The Electrodermal System

[insert sweaty joke here]
Glossary

Generic terms
EDA = electrodermal activity
GSR = galvanic skin response

Skin Resistance
SRL = skin resistance level (tonic); 10,000-500,000Ω
SRR = skin resistance response (phasic); 100-10,000 Ω

Skin Conductance
SCL = skin conductance level (tonic); 2-50 µsiemens
SCR = skin conductance response (phasic); .05-5 µsiemens
SSCR or NSSCR = spontaneous or non-specific skin conductance Response

Skin Potential
SPL = skin potential level (tonic); 0-60 mV
SPR = skin potential response (phasic); .1-10 mV
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 psychophysiology
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

- Sweat glands primarily driven by sympathetic innervation that is cholinergic.
- Sudomotor fibers originate in the sympathetic chain, terminate on sudomotor cell of sweat gland.
- Stratum Corneum acts as a variable resistor, with decreased resistance due to sweat.

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

From Dawson et al 2007
Central Control

Figure 7.2. Central nervous system determiners of EDA in humans (From Boucsein, 1992).

From Dawson et al 2007
How would you rate these images?

<table>
<thead>
<tr>
<th></th>
<th>Pleasantness</th>
<th>Arousal</th>
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<tbody>
<tr>
<td>Pleasantness</td>
<td>8.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Arousal</td>
<td>4.6</td>
<td>2.6</td>
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</tbody>
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Pleasantness: 1 = very unpleasant...9 = very pleasant
Arousal: 1 = totally boring...9 = highly arousing
Skin Conductance Response to Emotional Pictures

![Graph showing skin conductance responses to emotional pictures.](image)
FIGURE 2

SKIN CONDUCTANCE

STIMULUS MARKER

SCR onset latency
SCR measurement window
SCR.amp
SCR peak
SCR onset
begin measurement window
stimulus onset
end measurement window

5 seconds

13
12.6
12.3
12
µS

FIGURE 2
FIGURE 5

Trial 51 - reward/punishment interval

Trial 53 - anticipatory interval

RESPIRATION EFFORT

RAW SKIN CONDUCTANCE

DIFFERENCE SKIN CONDUCTANCE

TASK MARKER

0.04 \(\mu \text{S} \cdot \text{sec}\)

0.25 \(\mu \text{S} \cdot \text{sec}\)

5 seconds

Trial 51
choose deck B'
win $130
loose $1500

Trial 52
choose deck C'
win $45
loose $0

Trial 53
choose deck A'
win $110
loose $0
Patient EVR

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

Bechara et al., Science, 1997
EDA and decision-making: the Iowa Gambling task

Bechara et al., Science, 1997