a complex and paradox-prone matter, as particularly Carnap's attempts seem to suggest. At any rate, it appears that Hume, perhaps involuntarily, may have loosened here his orthodoxy towards the frequency theory, which would push him closer towards the line of thought presented by Carnap in his work on induction and probability.

4. HUME'S CONTRIBUTION TO THE PROBLEMS OF ASSERTION

As the above seems to suggest, theory of judgment advanced by Hume is radically empiristic, passivistic, allogenetic (defines judgments in terms of other mental states), and based on frequency conception of probability.

If Hume's theory is to be understood as a general theory of judgment, it fails in every respect. Radical empiricism's thesis that cognition is nothing more than sensual copying of the world is false. Further, the passivistic stance is flawed in that it rules out the choice between hypotheses or assumptions, forcing humans to adopt one or the other by the sheer power of external impulses. Further, judgments cannot be boiled down to ideas, only they can be more vivid. It is perfectly legitimate to imagine something extremely vivacious and be deeply moved by the ensuing emotions, while at the same time being aware that such dream images are not real. Finally, it's wrong to insist that the force of belief should depend solely on quantitative relation between two sets of impressions, one speaking for certain judgment, the other against it. This would suggest that all judgments lacking opposite instances to outweigh or weaken them would have the same maximum level of probability. But such a level hinges on other factors, such as, for example, the number of cases confirming current knowledge or logical probability (in Carnap's terms — probability *a priori*, see footnote 5).

As self-evident as they are, these observations need not further elaboration. Taken as a whole, Hume's theory must therefore be rejected. But if applied to certain types of propositions or situations, it soon turns out to be quite well aimed and illuminating. It supersedes the orthodox theory of judgment in at least two points. The first one is related to the characteristics of perceptual judgments, the other to emotional aspects of assertion.

Perceptual statements, more than any other statements, align with radical empiricism in that they express corporal states triggered by copying

of states in the environment. They are not a matter of choice, but rather function as a direct reaction forced by the reality. For this reason, they fit into the passivistic stance, even if this doesn't apply to empirical hypotheses, philosophical assumptions, or axioms in deductive systems. Although not without reservations, the allogenetic theory also could apply to perceptual judgments; this is because perceptual judgments aren't derived from concepts, which brings them closer to acts of perception, or apprehension.

For these reasons, one should perhaps introduce certain corrections to language, which deceives us in that it offers similar grammatical forms to express mental states that greatly differ psychologically and epistemologically. Indicative mood is used to make both perceptual statements and empirical hypotheses. It also serves to express analytic truths which greatly differ from the first two. These grammatical properties of language imply that judgment, i.e. assertion, has a similar status in each of those cases. However, perceptual statements should be made in different "logical tonality" than hypotheses, yet another should be reserved for analytic propositions.

The influence of passions on assertions deserves to be considered separately. The topic is fairly well explored, but Hume offers here a unique contribution of his own. In his view, passions, by lending intensity to other mental states, can substitute sensations, which, *ex officio*, are meant to lend intensity to ideas, thus transforming them into beliefs. To quote Hume:

"passions in their turn are very favourable to belief; and not only such facts as convey agreeable emotions, but very often such as give pain, do upon that account become more readily the objects of faith and opinion. A coward, whose fears are easily awakened, readily assents to every account of danger he meets with (...) When any affecting object is presented, it gives the alarm, and excites immediately a degree of its proper passion; especially in persons who are naturally inclined to that passion. This emotion passes by an easy transition to the imagination; and diffusing itself over our idea of the affecting object, makes us form that idea with greater force and vivacity, and consequently assent to it" (Hume 1951: 120-121).

Such a substitutive theory of passions is perhaps untenable. Bundling passions and sensations together in a single higher-order set of impressions finds no justification in known facts. Passions trigger heightened activity, for example increased electric conductance of the skin, but it hasn't been observed that such activity also causes sensations (see e.g. Woodworth, Schlosberg 1946:287-292). Also, our day-to-day experience suggests that perception is "contemplative," free from tensions carried by emotional states. Further on in the above-cited passage, Hume once more invokes the mys-

teriousness shrouding beliefs. One may suppose that he is mystified by the fact that sensations and emotions are two radically different sources of beliefs.[5] Hume seeks to dispel this mysteriousness by construing them both as impressions, but, as we can see, he is not entirely satisfied with the solution. The less so if, contrary to Hume, one draws a distinct line between sensations and emotions. The problem lies not in the fact that each on its own suffices to evoke the same phenomenon, but that we're unable to identify their common feature that causes the effect. Let's illustrate this with the following example. When a light bulb goes out, it may happen due to a number or reasons, for instance a burned filament, or fuse. But what is common to all occurrences that may trigger such an effect is that they happen because of the disconnected circuit. This makes it possible for each of them to make the bulb go out. As for causes of beliefs, those being either sensations or emotions, Hume saw their common feature in "liveliness," or "vivacity," capable of invigorating lifeless ideas. But even if we're ready to admit that this "liveliness," or "vivacity," serves well to express our intuitions, we will be compelled to agree that those intuitions are in each case different, with the word itself having at least two meanings. The liveliness of emotions hinges on certain tensions, which makes them different both from abstract thinking and sensations. The liveliness of sensations rests on them being highly concrete, which makes them different from reproductive or productive representations that are schematic and highly incomplete. Hume's theory profited from this equivocation, but the profit must be deemed illegal under the laws of logic. The mystery laid bare by Hume is therefore still waiting to be solved.

In the closing remarks of this paper I will provide a draft solution of my own. I propose to differentiate between several kinds of assertions, each having a separate system of postulates. What these assertions have in common is that their systems of postulates share some of the postulates. Symbol A (read as the quantifier "it is believed that," "it is considered that," etc.) stands for the concept characterized by this common pool of postulates, and

[5]This problem was addressed by moralists who hold that intrusion of emotions into the sphere of beliefs compromises intellectual integrity. Classic examples of this approach was offered by John Locke in "Of enthusiasm," a chapter in the second volume of "An Essay Concerning Human Understanding." Other authors, however, would rather argue that, as common as it is, emotions' influence on the formation of beliefs cannot be regarded as an ethical flaw or psychological anomaly. This is also the argument made against Locke by Wilhelm Gottfried von Leibniz in New Essays on Human Understanding (chapter 20), and, later on, John Henry Newman in An Essay in Aid of a Grammar of Assent (chapter 6: 181-183).

comprises at least three of them:

P.1 If it is believed that q, it is false that it is believed that not q. The same, but shorter:

$$\mathrm{A}(q) \rightarrow \neg\mathrm{A}(\neg q)$$

P.2 $\mathrm{A}(p \rightarrow q) \,\&\, \mathrm{A}(p) \rightarrow \mathrm{A}(q)$

P.3 q is tautology $\rightarrow \mathrm{A}(q)$

As easily demonstrated, one can use these postulates to deduce the laws of distribution and association of A in conjunction and alternatives (Marciszewski 1967). Using A, it is possible to define rejection and suspension of judgment, marked here by R and N, respectively.

D.1 $\mathrm{R}(q) \equiv \mathrm{A}\,(\neg q)$

D.2 $\mathrm{N}(q) \equiv \mathrm{A}\,(\neg\mathrm{A}(q) \,\&\, \neg\mathrm{R}(q))$

Those concepts, along with a variable running through a set of time-sections, can now be employed to distinguish two variations of assertions, let us call one spontaneous, and the other reflexive. Assertion of a specific judgment in a specific moment (small time-section) is reflexive, if in the given moment the judgment is perceived as valid, but it is preceded by another moment, in which it was rejected or suspended. In symbolic notation:

$$\mathrm{Ar}_t(q) \equiv \mathrm{A}_t(q) \,\&\, (\mathrm{E}u)\,((u \leqslant t) \,\&\, (\mathrm{R}_u(q) \vee \mathrm{N}_u(q))),$$

where "$\leqslant$" means "precedes or is concurrent with." Definition D.4 (spontaneous assertion) is produced by a negation of the second part of the conjunction that constitutes the right-hand side of D.3. Thus, assertion is spontaneous when there isn't a moment in which the present judgment was rejected or suspended. Reflexive assertion is always linked with valuation; this is because choosing the present assertion over the moment in which there was no particular assertion calls for motives that make us ascribe greater value to assertion rather than to the opposite. In case of spontaneous assertion such valuation is not necessary, although it is possible, and often happens, manifesting itself in a positive emotional attitude towards the judgment. This positive attitude may arise because the judgment reflects the person's views, represents moral fairness, strikes as brilliant, comes from a respected school of thought, etc. To clarify the matter further we shall

introduce two more concepts. Non-valued assertion, i.e. assertion where there's no evaluative attitude towards the judgment, shall be called passive assertion, whereas valued assertion shall be called active assertion. Thus, each reflexive assertion is active, while spontaneous assertion can be either active or passive. This terminology will help emphasise that here we're dealing with two largely different phenomena, both falling under the term "assertion" by virtue of sharing a common property (expressed in their relevant system of postulates). Judgments derived from sensations, or even perceived as such, are characterized by passive assertion. Scientific or daily-life hypotheses, as well as opinions structuring the worldview, beliefs, or worldly wisdom are experienced as active assertions. Trying to find a common denominator for such diverse mental states is therefore futile, even if all function as judgments phrased in the indicative. Language may not be the best guide for the philosophy of mind, with various complications and puzzles emerging if one chooses to follow it blindly. One such complication pertaining to belief has been acutely pointed out by Hume, and although his solution is far from satisfactory, this by no means dwarves his contribution to the matter at hand.

5. EPISTEMOLOGY AND SEMIOTICS

Remarks on Hume's conception of assertion belong rather to the history of epistemology or theory of cognition than strictly semiotic analysis. There are, however, good reasons to link epistemological investigations with semiotic research, and to promote the former while discussing issues explored by linguistics.

The relevance of semiotics has been insightfully demonstrated by Kazimierz Ajdukiewicz in *Epistemologia i semiotyka* [*Epistemology and Semiotics*], *W sprawie "uniwersaliów"* [*Concerning "Universals"*], *Obraz świata a aparatura pojęciowa* [*Worldview and Conceptual Apparatus*], *O stosowalności czystej logiki do zagadnień filozoficznych* [*On Application of Pure Logic to Philosophical Problems*] *Problemat transcendentalnego idealizmu w sformułowaniu semantycznym* [*Semantic Approach to Transcendent Idealism*], *W sprawie pojęcia istnienia* [*Concerning the Notion of Being*].[6] Also, Rudolf Carnap has devoted much of his work to relations between language and cognition, most notably in *Philosophy and Logical Syntax, Testability and Meaning, Foundations of Logic and Mathematics.*

[6]Those essays are published in Ajdukiewicz 1960 and 1965.

Those two names stand out in analytical philosophy, or logical analysis, as it's sometimes called. The discipline uniquely explores traditional philosophical problems, most notably epistemology, by reformulating them in the vocabulary of syntax, semantics, or pragmatics. It may be using language that is still a far cry from what some philosophers would wish for in terms of exactness, but it still fares better than the traditional theory of cognition. Precise formulation of the problem, although not sufficient, is ultimately necessary for its eventual solution. Thus, the language of semiotics, as long as it's properly translated into epistemology, may be well positioned to successfully drive forward "an inquiry concerning the human understanding."

As demonstrated, the path bridging semiotics and epistemology sees an animated, if one-way, traffic. Semiotics, with its new tools, offers a fresh perspective on traditional problems of epistemology. In its first phase (early works of Carnap and other neopositivists) the movement was inspired primarily by research into syntax. Later, in the 1930s, the pioneering work of Tarski opened new possibilities and spurred research in semantics. In recent years interest in pragmatics has been rekindled bordering on epistemic logic.

However, one might be wondering whether the opposite direction of research — from epistemology to semiotics — wouldn't be just as legitimate. Indeed, contemporary work on Hume, intent on introducing greater precision to pragmatic conceptualization of assertion, appears to be progressing along those very lines. Without being properly rooted in epistemology, assertion is destined to remain a vague concept, as exemplified by rather scarce remarks in *Principia Mathematica*. Indeed, Bertrand Russell, co-author of *Principia*, has much more to say on this particular topic in his epistemological essays entitled *Human Knowledge*.

If the whole ontology boils down to one simple question: "what exists?," the primary problem of epistemology can take an equally compact form, namely "what can we know?" Possible answers range from the skeptical "nothing" to the optimistic "everything." Those answers also determine the cognitive process itself, identify dispositions involved, and serve to evaluate the achieved results of the inquiries. For example, if we were to assume that what we cognize are platonic ideas, it would be immediately implied that the process is not sensual but intellectual, leading therefore to certainty, not illusory conceptions. This would mean that even purely formal properties of assertion would be different than assertion in empirical hypotheses, with still others found in observations. Thus, the epistemology of Platonic-Cartesian-phenomenological descent would imply assertion that is formally identical with the concept of necessity developed in modal logic

(Marciszewski 1971). In empiricistic epistemology, such as Hume's, assertion has formal qualities found in conditional probability and probability *a priori*. These are just two examples of various associations between epistemology and the theory of assertion. Other examples include conventionalism in the philosophy of science, and yet another comes with epistemology and methodology developed by Karl Popper.

If so, epistemological problems cannot escape the attention of those interested in exploring the nature and mechanisms of language. Also, one shouldn't forget that specific areas of inquiry are often arbitrarily pigeonholed, with particular fields of research assigned to specific disciplines for purely "administrative" reasons or because of more or less confusing terminologies. The problem of assertion crystallizes at the intersection of semiotics and epistemology, as well as logic and psychology. Those wishing to make forays into this sphere may face reproach for disloyalty or invite critiques for straying off the sanctioned discourse. I'm offering these remarks being aware of those risks, and if my opponents are kind enough to accept a terminological maneuver, my proposal is to establish a new discipline called semiotic epistemology. If the new discipline had an academic department, and maybe even scientific society to its name, it would certainly extinguish any controversies surrounding the present subject of my considerations.

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PRO-FORMS INSTEAD OF VARIABLES AND OPERATORS

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I

Inquiries into the logical analysis of a natural language tend to be inspired by the philosophical problems that a natural language generates; less commonly, it is the case because of a conviction that a natural language, despite even more widespread applications of formalized languages, is an indispensable tool of accumulating and transmitting information of cognitive significance.

In the research that stems from interest in a natural language as the language of passing on that which is scientifically valuable, two styles can be distinguished. The first one is about interpreting the expressions and syntactic forms of a natural language by way of indicating the manner of their translation into a standard formalized language. Apparently, at the root of this method of investigating natural language lies a conviction that the grammatical peculiarities are something irrelevant, non-functional and, essentially, it is the translation into a standard formalized language that reveals a true syntactic structure of natural language expressions and the accompanying semantic interdependencies. This method is illustrated by the book by Hans Reichenbach *Elements of Symbolic Logic* as well as one of Roman Suszko's early works *Zarys elementarnej składni logicznej*. The other style can be exemplified by Adelina Morawiec's *Podstawy logiki nazw*, which presents the conception of the logic of names, put forward by Suszko and elaborated on in a seminar for the Polish Academy of Sciences (PAN) Chair of Logic in 1966. It is about the creation of formalized languages that constitute RATIONAL RECONSTRUCTIONS of passages from a

natural language. The starting point here tends to be selecting from a natural language some types of expressions and syntactic forms that can be filled by these expressions. The syntactic rules are arrived at by the analysis of these forms. In the same way, we reach the formulation of the semantic interdependencies between expressions. The rational character of reconstruction is about ignoring these peculiarities of natural language which from the standpoint of a cognitive purpose can be seen as non-functional, and it is also about the assumption of the principle of unlimited construction (Suszko 1957: 40-41). A rational reconstruction of passages from a natural language can be more or less close to the original model, that is, more or less adequate. In order to try and obtain as adequate a reconstruction as possible, one should be careful in qualifying the phenomena occurring in a natural language as non-functional. It ought to be remembered that any graphic natural language has a sonic counterpart for aural perception. Accounting for this fact reveals the functionality of a number of features of a natural language.

The two research styles outlined above do not preclude each other. Indicating a way of translating expressions from a passage of a natural language into a standard formalized language can be a preparatory action for the reconstruction of this passage in the form of a non-standard formalized language.

The method of creating rational reconstructions of passages from a natural language does not stray from the commonly accepted principles of formalized language construction and is about 1) establishing the resource of simple vocabulary, 2) indicating the rules of creating complex expressions, with sentences in particular, 3) describing these constructions in semantic terms, that is, establishing the interrelationships between the objective correlates of simple expressions and the same kinds of correlates of complex expressions. The implementation of the last point presupposes the determination of a class of language models and it leads directly to the definition of the notion of a true sentence in a given model, which allows for the definition of a number of semantic notions, including the notion of logical consistency. Defining the notion of logical consistency is the aim of the whole project as it is the task of a logician who investigates a language to discover the logic inherent in it, that is, the function of logical consistency, determined in the set of sentences of this language.

It would be unreasonable to believe in the possibility of making a rational reconstruction of the whole natural language. This undertaking is made futile by the lack of strict resolutions on what is and what is not a correctly

constructed sentence of this language. A natural language is a domain for incessant creativity of its users and thus any grammar can be adequate only vis-a-vis some specific stage of the development of language, and only in approximation. This is not the only difficulty, though. Another major obstacle is that the methods and concepts used in logic do not allow moving beyond SEMANTICALLY self-sufficient PROPOSITIONS. By using this *ad hoc* term I mean sentences whose interpretation is not dependent on circumstances that are external to language. Semantically self-sufficient sentences are utterances whose comprehension only needs from the addressee the acquisition of the meanings of words as well as the grammatical and semantic rules proper to a language. Comprehending these propositions does not depend on whether the recipient understands the circumstances that accompany their production and nor does it depend on their knowledge or inferential ability.

Semantically self-sufficient sentences are not rare in a natural language; moreover, for any natural language proposition whose sense is definite in given circumstances, one can demonstrate an equivalent semantically self-sufficient proposition. These certainly include all carefully formulated scientific statements. Semantically non-self-sufficient sentences are the basic building blocks of any conversation: especially the sentences including situationally occasional expressions. This is a large class of sentences if we consider that a situationally occasional use happens to almost all descriptive expressions, rather than to ones such as *me, here, now,* which are listed in logic coursebooks. Semantically non-self-sufficient sentences also include ellipses, but not all of them. A sentence *ja pójdę górą a ty doliną* [I will go uphill and you'll go down a valley] is indeed non-self-sufficient but the reason is not that a predicate has been omitted in its second part as it is acceptable in terms of the rules of grammar to omit sentence parts that repeat further on within the sentence. The sentence *wieloryby są ssakami* [whales are mammals] is semantically non-self-sufficient even though anyone will guess that it refers to all whales, but in selecting such an interpretation they will refer to the elementary biological information that species are contained in classes. When hearing a sentence *wieloryby są złośliwe* [whales are malicious] the addressee would be less determined in their selection of interpretation. Replacing one expression with another seems to be a universal test, allowing us to determine whether in interpreting a sentence we appeal to the knowledge we have. A sentence like *Platon pisał swe dialogi w ostrej polemice z uczniami Sokratesa i postać mistrza służyła mu jako autorytet do poparcia własnego stanowiska* [Plato would write his dialogues in a sharp argument

with Socrates's disciples and the personage of the master was used by him as an authority to support his position] is understood only because Socrates was Plato's master. Upon the replacement of the word *mistrz* [master] with the word *wieszcz* [prophet], the sentence becomes unintelligible.

The concept of a semantically self-sufficient sentence may be difficult to be precisely formulated (like all concepts that refer to a natural language), but in my opinion it does introduce a significant distinction. It may mean the same as what we have in mind in the teaching of logic when we speak of a "sentence in a logical sense." Sentences in a logical sense are characterized as expressions which can be assigned a true/false value. 'True' and 'false' are understood as the properties of expressions (treated as a script) at least relativized to a language rather than the extralinguistic circumstances of communication. If so, then these properties can be sensibly attributed to semantically non-self-sufficient sentences only.

The purpose of this study is to present — as a formalized *PL* language — the reconstruction of a small passage of a natural language comprising some pro-forms. The next chapter is introductory and presents a selective analysis of the system of pro-forms of a natural language, illustrated by examples from Polish. The third chapter discusses the lexicon and the basic concepts in the *PL* syntax. The fourth chapter contains the description of the *QL* language that uses the variables and quantifiers as well as the rules of translating *PL* into *QL*. In the fifth chapter the notion of a true sentence in *PL* is defined. The sixth one concerns the issue of the information resource that can be expressed in the *PL* language, while the last chapter outlines the prospects of the definitional expansion of *PL* with new expressions such as pro-forms.

II

Pro-forms make a highly marked class among the words of a natural language and their uniqueness is of a semantic nature. In syntactic terms, that is, the places they occupy in sentence structure are no different from other expressions; they differ among themselves. Both these observations have long been known to grammarians. Grammarians do not say expressly what the semantic uniqueness of pro-forms is about. Some grammarians have rightly noticed that this peculiarity is about the way in which they refer to their objective correlates, but they describe this very generally and erroneously. This manner can best be characterized as representation in a sense which is applied in variables.

In linguists' opinion, the uniqueness of pro-forms is about their being SUBSTITUTES. The phenomenon of substitution is supposed to be about some expressions occurring vicariously in propositions, in place of expressions of a certain class. On this basis, we distinguish between pronouns (substituting nouns), pro-adjectives, pro-adverbs, etc. The origin of the category of substitution seems to be this: the division — accepted in grammar — of words into parts of speech is constructed along the assumed principle of division that includes the considerations of syntax, inflection and semantics. Semantic considerations require that pro-forms be treated as separate parts of speech; the remaining considerations make us include particular kinds of pro-forms into the category of nouns, adjectives, numerals, etc. In saying that pro-forms are substitutes, of sorts, of certain words representing parts of speech, nothing else is stated on top of their behaving like the part of speech in terms of syntax and inflection. A suggestion, present in linguistic propositions, that substitution is an asymmetrical relationship seems erroneous.

A division of pro-forms along the kinds of expressions they substitute, which has been accepted in grammar, inherits all the disadvantages of a division of words into parts of speech, and thus is of little use for this study. Instead of the category of speech, some concepts of logical syntax will be used here. It will just be assumed that, in a natural language, expressions can be identified that are NAMES OF INDIVIDUALS. It can be said of individual names that they all belong to the same SYNTACTIC CATEGORY. The definition of the idea of syntactic category, for the sake of a natural language, goes beyond the purpose of this study. For the record, as understood in this study, syntactic categories do not fulfill the condition: two expressions belong to the same syntactic category iff they are mutually replaceable in any expression, where the expression remains a sentence. The reason for this is the phenomenon of inflection.

The subject of interest here will only be those pro-forms which, in the language of grammarians, are substitutes for individual names. These pro-forms will be counted as individual names in terms of the syntactic category. It ought not to be inferred, however, that these pro-forms are regarded as names. In counting some pro-forms as individual names we only mean to state that, in the structure of a sentence, these pro-forms take the place earmarked for names of individuals.

Speaking of sentences, we will only consider semantically self-sufficient sentences. Thence, pro-forms such as *ja, ty* [I, you] and their inflectional varieties will not be of interest here even though they are substitutes of

individual names. Take the following names of self-sufficient sentences:

(1.1) *Sokates jest filozofem.*
[Socrates is a philosopher.]
(1.2) *Ktoś jest filozofem.*
[*Somebody* is a philosopher.]
(1.3) *Każdy jest filozofem.*
[*Everybody* is a philosopher.]
(2.1) *Sokrates nie jest cyklopem.*
[Socrates is not a cyclops.]
(2.2) *Nikt nie jest cyklopem.*
[*Nobody* is a cyclops.]
3.1) *Sokrates jest nauczycielem Platona.*
[Socrates is Plato's teacher.]
(3.2) *Sokrates jest nauczycielem kogoś.*
[Socrates is somebody's teacher.]
(3.3) *Sokrates jest nauczycielem każdego.*
[Socrates is everybody's teacher.]
(4.1) *Sokrates jest wrogiem Platona.*
[Socrates is Plato's enemy.]
(4.2) *Sokrates nie jest wrogiem nikogo.*
[Socrates is nobody's enemy.]
(5.1) *Jeśli Ksantypa jest żoną Sokratesa, to on jest jej mężem.*
[If Xantippa is Socrates' wife, then he is he husband.]
(5.2) *Jeśli Sokrates jest mężem Ksantypy, to ona jest jego żoną.*
[If Socrates is Xantippa's husband, she is his wife.]

These examples demonstrate that the pro-forms *everybody, somebody, nobody, themselves, he, she* and their inflections are substitutes of individual names. This list is not complete as we include pro-forms that represent people (or people, too). Please note that all personal pro-forms can be counted as individuals, such as in the case of the indefinite pronoun *anybody/whoever*, as per the example:
(6) *Whoever is Socrates' enemy is an enemy of Truth.*
takes a position that is inaccessible to individual names (rather, the whole expression "whoever is Socrates' enemy" belongs to the category of individual names).

Also, note that the substitutes of individual names can be compound expressions made up of a pro-form and a general name such as *każdy, pewien,*

żaden [every..., some... no . . .] or their inflections, with a general name in the place of the dots. Such expressions should thus be treated as belonging to the syntactic category of individual names. This observation suggests a view that is different from the one that holds in logic concerning the syntax of categorical statements (closer to grammatical concepts) and allows for its considerable simplification.

Among the pro-forms indicated above two kinds can be identified. The first includes *everybody, somebody, nobody* and their declensions. On account of their semantic kinship with quantifiers, they will be called 'quantifying pronouns.' For the others, the term 'reflectory pro-forms' seems an apt description as they always remain in a reflectory relation to other expressions. The idea of a reflectory relationship was introduced by Ajdukiewicz, who described it as follows: "[...] reflectory relationships [. . .] assign a member/part its objective correlate only on account of another member/part of the same sentence. [. . .] A reflectory relationship can be exemplified by the relationship obtaining between a pro-form and the noun it pertains to, and this is what assigns the pronoun its denotation" (Ajdukiewicz 1965: 345).

The expression to which a pronoun remains in the reflectory relationship is called by grammarians its antecedent, with the pronoun itself called the consequent of the expression. In sentence 5.1) it is the name 'Socrates' that is the antecedent of the pronoun 'he' and the antecedent of the pronoun 'she' — Xantippa; in sentence 3.4) 'Socrates' is the antecedent of the pronoun 'himself.' In correctly built statements the relation between the antecedent and the consequent is inverse. The antecedent usually precedes the consequent.

In the examples above, it is the expressions that are not pro-forms and are therefore antecedents of reflectory pro-forms. Such an application of reflectory pro-forms is statistically the most commonplace, but from the logical point of view, it is of little interest. The effect thus attained is purely stylistic (avoidance of repetition). For a logician, the cases where a quantifying pronoun is an antecedent to a reflectory pro-form are much more interesting. Reflectory pro-forms then become the equivalents of bound variables. Using reflectory pro-forms this way considerably expands the number of statements that can be uttered in a natural language. The following sentence is an example of this use of a reflectory pro-form:

(7) *Joanna loves someone and he loves Joanna.*

Which, in the functional calculus, is equivalent to the formula:

(7') $\bigvee_x(aRx \wedge xRa)$

Possibilities of using reflectory pro-forms in this role are quite limited, though. The occurrence of the antecedent-consequent relationship is established upon a grammatical rule that has it that the words bound by this relationship agree in gender and number. The gender and number is usually marked by way of an inflectional suffix or article. The number of genders in natural languages spans between 2 and allegedly 30, with the numbers from 2 to 4. The number of reflective pro-forms of various antecedents, occurring in the same sentence must therefore be lower than a small natural number. In Polish, we have three genders in the singular and two in the plural. Consequently, in Polish, five reflectory pro-forms of various antecedents can be used in the same statement. Apparently, then, natural languages are in the same situation as the functional calculus where only n varioform variables have been accepted, and therefore some statements cannot be formed in these languages. This is not so, however. What counteracts these limitations will be, among others, using expressions made up of a pro-form and an ordinal numeral, such as: *ktoś pierwszy* [someone first], *kogoś drugiego* [Acc. someone next/second], *ten pierwszy* [the first one], *ten drugi* [the second one], etc. Using numerals in such contexts has nothing to do with their ordinary meanings. Numerals perform the role of inflectional endings here or, if we take the perspective of formalized languages, the role of numeral indexes to variables.

Now onto the properties of quantifying pro-forms, as per the Polish pronouns *każdy* [everybody], *nikt* [nobody] and *ktoś* [somebody] and their declension forms (the pronouns no and *some/a* will be skipped here as they cannot occur without the accompanying general name). The rules of using quantifying pro-forms are tangled because each of these either cannot occur in every context or do not have the same meaning in every permissible context, that is, generalizing or existential. To record the behavior of the three aforementioned pro-forms in (simple) categorical statements. Two kinds of statements need to be accounted for here — affirmative (without inherent negation) and negative (with inherent negation) — as well as two positions of pro-forms: in the subject and in the object. The meaning is, in a given context, decided depending on what quantifier corresponds to it in a given transcription of the sentence onto the language of functional calculus. This transcription consists in the replacement of a pro-form by a variable and appending a quantifier suited to the sense of the sentence. Also, intrasentential negation is replaced by intersentential negation. Intersenten-

tial negation always occurs within the range of a quantifier that corresponds to a pronoun in the nominative, but before the quantifier corresponding to a pronoun in the predicative. Then we state:

The pronoun *każdy* [every(body)] can occur in the subject in affirmative sentences only, but in the predicative it can occur in both affirmative and negative statements. It always has a generalizing sense:

(8.1) *Każdy ceni Arystotelesa.*
[Everybody appreciates Aristotle.]
(8.1') $\bigwedge\limits_{x}$(*x ceni Arystotelesa*).
[$\bigwedge\limits_{x}$(*x* appreciates Aristotle)]
(8.2) *Arystoteles jest autorytetem dla każdego.*
[Aristotle is an authority for everybody.]
(8.2') $\bigwedge\limits_{x}$ (*Arystoteles jest autorytetem dla x*).
[$\bigwedge\limits_{x}$ (Aristotle is an authority for *x*)]
(8.3) *Arystoteles nie jest autorytetem dla każdego.*
[Aristotle is not an authority for everyone.]
(8.3') $\sim \bigwedge\limits_{x}$ (*Arystoteles jest autorytetem dla x*).
[$\sim \bigwedge\limits_{x}$ (Aristotle is not an authority for *x*)]

The pronoun *nikt* [nobody] can occur in both the subject and predicative but only in negative sentences. In the subject it has a generalizing sense but in the predicative — an existential one. Compare:

(9.1) *Nikt nie jest krezusem.*
[Nobody is a Croesus.]
(9.1') $\bigwedge\limits_{x} \sim$ (*x jest krezusem*).
[$\bigwedge\limits_{x} \sim$ (*x* is a Croesus)]
(9.2) *Aleksander nie boi się nikogo.*
[Alexander is not afraid of anyone.]
(9.2') $\sim \bigvee\limits_{x}$ *Aleksander boi się x*).
[$\sim \bigvee\limits_{x}$ Alexander is afraid of *x*)]

The pronoun *ktoś* [somebody] in categorical propositions always has an existential sense. In the object of negative statements the pronoun *ktoś* is not used:

(10.1) *Ktoś zabił Cezara.*
[Somebody killed Caesar]
(10.1') $\bigvee_x$(*x zabił Cezara*).
[$\bigvee_x$(x killed Caesar)]
(10.2) *Brutus zabił kogoś.*
[Brutus killed somebody]
(10.2') $\bigvee_x$ (*Brutus zabił x*).
[$\bigvee_x$ (Brutus killed x)]
(10.3) *Ktoś nie zdradził Cezara.*
[Somebody did not betray Caesar]
(10.3') $\bigvee_x \sim$ (*x zdradził Cezara*).
[$\bigvee_x \sim$ (x betrayed Caesar)]

By denoting the sense of the pro-form with a sign of the corresponding quantifier, the rules formulated above can be presented in tables. Comparing these, we notice that 1) the three pro-forms under scrutiny complement one another and guarantee that in each of the two identified syntactic positions there can be a pro-form both in a general and existential sense, 2) the pro-forms are not doubled in their roles.

everybody		subject	object
sentences	affirmative	$\bigwedge$	$\bigwedge$
	negative	—	$\bigwedge$

nobody		subject	object
sentences	affirmative	—	—
	negative	$\bigwedge$	$\bigvee$

somebody		subject	object
sentences	affirmative	$\bigvee$	$\bigvee$
	negative	$\bigvee$	—

What was said about the use of quantifying pro-forms in the object concerns both the direct and indirect object and can be generalized to the adverbials of time (being subject to quantification with the pro-forms *zawsze* [always], *nigdy* [never], *kiedyś* [some time]) and place (being subject to quantification by means of the adverbials *wszędzie* [everywhere], *nigdzie* [nowhere], and *gdzieś* [somewhere]). The findings of the investigation conducted here can

thus be applied to sentences such as:

Każdy komuś kimś grozi.
[Everybody threatens someone with someone.]
Każdy kiedyś przegrywa.
[Everybody loses some time.]
Ktoś wszędzie ma kogoś.
[Everybody has somebody somewhere.]

Note that establishing the meanings of pro-forms according to what quantifier corresponds to them is, in the case of negative categorical propositions, in a way arbitrary as it depends on what place — in a functional formula — is assigned to negation, and as we know, there are three possibilities here. Supposing we assumed that negation occurred in the range of the quantifier corresponding to the pro-form in the object case rather than before it, we would obtain a different result than that in the tables. It would turn out that it is not the pronoun *nikt* [nobody] but rather the pronoun *everybody* which is ambiguous and has an existential meaning in the object of negative propositions. What is independent from the conventions concerning the place of negation is the fact that one of the three pronouns under scrutiny is ambiguous because the result is obtained with any principle of adequate translation into the language that uses quantifiers.

A systematic description of the principles of using quantifying pronouns in compound sentences will be presented in the construction of a suitable formalized language. Here, only some observations will be presented. These observations concern compound sentences where there is a reflectory relationship between the members/parts of two different arguments of the conjunction, as in the sentence:

(11) *Joanna kocha kogoś i on ją kocha.*
[Joanna loves somebody and he also loves her.]

In such sentences at least one component (the argument of the conjunction) is not a semantically self-sufficient proposition as it contains a reflectory pro-form without an antecedent.

The pronouns 'everybody' and 'nobody' perform the role of the antecedent only in few contexts. Thus we say:

(12) *Nikogo nie potępiamy jeśli jego intencje są dobre.*
[We condemn nobody if their intentions are good.]

(13) *Każdy przyzna nam rację jeśli jego przekonania są zgodne z naszym.*
[Everybody will agree we are right if their convictions are in agreement with ours.]

However, the utterance:

(14) *Jeśli każdy jest geniuszem, to jego dzieci są genialne.*
[If everybody is a genius, his children are ingenious.]

is not a statement from the Polish language because the quantifying pronoun *każdy* [everybody] does not bound the reflectory pro-form *jego* [his] even though the formal condition of agreement in number and gender is fulfilled.

The sense of the pronouns *każdy* [everybody] and *nikt* [nobody] that perform the role of the antecedent is always generalized.

The pronoun *ktoś* [somebody] (and its declension forms) is nearly universal in its role of the antecedent of reflectory pro-forms, but it is ambiguous. In the conjunction 11) it has an existential sense, but in the implication:

(15) *Jeśli Joanna kocha kogoś, to również on ją kocha.*
[If Joanna loves somebody, he also loves her.]

it has a generalizing sense.

As a result, in the sentence:

(16) *Jeśli ktoś (pierwszy) jest pracownikiem, to ktoś (drugi) jest dyrektorem, i ten ktoś (drugi) jest zwierzchnikiem tego kogoś (pierwszego).*
[If someone /the first one/ is an employee, somebody /the other/ is a director and this somebody /the other/ is this somebody's /the first one's/ superior.]

it occurs in two meanings.

There is an opinion that the pronouns such as 'somebody' or 'something' perform the role of free variables in natural languages. This opinion does not seem to be correct. These pronouns surely do not perform the roles of free variables in the contexts in which they have an existential sense since — as we know — existential propositions cannot be uttered by means of free variables. Perhaps, then, this is the case when the pronouns have a

generalizing sense?

III

In this chapter and the next one a simple formalized language will be presented featuring symbols that have the syntactic and semantic properties of pro-forms. This language — hereinafter referred to as *PL* — can be considered a rational reconstruction of the system of natural language pro-forms that are substitutes of individual names.

Let it be established that the lexicon of *PL* contains a countable string of individual constants:

$a_1,\ a_2,\ a_3,\ \ldots,\ a_i,\ \ldots$

Every individual constant is a creation made up of the expression a_i and the $n (n = 0,\ 1,\ 2\ \ldots)$ index, which is a counterpart of an inflectional suffix and has the form of a_i^n. Four more pro-forms belong to the same syntactic category as individual constants: three quantifying ones and one of a reflectory kind. These are expressions of the following form: $\cap$(general pro-form), $\cup$(particular pro-form), $\frown^{\,k}$ a general or particular pro-form, depending on context) $(k = 1,\ 2,\ \ldots)$ and O^n(reflectory pro-form) $(n = 0,\ 1,\ 2,\ \ldots)$.

The choice of the remaining syntactic categories of descriptive terms is largely arbitrary. It has been decided to include a finite number of general names in the *PL* language:

$N_1,\ N_2,\ N_3,\ \ldots,\ N_r$

as well as the same sequence of relative one-argument predicatives (relatives)

$R_1,\ R_2,\ R_3,\ \ldots,\ R_s.$

(It would be possible to incorporate in PL transitive and intransitive verbs with the same result.)

The logical constants of *PL* are — on top of pro-forms — the symbols *est* and *est̄* (read as is and is not) as well as the symbols $\sim,\ \rightarrow,\ \wedge,\ \vee,\ \leftrightarrow$ which are the signs of intersentential negation, implication, conjunction, alternative and equivalence. In *PL* we use parentheses in accordance with the propositional calculus conventions accepted in Polish.

We will call a *PL* "expression" any finite string of symbols belonging to the *PL* lexicon. A "elementary expression" will be any sequence of symbols created in accordance with one of the following four schemes:

α *est* N_k, α *est̄* N_k, α *est* $R_1\beta$, α *est̄* $R_1\beta$,

by way of substituting the syntactic variables α and β any symbols belonging to the syntactic category of individual names (individual constants or pro-forms) and appropriate values in place of the numeral indexes k and l. (It

is obvious that not all *PL* expressions make sense in this language and not every *PL* elementary expression is a proposition of this language). The places which the symbol α takes in the above schemes is referred to as "in the subject;" the places which the symbol β takes in the above schemes is referred to as "in the predicative."

The definition of a *PL* proposition is the following inductive definition:

(D1)

1. the *PL* elementary expressions — $a_i^0 \, est \, N_k$, $\alpha \, e\bar{s}t \, N_k$, $\alpha \, est \, R_k \, a_j^0$, $\alpha \, e\bar{s}t \, R_k \, a_j^0$ — are *PL* propositions.

2. if the expressions φ and ψ are *PL* propositions, then the expressions $\sim \varphi, \ \varphi \to \psi, \varphi \wedge \psi, \ \varphi \vee \psi, \ \varphi \leftrightarrow \psi$are *PL* propositions.

3. If the expression φ is a *PL* proposition, then the expressions $\varphi[a_i^0/\cap]$ and $\varphi[a_i^0/\cup]$ are *PL* propositions.

4. If the expression φ is a *PL* proposition, then the expression $\varphi[a_i^0/O^0]$ is a *PL* proposition providing every elementary expression that is a passage from the expression φ and contains the constant a_i^0contains in the place of the subject one of the expressions $a_j^0 (j \neq i)$, $\cap$, $\cup$or O^n (n $\neq$ 0).

5. If φ is a *PL* proposition, then the expression $\varphi[a_i^0/a_j^0, \ O^0]$ and the expression $\varphi[a_i^0/\frown^n \ , \ O^n]$ $(n \neq 0)$ are *PL* propositions providing the expression φ does not contain the expression $\frown^m$ or a_k^m where there is any k and $m = n$.

One explanation: the abbreviation $\varphi[\alpha/\beta]$ means an expression which is formed from the expression φ by way of replacing in it the expression α by the expression β. The abbreviation $\varphi[\alpha/\beta, \gamma]$ signifies an expression that forms from the expression φ by replacing in it the expression α by the expression β in the first position and by the expression γ elsewhere. We assume that 1) (when α does not occur in φ, then $\varphi[\alpha/\beta] = \varphi$; 2) when α does not occur in φ in at least two positions, then $\varphi[\alpha/\beta, \gamma] = \varphi$.

A string of notions will now be introduced that will describe the structure of *PL* and some properties of expressions characteristic for *PL* will be demonstrated, and so will the way of reading those, which is in fact a translation into a natural language (Polish).

A *PL* "categorical proposition" is a proposition that is an elementary proposition of this language. Each sentence of *PL* is either a categorical proposition or a molecular proposition built of elementary expressions by means of conjunctions (including the negation sign $\sim$). Passages that are arguments of a conjunction are called the COMPONENTS of the proposition. The components that are elementary expressions are called ELEMENTARY COMPONENTS. If an elementary component contains the expression *est* it is called AFFIRMATIVE, if it contains $e\bar{s}t$ — a negative one. These terms are also applied to categorical statements. *PL* is characterized by the fact that, like in a natural language, the components of propositions are not always propositions.

The quantifying pro-forms $\cap$ and $\cup$ can — along with the definition (D1) — occur in any elementary statement component both in the subject and in the predicative. Their use is in no way limited apart from the aforementioned syntactic position.

The reflectory pro-form O^0 can occur in the predicative only and only in such an elementary component which has one of the following in the subject: a_i^0, $\cap$, $\cup$or O^n (n $\neq$ 0).

The reflectory pronoun O^n (n $\neq$ 0) can occur both in the subject and in the predicative but if and only if in the part preceding the given occurrence of the pro-form O^n there occurs at least one occurrence of the constant a_i^m or the quantifying pro-form $\frown^m$ and $m = n$.

The occurrence of the quantifying pro-form $\frown^n$ or the constant a_i^n can occur both in the subject and the predicative but if and only if the part of the proposition following it contains at least one occurrence of the reflectory pro-form O^m and m = n.

The inflection index 0 (zero) is only used when such an index is actually redundant and therefore it will be overlooked.

Note also the condition contained in 5) of the D1 definition: the occurrence of the pro-form $\frown^n$ or the constant a_i^n cannot find themselves in the range of another occurrence of the pro-form or a constant of the same inflectional index. (The expression:

$$\frown^1 \ est\ N_k \wedge \frown^1 \ est\ R_1 O^1 \rightarrow \ O^1\ est\ N_i$$

is not a proposition from *PL*). This restriction is justified in this way: the pro-from $\frown^n$ is devised as the antecedent of reflectory pro-forms. Its rejection would make some occurrences of the pro-form $\frown^n$ remain without the consequents and that would greatly complicate the reflectory relationships

between *PL* expressions.

A string of statements and detailed schemes of *PL* will now be presented as well as the way we should read them. To facilitate the reading , the letters N and M will mostly be used as general names, while R and S will stand for relatives and a and b as individuals. This will stray a little from the *PL* lexicon.

All categoral propositions of *PL* can be obtained from a small pool of schemata, presented below:

(1.1) $a\ est\ N$ a is N
(1.2) $a\ e\bar{s}t\ N$ a is not N
(2.1) $a\ est\ R\ b$ a is the R of b
(2.2) $a\ e\bar{s}t\ R\ b$ a is not the R of b
(3.1) $\cap\ est\ N$ everybody is N
(3.2) $\cap\ e\bar{s}tN$ nobody is N
(3.3) $\cup est\ N$ somebody is N
(3.4) $\cup e\bar{s}tN$ somebody is not N
(4.1) $\cap est\ R\ a$ everybody is the R of a
(4.2) $\cap e\bar{s}tR\ a$ nobody is the R of a
(4.3) $\cup est\ R\ a$ somebody is the R of a
(4.4) $\cup e\bar{s}tR\ a$ somebody is not the R of a
(5.1) $a\ est\ R\ \cap$ a is the R of everybody
(5.2) $a\ e\bar{s}t\ R\ \cap$ a is not the R of everybody
(5.3) $a\ est\ R\ \cup$ a is the R of somebody
(5.4) $a\ e\bar{s}t\ R\ \cup$ a is the R of nobody
(6.1) $\cap\ est\ R\ \cap$ everybody is the R of everybody
6.2) $\cap e\bar{s}tR\ \cap$ nobody is the R of everybody
6.3) $\cap\ est\ R\ \cup$ everybody is the R of somebody
6.4) $\cap e\bar{s}tR\ \cup$ nobody is the R of anybody
6.5) $\cup est\ R\ \cap$ somebody is the R of everybody
6.6) $\cup e\bar{s}tR\ \cap$ somebody is not the R of everybody
(6.7) $\cup est\ R\ \cup$ somebody is the R of somebody
(6.8) $\cup e\bar{s}tR\ \cup$ somebody is not the R of anybody
(7.1) $a\ est\ R\ O$ a is the R of themselves
(7.2) $a\ e\bar{s}t\ R\ O$ a is not the R of themselves
(8.1) $\cap est\ R\ O$ everybody is the R of themselves
(8.2) $\cap e\bar{s}tR\ O$ nobody is the R of themselves
(8.3) $\cup est\ R\ O$ somebody is the R of themselves

(8.4) $\cup e\bar{s}t R\ O$ somebody is not the R of themselves

On top of those, elementary expressions like the following are categorical statements:

(9.1) $\frown^n$ *est* $R\ O^n$ and (9.2) $\frown^n$ $e\bar{s}t\ R\ O^n$

which are read: somebody is (is not) the R of themselves (their own R), and thus just like the in 8.3) and 8.4). It is the only case where the reflectory pro-form O^n (n $\neq$ 0) is read: itself (of itself).

The way of reading pro-forms $\cap$, $\cup$, O in compound sentences is the same as in categorical propositions. The quantifying pro-form $\frown^n$ is read: in the place of the subject — *ktoś* [somebody;] in the predicative — *kogoś* [(of/to) somebody]. If needed, we can add an ordinal numeral *ktoś n-ty*, *kogoś n-tego* [n'th somebody, (of/to) nth somebody]. The reflectory pro-form O^n (n $\neq$ 0) in some cases can be read: *on* [he] or *jego* [his]; usually it is: t*en (ktoś) n-ty* [this n'th (somebody) or *tego (kogoś) n-tego* [(to/of) this nth somebody.

When the antecedent of the pro-form O^n (n $\neq$ 0) is an individual constant, a *PL* proposition often does not lend itself to reading, as in the following

(10) $a_1^1 est\ R_1\ a_2^2 \rightarrow\ O^2\ est\ R_2 O^1$,

even though its strict equivalent is the proposition:

Jeśli Ksantypa jest żoną Sokratesa to on jest jej mężem
[If Xantippa is Socrates' wife, he is her husband].

So is the case with the sentence:

(11) $a_1^1 est\ R_1 \frown^2\ \wedge\ O^2\ est\ R_1 O^1$

and with a sentence, similar in structure,

Joanna kocha kogoś i on ją kocha.
[Joanna loves somebody and he also loves her]

But we read this without difficulty:

(12) $\frown^1$ *est* $R\frown^2 \wedge O^1$*est* $N \rightarrow$ O^2 *est* M,

and that is:

Jeśli ktoś pierwszy jest R-em kogoś drugiego i ten (ktoś) pierwszy jest N-em, to ten (ktoś) drugi jest M-em
[If the first someone is the R of someone (other) and this first (someone) is N, then the (other) someone is M].

More examples of compound sentences of *PL* will be put forward when discussing the issue of the range of quantifying pro-forms.

The notion of the range of the quantifying pro-form is indispensable for the semantic description of the *PL* language and for the precise definition of the notion of the antecedent of a reflectory pro-form. The issue of the range of the quantifying pro-form in the sentence φ is about delimiting such a passage from the proposition φ which, upon adequate translation (due to the interpretation of a natural language determined by the way of its reading), and one possibly as faithful as possible, of the proposition φ into a language using variables and quantifiers, would become the range of the respective quantifier. The issue of range of a quantifying pro-form remains somewhat similar to the notion of quantifier range, but it also differs in significant ways. Trying to maintain the principle that the range of a quantifying pro-form in the proposition φ is always a continuous excerpt of the proposition φ which forms its part, we are forced to come to terms with the fact that two different quantifying pro-forms can have the same range. Another peculiarity of pro-forms is the phenomenon of extending the range of the pro-form by another pro-form. This will be discussed further on.

Let us first describe the range of the quantifying pro-form $\frown^n$. We will use the notion of the component of the nth order of the proposition φ, which can be inductively defined in this way:

The proposition φ is a component of the 0 order of the proposition φ.

The arguments of the main conjunction in the proposition φ are 1^{st} order components of the proposition φ.

The arguments of the main conjunction in the n'th order component of the proposition φ are n + 1^{th} order components of the proposition φ.

(D 2) The range of the given occurrence of the pro-form $\frown^n$ in the proposition φ of the *PL* language is the HIGHEST IN ORDER from among the components of the sentence φ, which:

1. contain the occurrence of the pro-form $\frown^n$

and

2. contain each occurrence of the pro-form O^m if $m = n$ and this occurrence a) takes place in the sentence part that follows the occurrence of the pro-form $\frown^n$ and b) there is no occurrence of the pro-form $\frown^n$ or the constant a_j^k where $k \neq n$ between it and the given occurrence of O^n.

The definition of the range of the individual constant a_j^n (n = 0) has the very same wording.

A set of examples of *PL* propositions will now be put forward where the ranges of the occurrences of the pro-forms $\frown^n$ are marked. Each sentence of *PL* is accompanied by its translation into a natural language and a translation of both into a language using variables and quantifiers. The comparison of the three statements confirms the adequacy of the range definitions proposed here.

(13) $\underbrace{\frown^1 \; est \; R \; \frown^2 \rightarrow \underbrace{O^1 \; est \; R \; \frown^3 \wedge O^3 \; est \; R \; O^2}_{\frown^3}}_{\frown^1, \; \frown^2}$

Jeśli ktoś$_1$ *jest R-em kogoś*$_2$*, to ten*$_1$ *jest R-em kogoś*$_2$ *i ten*$_3$ *jest R-em tego*$_2$*.*
[If somebody$_1$ is the R of somebody$_2$, then this one$_1$ is the R of somebody$_2$ and this somebody$_3$ is the R of this one$_2$].
(For an abbreviation of the formula, arithmetic symbols are used instead of numerals).

$$\bigwedge_{x_1} \bigwedge_{x_2} est \; R \; x_2 \rightarrow \; \bigwedge_{x_3}(x_1 \; est \; R \; x_3 \wedge x_3 \; est \; R \; x_2)]$$

This example also demonstrates that the pro-form $\frown^n$ corresponds to the general quantifier, when its range is implication (so is the case with an alternative and equivalence), but the particular quantifier — when its range is conjunction (or an elementary expression). This principle is in place in Polish also when regarding the pronouns *ktoś* [somebody] and *coś* [something]. Negation is never the range of the pro-form $\frown^n$, which follows from the definition (D1).

(14) $\underbrace{\underbrace{(a^2\ est\ R\ \supset^1 \rightarrow O^1\ est\ R\ O^2)}_{\supset^1} \rightarrow O^2\ est\ N}_{a^2}$

(cannot be read literally)

$$\bigwedge_{x_1} est\ R\ x_1 \rightarrow\ x_1\ est\ R\ a) \rightarrow\ a\ est\ N$$

(15) $\underbrace{\underbrace{\supset^1\ est\ N \wedge O^1\ \overline{est}\ R\ O \rightarrow \sim(\underbrace{\supset^2\ est\ N \rightarrow O^1\ est\ R\ O^2)}_{\supset^2}}_{\supset^1}}$

Jeśli ktoś$_1$ *jest N-em i (on) nie jest swoim R-em, to nieprawda, że jeśli ktoś*$_2$ *jest N-em to ten*$_1$ *jest R-em tego*$_2$.
[If somebody$_1$ is N and (he) is not his R, then it is not true that if somebody$_2$ is N then this one$_1$ is the R of this one$_2$].

$$\bigwedge_{x_1}[x_1 est\ N \wedge x_1\ est\ R\ x_1 \rightarrow\ \sim\ \bigwedge_{x_2}(x_2\ est\ N \rightarrow\ x_1\ est\ R\ x_2)]$$

(16) $\supset^1\ \ est\ R\ O^1 \wedge \supset^1\ \ \bar{e}stR\ O^1$
Ktoś jest swoim R-em i ktoś nie jest swoim R-em. [somebody is their own R and somebody is not their own R].

(17) $\underbrace{\underbrace{\supset^1\ est\ R\ \supset^2 \wedge O^2\ est\ R\ \supset^3}_{\supset^2} \rightarrow O^1\ est\ R\ O^3}_{\supset^1;\ \supset^3}$

Jeśli ktoś$_1$*, jest R-em kogoś*$_2$ *i ten*$_2$ *jest R-em kogoś*$_3$*, to ten*$_1$ *jest R-em tego*$_3$.
[If someone$_1$ is the R of somebody$_2$ and this one$_2$ is the R of somebody$_3$, then this one$_1$ is the R of this one$_3$].

$$\bigwedge_{x_1}\bigwedge_{x_3}[\bigvee_{x_1}(x_2 est\ R\ x_2 \wedge x_2\ est\ R\ x_3) \rightarrow\ x_1\ est\ R\ x_3]$$

The sentences (17) state that the relationship marked as the relative R is transitory).

The range of the quantifying pro-forms $\cap$ and $\cup$ in any *PL* statement is governed by the following 3 rules:

(R1) If a given occurrence of the quantifying pro-form $\cap$ (or $\cup$) occurs in the predicative of the elementary component of the proposition φ of the language *PL*, then this elementary component is its range in the proposition φ.

The rule can be illustrated by using examples. In order to distinguish between the pro-forms $\cup$ and $\supset^n$ the first one will be read — contrary to the Polish style — as *a/some* (*of a/some*).

(18) $\underbrace{\supset^1 \textit{ est } R \cap}_{\cap} \rightarrow \underbrace{O^1 \textit{ est } R\ O}_{\supset^1}$

Jeśli ktoś jest R-em każdego to ten ktoś jest swoim R-em.
[If somebody is the R of everybody, then this someone is their own R],

$$\bigwedge_{x_1}[\bigwedge_{x_2} est\ R\ x) \rightarrow\ x_1\ est\ R\ x_1]$$

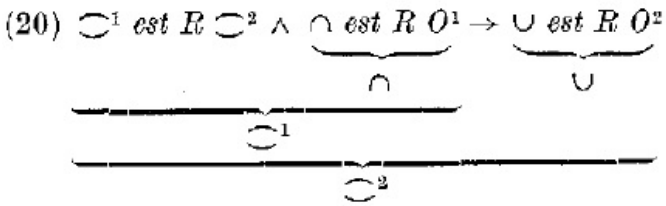
(19) $\underbrace{\supset^1 \textit{ est } N \rightarrow O^1 \textit{ est } R \cup}_{\supset^1}$

Jeśli ktoś jest N-em, to (on) jest R-em pewnego
[If someone is N, then they are some's R].

$$\bigwedge_{x_1}[est\ N \rightarrow \bigvee_{x} est\ R\ x)]$$

(R 2) If a given occurrence of the quantifying pro-form $\cap$ (or $\cup$) occurs in the subject of an elementary component of the proposition φ of the *PL* language, there is no pro-form $\supset^n$ in the predicative of this elementary component, and the range of this occurrence of the pro-form $\cap$ (or $\cup$) in the proposition φ is this elementary component.

This rule is exemplified as follows:



Jeśli ktoś$_1$ *jest R-em kogoś*$_2$ *i każdy jest R-em tego*$_1$*, to pewien jest R-em tego*$_2$
[If someone$_1$ is the R of someone$_2$ and everyone is the R of this one$_1$, then some is the R of this one$_2$].

$$\bigwedge_{x_2}\{\bigvee_{x_1}[x_1 \ est \ R \ x_2 \wedge \bigwedge_{x}(x = est \ R \ x_2)] \rightarrow \bigvee_{x_1}(x \ est \ R \ x_2)\}$$

(This example illustrates also how much simpler the structure of the language *PL* can be than the language of the corresponding propositions from the language of the functional calculus).

(R 3) If a given occurrence of the quantifying pro-form $\cap$ (or $\cup$) occurs in the subject of the elementary component of the proposition φ of *PL*, and in the predicative of this elementary component there occurs an occurrence of the pro-form $\frown^n$, then the range of the occurrence of the pro-form $\cap$ (or $\cup$) in the proposition φ is the component of the proposition φ which is the range of the occurrence of the pro-form $\frown^n$ mentioned.

The rule concerns the phenomenon of extending the range of some quantifying pro-forms by another quantifying pro-form. In the *PL* language, the pro-form $\frown^n$ extends — under some circumstances — the range of the pro-forms $\cap$ and $\cup$. This rule is in place in Polish, too, which can be seen when trying to arrive at the sense of the colloquial sentence: *Tutaj każdy zna kogoś, a ten ktoś jest co najmniej dyrektorem departamentu* [here everybody knows somebody and this somebody is at least the director of a department]. It can also find a rationale in the reasons of consistency. Note the statement:

a jest R pewnego N-a [a is the R of some N.]

is a shortcut of

a jest R-em kogoś i ten ktoś jest N-em.
[a is the R of somebody and this somebody is N.]

By means of quantifiers, these statements will be formulated identically:

$\bigvee_{x_1}$ *est* $R\ x_1 \wedge\ x_1$ *est* $N)$

Then the sentences:

Każdy jest R-em pewnego N-a.
[Everybody is an R of some N]

and

Każdy jest R-em kogoś i ten ktoś jest N-em.
[Everybody is the R of somebody and this somebody is N.]

ought to be formulated:

$\bigwedge_{x}\bigvee_{x_1}(x$*est* $R\ x_1 \wedge\ x_1$ *est* $N)$

According to the rule (R 3) whole sentence 21) is in the range of a pronoun $\cap$.

(21) $\underbrace{\cap\ \textit{est}\ R \frown^1 \wedge\ O^1\ \textit{est}\ N}_{\cap,\ \frown^1}$

The definition (D2) and the rules (R1), (R2) and (R3) unambiguously define the range of every occurrence of the quantifying pro-form in any proposition of *PL*.

The relation of being the antecedent of a reflectory pronoun is defined by the following conditions:

(A1) The antecedent of a given occurrence of the reflectory pro-form O^n (n $\neq$ 0) can only be an occurrence of the pro-form $\frown^n$ or the constant a_i^n.

(A2) A given occurrence of the pro-form $\frown^n$ (or the constant a_i^n) (n $\neq$ 0) is the antecedent of a given occurrence of the pro-form O^m (m $\neq$ 0) iff a given occurrence of the pro-form O^m occurs in the range of a given occurrence of the pro-form $\frown^n$ (or the constant a_i^n) and m = n.

(A3) The antecedent of a given occurrence of the reflectory pronoun O^0 can only be an occurrence of the pro-form $\cap$, $\cup$, O^n (n $\neq$ 0) or the constant a_i^0.

(A4) The antecedent of a given occurrence of the pro-form O^0 is always the occurrence of the expression $\cap$, $\cup$, O^n or a_i^0 which occurs alongside it in the same elementary expression.

IV

In order to obtain a clear interpretation of the semantic interdependencies between the expressions of *PL* a general method of translating *PL* statements into a formalized language using quantifiers and variables will now be demonstrated. This language will be called *QL*. *QL* does not differ significantly from the standard language of the max. 2-argument predicate calculus. The differences consist just in a different spelling and the presence within *QL* of an intrasentential negation, which can of course be treated as a secondary term.

QL will be made up of:

1) the symbols *est* and $e\bar{s}t$ and the same conjunctions as in *PL*,
2) the same general names and relatives as in *PL*,
3) individual constants the same as in *PL* but without inflection indexes,
4) individual variables: x_1, x_2, x_3, ..., x_n, ...
5) quantifiers: general $\bigwedge$ and particular $\bigvee$,
6) parentheses.

We call expressions from *QL* any finite strings of symbols belonging to the lexicon of the language *QL*.

The concept of *QL* proposition is defined as follows:

(D3)

1. The expressions of *QL*, of the following form:

$a_i\ est\ N_k$, $a_i\ e\bar{s}t\ N_k$, $a_i\ est\ R_1 a_j$, $a_i\ e\bar{s}t\ R_1 a_j$

are *QL* sentences.

2. If *QL* expressions φ and ψ are *QL* sentences, then $\backsim\ \varphi$, $\varphi \rightarrow\ \psi$, $\varphi \wedge \psi$, $\varphi \vee \psi$, $\varphi \leftrightarrow\ \psi$ are *QL* sentences.

3. If for some i the expression of *QL*: $\varphi[x_n/a_i]$ is a *QL* proposition and $\varphi[x_n/a_i] \neq \varphi$ then $\bigwedge\limits_{x_n}\varphi$ and $\bigvee\limits_{x_n}\varphi$ are *QL* sentences.

(This way of defining sentences with quantifiers comes from A. Robinson and, what is characteristic is that it does not allow redundant quantifiers or the use of a quantifier that binds the same variable. *PL* sentences have similar properties regarding the application of redundant inflectional indexes and the use of one quantifying pro-form in the range of the other).

Now the concept of the model of *QL* and a true sentence in this model will be introduced.
The model of the *QL* language is any arrangement of:

$$\mathrm{M} = <U;\ X_1,\ ...,\ X_r;\ Y_1,\ ...,\ Y_s>,$$

where U is a not-empty set, $X_1, \ldots, X_r$ — subsets of U — and $Y_1, \ldots, Y_s$ are subsets of the Cartesian multiplication UXU. There is a Δ_m function related to each model M, which subordinates a denotation to each descriptive constant. We assume that the function Δ_m reflects the set of individual constants of the *QL* language onto the set U, that is, that each element of the set U has a name in *QL*. Because we previously accepted that the set of individual constants of the *QL* language — as is the case in *PL* — is countable, we will only speak of *QL* language countable models. (This limitation is not relevant as owing to a known assertion which has it that any proposition is true in a given model if and only if it is true in a countable model, the semantic notions of consequence and tautology, described in the set of countable models, do not differ in range from the notions described in a set of free models). Also, it is assumed of the function Δ_m that $\Delta_m(N_k) = X_k$ and $\Delta_m(R_2) = Y_1$.

Using the abbreviation $Ver_m(QL)$ to denote the set of *QL* propositions that are true in the Mmodel, the set will be characterized by way of the following conditions:

1. a) $\ulcorner a_i\ est\ N_k \urcorner \in\ Ver_m(QL)$ iff $\Delta_m(a_i) \in \Delta_m(N_k)$,
   b) $\ulcorner a_i\ \bar{est}\ N_k \urcorner \in\ Ver_m(QL)$ iff $\Delta_m(a_i) \notin \Delta_m(N_k)$,
   c) $\ulcorner a_i\ est\ R_1 a_j \urcorner \in\ Ver_m(QL)$ iff $< \Delta_m(a_i), \Delta_m(a_j)> \in \Delta_m(R_1)$,
   d) $\ulcorner a_i\ \bar{est}\ R_1 a_j \urcorner \in\ Ver_m(QL)$ iff $< \Delta_m(a_i), \Delta_m(a_j)> \notin \Delta_m(R_1)$.
2. if the expressions φ and ψ are *QL* propositions, then
   a) $\ulcorner \sim \varphi \urcorner \in\ Ver_m(QL)$ iff $\varphi \notin\ Ver_m(QL)$,
   b) $\ulcorner \varphi \rightarrow \psi \urcorner \in\ Ver_m(QL)$ iff $\varphi \notin\ Ver_m(QL)$ or $\psi \in\ Ver_m(QL)$,
   c) $\ulcorner \varphi \wedge \psi \urcorner \in\ Ver_m(QL)$ iff $\varphi \in\ Ver_m(QL)$ and $\psi \in\ Ver_m(QL)$,
   d) $\ulcorner \varphi \vee \psi \urcorner \in\ Ver_m(QL)$ iff $\varphi \in\ Ver_m(QL)$ or $\psi \in\ Ver_m(QL)$,

e) $\ulcorner \varphi \leftrightarrow \psi \urcorner \in \ Ver_m(QL)$ iff $\varphi \in \ Ver_m(QL)$ only when $\psi \in \ Ver_m(QL)$.
3. If the expression $\bigwedge\limits_{x_n} \varphi$ is a QL sentence, then $\ulcorner \bigwedge\limits_{x_n} \varphi \urcorner \in \ Ver_m(QL)$ iff, for any i, $\varphi[x_n/a_i] \in Ver_m(QL)$.
4. If the expression $\bigvee\limits_{x_n} \varphi$ is a QL sentence, then $\ulcorner \bigvee\limits_{x_n} \varphi \urcorner \in \ Ver_m(QL)$ iff, for a certain i, $\varphi[x_n/a_i] \in Ver_m(QL)$.

Now the method of translating PL propositions into QL statements will be described. The rule of translation that will be used here is similar to those which were applied in the preceding chapter. Making use of the fact that QL has intrasentential negation, we try to obtain as literal a translation as possible so as to facilitate the comparison of QL and PL. One of the principles of the translation applied here is keeping intrasentential negation. The tradeoff is that in some cases — in the predicative of elementary negative statements — the general pro-form is rendered with a particular quantifier, with the particular pro-form rendered by a general quantifier.
So, the sentences:

a_i $e\bar{s}t$ $R_1 \cap$ and a_i $e\bar{s}t$ $R_1 \cup$

are translated into:

$\bigvee\limits_{x_1}$ (a_i $e\bar{s}t$ R_1 x_1) and $\bigwedge\limits_{x_1}$ (a_i $e\bar{s}t$ R_1 x_1)

The translation of the sentence φ of the PL language into QL will be obtained by making the following transformations:

1. if the proposition φ contains the occurrence of the constant a_i^k ($k \neq 0$), then we replace it with the constant a_i (the inflectional index crossed out) and substitute the same expression a_i in place of all occurrences of the pro-form O^k which occurred within the range of the given occurrence of the constant a_i^k and in place of all occurrences of the pro-form O^0 tied with them by a reflectory relationship.

2. If the proposition φ contains the quantifying pro-forms $\supset^n$, $\cap$ or $\cup$, then:

a. we add parentheses that delimit the range of particular occurrences of the quantifying pro-forms.

b. each occurrence of the pro-form $\frown^n$ is replaced by the variable x_{2n} and the same variable is supplied in place of all occurrences of the O^n pro-form that occurred within its range and in place of all occurrences of the pro-form O^0 associated with it by a reflectory relationship.
c. the occurrences of the pro-forms $\cap$ and $\cup$ are substituted, in the order of their occurrence, with the variables x_1, x_2, x_3, ..., x_i, ... If a given occurrence of $\cap$ (or $\cup$) is associated by a reflectory relationship with an occurrence of the pro-form 0^o, then it is replaced by the same variable as the occurrence of the pronoun $\cap$ (or $\cup$).
d. before the parentheses that delimit the range of a given occurrence of a quantifying pronoun a suitable quantifier is added with which the occurrence of pro-form was replaced by.
The quantifiers are written along with the following assignment:

1. The quantifier $\frown^n$ corresponds to $\bigwedge$ if its range is a conjunction or an elementary expression, and, in the remaining cases — $\bigvee$.

2. The pro-form $\cap$ corresponds to $\bigvee$ in the predicative of elementary negative expressions, and $\bigwedge$ in the remaining cases.

3. The pro-form $\cup$ corresponds to $\bigwedge$ in the predicative of elementary negative expressions, and $\bigvee$ in the remaining cases.

e. in case several occurrences of quantifying pro-forms have the same range, the corresponding quantifiers are placed in the order of these occurrences' taking place.

The adequacy of the method of translation presented here versus the semantic relationships that obtain in a natural language is corroborated by the examples provided previously. The rules of substituting pro-forms with variables described in b. and c. have been adopted for the following reasons:

1. so that no equating would take place between the variables corresponding to the various occurrences of quantifying pro-forms in ways which could change the sense of the utterance;

2. so that the quantifier that binds a given variable would not find itself within the range of another quantifier that binds the same variable which would lead beyond the set of *QL* propositions.

V

In this chapter a definition will be presented of a true *PL* proposition. This notion is relativized to a certain model of *PL*. *PL* models do not differ in anything from the previously described *QL* language models. They are also arrangements of the type:

$M = <U;\ X_1, ...,\ X_r;\ Y_1, ...,\ Y_s>$

The denotation function related to a given model becomes transformed only in the event of individual constants. We assume here that the function Δ_m reflects the set of constants of the type a_i^0 onto the set U and that for any $k \neq 0$, $\Delta_m(a_i^k) = \Delta_m(a_i^0)$. Like in *QL*, only countable models are considered.

In order to achieve the biggest transparency of definition, the reflectory pro-form O^0 is eliminated from *PL*, whose role in *PL* is insignificant. Notably, the pro-forms $\cap$ and $\cup$ are not indispensable as any proposition of *PL* where these occur may be replaced by a logically equivalent proposition that only includes the pro-forms $\frown^n$ and O^n $(n \neq 0)$. This is argued for in the next chapter.

If the pro-forms $\cap$ and $\cup$ were treated as secondary terms, a definition of a true *PL* proposition would be greatly simplified. This simplification can also be arrived at by the intrasentential negation being counted as a secondary term.

For a greater clarity of the definition the following symbolic acronyms will be used:

Pr (φ) instead of: φ is a *PL* proposition,
El (φ) instead of: φ is an elementary expression,
ElA (φ) instead of φ is an elementary affirmative expression,
ElN (φ) instead of: φ is an elementary negative expression,
C (φ) instead of: φ is conjunction,
A (φ) instead of: φ is alternative,
I (φ) instead of: φ is implication,
Eq (φ) instead of: φ is equivalence,
$a_i^n|\varphi$ instead of: φ is the range of an occurrence of a certain constant a_i^n $(n \neq 0)$,
$1 \frown^n |\varphi$ instead of: φ is the range of an occurrence of a certain pro-form $\frown^n$ and this occurrence precedes all occurrences of quantifying pro-forms having the range φ.

In the case of the pro-forms $\cap$ and $\cup$ we differentiate their position in elementary components, writing:

$1\ \cap_{pd}|\varphi$ instead of: φ is the range of some occurrence of the pro-form $\cap$ and 1) this occurrence precedes all occurrences of the quantifying pro-forms that have the range φ and 2) this occurrence comes in the position of subject,

$1\ \cap_{or}|\varphi$ instead of: φ is the range of some occurrence of the pro-form $\cap$ and 1) this occurrence precedes all occurrences of quantifying pro-forms having the range φ and 2) this occurrence comes in the predicative.

The symbol $\varphi[\alpha/\beta]$ signifies the result of SUBSTITUTING the expression β for the expression α in the expression φ, while the symbol $\varphi[\alpha,\beta/\gamma]$ — the result of the simultaneous SUBSTITUTING of α and β by γ in the expression φ. The symbol $\varphi[\alpha_1\|\beta]$ signifies the result of the REPLACEMENT in the expression φ of the first occurrence of the expression α with the expression β.

The set of true *PL* sentences in the model $M$is designated by the symbol $Ver_m\ (PL)$.

Using the designations adopted, the set $Ver_m\ (PL)$ can be described unambiguously by the following conditions:

(1.1) $\ulcorner a_i^0\ est\ N_k\urcorner \in\ Ver_m(PL)$ iff $\Delta_m(a_i^0) \in \Delta_m(N_k)$,
(1.2) $\ulcorner a_i^0\ \bar{est}\ N_k\urcorner \in\ Ver_m(PL)$ iff $\Delta_m(a_i^0) \notin \Delta_m(N_k)$,
(1.3) $\ulcorner a_i^0\ est\ R_1 a_j^0\urcorner \in\ Ver_m(PL)$ iff $< \Delta_m(a_i^0), \Delta_m(a_j^0) > \in \Delta_m(R_1)$,
(1.4) $\ulcorner a_i^0\ \bar{est}\ R_1 a_j^0\urcorner \in\ Ver_m(QL)$ iff $< \Delta_m(a_i^0), \Delta_m(a_j^0) > \notin \Delta_m(R_1)$.
(2.1) If Pr (φ), then $\ulcorner\backsim\ \varphi\urcorner \in\ Ver_m(PL)$ iff $\varphi \notin\ Ver_m(PL)$,
(2.2) If the sentences Pr (φ) and Pr (ψ), then:
a. $\ulcorner\varphi \rightarrow\ \psi\urcorner \in\ Ver_m(PL)$ iff $\varphi \notin\ Ver_m(PL)$ or $\psi \in\ Ver_m(PL)$,
b. $\ulcorner\varphi \wedge \psi\urcorner \in\ Ver_m(PL)$ iff $\varphi \in\ Ver_m(PL)$ and $\psi \in\ Ver_m(PL)$,
c. $\ulcorner\varphi \vee \psi\urcorner \in\ Ver_m(PL)$ iff $\varphi \in\ Ver_m(PL)$ or $\psi \in\ Ver_m(PL)$,
d. $\ulcorner\varphi \leftrightarrow\ \psi\urcorner \in\ Ver_m(PL)$ iff $\varphi \in\ Ver_m(PL)$ only when $\psi \in\ Ver_m(PL)$.
(3.1) If $Zd(\varphi)$ and $a_i^n\ |\varphi$, then $\varphi \in\ Ver_m(PL)$ iff $\varphi[a_i^n,\ O^n/a_i^0] \in\ Ver_m(PL)$.
(4.1) If $Zd(\varphi)$ and (El (φ) or C (φ)) and $1\ \supset^n\ |\varphi$, then $\varphi \in\ Ver_m(PL)$ iff for every i, $\varphi[\supset^n\ ,\ O^n/a_i^0] \in\ Ver_m(PL)$.
(4.2) If $Zd(\varphi)$ and (I (φ) or A (φ) or Eq (φ)) and $1\ \supset^n\ |\varphi$, then $\varphi \in Ver_m(PL)$ iff for every i, $\varphi[\supset^n\ ,\ O^n/a_i^0] \in\ Ver_m(PL)$.
(5.1) If $Zd(\varphi)$ and ($1\ \cap_{pd}\ |\varphi$ or $1\ \cap_{or}\ |\varphi$ and ElA (φ)), then $\varphi \in\ Ver_m(PL)$ iff for every i, $\varphi[\cap_1\|a_i^0] \in Ver_m(PL)$.

(5.2) If $Zd(\varphi)$ and ElN (φ) and $1 \cap_{or} |\varphi$, then $\varphi \in Ver_m(PL)$ iff for an i, $\varphi[\cap_1 \| a_i^0] \in Ver_m(PL)$.
(6.1) If $Zd(\varphi)$ and $(1 \cup_{pd} |\varphi$ or $1 \cup_{or} |\varphi$ and ElA $(\varphi))$, then $\varphi \in Ver_m(PL)$ iff for an i $\varphi[\cup_1 \| a_i^0] \in Ver_m(PL)$.
(6.2) If $Zd(\varphi)$ and ElN (φ) and $1 \cup_{or} |\varphi$, then $\varphi \in Ver_m(PL)$ iff for every i, $\varphi[\cup_1 \| a_i^0] \in Ver_m(PL)$.

The adequacy of the above description of the set $Ver_m(PL)$ can be stated by comparing it to the description of the set $Ver_m(QL)$ by way of the rules previously indicated concerning translating *PL* propositions into *QL*.

In order to establish that it indicates a necessary and sufficient condition of truthfulness for any *PL* proposition, one needs to appeal to the rules of quantifying pro-forms' range, too.

As we know, by using the concept of a true *PL* proposition (relativized to a given model), the function of logical consequence can be defined for the *PL* language. Only the logical calculus of *PL* expressions could provide a direct formal description of this function. It is easy to predict that such a calculus, in its part concerning pro-forms, would considerably differ from standard calculi. It is possible that in some ways such a calculus would be simpler than standard ones as all operations performed on it would come down to transformations that belong to propositional calculus and to the operations of substitution or replacement. At the moment we only have an indirect formal description of the logical consequence function, determined on *PL* expressions: the inference obtaining between *PL* propositions can be settled by having those translated into *QL* and investigating the logical relationships obtaining between the corresponding *QL* propositions.

VI

Comparing *QL* and *PL* a conclusion can be reached that not everything that can be said in *QL* can also be said in *PL* (but the reverse holds true as evidenced by the method of translating *PL* propositions into *QL*, formulated in chapter IV). This conclusion seems to be corroborated by the following observations:

By translating *PL* into *QL* using the method mentioned, we always obtain propositions in which the sequence of quantifiers and the sequence of the occurrence of the corresponding variables is the same. The proposition:

$$\bigvee_{x_1}\bigwedge_{x_2}(x_2 est\ R_1 x_1)$$

cannot be a translation of any *PL* proposition.

Also, the occurrence of the pro-form $\supset^n$, whose range is conjunction, always has an existential sense. Hence, the statement:

$$\bigwedge_{x_1}\bigwedge_{x_2}(x_2 est\ R_1 x_2 \wedge x_2\ est\ R_1 x_1)$$

cannot be a translation of any *PL* proposition.

The conclusion which was arrived at in the beginning does not appear relevant though. Based on the fact that the sets of models of *PL* and *QL* are identical, we can use the notion of logical equivalence in reference to propositions each belonging to the other language; in so generalizing the notion of logical equivalence, we assume that:

A sentence φ of the *PL* language and a sentence ψ of *QL* are LOGICALLY EQUIVALENT iff for any Mmodel, $\varphi \in \ Ver_m\ (PL)$ iff $\psi \in \ Ver_m\ (QL)$. The following theorem will now be proved:

(T 1) For any φ of the language *QL* there exists such a sentence ψ of the language *PL* that φ is logically equivalent to ψ.

This theorem can be called one of informational equivalence of *PL* an *QL* as it states that the information resources that can be conveyed by means of *PL* or *QL* are identical.

As we know, every *QL* sentence can be transformed into a logically equivalent proposition of a normal form (with quantifiers at the beginning of the sentence only). In order to prove the theorem (T 1), it is enough to indicate a rule allowing a transformation of a normal *QL* proposition into a logically equivalent *PL* proposition. This rule can be formulated as follows:

1. individual constants a_i is replaced by the constants a_i^0,
2. each occurrence of the variable x_n is replaced by the pro-form O^n,
3. the quantifier $\bigwedge_{x_n}$ is replaced by the expression:

$(\supset^n\ est\ N_k \vee O^n\ e\bar{s}t\ N_k) \rightarrow\ (...$

4. the quantifier $\bigvee_{x_n}$ is replaced by the expression:

$(\supset^n\ est\ N_k \vee O^n\ e\bar{s}t\ N_k) \wedge (...$

5. at the end of the formula we append an appropriate number of closing brackets,

6. one can delete brackets that are redundant along with the conventions adopted for *PL*.

This is to illustrate the translation of:

$$\bigvee_{x_1}\bigwedge_{x_2}(x_2 est\ R_1 x_1),$$

into:

$$(\frown^n\ est\ N_k \vee O^1\ e\bar{s}t\ N_k) \wedge (\frown^2\ \ est\ N_k \vee O^2\ e\bar{s}t\ N_k \rightarrow\ O^2\ est\ R_1 O^1)$$

Further on it will be proved that the way of translating normal *QL* propositions into *PL*, that has been adopted, leads to propositions that are equivalent with the starting sentences.

Let φ signify any normal *QL* proposition and $P_1(\varphi)$ — its translation into *PL*. Let $P_2[P_1(\varphi)]$ signify the translation of the proposition $P_1(\varphi)$ (of *PL*) into *QL* along the rules established in chapter IV. In order to prove that the proposition φ is logically equivalent to $P_1(\varphi)$, it is enough to prove that the sentence $P_1(\varphi)$ is logically equivalent to $P_2[P_1(\varphi)]$ and that the latter is logically equivalent to the proposition φ. The propositions $P_1(\varphi)$ and $P_2[P_1(\varphi)]$ are logically equivalent because the description of the set Ver_m (*PL*) was so selected that the proposition ψ from the language *PL* should belong to Ver_m (*PL*) iff $P_2(\psi)$ belongs to Ver_m (*QL*). It is then enough to prove that the propositions φ and $P_2[P_1(\varphi)]$ are logically equivalent. Both these propositions belong to *QL*, but it is easy to notice that they cannot be identical even when in the sentence $P_2[P_1(\varphi)]$ the indexes at the variables are divided by 2 (which can always be done as in the sentence $P_1(\varphi)$ the quantifying pro-forms $\cap$ and $\cup$ do not occur, so all indexes are even). The expression $P_2[P_1(\varphi)]$ is then different from the expression φ in the presence of tautological formulas of the type:

$$x^n\ est\ N_k \vee x^n\ e\bar{s}t\ N_k.$$

In our example, the proposition $P_2[P_1(\varphi)]$ looks as follows:

$$\bigwedge_{x_1}[(x^1\ est\ N_k \vee x^1\ e\bar{s}t\ N_k) \wedge \bigwedge_{x_2}[(x^2\ est\ N_k \vee x^2\ e\bar{s}t\ N_k \rightarrow\ x^2\ est\ R_1 x_1)].$$

The proposition $P_2[P_1(\varphi)]$ is, however, logically equivalent to the proposition φ because — as can easily be argued — every proposition of the type:

$$\bigwedge_{x_n}[\tau\ (x_n) \rightarrow\ \alpha(x_n)],$$

where $\tau(x_n)$ is a tautological formula, is logically equivalent to the proposition:

$$\bigwedge_{x_n}\alpha\ (x_n)$$

and also every proposition of the type:

$$\bigvee_{x_n}[\tau\ (x_n) \wedge \alpha(x_n)]$$

is logically equivalent to the proposition

$$\bigwedge_{x_n}\alpha(x_n).$$

Note that the *PL* sentences that are translations of a normal form of the language *QL* do not include quantifying pro-forms $\cap$ or $\cup$. We know that for any statement φ of the language *PL* there is a logically equivalent proposition ψ of the language *QL* which, in turn, is logically equivalent to its normal form $\mathrm{N}(\psi)$, and this one — to a *PL* proposition $P_1[N(\psi)]$, which does not contain the pro-forms $\cap$ and $\cup$. It hence follows that:

(*T* 2) For every *PL* proposition φ there is a logically equivalent proposition φ' of the same language that has no quantifying pro-forms $\cap$ or $\cup$.

The quantifying pro-forms $\cap$ and $\cup$ are thus — given a certain meaning of the phrase — secondary terms on account of the quantifying pro-form $\frown^n\!\!\smile$ and the reflectory pro-form O^n.

VII

The comparison of *PL* propositions with expressions from the natural language that are approximate in structure reveals that in a natural language the same can generally be said in another — much shorter — manner. This is illustrated by the three equivalent propositions:

(1.1) $\frown^1\!\!\smile$ *est N* $\rightarrow$ O^1 *est R* $\frown^2\!\!\smile$ $\wedge$ O^2 *est M.*

(1.2) If someone$_1$ is N, then this one$_1$ is someone$_2$'s R, and this one$_2$ is M.
(1.3) Every N is some M's R.

The abbreviation of the utterance is about bringing complex propositions or components of complex propositions to a categorical form by way of using syntactic forms, not yet discussed here, of the type: *every (a, no) N, of every (a, no) N*. We can also abbreviate utterances in a natural language by using conjunctions as name-generating functors and a similar usage of negation. We thus obtain general names and relatives of the type: non-N (non-sentimental), N and M (scholar and administrator), N or M (engineer or technician), R and S (friend and adviser), R or S (maternal uncle or paternal uncle).

There are no reasons why all such syntactic forms should not find their way to *PL*. As the subject matter of this discussion are pro-forms only, we will stop at enriching *PL* in two new syntactic forms: $\cap_N$and $\cup_N$. We take it for granted that in relation to them the same syntactic rules apply as those which govern the use of the pro-forms $\cap$ and $\cup$ (*cf.* the definition of a *PL* proposition {D1} 3, 4). These expressions, just like $\cap$ and $\cup$ are counted into the syntactic category of individual names. The expression $\cap_N$ reads: *(of) every N* or *no N* (in the subject of elementary negative expressions), whereas the expression $\cup_N$ *(of) an N* or *no N* (in the predicative of elementary negative expressions).

It will be demonstrated that the expressions $\cap_N$ and $\cup_N$ are secondary in *PL* on account of the pro-forms $\frown^n$ and O^n, by indicating a set of rules that allow the elimination of the expressions $\cap_N$ and $\cup_N$ from any *PL* proposition. These rules have the form of replacement rules. Each of these allows the replacement of φ by ψ in any proposition. The expressions φ and ψ are propositions or components of propositions. In forming the rules, the syntactic variable α will be used which represents any *PL* expressions in individual names category, that is:

$$a_i^n (n = 0, 1, 2, ...), \frown^n \ (n = 1, 2, ...), O^n (n = 0, 1, 2, ...), \cap, \cup$$

and $\cap_N$, $\cup_N$. Using the rules is subject to the following two conditions: 1) the expression φ (replacement) occurs in the range of no occurrence of the pro-form $\frown^n$ or the constant a_i^n, 2) if α is an expression of a form of a_i^m, $\frown^m$ or O^m (m $\neq$ 0), then m $\neq$ n.

For the sake of simplifying the rules discussed here, it is convenient to use in some cases the symbol of reverse implication, which for this purpose

is introduced into the vocabulary of the *PL* language. The sign of reverse implication $\leftarrow$ is read ...., if ..... . Using the symbol: est/$\bar{e}st$ means that the rule concerns both elementary affirmative expressions and negative ones.

These are the rules of the elimination of the expressions $\cap_N$ and $\cup_N$:

$$(\text{R } 1.1)\ \frac{\underset{N}{\cap}\ est/\overline{est}\ M}{\supset^n est\ N \rightarrow O^n\ est/\overline{est}\ M}$$

$$(\text{R } 1.2)\ \frac{\underset{N}{\cap}\ est/\overline{est}\ R\ \alpha}{\supset^n est\ N \rightarrow O^n\ est/\overline{est}\ R\ \alpha}$$

$$(\text{R } 1.3)\ \frac{\alpha\ est\ R\ \underset{N}{\cap}}{\alpha\ est\ R \supset^n \leftarrow O^n\ \overline{est}\ N}$$

$$(\text{R } 1.4)\ \frac{\alpha\ \overline{est}\ R\ \underset{N}{\cap}}{\alpha\ \overline{est}\ R \supset^n \wedge\ O^n\ est\ N}$$

$$(\text{R } 2.1)\ \frac{\underset{N}{\cup}\ est/\overline{est}\ M}{\supset^n est\ N\ \wedge\ O^n\ est/\overline{est}\ M}$$

$$(\text{R } 2.2)\ \frac{\underset{N}{\cup}\ est/\overline{est}\ R\ \alpha}{\supset^n\ est\ N \wedge O^n\ est/\overline{est}\ R\ \alpha}$$

$$(\text{R } 2.3)\ \frac{\alpha\ est\ R\ \underset{N}{\cup}}{\alpha\ est\ R \supset^n \wedge\ O^n\ est\ N}$$

$$(\text{R } 2.4)\ \frac{\alpha\ \overline{est}\ R\ \underset{N}{\cup}}{\alpha\ \overline{est}\ R \supset^n \leftarrow O^n\ est\ N}$$

The process of the elimination of the expressions $\cap_N$ and $\cup_N$will be illustrated by the example of a *PL* counterpart of (1.3), that is:

(2.1) $\cap_N est\ R \cup_M$.

Using rule (R 1.2) we obtain:

(2.2) $\supset^1 \quad est\ N \rightarrow\ O^1\ est\ R \cup_M$.

Using rule (R 2.3) to the consequent of the expression (2.2), we obtain:

(2.3) $\frown^1$ *est* $N \rightarrow$ O^1 *est* R $\frown^2$ $\wedge$ O^2 *est* M,

that is, the expression (1.1).

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CODE OF CONDUCT FOR NATURAL LANGUAGE

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The aim of this paper is to draw attention to and characterize certain methodological changes that are taking place in modern linguistics. More specifically, I intend to survey those aspects of methodological evolution (or perhaps revolution?) in linguistics that are responsible for the progress it has made in defining itself vis-á-vis the formal-logical theory of language. Identifying the existing similarities and differences between the two disciplines with regard to their subject matters, methods and research objectives will perhaps contribute to removing at least some of the misunderstandings that arise in the 'professional' exchanges between linguists and logicians.

The present treatment of the methodological situation in linguistics is deliberately sketchy and fragmentary: it discusses only some of the current trends and schools of thought, emphasizing only the most fundamental assumptions. There are several reasons why a more detailed description would not be feasible. Firstly, the heterogeneous nature of the problems classified as falling in the scope of linguistics makes some approaches methodologically incomparable to one another. Secondly, some problems, concepts and research techniques associated with the different approaches are undergoing radical changes. And, thirdly, some concepts, positions and proposals that can be found in the literature are far from clear. The conclusions of this paper are tentative, as they rely on one of the many possible interpretations of the published material in linguistics.

Empirical Basis and Subject of Study

All the questions posed within the science of linguistics arise from particular human behaviors that we label as 'linguistic;' these behaviors also serve as the ultimate criterion of the cognitive value of linguistic claims. The knowledge offered by linguistics about the linguistic behaviors of a language community is framed in terms of a description of the LANGUAGE spoken by that community.

The empirical basis for the study of language consists of physical products of linguistic behaviors: namely, strings of noises. Linguistic description presupposes a particular way of segmenting those strings of noises and relies on some established principles for identifying certain segments as tokens of the same EXPRESSION. The description does not simply provide a characterization of empirically discovered expressions; it goes beyond the available empirical data, encompassing the set of expressions that MAY BE the products of linguistic behavior in a given social group.

The history of science reveals the following, arguably with exceptionless regularity: the researchers' professional self-knowledge lags behind their scientific achievements. This is especially true of the definitions that are offered of the subject matter of a given scientific discipline. They often remain vague, metaphorical, or, indeed, completely illusory long after the science in question has made significant theoretical progress. The concept of language, as a subject of linguistic study, suffered a similar fate: for a long time, its ontological and methodological status remained undetermined. It seems, however, that recent years have seen a breakthrough in this regard.

The inspiration came from de Saussure, and more specifically from his famous distinction between *langue* and *parole* (de Saussure 1916) — language 'in the proper sense' and speech. *Langue* is an abstraction, a system of relations (rules), form rather than substance — whereas *parole* is a physical realization of *langue*, which is both determined by *langue* and serves as evidence of its existence.

The distinction has become the subject of many interpretations and critical analyses (e.g. Zawadowski 1958). It is difficult to assess its contribution to the advances of 20th-century linguistics. It is clear, however, that research practice in linguistics has born out de Saussure's claim that the abstract *langue* constitutes the proper subject of linguistics. It also seems that recent construals of this distinction are bringing us closer to its complete and adequate explication.

What I have in mind are the concepts of competence and performance, employed by Chomsky and his followers (Chomsky 1965, ch. 1, §§1, 2.). Competence, defined loosely as 'the linguistic knowledge possessed by an

ideal speaker-hearer,' receives an exact characterization in the scientific work of Chomsky's school. Performance, or the products of the linguistic behaviors of actual speakers, is the psychologically constrained realization of this knowledge. The first and foremost task for linguistics is to construct a theory of competence, which is a fairly radical idealization of performance. Only with such a theory in place can one begin a scientific study of performance, which, together with psychology, would yield theories of actual human linguistic behavior.

An important component of the latest views on the nature of the subject matter of linguistics is the belief that the available empirical data and the inductive procedures known from the philosophy of science do not provide a sufficient basis for reconstructing any natural language. Acquisition of competence with respect to a particular language is only explicable on the assumption that the speaker possesses some a priori knowledge of possible languages, a knowledge which comes as part of a cognitive endowment characteristic of the human mind (Chomsky 1965, ch. I, §8; Chomsky 1969; Katz, Postal 1964, §5.5). Correspondingly, it is impossible to obtain an adequate description of any language whatsoever by way of a pure observation of facts, a classification of collected data or inductive generalization.

Thus, modern linguistics has parted with many past conceptions of its subject of study and scope of research. It first abandoned the vague psychologistic slogan of analyzing language as 'an instrument for communicating thoughts.' Then it rejected the program of conducting narrowly empirical research into 'actualized' language, or speech, with a view to discovering its governing patterns and customs. It now focuses on a product of abstraction: the body of ideal linguistic knowledge which is supposed to form a theoretical basis for language as an empirical phenomenon. It proposes to replace a faithful description of facts with theory. It presents itself as an explanatory discipline.

This being so, some traditional arguments for the claim that the subject matter of linguistics is essentially distinct from that of the formal-logical theory of language lose their bite. More specifically, the claim that the subject matter of linguistics is given in experience (as physical products of linguistic behavior), while the language studied by logicians is given theoretically (as a set of rules), was justified only on the assumption that *parole* constitutes the sole subject of linguistic study. After all, de Saussure's *langue* and Chomsky's competence are not physical objects but rather sets of rules! The argument purporting that natural languages studied by the linguist are subject to certain constructive restrictions, of which artificial

languages studied by logic are free, collapses for much the same reason: the restrictions in question, which hold for actual linguistic behaviors, derive solely from the physico-psychological causes of those behaviors. There is no evidence that the notion of ideal linguistic knowledge should come into conflict with the principle of unrestricted construction; on the contrary, the principle seems to be a necessary component of an adequate description of natural language (Bach 1964: 12-13). Finally, given that the fact that no natural language is strictly determined by its empirical realizations entails that observational and inductive procedures can be employed only at the first stage of language reconstruction, one can venture that the kind of cognitive faculty operative at subsequent stages of that process is essentially no different from the faculty engaged in creating the 'arbitrary' languages constructed and studied in logic — regardless of whether we shall regard it as a sort of innate 'intuition' or a product of empirical interactions with an extra-linguistic reality.

The Goals of the Theory

The psychological and neuro-physiological nature of the linguistic competence of a grown person remains outside the purview of linguistics. Nor is linguistics interested in the biological endowment by virtue of which man can achieve this competence. Instead, linguistics seeks to answer the following two questions:

(1) What does a competent language user 'know' about his or her language?

(2) What must one 'know' about languages in general in order to be able to learn any of them?

It goes without saying that neither of these questions is about the kind of meta-linguistic knowledge that could be verbalized by a competent language user; a sufficient criterion of knowledge possession, in the intended sense of the term, is proficiency of language use and the capacity to learn any language in the usual way, respectively.

An answer to the first question should explain several kinds of facts which reflect the linguistic competence of natural language users. Chief among those facts is the ability to produce and interpret an indefinite number of sentences, most of which are novel ones (such that the language user has never heard them before). A second important fact is the ability to detect ambiguous sentences and to establish their possible interpretations, a third — the ability to identify, and sometimes interpret, deviant sentences.

An answer to the second question must explain how linguistic competence is acquired on the basis of the limited linguistic data available in the course of learning a language. One consequence of the creative character of linguistic competence, supported by the facts described above, is that learning a language cannot be a simple matter of storing information and generalizing upon it. The extent to which the human mind processes the scarce linguistic information and selects from a number of admissible options a single correct extrapolation of the data indicating the existence of some 'task constraints,' a knowledge about possible languages.

A major goal of linguistics is to provide, for every natural language, a description of the linguistic competence of its users formulated in terms of a set of rules. Let us call such a set of rules the GRAMMAR of a language. Providing adequate grammars for a sufficient number of natural languages would enable us to take up another task of theoretical linguistics: the construction of a UNIVERSAL GRAMMAR, or rather a GENERAL THEORY OF GRAMMARS, which would represent our knowledge about possible languages and thereby explain the mysterious properties of human 'linguistic intuition.'

Linguistics has only recently begun to make conscious and potentially fruitful attempts at tackling the latter task.[1] Although one can treat the theoretical results of traditional grammar as a partial explication of the linguistic competence of the speakers of particular languages, given the notorious incompleteness of this explication, it is better to regard it as a by-product of an altogether different endeavor. As a matter of fact, even the most thorough grammars contain many gaps; indeed, they are sets of rules that serve merely as EXAMPLES and GUIDELINES for the reader as to how sentences of a given language should be constructed or understood. Given this heuristic nature of traditional grammars, one should classify them as practical rather than theoretical achievements — significant in the context of education rather than science.

A grammar that explicitly characterizes the relevant properties of a natural language without appeal to the intelligence of the reader is known as a GENERATIVE GRAMMAR. A generative grammar of a given language is a set of rules that pair each phonetically possible utterance with a STRUCTURAL DESCRIPTION, which determines all the constituents of the utterance together with all inter-constituent relations. Grammatical

[1]The publication of N. Chomsky's *Syntactic Structures* (1957) is usually regarded as the turning point, although many of its ideas have since lost their topicality or been modified.

sentences of the language correspond to a special set of such structural descriptions. The set of utterances defined by such descriptions is called the LANGUAGE GENERATED BY A GIVEN GRAMMAR.

Generative grammars grew out of the theoretical assumptions, methods and research techniques of the structuralist schools in linguistics. However, the generative grammars constructed within the conceptual framework of classical structuralism did not provide an explanation for the basic linguistic facts of sentence production and sentence comprehension. The explanatory power of those grammars was negligible because, loosely speaking, the structural descriptions of utterances that they offered in terms of the so-called phrase markers were not subtle enough. As a scheme for adequately representing theories of linguistic competence, grammars of this type (called PHRASE STRUCTURE GRAMMARS or CONSTITUENCY GRAMMARS) are contrasted with the so-called TRANSFORMATIONAL generative grammars.[2]

For over a decade now, the methodological assumptions of transformational grammars have been a topic of great interest for mathematicians, logicians, psychologists and philosophers of language as well as linguists. In the course of many discussions, the theory has undergone significant changes,[3] and nothing suggests that it has already taken its final shape. It seems, however, that one can regard its basic research objectives as fixed. We shall discuss them in a little more detail, focusing on the already mentioned task of explaining the interpretability of sentences.

In providing the sentences of a language with their structural descriptions, a transformational grammar should 'mimic' the language user in how he or she comprehends an utterance with respect to those of its aspects that do not presuppose reference to an extra-linguistic reality. Thus, for example, it should distinguish the grammatical from the deviant, as well as the unambiguous from the ambiguous, assigning the correct number of interpretations to the latter. It should identify synonymous sentences, capture differences in meaning between any pair of sentences and characterize those differences in terms of inter-sentence meaning relations (entailment, incompatibility, independence, etc.).

[2]For the relation between transformational grammar and phrase structure grammar see Szaumian 1966; Chomsky 1964.

[3]From our present perspective, the publication of Katz and Fodor's *The Structure of Semantic Theory* (1963) was the turning point in the development of this theory, supplementing Chomsky's phonological-syntactic conception with the semantic component.

All the proposals to date as to the internal structure of grammars satisfying these conditions divide the task of their fulfillment between the syntactic and the semantic component; also, all of them respect the principle that the meaning of a sentence is a function of the meaning of its constituents. From the general point of view we are assuming here, differences between those proposals appear irrelevant.[4] It is an important fact, however, which has many consequences for the relation between linguistics and the logical theory of language, that they abstract from those properties the acts of comprehension that associate linguistic expressions with extra-linguistic reality. The apparatus of transformational grammar does not distinguish between sentence meanings whose interpretation depends on situational context (though it takes into account linguistic context);[5] it does not even distinguish such sentences from other sentences. Above all, it does not capture those aspects of the phenomenon of synthetic (situation-independent) sentence comprehension that enable the language user to determine which sentences are true: it does not account for successful acts of naming objects in the world or for any other referential procedures. It does, however, specify the set of analytic truths for a language, as by assumption it accommodates all intra-linguistic meaning relations.

The idea of describing language in terms of transformational grammar clearly coincides at this point with the formal-logical notion of an uninterpreted language. The latter defines language L in terms of the set of its expressions, E, (with a special subset S of sentences) and the set of sentences, A, where $A \neq S$, that are true in all 'possible worlds' (models) of language L, i.e. in all the domains of reality that can be described using L. Thus, A is the set of analytic truths of L. One can represent language L as an ordered pair of the following form:

(i) $<E, A>$.

An interpretation transforms language L into an ordered triple:

(ii) $<E, A, M>$,

where M is 'the real world' (selected model) of language L, i.e. the domain of reality actually talked about in L. Model Mfixes the denotation of the expressions of L and thereby specifies the set of synthetic truths for L.

[4]Cf. Katz and Postal's proposal (1964) and Weinrich's counterproposal (1966).

[5]Arguments for this construal were presented by Katz and Fodor (1964: 486-491).

Logicians investigate systems of both kinds, making certain standard assumptions about their structure and relations between their elements. Systems of type (i) are investigated within logical syntax; systems of type (ii) are investigated within logical semantics.

It follows that, on the meaning of the term 'semantics' adopted in logic, the theory of language constructed in terms of transformational grammar is programmatically asemantic. By refusing to investigate any relations between linguistic expressions and the things they are used to talk about, it assumes a purely syntactic perspective. Yet, in linguistics, the terms 'semantics' and 'syntax' are used differently than in logic. Moreover, linguists disagree over their precise meaning: the question of how to draw the distinction between syntax and semantics is far from resolved. It seems that one possible solution to this problem would be to classify investigations into set E as belonging to syntax and investigations into set A as belonging to semantics (qua elements of systems of type (i)). To incorporate the 'semantic component' mentioned above into a transformational grammar would be, simply, to decide to describe a language in terms of both set E and set A.[6]

The following question now suggests itself: To what extent can a theory of language based on these principles account for the basic facts of linguistic competence? In particular, what *are* the properties of the act of sentence comprehension (interpretation) which the theory allegedly sets out to explain? If the remarks made above are correct, one can assume that said properties coincide with those stipulated by the following definition of sentence comprehension, which is sometimes investigated in logic:

x comprehends sentence s of language $L \equiv_{df}$ x can identify every sentence entailed analytically by s in L.

The notion of sentence meaning associated with this definition is as follows:

The meaning of sentence s in language L is the set of all analytic entailments of s in L.

It is clear that these definitions are fairly good approximations of our intuitions. It is equally clear, however, that there are certain intuitions that they fail to capture. Indeed, a person may comprehend (in the sense defined above) the sentence 'Man has two eyes' (by identifying its entailments such

[6]One could modify slightly the terminology adopted above by calling systems of type (i) partially (verbally) interpreted and reserving the term 'uninterpreted language' for set E.

as 'Man has a pair of eyes,' 'Man has two visual sense organs,' 'The number of man's eyes is smaller than 3,' etc.) and yet have no idea whether it is true! One can sincerely assert 'It's not raining,' and know perfectly well what the meaning of this sentence is in English, while getting soaked to the bone in a thunderstorm!

If we accept the above definitions as good 'first approximations' of the intuitive notions of meaning and sentence comprehension, these somewhat paradoxical consequences force us to recognize that a gap exists between the explicatum and the explicandum. In order to fill this gap, we must take into account the referential function of linguistic expressions, which the linguistic theory under consideration programmatically ignores. This sometimes gives rise to the objection that linguistic theory does not describe the principal function of language, namely the role it plays in cognition.

The linguist can answer this criticism by pointing out that not only has he not set himself the task of describing the cognitive function of language, but also that such a description is beyond his expertise, as its fulfillment requires certain epistemological and ontological commitments which he is not qualified to make. The referential version of the theory of language ought to be developed within disciplines that have at their disposal a suitable conceptual apparatus and a repertoire of appropriate research methods. In particular, it is the formal theory of knowledge, i.e. logical semantics, that seems up for the task of conducting research into the properties of languages (including natural ones) construed as systems of type (ii).

The Structure of the Theory

The task of answering the second principal question of linguistics, formulated in the previous section, lies with the general theory of grammars. The goals of the theory include providing a method for selecting one from among the many grammars that are compatible with the appropriate corpus of empirical linguistic data (and structural descriptions assigned to them). Above all, however, the general theory of grammars ought to identify the class of POSSIBLE GRAMMARS of natural languages.

Despite continuing discussions over the issue of the internal structure of these grammars, the main methodological outline is quite uncontroversial. First of all, given their generative character, it is necessary to characterize the grammars in purely formal terms; in particular, grammatical rules must be formulated in a way that guarantees the possibility of their 'automatic' application, which is to say they are modeled on formalized deductive systems. (One consequence of this constraint is that the traditional semantic definitions

of categories such as 'noun,' 'verb,' 'adjective,' etc. have been abandoned in favor of enumerative specification). Furthermore, given the intended scope of grammatical description of natural languages, their grammars must include the syntactic, semantic and phonological components (the last one being necessitated by the type of physical realization characteristic of those languages). Finally, well motivated considerations support the view that grammatical rules belonging to each component are heterogeneous; for example, the syntactic component seems to combine so-called rewrite rules with transformation rules.

Ignoring the absence of a phonological component in the formal-logical scheme of the description of artificial languages (which are essentially non-spoken), it seems that the only distinguishing feature of grammars of natural languages is the structural heterogeneity of their rules. It also seems that this feature is exhaustively accounted for by the fact that expressions of artificial languages lack the syntactic and lexical ambiguity characteristic of many expressions of natural languages. In particular, introduction of transformation as well as rewrite rules into the syntactic component of grammar is motivated by the need to distinguish between superficially identical syntactic forms with different semantic interpretations. With regard to syntactically unambiguous expressions, rewrite rules and structural descriptions with which they are associated (phrase markers) carry a sufficient amount of information about the grammatical structures of sentences. On the other hand, the procedure of specifying the set of expressions of a given language by means of describing their structure via inductive definition, so commonly employed in logic, bears a close resemblance to the method of phrase structure grammars.

However, regardless of all the differences and similarities between the formal methods that are in fact being used, what has, in recent years, brought the logical and linguistic studies of language closer together (putting an end, in the words of Bar-Hillel, to their peaceful and uninspiring coexistence) is the idea of mechanizing the determination of syntactic structure. In order to realize this idea in linguistics, it is necessary to fully formalize grammars of natural languages — to reconstruct their internal CODE, as it were — which would open up the prospect of systematic research into the structural properties of those languages and their interrelations.

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Rajmund Ohly

SELECTED SEMIOTIC ASPECTS OF TEXTS (ON THE EXAMPLE OF SWAHILI)

Originally published as "Niektóre aspekty semiotyczne tekstu (na przykładzie języka suahili)," Studia Semiotyczne 2 (1971), 205–228. Translated by Maja Wolsan

We assume that a text is a certain sequence of signs selected from a predetermined repertoire. This sequence of signs, being a linear combination of the selected elementary signs of a finished set of signs (alphabet), forms a semiotic system. A finished set of those signs is then divided into sequences of word-shaped signs in accordance with some established rules (word formation), which are then combined into sentence-shaped sequences in line with the existing system of rules (syntax). If we attribute meaning to those sequences, which takes place when we interpret them, the sequences of signs form words and sentences of a given language (Klaus 1967: 645).

This article will try to answer two main questions: (a) To what extent does the divergence between the contents of two texts influence the proportionality of signs (sequences) used in these texts?; (b) To what extent does the distribution of signs (sequences) reflect the content of the texts?

As a preliminary study, we have confronted two texts: a philosophical parable by Shaaban Robert entitled *Uzuri* (*Beauty*) from the collection *Kielezo Cha Insha* (*Example of a Sketch*) (Robert 1954) was compared with a detective story by Mohd I Faiz, entitled *Uwanja wa Mwizi Umekwisha* (*The End of the Criminal Game*), published in No. 658 of the periodical "Mambo Leo" (Faiz 1962).

Shabaan Robert is considered the most eminent modern writer of the Swahili language area; his works can serve as a model for the creative use of modern Swahili. The analysed work belongs to the genre of moral-philosophical parable stemming directly from classical Swahili moralising

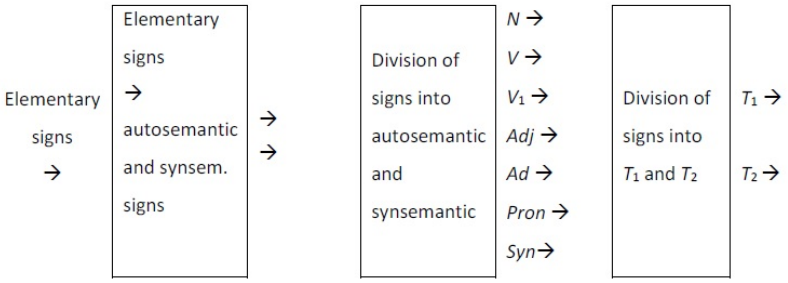
poetry. This genre, while typical of the collection, is quite new in prose as such. The story by Mohd I Faiz, in turn, is one of numerous works inspired directly by the genre of crime-story, massively popular and widespread in Europe. The author's name is not, as it seems, widely known. It should be stressed, however, that "Mambo Leo," which published the story, is one of those periodicals that pay much attention to linguistic correctness.

A. DISTRIBUTION OF SIGNS IN SETS

1. Let us take two texts with an equal number of sentences (32). T_1 (= Shaaban Robert's text) is composed of 1510 elementary signs, T_2 (= Mohd I Faiz's text) of 2102 signs. Compared with the number of sentences in these texts, this gives us on average 47 elementary signs per sentence in T_1 and 65 signs per sentence in T_2. Thus the first difference between the sets stems from the unequal use of elementary signs (T_1 — 100% : T_2 — 129%).[1]

2. Elementary signs were used to create word-shaped sequences, semantic signs, which made up the following subsets: $(N + V + V_1 + Adj + Ad + Pron + Syn^2) \in T_1$ or T_2.

The process can be illustrated as follows:



3. Deviations from the quantitative average of the elementary composition of semantic and synsemantic signs do not exceed 1 elementary sign in the texts. Only the composition of V_1 in T_2 is larger than that in T_1 by 1

[1]The reason for this is that the constitutive sentences in T_1 are simple sentences, while in T_2 they are compound or complex sentences.

[2]These sets can be presented as follows:

$T_1 =$ $N_1, N_2 \ldots N_{118}$; $V_1, V_2 \ldots V_{92}$; $V_{(1)1}, V_{(1)2} \ldots V_{(1)25}$; $Adj_1, Adj_2 \ldots Adj_{25}$; $Ad_0 \ldots Ad_0$; $Pron_1, Pron_2 \ldots Pron_{17}$; $Syn_1, Syn_2 \ldots Syn_{77}$

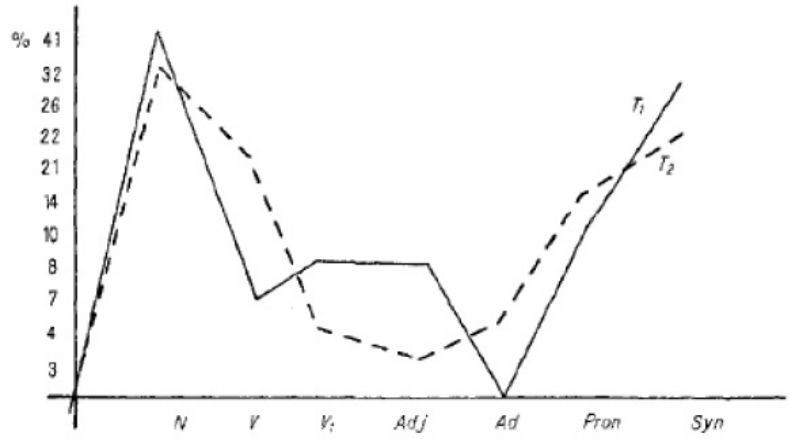
$T_2 =$ $N_1, N_2 \ldots N_{122}$; $V_1, V_2 \ldots V_{83}$; $V_{(1)1}, V_{(1)2} \ldots V_{(1)18}$; $Adj_1, Adj_2 \ldots Adj_{13}$; $Ad_1, Ad_2 \ldots Ad_{18}$; $Pron_1, Pron_2 \ldots Pron_{55}$; $Syn_1, Syn_2 \ldots Syn_{83}$

List of abbreviations: symbolising sings — N = noun, V = verb, V_1 = auxiliary verb, Adj = adjective, Ad = adverb; indicative sings — $Pron$ = pronoun; Syn = synsemantic signs.

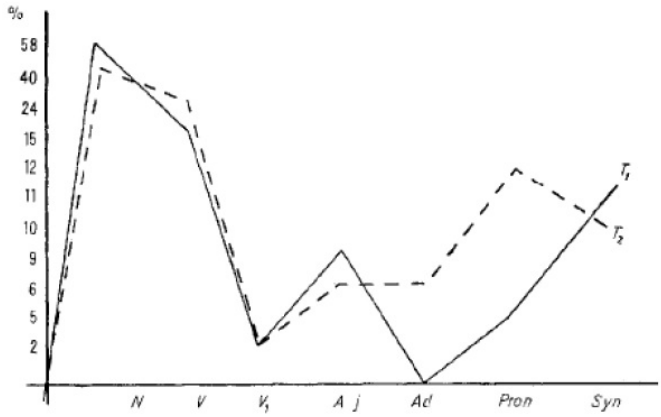
sign, therefore from now on we will leave the issue of elementary signs on the side.

4. In total, T_2 contains 97 semantic and synsemantic signs more than T_1. This quantitative difference is particularly large for verbs (60 units more), pronouns (28 units more) and adverbs (18 units more), but T_1 contains more adjectives than T_2 (12 units more).

The quantitative distribution of the parts of speech (signs) in both texts suggests, however, a tendency to even out the proportions. In fact, the percentage deviation in the distribution of the two texts only once exceeds 10% (T_2 has 14% more V) and once is close to 10% (T_1 has 9% more N); the other deviations do not exceed 5%, as shown on the graph below:



5. The vocabulary of T_2 is richer than that of T_1 by 71 units, which is 35%. The quantitative advantage of T_2 is particularly large in verbs (31 units), pronouns (18 units) and adverbs (12 units). T_1 has only a few more auxiliary verbs and adjectives. The percentage share of signs in both vocabularies shows that the share of N in the vocabulary of T_1accounts for 58% and that of T_2 for 40% of the total number of signs, while for V it is 15% and 24% respectively. Thus, the essential difference between the distributions of signs comes down to an 18% advantage of T_1 over T_2 in terms of the number of N and a 9% advantage of T_2 over T_1 in terms of the number of V. The other deviations do not exceed 7%, as illustrated by the following graph:



6. From the perspective of the frequency of use of each sign from the vocabulary, signs used only once constitute in total 65% of the T_2 vocabulary and 67% of the T_1 vocabulary. As for individual signs, the distribution is as follows:

As regards N: in T_1 75% and in T_2 77% were used once; in T_1 18% and in T_2 13% were used twice; in T_1 3% and in T_2 6% were used three times; and in both texts 4% of the total number of N were used more than three times.

As regards V: in T_1 90% and in T_2 — 59% were used once; in T_1 10% and in T_2 26% were used twice; while 15% were used three times and more, exclusively in T_2.

The frequency in use of V_1 is regular in both texts: 25% of V_1 were used in T_1 once, five, seven and twelve times, while in T_2 33.3% of V_1 were used once, five and twelve times.

As regards *Adj*: T_1 uses 54% and T_2 uses 92% of the vocabulary once,; twice: T_1 30%, T_2 8%; three times and more: 16%, exclusively in T_1.

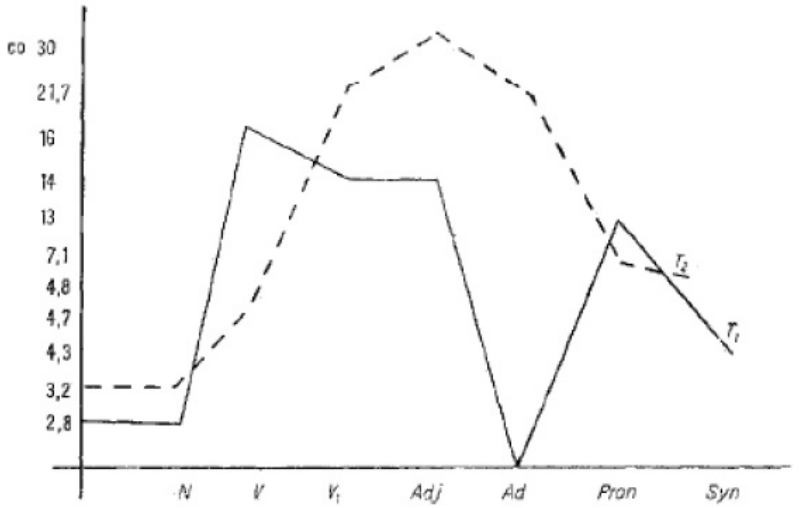
Proper *Ad* practically do not occur in T_1. The frequency of use of *Ad* in T_2 is as follows: once — 67%, twice — 25%, four times — 8%.

As regards *Pron*: 29% in T_1 and 45% in T_2 were used once; 32% were used twice in T_2 (exclusively); 29% in T_1 and 12% in T_2 were used three times; 13% were used fourtimes in T_1 (exclusively); 29% in T_1 and 4% in T_2 were used five times; and 4% were used fifteen times in T_2 (exclusively).

The frequency of *Syn* exhibits the largest distribution in both texts: 38% in T_1 and 35% in T_2 were used once; 23% in T_1 and 30% in T_2 were used twice; 15% were used three times in both T_1 and T_2; 5% were used four times in T_2 (exclusively); 5% were used nine times in T_2 (exclusively); 24% in T_1 and 10% in T_2 were used thirteen times and more.

7. The average frequency of occurrence can be illustrated by the following

amplitude:



B. REGULARITY OF DISTRIBUTION OF SIGNS IN SETS

If we assume that all parts of speech (*N* , *V*, V_1, *Adj*, *Ad, Pron*, and *Syn*) occur regularly in each sentence, then the degree of indeterminateness of their occurrence in each sentence would equal log 32 = 1.5051, and the degree of probability of occurrence of each of them would be $1/32$[3]; the indeterminateness of each result would be log 32/32 = 0.0457. However, the actual indicators of occurrence of the parts of speech show deviations from both the conventional average indeterminateness and between the two compared texts, e.g. in T_1 $N = 2.0719$ and in T_2 $N = 2.0864$, in T_1 $V = 1.3424$ and in T_2 $V = 1.9138$, etc.

A particular property of this disproportion is the size of both texts: T_2 is much larger than T_1, it introduces 97 units more (while keeping the same length of text measured according to the number of sentences). Similar quantitative deviations are observable in individual subsets of signs.

However, while examining the internal volume proportions in the distribution of signs in T_1 and T_2, we can notice some regularities.

1. Among obvious regularities of the texts we should mention the elementary composition of semantic and synsemantic signs. Synsematic signs have the lowest average composition (3.45 phonemes), then in the rising order there are the compositions of pronouns (3.9), auxiliary verbs (4.3), adverbs (4.4), adjectives (5.2), nouns (5.5) and verbs (7.95). Only in one

[3]I.e. $\log_2 32 = 5$.

case do deviations reach 1 phoneme (advantage of T_2), which results from the proportion of the use of full and partial forms of auxiliary verbs.[4]

2. The next regularity is the predominating share of nouns in the distribution of words in the text, in T_1 — 41% and in T_2 — 32% of the text volume; synsemantic morphemes take second place (T_1 — 26%, T_2 — 22%). Consequently, nouns and synsemantic morphemes account for 67% of T_1 and 54% of T_2. Verbs, which are sentence-forming elements, take third place in T_2 (21%), and only last place in T_1 (7%). Even if we add nouns and auxiliary nouns together, their percentage share in T_1 will be 15% and in T_2 — 25%.

3. Despite the quantitative differences in the distributions, only in one case do they reach 14% (advantage of T_2 in terms of V), deviation index 3.742, and in one other case 9% (advantage of T_1 in terms of N), deviation index 0.9487; the others do not exceed 5% (index 0.7071). Hence we can speak of a further regularity: the share of individual parts of speech, regardless of the number of parts of speech used, is more or less constant in a text. Deviations reaching no more than 14% are observed only in nouns and verbs.

4. This regularity also concerns the vocabulary of the texts despite changes in quantitative distribution. Nouns have the largest quantitative share in the vocabularies of both texts (T_1 — 58%, T_2 — 40%), just as in the general volume distributions. Second place is taken by verbs (T_1 — 15%, T_2 — 24%); while synsematic morphemes are in third place in T_1 (11%) and fourth in T_2 (10%) —after pronouns (12%). Thus nouns and verbs constitute 73% of the vocabulary of T_1 and 64% of T_2.

This phenomenon is strictly related to the fourth regularity of the texts: the directions of use of the vocabulary are the same in both of them.

	%	N	V	V_1	Adj	Ad	Pron	Syn
Vocabulary	T_1	58	15	2	9	0	5	11
Volume	T_1	41	7	8	8	0	10	26
Vocabulary	T_2	40	24	2	6	6	12	10
Volume	T_2	32	21	4	3	4	14	22
Volume	T_1	–	–	+	–	0	+	+
Volume	T_2	–	–	+	–	–	+	+

As we can see, the use of a vocabulary for the composition of a text reduces the percentage share of nouns, verbs, adjectives and adverbs in the volume distribution of the text, while the percentage share of auxiliary verbs, pronouns and synsemantic morphemes increases.

[4] V_1 = *kawa* or *ni*.

5. The above rule is justified by the frequency of use of each word. Over 50% share of parts of speech whose vocabulary has been used once decreases in the overall volume of the text, while a lower than 50% share of parts of speech whose vocabulary has been used once increases in the overall volume of the text.

There is also a sixth regularity: the vocabulary of a text used only once in the text accounts on average for 66% of the vocabulary (in T_1 — 68%, in T_2 — 65%) and on average 32% of the overall volume of the text (T_1 — 34%, T_2 — 30%).

6. The next regularity is highlighted by the relation between the volume of the texts (= n) and the vocabulary of the texts (= v): the vocabulary accounts for 45% of the volume of T_1 and for 52% of T_2. Using the formula $v/\sqrt{n}$we receive the value of the index of quantitative diversity of the vocabulary[5] — 24.9 for T_1 and 29.4 for T_2. The deviation is relatively high — 4.5 units. But inclination, calculated according to the formula $a = \log n/\log v$ is 1.12 for T_1 and 1.09 for T_2. The deviation value is 0.03, therefore the values are quite similar. Similarly, the distribution index of the texts,[6] calculated according to the formula $v_1(f/v)$, shows substantial closeness of the values: T_1 — 1.47, T_2 — 1.52.

7. The degree of entropy,[7] according to the formula $H = \sum_{i=1}^{i=k} Pa_i log Pa_i$, is 0.1117 for T_1 and 0.0718 for T_2; thus the degree of indeterminateness in T_1 is larger than in T_2.

C. DISTRIBUTION OF SIGNS AND THE CONTENT OF SETS

The question that comes to mind is whether it is possible to determine, on the basis of data on the distribution of signs and the nature of the content, the semantic structure of the texts.

1. Based on the distribution of semantic and synsemantic signs, we can establish the speed with which information is conveyed and the average information content. The matter of speed will not be important further on in this article. Let us only note, as a curiosity, that if we assume the average composition of elementary signs for each semantic/synsemantic sign (M) in both texts of $5f/M$, i.e. 2.32 bit/M, and that the average time needed to read a text composed of 31 lines (with 65 signs per line) is 180 seconds,[8] then the average speed with which information is conveyed in both texts

[5]Formula according to P. Guiraud (1966: 96f).

[6]v_1 = a set of words used once.

[7]Formula according to Z. Rowieński, A. Ujemow and I. Ujemowa (1963: 74f).

[8]Second = t.

is 2.2 M/t, i.e. 1.1 bit/sec; given that the average number of words in T_1 is 302, which gives us 8.3 bits, and in T_2 it is 420, i.e. 8.7 bits, the speed with which information is conveyed is 18.3 bits/t for T_1 and 19.1 bits/t for T_2. These results are close to the standard obtained in other studies (Pierce 1967: 301f).[9] Deviations for both texts are minimal.

2. When examining the average content of information in both texts solely on the basis of the distribution of parts of speech according to the formula[10]

$$(\frac{1}{N} \times log_2 N + \frac{1}{V} \times log_2 V \ldots \frac{1}{Syn} \times log_2 Syn)$$

we get for $T_1 = 0.88$ bit/M and for $T_2 = 1.06$ bit/M, which confirms the observations that the information content in T_2 is bigger than in T_1. Consequently, the distribution of parts of speech in T_2 is better because it conveys the content intended by the author more effectively.

3. In this case, our suppositions on the nature of the content of the two texts can be based on the distribution of sentence-forming elements. If we consider only symbolic names, it turns out that verbs account for 11% and auxiliary verbs for 13% of T_1, while in T_2 it would be 33% and 5% respectively. This shows the significant share of defining presuppositions in T_1, of expressions describing the fact of being something or having a certain quality, which are predominant over assertions of some activity or state of certain objects/subjects (Whiteley 1961: 148, 2n). In T_2, the share of defining presuppositions is negligible in the structure of the entire text and is clearly overshadowed by synthetic sentences. If we additionally take into account the factor of importance, it turns out that 90% of verb units in T_1 and 59% in T_2 occur once, while among adjectives 54% in T_1 and 92% in T_2 were used once. We can conclude that T_1 attaches the same weight to adjectives (high frequency of use) than T_2 does to verbs. We can further suppose that the content of T_1 is semantically static, which means that it has few words describing actions, many words for the being of objects, defining presuppositions, while the content of T_2 is dynamic, i.e. it is important that some things are happening in time and space.

4. An analysis of the lexical and grammatical forms (B)[11] occurring in both texts allows us to detect other significant regularities: first, deviations

[9] Our data is understated, which results from the conventional average (31 lines/180 sec.).

[10] Formula according G. Klaus (1967: 27).

[11] See Annex.

in simple, adjectival and verbal nouns and compounds belonging to the vocabulary do not exceed 13%, and the fact that there is a greater number of N_s in T_2 is countered by the fact that there is a greater number of N_{adj} in T_1 (Table 7); second, in both vocabularies abstracts account for 45% of N and the predominance of general names (Table 8) in T_1 is balanced by the predominance of individual names in T_2 (deviation up to 8%); third, deviations in the distribution of nouns according to noun classes reach 10% only once, and in the other cases fall below 6% (Table 10); fourth, the distribution of nouns, both derivative and simple, is almost identical in both texts (deviation of 2%) (Table 11).

The distinguishing elements cast more light on the specificity of the texts: in terms of nouns, Table 9 shows that the advantage of T_2 in simple nouns results first of all from the preference for individual names, while the advantage of T_1 in adjectival nouns is based mostly on adjectival abstracts. The sequence of nouns used in T_1, in line with the rule N_{abst} — N_{ind} — N_{gen} (13%) deviates from the sequence in T_2 N_{ind} — N_{abst} — N_{gen} (5%) in the lesser (in percentage) vocabulary of T_2 in general names. Hence abstracts and general names constitute 58% of T_1 and 50% of T_2, while individual names constitute 50% of T_2 and 42% of T_1. The assumption that T_2 is more concrete is confirmed by the fact that in T_2 *verba sentiendi et dicendi* and *verba affectus* constitute 27% of V, while in T_1 as much as 50% of V.

At the same time, we should notice borrowings, which come down solely to Arab words in T_1, while T_2 includes Arab, English, Portuguese, and Hindi words. Borrowings constitute 56% of nouns in T_2 (in T_1 — 33%); the degree of borrowings in the noun vocabulary of T_2 deviates far from the generally accepted norm (35%) but is balanced in the overall vocabulary (35.3%, Table 15). The presence of English borrowings in T_2 makes it possible to immediately establish the period of setting of T_2 as after 1905, which is not possible for T_1.

D. DISTRIBUTION AND THE SEMANTIC ASPECT OF SIGNS

According to the theory of information (Shannon), the concept of information is in fact a statistical concept and from the semantic perspective covers only the syntactic aspect of signs or sets of signs. However, sings enter into relations not only with other signs but also with their meanings (the semantic aspect) (Klaus 1967: 721f).

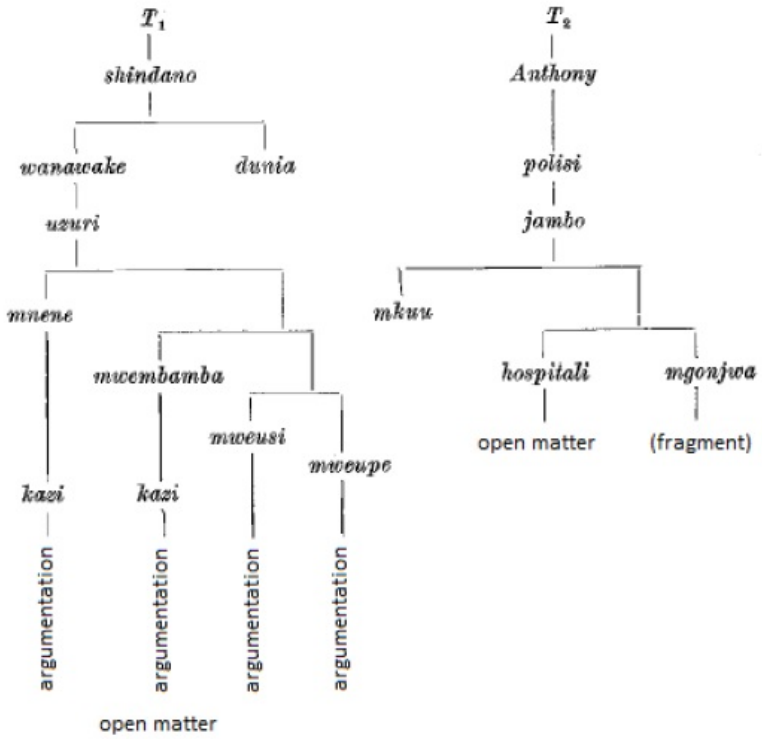
1. The analysis of the vocabularies (in the section A 5) shows a considerable percentage of common vocabulary as regards auxiliary verbs, synsemantic morphemes and pronouns, which is obvious, while for adjectives and

verbs it is 11—12% and for nouns only 4%. This might additionally point to the different contents of the texts. The common nouns include: *kitabu* 'book', *wakati* 'time', *mtu* 'man', *haraka* 'haste', *hewa* 'air', *mkono* 'hand' and *macho* 'eyes'; the verbs include: *toka* 'go out', *weza* 'can/be able to', *fanya* 'make/do', *taka* 'want', *sema* 'speak', *pa* 'give', *angalia* 'watch out', *patikana* 'receive'; adjectives: *gumu* 'heavy', *ema* 'good'; intensifiers: *sana* 'very'. Only some of these words, however, belong to the most frequently used words, therefore they do not determine the content of the texts. According to the rule that the most frequently used words are the most important in a given text, we have the following distribution of nouns and verbs:

T_1			T_2		
mwanamke (wanawake)	'woman/women'	17 x	*Anthony*	Anthony	11 x
			jambo	'case'	5 x
uzuri	'beauty'	7 x	*mkuu*	'superior'	5 x
dunia	'world'	4 x	*wakati*	'time'	3 x
shindano	'competition'	3 x	*polisi*	'police'	3 x
kazi	'work'	3 x	*sigara*	'cigarette'	3 x
weza	'be able to'	2 x	*hospitali*	'hospital'	3 x
taka	'want'	2 x	*mgonjwa*	'patient'	3 x
			sema	'speak'	7 x
			lala	'sleep'	3 x
			fika	'arrive'	3 x
			jibu	'ask'	3 x
			wasili	'arrive'	3 x
			ita	'summon'	3 x
			toka	'go out'	3 x
			ingia	'enter'	3 x

These words confirm the rule mentioned above as they are a clear reflection of the main motif of the content of each of the texts: in T_1 the main characters are women who believe that their beauty is the greatest in the world; therefore they compete to prove their superiority, for example, by proving that they can do any work better than others if they want to.

In T_2 the main character is Anthony, a police detective who is suddenly summoned by his superior in a criminal case, from where, after a short briefing, he goes to a hospital in order to question an injured patient. The cigarette is the usual attribute of hectic actions (the first part of the text). The following structures illustrate the composition of the motifs in the text:



In T_1, presenting the key motif requires the introduction of additional elements ('chubby', 'slim', 'black', 'white'), which are not among the most frequently used words, while in T_2 these words are sufficient to develop the motif. This is another proof of better distribution of T_2.

2. Syntactical data confirm the earlier observations. The structures of compound and complex sentences (Table 19) clearly show the dynamic of T_2: it uses twice as many syntactic forms introducing various logical connections and enriching the line of thought by providing the effects, causes, goal, relativity, contrast, and result of an action, as well as its duration; while in T_1 we can observe the unity of time and place, taking into account the cause, conditionality and relativity of action. T_2 has the greatest advantage in relative, purpose, contrasting and time clauses. The latter have additional support in structures with compound tenses, which do not occur in T_1.

Another regularity of both texts can be observed in the use of verb forms — a preference for the basic grammatical form of *cl.T.V* verbs, which is used in around 50% of the structures in the texts.

By analysing the syntax we can determine the syntactic index,[12] i.e. the nominal to adjectival attributes ratio. T_1 has 25 adjectival structures

[12]Formula according to Guiraud (1966: 96).

(adjectives in primary function), T_2 has 13, while nouns in the attributive function appear 28 times in T_1 and 20 times in T_2 (the frequency of use of a synsemantic morpheme — *a*). Therefore the syntactic index for T_1 is 0.89 and for T_2 — 0.65. These indexes are relatively high, which results from the limited basis of proper adjectives in Swahili and the resulting need to use nouns to express attributes. However, the fact that T_1 has a higher index despite the significant predominance in the use of adjectives additionally confirms the tendency of T_1 to emphasise the characteristics of the subjects rather than action.

The distribution of nouns according to their syntactic function shows another regularity of Swahili texts: nouns in their primary function account on average for 21% of text and in their secondary function on average for 64% (deviations around 2—3%). The further distribution of nouns according to the function of the base, the possessive attribute, the object attribute, and the prepositional phrase illustrates another regularity:

T	Base	Possessive	Object attribute and prepositional phrase
T_1	22	28	68
T_2	27	20	75

Ratio (%)

T_1	19	23	58
T_2	22	16	62

The deviations do not exceed 7%.

The deviations do not exceed 7%.

*

Statistics are critical for studies based on small samples. There is no doubt that this is indeed justified considering that the error rate decreases proportionally to the increase of the quantitative volume of the sample and that the increase not only makes the information more accurate but also enriches it. The error rate in the above analysis, namely deviations from the norm, is certainly considerable. The thing is that it is hard to verify it because there are no pre-existing statistical linguistic norms for Swahili. The only available data is the percentage of borrowings in the vocabulary of the language, which is 35%. The results of our analysis are consistent with this norm. Moreover, if we compare the data stemming from our analysis

with general linguistic data calculated by Yule (Guiraud 1966: 97), it turns out that there are actual similarities in proportions. It is assumed that the vocabulary of a given text is proportional to the square root of its length; the mean value is $v/\sqrt{n}$= 22. Yule gives the following example: n= 2000, v= 940, a = $\frac{logn}{logv}$ = 1.11, $v/\sqrt{n}$= 21. Thus $v$equals 47% of n; for T_1 this ratio is 45% and for T_2 — 52%; hence in our texts the quantitative richness index is 24.9 and 29.4 and a (inclination) = 1.12 and 1.09, respectively. In another work, Guiraud (1954: 37) presents the model that nouns from a 1000-unit vocabulary constitute 62% of the overall number of nouns of any text, while nouns used once account for 69% of the nouns in the vocabulary. For T_1 these indexes are 67% and 74% respectively. Examples of this kind are many. It should be concluded, as it seems, that despite the relatively small samples, the data obtained from our analyses will be close to the data obtained in the future for much longer texts. At the same time, the relatively minor deviations between the two texts and the observable regularities seem to exclude any randomness of the data. For now, the regularity indexes for Swahili texts proposed in our materials can serve as approximate reference data.

The main aim of this work was to compare two texts with different content and to detect possible differences, which could be used to identify, based on distribution data, those differences in the distributions that result from the respective contents. The distribution data was illustrated by tables and analyses. We should only add, using the criteria of linguistic universalism great caution, that the distributions provided by Guiraud for French abstract prose (*prose abstraite*) and fiction/concrete prose (*prose concrète*) (Guiraud 1954: 39) allow us to notice similar general phenomena in both languages: both in French abstract prose of the 20^{th} century and in Shaaban Robert's philosophical parable the percentage share of nouns and adjectives is much larger and that of verbs and adverbs is much smaller than in French fiction and in the detective story by Mohd I Faiz. This seems to be the rule for the distribution of parts of speech in these literary genres.

ANNEX

A. DISTRIBUTION OF PARTS OF SPEECH

1. Shaaban Robert's work (= T_1) is composed of 32 sentences, constituting a closed whole. From the story by Mohd I Faiz (= T_2) we have selected 32 sentences accordingly, which constitute around 1/3 of the whole text, starting from the first sentence to the thirty-second.

2. Sentences were ordered according to the following rule: simple sentences: (a) short (Subject + Verb) (b) long (with additional other elements); non-simple sentences: (a) complex, (b) compound, (c) compound-complex.

Table 1

T	Simple sentence		Overall	Non-simple sentence			Overall	Total
	short	long		complex	compound	compound-complex		
T_1	6	14	20	6	5	1	12	32
T_2	2	8	10	5	2	15	22	32

Divergence I

T_1	4	6	10	1	3	0	0	0
T_2	0	0	0	0	0	14	10	0

Ratio (%)

T_1	19	43	62	19	16	3	38	100
T_2	6	25	21	16	6	47	69	100

Divergence II

T_1	13	18	31	3	10	0	0	0
T_2	0	0	0	0	0	44	31	0

3. T_1 is composed of 1510 phonemes, T_2 of 2012 phonemes. On average, 1 sentence in T_1 equals 47 phonemes, in T_2 — 65 phonemes.

Divergence III

T_1 — 100% of phonemes: T_2 — 129% of phonemes.

4. We have obtained the following distributions, taking the following as parts of speech: symbolic names: nouns (= *N*), verbs (=*V*), auxiliary verbs[13] (= V_1) adjectives (*Adj*), adverbs (= *Ad*); indicative names: pronouns (= *Pron*); and synsemantic morphemes (= *Syn*):

[13] V_1 are the forms of 'to be' — *kuwa*, *ni*, as well as *mo*, *na*.

Table 2

T	*N*	*V*	V_1	*Adj*	*Ad*	*Pron*	*Syn*	Total
T_1	118	22	25	25	–	27	77	294
T_2	122	82	18	13	18	55	83	391

Divergence IV

T_1	0	0	7	12	0	0	0	0
T_2	4	60	0	0	18	28	6	97

Ratio (%)

T_1	41	7	8	8	–	10	26	100
T_2	32	21	4	3	4	14	22	100

Divergence V

T_1	9	0	4	5	0	0	4	0
T_2	0	14	0	0	4	4	0	0

5. For the construction of the parts of speech we have used the following numbers of phonemes.

Table 3

T	*N*	*V*	V_1	*Adj*	*Ad*	*Pron*	*Syn*	Total without *Syn*	Total without *Syn* and *Pron*	Total
T_1	5.8	7.9	3.8	5.5	–	4.1	3.5	5.4	5.7	5.1
T_2	5.3	8.0	4.8	4.9	4.4	3.7	3.4	5.2	5.4	4.9
av.	5.5	7.9	4.3	5.2	4.4	3.9	3.45	5.3	5.55	5.0

Divergence VI

T_1	0.5	0	0	0.6	0	0.4	0.1	0.2	0.3	0.2
T_2	0	0.1	1.0	0	–	0	0	0	0	0

6. In T_1 there is a vocabulary of 122 words and 13 synsemantic morphemes, in T_2 there are 186 words and 20 synsemantic morphemes. The vocabulary has the following distribution:

Table 4

T	*N*	*V*	V_1	*Adj*	*Ad*	*Pron*	*Syn*	Total	Without *Syn*	Without *Syn* and *Pron*
T_1	78	20	4	13	–	7	13	135	122	115
T_2	83	51	3	12	12	25	20	206	186	161

Divergence VII

T_1	0	0	1	1	0	0	0	0	0	0
T_2	5	31	0	0	12	18	7	71	64	46

Ratio (%)

T_1	58	15	2	9	–	5	11	100
T_2	40	24	2	6	6	12	10	100

Divergence VIII

T_1	18	0	0	3	0	0	1	0
T_2	0	9	0	0	6	7	0	0

7. The frequency of use of the vocabulary is as follows:

Table 5

	N		*V*		V_1		*Adj*		*Ad*		*Pron*		*Syn*	
x	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
1	58	64	18	30	1	1	7	11	–	8	2	12	5	7
2	14	11	2	13	–	–	4	1	–	3	–	8	3	6
3	2	5	–	7	–	–	1	–	–	–	1	3	2	3
4	1	–	–	–	–	–	1	–	–	1	1	1	–	1
5	–	2	–	–	1	1					–	1	–	–
6	–	–	–	–	–	–					–	–	–	–
7	1	–	–	1	1	–					–	–	–	–
8	–	–			–	–					–	–	–	–
9	–	–			–	–					2	–	–	1
10	–	–			–	–					–	–	–	–
11	–	1			–	–					–	–	–	–
12	–	–			1	1					–	–	–	–
13	–	–									–	–	1	–
14	–	–									–	–	1	–
15	–	–									–	1	–	–
17	1	–											–	–
20													–	1
21													–	1
28													1	–

Divergence IX

Divergence IX

	N		*V*		V_1		*Adj*		*Ad*		*Pron*		*Syn*	
x	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
1	0	6	0	12	0	0	0	4	0	8	0	10	0	2
2	3	0	0	11	–	–	3	0	0	3	0	8	0	3
3	0	3	0	7	–	–	1	0	–	–	0	2	0	2
4	1	0	–	–	–	–	1	0	0	1	0	0	0	2
5	0	2	–	–	0	0					0	1	–	–
6	–	–	–	–	–	–					–	–	–	–
7	1	0	0	1	1	0					–	–	–	–
8	–	–			–	–					–	–	–	–
9	–	–			–	–					2	0	0	1
10	–	–			–	–					–	–	–	–
11	0	1			–	–					–	–	–	–
12	–	–			0	0					–	–	–	–
13	–	–									–	–	1	0
14	–	–									–	–	1	0
15	–	–									0	1	–	–
17	1	0											–	–
20													0	1
21													0	1
28													1	0

8. The average frequency of occurrence[14] of parts of speech:

Table 6

T	*N*	*V*	V_1	*Adj*	*Ad*	*Pron*	*Syn*
T_1	2.8	16	14	14	0	13	4.3
T_2	3.2	4.7	21.7	30	21.7	7.1	4.8

Divergence X

T_1	0	11.3	0	0	0	5.2	0
T_2	0.4	0	7.7	16	21.7	0	0.5

B. DISTRIBUTION OF LEXICAL AND GRAMMATICAL FORMS

1. In T_1 there are 49 simple nouns, including 24 Arab borrowings, and 28 derivative nouns, including 12 adjectival nouns (= N_{adj}) and 16 verbal

[14]I.e. average spaces between the occurrences of the parts of speech in the text.

nouns (= N_v); apart from that, there is 1 compound (= N_c). There is 1 Arab borrowing among the N_{adj} and 1 among N_v.

In T_2 there are 63 simple nouns, including 44 borrowings: 31 from Arab, 9 from English, 2 from Portuguese, and 2 from Hindi, as well as 18 derivative nouns: 4 adjectival and 14 verbal. There is also 1 compound. Among N_v there are 2 Arab borrowings; the compound is composed of two borrowings (English and Arab).

Table 7

T	N_s	N_{adj}	N_v	N_c	Total borrowings
T_1	49	12	16	1	26
T_2	63	4	15	1	47

Divergence XI

T_1	0	8	1	0	0
T_2	14	0	0	0	21

Ratio (%)

T_1	63	16	20	1	33
T_2	76	5	18	1	56

Divergence XII

T_1	0	11	2	0	0
T_2	13	0	0	0	23

2. In T_1, N are composed of 18 abstract names (including 11 borrowings), 10 general names and 21 individual names; N_{adj} of 8 abstracts and 4 systemic names; N_v of 13 abstracts, including 3 *nomina actionis*, 1 *nomen patientis* and 3 *nomina agentis*.

In T_2, among N there are 25 abstract names (including 22 borrowings), 4 general names and 34 individual names; N_{adj} include 1 abstract and 3 systemic names; N_v are composed of 12 abstracts, of which 6 are *nomina actionis* and 2 are *nomina agentis*.

Table 8

T	abst. names	gen. names	ind. names
T_1	36	10	33
T_2	38	4	41

Divergence XIII

T_1	0	6	0
T_2	2	0	8

Ratio (%)

T_1	45	13	42
T_2	45	5	50

Divergence XIV

T_1	0	8	0
T_2	0	0	8

Table 9

	N_s				N_{adj}		N_v			
T	abst.	gen.	ind.	borr.	abst.	sys.	abst.	*act.*	*pat.*	*ag.*
T_1	18	10	21	11	8	4	7	13	1	3
T_2	25	4	34	22	1	3	6	12	–	2

Divergence XV

T_1	0	6	0	0	7	1	1	1	1	1
T_2	7	0	13	11	0	0	0	0	0	0

3. Distribution of N based on noun classes:

Table 10

	classes							
T	1	2	3	4	5	6	7	8
T_1	10	4	28	3	14	13	–	6
T_2	7	9	33	6	16	6	–	6

Divergence XVI

T_1	8	0	0	0	0	7	0	0
T_2	0	5	5	3	2	0	0	0

Ratio (%)

T_1	12	5	36	4	18	17	–	8
T_2	8	11	40	7.3	19	7.3	–	7.3

Divergence XVI

T_1	4	0	0	0	0	9.7	–	0.7
T_2	0	6	4	3.3	1	0	–	0

4. Among the 20 *V* in T_1,there are 7 derivative and 13 simple verbs, while among the 51 *V* in T_2,there are 19 derivative and 32 simple verbs.

Table 11

T	V_s	V_{der}	% of V_{der}
T_1	13	7	35
T_2	32	19	37

Divergence XVIII

T_1	0	0	0
T_2	19	12	2

Among the 20 *V* in T_1, there is 1 borrowing (Arab), while among the 51 *V* in T_2, there are 9 borrowings, which gives us the relation of 5% : 17%.

The distinguishing feature of *V* in T_1 are *verba sentiendi et dicendi* and *verba affectus*, i.e. 10 in 20 *V*; in T_2 there are 14 verbs of the same type in 51 *V*, which gives us a relation of 50% : 27%.

5. Among the 13 adjectives in T_1, there are 3 borrowings, i.e. 23%, while in T_2 among the 12 adjectives, there are 4 borrowings, that is 33%.

Six among the 13 *Adj* in T_1 express mental properties, 5 express physical properties (including 4 for volume or size, 2 for colours), 1 expresses quantity and 1 — intensification. Seven among the 12 *Adj* in T_2 express mental properties, 2 — physical properties (volume or size), 2 — quantity and 1 — intensification of a property.

Table 12

T	mental	physical	quant.	int.	borrowings	%
T_1	6	5	1	1	3	23
T_2	7	2	2	1	4	33

Divergence XIX

T_1	0	3	0	0	0	0
T_2	1	0	1	0	1	10

Percentage rate

T_1	46	38	8	8	23
T_2	58	17	17	8	33

Divergence XX

T_1	0	21	0	0	0
T_2	12	0	9	0	10

6. Among the 12 *Ad* in T_2, there are 5 adverbs of manner, 3 of place and 4 of time. In T_1 there are no adverbs.

Table 13

T	manner	place	time
T_1	–	–	–
T_2	5	3	4

7. Among the 6 *Pron* in T_1, there are 3 possessive, 1 indicative, 1 interrogative and 1 independent. Among the 25 *Pron* in T_2, there are 5 possessive, 12 indicative, 1 interrogative and 2 independent, as well as 5 dependent pronouns separate from a verb complex.

Table 14

T	poss.	ind.	interr.	indepe.	dep.
T_1	3	1	1	1	–
T_2	5	12	1	2	5

Divergence XXI

T_1	0	0	0	0	0
T_2	2	11	0	1	5

8. The proportions of synsemantic morphemes will be discussed in the section on syntax.

9. The common lexical composition of both texts is as follows:

Among the 161 *N* in both texts, the common vocabulary is 4%, among the 71 *V* — 11%, among the 7 V_1 — 85%, among the 25 *Adj* — 12%, among the 32 *Pron* — 15%, and among the 33 *Syn* — 21%. There are no common *Ad*.

The common elements constitute the following percentage of the two texts:

Table 15

%	*N*	*V*	V_1	*Adj*	*Ad*	*Pron*	*Syn*
T_1	8	40	75	23	–	70	53
T_2	8	15	100	25	–	20	35

Divergence XXII

T_1	0	25	0	0	0	50	18
T_2	0	0	25	2	0	0	0

10. Distribution of borrowings in the two texts according to parts of speech:

Table 16

%	*N*	*V*	*Adj*	Total
T_1	33	5	23	20.3
T_2	56	17	33	35.3

Divergence XXIII

T_1	0	0	0	0
T_2	23	12	10	15

C. DISTRIBUTION OF SYNTACTIC FORMS

1. The distribution of nouns used either in the form of a base, i.e. in the primary function (= 1) or as attributes, i.e. in secondary functions of the first (=2), third (=3) or fourth (=4) grade is as follows:

Table 17

N	1	2	3	4	Total
T_1	22	74	21	1	118
T_2	27	79	13	3	122

Divergence XXIV

T_1	0	0	8	0	0
T_2	5	5	0	2	4

Ratio (%)

N	1	2	3	4
T_1	19	63	17	1
T_2	22	65	11	1

Divergence XXV

T_1	0	0	6	0
T_2	3	2	0	0

2. The grammatical forms of verbs used in T_1 and T_2 are as follows: 0 = *V*, 1 = *cl. T. V*, 3 = *cl. T. rel. V*, 4 = *cl. T. ob. V*, 5 = *cl. T. rel. ob. V*,

6 = *cl. T. ref. V*, 7 = *neg. cl. T. V*, 8 = *cl. V R. pass. rel.*, 9 = *cl. V rel.*, 10 = *cl. T. V R. pass.*, 11 = *cl. T. rel. V R. pass*, 12 = *cl. T. ob. V R. pass.*[15]

The distribution of these structures in the texts is as follows:

Table 18

V	0	1	2	3	4	5	6	7	8	9	10	11	12	Total
T_1	1	3	10	–	1	–	1	3	1	1	1	–	–	22
T_2	–	15	44	3	9	–		1	–	–	8	1	1	82

Divergence XXVI

T_1	1	0	0	0	0	0	1	2	1	1	0	0	0	0
T_2	0	12	34	3	8	0	0	0	0	0	7	1	1	60

Ratio (%)

T_1	4.5	14	46	–	4.5	–	4.5	14	4.5	4.5	4.5	–	–	
T_2	–	19	54	4	10	–	–	1.3	–	–	9	1.3	1.3	

Divergence XXVII

T_1	4.5	0	0	0	0	0	4.5	12.7	4.5	4.5	0	0	0	
T_2	0	5	8	4	5.5	0	0	0	0	0	4.5	1.3	1.3	

3. Structures with compound tenses (auxiliary verb + main verb) were used 5 times in T_2. These forms do not appear at all in T_1.

4. All adjectives in T_1 and T_2 are used in the primary function.

5. After reducing compound-complex sentences to compound and complex sentences we can identify 14 sentences of this kind in T_1 and 53 in T_2. T_1 uses 5 types of sentences, and T_2 uses 10.

[15] *V* = stem, *cl* = pre-verbal pronoun (verbal clitic), *T* = indicator of time and aspect, *rel.* = relative pronoun, *ob.* = object pronoun, *ref.* = reflexive marker, *neg* = negation marker, *VR* = root, pass. = passive marker.

Table 19

Complex and compound sentences

	compound			complex							
T	conjunctive	disjunctive	resultative	time	object	comparative	effect	causative	conditional	purpose	relative
T_1	6	–	–	–	–	1	–	3	2	–	2
T_2	22	4	1	6	3	1	2	2	–	6	6

Divergence XXVIII

T_1	0	0	0	0	0	0	0	1	2	0	0
T_2	16	4	1	6	3	0	2	0	0	6	4

Ratio (%)

T_1	43	–	–	–	–	7	–	22	14	–	14
T_2	42	7	2	11	6	2	4	4	–	11	11

Divergence XXIX

T_1	1	0	0	0	0	5	0	18	14	0	3
T_2	0	7	2	11	6	0	4	0	0	11	0

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