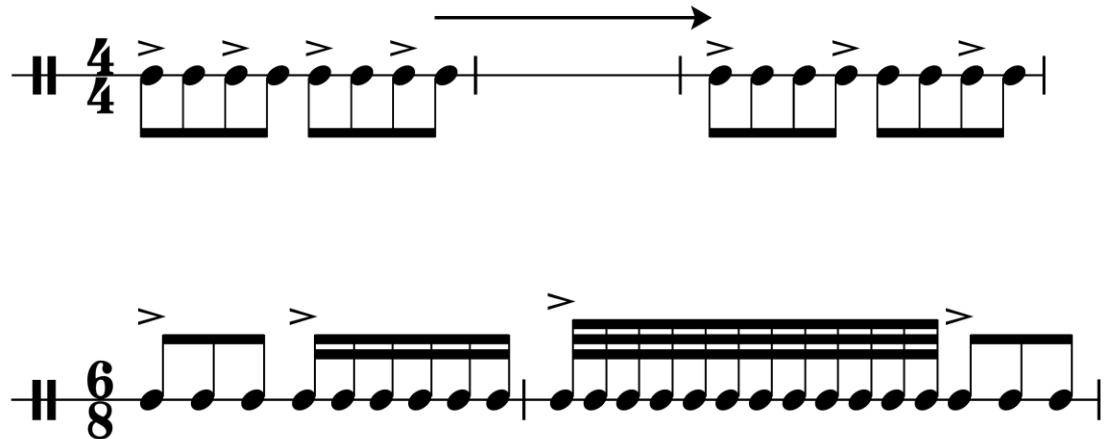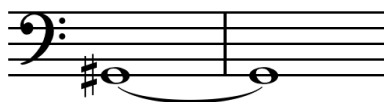# MIDI Extensions

Music 253/CS 275A

Stanford University

MIDI shortcomings: Accent

- ☐ Barring
- ☐ Accent
- ☐ Beams
- ☐ Grouping

Shortcomings: Duration, articulation

Durations

- ☐ Ties (certain kinds)
- ☐ Ambiguity of articulation/
     instrumentation
- ☐ Matching written values to sounding values
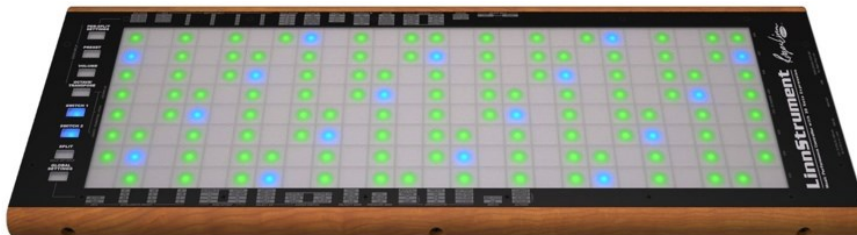
Articulations

- ○ Staccato
- ○ Marcato
- ○ Tentuto

Expressive MIDI: Code vs. Controllers
(Making MIDI more competent for notation)

Who: Cooper, Ng, Boyle

- **expEvent** (SysEx)
- Min length = 5 bytes
  - 0xF0 start of message
  - 0x7D non-commercial
  - <data bytes [2..n]>
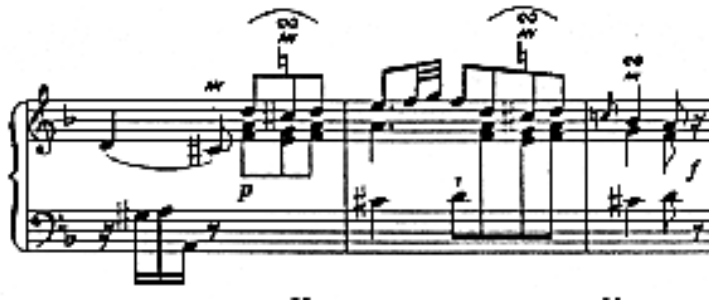 - 0xF7 end of message

Linnstrument

Two encoding tables

- *Finale* [=Adobe] font list
- "Isolated" symbols
  - Articulation signs
  - Dynamics
  - Rests
  - Stems and tails
- Bit flags for graphical placement of adjunctive objects

MIDI vs notation

Extensible symbols, with bit flags

- 8ve
- Pedal markings
- Trills
- Crescendos
- Beams
- Slurs

Super objects [MuseData]

Objects that subsume multiple more finite objects/events
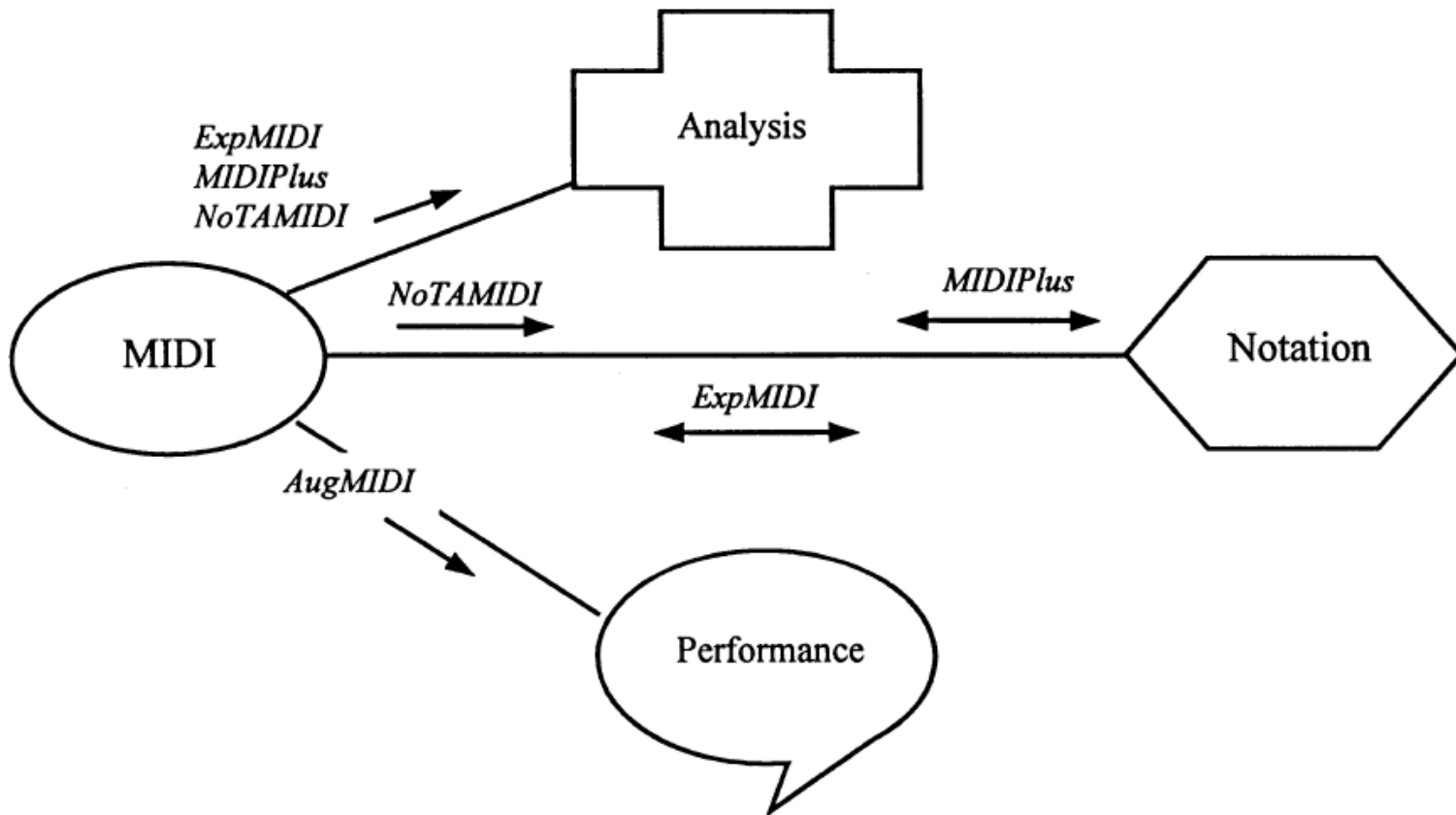
- Beams
- Slurs

Remedies: Overview

- System-exclusive messages: manufacturers

- Bit re-purposing: Mathews, Hewlett, et al.

- Addition of control track: researchers (Mathews et al.)

Proposed (never adopted) extensions

NotaMIDI (Kjell Nordli)

☐ Employed **meta-events** for extended info

- Time signature

  Key signature

  Clef-sign

  Crescendo, diminuendo

  Accent

  Slur

  Enharmonic pitch

  Tempo name (Allegro, Adagio, et al.)

Expressive MIDI (Ng, Boyle, et al.)

☐ Based on **system-exclusive** messages

Data byte 1 $0XXY_1Y_2Y_3Y_4Y_5$

Plus look-up table

	0	1	2	3	4	5	6	7	8	9
0		◜	//	♯	₄⁴	𝄌	𝄞	.	(	)
10		+	,	–			0	1	2	3
20	4	5	6	7	8	9				
30	>	𝄢	≠	(♭)	𝄡	¢	□	♪	*mf*	◜
40	♩		♪	□	○		(♮)	◇	*mp*	♪
50	□	*sf*	∿	⌢	𝄞	‖◖‖	♪	◡	*fz*	⊕
60	| stem	⊗	∧	—	□	⊕	♭	**c**	□	♪

# Augmented MIDI (Mathews, Hewlett)

☐ Mathews's system based on bit repurposing

☐ For:

- ◼ Accents

- ◼ Articulations

☐ From:

- ◼ Bits in the Note-On command OR

- ◼ Bits from the Velocity byte

Augmented MIDI (controller legacy)
(How to accommodate gesture in MIDI)

- ☐ Who?: Max Mathews
- ☐ Method
    - ■ Addition of "drum track"
- ☐ Gestural information
    - ■ Accents
    - ■ Articulations (incl. slurs)
- ☐ How?
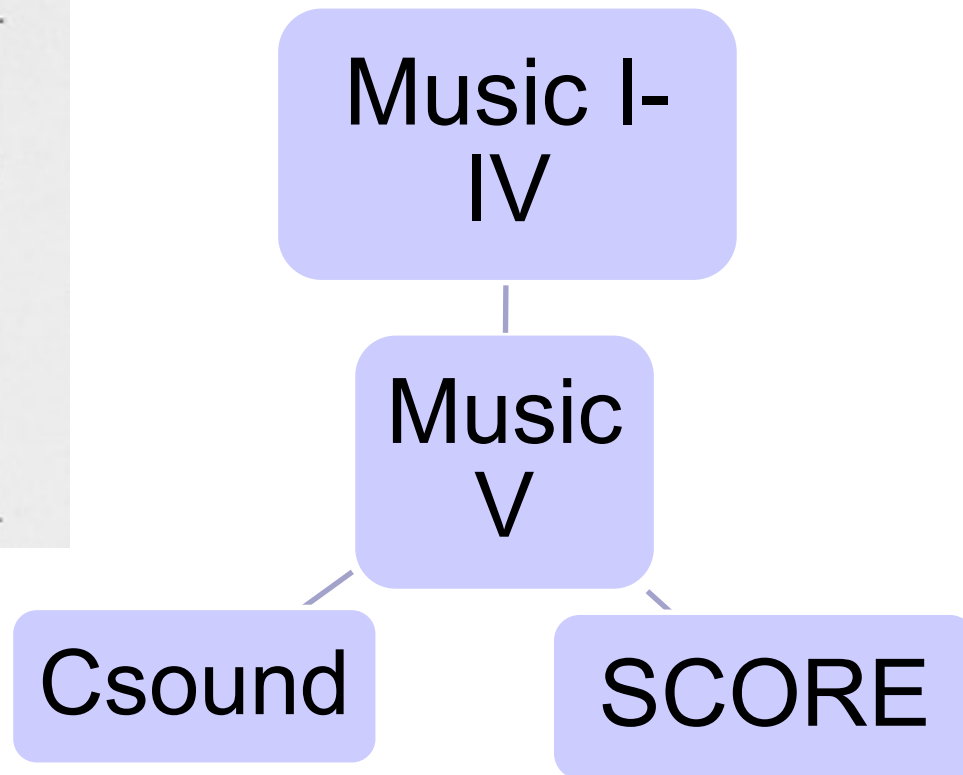   - ■ Reassign two bits from note-on command
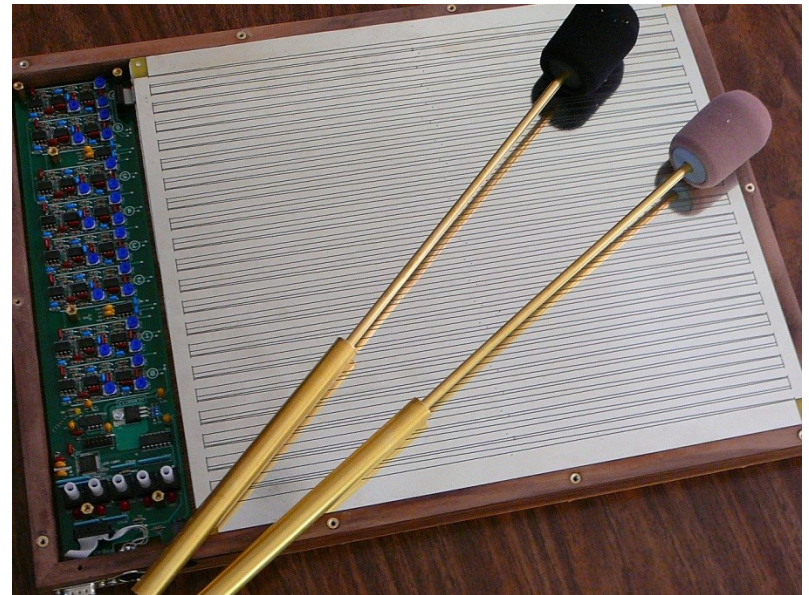
Max Mathews' Radio Baton

Mathews' Music V (pre-MIDI)

[Owed a debt to Pierre Boulez's wish for similar control for tapes]

```
1   INS 0 1 ;
2   ØSC P5 P6 B2 F2 P30 ;
3   ØUT B2 B1 ;
4   END ;
5   GEN 0 1 2 0 0 .999 50 .999 205 −.999 306 −.999 461 0 511 ;
6   NØT 0 1 .50 125 8.45 ;
7   NØT .75 1 .17 250 8.45 ;
8   NØT 1.00 1 .50 500 8.45 ;
9   NØT 1.75 1 .17 1000 8.93 ;
10  NØT 2.00 1 .95 2000 10.04 ;
11  NØT 3.00 1 .95 1000 8.45 ;
12  NØT 4.00 1 .50 500 8.93 ;
13  NØT 4.75 1 .17 500 8.93 ;
14  NØT 5.00 1 .50 700 8.93 ;
15  NØT 5.75 1 .17 1000 13.39 ;
16  NØT 6.00 1 1.95 2000 12.65 ;
17  TER 8.00 ;
```

Music V: Sound generation, pre-MIDI

Music I-IV → Music V → Csound, SCORE

Radio drum/baton file (*c.* 1988)

GEN2	3 0.0 2 1 1 0 .5 0 .25 0					This statement defines an instrument. Here a wave-form table for the clarinet is set up. GEN2 calls an oscillator subroutine. The parameters are (1) an operation code [3 = generate function], (2) an action time, (3) an instrument number, (4) a table number, and (5–10) the relative amplitudes of harmonics 1..6.
NOT 1	2	0.0	.5	1	440	These statements cause notes to be played. The initial parameters are (1) an operation code [1 = play note], (2) an instrument number, (3) a start-of-action time, (4) event duration, (5) an absolute amplitude for the event, and (6) event frequency (Hz). These parameters may be followed by a variable number of user-defined parameters (not shown).
NOT 1	2	0.5	.5	2	554	
NOT 1	2	1.0	.5	3	660	
NOT 1	2	1.5	.5	4	554	
NOT 1	2	2.0	1.0	5	880	
NOT 1	2	3.0	.5	3	660	
NOT 1	2	3.5	.5	2	554	
NOT 1	2	4.0	.5	2	494	
NOT 1	2	4.5	.5	4	588	
NOT 1	2	5.0	1.0	5	740	

Example G1 Music V representation of Bars 1 and 2 of the *Clarinet* part of the Mozart trio.

Beyond MIDI, Glossary
http://beyondmidi.ccarh.org/beyondmidi-600dpi.pdf

Controller legacy in Malinowski's cranker

- Stephen Malinowski's "cranker" for electro-acoustic performances
  - https://www.youtube.com/watch?v=EAWSonBN3Pk