Pioneers of Electronic Music/ World Centers

Musique Concrète (Paris)

Elektronische Musik (Cologne)

The Origins of Musique Concrète

- In 1942, Pierre Schaeffer, an electrical engineer working for Radiodiffusion Télévision Française (RTF), convinces RTF to initiate new research into musical acoustics with himself as director.
- Schaeffer focused on the use of recording techniques as a means of isolating naturally produced sound events.
- By 1948, Schaeffer begins to consider how recorded material could be used as a basis for composition.
- 1948 - *Étude aux chemins de fer* (Railroad Study), his first piece of Musique Concrète, uses sounds recorded at a railroad station in Paris.
    - primarily used successive rather than overlaid sounds, making overt the repetitive characteristics of the sounds

- In 1949, RTF hires composer Pierre Henry to join Pierre Schaeffer in his research.
- Collaboration between Henry and Schaeffer results in the composition *Symphony pour un homme seul.* (1949) Sounds selected included:

Human sounds	Extra-human sounds
breathing	footsteps
vocal fragments	knocking on doors
shouting	percussion
humming	prepared piano
whistling	orchestral instruments

- Disc Cutters were used to record sounds
- Turntables, mixing units, and loudspeakers used for live performance

Aesthetic Goals of Musique Concrète

- To isolate sounds from their original source via recording
- To treat these individual sounds as “sound objects” or *objects sonores*
- To create new sounds through manipulation, processing, and mixing the sound objects

Special concerns:

- Schaeffer was concerned with codifying a syntax or scientific language for Musique Concrète.
- Henry was concerned with creating written scores for his tape pieces.

Magnetic Tape

- In 1949, Magnecord introduced the first stereo tape machine. The first commercial splicing block was introduced the same year.

- RTF incorporated magnetic tape into the studio in 1951 but still continued to use disk cutters for some time.

    Equipment included tape recorders with varying numbers of tracks (one with 5 tracks) and a morphophone which was a tape recorder with 12 playback heads used to produce tape-head echo

Techniques used in Musique Concrète

Varying speed of playback - changes pitch and duration, and tends to alter timbre by varying length of attack, sustain, and delay times.

Reverse direction - creates reversal of decay, sustain, attack, and entire sound events.

Loops - create continuously repeated playback of an isolated sound event.

Montage - juxtaposes fragments of sounds into longer sound event through tape splicing.

Mixage - juxtaposes longer sounds in an overlapping manner.

Tape head echo (post 1951)- creates echo effect by running tape past a row of playback heads.

Multi-track spatial effects - sounds are recorded on separate tracks for playback through different loudspeakers. (5 tracks were recorded for playback on 4 loudspeakers.)

Real time spatial effects - location of sounds can be controlled during performance via the potentiomètre d'espace. (5th track controlled live)

Musique Concrète Matures

- In 1953, Henry composes *Variations pour une Porte et un Soupir* (Variations on a Door and a Sigh)
  - -uses a limited number of sound sources recorded from a door and a person breathing
  - -limits treatment of sound objects to montage, mixing, and tape echo
- Throughout the 1950's, several well-known composers work at RTF including Boulez, Messaien, Milhaud, Varèse, and Stockhausen.

The Origins of Elektronische Musik 1948-1951

Werner Meyer-Eppler - director of the Department of Phonetics at Bonn University

-Inspired by Homer Dudley's 1948 visit from Bell Labs to demonstrate the vocoder, a device for electronically processing vocal sounds, he gives a lecture at the North West German Music Academy in 1949 illustrating the sound possibilities of the vocoder. This lecture is heard by…

Robert Beyer - researcher from the Westdeutscher Rundfunk (WDR)

-Teams up with Meyer-Eppler to give presentations at the Darmstadt in 1950. His focus is on design principles used in electronic musical instruments. Eimert focuses on the field of speech synthesis. These lectures are heard by …

Herbert Eimert - composer

-Joins Meyer-Eppler and Beyer in the quest to further develop elektronische Musik.

1950

Meyer-Eppler procures a Melochord, a monophonic electronic instrument similar to the Trautonium. With this instrument, he prepared a number of *Klangmodelle*, studies produced by layering recordings of selected tones

Summer of 1951

Meyer-Eppler presented *Klangmodelle* at Darmstadt in a lecture entitled "The Possibilities of Electronic Sound Production." Beyer contributed the paper "Music and Technology," and Eimert discussed "Music on the Borderline"

October, 1951

A committee consisting of Meyer-Eppler, Beyer, Eimert and Fritz Enkel, the technical director of WDR decide to establish an electronic music studio at WDR.

-The studio took two years to become fully operational, but in the meantime the research began.

1952

Additional composers join the pursuit of Elektronishe Musik including Bruno Maderna, Gottfried Michael Koenig, Karlheinz Stockhausen

1953

Studio becomes fully operational. Herbert Eimert becomes the artistic director.

Aesthetics of Elektronische Musik

- Elektronische Musik strove for complete control over timbre through creation and manipulation of synthetically produced sound.
- Imitation or “humanized sound” is avoided; pure abstract tones and strict musical procedures are favored. (serialism)
- These strict aesthetics were propagated by Eimert, who expected the studio’s other composers to comply.

Techniques used in Elektronische Musik

Additive synthesis - creation of new timbres from combinations of sine waves of various frequencies and amplitudes.

Subtractive synthesis - creation of new timbres by running white noise through filters, the result highlights the remaining tones.

Ring modulation - one sound is used to modulate another sound and the result is the creation of sum and difference tones calculated by adding and subtracting the frequencies of the two tones. (All harmonics present in the tones create their own sum and difference tones as well.)

Square wave as modulator - this wave produces an on/off effect because of the pulsing of its amplitude. It is used as the modulator wave in a ring modulation.

Reverberation - recorded sound is rerecorded in an acoustic chamber or reverb is applied via a reverberation plate.

Tape head echo - same as the French

Equipment used in Elektronische Musik

Tape recorders

Oscillators- produced sine waves

Melochord and electronic monochord - produce sawtooth, triangle, and square waves.

White noise generator - provides noise to be filtered

Filters - used to subtract parts of a noise's spectrum

Ring modulator

Reverberation chamber - provides "natural" sounding reverberation

Reverberation plate - provides easily adjustable but less natural reverb

Elektronische Musik Matures

- *Gesang der Junglinge* - 1955-56 by Stockhausen
  - -Integrates naturally produced and synthetic sounds.
  - -Materials used for this piece are recordings of a young boy singing and sine wave combinations.
  - -This piece points towards a gradual loosening of the strict requirements of Eimert's aesthetic approach by some composers at this studio.

- *Klangfiguren II* - 1955-56 Gottfried Michael Koenig
  - -Uses meticulously constructed additive synthesis timbres, subtractive synthesis and ring modulation
  - -Employs mathematical procedures in its juxtaposition of sounds