

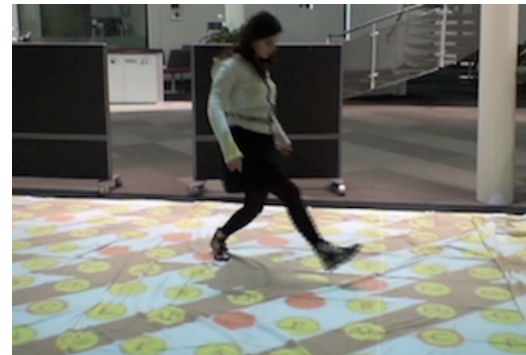
Running up Blueberry Hill: Whole Body Interaction with Musical Harmony

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Overview

- Three perspectives
- Background
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- Setup
- Tasks
- Observations
- Conclusions



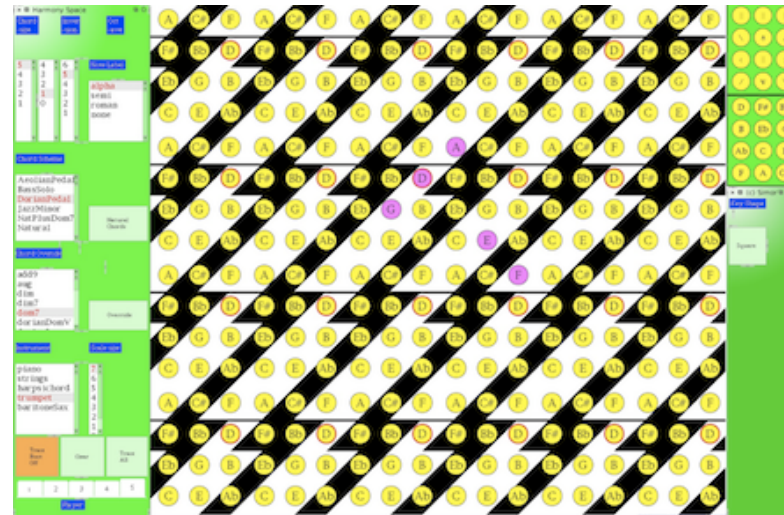
Three perspectives



- **E-Sense Project**
 - Technologically extended senses
 - AHRC speculative research
 - <http://www.esenseproject.org/index.html>
- **Harmony Space: re-conceptualising Musical Harmony**
 - Mathematics: Lakoff and Nunez
 - Music: Zbikowski, Katie Wilkie
- **Embodied cognition as design guide**
 - Systematic use of conceptual metaphors to shape interaction - Jorn Hurtienne

Musical harmony

- Musical Harmony – abstract, technical, difficult.
- Taught using abstract, complex, symbolic, domain-specific concepts.
- Existing *desktop* tool Harmony Space exploits theories of embodied cognition & music perception to....
- Let people (across musical ability range) employ navigational/spatial skills to interactively visualise, analyse, manipulate and create harmonic sequences.
- Single, consistent, unified spatial metaphor for harmony in terms of
 - Moving objects & shapes,
 - Trajectories,
 - Passage across allowed vs forbidden areas.
- Transit affects trajectories & shapes
- Spatial games equivalent to formal theories of harmony



Aim

- Immediate aim - design study for a new Harmony Space system using *whole body navigation* to carry out range of musical tasks.
- Papert's notion of body-syntonic learning - can participants exploit their own situated sense of space and how bodies move to gain a deeper understanding of harmonic relationships?
- Explore design requirements in adapting Harmony Space from a desktop system to the medium of whole body interaction.
- Identify possible benefits, both to beginners and accomplished musicians.
- Take practices that work in one medium apply in another a to explore the affordances of a new medium.
- Identify and characterize new opportunities presented by whole body interaction.



Physical Setup



- Large Atrium
- Top level - powerful data projector with 45 degree mirror
- Ground level projected display approx 6 meters x 4 meters
- Central feature – fixed grid of some 12 x 15 circles labeled with note names
- Labelling may vary dynamically
- Other dynamically moving features

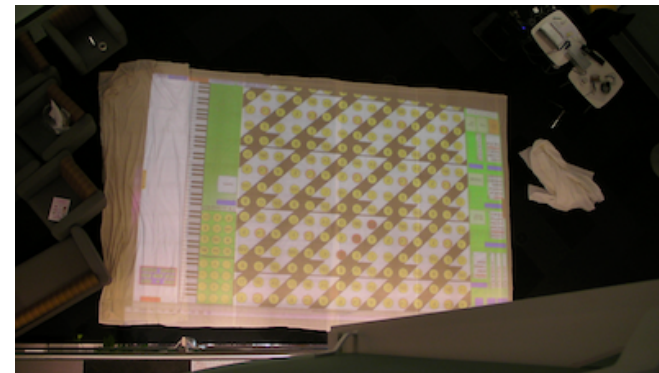




System

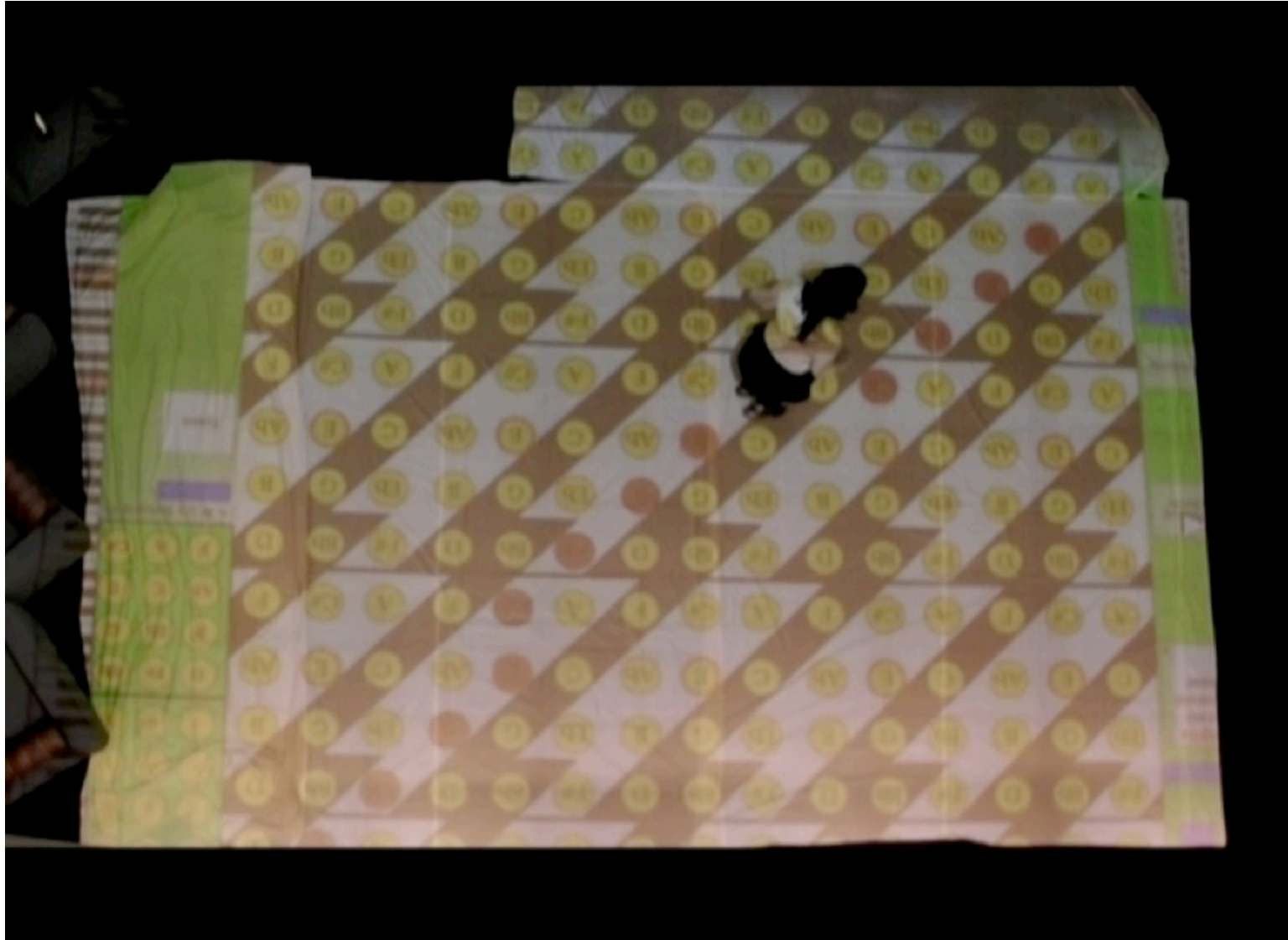


- Modified Desktop Harmony Space as engine.
- ReacTIVision camera-based tracking system is already integrated, but for this study, to help explore design space flexibly, used Wizard of Oz tracking.
- Human operator tracked position of players by eyeball in realtime.
- Explore the implications of different candidate tracking mechanisms (track head, track foot, camera-based, pressure-based etc).



Task I

- **Bass line only**
- When player steps on a note circle, note illuminated, and corresponding bass note sounds.
- How does player know where to go?
 - Follow lights - (Guitar Hero-esque, automated),
 - Learn by social demonstration/ coaching - (More demanding, more fun).
- How does player keep track of complex paths?
 - Trace
 - No trace



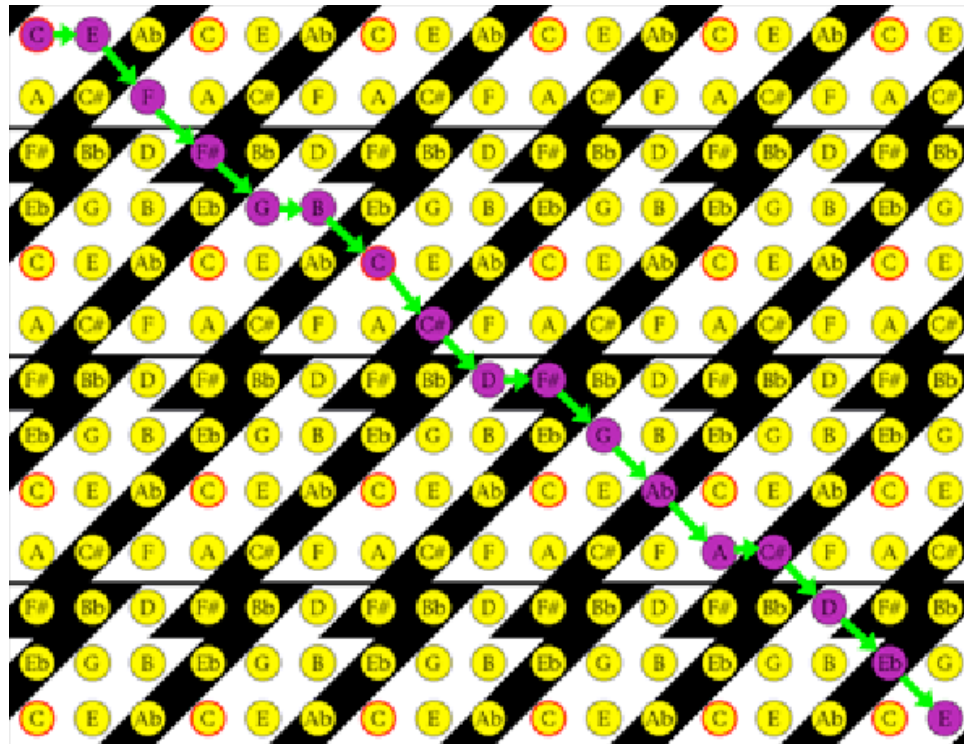
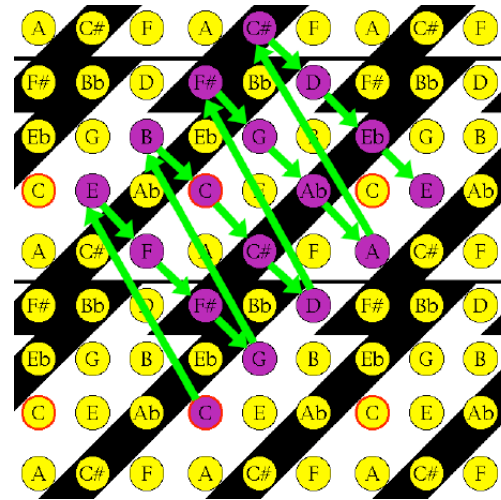
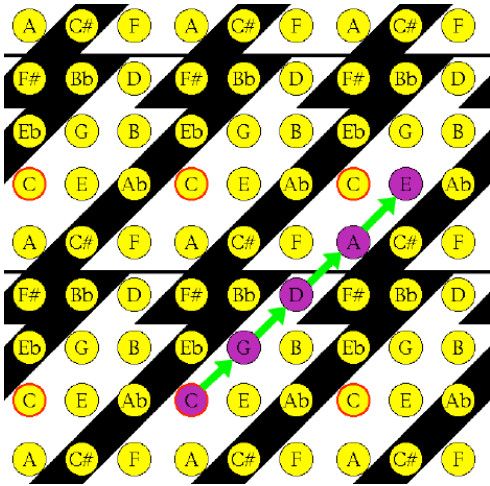
Task 2

- **Chord sequences**

- Stepping on a circle elicits *three or four notes played and highlighted simultaneously (a chord)*.
- Shape of the chord produced varies depends on the position of the root within a bounding box (representing key).
- Differences in chord shape can be seen visually, and heard aurally.
- Variation in chord shape follows a regular and visually obvious rule – constrained by bounding box.
- Two display variants tested
 - Show all notes - all of the simultaneously sounding notes were shown, but no persistent trace.
 - Root only - whole chord sounded, but only the root illuminated and traced

Some observations

- Precise, orienteering style vs exuberant dance style.
- Stride length - various trade offs;
Fun vs. precision,
Engaged physicality and challenge vs.
Accommodating range of participants - athletic older, smaller, younger.
- Different individual strategies for choosing paths for playing the same bass lines.
- - Physical convenience vs managing real estate.
 - Different memorability of different but equivalent paths.
 - Animated conversations between participants and bystanders.
 - Emergent unanticipated collaborative behaviour
 - Ease of movement sometimes depends on orientation
 - Keeping bearings when “ground shifts”
- Memory for paths appears qualitatively different than on desktop (think walk vs map)



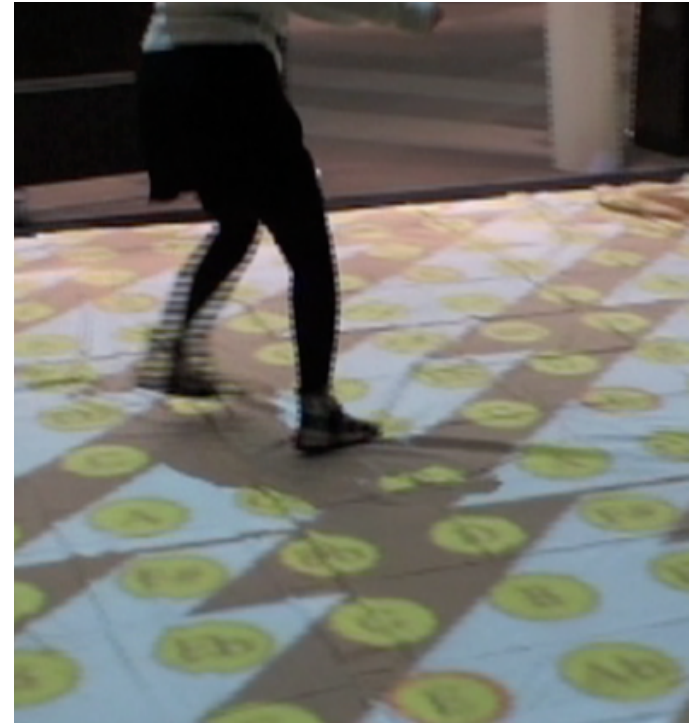
Conclusions and Further Work

- Players reported absorbing, attractive, demanding, and fun; combined mental & physical workout.
- Apparent qualitative differences compared with desktop.
- Deeper engagement and directness.
- Rich physical cues for memory and subsequent reflection.
- Full embodied engagement with rhythmic time constraints.
- Hands which are free for other simultaneous activities (such as controlling other aspects of music or playing traditional instruments).
- Qualitatively new possibilities for collaborative use - new ways of splitting up musical tasks.

Thanks!

Questions?

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<http://www.esenseproject.org>

<http://mcl.open.ac.uk/hsp>

<http://mcl.open.ac.uk/musiclab>