

transformational features of systems rather than their static characteristics. Hence, what comes under the rubric of the morphological are irregular, inexact, or changing shapes rather than ideal, geometrical forms. While *morphology* occasionally designates a topology or broad system of classification, more often it implies an attention to individual variation—objects as they appear in the real world—over and above general categories. When the term is used in humanist disciplines, it has therefore tended to be used with varying degrees of rigor and precision to impose order on not readily formalizable entities such as history and language.

Goethe coined the word *morphology* in his botanical writings ("Zur Morphologie," 1817–1824; see Goethe, 1988) as he sought, through comparative anatomical methods, to discover a primal plant form that would contain all others—the celebrated *Urpflanze*. Ultimately, for Goethe, morphology is a descriptive enterprise that would unify the sciences by merging experience and theory, holding out the hope of a *mathesis matheseos*, a science of science. Goethe expressed this morphological vision not only in his scientific projects but also in his poetic explorations of the world.

In the 1920s, the term achieved an unprecedented popularity due to the dissemination of biological theories in works such as D'Arcy Thompson's *On Growth and Form* (1917), as well as to Oswald Spengler's influential account of "Morphology of History" in *The Decline of the West* (1918–1922), which attempted to conceive of the totality of world history in terms of recurrent organic patterns. Carol O. Sauer's "Morphology of Landscape" (1926) founded the study of geography in America by applying Spengler's method to the study of landforms. Vladimir Propp, in *Morphology of the Folktale* (1928), a key text of the Russian formalist movement and precursor of Lévi-Straussian structural anthropology, paid homage to Goethe's holistic vision in developing a complex classificatory scheme of literary motifs. Alfred North Whitehead, in his major philosophical treatise, *Process and Reality* (1929), extended the concept of the morphological to encompass a metaphysical dimension of the cosmos. Louis Hjelmslev (1899–1965) and others also underscored its importance as a linguistic category.

In recent years, new mathematical paradigms have furthered the investigation of transformational phenomena, including those of morphogenetic or self-

organizing formal systems. Alan Turing, the inventor of the concept of the computer, pioneered research in chemical morphogenesis in 1952, and this work has led to a growing field of biological studies of embryology, as well as to new understandings of the nature and variety of formal complexity (see Turing, 1992). Scientific thinkers such as Ilya Prigogine, René Thom, and Benoit Mandelbrot have used the morphological as a springboard for articulating original and comprehensive philosophies of becoming and mathematical theories of morphogenesis.

[See also Catastrophe Theory; Hjelmslev; Spengler; Thom; and Turing.]

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—ALBERT LIU

MOSCOW-TARTU SCHOOL. A group of Russian scholars who dominated the Soviet semiotic scene from the early 1960s until the end of the 1980s and made fundamental contributions to the semiotics of culture, the Moscow-Tartu School had two intellectual and organizational centers: the Estonian city of Tartu and Moscow, where, historically speaking, the linguistic and structuralist roots of the school can be found. It is important to remember that the development of structuralism in the Soviet Union was constrained by the cultural and political context. The

very first discussions of structural phonology (S. K. Šaumjan) took place in the early 1950s, and only after the Twentieth Party Congress in 1956 did the process of de-Stalinization lead to a "thaw" in politics and culture. Young scholars, mainly in the social sciences, started questioning the monolithic ideology and its official methodology and tried other approaches. Although there were no public discussions on this topic, it became clear that language was the dominant means of conveying ideological contents and, thus, was an ideological instrument. Consequently, contributions from ideologically less-sensitive domains such as cybernetics, information theory, machine translation, and structural and mathematical linguistics shaped the early structuralist discussions.

The year 1956 turned out to be crucial for the development of structuralism. One important event was the discussion on structuralism that arose in *Voprosy jazykoznanija*, the official publication organ for the study of linguistics. In the same year, a seminar on the application of mathematical methods in linguistics was initiated by A. A. Kolmogorov at Moscow State University. This seminar, guided by Vjačeslav V. Ivanov, was attended by many young scholars who later became important members of the Moscow-Tartu School (among them I. I. Revzin, B. A. Uspenskij, and T. M. Nikolaeva). Also in 1956, Ivanov, Revzin, and others founded the Association for Machine Translation in Moscow, an event that paved the way for the First All-Union Conference on Machine Translation in Moscow in 1958 and its follow-up conference in Leningrad in 1959. These initiatives were closely related to the activities of V. J. Rozenveig, who in 1958 organized a meeting between the young Moscow linguists and Roman Jakobson. Jakobson was on his first visit to Moscow, for the International Congress of Slavistics, after his emigration from the Soviet Union.

All these initiatives were characterized by a close cooperation between linguists and mathematicians and by the additional integration of specialists in aphasiology (A. R. Lurija), psychology (N. V. Žimkin), surdopedagogy (Sokoljanskij), analysis of writing systems (J. V. Knorozov), and many others. They all were members of a separate linguistic section at the Academy of Sciences, initiated by A. I. Berg and headed by Ivanov. The orientation of this group's work was clear: multidisciplinary approaches to language, which necessarily led to questions beyond pure lin-

guistics. Crucial figures in initiating and organizing the activities were Ivanov and V. N. Toporov, both of whom became the main exponents and promoters of semiotics as a broadly conceived discipline in its own right. Toporov had shocked his audience at a 1957 conference on the relationship between synchrony and diachrony in linguistics, during which he declared that the topic of the conference could as well have been brought up some thirty years earlier and that also the proposed solutions to obsolete questions were far from new; he explicitly criticized the lack of acquaintance with modern methods of scholarly research, and he called the discussion deeply provincial.

In 1960, the Section of Structural Typology of Slavic Languages was founded as an integral part of the Academy of Sciences, first headed by Toporov (until 1963), then by Ivanov. Many of Ivanov's and Toporov's former students (e.g., T. V. Civ'jan, M. I. Lekomceva, D. Segal) became attached to this institute as researchers, which soon was to be considered the leading organizational center for semiotic studies. The institute was the main organizer of the seminal Symposium on the Structural Study of Sign Systems in Moscow in December 1962 that was the official breakthrough of semiotics as an autonomous discipline. These activities raised controversial discussions on the status and ideological foundations of semiotics in the Soviet Union. Still, a commission on the improvement of the status of semiotics was founded at the Academy of Sciences in 1963, again on the initiative of A. I. Berg. Soon after the symposium, close cooperation began with J. M. Lotman and his colleagues (I. Černov, Z. G. Minc, A. G. Egorov, and others) from Tartu University. This cooperation resulted in unrestricted discussions on almost any potentially semiotic theme and, as a result, an enormous number of papers, frequently with varying coauthorships. Many of these contributions were formulated as tentative hypotheses.

Organizationally, the Moscow-Tartu cooperation had two important results: first, the Tartu Summer Schools which took place every alternate year, from 1964 to 1970; here, Moscow and Tartu scholars met on the (geographic and academic but also political) periphery of the Soviet Union and discussed freely semiotic issues. Second, Lotman began to edit the journal *Trudy po znakovym sistemam* (Studies on sign systems). His twenty-five issues (1964–1992) contributed to the establishment of the Moscow-Tartu

School's international reputation, and many articles from it have been translated into many languages. Still, many other papers were published in peripheral publications not always easily accessible to outsiders.

The 1962 Moscow symposium was concerned with the whole spectrum of semiotic systems, starting from natural language, including artificial languages and nonverbal communication, and extending to topics such as traffic signs, card games, art, and many others. The introduction to the symposium, which was written anonymously by Ivanov, contained a blueprint for Soviet semiotics in the decades to come. Hence, methodological insights gained from the analysis of natural language were applied, at least tentatively, to other sign systems. In this sense, Moscow-Tartu semiotics was oriented from the onset toward application rather than theory. The claim of semiotics to the leading role in the analysis of human communication (implying that semiotics is both one discipline among others and an integrative metadiscipline) necessarily implied competing with the official ideology in explaining social behavior. Consequently, *semiotics* was not a term welcome by official ideology; therefore, semioticians avoided it and called sign systems other than natural language "modeling systems." After the 1964 summer school, the notion of secondary modeling systems was generally accepted, and the term became a key concept of the Moscow-Tartu School. Defining sign systems such as literature, myth, theater, painting, and puppetry as secondary modeling systems implied natural language as a primary modeling system on the basis of or corresponding to which all secondary systems are constructed. In this sense, Moscow-Tartu semiotics continued Ferdinand de Saussure's and Louis Hjelmslev's ideas, understanding sign systems as structures consisting of elements in a particular (functional) relationship.

The semiotic analyses of the 1960s were characterized by an extension and reformulation of many terms originating in linguistics. The central term *text*, for example, was applied not only to linguistic texts, but in its broader semiotic understanding to any meaningful sequence of signifying elements (thus, paintings or films could be regarded as texts, too) organized by a particular underlying "language." Thus, the conceptual extension was oriented toward the convergences of various sign systems. This extension was paralleled by crucial restrictions, however: only those structures analogous to those of natural lan-

guage (or to the categories of metalanguage) were likely to be considered semiotic. Further, semiotic systems were likely to be analyzed selectively, since only those elements that could be assimilated to linguistic structures were taken into consideration. The specificity of other sign systems was likely to be reduced to the structures of natural language.

The previously more or less exactly defined terms became increasingly metaphoric, which in turn allowed for a greater freedom in their semiotic application. Since the Moscow-Tartu School was at that time a rather closed circle, there was a tacit understanding of both orientation and usage of the basic terms and concepts, although not all scholars used one and the same term identically. Only later did external criticisms of the Moscow-Tartu School's concepts point to their terminological problems.

In 1970, Lotman presented his seminal "Propositions" for the Fourth Tartu Summer School, which was attended by both Roman Jakobson and Claude Lévi-Strauss. From then on, the notion of "culture" guided the school's activities. Based on the assumption that the human production, exchange, and storage of information by way of signs form a particular unity, culture was understood as the functional correlation of the various sign systems used by individuals as members of groups and societies. The semiotics of culture thus studies these sign systems in their correlation and hierarchical organization.

The "Theses on the Semiotic Study of Culture" (Lotman et al., 1973) guided the semiotic research of subsequent years. Partly in the form of programmatic hypotheses, it included issues such as the relevance of natural language for the definition and functioning of culture; the minimal preconditions of culture; the relation of culture to its obligatory counterpart, nonculture; the relevance of internal and external points of view in the analysis of culture; the temporal status of culture as experience, as collective memory, as nonhereditary information, and as a program for the future; the topological organization of culture; the typological diversification of cultures; the relation of "utterance" (in a semiotic sense) and culturally relevant texts; the relation of texts and their functions; and the evolution of culture. It was mainly Lotman who proposed these research perspectives. On the basis of his structural studies of literature and art, he developed topological descriptions of literary artifacts. Applying concepts such as "external/internal," "we/they," "own/alien," "sacred/profane,"

"chaos/cosmos," and others, Lotman strived for the spatial description of relations and values in general. The application of semantic oppositions in order to describe cultural texts was not uncommon to the Moscow linguists. As early as 1965, Ivanov and Toporov had established a list of sixteen semantic oppositions such as "life/death," "fortunate/unfortunate," "even/odd," and others to describe Old Slavic cultural texts; they claimed this list was one concrete realization of a universally valid repertory, consisting of about eighty semiotic classifications.

Thus, heterogeneous tendencies converged in the term *culture*, and the 1970s were characterized by the intensive study of cultural texts. Semiotic studies confirmed the orientation toward applied semiotics, although various attempts were made to relate the results to semiotic roots and foundations of semiosis, whether linguistic-etymological reconstructions in their cultural relevance, the reconstruction of proto-myths, or functional brain asymmetry as the biological basis of semiosis. Ultimately, these attempts led to a diversification of interests.

Contemporary Soviet culture was usually not the object of semiotic analyses, and there was no overt discussion of its semiotic organization; rather, by denying Soviet culture the status of a semiotic topic in its own right, it was implicitly treated as a non-culture. On the other hand, Moscow-Tartu scholars were aware of the fact that scientific texts are not only ways to study a given culture but also part of that culture, since they contribute to their culture by modeling its character. In this sense, the Moscow-Tartu School can be regarded as a particular subculture in its own right, and the semiotic texts produced by it can be considered as an alternative cultural model.

[See also Cybernetics; Jakobson; Jakobson's Model of Linguistic Communication; Lotman; Multimodality; and Text.]

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MOTIVATION. See Linguistic Motivation.

MUKAŘOVSKÝ, JAN (1891-1975), Czechoslovakian structuralist, known mainly for his contributions to aesthetics and the semiotics of art. Mukařovský studied linguistics and aesthetics at the philological faculty of Charles University in Prague until 1915; in 1923, he received his doctoral degree for his dissertation, "Contribution to the Aesthetics of the Czech Verse." He became a founding member of the Prague Linguistic Circle in 1926. After teaching at the University of Bratislava from 1931 to 1937, he returned to Prague to become director of the Institute of Aesthetics and professor at Charles University. From 1948 to 1953, Mukařovský was rector of the university.

Mukařovský's works can be divided into several periods. The "formalistic" period (1923-1928) is characterized predominantly by stylistical analyses; not yet acquainted with Russian formalism, Mukařovský understands the works he studies as a continuation of the formalist tradition going back to scholars such as J. F. Herbart (1776-1841), Joseph Durdík (1837-1902), Otakar Hostinský (1847-1910), and Otakar Zich (1879-1934). In his study *Máchův Máj: Estetická studie* (Mácha's "May": A Study in Aesthetics, 1928), Mukařovský claims that the work of art must be understood as a phenomenon sui generis, regardless of any external relations, including those to its creator and to reality.

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