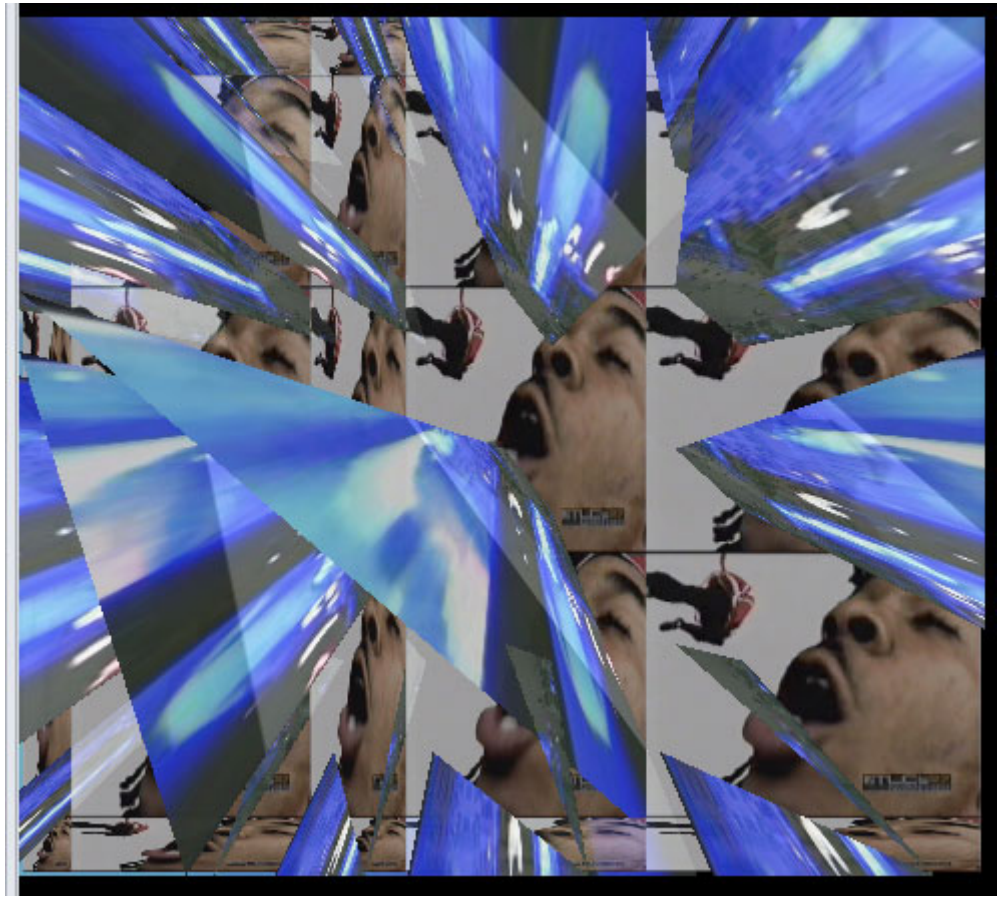
# Emonic Environment :: Manual & FAQ

*v. 0.3.*

*BEING UPDATED... STAY TUNED!*



**EMONIC ENVIRONMENT :: MANUAL & FAQ 1**

**IX. FAQ 23**

## I. What is the Emonic Environment?

The Emonic Environment (EE for short) allows you to create, browse, compose, and exchange audio, video and text in an improvisational manner. It is designed to help you interact with the computer in a new way, where the computer takes an active role in determining the content you see and hear. As a result, the media you play with looks, sounds, and behaves differently from how it would, were you to be the only "decision maker".

The EE can find the media you have on your hard drive. You can also use your microphone, video camera, cell phone, and other devices to add more sounds and images. To control what the EE does, you can use a mouse, keyboard, MIDI controllers, sensors, and cell phones. The operation of the EE, once you get the meaning of different elements, is pretty straightforward: you add, connect, and modify three types of elements: **emons**, **actions,** and **p-Units**.


**P-Units** stand for 'processing units'. They control the detailed properties of your media – how it looks and sounds. There are multiple types of p-Units, each responsible for a particular type of manipulation that defines what you hear and see.


**Emons** control the behavior of p-Units over time. They relate to p-Units through Actions (see below). By placing multiple *emons* on screen, connecting them into a network, and assigning *Actions* to some of them, you can create an organism that controls processing of media on a higher level than merely interacting with p-Units, allowing you to think about interaction with your media in a way similar to that of a practicing improviser.

**Actions** are functions that let *emons* control *p-Units*. Each Action controls one or more of the properties of one or more p-Units. You can define Actions on your own, let the computer create them for you, or get them from other users of the EE online.

In order to have different emons and p-Units affect each other, you connect them into networks. Emons, when connected to each other, form what we call a *Structural Layer.* P-Units, connected to each other, form a *Perceptual Layer*. As mentioned above, the Structural Layer (i.e., emons) affects the Perceptual Layer (i.e., p-Units) using the Actions.

Perceptual Layer controls parameters of how audio, video, and text. The Structural Layer controls how the p-Units behave over time. In other words, by triggering Actions, emons control how properties of p-Units change over time - in a way similar to how a sequencer helps you arrange media samples and control their parameters. You can see an example of a simple EE network (consisting of Structural & Perceptual networks and the connecting Actions) in figure 1 below.

Interconnected emons 'talk' to each other by firing *stimuli*. Stimuli can only be fired in one direction which you define (i.e., you can connect from emon A to emon B, or from emon B to emon A, but not both). Emons fire stimuli when someone *stimulates* the emon (i.e., changes its activation level).

Once stimulated, the emon performs Actions that are associated with it (if any). The Actions in turn determine what effect activating this Emon has on the p-Units (i.e. on what you hear and see). *Tip: typically, the more stimuli travel through the Structural network, the more p-Units are changing.*

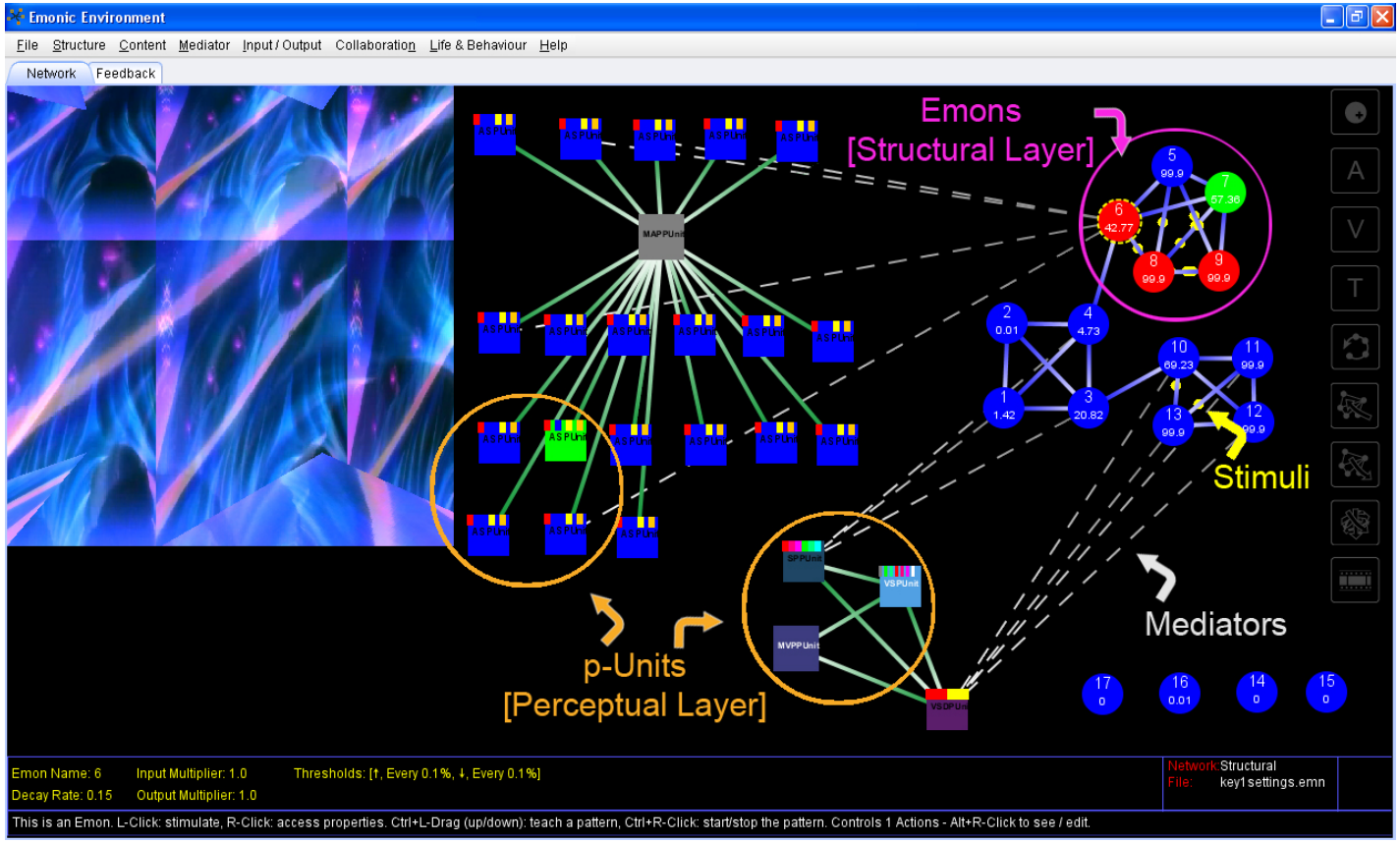



***Figure 1. A typical EE Network.***

## II. The Structural Layer and the properties of emons


The Structural Layer is made of emons, both interconnected and not. This layer is an instrument for influencing and observing the ongoing activity of p-Units within the Emonic Environment.

***Figure 2. Emon states. Emon's name on top, activation level on the bottom.***

For those interested, the Structural Layer is modeled as a recurrent neural network. It allows evaluation of stimuli propagation and node cluster formation over time and is concerned solely with the state of its elements (i.e., independent of any actual media processing that takes place as a result of its activity).

Each emon possesses several properties. The most important of these is the *activation level* which tells you how "active" a certain emon is.

As mentioned above, emons communicate by sending stimuli to each other. When an emon receives a stimulus, its activation level goes up. Stimuli are sent to all the emons connected to the emon that is being stimulated, provided that the activation level of the emon in question is higher (or lower) than a given threshold (explained later on). You can stimulate an emon in several ways:

- Manually: to do that, just click an emon and watch its activation level change. An alternative method is to select the emon with the mouse and press the <E> key.
- By incoming stimuli: connect from emon A to emon B, then click on emon A, and, as soon as the stimulus hits emon B, emon B's activation level changes.
- By teaching a pattern: you can teach an emon to change its activation level at certain times. E.g., you could say, go up 40%, wait 2 seconds, go down to 10%, wait 3 seconds, etc. The pattern is executed in a loop and as a result, whenever the emon gets activated it fires. To do this, click Ctrl key, and while holding it, click the emon you want to teach with the left mouse button and drag it up and down. When you release, the pattern will start executing. To stop execution, click Ctrl key, and, while holding it, click right mouse button once on the emon.

- Automatically: open the Activity & Evolution Agent panel, and activate the Automatic Activation option (see fig. XXXX and description of the Agent below).
- By outside source: input from serial and USB sensors as well as MIDI controllers, cell phones, etc., can be used to stimulate an emon (or a group of emons).

Operations such as increase, decrease, and nullification of activation level as well as connecting and dragging emons can all be performed on both a single emon and on a group of emons simultaneously. To perform an operation upon a group first choose the group and then perform the operation. To choose a group, click anywhere in the empty space and then drag the selection rectangle to cover (select) the emons you want to be a part of the group. Another option is to hold the Ctrl key and press left mouse button on the emon(s) you want to choose. Yet another option is to press Ctrl-A or right-click an emon and select the Select All Emons option from the popup menu (figure XXXX).

### *Adding and connecting emons*

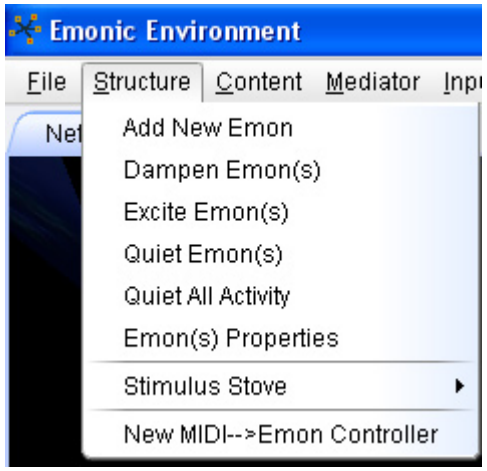
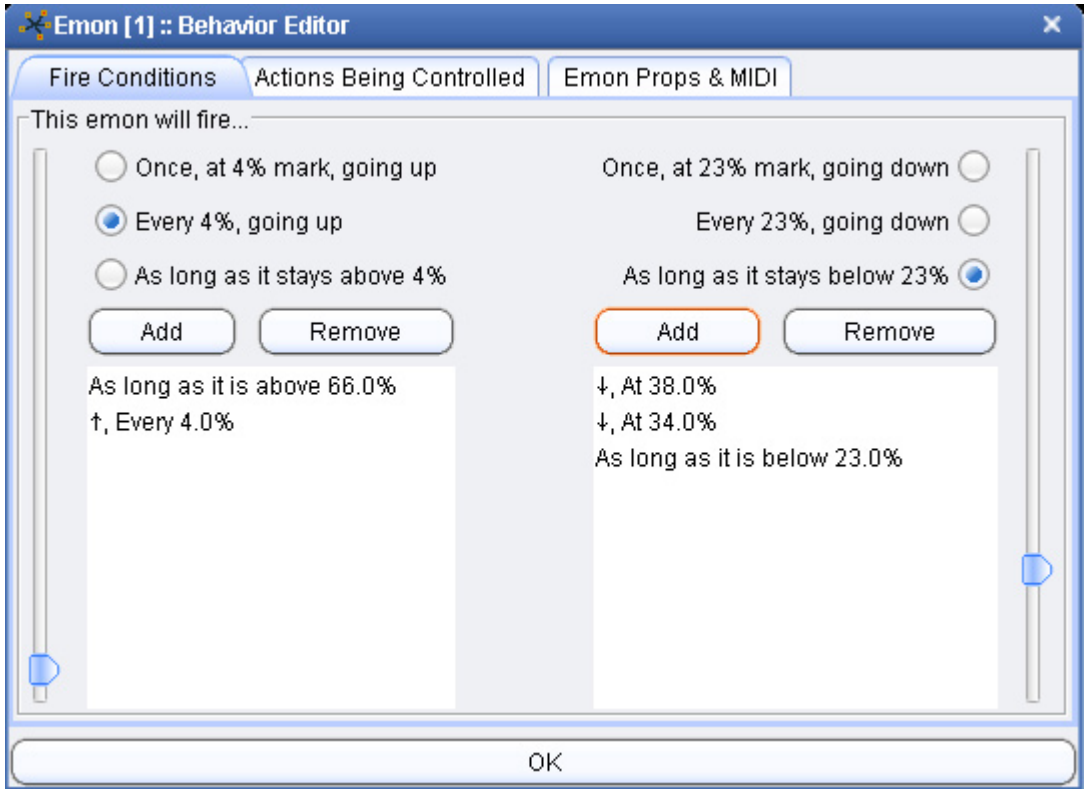



***Figure 3. Structure Menu***

Click *Structure* in the top menu, select *Add New Emon*. Do this twice. You should now see two blue circles on your screen. **Tip**: try moving the new emons as they might have been placed on top of each other or older emons.

To connect the two emons click with the middle mouse button first one circle, then similarly on the second. They should be now connected. Stimuli will flow only in one direction, from the one on which you first clicked to the one you clicked on second. If you don't have a middle button on your mouse, hold down the Shift key and press left mouse button first on the origin emon and then on the target one.

### *Setting emon firing conditions*



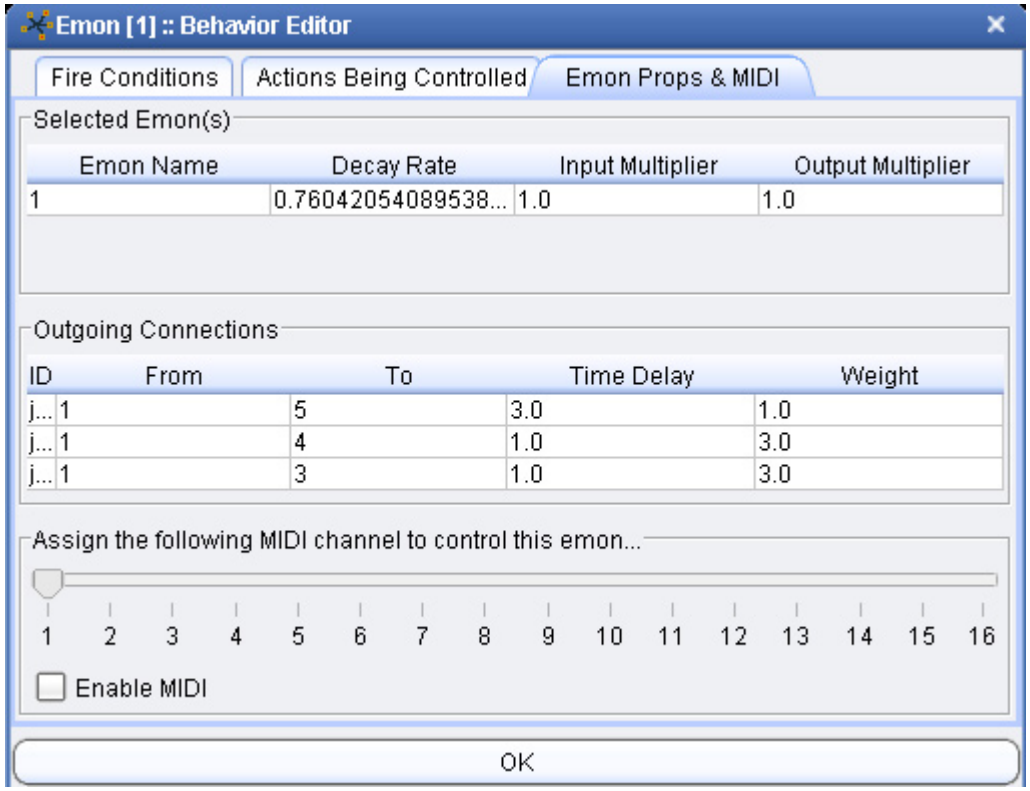

You can set an emon's firing conditions by right-clicking it and selecting *Set Fire Conditions*. This menu allows you to define the thresholds at which the emon fires (sends stimuli). You can choose the thresholds by moving the sliders located on the sides of the menu window (fig 4). The left half of the window sets firing conditions for when emon's activation is increasing; the right half of the window defines firing conditions for when the emon's activation level is decreasing.

Having chosen a threshold, you proceed to choose one of three firing types, by clicking on one of the three radio buttons in each group. Selecting the "Once..." button means firing will occur once, at the activation level you chose. Selecting the "Every..." button means firing will occur every time the emon increases by that many %s. Selecting the "As Long..." button means firing will occur as long as the emon's activation level is above (or below, for right half) the activation level you chose.

***Figure 4. Behavior Editor :: Firing Conditions menu.***

Once you defined the two parameters mentioned above, hit the *Add* button, and your selection will appear in the list located at the bottom of the window. You can repeat this process as many times as you want, to set additional thresholds.

### *Setting emon properties*




You can set the properties of an emon by right clicking over it and selecting *Set Properties* (fig. 5). This window allows you to name the emon, see the names of emons it is connected to (if any) and define how the emon behaves when activated.

Setting the *decay rate* defines the decrease in the emon's activation level each system beat. This beat occurs automatically every second. The *input multiplier* is a parameter that determines by how much the activity of an oncoming stimulus will be multiplied, thus affecting the activation level of the emon when receiving stimuli. The *weight* is the activity of each stimulus shot. The *output multiplier* is a parameter that determines how much the activation level changes every time a stimulus is fired. The activation level changes by the weight of each stimulus multiplied by the output multiplier. Setting the *time delay* defines how long it takes the stimulus to arrive at the next emon.

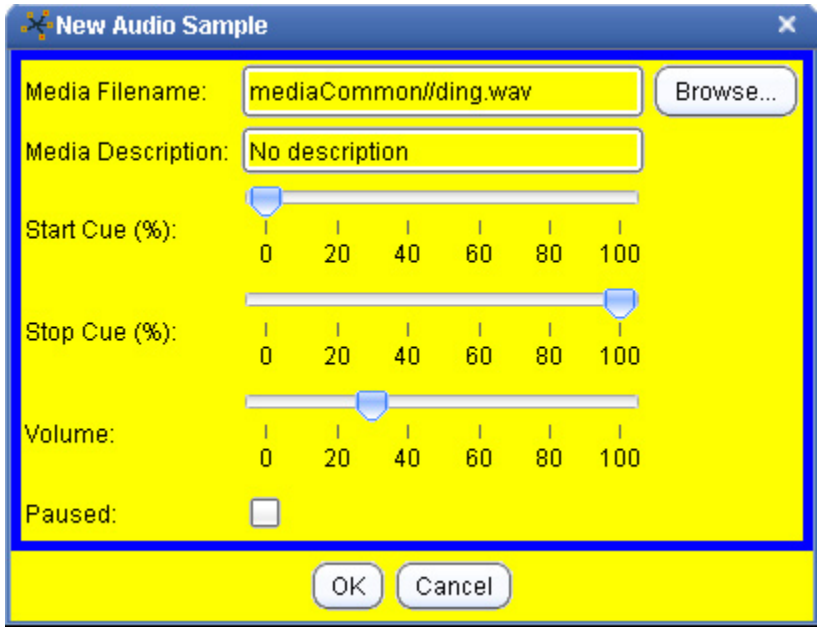
***Figure 5. Emon Behavior Editor :: Emon Properties menu.***

## III. Types of p-Units that exist and their properties

In order to provide media content, you populate the Perceptual Layer with p-Units of various types, each with its own set of properties. The p-Units control how the media is generated, modified, and played back (e.g. speed or volume of sound, rotation

angle of a video frame, semantic relationship of a piece of text). P-Units can be connected to other p-Unit types for the creation of nested processing structures. Here are the types of p-Units that exist and their inherent properties:

### *Audio sample*




AudioSample p-Unit controls how a given audio sample, be it recorded by you, or retrieved from a database, is played back. AudioSample p-Units allow manipulation of sample-based audio; properties such as volume, start / stop cue points, playback direction, time and pitch shift, audio file location (locally or on the net), and other properties, are all individually adjustable.

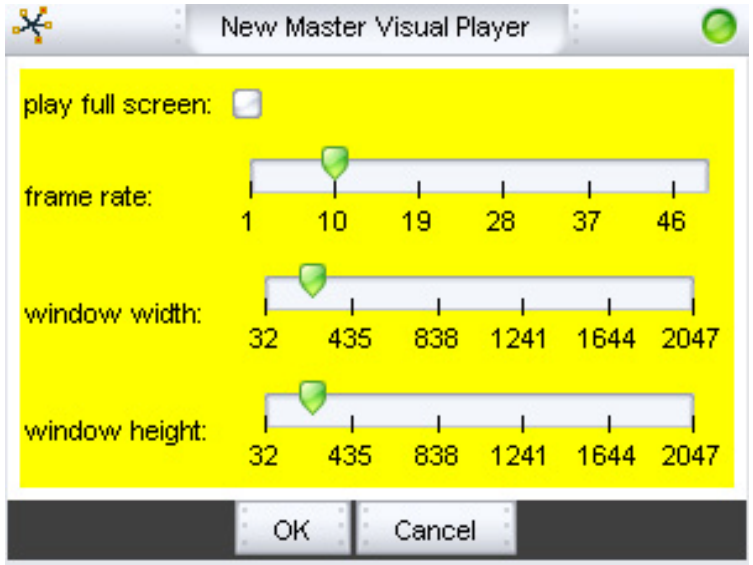
To understand the usefulness of the individual properties, remember that any property repeats over time. For example, take a look at the start and stop cues: let's say you have an audio file where the middle part fits well in a given context, but you don't feel like cluttering the overall output with the rest of the sample. Instead of permanently changing the sample, you can just change the start and stop cues, to indicate which portion of the sample should be played. Now, as you go on, you might decide that the rest of the audio sample fits the new conditions better and get a result by simply changing the cues. After all, any editor can do that, but now consider that you can set up an action that will each time change one or both of the cues, thus changing which part of the audio sample you hear based on other actions. In other words, as your network evolves, the portion of an audio sample being played can be changed to create a different sound without modifying the source.

Multiple start and stop cues may exist, with two versions : (1) a mask that preserves the length of the sample in its playback, introducing silence in the masked-out portions of the sample, or (2) a selective mask that plays only the desired portions, skipping over the masked-out spots.

### *Master Players*

One of the key improvisational principles is the continuous incorporation of ongoing contextual events into the improvisation. The Master Player p-Units express this concept by controlling the spatial placement of sound, video, and text. A person standing in one part of the room may hear a certain output and choose to modify the tempo of the audio he hears, while a participant on the other side of the room may hear a combination of other outputs and change what audio samples are playing. As a result a whole set of behaviors can be constructed by the participants; for instance, by dynamically changing connections between Audio Sample and Master Output p-Units, one can control the spatial presence of audio in particular areas, with the mutation of this balance resulting in shifting or rotating of sound around a room for a fully encompassing atmosphere.

## Master Visual Player




Master Visual Player p-Unit is responsible for the overall video playback, resulting from the sum of all the ongoing visual manipulations.

*Properties:*

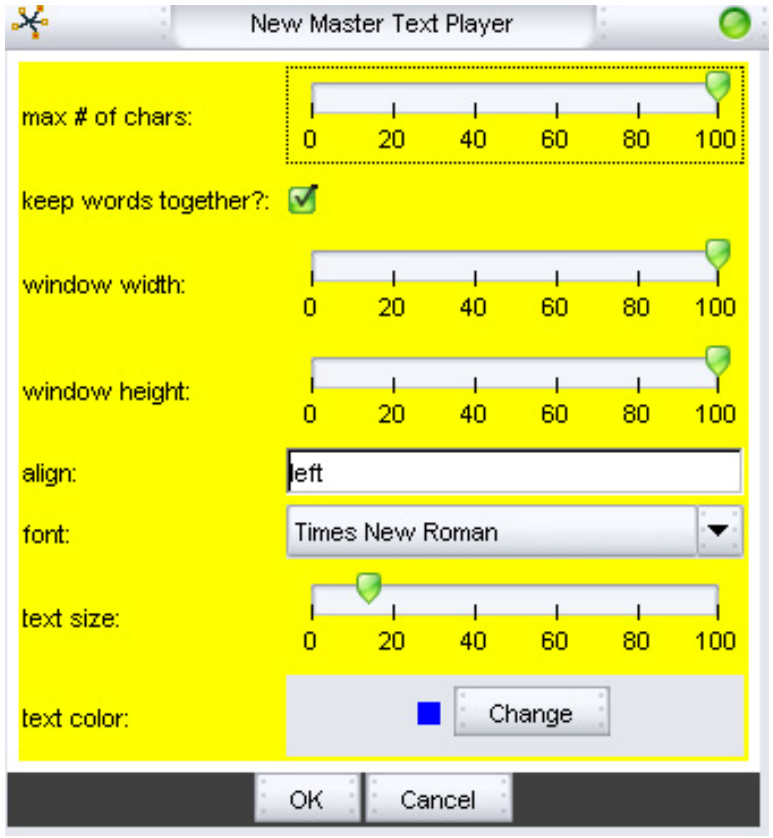
Size – how large of a window is desired (or full screen)

Display ID – only relevant for multi-display scenarios where the network is to be placed on one screen and the visual result on another

Coordinates on screen - where the video window will initially appear.

Layering of the sources – the priority order of the p-Units connected to the Master Visual Player p-Unit. The latest to connect will be the top-most, the earliest - the lowest. Yes, life of p-Units is not fair.

## Master Text Player (can be laid over master visual player)




Master Text Player p-Unit is responsible for the overall text display, resulting from the sum of all the ongoing text manipulations.

*Properties*:

Maximum number of characters, determines how many letters appear.

Words Together, determines if words are out in line or wrapped around.

Text Window width and height

Align left right center or justify

Font

Font Size

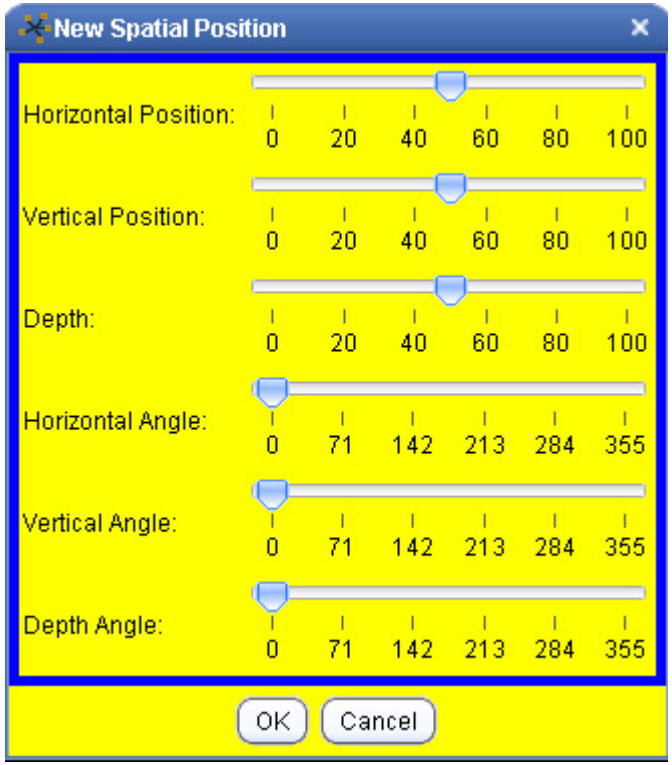
Font Color

## Master Audio Player


Master Audio Player p-Unit is responsible for the overall audio playback – a sum of all audio p-Units connected to it.

*Properties:*
- Audio Channel defines which speaker will play the audio.

## Spatial position

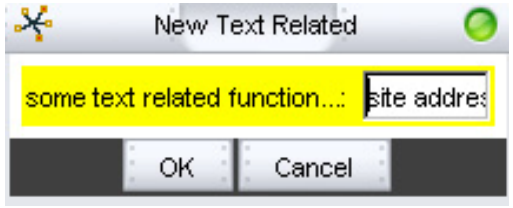



Spatial Position p-Unit defines the position and rotation of the image in 3D.

Properties:

- Left-Right
- Down-Up
- Far-Close
- Left-Right's Angle
- Down-Up's Angle
- Far-Close's Angle

## Text Related

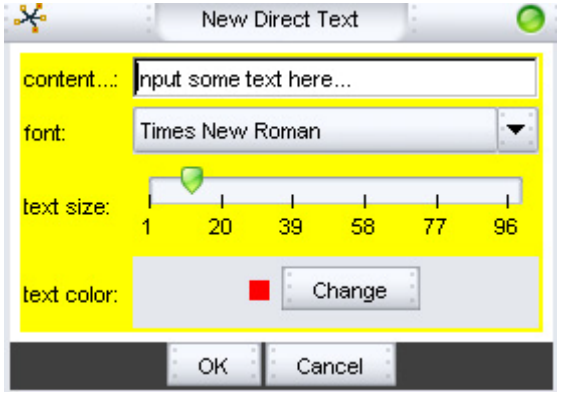



The text related p-Unit finds online text that is related to the one you put in the text sample and displays it through the existing master text player.

### *Text Rhyme*


Text rhyme p-Unit finds online text that rhymes with the one you put in the text sample and displays it through the existing master text player.

### *Text sample*




The Text Sample p-Unit allows interactive input of text to be displayed in real time.

Properties:

Content, which defines the text content to be displayed.

Font Size

Font Color

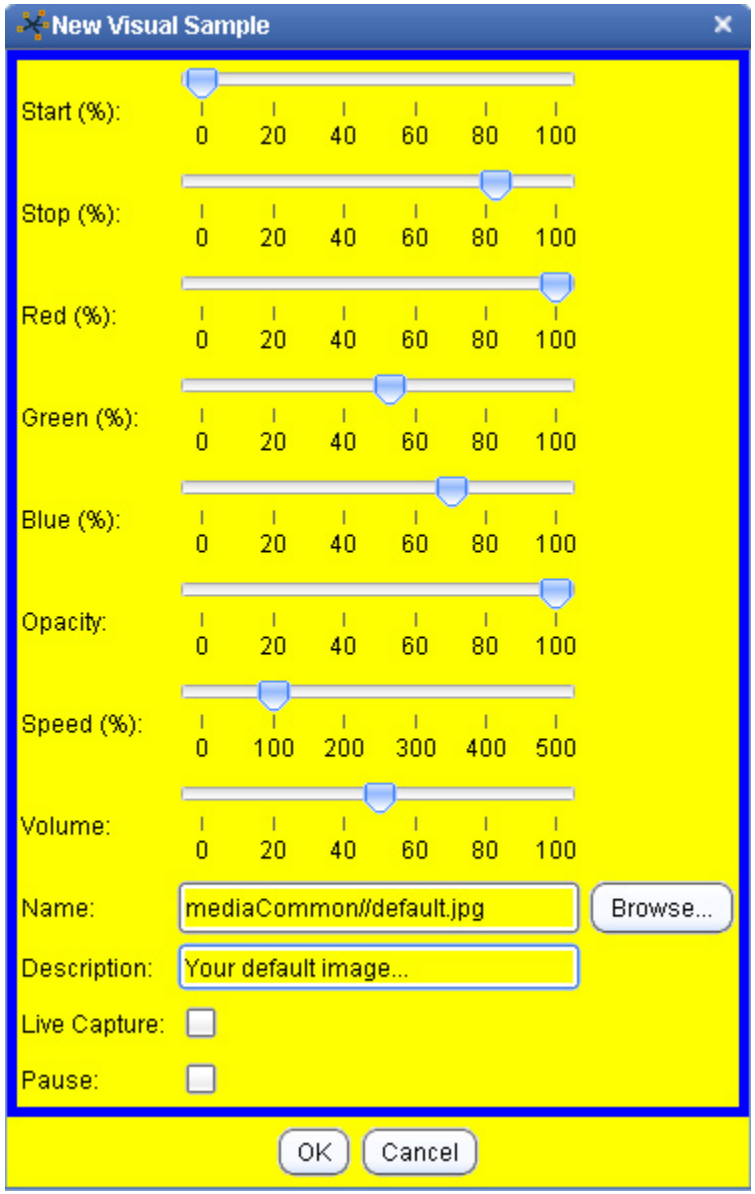
### *Visual Subdivide*

Visual Subdivide p-Unit divides and replicates its input (a VisualSample or another Visual Subdivide p-Unit).

Properties:
-Horizontal ratio and Vertical radio. The two arrays of ratios define how the incoming signal is divided, individually for the X and Y axes, cloning the original image into multiple copies.

For example, setting the horizontal property to [1, 2, 3] will result in three horizontal copies of the source signal, arranged side by side, with the ratio of their relative sizes being 1 : 2 : 3.

***Visual Sample***




VisualSample p-Unit allows playback of video and still pictures. As such, it parallels the functionality of AudioSample and TextSample p-Units. To play a picture or a video, set the Name property of the p-Unit to point to a file on your disk (or online) that contains the video or the picture you'd like to manipulate. As a rule, any file format recognized by Apple Quicktime for Windows should be readable (i.e., .MOV, .AVI, .MPEG, .JPG, .PNG, .TIFF, etc).

The p-Unit's properties are:

- Start & Stop: define the limits (relative to the sample's length) within which the playback loops.

- Individually addressable prominence of red, blue, and green channels for the visual sample being displayed.

- Opacity: setting of 0 results in a completely transparent (invisible) image, 100 in a fully visible one.

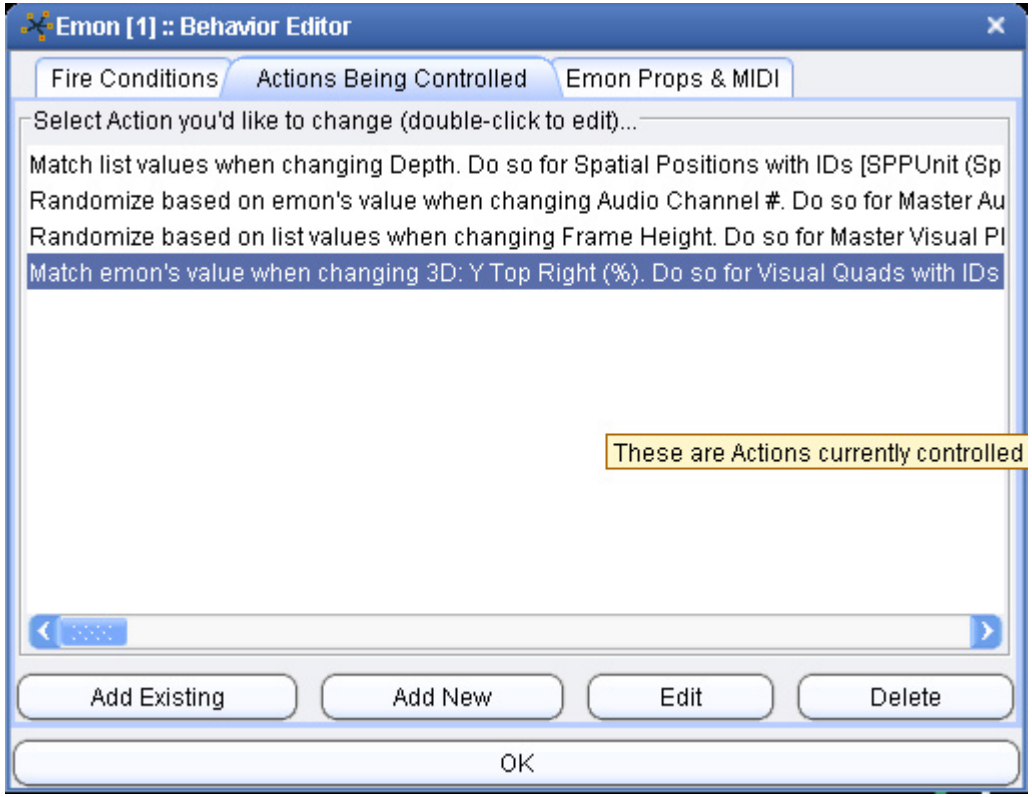
- Name: the name of the visual sample to manipulate.

- Speed: playback speed (forward or backward) at which a video plays. It can be defined on the range 0% to 500%, where 100% is the natural play speed.

- Live Capture should be clicked if image arrives from a live camera.

- Play Sample will allow you to run the sample file.

## IV. Possible Actions & Action Designer




Each emon can be configured using the Emon Behavior Editor, selected by right clicking over a emon. Aside from providing access to the Set Properties window and the Set Fire Conditions window, the middle tab is the *Actions Being Controlled* window (figure 4.1.). In this window you can define the action controlled by a emon. Each emon can have multiple actions associated with it. An Action affects one P-Unit property of one or more p-Units of a given p-Unit type.

As described in section 2, each time a emon is activated beyond a certain threshold it fires a stimulus at another emon. When it receives a stimulus, it performs an action.

***Figure 6. Emon Behavior Editor :: Actions Assignments menu***

### *The Action Designer*

The Action Designer connects the activity within the Structural network to the media processing activity of p-Units. You can configure this connection in real time, or set it in advance. In practice, actions are assigned to specific emons through the Action

Designer window. The Action Designer forms the mediation between the structural layer and the p-Units, making it potentially possible to replace either one with a different type of controller or media system, converting the EE into an improvisational hub.

### *Assigning an Action to an emon*

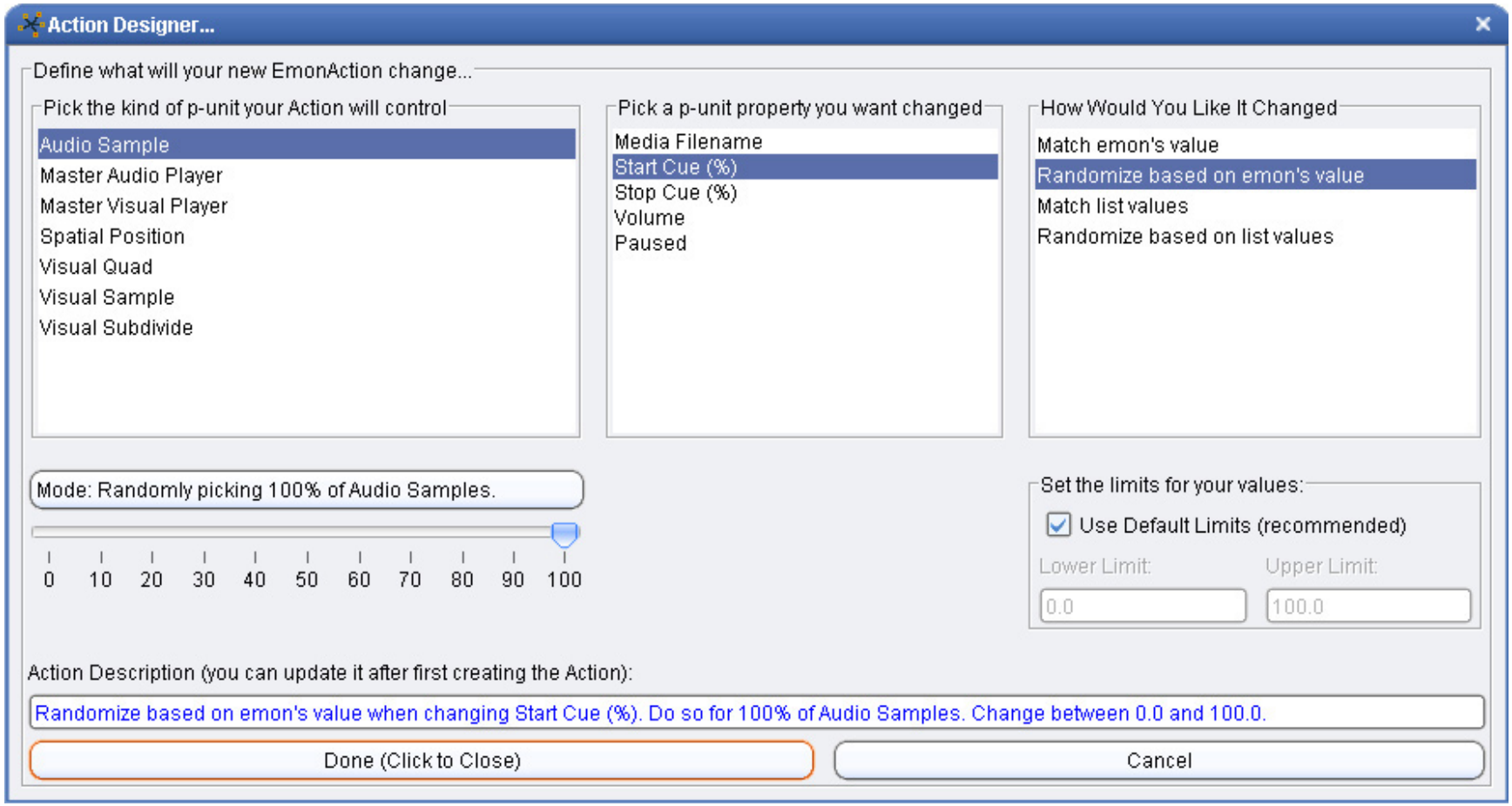



***Figure 7. The Action Designer.***

If you want an Emon to execute an Action, that Action needs to be created. It can be created in 3 different ways. Let's begin with the most elaborate, to understand what happens "under the hood", and then look at the shortcuts.

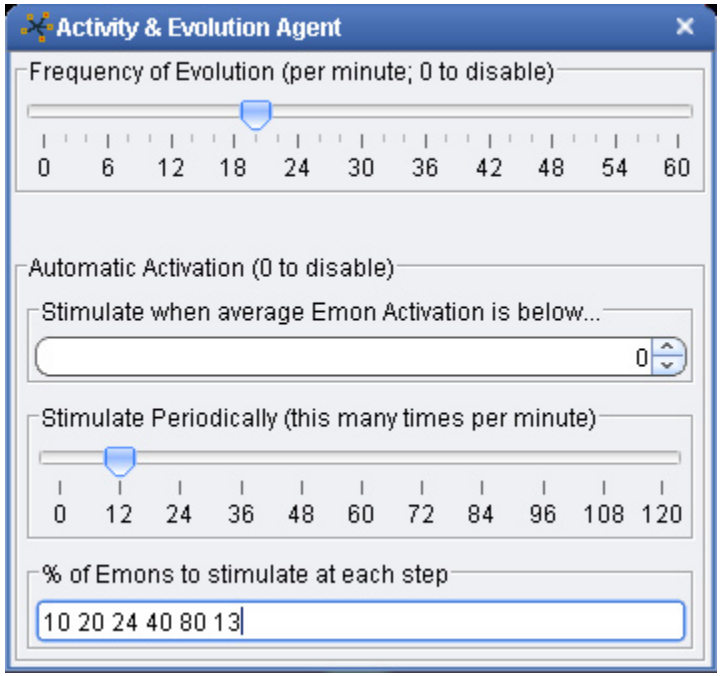
The full version requires that you use the Action Designer to do just what the name implies. You can assign actions in two ways. The first is by right clicking on the desired emon and selecting *Add/Edit Actions*. The Actions Being Controlled window will pop up (figure 4.1.), click the *Add New* button at the bottom of the window to access the Action Designer window (figure 4.2.). The second is by middle clicking over the desired emon and then middle clicking on an already existing p-Unit on which you would like the action to take effect.

The left column of the window displays a list of all p-Unit types. Choose the type which you would like the action to control. Once you chose an p-Unit to control, the middle column will be populated with all the properties this p-Unit type has, which is a similar list to the one described for each p-Unit in section III. Choose a property to be controlled.

The rightmost column will display a list of possible changes for this type of property. The full list of possibilities includes *Step through values in the list below, Randomize from all possible values, Decrease between boundaries, Increase between boundaries, Match emon value (%).* Please note that each property can be changed in one or more of the above ways, but not necessarily all. Select the way in which you would like the property to change and input the associated values in the appropriate box, if you are requested. Once selected, click *'Create the Desired Action'* and then, if satisfied, click that same button (now called *'Done'*) again.

If you chose the first method of assigning an action (as described above), the p-Units you selected in the leftmost column will appear on the screen and a dashed line will connect them with the emon which controls their properties. If you chose the second method, a dashed line will connect the p-Unit you chose to control with the emon you assigned to control it.

## V. Activity and Evolution Agent

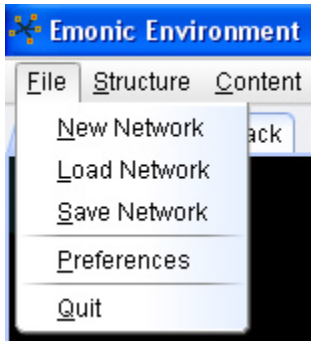



[insert a description of all the options here; insert a screenshot of MutationWindow]

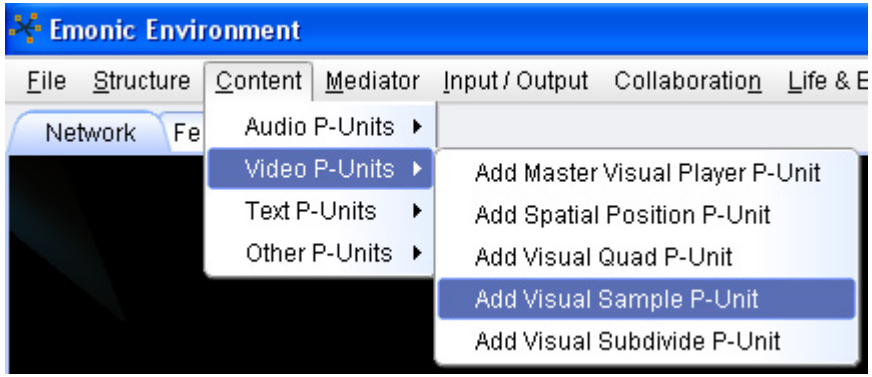
***Figure 8. Activity & Evolution Agent.***

## VI. Putting together a new session in the Emonic Environment

Let's build a little Emonic Environment session from scratch:




- Start the EE. From the File menu, pick *New Network*.




- Add new audio: click the *Content* menu, select *Audio P-Units* → *Add New Audio Sample P-Unit*.

You should now hear a sound and have three squares of different colors on your screen. Roll your mouse over the squares, and see how for each one of them different information is displayed in the bottom of the screen. The 3 squares are 3 different types of p-Units: an AudioSample p-Unit, a MasterBeat p-Unit, and a MasterAudioPlayer p-Unit:

- The AudioSample p-Unit defines what sound will be playing.
- The MasterBeat p-Unit provides the beat at which the AudioSample is playing.
- The MasterAudioPlayer defines through which of your speakers the AudioSample is playing.

Notice that the three squares have lines connecting them, each line going from full color to white. These lines are *p-Unit connections*, and the color defines the direction of the connection – the full color end is the FROM and the white end is the TO. Therefore, MasterBeat p-Unit is connected to AudioSample p-Unit which in turn is connected to the MasterAudioPlayer p-Unit.

Try destroying the connections by right-mouse-clicking on one of the connections and selecting "Delete". The sound should now stop. To make it go again, middle-mouse-click on the FROM p-Unit and then middle-mouse-click on the TO p-Unit. You should now have sound again. If you don't hear the sound, make sure you connected them in the right direction.

The beat you hear now repeats every second or so. Why? Because the MasterBeat p-Unit provides the beat to whoever is connected to it. A beat is like a command: “do whatever it is that you know how to do”. The AudioSample type of p-Unit knows how to play audio. Therefore, each time it receives a beat it plays the sound sample associated with it.

To substitute the sound file being played, select the AudioSample p-Unit and press Ctrl-X. To record a new one, press "r" together with the channel to record on (e.g., press "R" and while holding it, press "1". While they are pressed, your microphone is recording, when you let one of the keys go, the recording stops).

## VII. Shortcuts

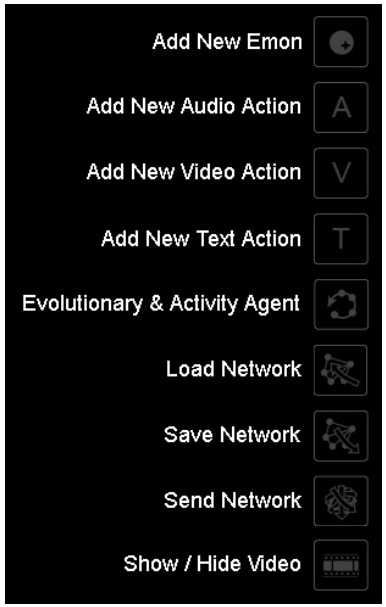



***Figure 9. Icons Panel***

Icons shown in fig. 9 allow access to a number of frequently used functions of the EE. Here is a brief listing:

[INSERT]

## VIII. Scenarios

Tip: If confused with anything below you can always start anew by loading a blank new network (Fig. 11) or loading a sample network that gives you a starting point (Fig. 12).

[INSERT SCREENSHOTS]

***Creating an endlessly repeating audio beat.***

- Create a new network.
- Add a new emon
- Add an action to the emon that controls playback of audio (choose the "Restart Audio" property in Action Designer)
- Click OK.

***Adding video, synchronized to the audio defined in scenario #1***

- Open up the emon properties window and click on the Actions tab.
- Add another Action to the list, this time one that controls playback of video (choose "Restart Video" in Action Designer)
- Click OK.

***Making video go in and out of sync with regards to the audio***

- Create the network in scenario #1.
- Add an additional emon
- Add Action to the 2nd emon of "Restart Video"
- Connect the two emons
- Move action

***Video pulsating, increasing and decreasing its size (Z-axis)***

- Add a new action to a new or existing emon, specifying Spatial Position p-Unit as the p-Unit target, and Far-close angle as the property to control.
- Set Match Emon Value as the type of change.

***Video becoming more transparent when further and less transparent when closer (adding 2nd synchronized Action)***

- Add 2nd Action to the emon defined in Scenario #4, with the Action defining Opacity of a Visual Sample P-Unit.

***Interaction between emons: increase-decrease size 4 times, then bring in a new image***

- [INSERT]

## IX. FAQ

***Are you attempting to replace Max/MSP, Reaktor, TV?***

No. We do however aim to provide you with something these interfaces seem to lack, namely, life (evolution) as expressed by the ever-going change of the source media and its structures.

***What does the Emonic Environment mean for file sharing?***

It means good. Essentially a side objective of this project is to render copyright meaningless in the context of active creation. The Emonic Environment uses no source media without modifying it in one way or another. Furthermore, each exchange of EE networks between users results in all of their media becoming available to all the other users of the same server. This way, from being unrelated pieces of media, your videos, images, and sounds become what we call Creative Media Sources™, with the EE facilitating the propagation of these around.

***When will the Emonic Environment be available?***

It is available for download now. New versions are released once in awhile. Future versions of the EE will have an automatic update feature that will alert you to the availability of a new version. In the meantime you can find out what version you have by clicking on the 'Help' menu and choosing the 'About' option.

### *How stable is the Emonic environment?*

Alpha versions available for download may or may not be stable. We have also produced stable* versions when necessary.

* stable defined as “run without crashing for a week straight”.

### *I'm an artist. Why should I be interested?*

For all the wrong reasons; if you are looking for a sequencer that is not it. The EE will allow you to create art, but practices of art mastery as defined in the European tradition are meaningless here. The idea, put simply, is that you are NOT in control. Instead, you are playing (or some would say 'creatively fighting') with the machine, exposing new combinations of media, looking at the resulting structures, interrelationships of structural and media properties, and trying to make sense out of it, only to be again led into the endless change of what you've just created. It is fun, and it certainly changed our view of what artist's role will be in the years to come.

### *I'm a music fan. Why should I be interested?*

You probably know everything about programs like ACID, Ableton Live, FruityLoops, Max/MSP, Reaktor for audio, Jitter and NATO for video, and many others. They are all excellent programs and allow you to do lots of interesting audiovisual manipulations. These programs, however, don't offer you a way to get beyond the media that you currently have (e.g. they don't go on the net and find some new media for you).

Furthermore, once you used one of these programs to create a piece, that piece is fixed. What's bad with a fixed piece? It's great if your objective is producing a CD record; if however you want to create something that is alive, changing every time you run the program, something that will lead you to explore new combinations of media, solo or in a joint venture with other users, you won't get much help from these programs. This is where the Emonic Environment comes in.

### *I'm a developer. Why should I be interested?*

If you have a program that performs audio or video manipulation you can interface it with the Emonic Environment (using OSC or TCP/IP). Why would you want to do so? Simple – by hooking our systems together you will be able to bring evolutionary change, multi-user control, and many other new features into your program and we will be able to give our users an ability to perform new exciting types of audiovisual manipulation provided by your program.

### *I run a music label. Why should I be interested?*

Running the Emonic Environment is a new way to give the much needed exposure to the artists you represent. By engaging with the materials initially created by your artists, people become used to see you as their media provider. Your role is thus more essential than ever, for you are no longer a middleman but a creative filter associated in public's mind as active source of new media that they can play with.

We are currently working on a distribution model that you might find quite different from what you've seen before but beneficial to you and the artists. Contact us for more details.

### *I run an mp3 site. Why should I be interested?*

Up to now people were able to download songs from you. How about giving them more? By running the Emonic Environment server (available in both built-in and standalone versions) you will be able to give your visitors ability to do something with all these songs other than just listen.

### *I'm a couch potato, I love my TV. Leave me alone.*

OK. Do you own a cell phone? If yes, you might be interested in checking out our upcoming project, Cellular Emonic Tone, which allows multiple participants to control and contribute media through their cell phones.

### *Why should I trust you that the EE is clean from viruses?*

The Emonic Environment is developed by the Media Fabrics Group (ex-Interactive Cinema) at the MIT Media Lab. We take your privacy seriously and do not perform any non-advertised operations on your computer or within your computer network.

### *I want to contribute to the EE development. How can I?*

If you have skills (primarily coding or design), or can think of some other way to help us, we would very much appreciate your help. Contact us – emoninfo@media.mit.edu

It might be of interest to you that we are designing an API that will allow people to write their own processing units for the EE.

### *Can I get the source code?*

Not yet. It is fairly well structured but not sufficiently well documented to make it public. We are however considering to make it open-source at some point.

### *I'd like to use the EE in a public setting. Can I?*

Generally yes, but there are a few things that should be negotiated first. Please contact us at emoninfo@media.mit.edu

### *I'd like to use the EE in a for-profit context. Can I?*

Please contact us at emoninfo@media.mit.edu

### *Where can I learn more about the EE, apart from this manual?*

- For a higher-level academic view of the Emonic Environment and its general theoretical framework, please see the publications related to it. These can be found at http://www.media.mit.edu/~pauln/research/publications.html
- If you are interested to learn more about how to use the EE, or would like to report your experiences (or discuss them with other users), please use the EmoniForum http://cgi.media.mit.edu/emonic/eforum
- If you are interested in a broader take on what we're up to, please see the EmoniBlog http://cgi.media.mit.edu/emonic/eblog