Comparison between the old MonkeyLogic and NIMH MonkeyLogic

Old MonkeyLogic (Oct 2014 version)

● The old MonkeyLogic (ML) depends on the legacy interface of MATLAB Data Acquisition (DAQ) Toolbox.

→ MATLAB DAQ Toolbox does not read out new data samples as frequently as necessary for near-realtime behavior monitoring. To work around this problem, the old ML requires two DAQ devices.

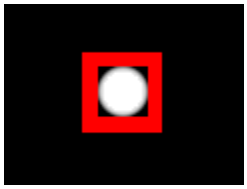
→ The legacy DAQ interface is available only in the 32-bit MATLAB and therefore the old ML cannot run on the 64-bit version. This has been a major obstacle to running ML in the up-to-date computing environment, because the latest MATLAB (R2016a or later) does not provide the 32-bit version any more.

● Graphics in the old ML are based on XGL Graphics Library, which was written for Window XP ten years ago. (http://svi.cps.utexas.edu/software.shtml)

→ XGL supports only one monitor, so the objects are presented normally on the subject screen but drawn in diagrammatic form on the control screen.

Subject screen **Control screen**

→ Transparent graphics are not supported in the old ML. As shown in the example below, the unpainted background of the white fixation point occludes the red square in the back.



NIMH MonkeyLogic (Feb 17, 2017)

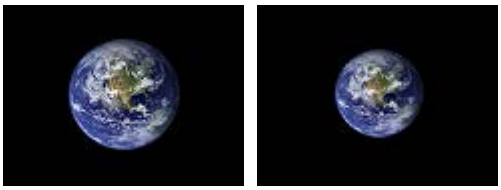
● NIMH ML uses an in-house developed DAQ Toolbox (NIMH DAQ Toolbox) that is compatible with MATLAB's toolbox and supports both 32-bit and 64-bit versions.

→ NIMH DAQ Toolbox fetches new samples whenever requested, so there is no need of additional DAQ hardware. This allows users to save the cost for MATLAB DAQ Toolbox ($997 as of Mar 2015) and the duplicate DAQ device (>$1,000 in a typical NIMH setup).

→ NIMH DAQ Toolbox enables not only NIMH ML but also the old ML to run on the 64-bit MATLAB, which ensures the availability of ML on the latest computing environment and hence continuity of research.

● NIMH ML uses a new graphics library, MonkeyLogic Graphics Library (MGL), which is written for ML with 3D APIs.

→ MGL displays the same scene on both subject screen and control screen ("what you see is what your monkey sees").



Subject screen **Control screen**

→ In NIMH ML, the red square is not occluded by the unpainted part of the white circle. MGL supports transparent images by both alpha blending (PNG format) and color keying.

→ To play movie stimuli, the old ML requires loading all the frames into memory beforehand, which practically limits the playable length of movies to a few tens of seconds.	→ MGL supports movie streaming. There is no limit in the movie length that NIMH ML can play.
● The old ML does not support hardware acceleration in audio, so the latency in sound output is relatively longer (typically a few hundred milliseconds, but it varies depending on the system performance).	● NIMH ML supports low-latency audio output (as short at 25 msec in private tests), using Microsoft XAudio2 APIs.
● Touchscreen is not supported in the old ML.	● NIMH ML supports mouse/touchscreen input as well as USB-type joysticks. (Some touchscreens that do not translate touches into mouse messages are not compatible.)
● The old ML requires MATLAB Image Processing Toolbox ($997/copy as of Mar 2015) to run its eye calibration tool.	● NIMH ML provides a new calibration method that does not require Image Processing Toolbox.
● The old ML needs two monitors and DAQ hardware even when running in the simulation mode for testing.	● NIMH ML can be run with just one monitor and it does not require a DAQ device in the simulation mode. There is no need to go to the lab just to test new tasks.
● The old ML supports only one single line of output for reward triggering. This limits the type of reward devices that we can use.	● NIMH ML allows users to assign multiple digital lines for reward and easily customize the reward function so that multi-channel reward devices can be used.