

From “Music” to MIDI

Music 253/CS 275A
Stanford University

MIDI as sound

□ Timbre

- Ex. 1: band organ



- Ex. 2: timbre



- Ex. 3: timbre



- Ex. 4: timbre



□ Quantization

- Ex. 1



- Ex. 2



- Ex. 3



- Ex. 4



General MIDI “instruments”

Timbre

- String
- Woodwind
- Brass
- Percussion
- Voice

Level II—1999

General MIDI

- 256 slots (extended set)
 - 128 standard
 - 128 proprietary
- Many synthetic slots
- Quality varies by category
 - Strings
 - Woodwind
 - Brass
 - Percussion
 - Tuned and/or “dry” percussion
 - Voice (try MIDI Oohs and aahs)

Latest MIDI controllers



Yamaha *Tenori-on* controller for “drawing” music input

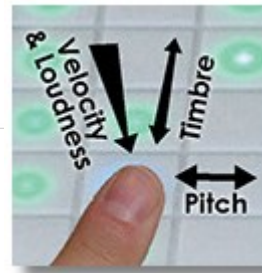
MIDI controller with iPhone cradle



Haken Audio Continuum: High-end audio



Roli Seaboard Rise: gesture



Linnstrument (expression)



Note locations in 4ths tuning. Click to expand.

Alternative MIDI instruments

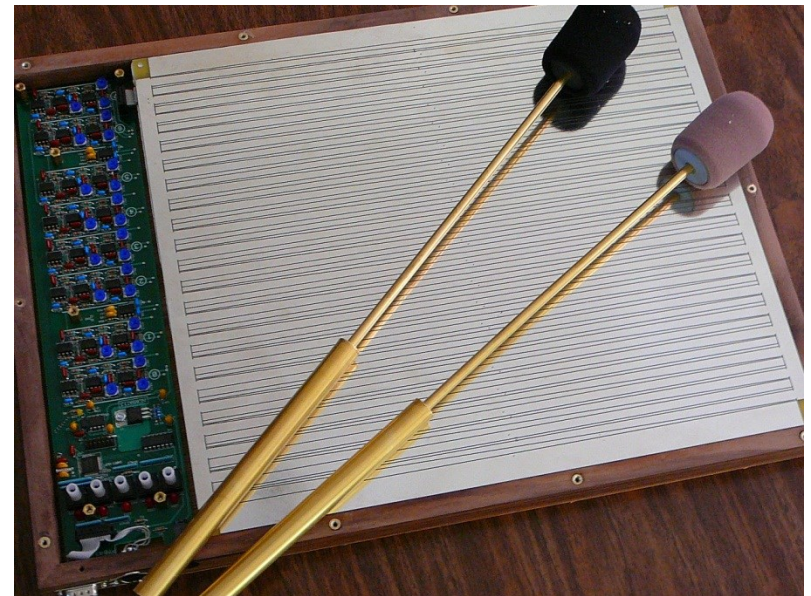
- ❑ MIDI horn: Gary Lee Nelson
- ❑ MIDI trumpet: Dexter Morrell
- ❑ MIDI chelletto (“little cello”): Chris
- ❑ MIDI violin: Yamaha
- ❑ MIDI guitar: Zeta Music/Gibson



Akai wind
Controller
(2016)

MIDI as an adjunct to other sound tech

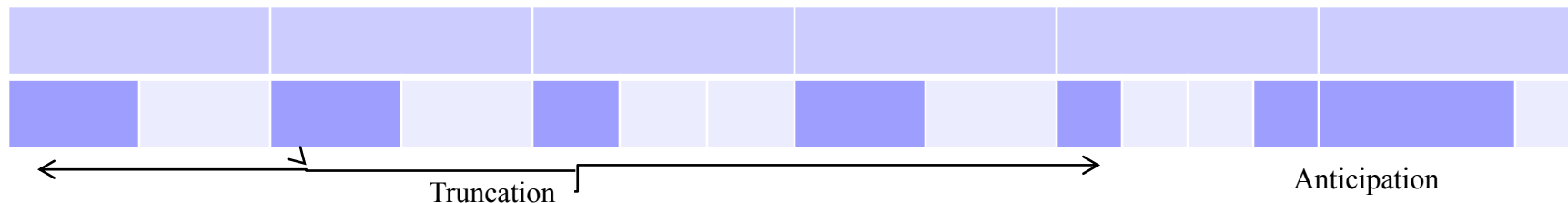
- MIDI data can be synchronized with other kinds of data
 - Video, animations
 - Electronic instruments
 - Software routines



Max Mathews' Radio Baton

<https://www.youtube.com/watch?v=3ZOzUVD4oLg>

Duration: Implied vs. real (MIDI)



Upper row: The first six notes of this piece are written in notes of equal duration.






Lower row: The actual sounding durations are variable.

[Bear in mind complex nature of temporal value]

Tempo and quantization

- Software may have tempo controls; MIDI hardware does not
- **Quantized MIDI files** suited to transcription
- **Unquantized MIDI files:** expressive, not suited to transcription

MIDI data for notation

- “Pitch” < Key number
- “Duration” = Clock time
 - Articulation
 - But pizzicato = Gen. MIDI 45
 - Staccato
- Dynamic range < velocity
- “Tempo”
 - < ratio of quarter to whole     
- Meta-events
 - Key signature
 - Meter signature
 - Lyrics
 - Copyright notice



The image displays two systems of a musical score for the second trio from the Mozart Clarinet Quintet, K. 581. The first system includes staves for clarinet in A, violin I, violin II, viola, and violoncello. The second system continues the score, showing a repeat sign and pizzicato markings for the strings.

Example 1.1 Second trio from the Mozart Clarinet Quintet, K. 581 (“Mozart trio”).

Early MIDI file types

- Vertically organized
 - 0 = monophonic music [merged single track]
 - 1 = polyphonic music [multiple tracks]
 - Horizontally organized
 - 2 = accommodates rhythmically independent tracks
- See MMA file: http://www.midi.org/aboutmidi/tut_midifiles.php

Standard MIDI File Format (SMFF)

- “Chunks” (file sections)
 - **Header chunks (MThd):** what to expect in the data
 - Byte segments address
 - Chunk type
 - Header length
 - Number of tracks
 - Meaning of *delta* times
 - Time code
 - Slight differences by format type (0, 1, 2)
 - Track chunks (MTrk):

Standard MIDI File Format (SMFF)

- “Chunks” (file sections)
 - Header chunks (MThd)
 - **Track chunks (MTrk):** sequential data
 - Iterative process
 - Delta time
 - Event
 - Event types
 - MIDI events (note on, note off et al.)
 - Meta-events (see above; often textual)
 - System-exclusive events (hardware-specific, proprietary)