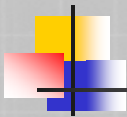




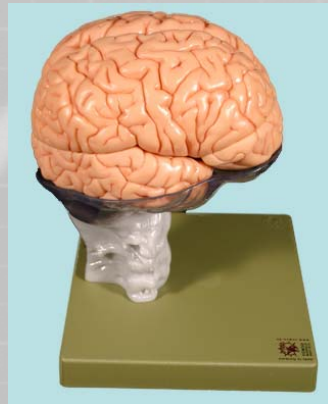
# Physiology Showcase

Patricia M. Finkenstadt  
Phoenix College  
Department of Biology  
January 5, 2007



## What are we doing now?

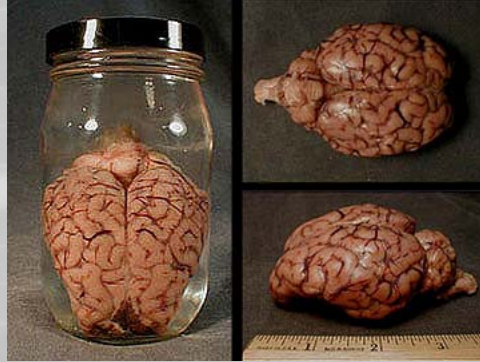
- Anatomy
  - Models





## What are we doing now?

- Anatomy
  - Models
  - Preserved specimens



<http://www.customcreaturetaxidermy.com>



## What are we doing now?

- Anatomy
  - Models
  - Preserved specimens
  - Prosected cadavers

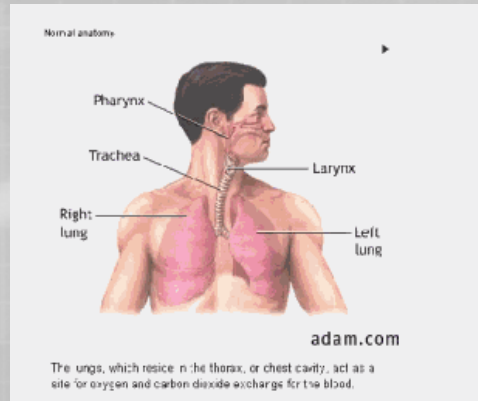


Anatomy and Physiology Revealed, McGraw Hill

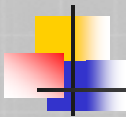


## What are we doing now?

- Anatomy
  - Models
  - Preserved specimens
  - Prosected cadavers
  - ADAM slide shows

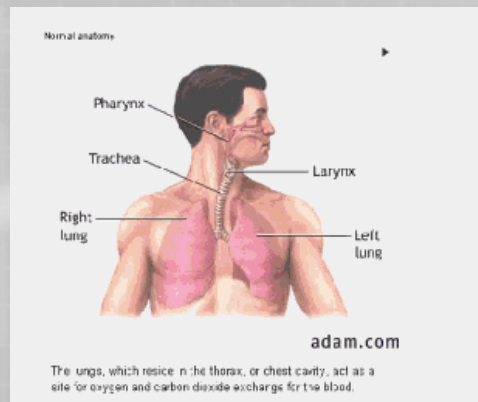


<http://www.nlm.nih.gov>



## What are we doing now?

- Physiology
  - ADAM slide shows



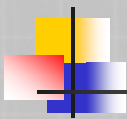
<http://www.nlm.nih.gov>



## Why BioPac?

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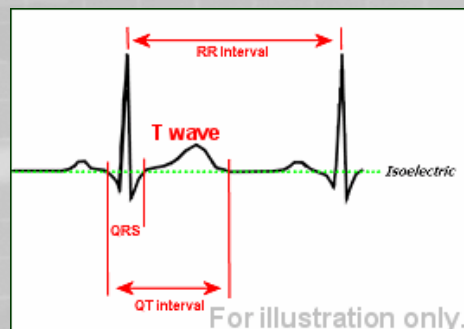
- Easy set-up and tear down
- Runs on PC or Mac
- At-home student analysis



## Why BioPac?

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- Varied lessons
  - EKG



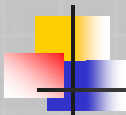


## Why BioPac?

- Varied lessons
  - EKG
  - EEG

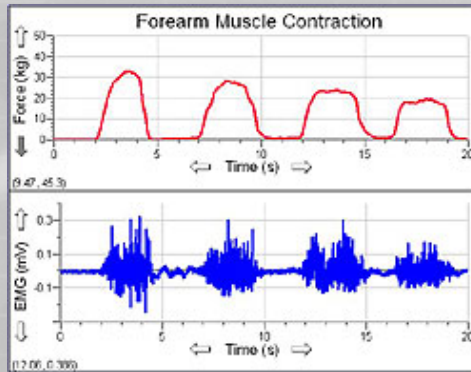


<http://people.brandeis.edu>

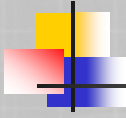


## Why BioPac?

- Varied lessons
  - EKG
  - EEG
  - Hand dynamometer

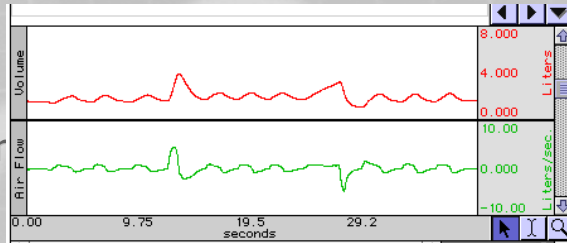


<http://www.vernier.com>

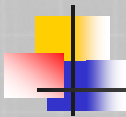


## Why BioPac?

- Varied lessons
  - EKG
  - EEG
  - Hand dynamometer
  - Spirometry



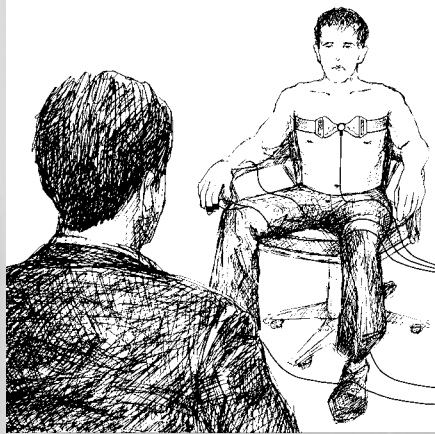
[www.biopac.com](http://www.biopac.com)



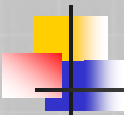
## Student Lessons

- Students gather data in-class
- Students analyze data in-class or at-home
- Students gain proficiency in
  - Data analysis
  - Critical thinking
  - Scientific writing
  - Numerical literacy

# Galvanic Skin Response and the Polygraph

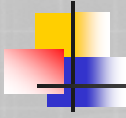


# Galvanic Skin Response and the Polygraph



## Basis of the Polygraph

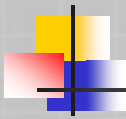
- *Poly* - (many), *graph* - (write)
  - Many measurements
- Recording of many physiological variables
  - Galvanic Skin Response
  - Respiratory Rate
  - Heart Rate/Blood Pressure



# Galvanic Skin Response and the Polygraph

## Basis of the Polygraph

- Principle #1
  - Autonomic responses are automatic (not consciously controlled)
    - Sweating, heart rate, respiratory rate, blood pressure, blood flow
- Principle #2
  - Changes in emotional state cause changes in autonomic responses
    - Blushing, sweating, heart rate, respiratory rate



# Galvanic Skin Response and the Polygraph

## Basis of the Galvanic Skin Response

- Resistance to an electrical current varies with the emotions of a subject
  - Sweating changes the flow of an electrical current
  - You sweat in response to emotional changes
    - Lying, embarrassment, sensory stimuli (i.e., pain, temperature)
- $E$  (voltage) =  $I$  (current) \*  $R$  (resistance)
  - If you know two variables, you (or the computer) can calculate the third

# Galvanic Skin Response and the Polygraph

## Objectives

- To observe and record changes in respiratory rate, heart rate, and skin resistance associated with somatic and special sensory stimuli.
- To observe and record changes in respiratory rate, heart rate, and skin resistance associated with cognitive behavior and emotion.
- To analyze a 3-channel polygram recorded under various experimental conditions to gain a better understanding of polygraphy and its potential for use and misuse.

# Galvanic Skin Response and the Polygraph

## Set-up

- Choose a *Subject*
  - Attach respiratory sensor to *Subject* as shown (pg. 5)

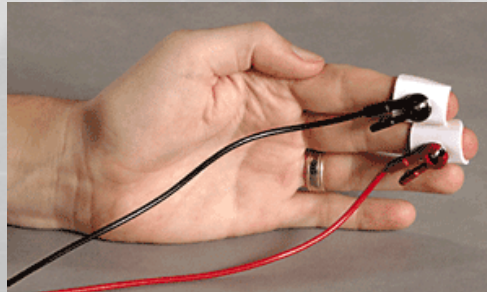


# Galvanic Skin Response and the Polygraph



## Set-up

- Attach galvanic skin response sensor (SS57L; CH3) using rectangular electrodes to *Subject* as shown (pg. 6)

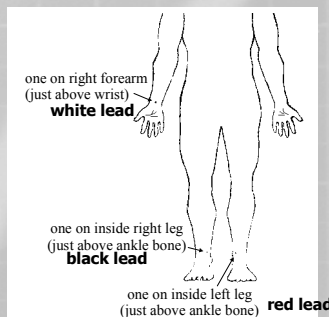


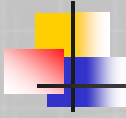
# Galvanic Skin Response and the Polygraph



## Set-up

- Attach heart rate sensor (SS2L; CH2) using round electrodes to *Subject* as shown (pg. 7)



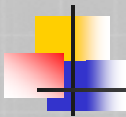


# Galvanic Skin Response and the Polygraph

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## Set-up

- Open BSL Lessons 3.7 from Desktop
- Open L09-Poly-1
- Type in the *Subject's* name
- Choose a *Director*
- Have the *Subject* sit comfortably with hands on legs facing away from the computer and facing the *Director*
- Choose a *Recorder*
  - *Recorder* should face computer and insert "event marker" (F9) at each event or question



# Galvanic Skin Response and the Polygraph

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## Calibration

- Click *Calibrate* (upper left)
- Follow directions on screen

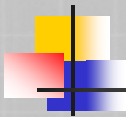


## Galvanic Skin Response and the Polygraph

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### Recording

- If the calibration is successful, click *Record* (upper left)
- Have the *Director* ask the *Subject* to perform the following tasks
- Wait a minimum of 5 seconds between tasks
- At each direction from the *Director*, the *Recorder* should insert an event marker (F9)
- To pause between tasks, click *Suspend*



## Galvanic Skin Response and the Polygraph

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### Tasks #1

- Quietly say your name
- Count backward from 10
  - 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
- Count backward from 30 by subtracting increasing odd numbers
  - 30, 29, 26, 21, 14, 5
- *Director* touches *Subject* on side of face
- *Recorder* clicks *Suspend* (upper left)

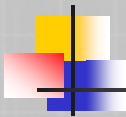


## Galvanic Skin Response and the Polygraph

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### Tasks #2

- *Director* holds colored paper about 2 feet from *Subject*
- *Subject* concentrates on paper for 10 seconds
- Display colors as follows
  - white, black, red, blue, green, yellow, orange
- *Recorder* clicks *Suspend* (upper left)

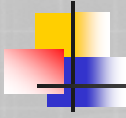


## Galvanic Skin Response and the Polygraph

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### Tasks #3

- *Director* asks *Subject* series of questions
- *Subject* answers each question with YES or NO (*Subject* may answer truthfully or falsely)
- *Director* records the *Subject's* response by circling Y or N
- *Recorder* inserts event marker for both question ASKED and question ANSWERED
- *Recorder* clicks *Suspend* (upper left)

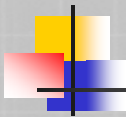


## Galvanic Skin Response and the Polygraph

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### Tasks #3 (cont)

- *Subject* records truthful answer
- *Recorder* clicks *Done* (upper left)
- Remove sensors from the *Subject*



## Galvanic Skin Response and the Polygraph

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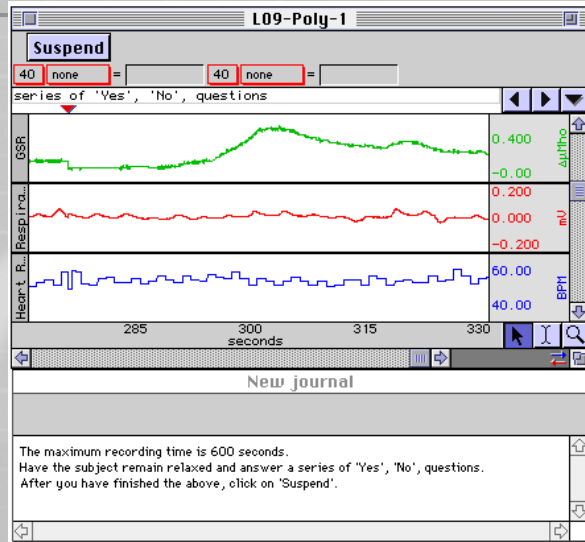
### Analysis

- Fill in the Data Report
- Analysis may be performed at home
  - Includes simple analysis (directions provided)
  - Includes analytical questions

# Galvanic Skin Response and the Polygraph



## Sample Data



www.biopac.com

Question	Answer	Truth	Heart Rate [CH 41 Value]	Respiratory Rate [CH 40 BPM]	GSR [CH 3 Value]
Student?	Y N	Y N			
Blue eyes?	Y N	Y N			
Brothers?	Y N	Y N			
Earn "A"?	Y N	Y N			
Motorcycle?	Y N	Y N			
Less than 25?	Y N	Y N			
Another planet?	Y N	Y N			
Aliens visit?	Y N	Y N			
"Fear Factor"?	Y N	Y N			
Truthful?	Y N	Y N			

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# Galvanic Skin Response and the Polygraph

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## Summary

- Students elicit and monitor physiological responses
- Students gather physiological data
- Students analyze physiological data
- Students prepare report about results

