MOUSIKÉ/MEMORY: SOUND/SIGN:
FROM JOYCE TO ZUKOFSKY

"Sounds pass quickly away but numbers remain."
—Ignato

"Dog can sometimes be read backwards, and reading the letters forwards and backwards is the world."
—Zukofsky, *Bottom: On Shakespeare*

Modern: a twelfth-century term designating an extreme form of Scholastic thought.¹
Modern: a mode of invention, a processual calculus governing Gothic pedagogy. In Louis Zukofsky’s terms, the poem as an “object in process”² inscribing performative utterance, requiring enactment of the particulars³ upon which the text invents its variations, Gothic in its drive toward sequence and simultaneity. Refuting infinity—defining it out—through the binding of music to speech (“music perceived as history,”⁴ the product of all possible speech acts) and of sound to story and mathémata in Zukofsky’s poetic integral in his great long poem “A.” Refuting stasis not through the imposition of a false finitude (the encyclopedia) but through the inscription of “everything / . . . moving / and mixing / with everything else” (“A” 634–35) which is the speculum, an “alphabet of subjects”⁵ each becoming its own fugue, arborescent in processual mimesis, numbers performed and become mathémata, the codes of the world.

For Foucault, an epistemic shift: the “modern” closes the gap opened by the Enlightenment’s privileging of concepts of subjectivity, causality, referentiality, which culminate in thoseontotheologies which we may label, metonymically, Freud, “Realism” and commodity capitalism with its humanist declarations of individual freedoms in the midst of denial and exploitation of those who choose, in terms of two of the Joyce system’s categories, Quinet over Michelet, botanical calligram over encyclopedia. Reaching back across the rift opened by two centuries of “Reason,” modernity reinvents the Gothic pedagogy of Scholasticism, once again choosing catechism and catachresis as operative strategies, challenging lan-
guage to reveal the structures of the world through the application of Vichian new science grounded in a semiotics of the perceived environment, of that world of "civil society which has certainly been made by men, and . . . its principles are therefore to be found within the modifications of our own human mind" (NS 331), its riddles synaptically encoded, susceptible to the "poetic logic" of the speculum, the resolution always already "there" in a potentially knowable and known world.

Setting aside the picture of the self which held us captive—the picture of a Cartesian world paradoxically haunted by mystery, its texts kerygmatic proclamations of darkness requiring a new light for their interpretation; setting aside with that great Scholastic thinker of modernity, Ludwig Wittgenstein, the possibility of enacting finitude upon process, modernity reaches across "beginnings" and "endings," across the Book of Kells and Bach and the Odyssey and Dogon masks, until perhaps like Tinguely's machines dismantling themselves by the pool at the MOMA, what is left is what was there to "begin" with—a preposition dangling into a knowable world to which we return with astonishing effort, seeing in Dachau, My Lai, Sharpeville, Chernobyl, Shatila the apocalyptic effects of the post-Cartesian heritage of the Enlightenment.

"To deconstruct . . . is to do memory work," as Derrida has said. The urgency of that memory work in both the Joyce and the Zukofsky systems is the urgency of modernity's return to connection with a pre-Enlightenment semiotics of word as act, of language in and of the world. Not a theological but a logological enterprise, this memory work concerns itself not with a nostalgia for origins but, rather, with a need to learn again a mnemonic repertoire which is grounded in what we have called the ecosystemic motiv in the Joyce system. Thus in Zukofsky the "utterance of construction" which is "the sounding of . . . [the sentences'] grammatical and typographical morphology by the voice," or "speech growing into song," inscribes catachresis across its field of enactment and configures its gestural codes according to the laws of "Musemathematics" (U 11.834).

Our project in this chapter is the invention of a specula/tive music which, incorporating some of the principles of such different textual machines as those of Louis Zukofsky and John McCarthy, will approach the Gothic pedagogical goal of the production of a manifestatio of specula/tive modernity. We begin with the two major categories offered by the quadrivium—the curricular structure of Gothic pedagogy—under the heading of "music": musica practica, or the craft of music making, and musica speculativa, or specula/tive music. Encompassing music not only as a branch of philosophy but also as a rhetoric having logical relations to other rhetorical arts, musica speculativa conceives music as a language, a grammatology which may be applied and which is amenable to what we have been referring to as the tradition of Augustinian speech act theory.

Consider the medieval distinction between the workman whose skill is applied in the actual construction of a building, and the architect whose knowledge of mathematics, philosophy, theology and so on enables him to design a structure as God designed the world. While the workman operates within the frame of musica practica, the architect, theorizing the structure of the building, operates within
**musica speculativa.** The analogy is an ancient one. As in Vichian poetics, it is the morphogenetic operation which is stressed in medieval music and architecture: the language of the treatise or formula, the summa or specula/tion on number theory, which is performative, its embedded gestural codes determinative of that form of enactment which is the sounding of music, the physical specificity of the building. As the *Wake* puts it, "Mere man’s mime: God has jest" (FW 486.09). In playing a musical instrument or using a carpenter’s tool, we mime the lavish and sometimes whimsical gestures of the divine workman whose morphogenetic principles and operations are best understood by the divine theorist. Thus the playing of music or the building of cathedrals is, according to medieval epistemology, a secondary activity, a *practice*, while the conceptual activities involved in the generation of such structures (in both cases, mathematical activities governed by logological theory) are thought to be at a higher level, approaching divine cognition more closely.

*Musica speculativa* is, then, concerned precisely with the problematic of processual mimesis and with the operation of technē, while *musica practica* with its quotidian concerns is grounded in the particularity of specific techniques applied in specific situations. Where, during and after the Renaissance, *musica practica* assumed dominance with its armory of instructional handbooks and exercises leading not to logotherapy but to better fingering or improved rhythm, by the end of the Middle Ages *musica speculativa* had mutated into cosmological, mathematical and linguistic studies, only to experience its own rebirth in the twentieth century courtesy of Webern, Schoenberg, Berio, Cage and Xenakis among many others in music as well, of course, as in the work of those post-Einsteinian physicists who pursue that great neo-medieval project, a "theory of everything" (TOE) or a "general theory of the universe" (GUT). In their more restricted and technologically different forms, TOEs and GUTs become that extraordinary synthesis of neurolinguistics, brain chemistry, computer engineering and physics which we know as Artificial Intelligence.

To construct an expert system is, in part, to construct a catechism, a fixed, dialogic repertoire whose roots are in hard-wired transformations of neural circuitry and in general theories of universal evolution at the cognitive level. But before we can conclude that the Joyce system is, among other things, a kind of expert system, we need to consider medieval theories of *musica speculativa* in more detail and to filter that information through the terministic screen of one of modernity’s greatest exercises in what Vico might have called "poetic music." Louis Zukofsky’s *speculum* entitled "A." Like the Joyce system, Zukofsky’s poem is involved in the inscription of *musica practica* within the morphogenetic paradigm of *musica speculativa*. And like the Joyce system, "A" foregrounds its musical intertexts, leaving us with the problematic of "poetic music" rather than with the identification of intertexts, a process which, in any case, would not meet the questions posed by *musica speculativa*. Attempting to attach the system analyzed to those extradihegetic plot- and character-functions which it produces as telos, *musica practica* as analytic strategy almost inevitably seeks to turn Gothic pedagogy against itself. Rejecting that strategy, we return again by way of Augustine, following a "commodius vicus"
(FW 3.02) back to the *Wake* with its eye/ear code and to "‘A’" with its poetic integral, compound of speech and song.

**“Beyond memory”: *Musica speculativa***

Letters (*grammata*), says Augustine, are "‘signs of sounds made by the articulate voice with which we speak.’" Other signs "‘pertain to the sense of sight [ . . . ] and very few to the other senses.’" Thus, banners, military standards, and manual gestures "‘are like so many visible words’" though words have a richer signifying capacity than do such purely visual tokens. However, because vibrations in the air soon pass away and remain no longer than they sound, signs of words have been constructed by means of letters. Thus words are shown to the eyes, not in themselves but through certain signs which stand for them.

Written or "‘visible words’" contrast with invisible words, the product of "‘voice [which] is air struck (*verberatus*) by the breath, from which circumstance words (*verba*) also receive their name,’” as Isidore of Seville puts it in his great *speculum*, the *Etymologiarum*. For Plato in the *Philebus*, mastery of the classification and performance of sound—the skills of reverberation—constitutes the summit of *paeideia*, the educational process:

> when you have learned what sounds are high and what low, and the number and nature of the intervals and their limits or proportions, and the systems compounded out of them . . . under the name of harmonies: and the affections corresponding to them in the movements of the human body, which when measured by numbers ought, as they say, to be called rhythms and measures . . . ; when, I say, you have learned all this, then, my dear friend, you are perfect. . . .

As Eric A. Havelock argues in his *Preface to Plato*, the emphasis in this passage on the acquisition of mnemonic paradigms which include such kinesthetic components as dance and gesture is typical of what the Greeks meant by *mousiké*. Thus "‘Greek ‘music’ exists only to make the words more recollectable, or rather to make the undulations and ripples of the meter automatically recollectable, in order to free psychic energy for the recall of the words themselves.’" Rediscovering the choreography of gesture devised by Marcel Jousse, Havelock catalogues the various gestural components of the mnemonic repertoire which is *mousiké*, including the physical movements of the vocal organs as well as of hands and feet, ears and torso "‘The entire nervous system,’” he concludes, "‘is geared to the task of memorisation.’" For the Greeks that task was facilitated by the structuring of language through the vehicle of the *stoicheion* or vowel sound, a developmental stage preceding that of the *grammata* or letters to which Augustine refers several centuries later. Serving to organize the production of speech and melody around tone and pitch
this sounding process renders all linguistic and musical experience dependent upon "sense-perception and memory" for, as Aristoxenus writes in the Harmonic Elements, "we must perceive the sound that is present and remember that which is past." Amplifying this doctrine, Augustine states in the De musica that "rhythms which are in the effect sustained by the ears, passio aurium, are brought to them by sound, and removed by silence," and he notes that this passion of the ears is shared by humans and animals just as memory itself is.

To study mousiké, then, is to acquire language and achieve competence in its use through performance of a mnemonic repertoire. But, as the Etymologiarum has it, since "the world itself is said to be composed by a certain harmony of sounds and heaven revolves in harmonic modulation . . . music extends to all things." Reaching back through Boethius’s De Musica to the Timaeus, Isadore recalls the Platonic axiom that "the soul of the universe is united by musical concord" and that "music is number made audible." Here Pythagorean number theory fuses with neoplatonic cosmology, a synthesis at the root of medieval music theory from the time of Boethius and persisting, as we shall see, into the seventeenth century. Macrobius, for example, argues that

Every soul in this world is allured by musical sounds so that not only those who are more refined in their habits, but all the barbarous peoples as well, have adopted songs by which they are inflamed with courage or wooed to pleasure; for the soul carries with it into the body a memory of the music which it knew in the sky. . . . Consequently it is natural for everything that breathes to be captivated by music since the heavenly soul that animates the universe sprang from music.

—a passage which both anticipates Vico’s theory of the stages of language acquisition and recalls Augustine’s of "number and dimensions" which the memory "contains" in spite of the fact that these principles cannot be the product of sensory perception. Distinguishing between sound per se and what sounded words call up in the memory, Augustine writes that "the words [signifying number and dimension] may sometimes be spoken in Latin and at other times in Greek, but the principles are neither Greek nor Latin. They are not language at all." Beyond language, beyond memory, is "the principle of number . . . [which] is not an image of the things we count, but something which is there in its own right." Beyond number is God for Augustine and Boethius, the World-Soul for the neoplatonic tradition following the Timaeus. In the Pythagorean tradition, however, number and the operations of its principles in mathematics serve as "the representation of fundamental truth" for, according to Stobaeus, "Truth is the proper innate character of number." And as Plotinus puts Augustine’s eminently traditional, neoplatonic point, "The variety of sense-objects merely recalls to the soul the notion of number." Number signifies that form of finitude which we have already classified in terms of the speculum just as its comprehensiveness, its specification of every aspect of its vast system, is evident in Pythagorean assertions of the Monad as the principle of both limit and unity, while the Duad—associated
with such negative elements as the female principle, even numbers ("weaker" than odd numbers), excess and defect, diversity and multiplicity which dare to break away from the unity of the Monad— is associated with infinity.

"The infinite," writes Proclus in the Elements, "is not cognate with the One but alien from it... The manifold of gods is therefore not infinite but marked by a limit." And for Plotinus in the Enneads, the beauty of the universe is sustained "only so far as the [principle of] unity holds it from dissipating into infinity." In other words, infinity is the vacuum which nature abhors (and which attracts makers of encyclopedias and repels makers of specula). Learning to enact the speculum of his culture, the Greek student of mousiké acquired knowledge not only of its limits but also of his own relationship with it, performing his own harmonic relation to the concords and discords of the universe as he danced, sang, played the cithara or the lyre, and caused the words of his ancestors' harmonies to reverberate the harmony of his own being.

Playing the music of the spheres on his monochord, Pythagoras became the emblem for the Middle Ages of the reconciliation of concord and discord in what Boethius classified as musica mundana or earthly music, through which an approach might be made to musica divina, the heavenly music of God. Musica mundana comprehends the music of the spheres, the fundamental harmony of the physical world including the operation of the four elements and seasons, and the movements of the heavens. Musica divina comprehends the beauty and proportion of God, known to the human world through musica divina's reflection not only in the harmonies of the earth but also in musica humana, signifying those relationships of balance and proportion earlier referred to the Greek mousiké. Thus musica humana was interpreted both physically and spiritually in Boethius's binary system:

In the first sense, reference is made [by Boethius] to the external symmetry of the human body, the balance of its members and their placement; in addition, there is the beauty of the internal organs and their arrangement, as well as the harmony between their functioning and man's well-being. On the other hand, there is also a harmonious relation between the body and the soul, a harmony seen in the health of the body and the functions of the soul—intelligence, love, etc. These relationships are a form of music, for they are, like music, founded on the same numerical laws.

Boethius's subset of musica humana is the lowest member of the system and is classified as musica instrumentalis, referring to the actual playing of instruments, a category which later was incorporated into musica practica, the workmanlike realm of those who, like the flute-girls of Plato's time, were without status, being unable to perform the intellectual calisthenics which Alanus de Insulis displays in the following passage from the De planctu naturae, in which he integrates the topos of the concordia discors into the fourfold subsets of musica humana and mundana:

just as the concordant discord, singular plurality, consonant dissonance, discordant accordance of the four elements unite into one whole the structure of the worldly
kingdom, so also do the similar dissimilarity, unequal equality, deformed conformity, divided identity of the four humours join together the edifice of the human body.\textsuperscript{32}

Thus although the full apprehension of the divine signified lies beyond human memory and performance, through music which \textit{is}—thanks to Plato and the Pythagoreans—mathematics, and through the experience of the beauty of the world which \textit{is} the experience of number (since "all things that are beautiful are subject to the power of number and can be explained by it," in Boethius’s system),\textsuperscript{33} at least partial access to the "soul of the universe"\textsuperscript{34} is possible.

Since \textit{mousiké} was primarily verbal in its emphasis—a paradigm retained throughout the Middle Ages as \textit{musica} acquired its subclassifications—Pythagorean understanding of the inscription of limitation within the Monad was transformed into a semiotics of predictable double-coding in which verbal and musical elements existed in a symbiotic, sometimes parasitic, relationship. St. John Chrysostom exemplifies the latter in his advice that "even though the meaning of the words be unknown to you, teach your mouth to utter them meanwhile. For the tongue is made holy by the words when they are uttered with a ready and eager mind."\textsuperscript{35} Symbiosis is apparently more likely to occur after death, however, for after "entering into God's sacred choir . . . you may yourself become a cithara, . . . making a full harmony of mind and body."\textsuperscript{36} Thus is the experience of the infinite sanctioned and rendered conceivable within the code of the finite.

However, double-coding need not be externalized to be operant within this system. "One may also sing without voice." John writes, "the mind resounding inwardly."\textsuperscript{37} But an outward resounding is equally possible, noted by Guido of Arezzo six centuries later in the \textit{Micrologus} as he contemplated the "concordant and mutually congruous lines" often seen in verse and wondered "at a certain harmony of language. And if music were added to this, with a similar internal congruity, you would be doubly charmed by a twofold melody."\textsuperscript{38} This "melody" is, in a sense, already present in words which are, as Augustine observed, \textit{sounds}, and which—if encountered in letters—must be reverberated in air or played, performed, just as the neumes of medieval musical notation were crystallized breaths, moments of \textit{pneuma} sounding on the page.\textsuperscript{39} "Consider, then," argues Guido, "that just as everything which is spoken can be written, so everything that is written can be made into song. Thus everything that is spoken can be sung . . . ."\textsuperscript{40}

The divorce between sound and musical notation expressed by Isadore of Seville with his sense of sounds perishing because they cannot be written down is less urgently felt by Guido not because neumes were any closer to sound for him but because, as the inventor of solfège, he had solved the problem of translating between aural and chiographic modes through the introduction of a fixed mnemonic system which was widely available and, written beneath the neumes, would serve to enable one familiar with the system "to sing a verse without learning it beforehand"\textsuperscript{41} from another singer's performance. Thus sound was harnessed to writing and made to sing through vowels, a chiographic adaptation of the \textit{stoicheion} system of \textit{mousiké}. Guido also devised a variation on this early Gothic pedagogy, generating music out of the vowels of the literary text by "placing the five vowels . . . in
repeated succession under the letter of the monochord (i.e., the great scale, or gamut, ranging from G up to d) and then allowing...[the] text to write the melody" for him.42

A similar strategy was used some three centuries later in the development of the isorhythmic motet during the French Ars Nova period. However, here the concern is not so much with Guido's simple series of transcoding operations but rather with a much more complex series of superimpositions involving the application of the talea, or "cutting," to the color, a melody which "was taken as a series of pitches, without rhythm and without necessity for retention of a specific melodic shape."43 In its privileging of disjunction between the color and the talea, the isorhythmic motet differs from the standard motet form of the Ars antiqua. "Thus if the melody included twenty notes, for example, and the rhythmic pattern decided upon used only fifteen of these, the color would begin its repetition after the talea had recommenced; there would be an overlapping of the first part of the talea with the last of the color."44 Five repetitions of the talea and four of the color would therefore be necessary in order to bring the structure to a point of final coincidence. Since neither the length of color and talea nor the number of repetitions or of variations in rhythmic pattern was fixed, numerous combinations were possible and the form has been said to anticipate the development of tone rows in twentieth-century serial music with its principle of "combinatoriality."45

The fact that the melodies employed in the construction of such motets were frequently taken from other musical sources and integrated into new forms through variation in context or rhythm also associates the form with that of the contrafactum or song to which "a new set of words has been fitted," often with "precise syllabic equivalence."46 With the development of polyphony in the thirteenth century, more complex effects based upon these forms became possible and three centuries later, Johannes Kepler was able in his Harmonices Mundi (1619) to associate the discovery with the playing of "the eternally lastingness of all created time in some short part of an hour by means of an artistic concord of many voices" by which the composer "might to some extent taste the satisfaction of God the Workman with his own works, in that very sweet source of delight elicited from this music which imitates God."47

Kepler—like Augustine, Boethius, Alanus de Insulis, and innumerable others before and, to a lesser extent, after him—wrote in the tradition of musica speculativa which developed out of both Platonic speculation on mousiké and Pythagorean number theory with its exfoliations into every level of medieval thought. In his Plain and Easy Introduction to Practical Music (1597), Thomas Morley defined musica speculativa as "that kind of music which, by mathematical helps, seeketh the causes, properties and natures of sounds, by themselves and compared with others proceeding no further, but content with the only contemplation of the art."48 It is this "high semiotics"49 of speculatieve music which forms one basis for the development of Gothic architecture as earthly manifestatio of sound and number, word and music, in polyphonic figures of the world.

"I have seen lines drawn by architects," Augustine observed in the Confessions, "and they are sometimes as fine as the thread spun by spiders."50 Like music for
Augustine, architecture was "scientia," a mode of knowledge, and its practitioners—until the rise of the great Gothic cathedrals in the thirteenth century brought about a social transformation in their role—were theorists ("theoretici") emulating the compositional tactics of the divine architect or, as Alanus de Insulis called him, "elegans architectus." Through Vitruvius's association of Pythagorean concepts of harmony in music with the harmony and proportion of the human body and of harmony in architecture, the master builders of the Gothic cathedrals conceived of themselves as building theology, imitating in stone "the single, delightful concordance of one superior, well-tempered harmony," in the words of Abbot Suger, traditionally assumed to be the first of the great builder-architects. Augustine's arachnid lines became a sounding in stone of the world-harmonies evident in all creation, from simplest to most complex forms, and a proclamation of the triumph of processual mimesis within the Gothic pedagogy of architecture and music, the "aural geometry" which is the manifestatio, the elucidation in time and space, of those principles of enactment which are explicit in the paradigm of mousike/musica humana and which become the evolving paradigm of liturgical enactment throughout the Middle Ages from the time of Augustine to the Thomist resolution of form as act.

In Gothic Architecture and Scholasticism, Erwin Panofsky has identified totality, homology, and "multiplicity" or combinatoriality as the three major characteristics of the High Gothic style. The totalizing force of this style is seen as an attempt "to embody the whole of Christian knowledge, theological, moral, natural, and historical, with everything in its place and that which no longer found its place, suppressed." The resulting synthesis of architectural motifs and elimination of such elements as the crypt, galleries and towers other than the two in the front of the structure, produced through "extreme linearization" what Jean Bony has referred to as "an intensely rationalistic approach to the play on forms." Characteristic of this approach is the "uniform division and subdivision of the whole structure" in such a way that homology serves as its operand principle. "The whole is thus composed of smallest units—one might almost speak of articuli—which are homologous in that they are all triangular in [the] groundplan and in that each of these triangles shares its sides with its neighbors.

This principle of multiplicity or "progressive divisibility" resulted in a configuring of the whole system in terms of regular series of replicating units. Thus at the height of what is classified as the Rayonnant style of Gothic, "supports were divided and subdivided into main piers, major shafts, minor shafts, and still [more] minor shafts; the tracery of windows, triforia, and blind arcades into primary, secondary, and tertiary mullions and profiles; ribs and arches into a series of moldings." Everywhere the emphasis was on the flattening of surfaces and the canceling out of depth, preserving only enough relief "to make the linear systems perceptible." Thus, as Jean Bony maintains, by masking a broken roofline with "an austere screen of wall," the architects of Mantes cathedral created "something as pure and abstract as a Le Corbusier of the 1920s. . . ."

The counterpart to this statement of "scholasticism in stone" (JHII, 515) is "the classic Summa with its three requirements of (1) totality (sufficient enumeration),
(2) arrangement according to a system of homologous parts and parts of parts (sufficient articulation), and (3) directness and deductive cogency (sufficient inter-relation)... enhanced by... suggestive terminology, parallelismus membroum, and rhyme. 64 Distinctness, deductive cogency and mutual inferability are the marks of this form according to Panofsky, who hypothesizes that someone trained in Scholastic methodology—or Gothic pedagogy at its medieval apogee—"would not have been satisfied had not the membrification of the edifice permitted him to re-experience the very processes of architectural composition just as the membrification of the Summa permitted him to re-experience the very processes of cogitation." As Panofsky concludes, processual mimesis demands "a maximum of explicitness." 65 For the inscription of words as "signs of sounds" is no less than the scoring of musica speculativa, the embedding of memory and forgetfulness in the codes of the world.

"An alphabet of subjects": Toward Zukofsky

Inheritor of Gothic pedagogy, Zukofsky recapitulates through Bach and Boethius the musica speculativa of the Joyce system, resolving words and music into the poetic integral of "A" as emblem of the world. Here Bach becomes a taxonomy of speculative paradigms, corollary of the Joyce system's use of liturgical enactment in the service of Gothic pedagogy. Here the Augustinian injunction in both systems that words not follow music but be music demands processual mimesis in the production of a Vichian "Mental Dictionary" of mousiké in all its replicating paradigms. "Verbivocovisuality," then, demands not only musica speculativa but, da capo, both synesthetic coincidences and rorsive movements along Moebius loops of words which, as notes, are numbers and defy infinity in their explicitness. In "A":

words you
count what
words you
leave out
that count
go backwards ("A" 315)

—and in Ulysses:

They list. Three. They.
I you he they.
Come, mess. (U 447)

"The mind is capable of performing an endless process of addition" ("A" 46), a process which is the performative enactment of the text, its "nature" as "creator"
and "created" ("A" 734)—naturans and naturata—bound into the "inertial systems" ("A" 735), of flower and leaf, the "figurate notation" of Aquinas's handwriting.

In Zukofsky's great speculum entitled Bottom: On Shakespeare, invention takes at least four forms: "an invention of sound that follows a thinking on singing, or an invention that follows a thinking on seeing, or that invention which is finally a thinking on thinking..." Invention is also "music as 'number, a felt relation of counting,' [ . . . ] Bach's feet dancing his fugue at the organ." In Finnegans Wake this is the Quinet motif; in Ulysses at/one/ment, the moment when words (suck, foetus) are epiphanized in Portrait. It is gesture, a metonym for mousiké alias musica humana, operant in all of its multiplicative sets in the eye/ear code of the Wake, summed up in the Gothic pedagogical motto, "What can't be coded can be decoded if an ear aye seize what no eye ere grieved for" (FW 482.34). Composition is invention and "action" is "place," for "these eyeing intimacies of print are all actions." Thus Joycean composition of place intersects with Zukofskian composition of and as process. Enacting place, poems or "acts upon particulars" are process. Inventing "place," we enact the process delineated by textual program, a process which is "music": speculative. Pythagorean in its abhorrence of infinity, architectural in its deployment of number and homology. One of the most fully developed examples in the Joyce system of invention which functions in this way and synthesizes the codes of eye and ear, setting them into homologous relations with each other, is the "verbivocovisual" code, one of the foundations of musica speculativa in Finnegans Wake.

In its privileging of an Augustinian sounding of words and of recursive modes of mnemonic processing, the Joyce system's eye/ear paradigm serves as a kind of solfège enabling us to perform one repertoire with competence early in our learning of the text. A contrafacted set, its components function in much the same way as a series of transputers or individual processors, each programmed to perform a particular operation or to process a specific portion of a problem. The initial division is simply between eye and ear, or I and ere. Subsequent homonymic transformations are from I to German Ei and Middle English ey with a variant in aylaye. Another subset is introduced with eye variants in such languages as Dutch (Oog), German (Auge), Icelandic (Auga), and Dano-Norwegian (Øye), the connector here being simple translation as transcoding device. A more complex instance of the eye code occurs with the transformation to egg (German Ei) and with the introduction of the pronominal category as an agent of transformation (from eyell to you), and then a return to homonym as agent with the transformation of you to yew and Ewe.

In the ear code, a similar series of transformations occurs, again with the initial homonym ere, followed by translations into Dutch (Oor and Aur), German (Ohr), and Dano-Norwegian (Øre). The homonymic subset Eirelair follows the pattern of vowel transformation (from o to a) while retaining an inaudible element of the eye code (Eilre). Between these two arrays of subsets is the mediating term or shifter, French oreilletoeil, like Eileyeegg an example of catachresis. Code-switching here produces such examples of Vichian morphogenesis as "Ere ore or ire in Aarland"
"if an ear eye seize what no eye ere grieved for" (FW 482.34), "he could talk earish with his eyes shut" (FW 130.19), "Ear! Ear! Not ay! Eye! Eye! For I'm at the heart of it" (FW 409.03), "Erin's ear" (FW 467.32; cf. Ireland's Eye), and "in my mine's I" (FW 425.25). This is geometric music, perhaps "audible geometry," one of the Joyce system's variants on Zukofskian *natura naturata*, an integral of eye and ear inscribed within the resolute homology of parallax. This sequence of operations may be diagrammed as shown in figure 5. Thus the Ballad of Persse O'Reilly is resolved into an invention on the themes of the verbi/voco and the visual, *specula/tively* balanced against each other in dialogic enactment. Like the similar resolution of number in its various forms, including geometry, into music (and vice versa) in the Pythagorean tradition as in the Joyce system, the transcoding of eye and ear in the *Wake* subsumes sequence and simultaneity, cause and effect, diachronic and synchronic within each other in recursive enumeration of the recombinant semes of the system.

"What has gone? How it ends?" (FW 614.19) Artificial Intelligence provides a model fulfilling Augustine's dream of cognitive mapping beyond memory and analogous to those emblematic Temples of Speculative Music which are a medieval invention on the theme of contemporary research on brain function. Given that strict analogies are made by some cognitive scientists between brain function and computer function and that computer architecture (that is, the configuration of the computer's processing operations) is increasingly modeled upon what is known, for
example, about information-relay operations in the brain, it is not surprising that modernity's drive toward holistic models of the semiotic web should result in Gothic pedagogical systems. Since some branches of Artificial Intelligence are concerned with the problem of the semiotics of processual mimesis in text "environments" of various kinds, the field also has the advantage of providing both a lexicon and an array of inquiry procedures which are useful in this context. In fact, the operations of John McCarthy's system, "LISP," provide another way of configuring that fugal arborescence of textual paradigms which is characteristic of Portrait and which, as we have seen, remains a principal structuring mode in Ulysses and Finnegans Wake as well.

Terry Winograd has argued that "all language use can be thought of as a way of activating a procedure within the hearer. We can think of any utterance as a program—one that indirectly causes a set of operations to be carried out within the
hearer's cognitive system. 70 Distinctive in terms of both its memory organization and its control structure, McCarthy's LISP employs hierarchical (rather than linear) structure which produces the ordering of data by results and prerequisites built into the system and not by time of entry into it. 71 Using a "tree-like" memory organization, LISP defines "new functions in terms of other functions that are already defined," 72 building on "primitive" or basic functions, configured according to the Y-braiding or nodal structure of a LISP tree. Since LISP nodes are not symmetrical, the branches (or sockets in this sequence of Y-connectors) are explicitly designated left or right. Thus, having identified the required tree and determined the path one's mnemonic sequence will follow, any continuous sequence of left and right turns may be selected in order to reach the designated node from the chosen root function. 73 LISP memory thus operates in terms of a sequencing of lists built as trees whose structures develop as programmed and according to required configuration, storing not only the final term or result of the sequence but also all of the connections among the nodes in the tree or list. The mnemonic hierarchy works by moving back from results to prerequisites or requirements and thus fixes a hierarchy of goals much as the "verbivocovisual" or eye/ear code does in Finnegans Wake.

John Haugeland provides a simple example of a LISP tree, based upon a scenario which begins with a breakfast order (chilled orange juice, two fried eggs) being given in a restaurant. The kitchen or McCarthy machine must then work back to prerequisites, or "arguments" in mathematical parlance, having established the goal or "values" (juice, eggs) required. Haugeland's version of this LISP tree is shown in figure 7. 74 The task has been subdivided into a series of "subroutines" which must be performed (chill, crack, fry) before the goal (breakfast) can be achieved by way of presentation of the appropriately prepared materials (orange, eggs). In other words, a list of lists must be prepared and each must be configured according to the mnemonic repertoire of the system. Since "whenever a LISP function gets an argument (or prerequisite/s), it assumes that the argument is actually specified via another function," each function must first be "evaluated" or scrutinized in order to determine its position within the system. Further, since the LISP machine accepts "only LISP trees as arguments and returns only LISP trees as values... it is possible to define a single complex function that will return
any...[designated] transform as its value, for any input. LISP is therefore universal"—or, in terms of Gothic pedagogy, finitely recursive since the maximum number of branching maneuvers is already bounded within the system. It will be obvious, then, that McCarthy’s machine is a thoroughly speculative one, concerned with a version of processual mimesis and bound by the multiplicative drive of its sets and subsets to reenact the operations of the system.

In LISP, form is act in all senses, and act a recombinant sequence of recursive definitions. Thus "in defining a function, that function itself may be used, as long as there’s an escape clause that eventually stops the regress." However, lest it seem that this "escape clause" is LISP’s version of an encyclopedic infinity, it is important to note that one "escapes" from or "exits" the system, having reached its boundary, and that such transcoding maneuvers can also be built into the system through the insertion of a "NIL" element, a blank or empty set, as a term of a list. Since "LISP programs and LISP memory units ('data structures') have exactly the same underlying form," it is possible to inscribe such "NIL" nodes in both program and mnemonic repertoire and thus, in Gothic pedagogical fashion, inscribe in absentia terms within the system. Thus, like black holes and memory holes, "NIL" tokens serve in the Joyce system as contained universes which have "escaped" and are occasions of regeneration through forgetting. As "A" puts it,

To begin a song:
If you cannot recall,
Forget ("A" 140)

As we have seen, in *Finnegans Wake* dream functions as narrative sanction of processual mimesis and of "forgetting" or anamnesis within the system. Thus in its last great rejection of the codes of Enlightenment propriety in fictive form, the system displaces us to the margin, to the operations of *Wake* language, to learning again how to exercise the system's exercises. On such occasions we may find ourselves in the midst of what computer architects refer to as the "return-from-subroutine problem," which involves how to return "home" via the "return address" when one is out on a limb of one's memory tree. In Joycean terms, this is the problem of how to keep both ends of parallax going at the same time, or how to operate catechetical paradigms outside *Ulysses* III.2, or how to ensure that catachresis predictably operates according to its morphogenetic program. The simple answer is repetition, but how does repetition function to achieve its text-designated goal? There are at least two responses in terms of computer architecture, the first involving one solution to the "return-from-subroutine" problem as explained by Haugeland:

Whenever a portion of your program calls a subroutine it first puts its return address on the top of the stack [a "last-in-first-out" memory system] and then branches. Whenever any subroutine finishes its job, it removes whatever address is on top of the stack and branches back there. The result is that any subroutine always returns automatically to the most recent call that has not yet been answered... Thus
subroutine calls can be nested (sub-subroutines calling sub-subroutines and so on) arbitrarily and without distinction.\textsuperscript{79}

This is how motiv systems operate in the Joyce system, replication producing branching which leads into the whole paradigm composed of a subsystem of nested motifs. So each motiv system is a subroutine addressed to its components, as we have seen in the case of the ear/eye paradigm in *Finnegans Wake*.

But the dialogical structure of both catechetical paradigms and catachresis demands a more complex procedure. In computer lexicon, this is an “expert system” which requires a well-defined “micro-world”\textsuperscript{80} such as a textual system is. There are several other requisites, all having to do with the criterion of practicality since expert systems are typically devised in such cases as medical diagnostic situations where large amounts of data particular to, for example, chemotherapy options relevant to a specific form of cancer, are to be systematized in such a way that a diagnostician may consult the system about a particular array of variables in a specific situation (for example, a negative response to a particular combination of drugs at a specific stage of treatment). Expert systems operate on the basis of semiotic analyses of ranges of semic clusters and serve as filters for arrays of information too complex for the diagnostician to deal with efficiently in any other way. Such systems clearly also facilitate the comparison of a specific situation with a vast repertoire of other data relevant to a specific factor or group of factors.

Employing interactive programs, expert systems are fundamentally catechetically based pedagogical machines in which a LISP-like hierarchy may be used. Proceeding, as *Ulysses* III.2 instructs, from the known to the unknown, the user of the Joycean expert system encounters not only the nested subroutines of the motif system and the relatively fixed catechetical paradigms but also the much more complex situations of catachresis where the inscription of ictus, or an *in absentia* element, within the structure produces at least a momentary cognitive gap. Here the textual program functioning as expert system provides an array of solutions or responses designated as appropriate or “felicitous” by the system on the basis of its homologous patterning. However, textual “felicity conditions” are met more easily in the “micro-world” of the Joyce system than in Austin’s speech act environment for here response paradigms are fixed and comprehension is a corollary of finite, performative competence—finite not only because of the evident limits of the text and the fixed orders of its paradigms and elements but also in a musical sense for, as we have seen, *musica speculativa* abhors a vacuum and *mousiké/musica humana* demands full gestural enactment.

All of which is to argue, at least in part, that High Gothic cathedrals are architectural expert systems and that the modernity of Gothic\textsuperscript{81} is rooted in mathematical paradigms which are also typical of *musica speculativa*. Modified in a variety of ways by both the Joyce and Zukofsky systems, those paradigms not only recur in the twentieth century but again constitute the core of modernity. Gothic pedagogy is, then, the crucial techne of the modern wherever it occurs, peculiar neither to the specific mode from which it takes its name nor to the Joyce system’s enactment of it. A dramatistic strategy which, in its Joycean variation, derives its terministic
screens from logologically grounded performative operations including liturgical
 enactment, catachresis, and musica speculativa. Gothic pedagogy takes as motto
Beckett's apprehension that "Joyce came to see that the fall of a leaf is as grievous
as the fall of man"—both alive, both fallen, falling: homologous portions of a
world living, breathing, dying, ceaselessly. The ecosystemic motif again.

"An Hieroglyphical and Shadowed Lesson of the Whole World":
Zukofsky and the Lessons of the Joyce System

Returning to the golden section as architectural module, Le Corbusier redis-
covered Vitruvian Pythagoras, proclaiming that "a house is a machine to live in" (built on a human scale, its geometry a set of nested figures). A text is also a
machine: in the case of the Joyce system, a McCarthy machine though with a
repertoire of variations exceeding LISP's wildest dreams. Learning the rules, ded-
ucing Joycean game theory, we acquire performance-competence. Exercising the
exercises, we are trained in mousiké and experience that "semiophany" which
Augustine locates "beyond memory," a realm to which musica speculativa gives
access. Remembering where we are, we discover forgetting, anamnesis—finite
boundary, memory hole, closure out of which the system reinvents itself "in soandso
many counterpoint words" (FW 482.34) according to textual program, until the
end.

"To begin a song: / If you cannot recall, / Forget" counsels "A"-12. A prosody
handbook like Augustine's De Musica, Zukofsky's long poem "A" is also a
speculum and a Gothic pedagogy of contrafacted sequences, incorporating the
Pythagorean quadrivium as strategy of world-building or of architecture as scientia.
Bottom serves as foil to and commentary not only on "A" and Zukofsky's complete
production but also on the life and works of Shakespeare. It is one of the great
metacritical texts in the English language. In both "A" and Bottom (or "B"),
Pythagoras's four mathematical disciplines are resolved into that "ideational music" which is evident in the geometric triumph of the Gothic cathedral, in the
fugues of Bach and the works of Shakespeare, and in the structure of the universe,
whether of text or "nature." In Zukofsky's recurrent citation of Bach, "The order
which rules music is the same order that controls the placing of the stars and the
feathers in a bird's wing." Replicating the movements of nature, "He who creates
/ Is a mode of these inertial systems— / The flower—leaf and leaf wrapped around
the center leaf . . . ," as one voice in "A"-24 puts it ("A" 735).

Poems, like flowers, are in constant process of enactment: "Poems are only acts
upon particulars. Only through such activity do they become particulars them-
selves—i.e., poems." Like leaves wrapped around each other, letters—those "eye-
ing intimacies of print [—] are all actions" as well and are bound, like flowers,
into a larger system. Quoting Christopher Smart in Bottom, Zukofsky writes:

For there is a language of flowers.
For there is a sound reasoning upon all flowers. . .
For flowers are medicinal.
For flowers are musical in ocular harmony.\textsuperscript{87}

Botanical "reasoning" involves not only soundness of logic but also reasoning through sound, the logic of both music and flowers being that of "nature" whose "ocular harmony" is interfaced with musical harmony. In Zukofsky, "botanical calligrams" have become audible; so is the work of Shakespeare though in a speculatve as well as practical sense. Thus in Bottom, Shakespeare "is not a metaphor for music—a matter of what the eyes see flowing away in the mind."\textsuperscript{88} not a metaphor restricted to a mode of optic intellation but, rather, the nonfigurative reality of "presence joined by the fixed curve" or Blakean "bounding line" of musica mundana, the limits of human music intersecting the boundary of musica divina. So "music avoids impossibility"\textsuperscript{89}—avoids the "infinite" in the Pythagorean (negative) sense, and, like memory, is bound into the cycle of forgetfulness.

For Zukofsky as for Vico (\textit{NS} 461–63), "man sung before he spoke"\textsuperscript{90} and words remain sounds. Sounding the letters, we articulate an Augustinian music as

The syllables of \textit{Pericles} are brought together like notes. And if that intellective portion of mind that is music can make poetry and prose interchangeable, because there is a note always to come back to a second time—sung to the scale the "subjects" of speech are so few and words only ring changes one on another, the differences perceived by their fictions are so slight music makes them few. Up, down, outwards—for even inversions and exact repetitions move on—are the melodic statement and hence the words' sense; or after syllables have been heard before in contiguity, they may also be augmented or diminished, or brought to crowd answer on subject in a great fugue, as in \textit{[Pericles]} V, i.\textsuperscript{91}

Music mimes nature's modes of processual operation and enactment, moving as nature moves according to John Scotus Erigena as cited in Bottom: "Nature is eternal . . . but . . . dynamic, moving by the dialectical process of division and return."\textsuperscript{92} Fugue form provides a restricted model of this process: "everything must grow out of the subject and there must be nothing new [. . .], there being a unity in spite of infinite multitude, and an infinite multitude in spite of unity."\textsuperscript{93} Thus music, nature, and memory function as correlative within this stable system in which creator and created exist in a relation of exchange which is not only dialectical but also, and more importantly, dialogical:

\texttt{Natura naturans— / Nature as creator / Natura Naturata— / Nature as created ("A" 734)}

Verbal music and semantic data exist in a similar tension since "the sound and pitch emphasis of a word are never apart from its meaning."\textsuperscript{94} In turn, this exchange relation is replicated in poems whose "forms are achieved as a dynamics of speech
and sound, that is, as a resolution of their interacting rhythms—with no loss of value to any word at the expense of the movement.95

Miming nature's operations, art becomes for Zukofsky a part of nature. As he states in Bottom.

That art is "good" which does not presume or run out on the world but becomes part of visible, audible, or thinkable nature: an art reached with scaled matter, when it is, as in Shakespeare with words, in Bach with sounds, in Euclid with concepts, or in Ravenna mosaic with small colored stones.96

In Zukofsky as in the tradition of musica speculativa upon which he draws, all matter is "scaled," constructed according to scale, occupying its place though that "place" be in movement. As Scotus Erigena explains in a passage from The Division of Nature quoted in Bottom:

Dialectic begins with essence . . . to which it returns. Geometry . . . with the point from which all figures are developed and into which it is resolved. Astronomy . . . with the moment from which all motion is developed and into which it is resolved. Metaphysics begins and ends with God. In nature . . . division is creation, by successive states from the divine unity. All things flow constantly from God as water flows from a spring . . . as water tends ever to return to its level.97

Like "A," nature contains its own "omissions" which are part of the poem, delineates the boundaries of its black holes, reconfigures an ultimately fixed system, permits broken symmetries within a world enacting "mind's music" ("A" 606), musica humana which is "chances of ordered changes changes of ordered chances . . . " ("A" 406). Thus in "A"-24,

I feel
that everything
is moving
and mixing
with everything else ("A" 633–34)

as the other four voices of this Masque move and mix with each other according to a set performance ritual:

The metronome markings for the music determine the duration of each page for all the voices on each page. The speed at which each voice speaks is correlated to the time-space factor of the music. The words are NEVER SUNG to the music. ("A" 564)

But Handel's "Harpsichord Pieces" serve primarily as an aide-mémoire in "A"-24, sending us da capo, back through "recurrence," "forgetfulness," and "L. Z."
(“A” 806), the code of authorial inscription from A to Z, and into that “nature” which is in process of being and becoming in “A,” which is the poem at any moment when the wheel of memoration stops and we peer into Platonic anamnesis, searching for a way to start again. However, “Thanks to the dictionary,” there is always a way in Zukofsky’s system; no sensory modality is lost. Dante, following the same path, provides an exemplum for when he “‘thinks’ a metric foot in De Vulgari Eloquentia a human foot stalks him like Cressid’s. So the visible reference persists ‘tangibly’ as print, as the air of the voice in handwriting as notes.” Dante’s metrics are Augustinian musica speculativa, his “notes” the visibile parlare of the Purgatorio. Synthesizing Augustine and Scotus Erigena on the subject of “musical” form in his essay “An Objective,” Zukofsky stresses that a poem is “a context associated with ‘musical’ shape, musical with quotation marks since it is not of notes as music, but of words more variable than variables, and used outside as well as within the context with communicative reference.”

That all script is musical notation in a speculative sense is crucial to both the Joyce system and to Zukofsky’s theory of the integral, which, as “A”-12 states, is his “poetics” whose “lower limit” is speech and “upper limit music” (“A” 138). However, those fixed limits to the scale which are denoted by this poetic integral undergo a series of permutations from “A”-12 to “A”-14. The first occurs later in “A”-12 where the original version—

$$\int \text{music}$$

$$\text{speech (“A” 138)}$$

becomes

$$\int_{-1}^{1} \int \text{sound}$$

$$\text{story–eyes: thing thought (“A” 173)}$$

Sound is to music as story is to speech or as story is to eyes, but here we may construe the dash preceding “eyes” in alignment with the negative quantity (-1) of the lower limit of the corresponding integral. Thus, story minus eyes is to sound (working from lower to upper limit) as speech is to music. The music of an oral narrative is, as the repeated stress upon the dialectic of aural/oral and visual presented above would seem to indicate, incomplete without the stimulus of the visual. A story without the involvement or voice of the eyes is equivalent to a “thing thought.”

The second permutation of this system, in “A”-14, will help us here:

lower limit music
upper limit mathémata
swank for things (“A” 349)
Things become music when they are thought: Pythagorean *mathêmata* become mathematics through the energy of *mousikê*. Acting upon the particulars of things, music is the upper limit of speech in its most fully articulated (harmonized, mnemonically encoded) form, that of poem or "story." As the rest of the second permutation from "A"-14 has it:

lower limit body
upper limit dance
lower limit dance
upper limit speech
lower limit speech
upper limit music ("A" 349)

If we align the terms of the initial version of the integral with their equivalents in its two permutations, another paradigm emerges as shown in figure 8. Nonreplicating terms are thus *sound* and *mathêmata* from the upper limit of the integral, and *story-eyes* with its correlative *thing thought* followed by *body*. A chiasmic interrelationship is evident: *mathêmata* ("swank for things") is aligned with *thing thought* and thus with *story-eyes* while *sound* is aligned with *body*. But we know from a passage earlier in "A"-12 that

Music does not always
Call on the human voice
Only free (often wordless)
Men are grateful to one another ("A" 130)

Like the debt of gratitude to Celia Zukofsky (Celia the music maker after her hagiographic namesake, patron of musicians) which is acknowledged and celebrated at the end of "A," gratitude here is an aspect of freedom and of that love—of family, of Bach, of words and music—which is invoked again and again across the poem and which, as reflection of *musica divina*, is the sustaining force when words are "blown" by the wind’s harmonics beyond the range of the human ear. Bodies may not always be capable of receiving sound nor may thoughts always impinge upon things (or vice versa) or things upon things. Things may exceed the
reach of eyes or of stories (as those objects known as stories or poems may summon
eyes but not thoughts). But within the dialogical poetics which Zukofsky’s integral
encodes, we move nonetheless through a consistent series of parallel scales bounded
in each case by parallel lower limits (speech, story—eyes/thing thought, body, dance,
music) and by parallel upper limits (music, sound, dance, speech, mathémata).
Speech is music, story is sound, body is dance, music is mathémata is speech—a
recapitulation of musica speculativa which, with several extra terms, is a version
of the "nine/men’s/morris" dance which occurs in "A"-21 ("A" 445), echoing
Joyce’s SD in Ulysses 1:2:

this
is
my
form

a
voice
blown ("A" 445)

writes Zukofsky; and Joyce:

Across the page the symbols moved in grave morrice, in the mummyry of their letters
| . . . |; so: imps of fancy of the Moors. Gone too from the world, Averroes and
Moses Maimonides, dark men in mien and movement, flashing in their mocking
mirrors the obscure soul of the world, a darkness shining in brightness which bright-
ness could not comprehend. (U 2.155)

It is a version of Bach’s triad of music, stars, and feathers: the music of all
spheres—some stellar, some avian—bound into a world fugue which is Zukofsky’s
book, Joyce’s Moorish algebra transposed into Ulysses and Finnegans Wake. But

. . . What book?
what book?
entire enough
to take
the place
of all
the books
and of
the world itself ("A" 423)

—a riddle to which one answer is the world as book, the ancient topos grounded
in an understanding on the part of medieval grammarians of author, auctor, as one
who “performed the act of writing. He brought something into being, caused it to
‘grow,’ ” or, in Augustinian terms, caused words to be sounded. As A. J. Minnis
writes in his study of Medieval Theory of Authorship, the term auctor was thought
to have been derived from the Latin verb agere, "to act or perform," augere, "to grow," and auieo, "to tie," as well as from the Greek noun autentim, "authority." Thus authors were imaged also by such poets as Virgil and Lucan as tying together their verses with feet and meters or, in Augustine's terms, with sounding words. So in performing "A"-24, we grow the work from A to Z, do capo, learning as we perform according to the visual and aural/oral directive provided by Zukofsky's vast "performance-system." Learning to tie our note together and keep time. Foregrounding its Gothic pedagogical goals, Zukofsky's system articulates Joycean operations, voicing explicitly the lessons of the Joyce system.

Not a metaphoric sequence but a homologous one:

\[ \textit{musica speculativa (mousikê)/architecture (geometry)/text (word, sound)/world (memory system)} \]

A taxonomy of recombinant technai, a "Mental Dictionary." Or a calculus in which the logic of topoi ("topo-logie") is a subset of \textit{musica speculativa}; in which troping the performative discourse of the text is a musical strategy involving "an interpolation, textual or musical, into an already existing composition;" in which \textit{contrafactum} engages the system in endless recirculation by the river of dream narrative; in which "dream" is an element in an isorhythmic motet which starts with Vico's Homer practicing \textit{mousikê} and proceeds by way of Ignatian exercise to composition of place, speech become music become \textit{mathêmata}, sounding in speculative world.

Memory is a stomach, says Augustine. In the \textit{Confessions}.

"ego sum, qui memini. ego animus."

\textit{Animus} nourishes and digests \textit{ego} in the continuous present-tense process of being, \textit{ego sum}, which drives the stomach of memory in peristalsis, alimentary desire. Subsuming \textit{ego} within itself, \textit{qui memini}—centered, relative clause balancing \textit{sum} against \textit{animus}—verbalizes its own action in ongoing rememoration. So composition is act \textit{(sum, memini)} and place or locus of enactment \textit{(ego, animus)}, the product of the repertoire of encoded mnemonic paradigms. Recapitulation—\textit{an kepbalaiosis}, multiplicability, combinatoriality—drives the system.

See this. Remember.
\[ \ldots \]
Listen. \textit{(U 9.294)}

"Astronomically fabulafigured" (FW 596.29), the Joyce system flaunts its quoddrival music while dispatching Model Readers on allusive expeditions. Perhaps when their backs are turned, the system "is epiphaniased," a recapitulative moment like that which Lethaby imagines of a Gothic cathedral which \textit{rings} when a mass taps a pillar to make its stress audible. The note is the world.
technique" in *The Decentered Universe of "Finnegans Wake"* [Baltimore: Johns Hopkins Univ. Press, 1974], p. 17). It is interesting to see that in spite of her use of psychoanalysis in analyzing *FW*, Norris maintains that "there is ample evidence to suggest that . . . *FW* is designed precisely to refute the realist epistemology that has dominated prose fiction since the eighteenth century" (p. 11). In a book which was not available to me until *Writing Joyce* was completed, John Bishop links Freudian "Traumwerk" with Vichian and argues that "Vico gave . . . [Joyce] the dream-work by which he spun out *Finnegans Wake*" (*Joyce's Book of the Dark* [Madison: Univ. of Wisconsin Press, 1986], p. 185). Paradoxically, however, while maintaining that the *Wake* "devastates as completely as the condition of sleep the whole notion of discrete individuality" (p. 214), Bishop employs a subjectivist epistemology throughout his book, thus deflecting his reading of dreamwork away from Vichian materialist semiotics and toward kerygma.


5. Mousiké/Memory : Sound/Sign


5. Ibid., p. 94.


10. Ibid., p. 35.

11. Ibid., p. 36.


15. Ibid., p. 151.
25. Ibid.
26. Ibid.
30. Ibid., p. 41.
36. Ibid., p. 70.
37. Ibid.
42. Stevens, *Words and Music*, pp. 383–84. Cf. the system devised to enable singers and players to sing Seiklos’s Skolion or round-song, which, because of the antimetric rhythm of its verses set against a regular music pattern (i.e., a *tala* in Indian music), required a shorthand notation to facilitate performance. Thus a horizontal dash above the note indicated two units; an angle \( \text{L} \), three; \( \text{U} \), four; and \( \text{W} \), five units. A small upright angle \( \Lambda \) signified a rest, stood for lambda, and was sometimes replaced by an arc \( \text{f} \). See Curt Sachs, *The Rise of Music in the Ancient World East and West* (New York: Norton, 1943), pp. 264–65. Joycean numerologists may wish to speculate on the extent to which this system is applicable to *Finnegans Wake* with its virtually identical sigla.
45. Charles Rosen, *Schoenberg* (London: Marion Boyars, 1976), p. 101. Rosen notes Webern’s version of Frank’s ekphrastic principle in 1912. "Writing down the twelve notes of the chromatic scale in his notebook and then crossing off the individual notes as they appeared in one of his miniature pieces," Webern wrote that he ‘‘had the feeling that when the twelve notes had been played, the piece was over’’ (Rosen, pp. 70–71).


48. Quoted in ibid., p. 20.

49. Deely, Introducing Semiotic, p. 18.


53. Quoted ibid. See also ibid., p. 36, fn. 38.

54. Ibid., p. 133.


57. Ibid., pp. 44–45.


59. Panofsky, Gothic Architecture, p. 46.

60. Ibid., p. 48.

61. Ibid.


63. Ibid., p. 154.

64. Panofsky, Gothic Architecture, p. 31.

65. Ibid., p. 59.


67. Ibid., p. 37.


70. Quoted in Hofstadter, Gödel, Escher, Bach, p. 629.


72. Ibid., pp. 154–55.

73. Ibid., p. 148.

74. Ibid., p. 152.

75. Ibid., pp. 153–54.

76. Ibid., p. 156.

77. Ibid., p. 155.


79. Haugeland, Artificial Intelligence, pp. 144–45.

80. Ibid., p. 193.

84. Peter Quartermain, "'I am different, let not a gloss embroil you.'" rev. of "A Paideuma 9:1 (Spring 1980), p. 205.
85. Zukofsky, Bottom, p. 276.
86. Louis Zukofsky, "'The Effacement of Philosophy,'" in Prepositions, p. 55.
87. Zukofsky, Bottom, p. 197.
88. Ibid., p. 184.
90. Zukofsky, "'About the Gas Age,'" in Prepositions, p. 172.
91. Zukofsky, Bottom, p. 432.
92. Ibid., p. 118.
94. Zukofsky, "'An Objective,'" in Prepositions, p. 17.
95. Ibid., p. 22.
96. Zukofsky, Bottom, p. 182.
97. Ibid., p. 118.
100. Zukofsky, "'An Objective,'" in Prepositions, p. 16.
103. Stevens, Words and Music, p. 511.