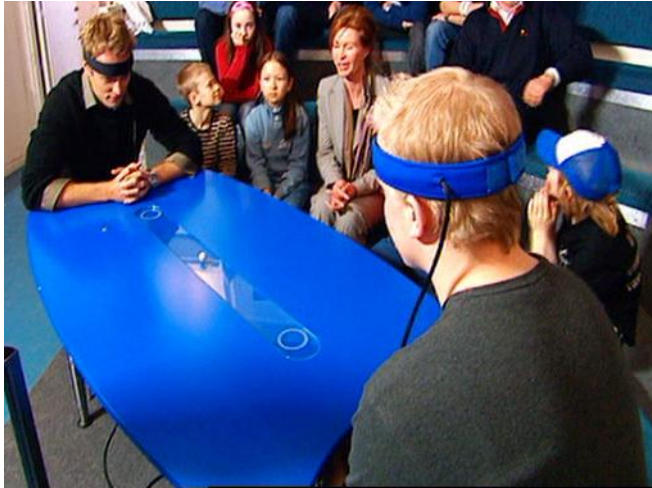# Q&A Session

Existing BCI games

Mindball

MindFlex

Existing BCI Games

Neuroboy

Judecca

Difficult-to-adjust Mindset
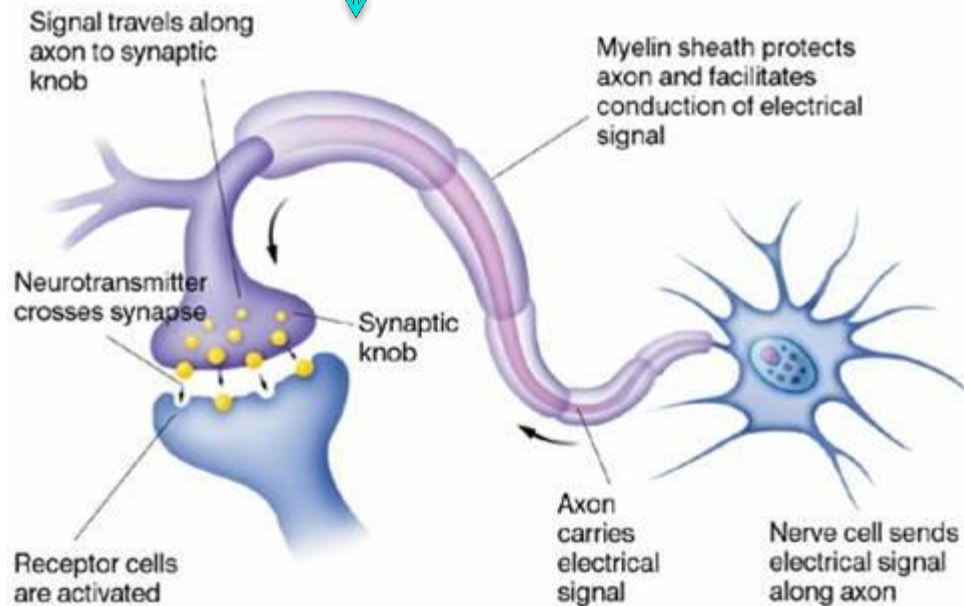
Difficult-to-adjust Mindset

5. Conclusions and future work

The usability and reliability of MB readings to assess attention levels and to amalgamate with user-generated data was evaluated in an assessment exercise in Second Life, N=34. The results regarding usability suggest some users had problems wearing the device due to head sizes or hair interference and that the device's signals to indicate flat batteries are poor. Furthermore, 35% thought the device was neither comfortable not uncomfortable, 37.5% thought it was neither easy nor difficult to wear and 47.5% said they had a satisfactory experience with the device. More

Assessing NeuroSky's Usability to Detect Attention Levels in an Assessment Exercise
http://www.springerlink.com/content/c471m5083xp905g6/fulltext.pdf

Brain... waves?

Brain wave sensor
(detects **induced** micro-current)

Signal travels along axon to synaptic knob

Myelin sheath protects axon and facilitates conduction of electrical signal

Neurotransmitter crosses synapse

Synaptic knob

Receptor cells are activated

Axon carries electrical signal

Nerve cell sends electrical signal along axon

Writing UnrealScript

Getting Stuck in UDK

More Passive Control

Binary Space Partitioning (BSP)

3D & Top Views

Hyperplane

http://maven.smith.edu/~mcharley/bsp/createbsptree.html
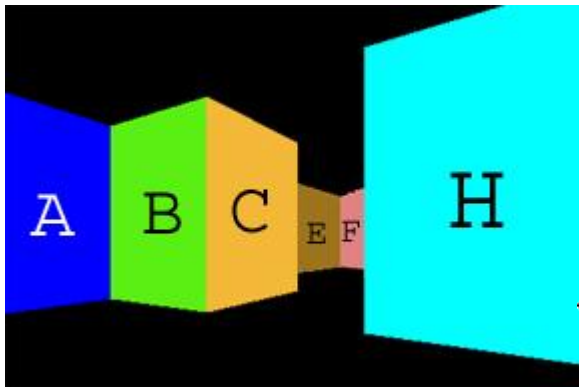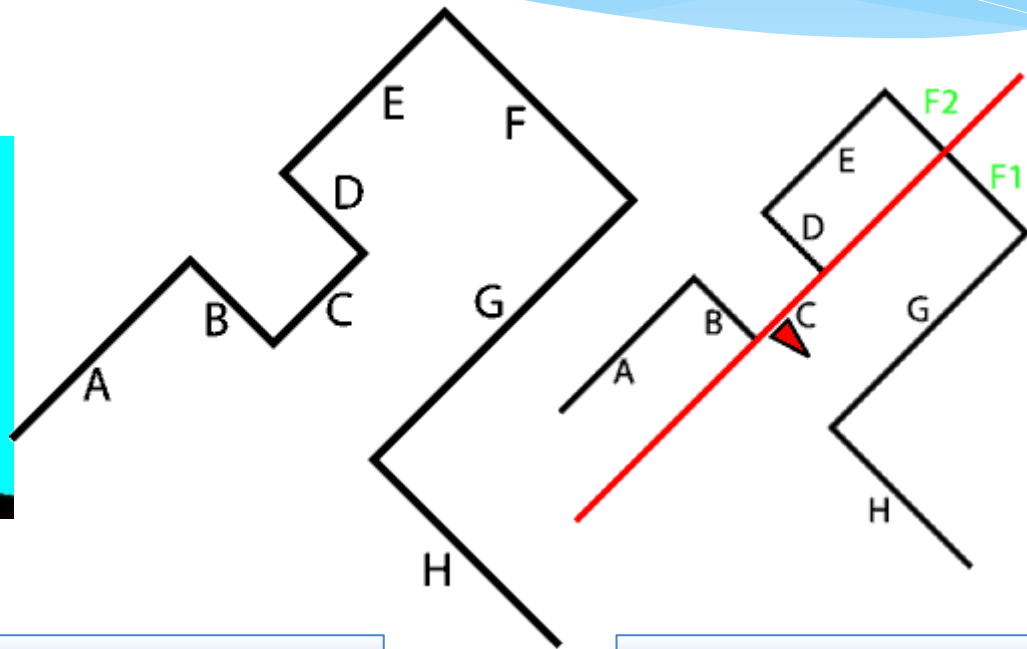
Binary Space Partitioning (BSP)
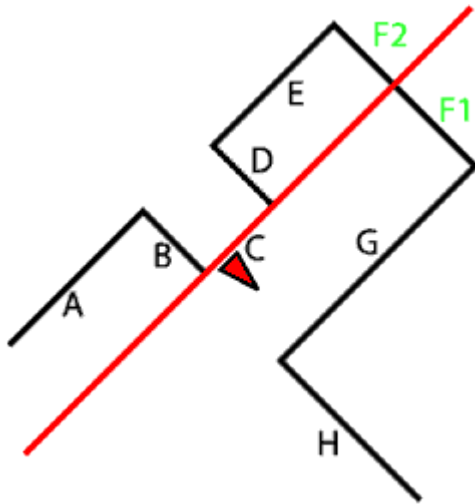
1 Pass
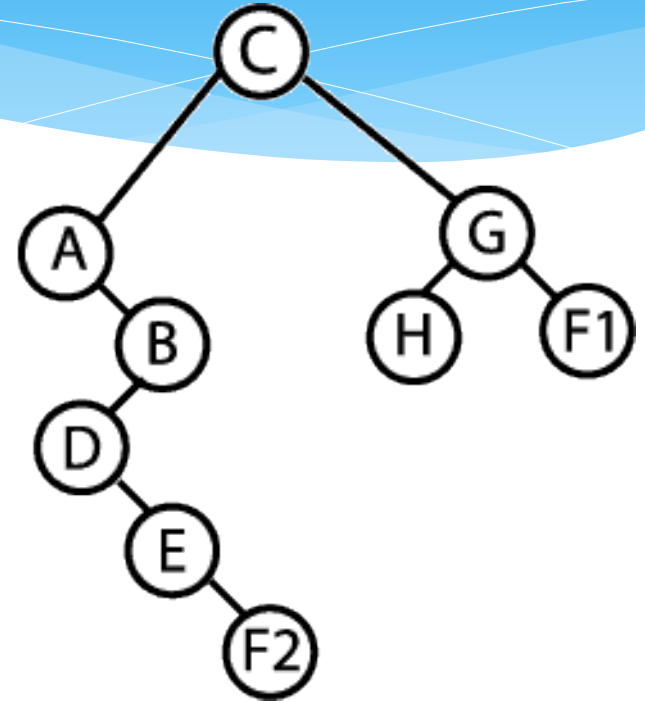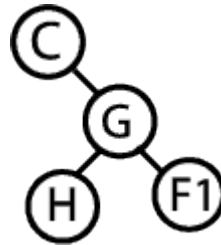
Completed

Data Flow of Mindset
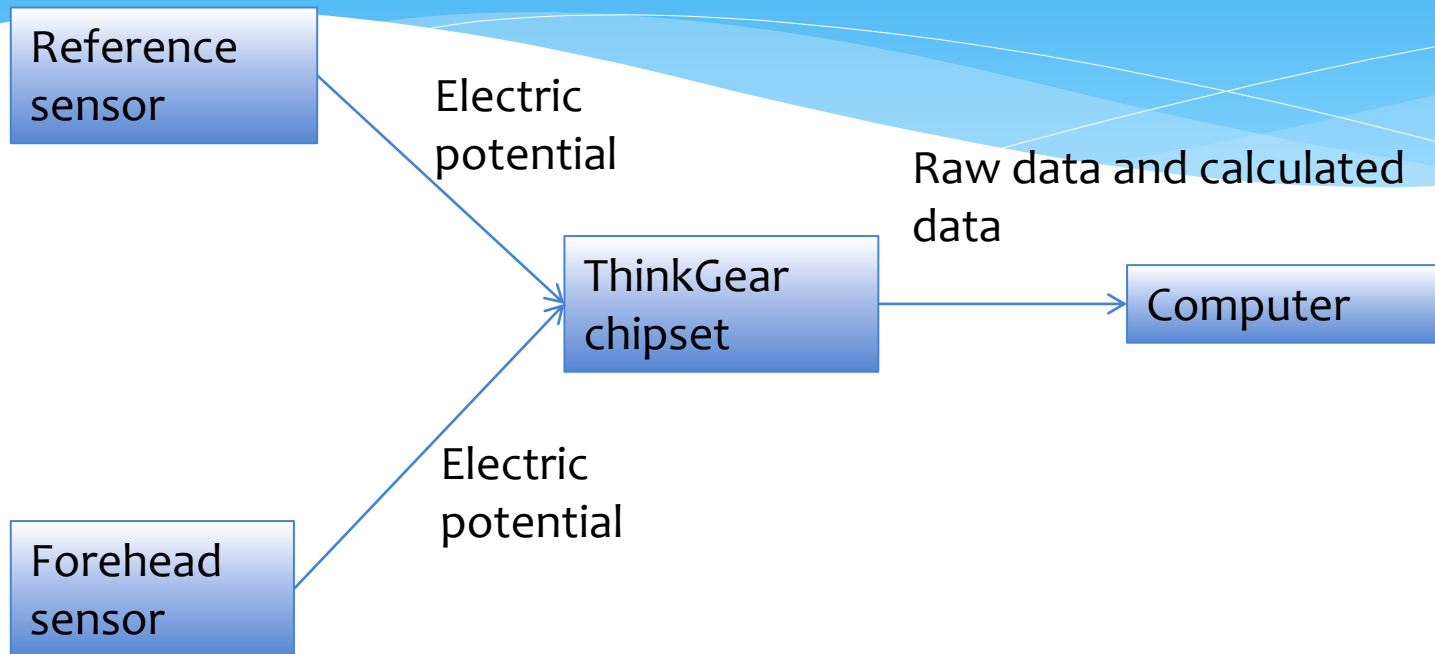
Figure 3.1.3-2 Data flow of Mindset

Relevant Brainwaves

Brainwave Type	Frequency range	Mental states and conditions
Delta	0.1Hz to 3Hz	Deep, dreamless sleep, non-REM sleep, unconscious
Theta	4Hz to 7Hz	Intuitive, creative, recall, fantasy, imaginary, dream
Alpha	8Hz to 12Hz	Relaxed, but not drowsy, tranquil, conscious
Low Beta	12Hz to 15Hz	Formerly SMR, relaxed yet focused, integrated
Midrange Beta	16Hz to 20Hz	thinking, aware of self & surroundings
High Beta	21Hz to 30Hz	Alertness, agitation

Relaxed Participants

Name	Overall Attention	Clip1	Overall Meditation	Clip1
antonio	61.6513	39.7857	55.7599	39.5179
Ben	46.6544	66.5	54.7819	44.9286
Boris	54.6327	51.7551	59.619	55.2857
EddyLau	27.5927	38.2931	36.5236	19.5862
KK	43.3062	39.7759	51.6547	59.2414
otacon	54.9112	59.8596	47.8726	39.5439
ray	61.8203	47.8214	43.098	29.1071
WaiMo	26.7741	45.4909	46.1628	47.7818
yiunganyuk	49.3415	17.587	66.0557	47.413
yuen	50.2704	38.3448	63.8665	63.6724
yuen520	49.7545	35.2593	60.1661	68.2407
Average	47.88266	43.67935	53.2328	46.75625
Part 1 Average - Overall average				
Attention	Meditation			
-4.20332	-6.47655			

Questionnaire Result

For Clip#1 (the string orchestra), which of the followings best describes your general emotion?	For Clip#1 (the string orchestra), a strike of loud sound was played, which of the followings best describes your emotion at that moment?	Which of the followings best describes your emotion AFTER that?	For Clip#2 (the Pope's speech), which of the followings best describes your general emotion?	For Clip#2 (the Pope's speech), which of the followings best describes your general emotion for the first half of the clip?	Which of the followings best describes your general emotion for the remaining part of the clip?	For the first test of Clip#3 (the Bikini), which of the followings best describes your emotion BEFORE you got the answer?
Relaxed	Excited	Normal	Concentrated	Concentrated	Bored	anxious
Bored	Bored	Bored	Bored	Bored	Bored	Bored
Relaxed	Excited	Concentrated	Bored	Bored	Bored	Concentrated
Relaxed	Relaxed	Bored	Bored	Bored	Bored	Concentrated
Relaxed	Excited	Bored	Bored	Concentrated	Excited	Bored
Relaxed	Excited	Excited	Bored	Bored	Bored	Excited
Relaxed	Fear	Excited	Bored	Bored	Bored	Bored
Excited	Excited	Excited	Bored	Bored	Bored	Concentrated
Relaxed	shocked	Normal	Bored	Bored	Bored	Normal
Bored	Surprised	Relaxed	Bored	Bored	Bored	Bored
Fear	Excited	Fear	Bored	Fear	Fear	Bored
Relaxed	Excited	Relaxed	Bored	Bored	Concentrated	Concentrated
Relaxed	Fear	Concentrated	Bored	Bored	Bored	have not reading the question
Bored	Bored	Bored	Concentrated	Concentrated	Relaxed	Bored
Relaxed	Excited	Relaxed	Bored	Bored	Bored	Relaxed
Relaxed	Excited	Concentrated	Relaxed	Relaxed	Fear	Excited
Bored	Excited	Concentrated	Bored	Bored	Bored	Concentrated
Bored	Concentrated	Concentrated	Bored	Bored	Concentrated	Concentrated
Bored	Bored	Bored	Bored	Bored	Bored	Concentrated

Questionnaire Result

Which of the followings best describes your emotion AFTER you got the answer?	On which attempt did you got the answer?	For the second test of Clip#3 (the Bikini), which of the followings best describes your emotion BEFORE you got the answer?	Which of the followings best describes your emotion AFTER you got the answer?	On which attempt did you get the answer?	For Clip#4 (Spot the ghost), which of the followings best describes your general emotion BEFORE the ghost popped out?
Excited	Had to read the answer	anxious	Excited	Had to read the answer	Concentrated
Bored	First attempt	Bored	Bored	First attempt	Bored
Concentrated	Had to read the answer	Concentrated	Concentrated	Had to read the answer	Concentrated
Relaxed	Had to read the answer	Concentrated	Concentrated	Had to read the answer	Concentrated
Concentrated	Had to read the answer	Concentrated	Concentrated	Had to read the answer	Concentrated
Excited	Had to read the answer	Concentrated	Relaxed	Had to read the answer	Bored
Bored	Had to read the answer	Bored	Bored	Had to read the answer	Concentrated
Concentrated	Had to read the answer	Concentrated	Concentrated	Had to read the answer	Fear
Normal	Had to read the answer	Normal	Normal	Had to read the answer	Normal
Bored	Third attempt	Bored	Relaxed	Third attempt	Fear
Bored	Had to read the answer	Fear	Concentrated	Had to read the answer	Fear
Relaxed	Had to read the answer	Concentrated	Relaxed	Had to read the answer	Concentrated
have not reading the question	Had to read the answer	have not reading the question	have not reading the question	Had to read the answer	Concentrated
Concentrated	Had to read the answer	Concentrated	Concentrated	Had to read the answer	alerted
Concentrated	Had to read the answer	Relaxed	Suprised	Had to read the answer	Concentrated
Concentrated	Had to read the answer	Concentrated	Excited	Had to read the answer	Concentrated
Relaxed	Had to read the answer	Concentrated	Relaxed	Had to read the answer	Concentrated
Relaxed	Had to read the answer	Concentrated	Relaxed	Had to read the answer	Fear
Excited	Had to read the answer	Concentrated	Excited	Had to read the answer	Concentrated