

A. Muscle Physiology

1. Factors Affecting Contraction

a) All or None Principle - a muscle fiber contracts 100% or not at all

❖ Explain how the intensity of a muscle contraction is controlled when muscle cells follow the "are all or none" principle.

Motor Units

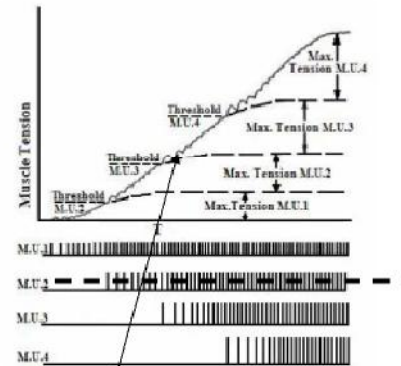
(1) A group of muscle fibers all controlled by one nerve.

(2) Motor Unit size determines muscle precision. (Think gears)

→ (a) Many small M.U. = fine control *Finger*

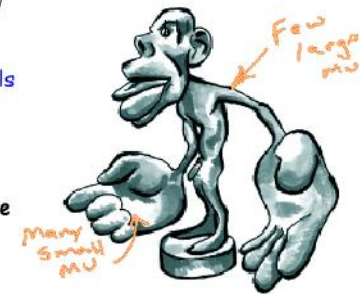
(b) Few big MU = coarse control *Leg*

(3) Purpose - simplified control (bank of lights on 1 switch), saves on # of brain cells needed



What explains the shakiness of the line as it increases?

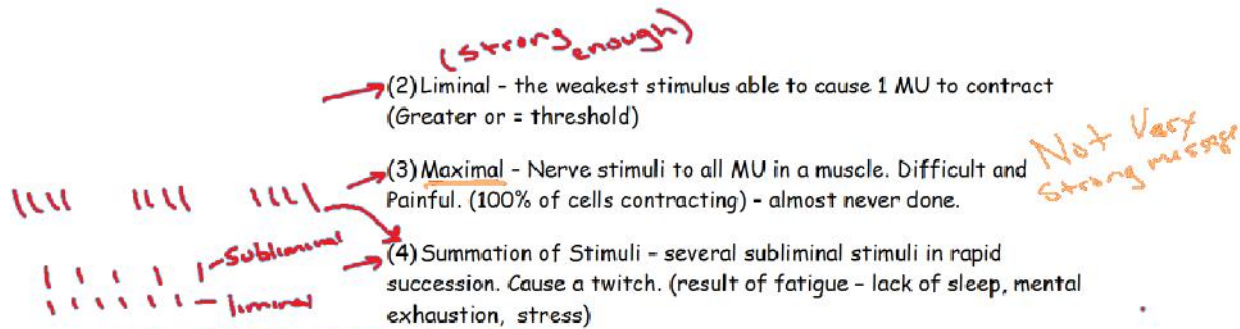
b) Nerve Stimulation (Threshold Stimulus - minimum frequency of impulses that a nerve will react to.)



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Too Slow → (1) Subliminal - a nerve message too weak to cause contraction (background noise) constantly generated

- as muscles get tired, they need stronger (faster) messages



*raise force Temp*

c) Temperature

(1) Increased temperature = more efficient contractions

d) Coordinated Muscular Activity

(1) Prime Mover - does most of the motion (biceps brachii)

*DO*

(2) Synergist - assists prime mover. Smaller. (brachialis, brachioradialis)

*HELP*

(3) Antagonist - Opposite of Prime mover. (triceps brachii)

*STOP*

*Slow down / stop motion*

## 2. Types of contractions

a) ~~Twitch~~ - single, isolated contraction of a MU

*Iso = Gravity*

b) Isometric - Contraction w/ no change in muscle length (against stationary object) "holding still"

*Yoga*

c) Isotonic (Isokinetic)

*Conc. > Gravity*

(1) Concentric - muscle shortens (against gravity/force)

*LIFT UP*

*Ecc < Gravity*

(2) Eccentric - Muscle Lengthens (with gravity or against current motion)

*Set Down*

d) Muscle Tone - Slight contraction of a resting muscle. Motor Units work in relays.

For Joint Protection



❖

Explain what type of contraction this is likely to produce and how you can tell.