Lab: Two-Point Discrimination (Tactile Acuity)

BIO 137 · Human Anatomy and Physiology I · Unit 2 Lab
Fall 2025 · KCTCS Somerset · Instructor: Justin N. Howard · (In Person)

Introduction

This lab investigates tactile acuity by measuring two-point discrimination thresholds across different body regions and relating receptor density to sensitivity.

Background

Touch acuity varies across the body due to differences in mechanoreceptor density and cortical representation. The two-point discrimination test estimates the smallest distance at which two simultaneous touches are perceived as distinct.

Figure 1: Example apparatus and target regions for two-point discrimination.

Safety

This is a non-invasive lab. Avoid excessive pressure that could break skin. Sanitize shared instruments between participants.

Materials

- Vernier calipers or measured paperclip divider
- Metric ruler
- Alcohol wipes or disinfectant
- Data sheet and pen; timer (optional)

Procedure

1. **Prepare instrument:** Set to a small separation (e.g., 1–2 mm) and verify with a ruler.
2. **Subject posture:** Subject closes eyes; arm relaxed on table.
3. **Testing rule:** Apply either one or two points gently and simultaneously for $\sim$1 s.
4. **Adaptive staircase:** If reported “one,” increase separation by 2–3 mm; if “two,” decrease by 1–2 mm.
5. **Threshold:** Record the minimum distance identified as “two” in 3 consecutive trials.
6. **Regions (suggested):** fingertip, palm, forearm (volar), upper arm, back, calf.
7. **Repeat:** Collect data for both partners.

Student Worksheet — Lab: Two-Point Discrimination (Tactile Acuity)

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Name: **Date:**

Instructions (Submission). You have two options:

1. **Electronic (preferred):** Complete this fillable PDF, save as `Lastname_Firstname_Unit2Lab.pdf`, and upload to Blackboard.
2. **Paper (alternative):** Use the paper worksheet PDF, complete by hand, and submit in person at the next class meeting.

Choose only one method.

Data Tables

Region	Trial 1 (mm)	Trial 2 (mm)	Trial 3 (mm)	Threshold (mm)
Fingertip				
Palm				
Forearm (volar)				
Upper arm				
Back				
Calf				

Analysis & Questions

1. Which region had the smallest (best) threshold? Which had the largest (worst)? Explain using receptor density.

2. How could calluses, prior injury, or pressure variability affect thresholds?

3. Compare your data to your partner's. What biological or methodological factors explain differences?

References

Shier, D., Butler, J., & Lewis, R. (2021). *Hole's Human Anatomy & Physiology* (14th ed.). McGraw–Hill Education.