

EMERGENT SOUNDSCAPE COMPOSITION:
REFLECTIONS ON VIRTUALITY

by

Mark Christopher Brady
Bachelor of Science (Honours), University of Cape Town, 1994

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Evaluation I - Acoustic Design in the Computer-Mediated Environment

The backdrop of soundscape studies of the acoustic, electro-acoustic, mass media and computer-mediated environments allows us to describe design criteria for acoustic environments that afford communication. In the following table we describe these criteria as guidelines for sound design in the computer-mediated environment, and evaluate *Lost* with respect to these guidelines.

Table 1: Acoustic Guidelines

| Guideline | Description | Adherence in <i>Lost</i> |
|---|---|--|
| 1. Reconnect Sounds with Source Events or processes | <p>In the acoustic environment sound propagates rapidly and dissipates rapidly. Thus most are perceived in sync with their source events. Even secondary reflections arriving up to 40ms late are not perceived as a secondary event under the precedence effect (Truax 1978 p.96).</p> <p>The origin of a sound is important in reconnecting sound objects with their sound sources; quite simply, the perceived origin of a sound should correspond to the location of its source event, even when the sound is synthesized. In the natural acoustic environment this is almost always the case, except for echoes and other gross reflective phenomena, in which a phantom sound source appears.</p> | <p><i>Query Drops</i> and <i>Connection Hum</i> sound objects are connected to the query arrival time, they are synchronic. <i>Query Drops</i> and the <i>Byte Narrator</i> sounds are spatialized to reflect their disparate origins.</p> |

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| <p>2. Stimulate Diagnosis using Coloration and Timbral Complexity</p> | <p>A value of environmental sound is that it directly reflects the minutia of physical events and processes. Acoustic sound is analogic. This allows listeners to discern meaning to be found independently of their spoken language or other symbolic communication. Even speech is surrounded by paralinguistic of “um”s and “er”s, and speech sound’s inflections reveal the speaker’s emotional state.</p> <p>This is not to say that sound cannot have symbolic meaning: certain sounds gain cultural and symbolic meaning over time. The expression of sound is to be found in the combination of representation and reflection. The suggestion here is that earcons should be ideally designed to reflect and represent events and processes. The challenge is that many virtual processes are mute and abstract, making it difficult to choose meaningful iconic sounds and mapping strategies, because they have no real world counterparts.</p> <p>Sound designers can encode the details of events within the subtleties of sound’s inner composition (Truax 1992). Experienced listeners can detect aberrations in the sounds, while novices are still aware of events at a lower level of detail.</p> <p>This calls for design of classes of sounds, which vary with some parameters abstracted from the reflected event or process. There is however a danger that these parameters might alter the sound so much that it will lose its semantic tie. For example if an event’s duration is mapped to its sound duration, very short events may be reduced to the sound of a meaningless click</p> | <p><i>Query Drop</i> is modulated to reflect rate of queries and synthesized in a dynamic variety.</p> |
| <p>3. Avoid Masking, Limit use of Soundscape Resources</p> | <p>In order to promote the emergence of hi-fi soundscapes and thus provide a space for a range of listening levels, sound designers need to establish limits to their use of the soundscape and thus allow a functional equilibrium to develop. These limits might be in terms of loudness, spectral bandwidth use or temporal frequency and duration. For example non-critical sounds can be delayed until the ambient sound level returns to an expected norm.</p> | <p>All sounds are maintained at ambient levels. Connection Hum is restricted to lower spectral range (<180Hz). Query Drops are of short duration (<50ms).</p> |
| <p>4. Do Sonify</p> | <p>Careful sonification of routine events can allow sound marks and keynotes</p> | <p>Routine events of the Gnutella network are</p> |

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| Important, Anomalous and Even Routine Events | to emerge, which will provide the “natural” character of an environment to develop. Care however must be taken in ensure the sounds used have a semantic tie to the events they represent. | consistently sonified. Sounds are designed to represent the synthetic nature of the digital environment without being abrasive. |
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Table 2: Mass Media Guidelines

| Guideline | Description | Adherence in <i>Lost</i> |
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| 1. Avoid Repetition of Canned Sound | Repeated undifferentiated samples will bore the listener. | Algorithmic techniques are used to generate dynamic variation of sounds. |
| 2. Follow and Trace | Take cues from the listeners’ activities and acoustic environment for indication of what tempo should be used, so that a pace can be found interactively, rather than imposed. Let content dictate structure, rather than technological or commercial interests. | Live incidental actors dictate all sound except for <i>Connection Hum</i> . |
| 3. Identifiable Variety | Allow the listener to select the theme, character, voice or distinctive style of sounds. A cohesive style can allow listeners to group disparate sounds as belonging to an identifiable layer of audio augmentation. The act of selection of this style will increase the listeners’ sense of agency, as they see their own choice is reflected in their surroundings. Provide an open architecture so that interactors and sound artist may design their own themes. | <i>Query Drop</i> sounds are identifiable as belonging to the same group of short scattered sounds. <i>Lost</i> is not open to new sounds, but will be released as an open source project. This includes the artist’s sensibilities in sound design and evaluation in critical review by sound artists Barry Truax, Martin Gotfrit and Kenneth Newby. |

Table 3: Electro-Acoustic Guidelines

| Guideline | Description | Adherence in <i>Lost</i> |
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| 1. Music and Voice | Music has strong mood altering effects and does not easily mix with other music. Use it sparingly and allow listeners to easily switch it off. Similarly humans are particularly sensitive to other human voices, which may be distracting or annoying if they are poorly reproduced. Voice should be reserved for high priority, low frequency messages. Avoid excessive overlapping of multiple voices. | Music was not used, except for a rarely triggered <i>Breathy Interlude</i> , which is a sparse rhythmic composition. Voice is blurred. |
| 2. Provide an Off Switch | Portable personal devices may travel into places where their sound is inappropriate — provide an off switch. | It is recommended that the installation should be located in a semi-public area in which people do not spend long continuous amounts of time. <i>Connection Hum</i> recedes — reducing its level once the connection is stable. |
| 3. Augment rather than Isolate | Provide a set of sounds that act as an additional identifiable layer onto the soundscape rather than replacing or dominating the soundscape that already exists. If the communicational value of this new layer is high, but masked by noise, listeners may demand noise abatement. | <i>Lost</i> is not immersive due to its limited visual display, limited use of voice and ambient levels. |

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| 4. Emulate Natural Sounds at the Internal Structural Level, Roll off High Frequencies | Electro-acoustically created sounds or processed sounds can be perceived as unnatural and thus more distracting. Men and especially women are more sensitive to higher frequency sounds of equal amplitude. Thus avoid simplistic synthesis methods and equal amplitudes across a variety of frequencies, rather roll off the amplitudes of high-end spectrum. For example simple and cheap buzzers create sounds of equal amplitude across their frequency spectrum, whereas sounds in the acoustic environment have reduced intensity at higher frequencies. The result is that buzzers sound unnatural to the ear. | Sound objects are derived from high quality recording of rich complex sounds (e.g. bells) and human voice. The amplitudes of the higher order harmonics of the <i>Connection Hum</i> are reduced. Softer pink noise used rather than white noise. |
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Table 4: Computer-Mediated Guidelines

| Guideline | Description | Adherence in <i>Lost</i> |
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| 1. Model the Environment | An internal representation of the environment in which a CME device finds itself in will be useful to help make appropriate decisions for audio augmentation. | <i>Lost</i> is not aware of the installation space, but the artist is able to tailor <i>Lost</i> for each space by setting up the levels for each voice independently during installation. |
| 2. Listen | As members of the acoustic community, devices should listen to the acoustic environment too. While generalized voice recognition is in its infancy, even simple ambient noise level measurement can be used to complement heuristic decisions, needed to determine the appropriateness of audio augmentation. | <i>Lost</i> does not listen, see <i>Found</i> . |