

**Fellow Travelers - Topography as Metaphor and Method**  
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Digital networks are a useful medium for musical collaborations remote and present, but can the network itself be a source of musical information? In a network-based musical project how can the performance terrain and the network interact and overlap? How can networks be enhanced to include people who don't play laptop? Where are the elisions between composition, improvisation, and emergent musical behaviors?

Using the author's works for *instrumental ensembles with navigation electronics* as examples, this paper explores the history, technology, and aesthetics of using the physical spaces and the topology of networks as musical elements.

I'd like to talk about the nature of digital networks, the way they're applied and extended in my work and in the work of some other musicians, and along the way touch on some of the history of networked art and music and the metaphors we use when talking about these forms. I'll explore two ideas that have helped shape the Global Village and so are woven into networked music: space and community.

Searching for a mental picture of the Internet, we borrow and modify geographical terms to describe networks... "cyberspace", "topology", "sites"... and travel across the http-scape on the "information superhighway". Maps of the Internet vary according to the needs of their makers, but most impart a solid physicality to an infrastructure that has a tenuous grip on the material world. Images of major network nodes branching to smaller nodes spanning (most of) the globe with straight lines evoke an industrial hierarchy of pipelines, roadways, and distribution centers.

In contrast are virtual communities such as The Well, social networking sites like MySpace, multi-user games such as Second Life, and blogs. Virtual meeting points in the form of newsgroups and chatrooms tapped into a pioneering idealism at the dawn of the Internet Revolution.

These social clusters were previewed in the early days of radio. In its origins as a point-to-point communications

channel between amateurs, where 'every transmitter is also a receiver', radio was driven by utopian impulses.

Some of the pioneers who participated in the early days of telecommunications art explored the nature of community as the body of the work itself. In this article from 1984, *Art and Telematics: towards a network consciousness*, Roy Ascott writes:

*"...the transformations of "creative data", are in perpetual motion, an unending process. In this sense art itself becomes not a discrete set of entities, but rather a web of relationships between ideas and images in constant flux, to which no single authorship is attributable and whose meanings depend on the active participation of whoever enters the network. In a sense there is one wholeness, the flow of the network in which every idea is a part of every other idea, in which every participant reflects every other participant in the whole. This grand reciprocity, this symmetry of sender and receiver is such that a mirror image is exchanged in which sender is receiver and receiver sender."*<sup>1</sup>

Geographer Michael Curry terms these two metaphors cyberspace and cyberplace. Cyberspace as an extension of the Cartesian/Newtonian model of space, cyberplace as the invisible network created by social and cognitive interaction<sup>2</sup>. Curry's analysis is in harmony with Marshall McLuhan's ideas of visual vs. acoustic space. Cyberspace as visual space, the highly linear space of cognition and causality molded by the phonetic alphabet and perspective, and cyberplace as acoustic space, a context for simultaneity, nonlinearity, and resonance.

While the metaphors of cyberspace and cyberplace, visual and acoustic space, appear to be disjunct, they meet in the nomadic wanderings of networked music.

## **Reading the Landscape**

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<sup>1</sup> Ascott, R. 1984. *Art and Telematics: towards a network consciousness/ Telematik/L'Art et le Télématique*. In: H. GRUNDMANN, *Telecommunication*. Vancouver: The Western Front, pp. 25-67.

<sup>2</sup> Curry, Michael R., *"Cyberspace and cyberplaces: Rethinking the identity of individual and place"*, [http://www.komdat.sbg.ac.at/ectp/CURRY\\_P.HTM](http://www.komdat.sbg.ac.at/ectp/CURRY_P.HTM)

In the late 1970's composer and 'Silicon Valley polymath' Rich Gold developed the *Terrain Reader* program and used it in network music projects with the League of Automatic Music Composers, a San Francisco Bay Area group. Conceptualizing computer memory as a three-dimensional landscape, Gold set sonic travelers in motion across this virtual territory.

"From the equation  $f(x,y) = z$ , where  $x$  is the latitude and  $y$  the longitude of a traveler on a fairly smooth, basically continuous surface, where  $z$  is the altitude of the traveler, and where the traveler exhibits a continuous, closed motion about the surface,  $z$  can be shown to exhibit periodic-wave-like properties where the frequency of the wave ( $z_w$ ) is determined by the length of the traveler's closed walk and the speed of the walking while the timbre of the wave, including amplitude, is determined by the **hills and valleys of the land.**"<sup>3</sup> [emphasis mine].

A decade later, Scot Gresham-Lancaster and Bill Thibault extended this method to include the use of 'real' data, digital elevation models gathered from the United States Geographical Survey.<sup>4</sup> More recently Jens Brand's *G-Player* gathers geographical data from satellites in real-time to play back the surface of the earth.

Another way to approach terrain-generated music is to use the shape of the network itself. Tim Perkis' *Wax Lips*, created for The Hub, sonically maps the network topology. Using a strategy of message passing and simple transformations at each node the emergent sonic behavior of the network is revealed. Each player is free to define his own transformations, creating a collaborative platform for this exploration.

### **Topology and Complexity**

One stream of my own work has applied the ideas of terrain reading and emergence to the instrumental domain.

In *True North* (2000), a quartet of oboe, clarinet, trumpet and trombone wander over 'real' terrain. Each member of the

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<sup>3</sup> Foundations of Computer Music, , Roads and Strawn, eds., MIT Press, Cambridge, MA, , 1987, pp 591-592

<sup>4</sup> Stuart, James. "Introduction to Wave Terrain Synthesis". [http://portal.ecu.edu.au/adt-public/adt-ECU2006.0037/02chap1\\_JamesSG.pdf](http://portal.ecu.edu.au/adt-public/adt-ECU2006.0037/02chap1_JamesSG.pdf)

quartet is outfitted with wearable navigation electronics: a microcontroller connected to an electronic compass and an LED display. The LED displays are mounted on each instrument using slightly modified marching band lyres. Each player has a score in the form of a flipbook also attached to the lyre.



Within the codespace of each microcontroller are instructions for coordination of the players and the display of compass headings, all transmitted to the players via the LED displays. The players use the information on the display to navigate the performance space, flip pages, and to pair up with another player.

[ *o-p, fff < ffff > fff* ] tutti

19'00

A musical score for four instruments: clarinet (cl), oboe (ob), trumpet (tp), and trombone (tb). The score is written on four staves. The clarinet staff starts at measure 41. Each staff contains musical notation with notes, rests, and dynamic markings. The dynamic markings include *fff*, *ffff*, and *fff*. There are also wavy lines above some notes, possibly indicating vibrato or a specific performance technique. The instruments are labeled on the left side of their respective staves.

In the excerpt from the score, above, the polygons above the clefs indicate that the clarinet and trumpet should walk in the direction of a flat horizontal surface, a tabletop perhaps. The oboe and trumpet will head towards a flat vertical surface, like a wall or window. The resulting compass heading indicates which of the bars on the staff should be played. There are eight possible compass headings, N,NE,E,SE,S,SW,W,NW, indicated by a number from one through eight on the display. The +++ symbols are cribbed from the score of Stockhausen's *Kurzwellen*. Here they describe how a sound should be transformed relative to another sound. That 'other sound' is from one of the other players, as indicated by a single digit (1..4) on the LED displays. In the example above everyone is playing a vibrato much faster than their partner. (This seems like it could get out of hand rather quickly, but it's unlikely to happen in any physical space of reasonable complexity.)

Using this rule set the musicians are set loose to wander over the performance terrain. The music emerges from the interactions of the physical characteristics of the performance space, the composer's intentions, and the musical capabilities, tendencies and habits of the players. This piece has been performed three times with different ensembles in radically different places. Each performance, while easily identifiable as *True North* on a macro-sonic level, has differed substantially from the others on a moment-to-moment basis.

*Propagation, Reflection and Absorption* (2002) simplifies the *True North* instruction set. Six players are divided into two trios. One member of each trio travels around the performance space wearing a microcontroller/compass/display unit, playing a drone. Her compass heading is sent by radio transmission to the other members of her trio, seated. The seated players bend a single tone according to the compass heading of the traveler, how much to bend (flat or sharp) is indicated on their displays. Additionally, when her signal is lost through radio interference in the performance space the seated players are asked to play something very noisy. There's no score, per se, just these instructions, the terrain, and a wandering musician, interacting to unfold the composition in real-time. With a more direct, linear kind of communication between players and fewer opportunities for improvisation, the piece paints a clearer map of the performance territory than *True North*.

## **Joining Space and Place**

Network music projects can take many forms: remote collaborations using streaming audio, interconnected improvisations in a shared physical space, soundings of the network's physical dimensions, elisions of all of these plus other permutations. Here I've looked at the possibility of joining two metaphors (cyberspace and cyberplace) and two methodologies (terrain-reading and emergence) as the starting point for a set of pieces that invite those who play acoustic instruments into network play, and extend the more idiomatic features of network behaviors into the physical realm. Network music, it's roots in the surround-sound simultaneity of acoustic space and the social dynamics of music-making, is in a unique position to discover collaboration and spontaneity on the digital landscape.