

Phenomenological approaches to sound analysis

Phenomenology:

- General idea: taking our subjective perception of the world (sound, vision, movement, etc.) as point of departure
- Roots in philosophy at the end of the 19th century, and continued in various directions of psychology and neurophysiology in the 20th and 21st centuries
- Main question: how can we have relatively stable mental images of the world when everything is in a constant flux, i.e. always changing?
- And: Perception is guided by *intentionality*, i.e. we see/hear/feel selectively according to our background

Phenomenology in music:

- Edmund Husserl was much interested in music perception, and his writings on time are focused on music
- Pierre Schaeffer the great phenomenologist in music in the 20th century
- Background for Schaeffer's theories: the challenges of non-european music, the avantgarde, and new technology
- Aim: a universal theory founded on subjective impressions of sound
- Focus on *sonic objects*

Sonic objects:

- Sonic object = Fragment or chunk of musical sound, typically in the 0,5 to 5 seconds range
- Perceived as a meaningful entity
- Perceived holistically
- Seems to fit into short-term memory
- Typically how we identify style
- Hypothesis: The most significant level in music
- Theories of sonic objects emerged from work in electroacoustic music, but can be equally well applied to all kinds of music
- Practical need to work with loops on the phonographs in the 1940s and 1950s

Electroacoustic music:

- Electroacoustic music = General term for music that's reproduced by loudspeakers and with variable degrees of pre-recorded elements
- *Musique concrète* = Music based on recorded fragments of sound from our environment, but also including various music instrument and electronic sounds, all variously treated and edited together in a montage
- Synthesis = Various means for creating sound
- Sound processing = Various means for transforming sound, also referred to as DSP (digital signal processing)

Challenges of electroacoustic music:

- Electroacoustic music: Could also be called ‘sonic art’, related to various other art forms such as soundscapes, installations, radiophonic art, or hip hop
- Point of departure = not only music with new sounds, but also music from other cultures
- Traditional western music theory does not say much about this new music, hence the challenge to develop a new and more universal conceptual apparatus

Schaeffer basics:

- Point of departure = taking subjective impressions seriously: 'What do you hear now?'
- Acousmatic = Not seeing the sound-source
- Correlating subjective impressions with the acoustic substrates
- Focus on fragments rather than longer passages or whole works
- Fragment focus initially pragmatic ("sillon fermé"), later theoretical.
- "Écoute réduite": "Focused listening" (Joel Chadabe) on sonic features, disregarding source and everyday meaning. Listen to these sounds:

Typo-morphology:

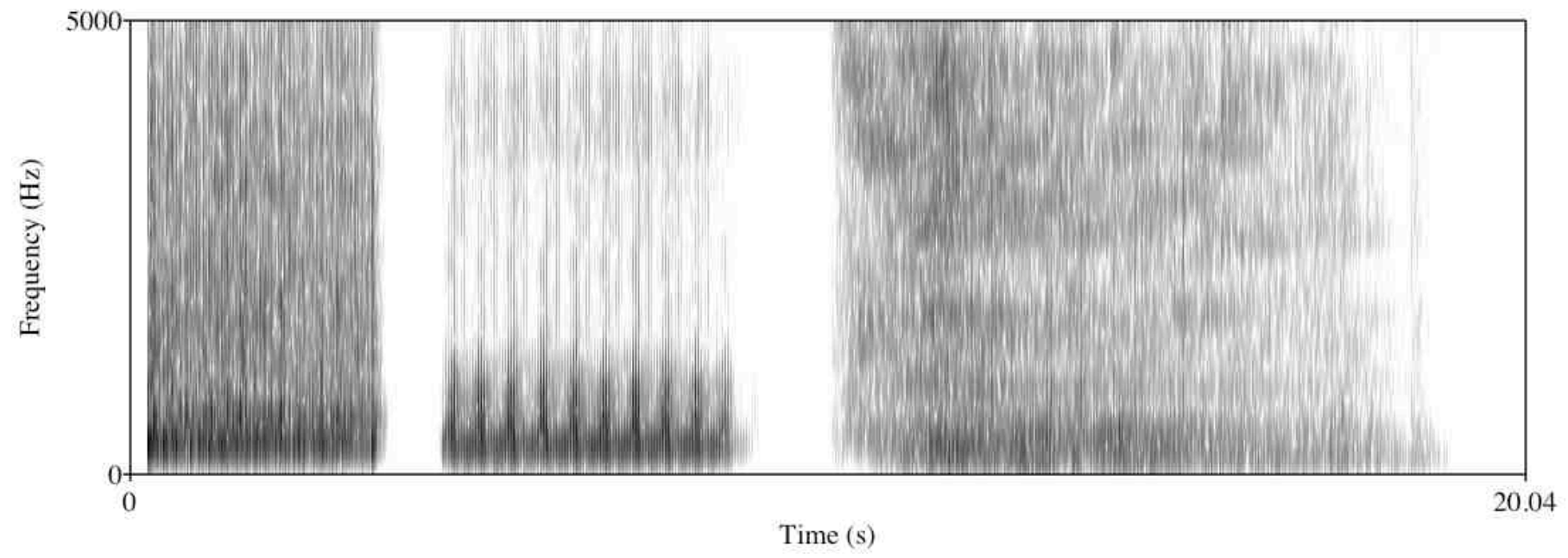
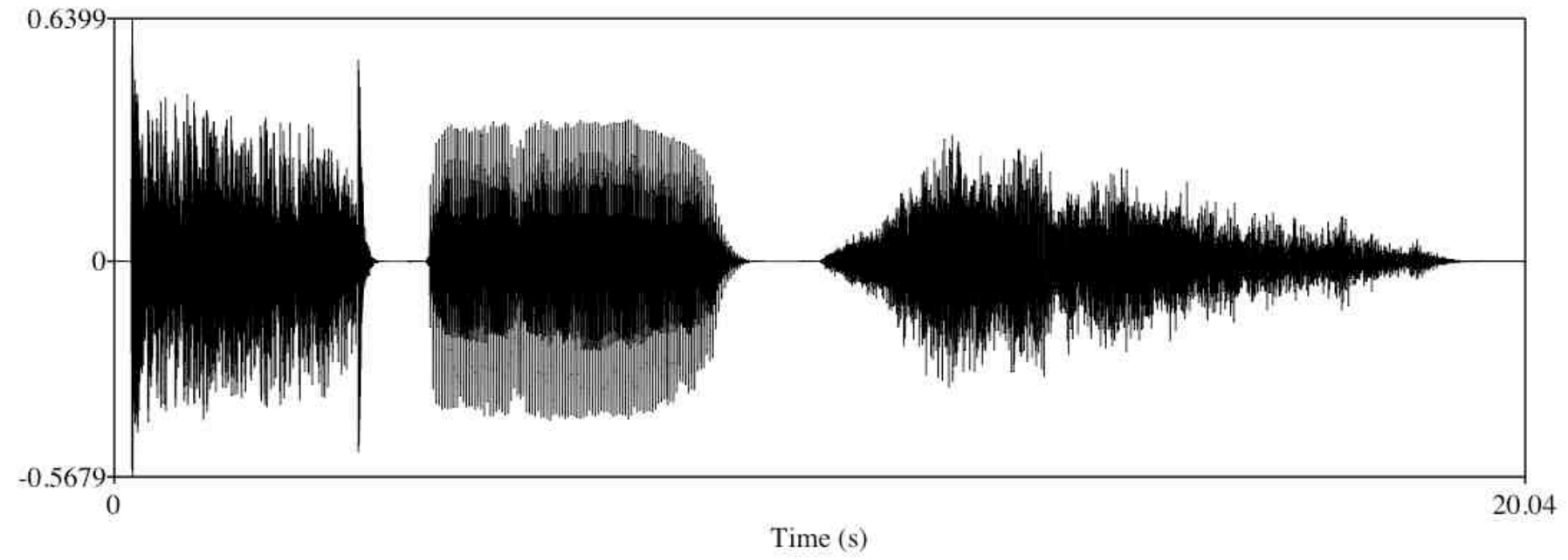
- Feature dimensions based on subjective judgments
- Evolution within sonic objects as motion trajectories
- Features as dimensions, hence sounds as multidimensional objects
- Typology = parsing sound into sonic objects
- Morphology = qualifying the internal features of the sonic objects
- Example: Describe the similarity between these two sounds. What are the similarities and differences?
- What features do we compare (tamtam-piano)?



The point: Multidimensionality, as in the typo-morphology:

Excitatory gestures, related to Schaeffer's "facture" categories:
"Facture gestuelle"

- Ballistic ("facture ponctuelle"/"impulsion")
- Sustained ("facture continue")
- Iterated ("facture itérative")
- Schaeffer also suggested these categories may apply across different timbres and instruments, here, drum roll, basson, electroacoustic (also note rather different spectrograms and very different waveforms):



Modifying gestures, related to Schaeffer's morphological criteria (for sustained sound):

- Sustained (with "grain")
- Selection (placement of filter, change of "mass")
- Modulation ("allure", "gait")

Suggestion: Excitatory, selective, and modulatory gestures, as well as various tracing gestures of the sonorous object's evolution, are not in conflict with Schaeffer's typomorphological thinking.

Écoute réduite:

- Does turning away from source also mean eradicating the body from music perception?
- "Pure sound" or something else in addition?
- Were metaphors and schemata from "non-sonic" domains inevitable for Schaeffer?
- There are clearly cross-modal elements in Schaeffer's conceptual apparatus, e.g. geometry and motion
- Notions of "event", involving both discontinuity of effort and images of motion trajectories

Intentionality:

- Schaeffer: Infinite number of features in sounds, need for selective focus
- Sonic object = intentional focus
- Intentionality = an active attitude
- Intentional listening = actively tracing the sounds we hear/imagine
- Conclusion: In spite the demands of "écoute réduite" to disregard source and various significations, mental gestural tracing of sonic objects remains

Temporality and sonic objects in Schaeffer's theory:

- Schaeffer's discussion of temporal warping (anamorphosis): Fragments perceived holistically
- Most (all) features in the typo-morphology are time-dependent, i.e. trajectories of value changes
- Context vs. contexture: Zooming outwards and inwards
- Schaeffer's "articulation-appui" ("attack-sustain"): Universal parsing criteria of energy-discontinuity
- Gestural-sonorous objects after "articulation-appui" parsing (Solfège 3, 19-22):

		1	2	3	4	5	6	7	8	9
CRITERIA for musical perception	Qualification (2-3) Evaluation (4-9)	TYPES	CLASSES	GENRES	SPECIES (site and width of the dimensions in the musical field)					
		typo-morphological summary	musical morphology	musical characterology	PITCH		INTENSITY		DURATION variations of emergence	
					SITE OF TESSITURA	WIDTH OF VARIANCE	SITE OF WEIGHT	WIDTH OF RELIEF	IMPACT	MODULE
1	MASS	TONIC type N COMPLEX X VARIABLE Y ANY W,K,T	1. Pure sound 2. Tonic 3. Tonic group 4. Striped 5. Nodal group 6. Node 7. Fringe	Characteristic TEXTURES of mass			WEIGHT OF HOMOGENOUS MASS	PROFILE of the texture of a mass		(threshold of recognition for short sounds)
2	DYNAMICS	mil: homogenous H iterative Z weak weft N,X,T note shape N,X,N',X" impulsion N,X' cyclic Zk reiterated E accumulated A	Anamorphosis: SHOCKS RESONANCE Profiles: delta hollow biting Anamorphosis: flat	ATTACKS(dynamical timbre) 1. abrupt 2. steep 3. soft 4. flat 5. mild 6. pressed 7. tail			WEIGHT OF PROFILED MASS as function of its module	PROFILE MODULE	VARIATION OF PROFILE slow medium fast	SHORT SOUNDS MEASURED SOUNDS LONG SOUNDS
3	HARMONIC TIMBRE	either: GLOBAL TIMBRE or: secondary timbre of masses M1 tm1 M2 tm2 M3 tm3 ...	(linked to the masses) NIL 1-7 TONIC 2 COMPLEX 6 CONTINUOUS 3-4 STRIPED 4-5	CHARACTER OF THE SOUNDING BODY hollow-filled round-sharp bright-dull etc.	COLOUR dark bright	WIDTH narrow wide 1 2 3 4	RICHNESS poor timbre rich timbre	density? volume? 1 2 3 4	variation: of width, of colour, of richness, from 1 to 9	(threshold of recognition for short sounds)
4	MELODIC PROFILE	Un-folding Profile Anamorphosis Fluctuation N, X N, X N, X Evolution Y, T Y, W N, W Modulation G, P G, M G, K	(Only Y notes) podatus clivis toculus porrectus	character of profile: melodic pizz. trailing, etc.	or site of profile (see mass)	melodic variance weak medium strong	link of melodic profile with dynamic profile	slow medium fast 1 2 3 4 5 6 7 8 9	Partially or totally, se col. 3	start sustain decay
5	PROFILE OF MASS	Typological evolution Fluctuation N/X or X/N Evolution Y/W or W/Y Modulation G/W or W/G	(Only thickness) dilated delta slimming hollowing	characteristic evolution in mass in harmonic timbre	consequences for the tessitura or the colour (mass and harmonic timbre)	melodic variance weak medium strong	link of mass profile with dynamic profile	slow medium fast 1 2 3 4 5 6 7 8 9	Partially or totally, se col. 3	start sustain decay
6	GRAIN	Pure or mixed by resonance scrubbing iteration	Trembling Seething Limpid rough dull smooth large clear fine	harmonic compact-harmonic compact compact-discontinuous discontinuous discontinuous-harmonic	GRAIN SEEN AS MASS OR TIMBRE colour of grain thickness of grain	Relative weight GRAIN-MASS LINKED Dynamic texture of grain weak medium strong	variation of grain width/speed from 1 to 9	1 2 3 4 5 6 7 8 9	tight adjusted loose	
7	GAIT	Pure or mixed mechanical living natural	order fluctuation disorder 1 2 3 4 5 6 7 8 9	regular cyclic vibrato progressive irregular steep fall damped incident	variance of pitch of the gait weak medium strong	Relative weight allure/dynamic Dynamic relief of gait weak medium strong	variation of gait width/speed from 1 to 9	1 2 3 4 5 6 7 8 9	tight adjusted loose	

What can we learn from Schaeffer's theory:

- Focus on fragments of musical sound, i.e. on sonic objects; that's where we find very significant features
- Taking subjective impressions as point of departure
- Top-down subjective feature "questionnaire" approach
- Sonic objects as multidimensional entities
- Distinguishing as many features of musical sound as possible
- Western music theory limited in focus, very many features of musical sound not mentioned at all
- Western music theory mostly limited to notated music; very much music is not notated

Other similar sound fragment-oriented projects:

- The *Acousmographe* software, a continuation of Schaeffer's approach
- SOb: <http://www.soundobject.org/>
- SID: Sonic Interaction Design
- UST: Unités Sémiotiques Temporelles
- Extension of Schaeffer's theories
- Shapes, like these:

UST

Les unités sémiotiques temporelles

- Chute (fall)
- Trajectoire inexorable (inexorable trajectory)
- Contracté-étendu (contracted-extended)
- Elan (dash)
- Etirement (stretching)
- En flottant (floating)
- Sans direction par divergence d'information (without direction by divergence of information)
- Lourdeur (heaviness)
- Freinage (breaking)
- Obsessionnel (obsessed)
- Qui avance (which advances)
- Qui tourne (which turns)
- Qui veut démarrer (which will start)
- Sans direction par excès d'information (without direction by excess of information)
- Suspension – interrogation (suspension - interrogation)
- En suspension (suspended)
- Par vagues (by waves)
- Stationnaire (stationary)
- Sur l'erre (wandering)

UST in practice:

- **Chunking:** Cutting music into pieces and putting labels on the pieces
- Apply this to various kinds of music and see whether there is a consensus:

Suspension
interrogation 1

Trajectoire
Inexorable 1

Lent

ppp

pp

un peu en dehors

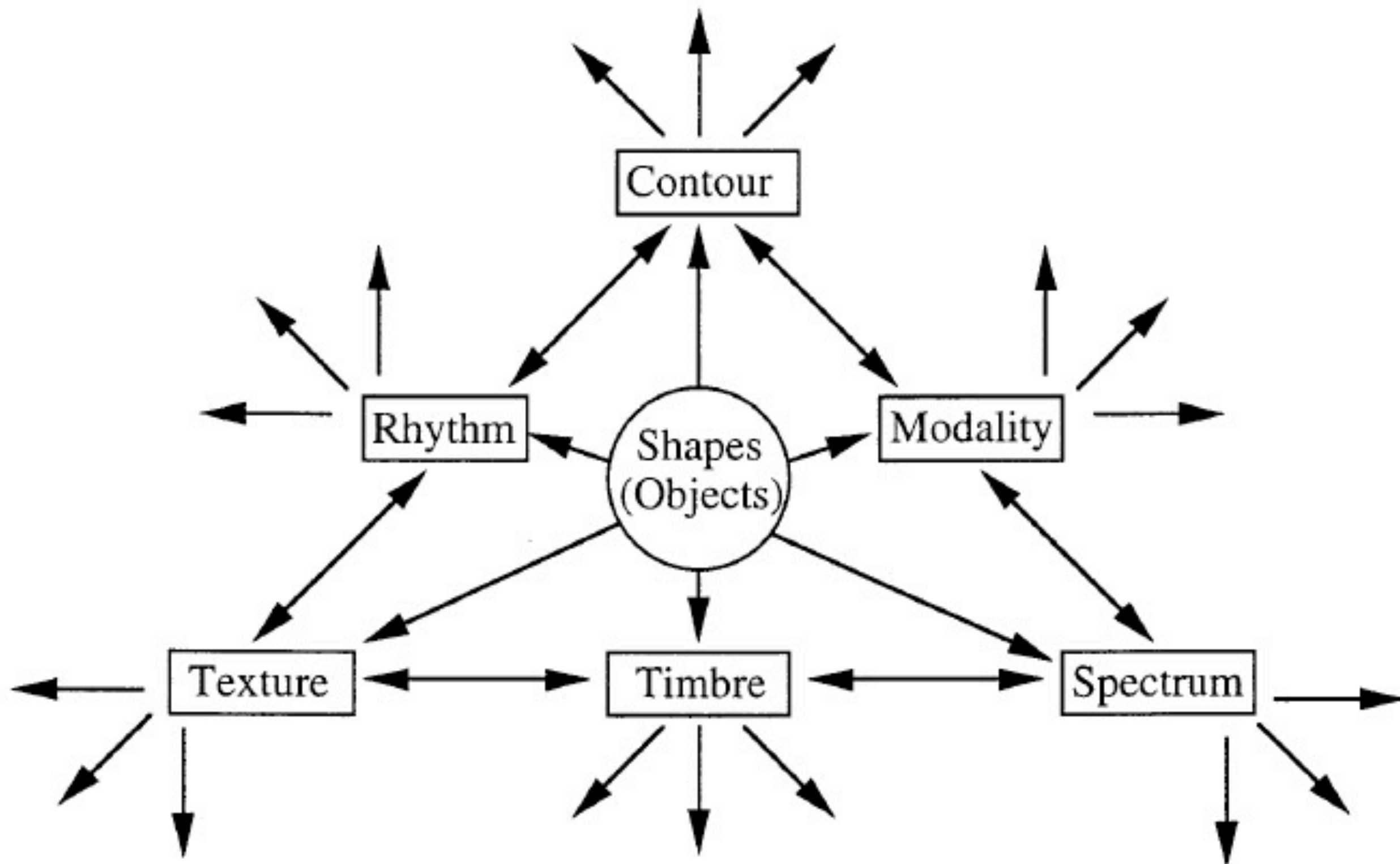
8

8^a b^a 1

The image shows a musical score for piano and voice. The piano part consists of three staves (treble, middle, and bass clefs). The voice part is on a single staff with lyrics. The score is annotated with a red vertical line on the left, a blue double-headed arrow labeled 'Suspension interrogation 1', and a blue arrow labeled 'Trajectoire Inexorable 1'. The tempo is marked 'Lent'. Dynamics include 'ppp' and 'pp'. The lyrics are 'un peu en dehors'. There are some markings like '8' and '8^a b^a 1' at the bottom.

Conclusion - Musical objects research in practice:

- Focus on fragments of musical sound
- Multidimensional feature differentiation
- Analysis by synthesis explorations, i.e. making incrementally different variants and evaluate what are significant features and values



Musical objects = holistically perceived chunks (delimited segments) of sonorous unfolding