Synchronization

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Advanced Mixed Music Composition
Main Considerations

• Not all synchronization techniques work for all types of music
  > certain musical passages are more idiomatic for certain
  synchronization techniques than others

• Synchronization must be considered from the beginning of the
  compositional process (and re-considered as the piece develops)

• Complexity of synchronization is highly related to the possibility
  of repeat performances
Survey of Various Synchronization Techniques

- Fixed media (e.g., tape) + listening (+ visual cues from the score)
- Fixed media (e.g., tape) + Stopwatch
- Click track (continuous or stop + start)
- Foot/hand triggers (with pedals or buttons)
- Keyboard triggers (e.g., a specific note triggers a specific event; sampler style)
- Amplitude Following
- Pitch Tracking
- Machine listening (e.g., Antescofo)
- Visual cues (e.g., progress bars)
- Combination of any of the above
Typically Difficult Musical Passages to Synchronize:

- Crescendos in the electronics with an instrumental attack at the end
- Contrapuntal lines where the electronics play similar material to the instrumental parts
Case Studies: Sampler Triggers, Visual Cues, and Antescofo

Sampler Triggers

Ondrej Adamek, Ça tourne, ça bloque (2007-2008), for ensemble and electronics

• Electronics are triggered via an 88 note keyboard, played by the pianist.
• Each note triggers a short sound file that often gives the tempo (make crescendo figure possible)
• Since the sounds are often short, the pianist can easily compensate if the ensemble goes off tempo.
• Very effective during rehearsals
• Robust system: software (i.e., Kontakte) is readily available and well designed (rarely crashes), as are MIDI controller keyboards.
• The Max patch for the projected sub-titles is the most “dangerous” aspect of the technical setup (it’s a very dense and hard to fix patch).
Case Studies: Sampler Triggers, Visual Cues, and Antescofo

Visual Cues

Karlheinz Stockhausen, *Kontakte 12\(\frac{1}{2}\) (1958-60)*, for pno, perc, and 4 track tape
As performed by Mike Truesdell

• Electronics simply consist of 4 track tape and contain many crescendo gestures
• Score has very detailed notation of the electronics
• Truesdell used a computer screen to see the audio files to help him synchronize to the electronic sounds; he then conducted the pianist with head gestures.
Case Studies: Sampler Triggers, Visual Cues, and Antescofo

Antescofo

• What is it? It stands for “Anticipatory Score Following”

• How does it work? It “listens” to the musician (via a pitch tracking module) and compares the incoming data with a text version of the musical score. The comparison is done on with regard past and future events (i.e., it compares where it think it is in the score with what has happened and with what should happen later). Thus it musically anticipates musical events.

Pros:
• Most musical of all techniques
• Very versatile (it’s magical when it works)
• Almost every type of musical gesture can be precisely synch (maybe…)
• Can be fairly easily integrated with other methods

Cons:
• Operator must follow the follower
• Very sensitive to mic differences
• Text score complicated to edit
• Requires specialized person to operate
In Class Performance Examples

Example 1: Click Throughout

Pros:
• Simple
• Almost any musical gesture can be precisely synchronized
• If used with sequencer, allows for precise adjustments of the electronics (via automation)
• Easily portable to different systems

Cons:
• Inflexible timing (i.e., no live rubato)
• Requires in-ear monitoring system, which can be cumbersome and/or awkward
• Multiple musicians tend not to listen to each other (listen to click instead)
In Class Performance Examples

Example 2: Foot Pedal Triggers by Pianist (but could be by flautist)

Pros:
• Simple
• Precise triggering
• Musical timing remains flexible
• Easily portable to different systems

Cons:
• Crescendo gestures hard to synch (unless there is tempo information in electronic sound)
• Some performers are not used to playing with a pedal
• Lack of feedback from pedal can be frustrating for performers
• Requires someone with MIDI knowledge
• Requires specialized equipment
In Class Performance Examples

Example 3: Operator Triggers via Keyboard Keys (Sampler Style)

Pros:
• Simple
• Precise triggering, but requires that operator actively participates in rehearsals
  • Musical timing remains flexible
  • Easily portable to different systems
  • Best system for rehearsals

Cons:
• Crescendo gestures hard to synch (unless there is tempo information in electronic sound)
• Requires someone with MIDI knowledge
• Requires specialized equipment
In Class Performance Examples

Example 4: Amplitude Threshold Triggers via Operator (i.e., pre-pedals)

Pros:
- Simple
- Precise triggering, and not dependant on musicality of operator
- Musical timing remains flexible

Cons:
- Crescendo gestures hard to synch (unless there is tempo information in electronic sound)
- Requires someone with MIDI knowledge
- Requires specialized equipment
- Dependant of specific software
In Class Performance Examples

Example 5: Combination of Techniques (pre-pedals, click, and regular pedals)

Pros:
• All types of musical material possible (inc. crescendo gestures)
• Precise triggering, and not dependant on musicality of operator
• Musical timing remains flexible

Cons:
• More involved technically
• Requires someone with MIDI knowledge
• Requires a lot of specialized equipment
• Dependant of specific software