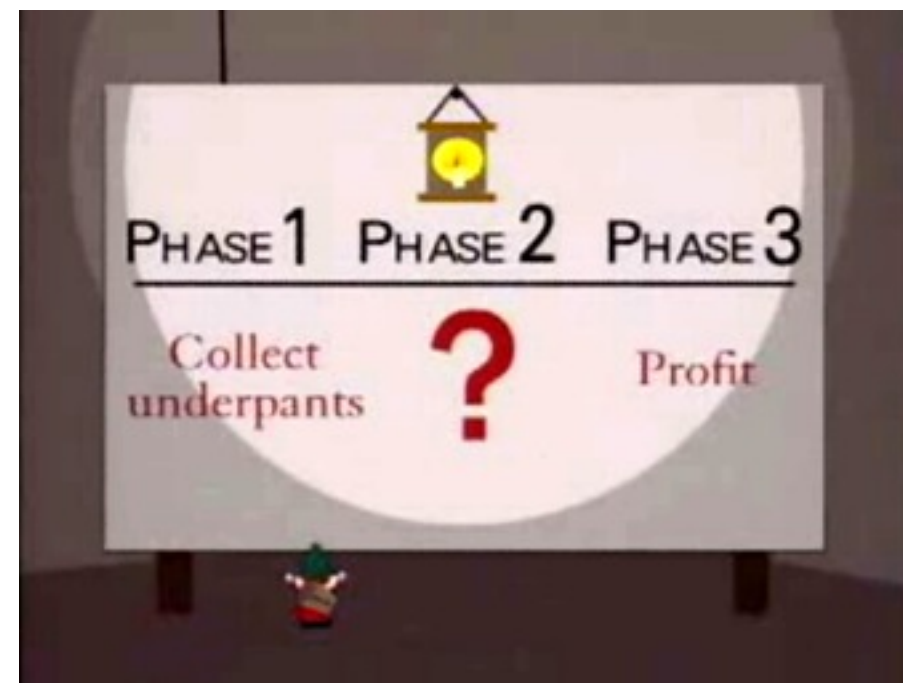


WELCOME TO THE NITP Psychtoolbox Tutorial 2013!



What is PTB?

collection of scripts in Matlab that allow for
precise control of stimulus presentation – and
collection of inputs

what you're going to use to code your experiments

Why? FLEXIBILITY

1. free
2. cross platform
3. easy to integrate devices
4. great control & precision available
5. extremely customizable
6. Matlab based (big community)
7. fast/portable

Demos

images, sounds, responses
full experiment

Next ~30 min

if you're Matlab competent
explore the demos:

driftDemoX.m (series)
SadowskiDemo.m
BasicSoundOutputDemo.m
DrawDots.m

KbDemo.m
SpriteDemo.m
SimpleVoiceTriggerDemo.m
BasicSoundInputDemo.m

ErrorCatchDemo.m

“help psychdemos”

Next ~30 min

if you have no idea
what's going on:

1. Launch Matlab
2. Orient yourself (with some help) to the Step1 (Matlab) directory
3. Open README.doc
4. Follow instructions.

if you finish go on to the demos

Go!



When Things Go Awry...

- Command C
- Control 0
- SCA

TIMING & External Devices

some of the most powerful features of PTB (code based software for experimental design)

- Using precise control of drawing images to screen
- Using fast rather than slow commands (PutImage vs. MakeTexture)
- Capturing Time Stamps
- Synchronizing Devices (TTL & NTP)

Do Milliseconds Really Matter?

- Short Answer YES
 - Averaging of ERP's in EEG can be ruined by inexact timing
 - “Jittery” displays are uncomfortable to watch.
 - Possibly introduce extra activations with discontinuous stimulus

Flip Command

```
[VBLTimestamp StimulusOnsetTime FlipTimestamp Missed Beampos] =  
Screen('Flip', windowPtr [, when] [, dontclear] [, dontsync] [, multiflip]);
```

<http://docs.psychtoolbox.org/Flip>

VBLTimestamp: when the actual flip has happened

StimulusOnsetTime: Estimate of the time the stimulus was presented

FlipTimestamp: timestamp taken at the end of Flip's execution

Missed: Did the flip miss the intended frame

Beampos: position of the monitor scanning beam when the time measurement was taken

windowPtr: Which screen to flip

when: When to execute

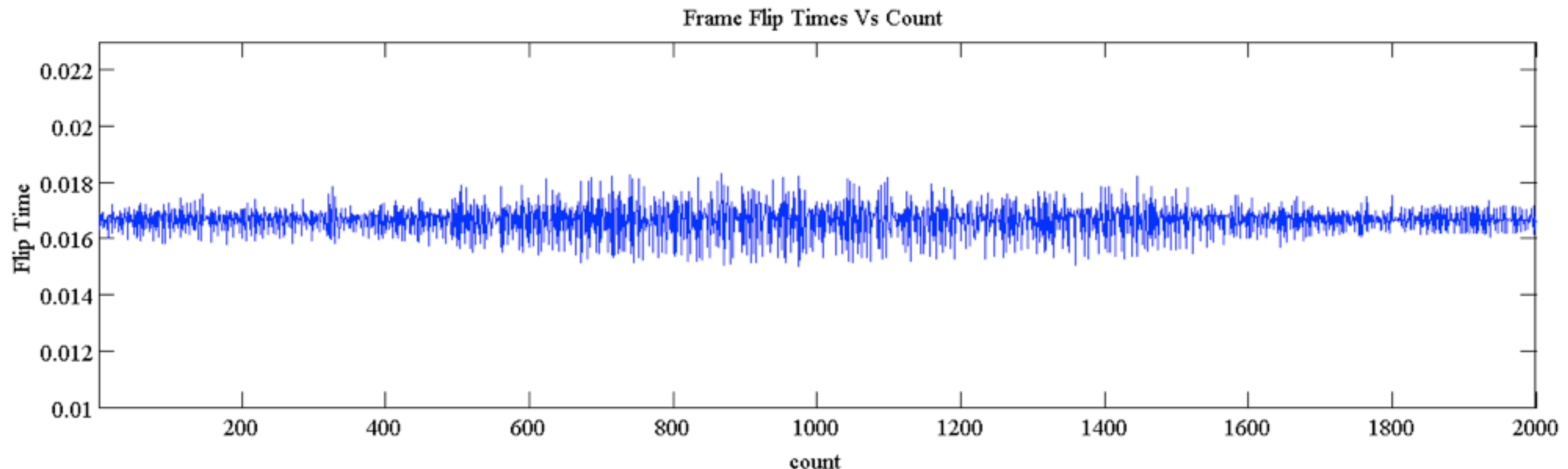
dontclear: what to do with the things in the frame buffer

dontsync: do not synchronize the flip to the vertical retrace

multiflip: if multiple screens are connected should they be flipped simultaneously

Images Vs Textures

- Draw Image Renders the Display CPU and then Passes to the GPU (Very Slow, DON'T USE if you care about timing)
- Make Texture Preloads/Renders the Display on the GPU (Fast, USE this Method, see Drift Demo through DriftDemo6)



Synchronization Amongst Devices

- TTL – Transistor – Transistor Logic
 - A Digital (e.g. 5V pulse is sent out from the master device and recorded in all of the separate recording devices)
 - Mac users don't fret, there is a easy and cheap way to do this using a Mac: http://ccn.ucla.edu/wiki/index.php/A_Simple_Serial_Based_TTL_Device
- NTP – Network Time Protocol
 - Clocks of all recording devices are synced before the start of the recording and then “events” are passed by sending clock times over a network connection. Assumes the clocks of all recording devices are locked to one another for the duration of the recording

Next ~60 min

if you're the pro:

1. Navigate to /Step3 Experiments/
2. Open README.doc
3. Run each of the sample experiments.
4. Explore the code to see how drawing and response collection is achieved.
5. Add code to test if the timing is optimal. Can you improve it?

Next ~60 min

if you either just finished Step 1 or need a little more guidance:

1. Orient yourself to /Step2 PTB Basics/
2. Open README.doc
3. Follow instructions.

THIS DOCUMENT INTRODUCES CORE FUNCTIONS OF PTB in a more GUIDED WAY than self exploration

Go!

Closing Notes

- * Step 2 – use as reference, saving etc
 - * TroubleshootingTiming.pdf

* Your Experiment:

- code using your own style or one of the experiment templates
 - do not worry about interfacing with scanner/peripherals
 - you have 4 buttons (1,2,3,4)
 - make sure it works on your computer
 - make sure you're saving all of the data you need
 - once ready work with me, Cameron, Edward