

# **Making People Move:**

## **Collaborative cross-domain real-time score generation and performance**

Cambridge Dorkbot

Cambridge Makespace, February 25th 2015

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v0.01

**8th Feb 1963**

*Notation is a way of making people move. If you lack others, like aggression or persuasion. The notation should do it. This is the most rewarding aspect of work on a notation. Trouble is: Just as you find your sounds are too alien, intended 'for a different culture', you make the same discovery about your beautiful notation: no-one is willing to understand it. No-one moves.*

Cornelius Cardew, from **Treatise Handbook**, 1971

This image shows a handwritten musical score on a single page. The score is composed of several staves and various musical notations. At the top right, there is a large, hand-drawn oval shape. Below it, the score begins with a treble clef and a key signature of one flat (B-flat). The notation includes a series of notes on a staff, some with stems and beams, and others with flags. There are also some vertical lines and a small diagram of a plant-like structure with a stem and leaves. The score continues with more notes and stems, some of which are grouped together. In the middle, there is a section with a large circle around it, containing a few notes and a stem. To the right of this, there is a section with a large, curved line that arches over several staves. Below this, there is a section with a large, curved line that arches over several staves. At the bottom of the page, there are several empty staves. The overall style is that of a sketch or a preliminary draft of a musical composition.

# Three research streams

1. algorithms (patterning)

2. physical computing

3. notation/representation

...linked by cross-domain expression and interpretation

# Cross-domain expression?

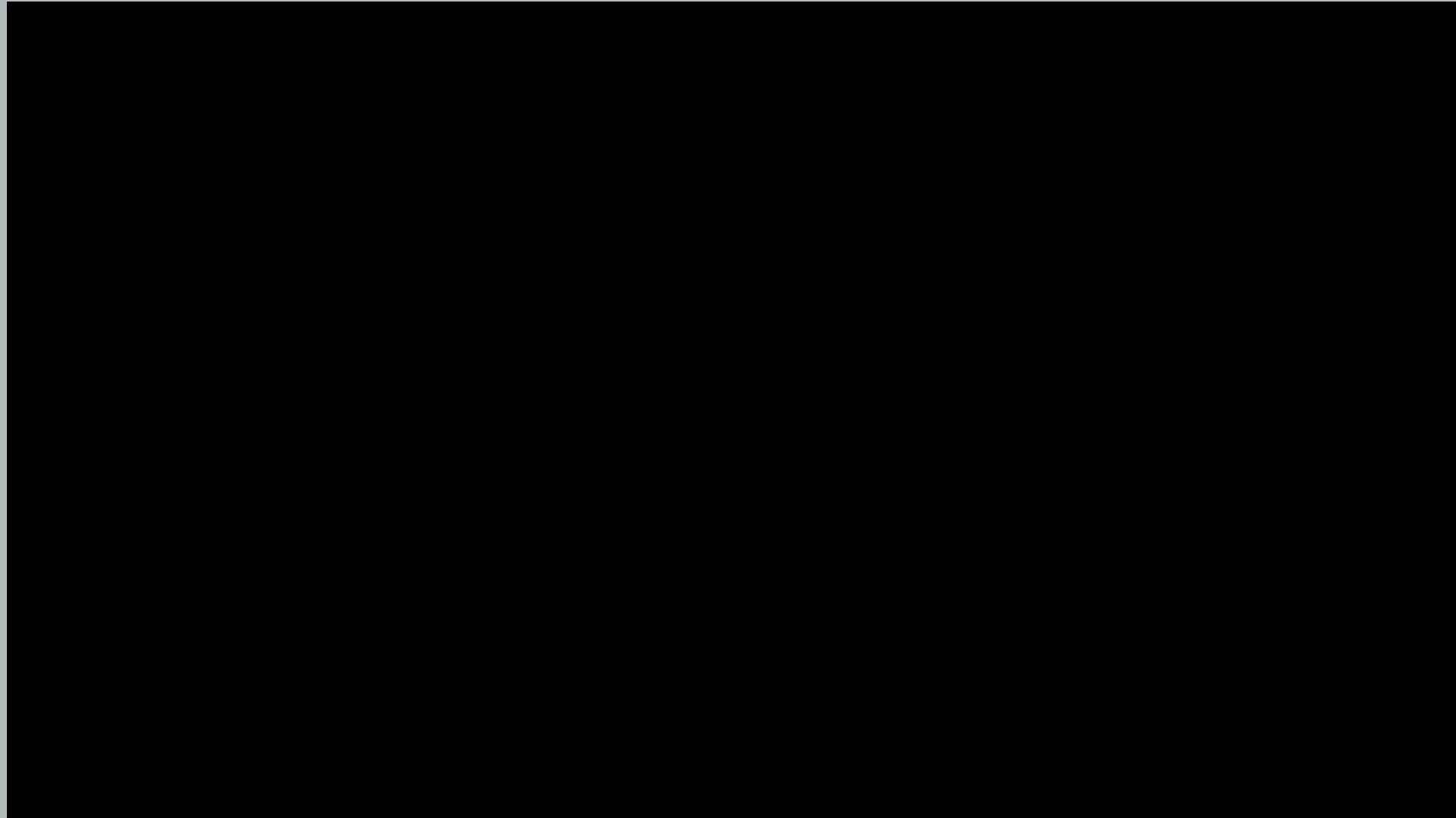
- Music is already cross-domain (as are all arts)
- It is formed of physical action to create patterns
- I'm not worried about what happens when those patterns are created today. As a composer, I suppose I rely on my judgement to help me decide whether I *like* a pattern or not.

# Physical computing

## NIMEs or not?



Laetitia Sonami *Lady's Gloves*



## Marije Baalman *Wezen-Gewording* (2013)

Gewording (Becoming) is the first performance version where the link between physical and sonic gesture is explored during a live performance, combining movement of the body and live coding.



Imogen Heap *Me the Machine* (2014)





Imogen Heap - MiMu Gloves Demonstration, 13th December 2014



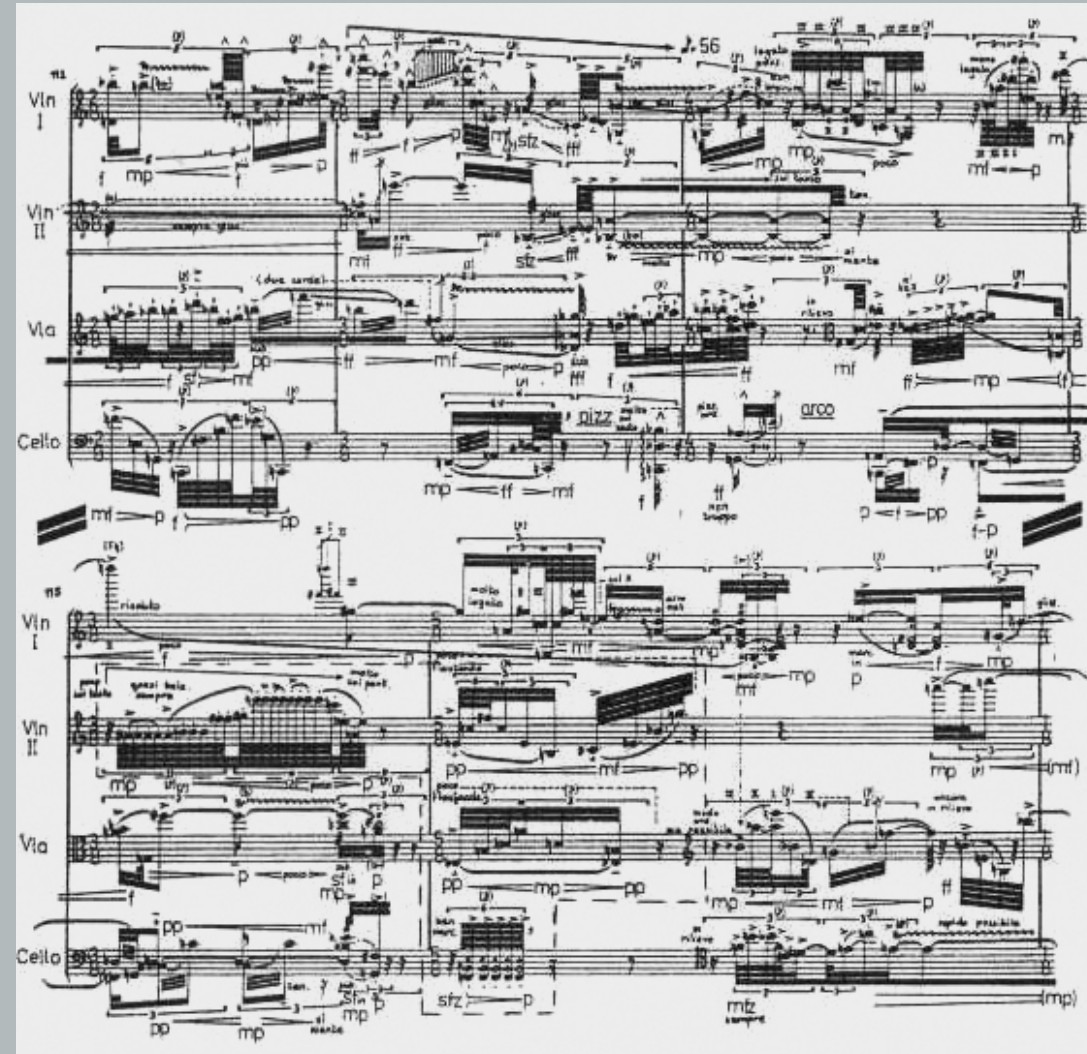
TEDxBRISTOL 2011 - CREATIVITY SESSION - IMOGEN HEAP

see particularly 7:45+ (violin bow)

# Notation/representation

- is a complex semantic and graphic form of 'language'
- is not really suited to non-specialised environments
- presents many challenges concerning electronic implementation and display

# Notation: complexity



A complex musical score for a string quartet, featuring five staves: Violin I, Violin II, Viola, Cello, and Double Bass. The score is densely packed with musical notation, including various note values, rests, and dynamic markings such as *mp*, *f*, *ff*, *pp*, *sfz*, and *mf*. The notation is highly detailed, with many notes beamed together and complex rhythmic patterns. The score is divided into two systems, with the first system starting at measure 56. The overall appearance is one of extreme complexity and technical difficulty.

Ferneyhough **Second String Quartet** (1980)



# Notation: Mea culpa

Handwritten musical score for "Mea culpa" by Richard Hoadley. The score is written on a system of staves, including a string quartet (Violin I, Violin II, Viola, and Cello/Double Bass) and vocal parts (Soprano, Alto, and Tenor). The tempo is marked as quarter note = 110. The key signature is one sharp (F#). The score includes various dynamics such as *mf*, *p*, *p sotto*, *mf sopra*, *f sopra*, and *tti*. The notation features complex rhythmic patterns, including sixteenth and thirty-second notes, and rests. The vocal parts are written in treble clef, and the string parts are written in their respective clefs (treble for Violin I and II, alto for Viola, and bass for Cello/Double Bass).

Richard Hoadley **Four Archetypes** (1995)

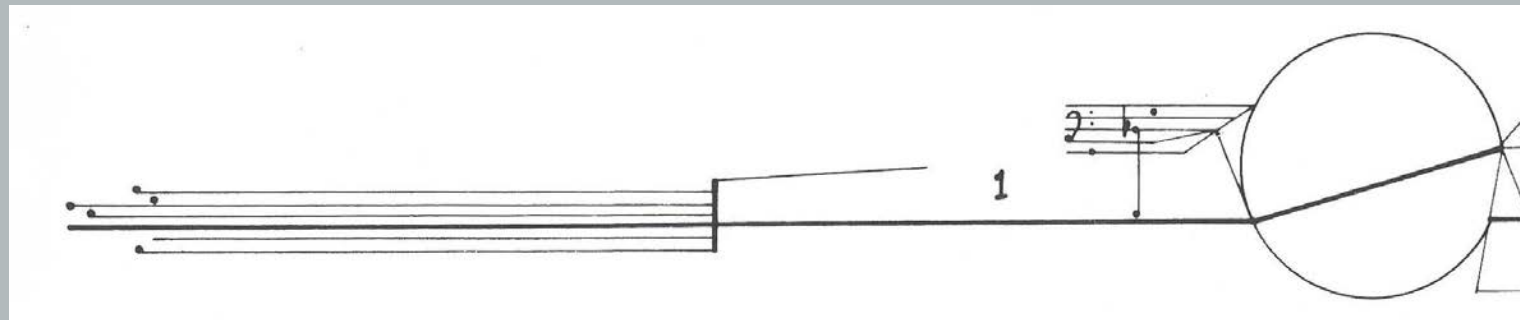
# Graphic notations: Cardew

Cornelius Cardew: Octet '61

The image displays a handwritten musical score for 'Octet '61' by Cornelius Cardew. The score is organized into six numbered sections, each represented by a circled number (1-6) above a staff. Section 1 shows a treble clef staff with a single note and a fermata. Section 2 shows a treble clef staff with a single note. Section 3 shows a treble clef staff with a complex, dense graphic notation. Section 4 shows a bass clef staff with a single note. Section 5 shows a bass clef staff with a single note. Section 6 shows a treble clef staff with a complex, dense graphic notation. Below these sections, a larger staff contains a sequence of notes and rests, with circled numbers 1-6 indicating the corresponding sections. The notation includes various clefs, notes, rests, and dynamic markings such as 'f' and 'p'. A '3P' marking is visible at the bottom right of the lower staff.

From Cardew **Octet 61** (1961)

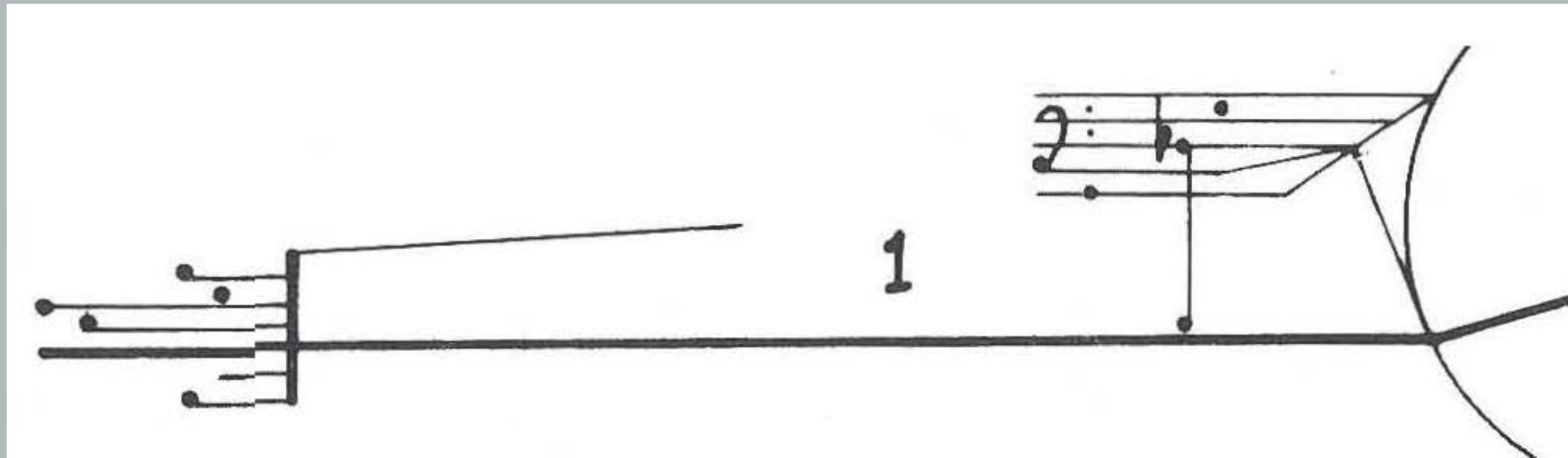
# Graphic notations: Cardew *Treatise* (1963) and *Bun No. 2* (1964)



A page of musical notation for 'Bun No. 2' by John Cage. The page contains several staves for different instruments: Flute (Fl.), Clarinet (Cl.), Bassoon (Bs.), Trumpet (Tr.), Trombone (Tbn.), Percussion (Perc.), Violin I (Vln I), Violin II (Vln II), Viola (Vla.), and Cello (Cello). The notation is a mix of traditional musical symbols and graphic elements. A section is labeled 'RICHTIG (1)'. The page number '3' is visible in the bottom right corner.

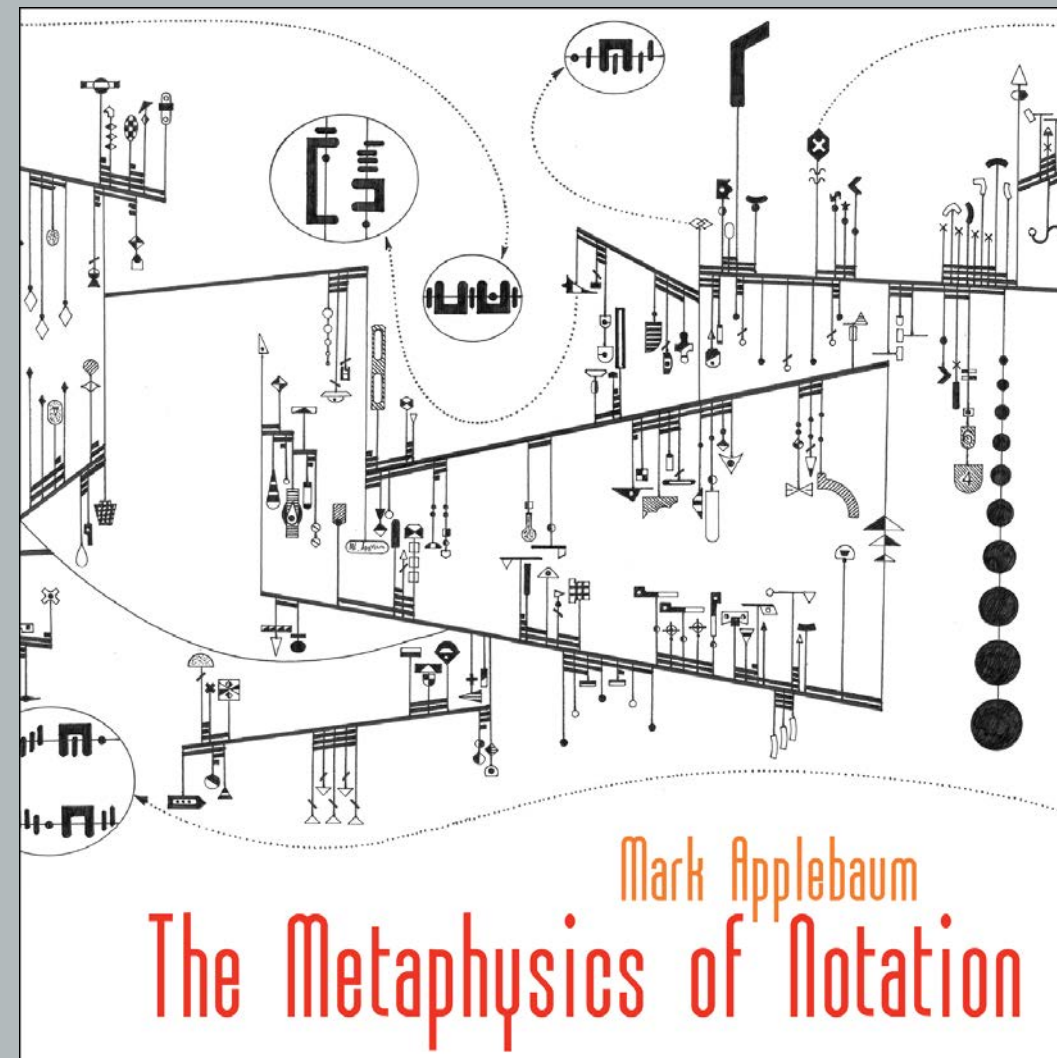


# Detail from Treatise and Bun 2...





# Graphic notations



From Appelbaum, **The Metaphysics of Notation** (2010)

# Why pursue these lines of research?

- for me it offers the greatest chance of understanding the act of composition
- it unifies dots and signals: enriching electronic music with live performance and algorithmic patterning [ quote ]
- it enables the live synchronisation of algorithmic generation of both electronic and electroacoustic material and notation

- it allows the study of links between expressive domains: algorithm and physical gesture into live notation: which gestures have 'meaning' and which don't
- it utilises virtuosic performance and investigates liveness in music performance and improvisation
- it allows analysis of compositional processes through automation
- ...as a consequence and to clarify, it's a technique and a tool, just as these compositions are both pieces and experiments

# and... String Sextet alternatives...

The image shows a handwritten musical score for Violin I and String Sextet alternatives. The score is written on five staves. The top staff is a grand staff with the instruction "poco ad lib, con licenza" written across it. The Violin I part is on the second staff, starting with the instruction "Vlno I" and "follow form rovere, ad lib.". The score is divided into four measures, each with a large letter 'J' above it. The first measure contains a melodic line with dynamics *p*, *mp*, and *p*. The second measure contains a melodic line with dynamics *f* and *mp*. The third measure contains a melodic line with dynamics *f*, *mp*, *mf*, *p*, and *mp*. The fourth measure contains a melodic line with dynamics *mp*, *p*, *mf*, *f*, and *mp*. The score includes various musical notations such as slurs, accents, and dynamic markings. There are also some handwritten annotations and arrows pointing to specific notes.



# from... Birtwistle Verses for Ensembles (1968-69)

6

$\text{♩} = c.42$

Alto Fl.

B♭ Clar.

Cor Ang.

*pppp*

*pp*

*ppp*

*pp*

*ppp*

*p*

*fff*

*pp < mp > pp*

*mp > pp > mp > pp*

*pp < mp > pp*

*pp < mp > pp*

*pp < mp > pp*

*pp < mp > pp*

*pp*

*mp*

*ppp*

*ppp*

*mp*

*pp*

*p*

*fff*

3  
4

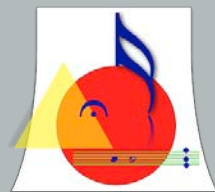
# Live notation

*We consider real-time music notation to be any notation, either traditional or graphic, which is created or transformed during an actual musical performance. However, the term has not been standardized, and various articles in this issue refer to real-time music notation using other terms, such as dynamic music notation, live scoring, virtual scoring, and reactive notation.*

Contemporary Music Review, Vol. 29, No. 1, February 2010, p. 1, Preface: Virtual Scores and Real-Time Playing, Arthur Clay and Jason Freeman

# The tools

- provide a structure for the generation of music and/or common practice notation as well as many arbitrary graphical elements
- facilitate communication between SuperCollider and INScore
- offer the beginnings of a more standard interface for physical mapping



# and are located...

- <https://github.com/supercollider/supercollider>
- <http://inscore.sourceforge.net/>
- <http://rhoadley.net/inscore> (eventually...)



# Performances

**Gaggle**, HCI conference, Cambridge, UK, 2009



# Performances

**Gaggle**, Museums, interfaces, spaces, technologies, 2010



# Performances

**Calder's Violin**, SuperCollider Symposium, London 2012



# Performances

**The Fluxus Tree**, LIPAM, Leeds UK, September 2012



# Performances

**Quantum Canticorum**, Museum of Modern Art, Barcelona,  
June 2014



To display, or not to display, the notation?



# Performances

**Quantum Canticorum Demonstration**, Natural History  
Museum, London, June 2014



# Performances

**Semaphore**, Cambridge, October 2014



NB for different performers

# Peer comment and criticism

1. many comments asking about the possibilities of machine musicianship as a compelling reason for using real-time notation (imagination over reality)
2. possible difficulties in keeping track of one's place in the score
3. the feasibility of obtaining an 'accurate' and structured rendition due to lack of rehearsal



1. the 'fetishisation' of the notation (when displayed)
2. the dancer being 'caged' by the 'cone of the Kinect' (MSphobia?)
3. the 'conservative' nature of the music (old fashioned modernism? a reasonable point, maybe, and there are no stylistic predicates with the technology)

(performers involved do not tend to agree with the majority of these comments, nor were views expressed at Natural History Museum)

# Forthcoming performances

**How to Play the Piano** with Philip Mead, 26th February 2015,  
Exchanging Cultures Festival, de Montfort University, Leicester

**Drawing Towards Sound** with David Ryan, Guildhall/Trinity  
Laban, 20th March 2015

video recordings of past performances are at **[rheadley.net/](http://rheadley.net/)**  
**[youtube](https://www.youtube.com/)** and  
**[rheadley.net/vimeo](http://rheadley.net/vimeo)**

# Demonstration

Just in case:



# Thank you

any questions?

contact:

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this presentation is available at

**<http://rhoadley.net/presentations>**

as **ccde-s.pdf**