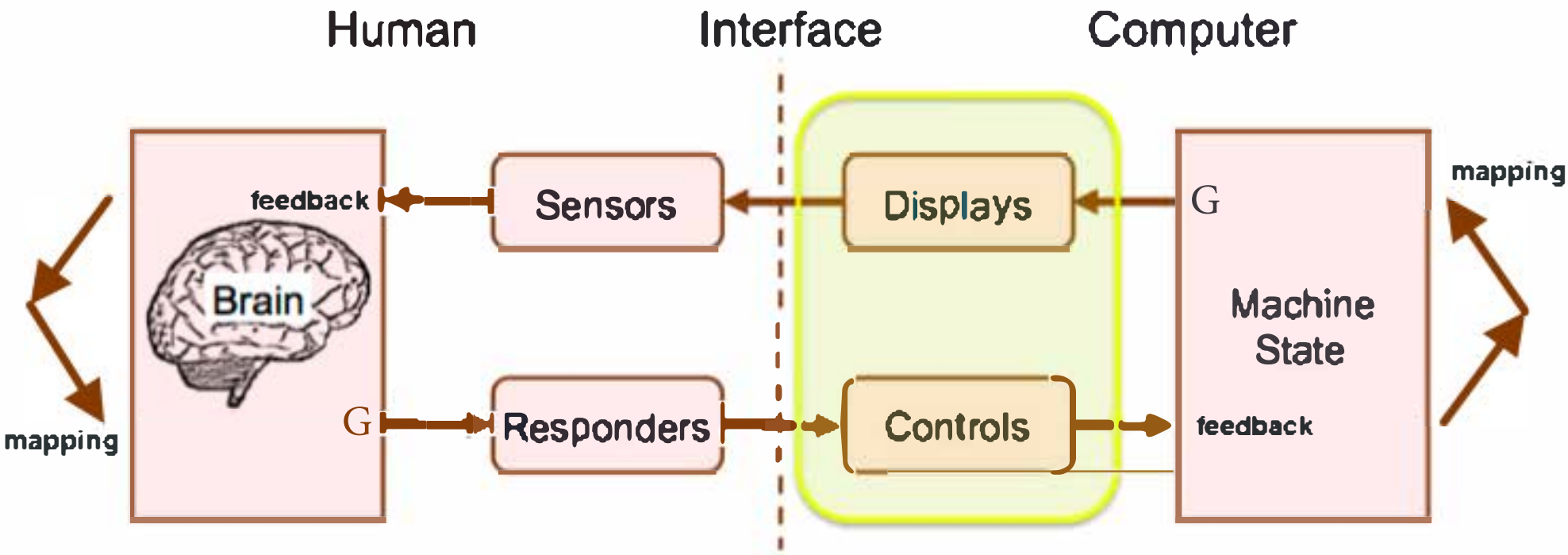
# HCI Models

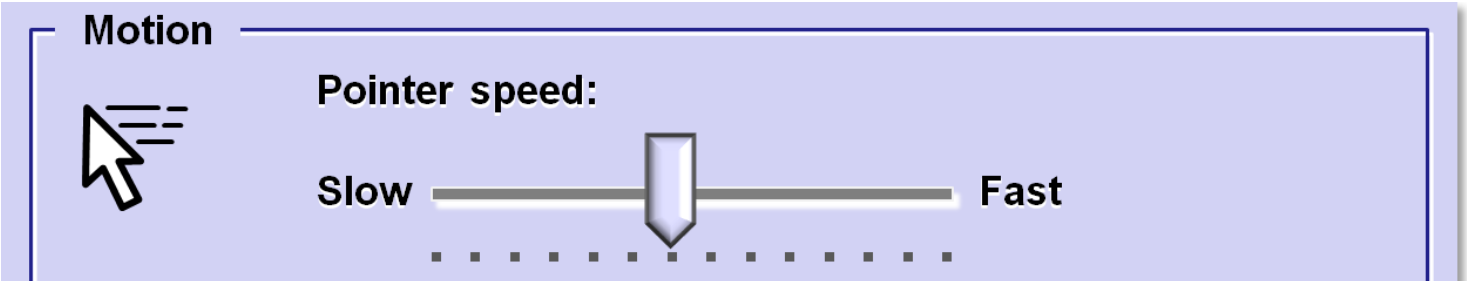
## BTH745 – Human-Computer Interaction

# HCI Model



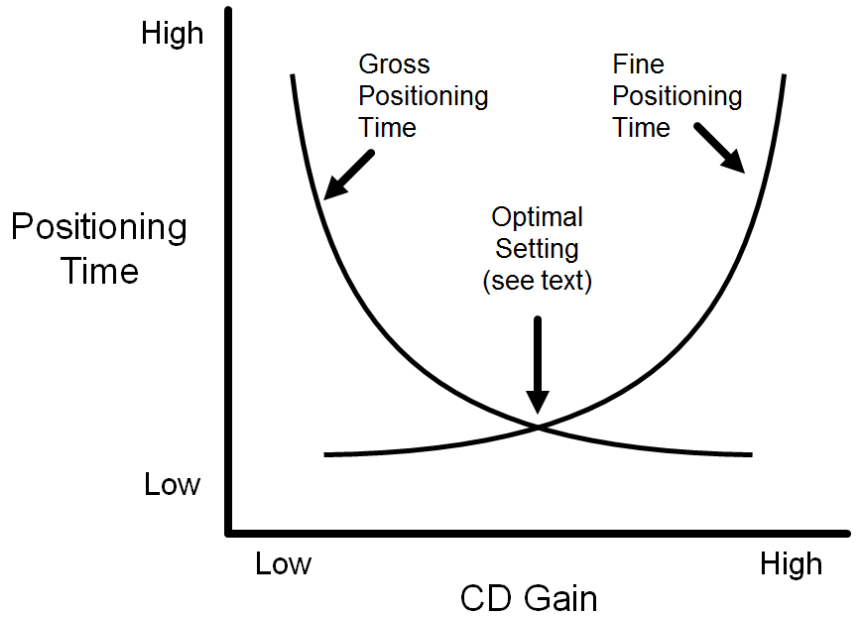
# CD Gain

- Quantifies the amount of effect in the display that is actually caused by a given responder output.
- For example: how much display movement for a given amount of controller movement?
- E.g., CD gain = 2 might imply that 2 cm of controller movement yields 4 cm of display movement
- Multiplicative constant: D = G x C
- Sometimes specified as the ratio D:C (since G=D/C)
- Typical control panel to adjust CD gain:



# CD Gain and User Performance

- Tricky to adjust CD gain to optimize user performance
- Issues:
  - Speed accuracy trade-off (what reduces positioning time tends to increase errors)
  - Opposing relationship between gross and fine positioning times:



# Latency

- *Latency* (aka *lag*) is the delay between an input action and the corresponding response on a display
- Usually negligible on interactive systems (e.g., cursor positioning, editing)
- May be “noticeable” in some settings; e.g.,
  - Remote manipulation
  - Internet access (and other “system” response situations)
  - Virtual reality (VR)

# Shannon Information Content

$$I = \log_2 N$$

*I* = information content in bits
*N* = number of possibilities
2 is the base (binary in this case)

# Shannon Information Content

$$I = -\log_2 p$$

*I* = information content in bits
*p* = probability
2 is the base (binary in this case)

# Fitt's Law

$$T = O_T + G \log_2 \left( \frac{D}{W} + 1 \right)$$

$O_T$: Time overhead.
$G$: Gain.
$W$: Width.
$D$: Distance

# Fitt's Law

$$T = G\left[O_I + \log_2\left(\frac{D}{W} + 1\right)\right]$$

$$O_T = GO_I$$

$O_I$: Information overhead.
$G$: Gain.
$W$: Width.
$D$: Distance

# Fitt's Law

$$T = O_T + GI_D$$

$$I_D = I(D, W) = \log_2 \left( \frac{D}{W} + 1 \right)$$

$I_D$ : Index of difficulty