Some references to books on gesture theory

Flow, Gesture, and Spaces in Free Jazz
Towards a Theory of Collaboration

Musical Performance
A Comprehensive Approach: Theory, Analytical Tools, and Case Studies

Musical Creativity
Strategies and Tools in Composition and Improvisation

The Musical Multiverse of Gestures

2007-2012

2016
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology

Es (das Glasperlenspiel) bedeutete eine erlesene, symbolhafte Form des Suchens nach dem Vollkommenen, ein Sichannähern an den über allen Bildern und Vielheiten in sich einigen Geist, also: an Gott.

It (the glass bead game) represented a symbolic form of seeking for perfection, an approach to that Mind which beyond all images and multiplicities is one within itself – in other words, to God.
A precise description of the game does not exist. Here is a passage:

Under the shifting hegemony of now this, now that science or art, the Game of games had developed into a kind of universal language through which the players could express values and set these in relation to one another. Throughout its history the Game was closely allied with music, and usually proceeded according to musical or mathematical rules. One theme, two themes, or three themes were stated, elaborated, varied, and underwent a development quite similar to that of the theme in a Bach fugue or a concerto movement. A Game, for example, might start from a given astronomical configuration, or from the actual theme of a Bach fugue, or from a sentence out of Leibniz or the Upanishads, and from this theme, depending on the intentions and talents of the player, it could either further explore and elaborate the initial motif or else enrich its expressiveness by allusions to kindred concepts. Beginners learned how to establish parallels, by means of the Game's symbols, between a piece of classical music and the formula for some law of nature. Experts and Masters of the Game freely move the initial theme into unlimited combinations.
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
I The world is everything that is the case.
Not more? Come back to this.
On this level, Hesse’s game has been realized by mathematical music theory in 1985.

Sonate für Klavier
Aut_G(Messiaen III)\DIA^{3}(1981)
Construction on 58 pages
99 measures, meter 12/8, C-major

CD: Patrizio Mazzola
SONATE
GROSSE SONATE FÜR DAS HAMMER-KLAVIER
Dem Erzherzog Rudolph von Österreich gewidmet
Komponiert 1817/18
Opus 110

Allegro

Sonate op. 106 « Hammerklavier »

www.melism.info.com
Thesis: The modulation structure of op. 106 is governed by the symmetry group of the diminished seventh chord $C\#^{-7} = \{c\#, e, g, b_p\}$ in the role of admitted modulation forces.

world anti-world

Exposition

Development

Recapitulation

Coda
Global Scheme

Op. 106

\[ \text{Sym}_Z(C#^{7}) \approx e^{3Z_{12}} \times \{\pm 1\} \]

minor third ~
Messiaen 2 scale
„limited transpositions“

Op. 3

\[ \text{Sym}_Z(C#^{+}) \approx e^{4Z_{12}} \times \{\pm 1\} \]

major third ~
Messiaen 3 scale
„limited transpositions“
Thesis: The modulation structure of op. 3 is governed by the symmetries of the augmented triad $\text{C#}^+ = \{ \text{c}_\#, \text{f}, \text{a} \}$ in the role of admitted modulation forces.
Tonal modulation via exchange of modulation quanta

Arnold Schoenberg (1874-1951)
Modulation $G_b \rightarrow A_b$
The Ontology of Musical Facts

- expression
- signification
- content

communication

- poiesis
- neutral level
- aesthesis

realities
- physical
- psychological
- symbolic
The Ontology of Music
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
Alexander Grothendieck  
(1928-)

Euclid of Alexandria:  
punctus est cuius pars nulla est

introduction of reference
Yoneda Lemma („lemme de la Gare du Nord“, 1954)

Nobuo Yoneda (1930-1996)
Lemma: The system $F$ of all $f: A \to X$ describes $X$ completely. Denote this system by $F = @X$, this the functor of $X$. 
Functors $F$ can also be defined without any object $X$ being their generator!

In modern mathematics, one is used to work with functors that are not necessarily represented by objects (such as $F = @X$).

Only the behavior of a functors is relevant, its object (if it exists) does not matter.

This is parallel to quantum mechanics: the observables are chimeras, e.g. wavicles, only their behavior, when they act on state vectors, is tangible, yielding probabilities in a measurement.
Pierre Boulez (1925-)

structures Ia (1952)
→ analyzed by György Ligeti

thread (« Faden »)

The composition is a system of threads.

But threads are $\mathbb{Z}^{11}$-addressed generalized points.

→ functorial approach
The yoga of Boulez’s serial construction is a canonical system of functorial address changes.

\[ \mathbb{Z}^{11} \boxplus \mathbb{Z}^{11} \rightarrow \text{Pitch} \times \text{Duration} \times \text{Loudness} \times \text{Attack} \]

on \( \mathbb{Z}^{11} \boxplus \mathbb{Z}^{11} \) (affine tensor product) generating new series of series used in the composition.

Ligeti’s matrix
Gérard Milmeister

Composer

http://www.rubato.org

part A  part B
fourth movement: Coherence/Opposition
The Fregean drama: morphisms/fonctions are the „phantoms“ (prisons?) of gestures.

Gottlob Frege (1848-1925)
Le geste est élastique, il peut se ramasser sur lui-même, sauter au-delà de lui-même et retentir, alors que la fonction ne donne que la forme du transit d'un terme extérieur à un autre terme extérieur, alors que l'acte s'épuise dans son résultat. (...)

Localiser un objet en un point quelconque signifie se représenter le mouvement (c'est-à-dire les sensations musculaires qui les accompagnent et qui n'ont aucun caractère géométrique) qu'il faut faire pour l'atteindre.

Les enjeux du mobile 1993, Seuil

La valeur de la science 1905, Flammarion
music unfolds symbolic formulas to gestures

rotation

matrix equation

\[
\begin{align*}
    a_{11}x + a_{12}y + a_{13}z &= a \\
    a_{21}x + a_{22}y + a_{23}z &= b \\
    a_{31}x + a_{32}y + a_{33}z &= c \\
\end{align*}
\]

\[
\begin{pmatrix}
    a_{11} & a_{12} & a_{13} \\
    a_{21} & a_{22} & a_{23} \\
    a_{31} & a_{32} & a_{33}
\end{pmatrix}
\begin{pmatrix}
    x \\
    y \\
    z
\end{pmatrix}
=
\begin{pmatrix}
    a \\
    b \\
    c
\end{pmatrix}
\]

☞ rubato/BigBang rubette
An attempt of reanimation:

Multiplication of complex numbers from phantom to gesture, infinite factorization

Come back to this when discussing Beethoven’s fanfare in op.106
We Do Not Choose Mathematics as Our Profession, It Chooses Us: Interview with Yuri Manin

Mikhail Gelfand

Notices of the AMS Nov. 2009

Instead of sets, clouds of discrete elements, we envisage some sorts of vague spaces, which can be very severely deformed, mapped one to another, and all the while the specific space is not important, but only the space up to deformation. If we really want to return to discrete objects, we see continuous components, the pieces whose form or even dimension does not matter. Earlier, all these sets with topologies...some of them have been factored through a process of...there is an unconsciousness of...numerical and...the basic components of a discrete set, then...continuous components...almost from the start, our images are so infinite that if you want to make something finite out of them, you must divide them by another infinity.

I see in this an analogy with a rebuilding of pragmatic foundations in terms of category theory and homotopic topology.

Yuri Manin (1937-)

Gelfand: So what will happen in the next twenty years?

Instead of sets, clouds of discrete elements, we envisage some sorts of vague spaces, which can be very severely deformed, mapped one to another, and all the while the specific space is not important, but only the space up to deformation. If we really want to return to discrete objects, we see continuous components, the pieces whose form or even dimension does not matter. Earlier, all these sets with topologies...some of them have been factored through a process of...there is an unconsciousness of...numerical and...the basic components of a discrete set, then...continuous components...almost from the start, our images are so infinite that if you want to make something finite out of them, you must divide them by another infinity.

I see in this an analogy with a rebuilding of pragmatic foundations in terms of category theory and homotopic topology.

Yuri Manin (1937-)

Gelfand: So what will happen in the next twenty years?

Instead of sets, clouds of discrete elements, we envisage some sorts of vague spaces, which can be very severely deformed, mapped one to another, and all the while the specific space is not important, but only the space up to deformation. If we really want to return to discrete objects, we see continuous components, the pieces whose form or even dimension does not matter. Earlier, all these sets with topologies...some of them have been factored through a process of...there is an unconsciousness of...numerical and...the basic components of a discrete set, then...continuous components...almost from the start, our images are so infinite that if you want to make something finite out of them, you must divide them by another infinity.

I see in this an analogy with a rebuilding of pragmatic foundations in terms of category theory and homotopic topology.
Music
Formulas $\leftrightarrow$ Gestures
Mathematics

Alexander Grothendieck on my mathematical music theory: „This is probably the mathematics of the new age“
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
Origins of gesture philosophy:

Hugues de Saint-Victor gives a most adequate definition:

“Gestus est motus et figuratio membrorum corporis, ad omnem agendi et habendi modum.”

(Gesture is the movement and figuration of the body’s limbs with an aim, but also according to the measure and modality proper to the achievement of all action and attitude.)

Tommaso Campanella:
(Philosophia Rationalis 1637-38, Paris, Du Bray):

“...omnes propositiones per singulares tamquam ad digitum exponuntur.”

(…pointing with your finger is the only certitude)
IN THESE WALLS DEVOTED TO THE MARVELS
I RECEIVE AND KEEP THE WORKS
OF THE PRODIGIOUS HAND OF THE ARTIST
EQUAL AND RIVAL OF HIS THOUGHT
ONE IS NOTHING WITHOUT THE OTHER

Paul Valéry (1871-1945)
C'est l'exécution du poème qui est le poème.
It's the rendition of a poem which is the poem.
The interest of science lies in the art of doing science.
Jean Cavaillès (1903-1944):

*Méthode axiomatique et formalisme* 1949, *revue int. de philo.*

*Comprendre est attraper le geste et pouvoir continuer.*

*Understanding is catching the gesture and being capable of continuing.*

Maurice Merleau-Ponty (1908-1961):

*Phénoménologie de la perception* 1945, *Gallimard*

*La parole est un véritable geste et elle contient son sens comme le geste contient le sien. C’est ce qui rend possible la communication.*

*Language is a veritable gesture and it contains its sense much as the gesture contains its own. This is what makes communication possible.*
Mirror-Neurons in anthropology and cognitive science:
- Anthropologist Merlin W. Donald: cultural human evolution via *gestural mimesis*.
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
Musical Transformation Theory

Manfred Clynes (inventor of „essentic forms“, elementary gestures for musical emotions), *Secrets of life in music*, Royal Swedish Acad. of Music 1985:

*In Western culture we have devised a singular means of killing music—writing it down in a score. It then has to be resuscitated or resurrected in performance. The performer has to supply all the nuances, the microstructure that was not and could not be notated by the composer, in order to bring the music to life. Therein lies his art.*

David Lewin

**Generalized Musical Intervals and Transformations**

1987/2007, Cambridge UP:

*If I am at s and wish to get to t, what characteristic gesture should I perform in order to arrive there? (...) This attitude is by and large the attitude of someone inside the music, as idealized dancer and/or singer. No external observer (analyst, listener) is needed.*
Gestures in Performance Theory

Theodor W. Adorno
*Towards a Theory of Musical Reproduction*
(1946) Polity, 2006:

*Correspondingly the task of the interpreter would be to consider the notes until they are transformed into original manuscripts under the insistent eye of the observer; however not as images of the author’s emotion—they are also such, but only accidentally—but as the seismographic curves, which the body has left to the music in its *gestural vibrations*. The idea of performance pertains to the music proper, and it is not accidental. Performing music: making music.*

Robert S. Hatten
*Interpreting Musical Gestures, Topics, and Tropes* 2004, Indiana UP 2004, p.113

*Given the importance of gesture to interpretation, why do we not have a comprehensive *theory of gesture in music*?*
**Gesture** = digraph morphism $g: \Gamma \rightarrow \vec{X}$

(= $\Gamma$-addressed point)

in *spatial digraph* $\vec{X}$

(= digraph of continuous curves $I \rightarrow X$, $I = [0,1]$)

of topological category $X$
Space of gestures with skeleton $\Gamma$ and body in $X$ is a topological category.

Notation: $\Gamma \vec{\rightarrow} X$

gestures of gestures of... = hypergestures!

realistic forms?
hypergesture

Space-time $X$
Look at fanfare of Beethoven’s op. 106 to understand rhythm!
repetition of halting gesture

halting of repetition gesture

halting gesture

repetition gesture
Solution: Complexification + Deformation

Lewin’s characteristic gesture

Complexification exchanges duration/onset ~ repetition/halting!
Tonal modulation via exchange of modulation quanta
[X,Y]-integral curves (Lie bracket)

symmetry of C major

symmetry of F major
Hypermegesture between $\text{VII}_C$ and $\text{VII}_F$ gestures
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
The name "free jazz" is the title of Ornette Coleman's LP recorded 1960 for Atlantis with a double quartet.

The famous citation of Coleman on „Free jazz“:

„Let's try to play the music and not the background.“

In free jazz, they do not play the music like a written theater play, but they play with it like in a game, where the rules are constantly generated and/or recycled: they make it and bring it to birth, shaping the body of time at any moment.
Cecil Taylor (1929-)

The body is in no way supposed to get involved in Western music.

I try to imitate on the piano the leaps in space a dancer makes.
The famous mime Marcel Marceau (1923-2007) describes gestural creativity in a beautiful poem:

Dans le vide de l’espace quelqu’un dessine,
Crée à travers son corps l’infini du temps.
Les mains bavardent, le buste s’exalte,
Le regard s’illumine et la scène se remplit
Petit à petit. Petit à petit
Le geste devient forme...
Folía,
(Concert at UNAM, October 2000, Silkheart Records SHCD153)

track #3: Fiery Mirror

or track #2: Sacrifice of the Dancer

- Guerino Mazzozla Boesendorfer
  Imperial Grand
- Heinz Geisser drums and percussion

A CD was played in the limousine which drove the duo to this concert of
Rachmaninoff’s 'Corelli Variations', reworking of a theme that had appeared
earlier in Corelli’s 12th Violin Sonata in D minor. Even at that time it was a found
theme originating in the 'Folia' madness, a fertility dance from the late 15th century.
Melting facticity by creative processes and gestures

Musical facts: notes, chords etc.

Transformational processes

Rubato software implements all three levels

Output: Bruhat

Gesture diagrams

Florian Thalmann
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
**Proposition** (Escher Theorem)
For a topological category $X$, a sequence of digraphs

$$\Gamma_1, \Gamma_2, \ldots, \Gamma_n$$

and a permutation $\pi$ of $1, 2, \ldots, n$,

there is an isomorphism of topological categories

$$\Gamma_1 \xrightarrow{\theta} \cdots \Gamma_n \xrightarrow{\phi} X \cong \Gamma_{\pi(1)} \xrightarrow{\theta} \cdots \Gamma_{\pi(n)} \xrightarrow{\phi} X$$
counterpoint

“world sheet”
String Theory

Diagram showing the relationship between matter, molecules, atoms, neutrons, and quarks. The diagram also illustrates open and closed strings and a brane.
S-Duality: exchange of particles and D-branes
BRANE (BRANE)
OUR UNIVERSE
SPACE-TIME CURVATURE
ANOTHER BRANE
THE MEGAVErSE
GRAVITONS
OUR UNIVERSE (BRANE)
DARK MATTER
GRAVITONS
source: The New York Times
[X,Y]-integral curves are branes of modulation theory
Constraint: Open strings cannot convert to closed strings
Gesture Theory ~ String Theory?

Escher Theorem: Flipping Hypergestures

S-Duality: Strings ↔ D-branes

gauge particle  graviton

counterpoint

Hypergestures ~ World Sheets
Music: Gesture Theory
- Hypergestures
- Escher Theorem
- Works
  (2.23\times10^{36} 72-element motives)
- Variable rule sets
- Communication via
  gestural interaction
- ...

Physics: String Theory
- Strings/branes
- Duality
- Universes
  (10^{450} string theory landscapes)
- Variable laws
- Interaction via exchange of
  bosonic strings
- ...
1. Recapitulating Hesse’s Glass Bead Game
2. Frozen Glass Beads of Facticity
3. The Revolution of Functors and Gestures
5. Gesture Theory in Music
6. Gestural Creativity
7. Gestures and Strings
8. Playing the Game in a Presemiotic Ontology
The Ontology of Music
Charles Alunni (1951-):

*Ce n’est pas la règle qui gouverne l’action diagrammatique, mais l’action qui fait émerger la règle.*

*It is not the rule that governs the diagrammatic action, but the action that causes the rule to emerge.*

Gilles Châtelet *Les enjeux du mobile:*

*Le geste n’est pas substantiel: il gagne de l’amplitude en se déterminant. (...) Le geste inaugure une lignée de gestes, alors que la règle n’énonce que des «instructions», qu’un protocole de décomposition de l’action en actes répétables indéfiniment.*

*The gesture is not substantial: it gains amplitude by determining itself. (...) The gesture inaugurates a progeny of gestures, whereas the rule only enunciates ‘instructions’, a protocol for decomposing the action into endless repeatable acts.*
The gestural level of ontology

Gestures

communication

realities

expression

signification

content
The gestural level of ontology
Some techniques for a presemiotic laboratory:

- Variational action principles with Lagrangian cohomology
- Roman Jacobson’s poetic function with symmetries
- Creativity-theoretical processes of semiotic extensions
- Gestural thought experiments following Châtelet