

The Electrodermal System

[insert sweaty joke here]

The Psychology of the Electrodermal Response (EDR)

- Motor preparation
- Orienting
- Arousal
- Emotional expression
- Social signal



Electrodermal Glossary

Skin Resistance

SRL = skin resistance level (tonic); 10,000-500,000 Ω

SRR = skin resistance response (phasic); 100-10,000 Ω

Formula: $V = IR$ (aka, Ohm's law)

where V is potential difference (in Volts), I is current (in Amperes)
and R is resistance (in ohms; Ω)

Skin Conductance

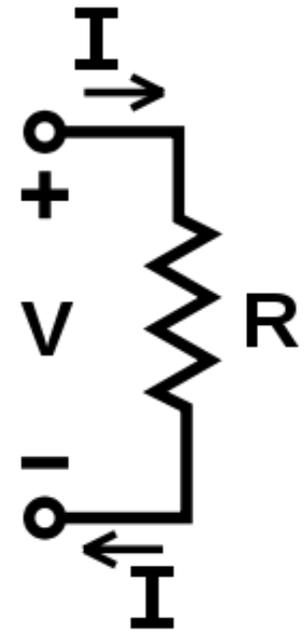
SCL = skin conductance level (tonic); 2-50 μ Siemens

SCR = skin conductance response (phasic); .05-5 μ Siemens

Aka: GSR = galvanic skin response

Formula: $G = I/V$

where G is conductance (in Siemens), V is potential difference (in Volts), I is current (in Amperes)



Types of sweat glands

Eccrine

forms basis of skin conductance recording

located all over body, but dense concentrations on surface of hands and feet

has many functions

Apocrine

found under armpits and genital areas

function a matter of debate

not of great interest to psychophysicologists

Functions of sweat glands

Thermoregulation

Thermal Preparation

Facilitate manipulative contact

Minimize abrasion

Accentuate Tactile Acuity

Odiferous communication? (Apocrine)

Anatomy of a Gland and the Skin

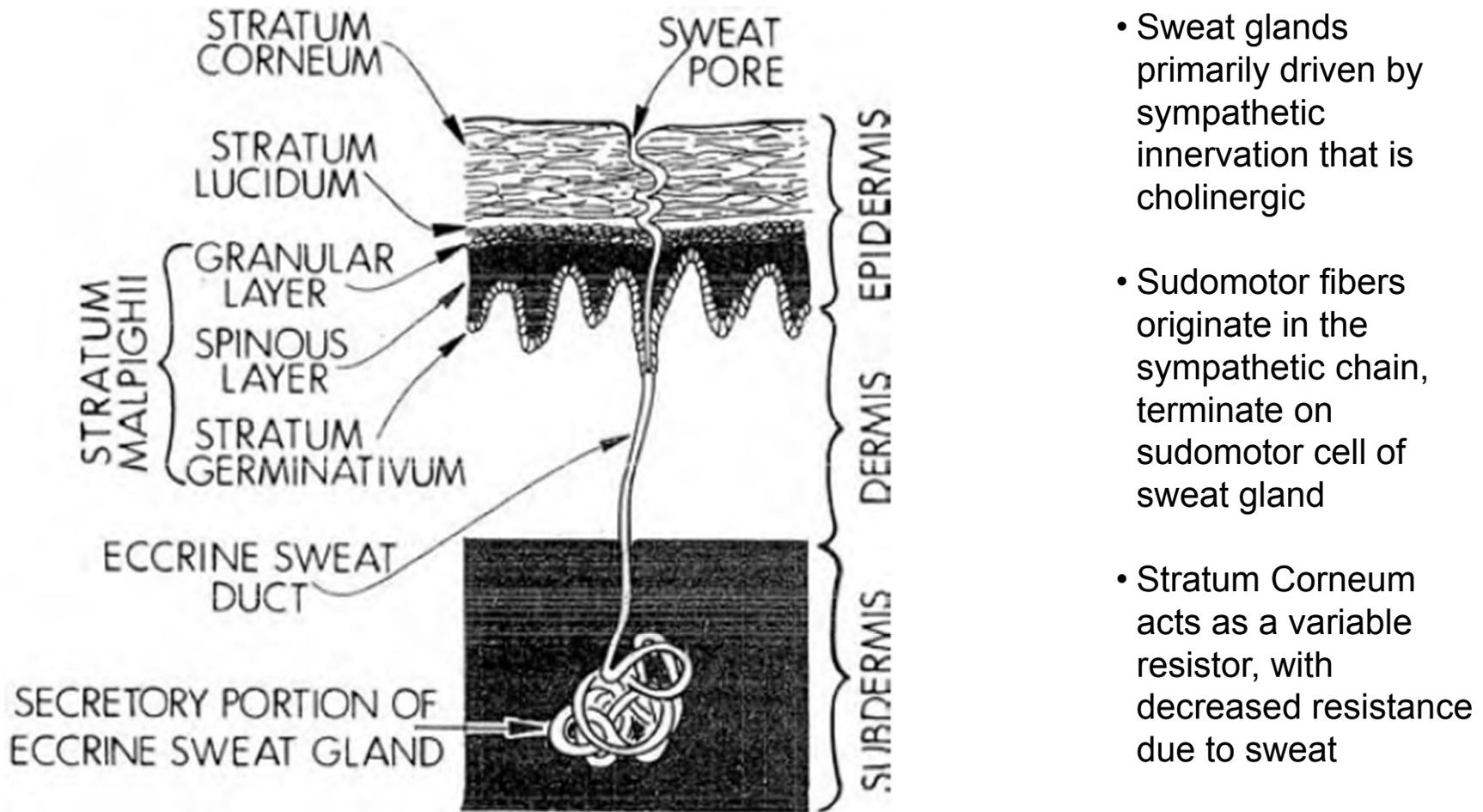
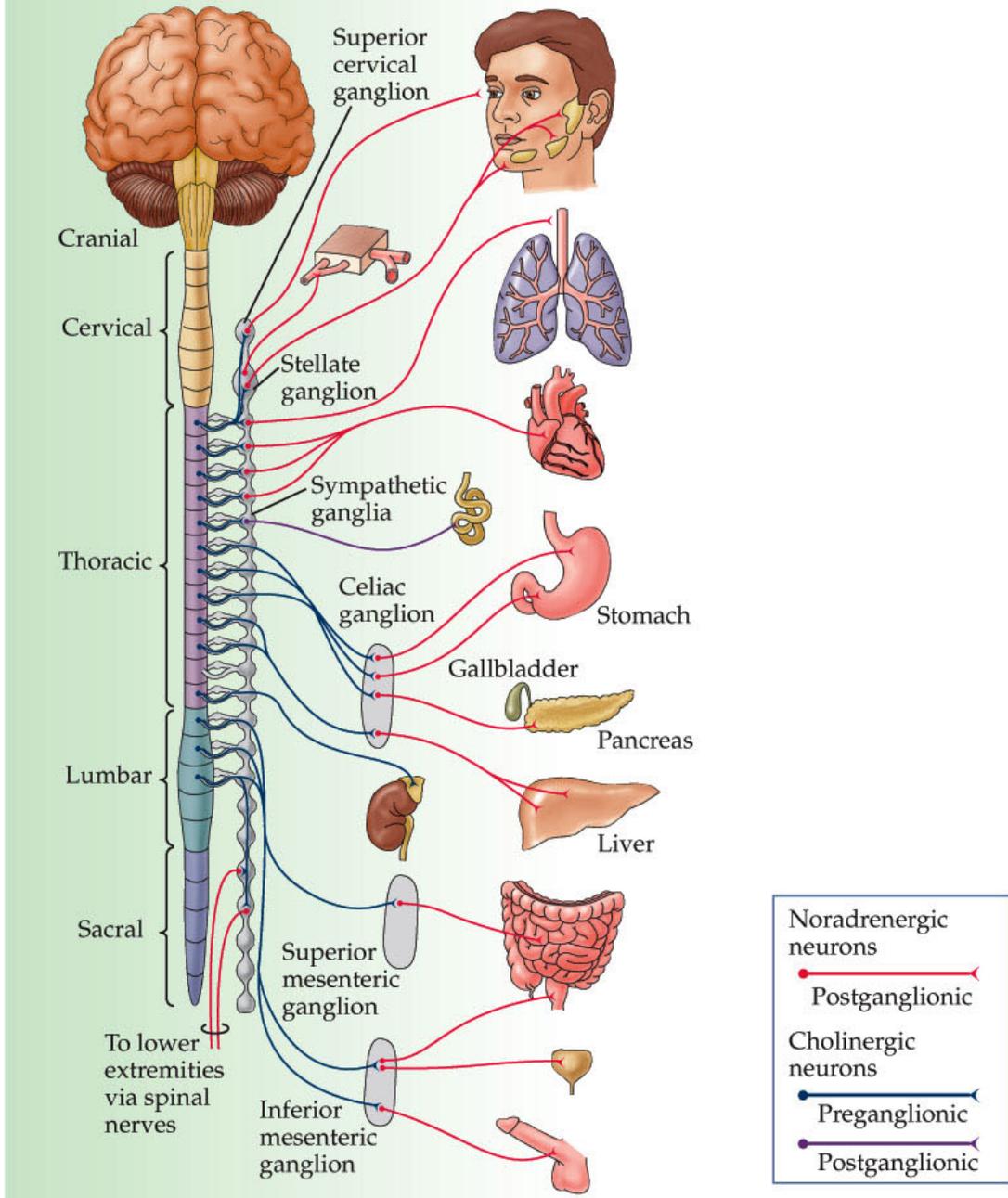


Figure 7.1. Anatomy of the eccrine sweat gland in various layers of skin. (Adapted from Hassett, 1978).

From
Dawson et al 2007

Sympathetic division



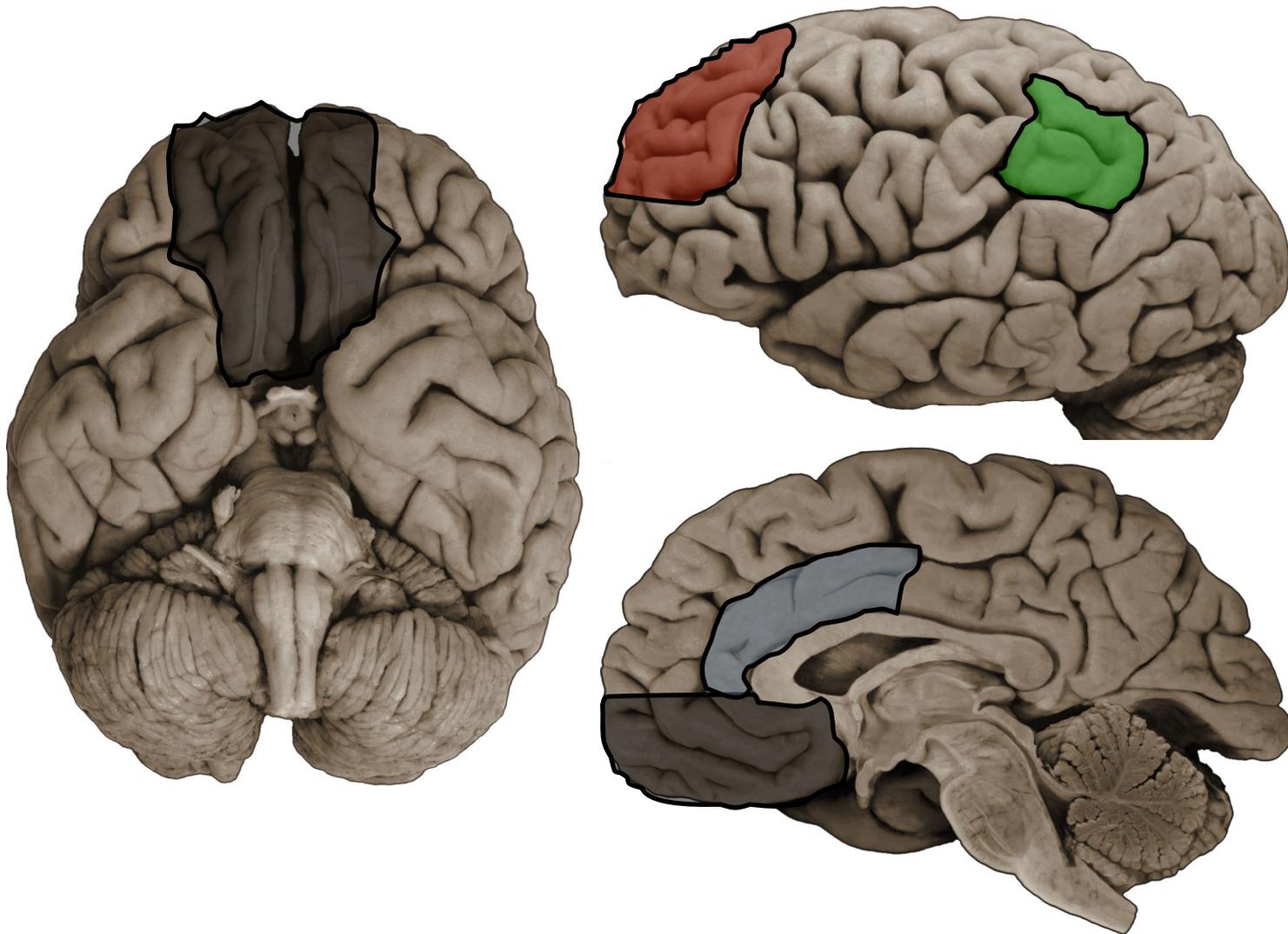
The Deadly Nightshade

- *Atropa belladonna*
- Atropine acts as an antagonist to muscarinic cholinergic receptors, causing pupil dilation





The Neuroanatomy of EDA



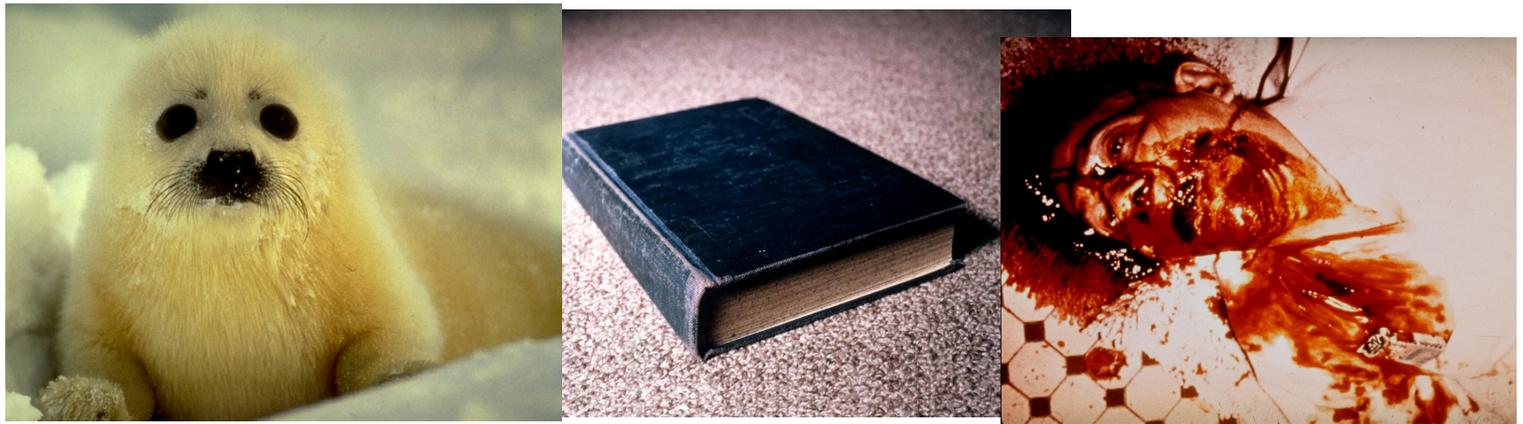
Adapted from Tranel & H. Damasio (1994)







How would you rate these images?

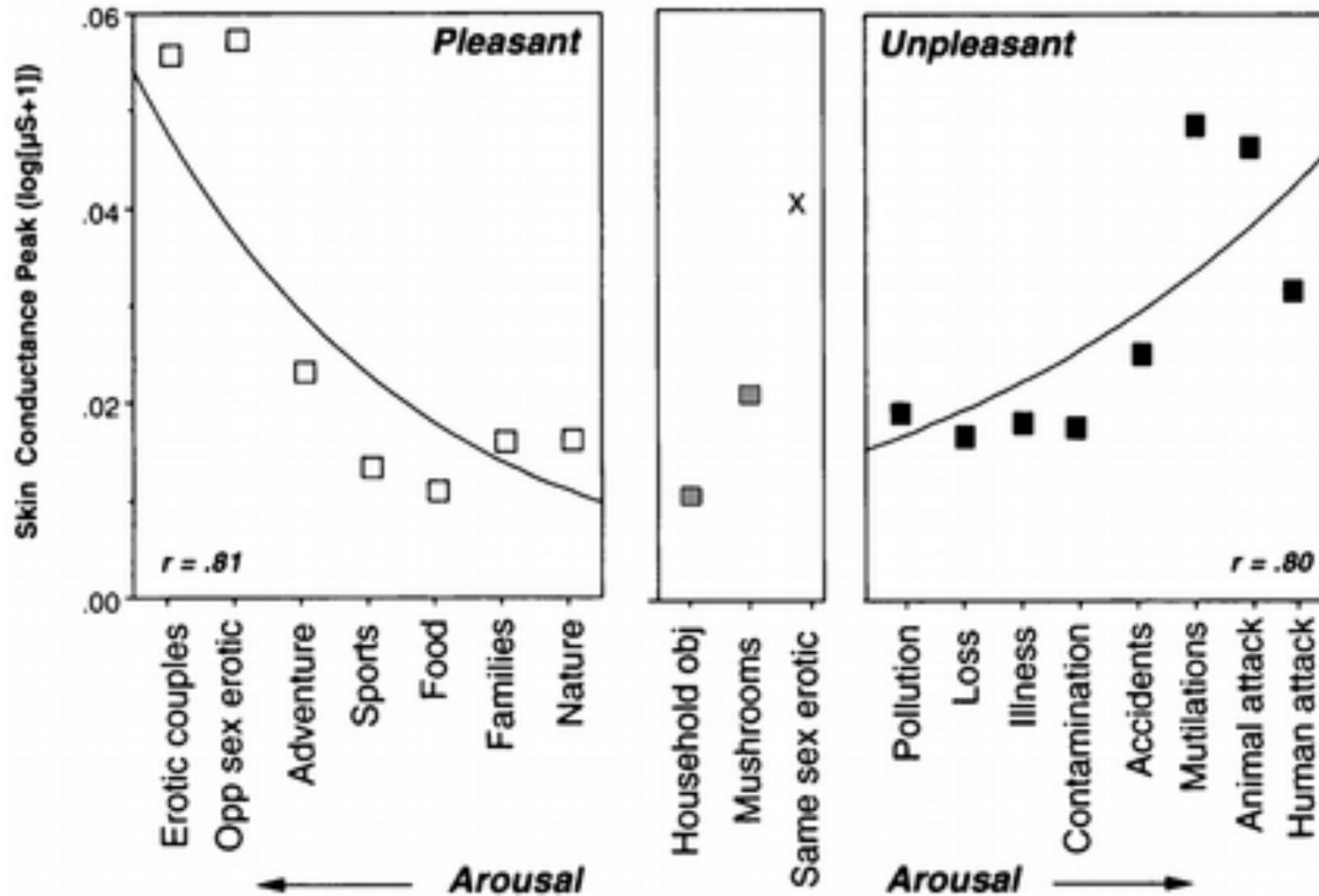


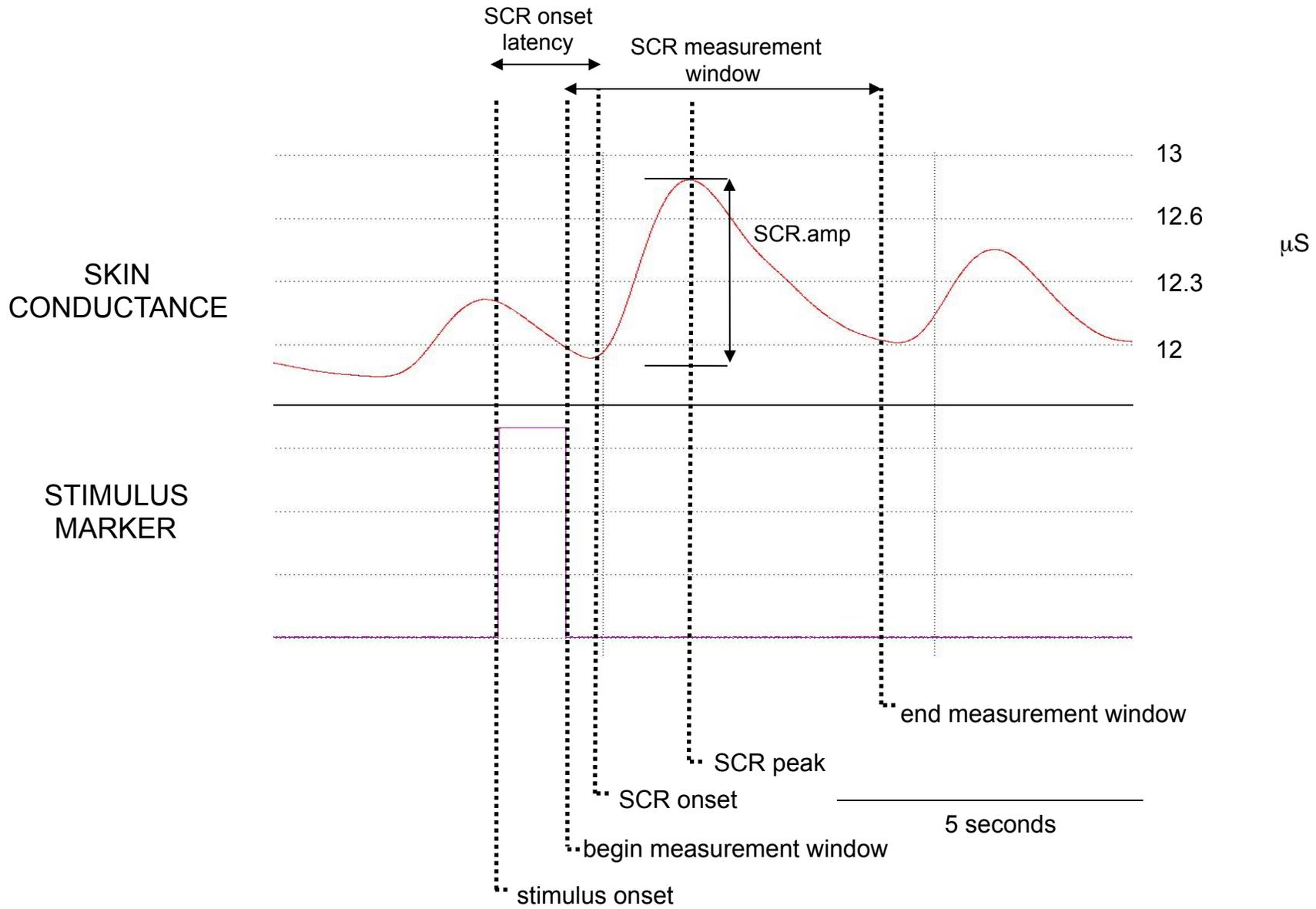
Pleasantness	8.2	5.2	1.7
Arousal	4.6	2.6	7.2

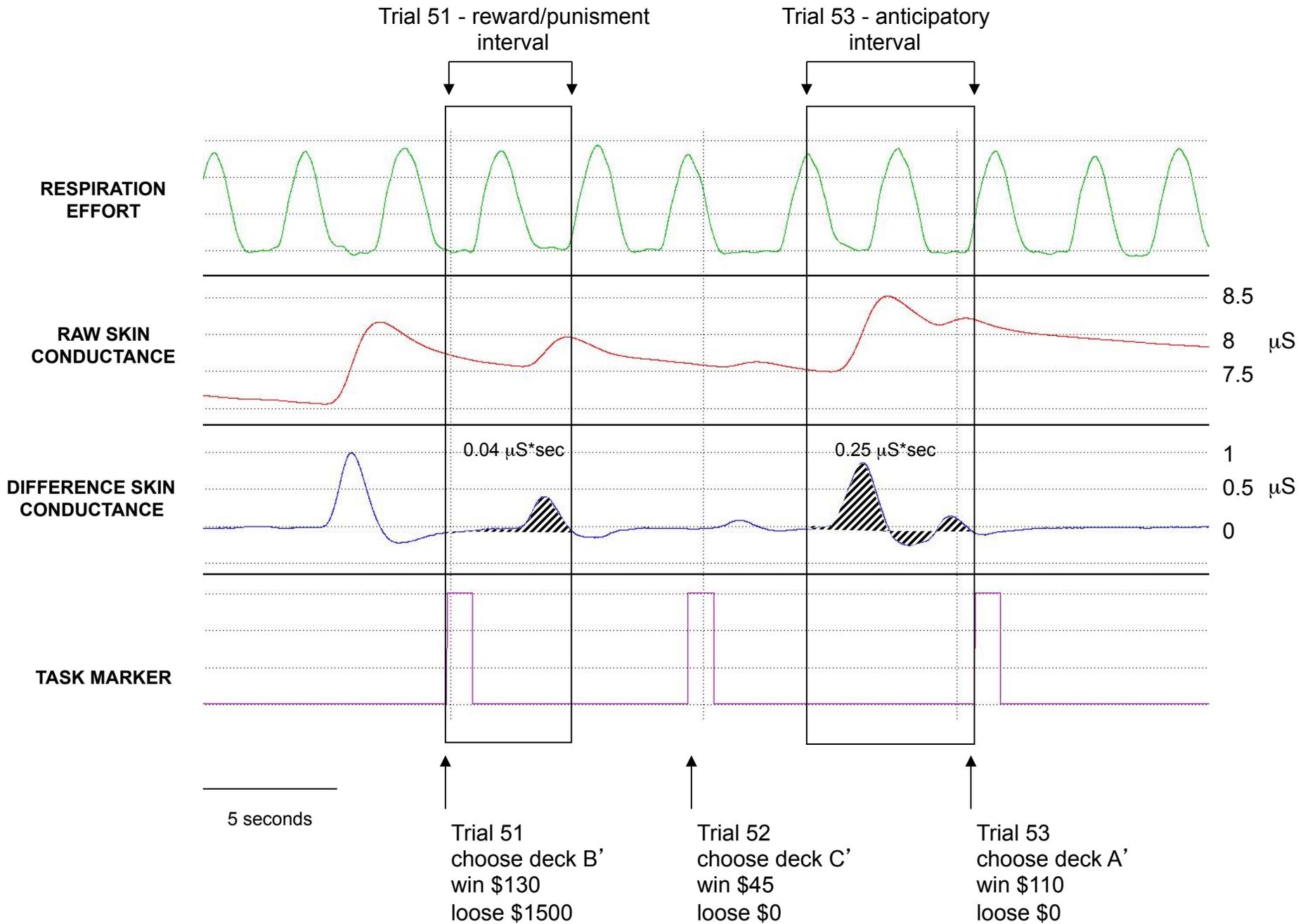
Pleasantness: 1 = very unpleasant...9 = very pleasant

Arousal: 1 = totally boring...9 = highly arousing

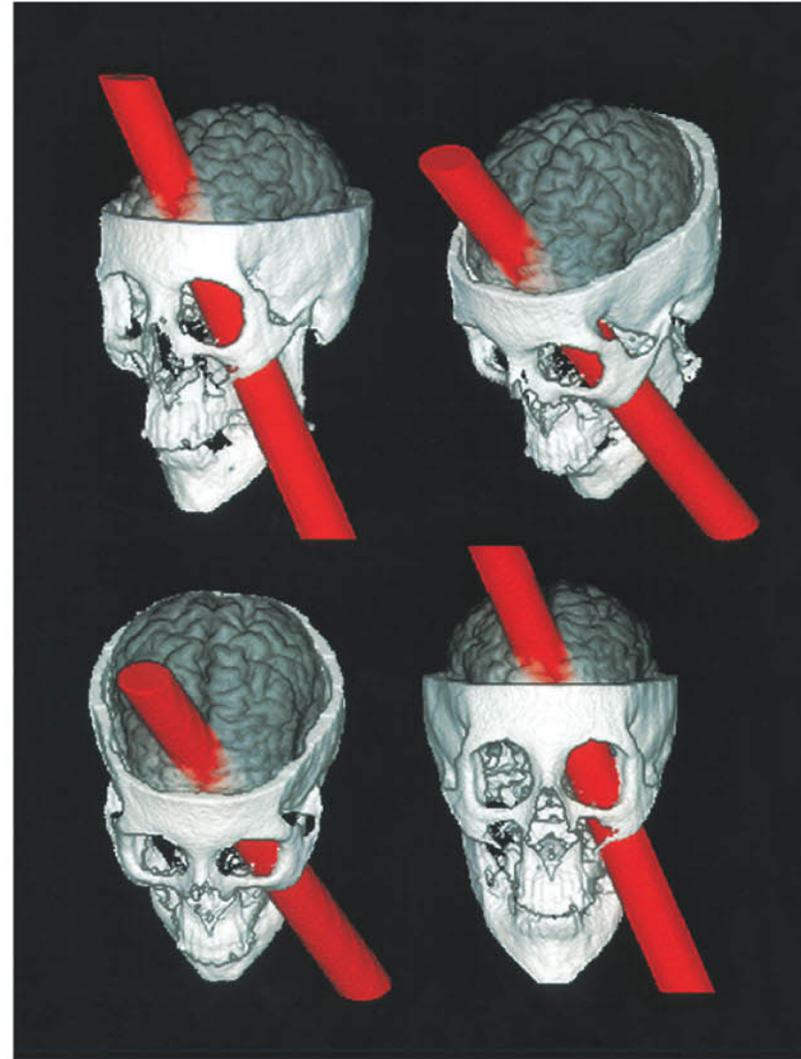
Skin Conductance Response to Emotional Pictures







Phineas Gage



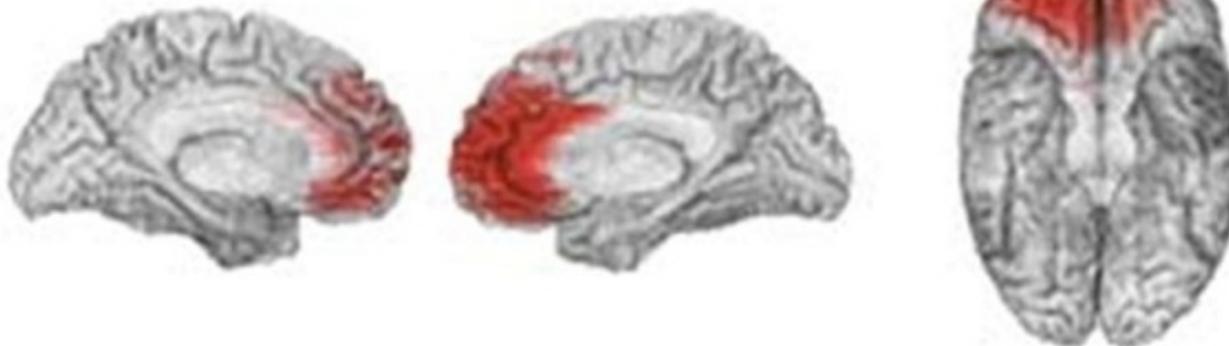
Patient EVR

Modern-day Gage
Meningioma resection
Fails to show skin
conductance to
emotional stimuli
Full Scale IQ = 143(!)

Eslinger & Damasio (1985) description:

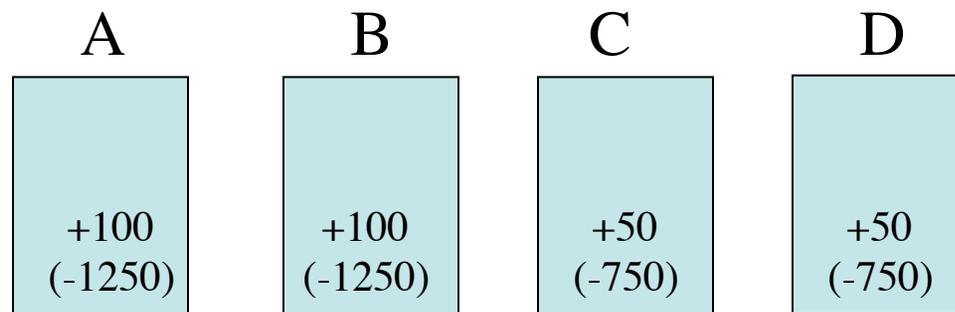
Was unable to hold a job, apparently due to “tardiness and disorganization”. Made a series of poor decisions regarding financial investments and interpersonal relationships.

“Deciding where to dine might take hours, as he discussed each restaurant’s seating plan, particulars of menu, atmosphere, and management. He would drive to each restaurant to see how busy it was but even then he could not decide which to choose.”

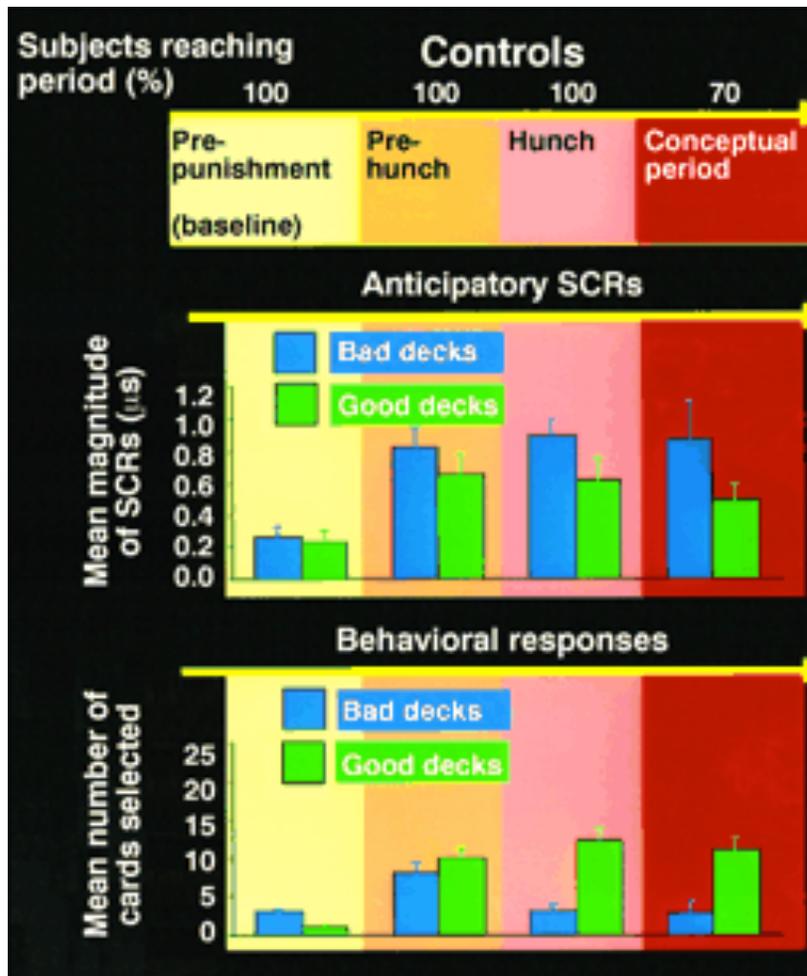


EDA and decision-making: the Iowa Gambling task

- An instrument for detecting decision making deficits in the laboratory



EDA and decision-making: the Iowa Gambling task



Bechara et al., Science, 1997

EDA Summary

- EDA serves as a reflection of sympathetic nervous system activity
- An objective measure of emotional response
- Can be used as a non-conscious index to guide decision making