Touch

• Touch Physiology
• Tactile Sensitivity and Acuity
• Haptic Perception

Touch

• Proprioception
  – Perception mediated by kinesthetic and vestibular receptors
• Somatosensation
  – A collective term for sensory signals from the body
Touch Physiology

- Touch receptors: Embedded on outer layer (epidermis) and underlying layer (dermis)
  - Multiple types of touch receptors
  - Each touch receptors has three attributes:
    1. Type of stimulation the receptor responds to
    2. Size of the receptive field
    3. Rate of adaptation

The Four Types of Mechanoreceptors ("tactile receptors")
TABLE 12.1  Response characteristics of the four mechanoreceptor populations

<table>
<thead>
<tr>
<th>ADAPTATION RATE</th>
<th>SMALL</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>FA I (Meissner)</td>
<td>FA II (Pacinian)</td>
</tr>
<tr>
<td>Slow</td>
<td>SA I (Merkel)</td>
<td>SA II (Ruffini)</td>
</tr>
</tbody>
</table>

FA I = fast-adapting type I, FA II = fast-adapting type II, SA I = slow-adapting type I, and SA II = slow-adapting type II. The receptor ending associated with each type is shown in parentheses.

Proposed Sensitivity Ranges of Mechanoreceptors

• Each receptor type has a different range of responsiveness
Touch Physiology (cont’d)

• Other types of mechanoreceptors within muscles, tendons, and joints:
  – Kinesthetic receptors (collective term)
    • Play important role in sense of where limbs are, what kinds of movements are made

Touch Physiology (cont’d)

• Spindles
  – Convey the rate at which the muscle fibers are changing in length
• Receptors in tendons provide signals about tension in muscles attached to tendons
• Receptors in joints react when joint is bent to an extreme angle
Touch Physiology (cont’d)

• Importance of kinesthetic receptors:
  – Neurological patient Ian Waterman
    • Cutaneous nerves connecting Waterman’s kinesthetic mechanoreceptors to brain destroyed by viral infection
    • Lacked kinesthetic senses, dependent on vision to tell limb positions

Touch Physiology (cont’d)

• Thermoreceptors:
  – Sensory receptors that signal information about changes in skin temperature
  – Two distinct populations of thermoreceptors: warmth fibers, cold fibers
  – Body is consistently regulating internal temperature
  – Thermoreceptors kick into gear when you make contact with object warmer or colder than your skin
Touch Physiology (cont’d)

- Nociceptors:
  - Sensory receptors that transmit information about noxious stimulation that causes damage or potential damage to the skin
  - Two groups of nociceptors
    - A-delta fibers: respond primarily to strong pressure or heat; myelinated
    - C fibers: respond to intense stimulation like pressure, hot/cold, noxious chemicals; unmyelinated