Notating algorithms

Richard Hoadley

Symposium for Performance of Electronic and Experimental Composition: 'Building an Instrument'

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v0.02

The nature of musical instruments...

"...the mystifyingly exquisite variation that can match the instruments on which music has been made for centuries."

The One-Handed Musical Instrument Trust
http://www.ohmi.org.uk/

http://www.ohmi.org.uk/the-rules.html

Acoustic, electronic, digital...

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Research Streams

- Real-time algorithmic generation of music

- Real-time generation and presentation of a notated version of this music and thence, performance and improvisation

- Real-time physical interaction

- Algorithmic music has been analysed in terms of it being either 'top down' (macro-structure-based) or 'bottom up' (micro-structure-based)

- The tendency is for algorithms to work on a micro-structure as 'vignettes' (cf. James McCartney, SC), or as inordinately long installations (minimalist)
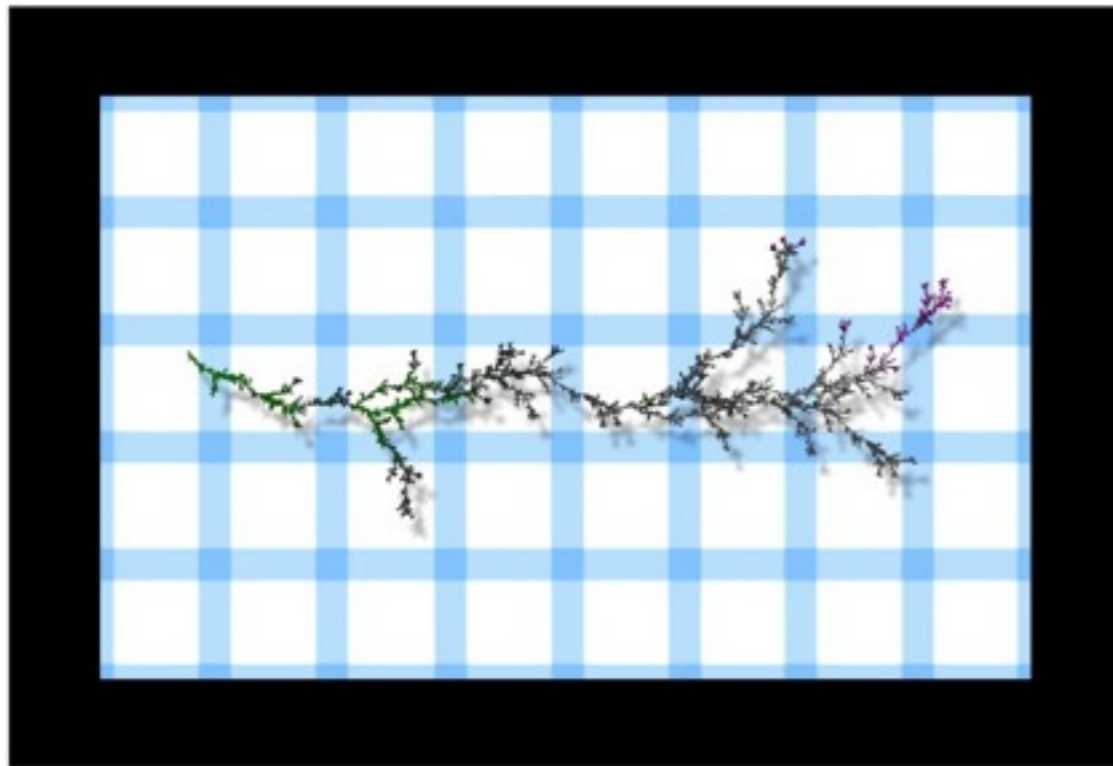
Figure 1. *Vine and Tablecloth*

Mark Franz 1997 Mathematics and Art

Figure 11. A landscape made from IFS attractors.

- The majority of western music is of intermediate length (say, between 3 minutes and 3 hours) and use structures where there is a 'top down' component.

- Usually composers work somewhere along the continuum between these two extremes.

- A useful metaphor compares composing to mapping a new territory.

Some examples of previous work using algorithms and physical computing...

Human Computer Interaction 2009, Cambridge

external video link: **http://vimeo.com/7710584**

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MIST 2010

external video link: **http://vimeo.com/13801015**

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Triggered: Metapiano, June 2011

external video link: **http://vimeo.com/25465581**

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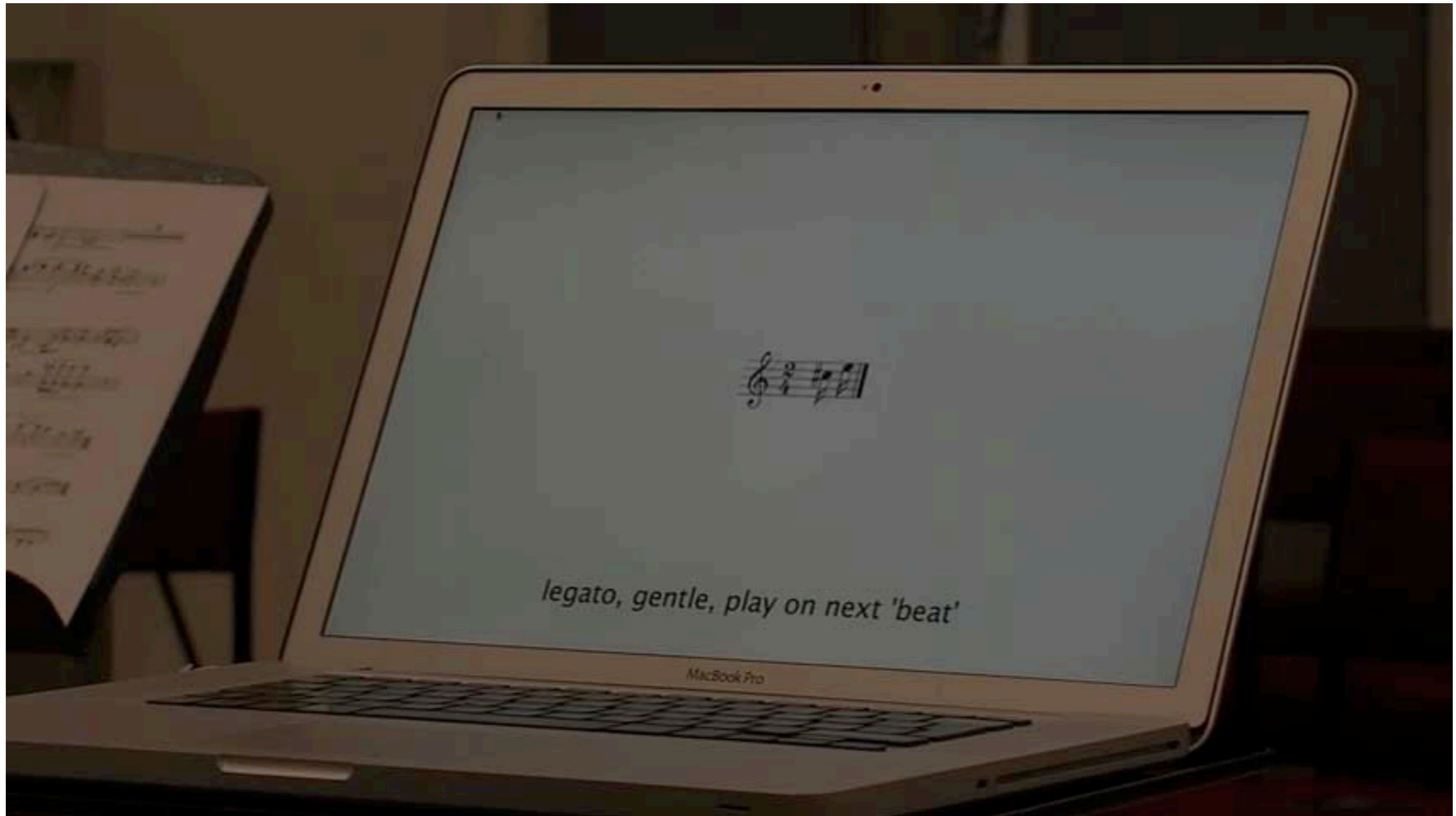# Calder's Violin

combining research streams:

- algorithmic composition

- music composition, performance, improvisation and notation

- physical computing, perhaps (hence title?)

involving

- SuperCollider (primarily MDAPiano) for audio and programming...

- ...linked via Open Sound Control (OSC) to INScore (http://inscore.sourceforge.net/)...

- ...also uses microprocessor (Arduino or mBed) for physical computing (not in current version of piece)

some excerpts...

Calder's Violin (excerpts), Mifune Tsuji, October 2011

external video link: **http://vimeo.com/32520438**

Why do it?

- *comprehension*: writing algorithms allows a deeper understanding of basic compositional processes - it's both 'different' from but similar to 'normal' composition (and it certainly doesn't save time!)

- *imagination*: it allows insight into and exploitation of areas of thought not normally considered consciously: differently balanced phrases and coloured harmonies, lots of notes, playability...

- *predicability*: it allows immediate audition but maintains an element of unpredictability, maybe mirroring performance. Balance with control and micro/macro structuring

- *performance practice*: giving (classically trained?) performers notation tends to mean they perform with more confidence more quickly
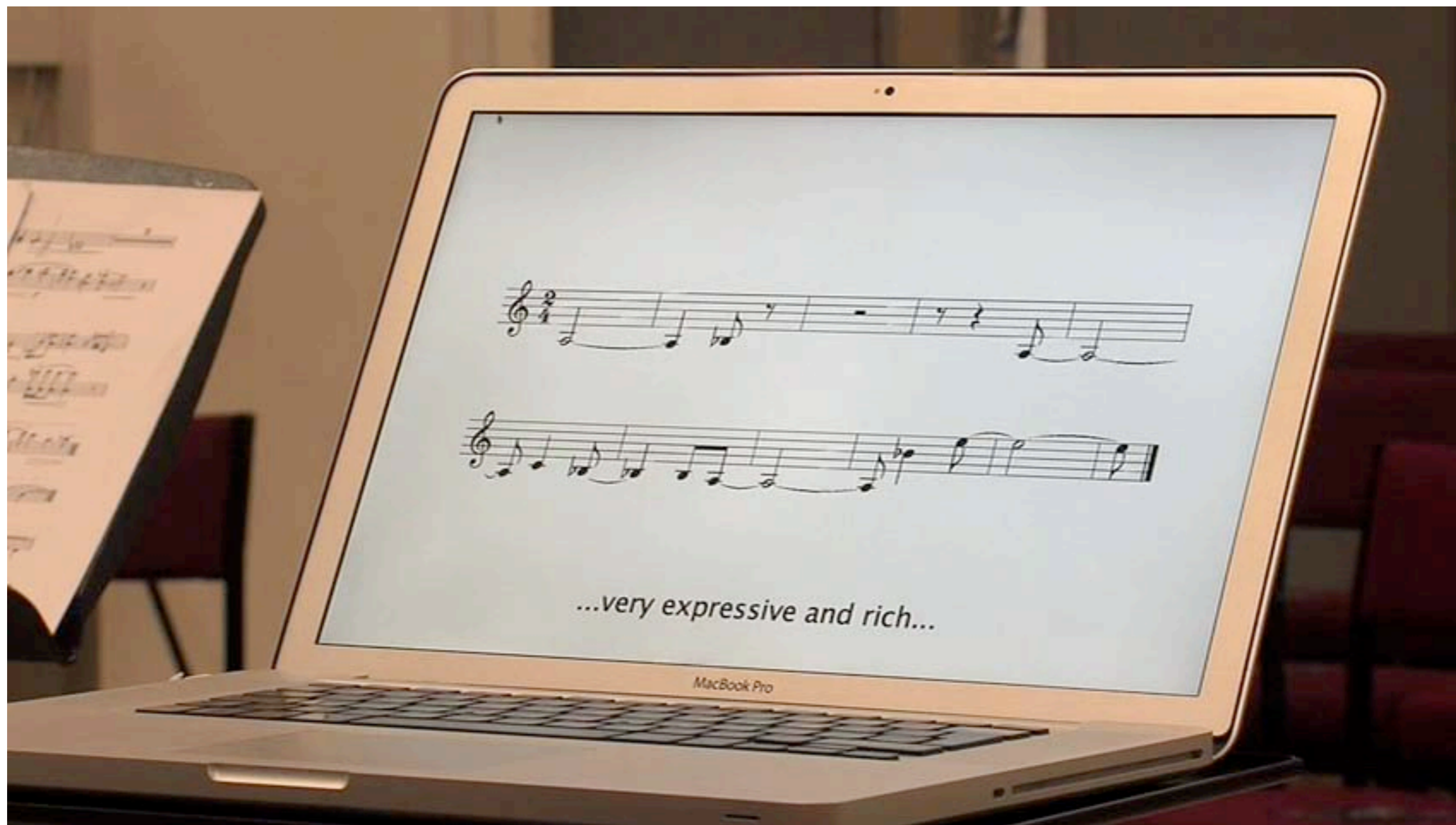
Matters arising

the work provides interesting perspectives on...

- *...acoustic composition*, the score, trills and ornamentation

- *...performance practice*, sight-reading, rehearsal, synchronisation...

- *...effort* and *reusability* - what 'value' are the notes, the phrases, the music produced, when they are produced, like all algorithmic material, apparently without effort? (The code means as much to me as pages of score), for instance:

...very expressive and rich...

Issues

- Other software (MaxScore (Didkovsky, Hadju), Bach (Agostini, Ghisi), eScore (McClelland, Alcorn), Lilypond. The functional emphases are different: quality, speed, variety of rendering, etc.

- Music notation is "deficient, inconsistent, and redundant" ??? Certainly complex and contradictory

- Traditional, graphic, both?

Issues *display (how to display it)*

- time and presentation: when to display, what to display, when to remove?

- what to include: cue parts, or a cue line for the performer to follow?

- if the music is being notated 'live' on a page, how much 'movement' of the existing notation is acceptable, if any? (INScore defaults to central alignment).

- what about synchronisation between many parts?

Issues *how soon is now?*

- When does something happen: when it is initially computed, when it is output?

- What happens when there is a conflict between computation and output?

- If you calculate all the data and then output that calculated data, what's the difference from simply 'pressing play'? When should 'now' be?

Demos

- score demo, then add physical computing

- *why?* creative reasons (dancer causes playable notation), educational/therapeutic (fool-proof sight-reading!), analytical: analysis of algorithmic output (although how useful is this if you know the algorithm?)...

- notation is another form of data representation

- it's also just an interesting thing to do.

Calder's Violin

Tuesday April 17th 2012, City University, London, part of the SuperCollider Symposium
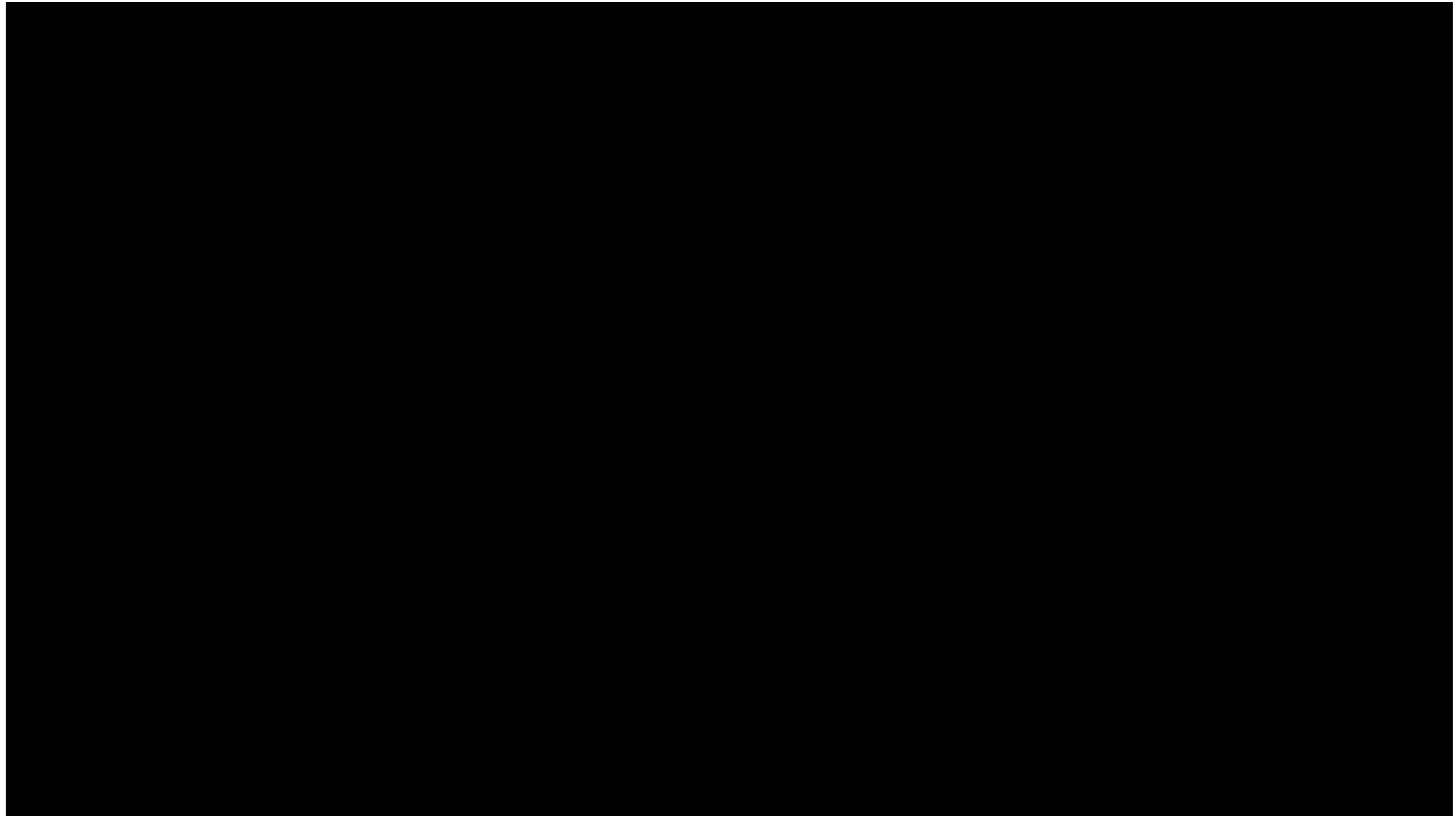
Metapiano installation

Conway Hall, London, April 13th - 14th

Touching Sound

Phil Barnard (MRC Cognition and Brain Sciences Unit), Ian Cross (West Road Centre for Music and Science), Satinder Gill (West Road Centre for Music and Science), Tommi Himberg (University of Jyvaskyla, Finland), Richard Hoadley (CoDE/DPL/MPA), Helen Odell-Miller (ARU Music and Health Research Group), Gill Westland (Cambridge Body Psychotherapy Centre), Sam Aaron (Cambridge University Computer Laboratory) and Rob Toulson (ARU CoDE).

Calder's Violin (excerpts), Mifune Tsuji, October 2011

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Thank you