

## Palpation Acquisition

### Developing a Feedback and Validation Model



Jane Stark - D.O.M.P. - Canada

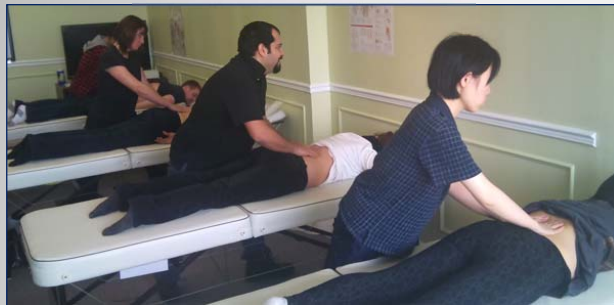
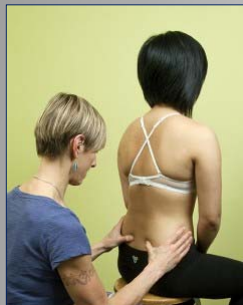
## Outline – Palpation Acquisition

1. Problem
2. Consequences
3. Solution(s)



## 1. Problem - Validation

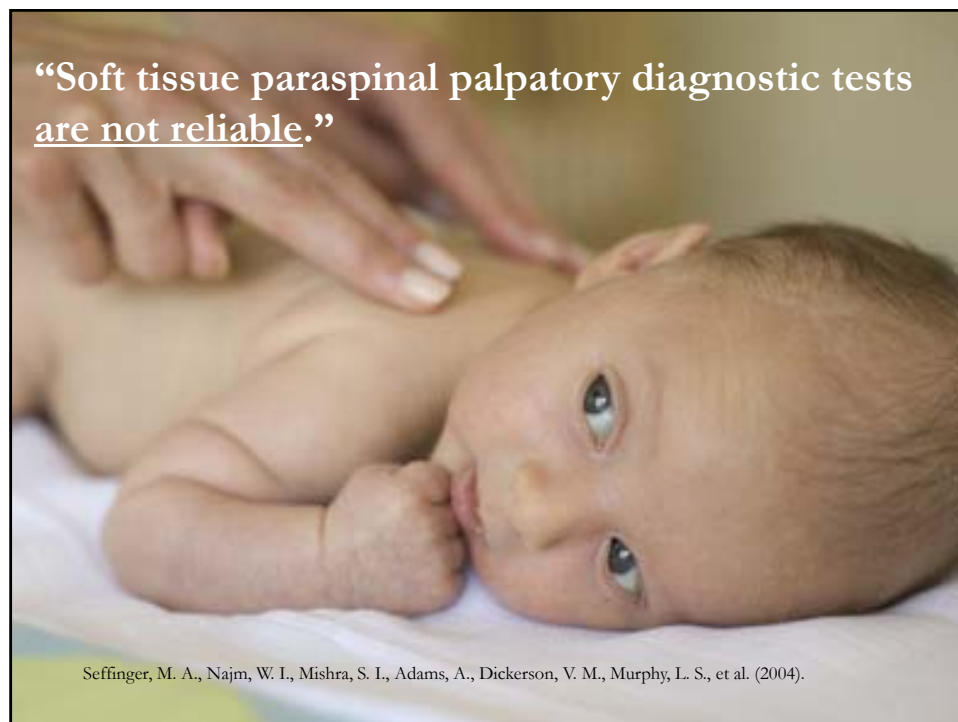
1. **Ourselves**
2. **Our students**
3. **Our research**



## 2. Consequences

- **Students**
- **Our profession**
- **Health professions**
- **Patients**





## ***Dig On***

- ✓ Teaching Method
- ✓ Learning System
- ✓ Testing

### 3. Solution

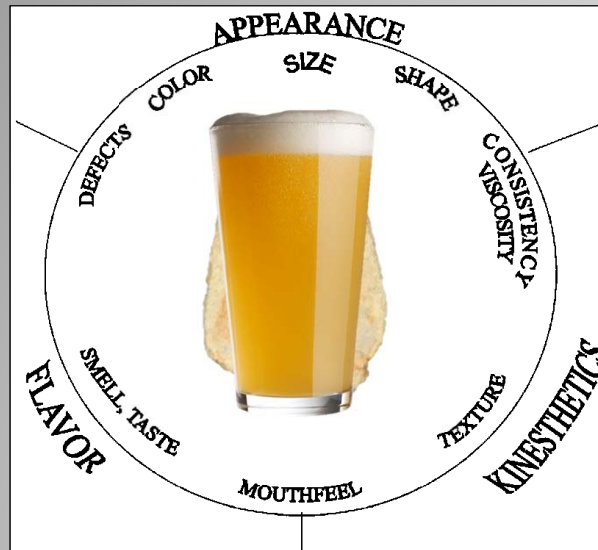
- **CATEGORIZATION**
  - reward mediated feedback trials
- **Tools**
- **Validation**



### Introduction



## Sensory Evaluation



## Sensory Evaluation – supported by:

### Sensory Science

The practical application of psychophysics to the sensory evaluation of food, beverage and consumer products.

### Psychophysics

The scientific study of the relationship between sensory stimuli and animal/human response

## Sensory Science



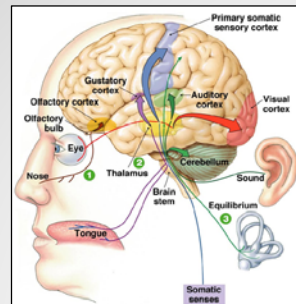
Dr. Chris Findlay



“The principles and practices of sensory science apply equally to all senses.”

### Somatic Senses

- Somesthesia
- Kinesthesia



## Psychophysics - -> Categorization

**Categorization** – “is any systematic differential interaction between an autonomous, adaptive sensorimotor system and its world.”



To Cognize is to Categorize: Cognition is Categorization  
<http://users.ecs.soton.ac.uk/harnad/Temp/catconf.html>

## Categorization

Feedback is the preferred method  
for training sensory panelists.



## Sensory Panelist





## Osteopath



## Role of the Evaluator



### I. CHEESE TEXTURE

#### 1. Surface

Rough Macro-bumpy  
Rough Micro-grainy/gritty or chalky  
Wetness  
Oily/Patty  
Loose Particles

#### 2. First Bite/First Chew

Firmness  
Hardness  
Denseness  
Cohesiveness  
Toothstick  
Number of Pieces

#### 3. Partial Compression

Springiness

#### 4. Chewdown

Mixes with Saliva  
Rate of Melt  
Cohesiveness of Mass  
Moistness of Mass  
Adhesiveness of Mass  
Lumpiness of Mass  
Grainy mass  
Toothstick

#### 5. Residual

Toothstick  
Mouthcoat  
Oily Film  
Chalky Film  
Tacky  
Dairy Film  
Particles Left  
Sticky film

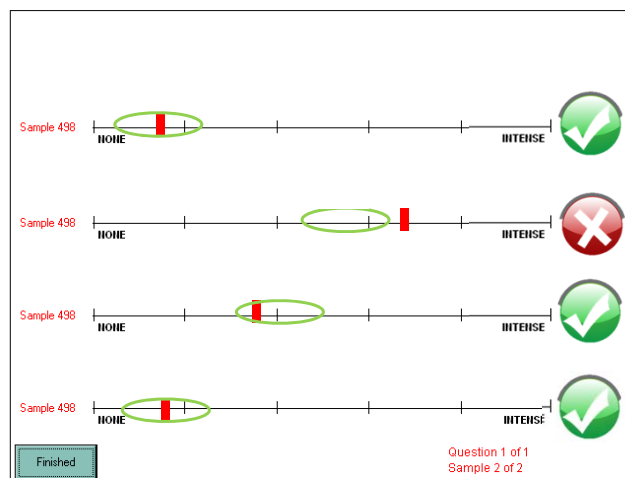


## Evaluation using the Somatic Senses



Stiffness  
 Force to Compress  
 Depression Depth  
 Springiness  
 Fullness  
 Tensile Stretch  
 Compression Resilience

## Training



# Learning to Categorize

## Dual System

1. Explicit Logical Reasoning (ELR)

2. Procedural Learning (PL)



Dr. Gregory Ashby

Ashby, F. Gregory; Ennis, John M.; Spiering, Brian J. (2007)

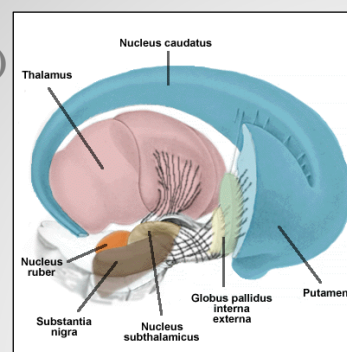
## Dual System

1. Explicit Logical Reasoning (ELR)

Cortical Direct

2. Procedural Learning (PL)

Sub-Cortical via the  
Basal Ganglia



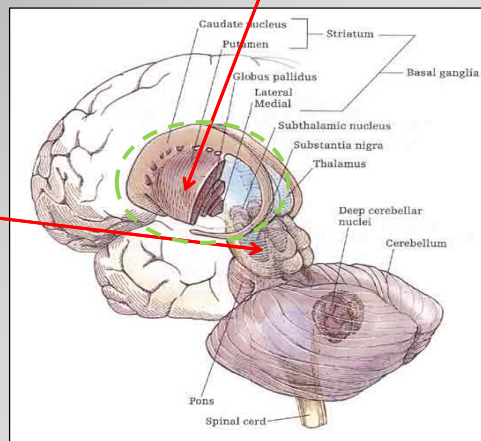
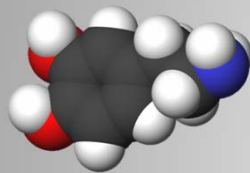
Basal Ganglia

Ashby, G., F. & Casale, M. B. (2003).

## 2. Procedural Learning

Somatosensory Stimuli - - - - - > Putamen

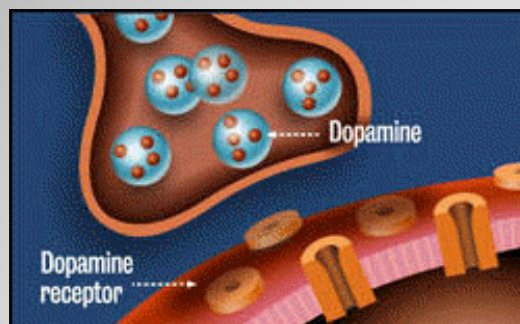
Substantia Nigra  
Dopamine



Basal Ganglia

## Dopamine

Released during rewarded categorization feedback trials for correct responses to a sensory stimulus



# Dopamine



- Correct - strengthens the synapse

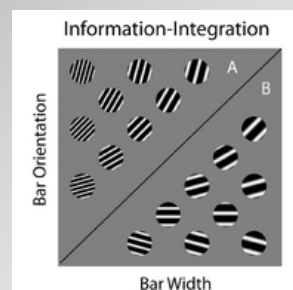
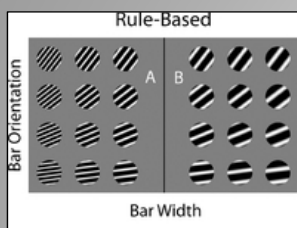
- Wrong - responses weaken the synapse



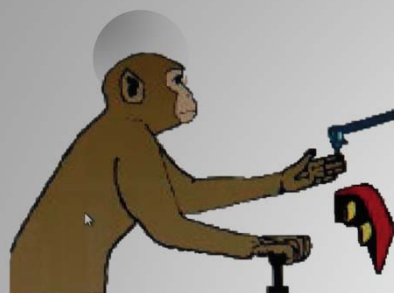
Under 3 seconds

Ross, B. H. (2006).

# Categorization



## Categorization with Reward



10 frequencies

Vibration

12-30 mm per second

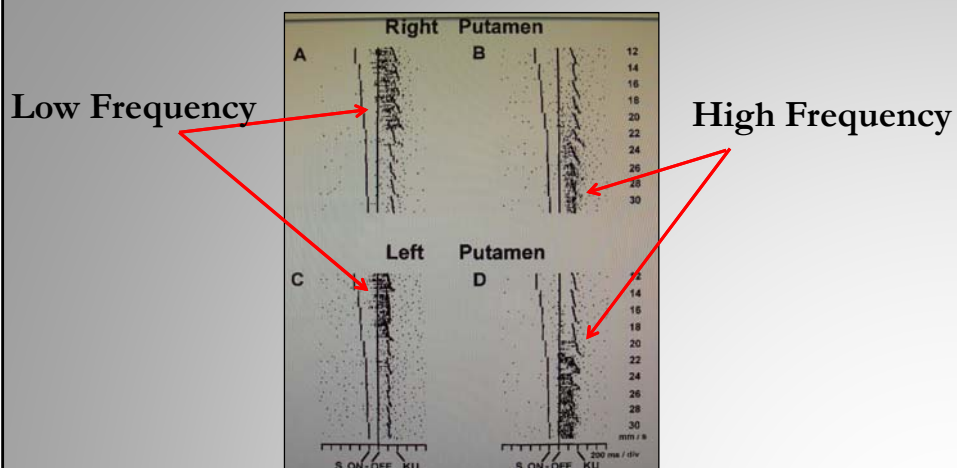
2 mm increments

Category A, >20 high

Category B, <20 low

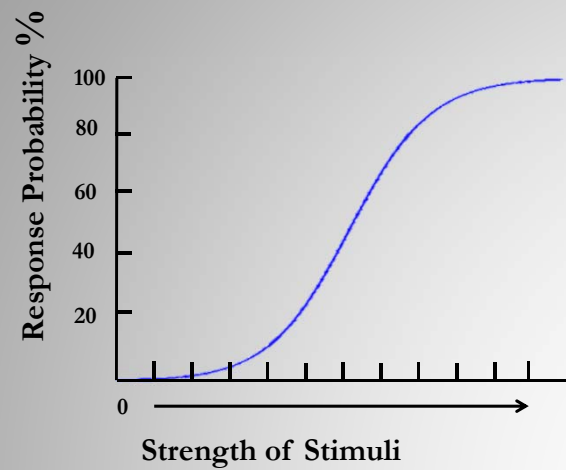
Romo, R., Merchant, H., Ruiz, S., Crespo, P., & Zainos, A. (1995). Neuronal activity of primate putamen during categorical perception of somesthetic stimuli. *Neuroreport*, 6(7), 1013-1017.

## Putamen

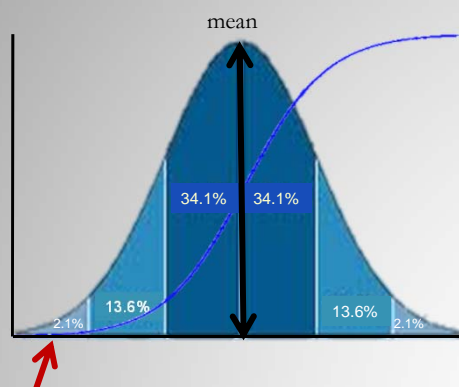


Merchant, H., Zainos, A., Hernández, A., Salinas, E., & Romo, R. (1997). Functional properties of primate putamen neurons during the categorization of tactile stimuli. *Journal of neurophysiology*, 77(3), 1132-1154., p.1143

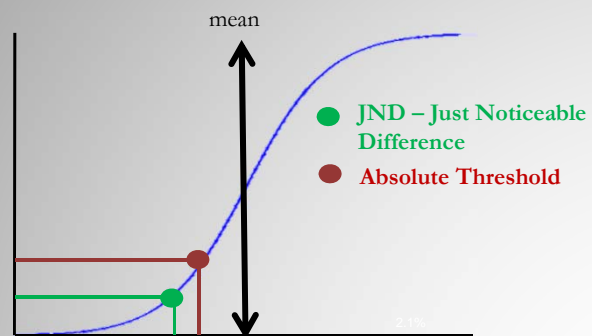
## Stimulus - Response Curve



## Normal Distribution



## Normal Distribution



## Categorization on Humans





## Humans

Position - **symmetry**, evenness

Dimension - size, weight

Surface attributes – dryness, oiliness,

Temperature - Heat

Consistency – Density, Texture, Lumpiness, Fibrosity, etc...

Pressure - Air, Fascial

Volume – Fluid, flow, **change in volume**

Motion -

- Velocity – linear, angular
- Acceleration/Deceleration
- Vibration/Oscillation
- Rhythmicity

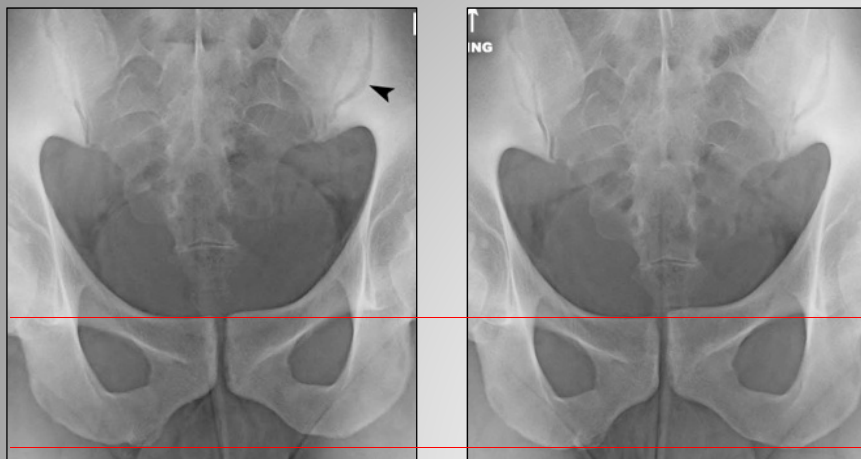
Current

Electromagnetism

Vitality ?

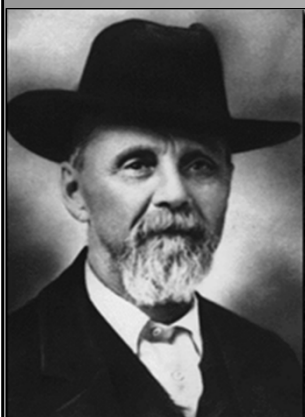
Other

## Palpation - Symmetry



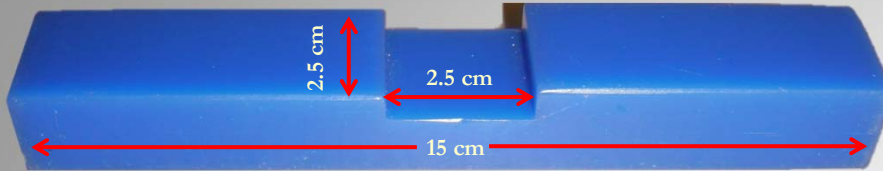


1/100 of a inch or **0.25 mm**



“It may be that by measurement we can discover a variation one-hundredth of an inch from the normal, which, though infinitely small, is nevertheless abnormal” (Still, 1902, p.33).

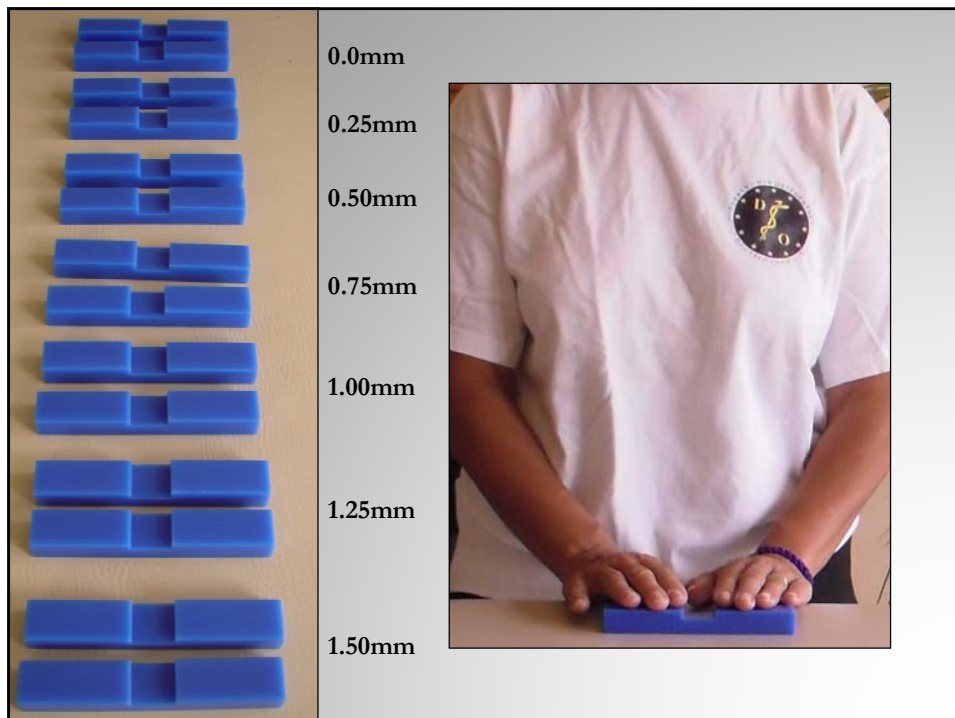
## Wax Blocks / Pubic Symphysis

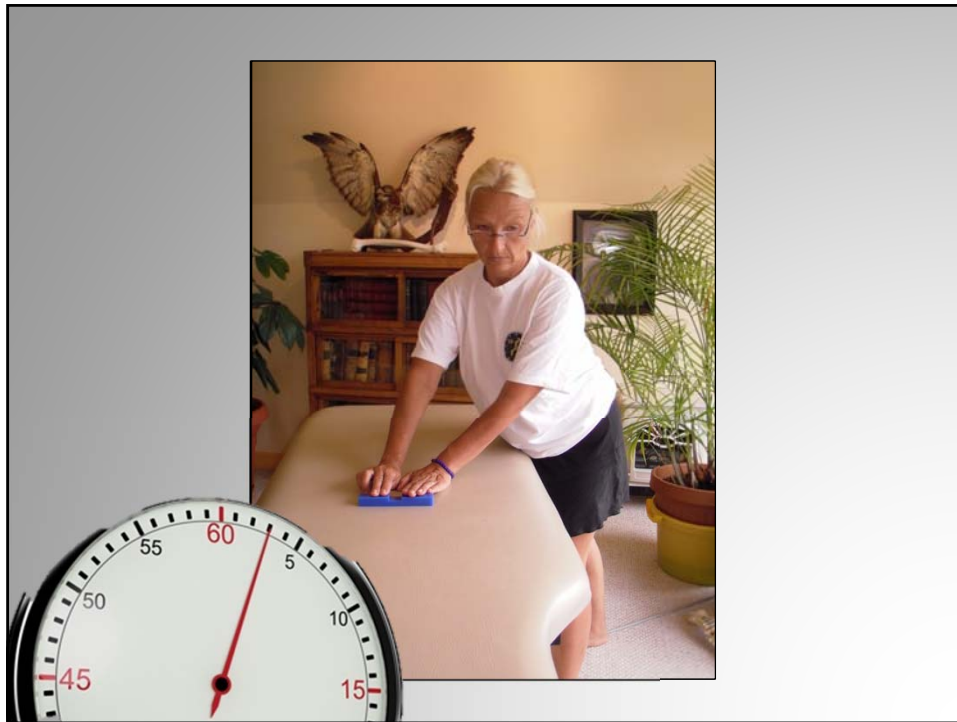


- Industrial-grade Machinable Wax



Creator: Chris Rieach  
Canadian College of Osteopathy





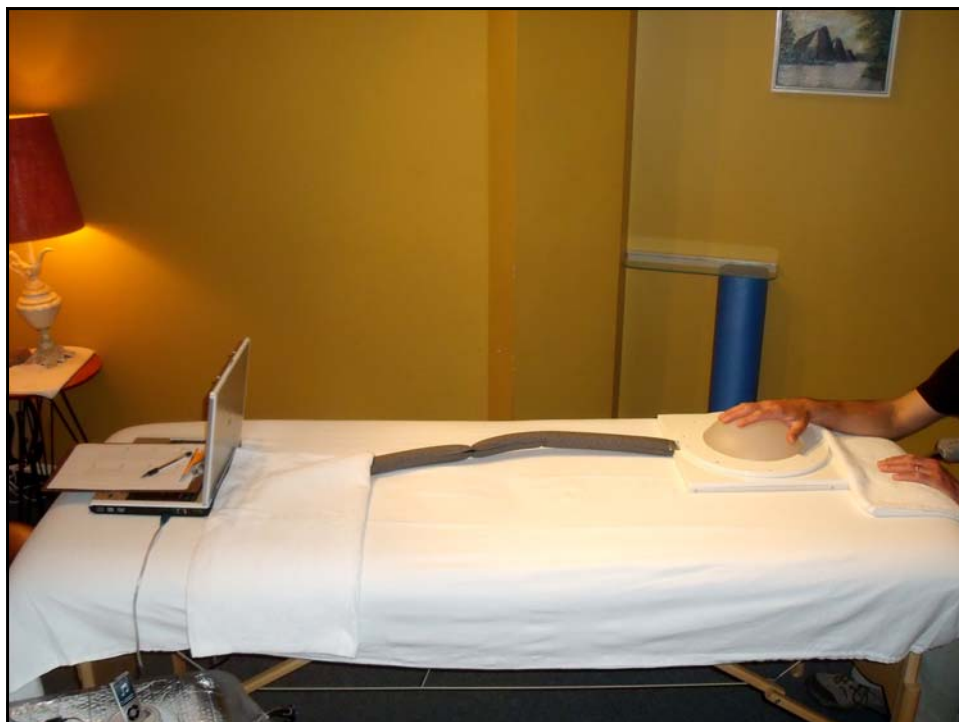
## Palpation - Volume Change



## MONARK \*



\* Creators: **Monica** Noy & **Mark** Snow  
Canadian College of Osteopathy





## Palpation Acquisition and Testing

