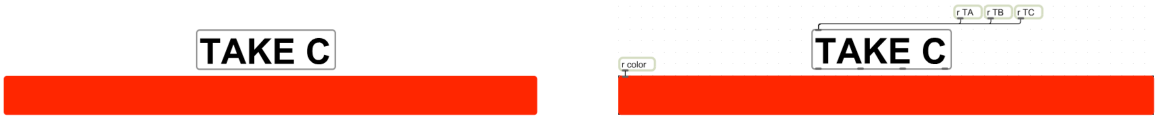
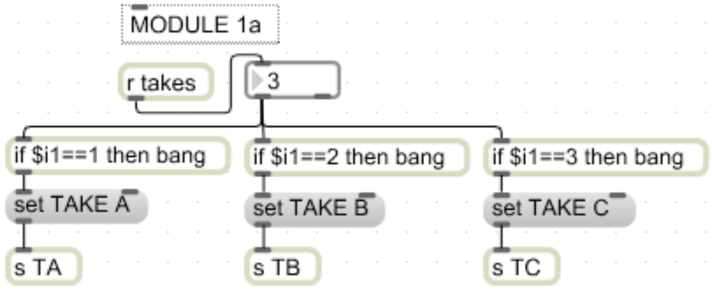
025:251 COMPOSITION: ELECTRONIC MEDIA II
Spring 2010
Live recording and playback in Max/MSP

1. This patch is automates the recording of a live performer, with a display provide visual cues. A display at the top of screen tells the performer which recording take is in the pre-take stage, count-in stage, and recording stage. The timing of each stage is controlled by the patch. The display looks like the example below:



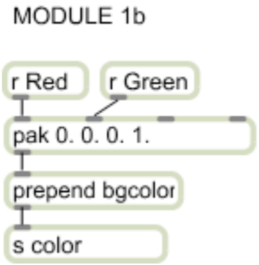
   a. The example on the left is shown how it appears when the patcher is locked.
   b. The example on the right is shown how it appears when the patcher is unlocked.
   c. As shown in these examples, objects and lines can be hidden when locked by the selecting the menu item Object>Hide on Lock. Hidden items can be made visible under Object>Show on lock.
   d. The words "TAKE C" and others are sent to the display via an "r TC" message box.

2. Module 1a controls the display of the words, "TAKE A", "TAKE B", "TAKE C", as shown below:



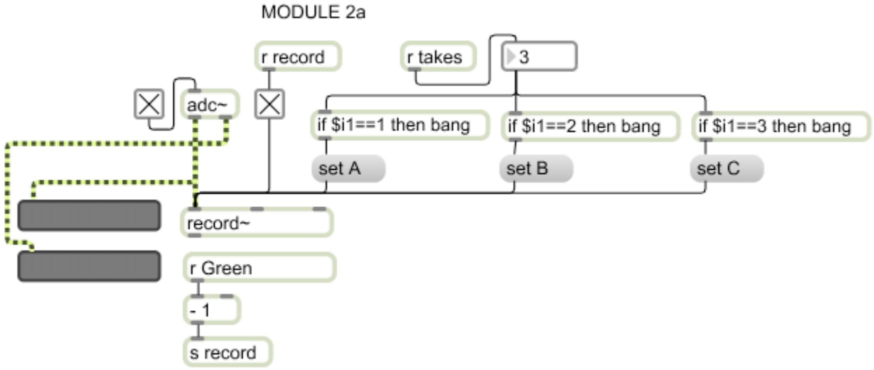
   a. A stream of numbers 1, 2, 3 received from the "r takes" receive object is sent to a number box, which is patched to 3 "if..." message boxes. These are patched into 3 "set TAKE A", "set TAKE B", and "set TAKE 3" message boxes. The word *set* will be discussed in class.
   b. When the number 1 is received by the "r takes" message box, a bang is sent to "set TAKE A". This sends the words "TAKE A" to the display above via the "s TA" send object.
   c. The words "TAKE B" and "TAKE C" are similarly sent to the display via the corresponding send objects.
   d. These words indicate to the performer which take is in the process of being recorded.

3. The colored rectangle in the display is set via the "r color" receive object. The color is determined by Module 1b, shown below:



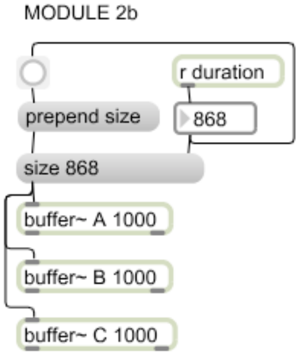
   a. Numbers 0 and 1 are sent to the "r Red" and "r Green" receive objects. These numbers are sent from the pak object below. This object is patched into a prepend message box that adds the phrase "bgcolor" to the color message, which is in turn patched to an "s color" send object. This message is received by the "r color" object in the display.
   b. These actions cause the display rectangle to change color from green, to yellow, to red.
   c. When the rectangle is green, the performer is free to play without being recorded.
   d. When the rectangle is yellow, the performer is signaled that the recording is about to begin.
   e. When the rectangle is red, the performer is told that the microphone signal is being recorded.

4. Module 2a records the live mic, as shown in the example below:



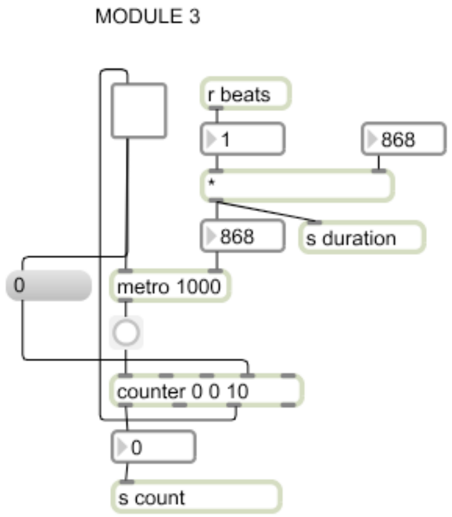
   a. The mic enters the module via the adc object, which is patched to level meters from the left and right outlets.
   b. Before recording can begin, a buffer A, B, or C must be specified. This is done via the "r takes" receive object which ultimately sends a bang to the message boxes "set A", "set B", or "set C". This is done in a manner similar to that shown in item 2a, above. Note that this meaning of set is different than that of item 2a, above.
   c. The record is triggered by several steps. First, the numbers 0 and 1 are received from the "r Green" receive object. Since these numbers were used to specify the color of the rectangle in the display above, these need to be reversed, which is accomplished by the "- 1" object. The numbers 1 are sent to the checkbox above via the "r record" receive object. The number 1 checks the box and the number 0 unchecks the box. This box is patched into the record~ object to start and stop recording.

5. Module 2b sets the size of buffer~ A, B, and C, as shown below.



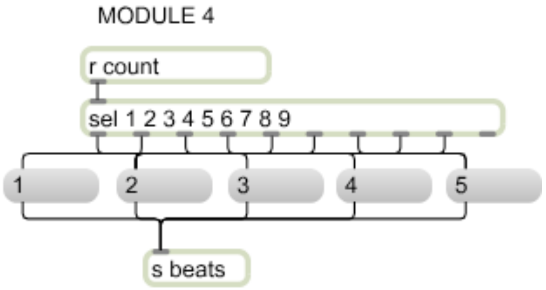
   a. The duration, in milleseconds, is received from the "r duration" receive object.
   b. This object is patched into a number box which sends the duration to the right inlet of the message box below.
   c. This number box also sends a bang to a "prepend size" message box. This action literally prepends the word "size" to the left inlet of the message box below. This creates a message box with the words like "size 868".

6. Module 3, shown below, starts the metro and counter that controls the timing of the actions above.



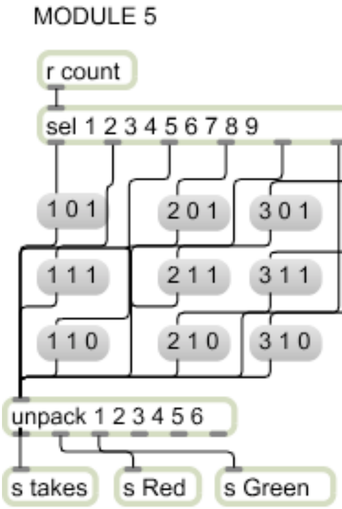
   a. The checkbox starts the metro object, whose speed is determing by the number box in its right inlet. This number is the product of a number box on the right and a number box on the left. The left number box receives a stream of numbers via the "r beats" receive object. This number is sent to the metro object's right inlet, determining its speed, as well as an "s duration" send object, which is sent to the "r duration" in Module 2b, described in item 5a, above. The right number box is by the user to control tempo.
   b. The metro object sends bangs to the counter below. This counter has 10 steps. The last step turns off the metro checkbox via the 3rd outlet of the counter.
   c. When the checkbox is unchecked, it sends a number 0 message box to the 4th inlet of the counter. This causes the counter to be reset to 0.
   d. In summary, every time the metro checkbox is checked, the counter sends out 9 bangs, each with unique durations. The source of this uniqueness is discussed next in item 7, below.

7. Module 4, shown below, is used to control the number of beats of the bangs sent by the metro object above.



   a. The "r count" receive object receives a string of numbers 1-9 from the counter in Module 3.
   b. This number is sent to a select object with 9 outlets. These outlets are arbitrarily (or artistically) patched by the user to the message boxes 1-5 below. Note that some message boxes may be patched from more than one sel outlet.
   c. These messages boxes numbered 1-5 are patched to an "s beats" send object and are received by the "r beats" object in Module 3, described in item 6a above.

8. In Module 5, shown below, network of values determines what the display shows.



   a. An "r count" receive object is patched to a sel object with 9 outlets.
   b. A succession of bangs 1-9 are sent to the "1 0 1"-type message boxes below.
   c. Each message box is a 3-element list, which is sorted by the unpack object below. The first element is sent to the "s takes" send object, the second element is sent to the "s Red" send object, and the third element is sent to the "s Green" object below. Numbers from these send objects are received by Modules 1a, 1b, and 2a, discussed above.

9. This patcher can be modified in the ways shown below:
   a. A laptop can have two screens, one for the technician and one for the performer. The display module in this patcher can be modified so that it appears at the top of a screen with a score underneath.
   b. Additional takes may be added.
   c. A pitch-tracking object like pitch~ can be used to advance from one take to the next, giving the performing more control over time.