

人因工程與工作環境

修平科技大學
工業工程與管理系

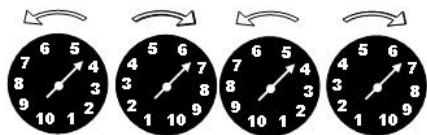
杜信宏

人因工程是

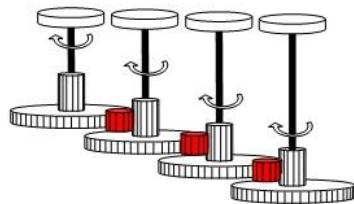
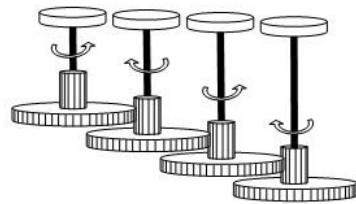
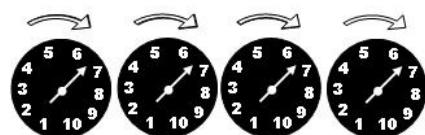
從瞭解人的性質、能力與限制，並將它們應用於器物、系統、環境和工作的設計，以達到舒適、安全與效率。

人因工程是

~~人就器物~~



器物就人



工作環境中的人因工程可能是？

生理方面：

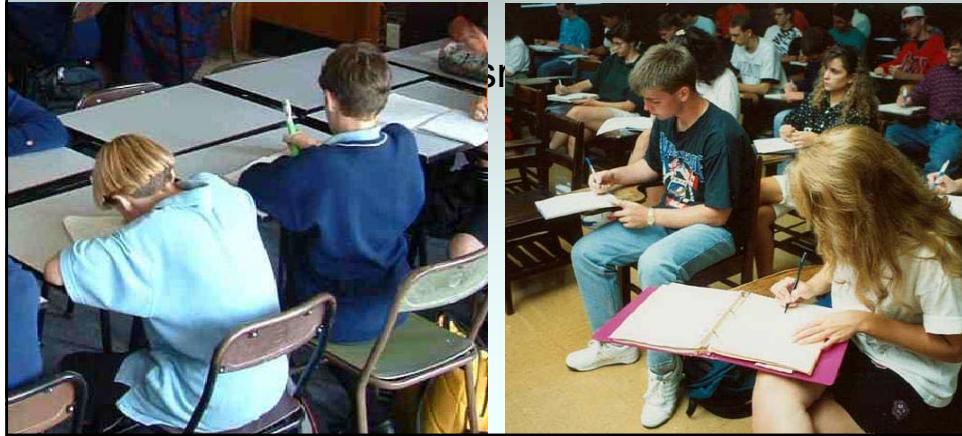
椅子設計
衣服、鞋子
洗衣機操作面板60°
車子設計
交通號誌與標示
手機介面
電燈開關

心理認知方面：

照明（光線）
噪音（聲音）
氣溫（冷熱）
溼度
震動

1. 讓”椅子設計” – 符合體型

- 小孩 Vs. 大人



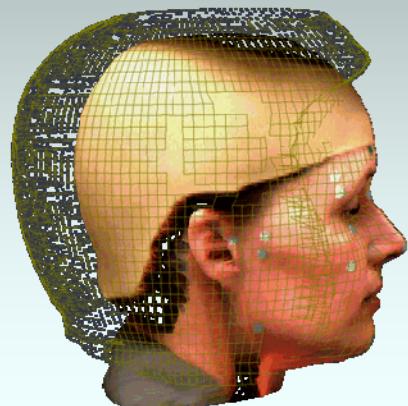
2. 讓”衣服鞋襪” – 符合體型

- 適合的身長胖瘦



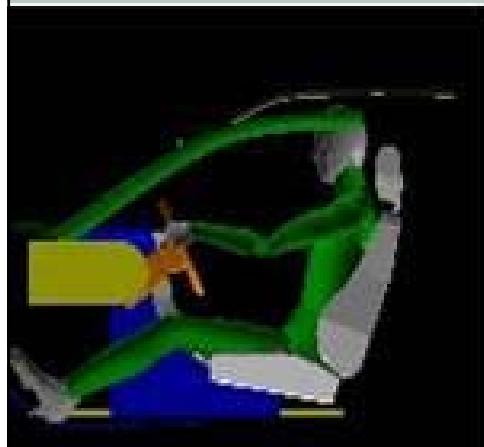
3. 也讓"頭盔、呼吸面罩"-符合體型

- 達到吻合、密和、與氣密

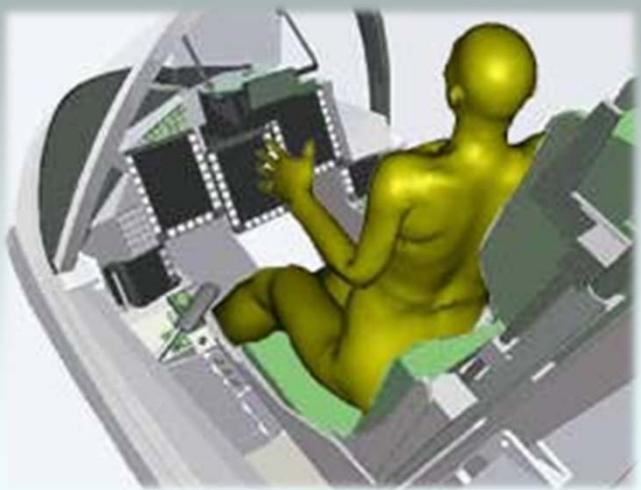


4. 當然，要讓"一切產品" - 符合體型

- 車子設計
- 腳踏車設計



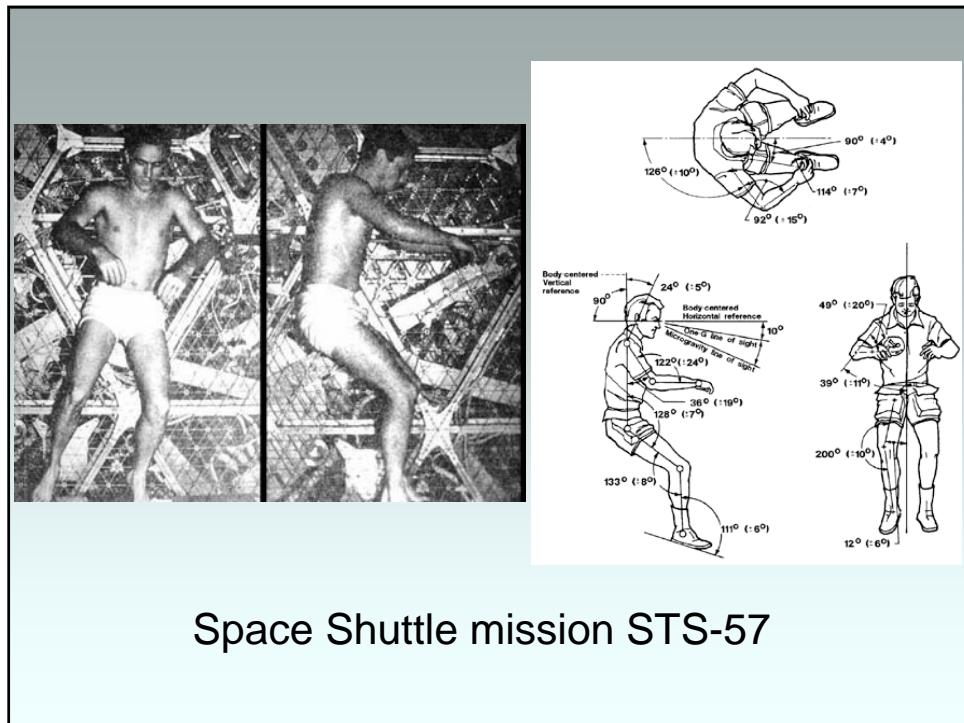
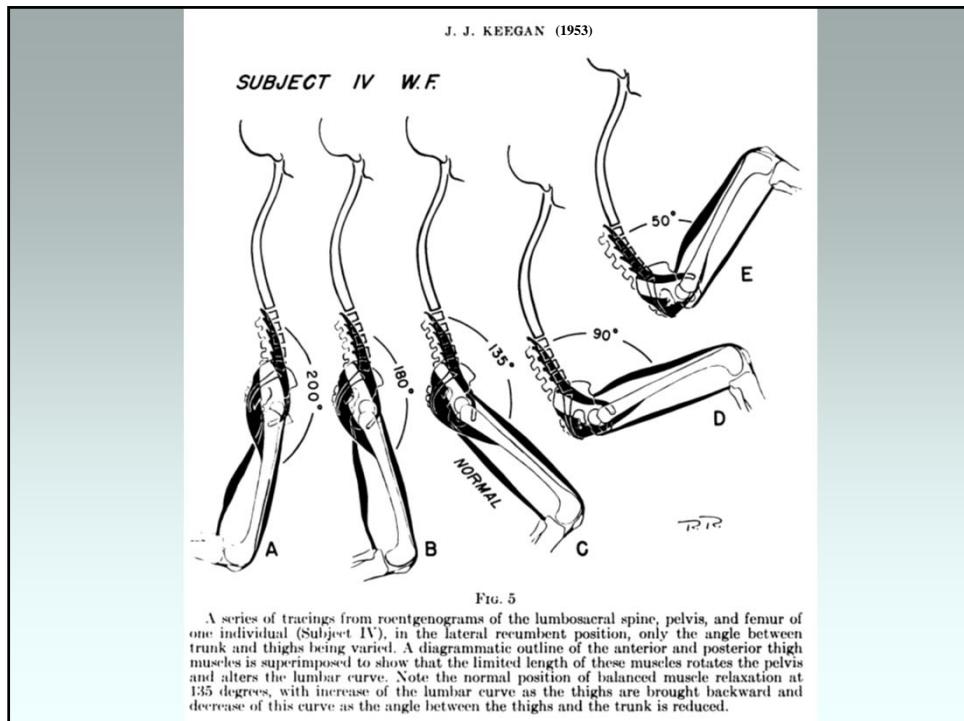
電子人模- 設計評估



5. 不只"體型"，還得符合"機能姿勢"需求

● 沙發 Vs. 縫紉

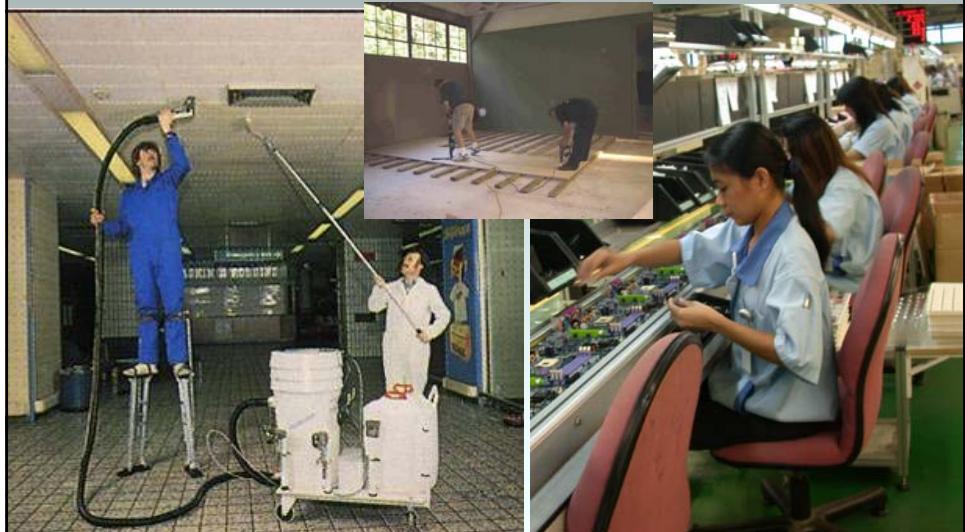






6. “工作”當然要符合“機能姿勢”需求

- 立姿、坐姿或其他

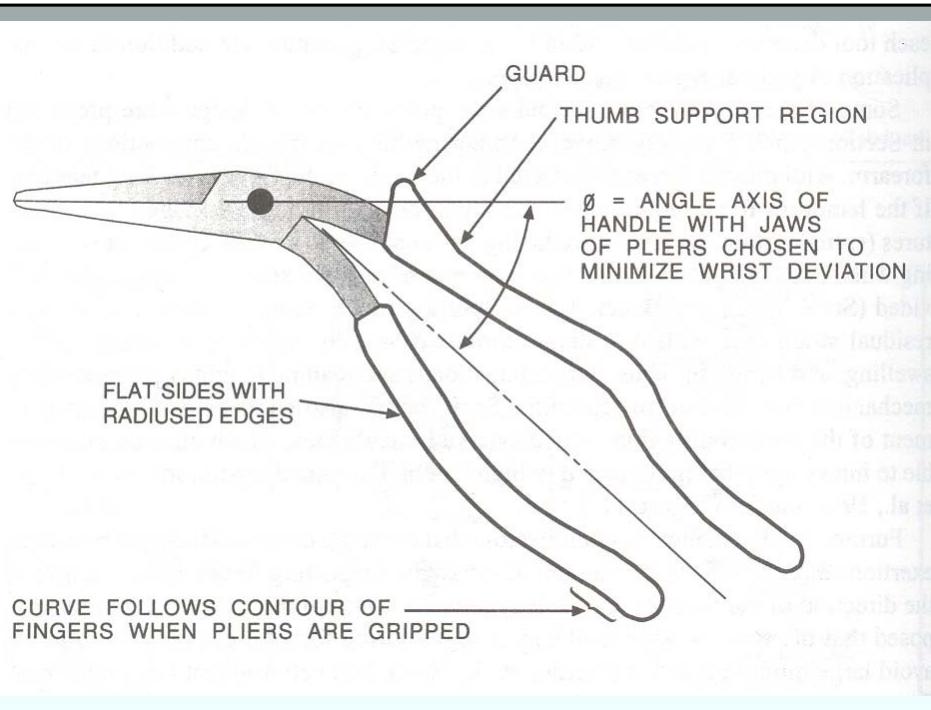


案例一 工作自然省力

- 坐姿

7. 手的“工作”更要符合“機能姿勢”需求

- 鉗子
- 屠體切割刀
- 鍵盤



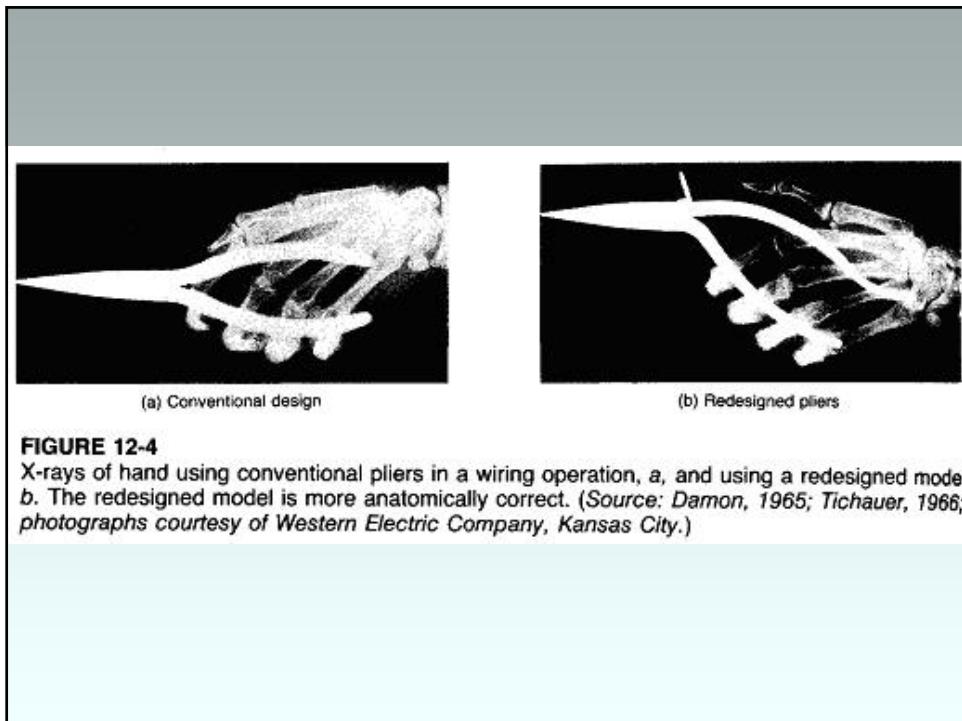
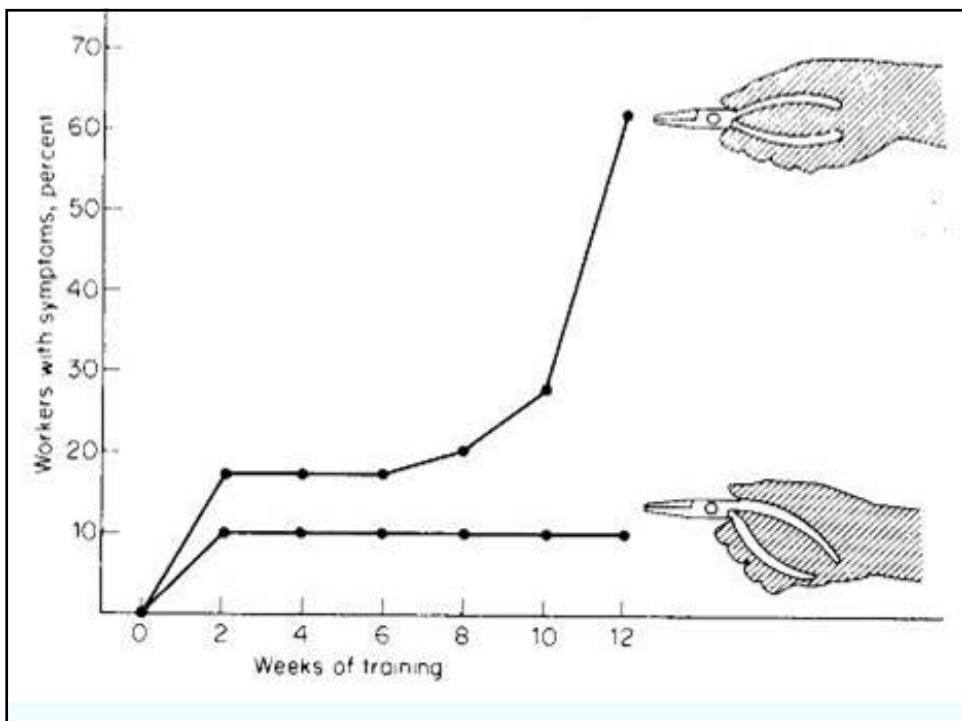
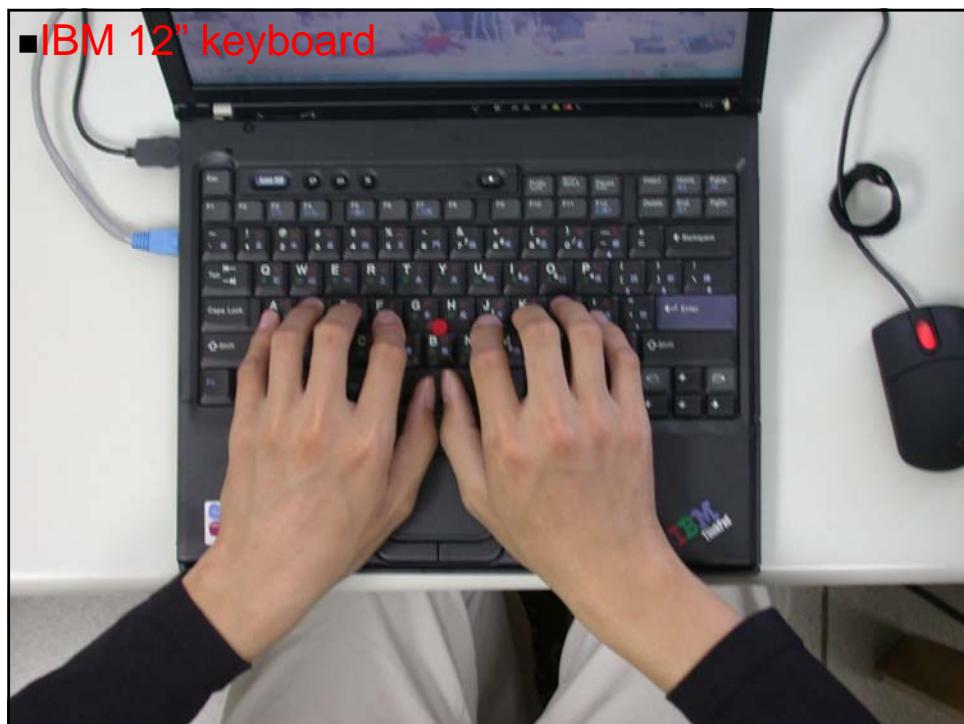
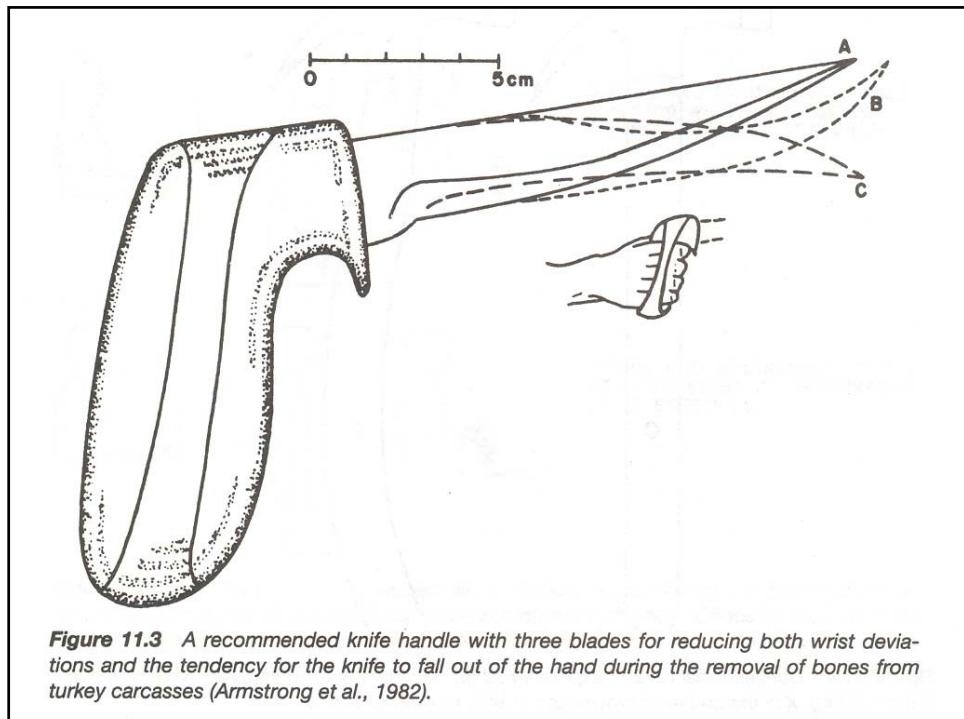


FIGURE 12-4

X-rays of hand using conventional pliers in a wiring operation, a, and using a redesigned model b. The redesigned model is more anatomically correct. (Source: Damon, 1965; Tichauer, 1966; photographs courtesy of Western Electric Company, Kansas City.)





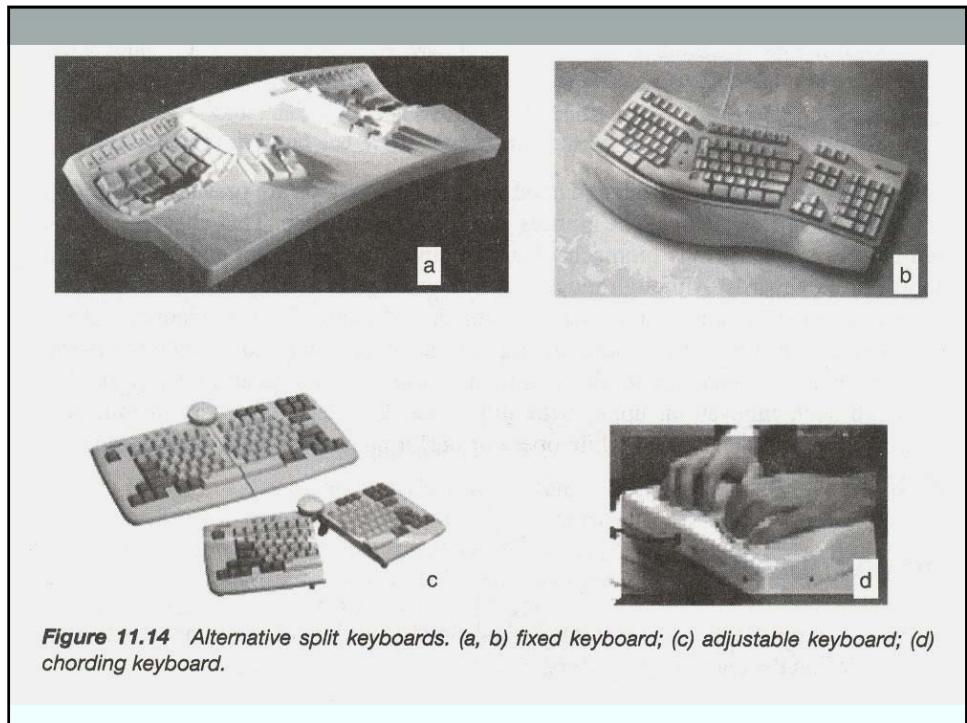
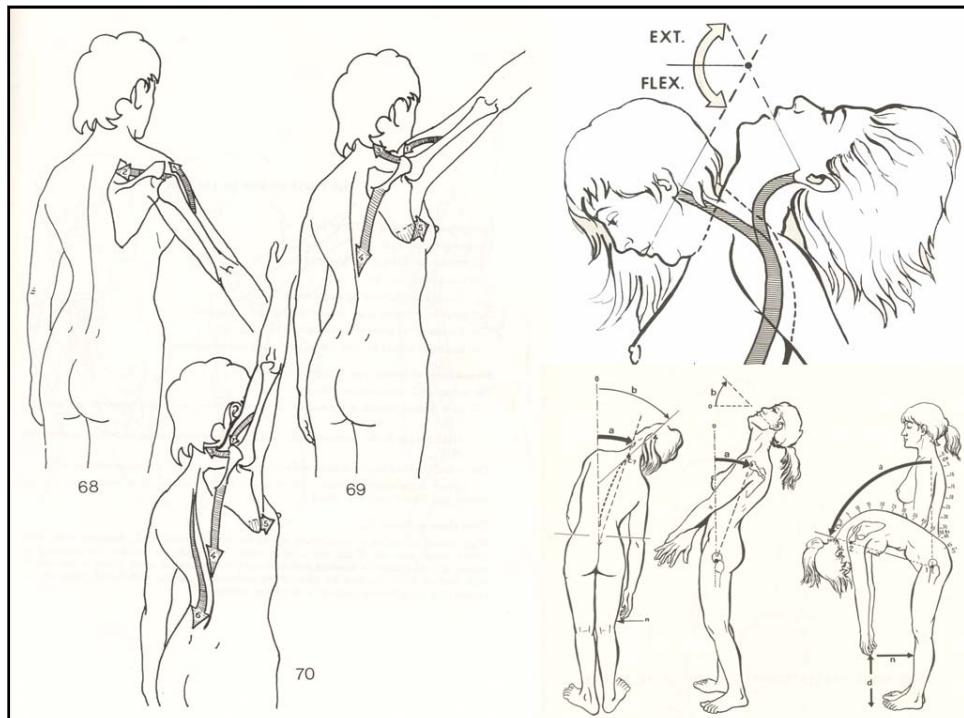
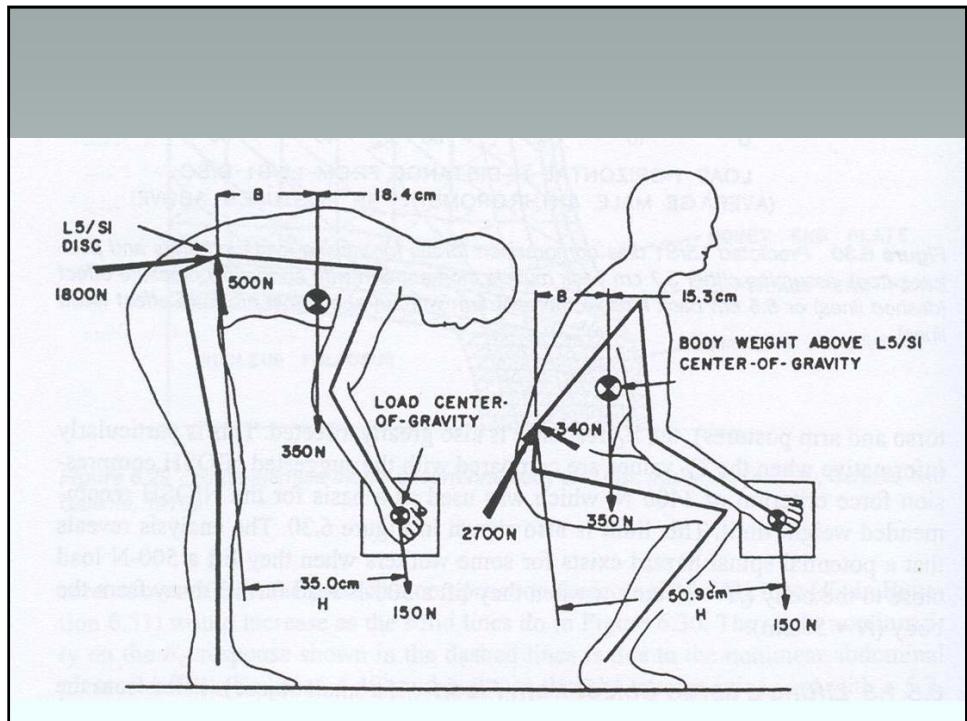


Figure 11.14 Alternative split keyboards. (a, b) fixed keyboard; (c) adjustable keyboard; (d) chording keyboard.

8. “姿勢”與“工作”必然照造成“壓力負荷”

●生物力學評估 - 物料抬舉、搬運





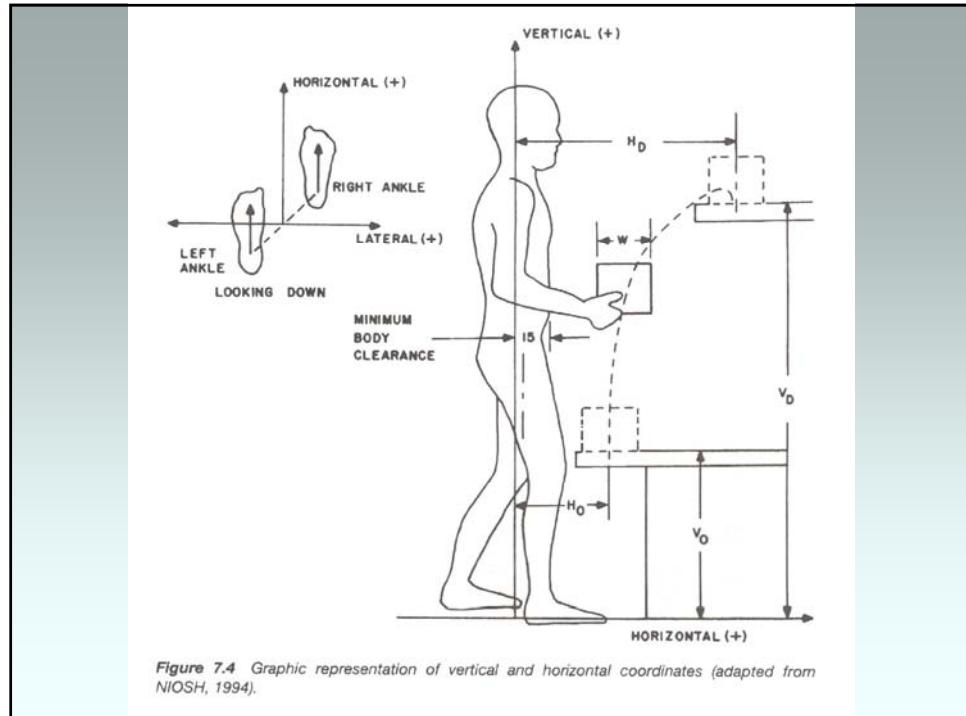
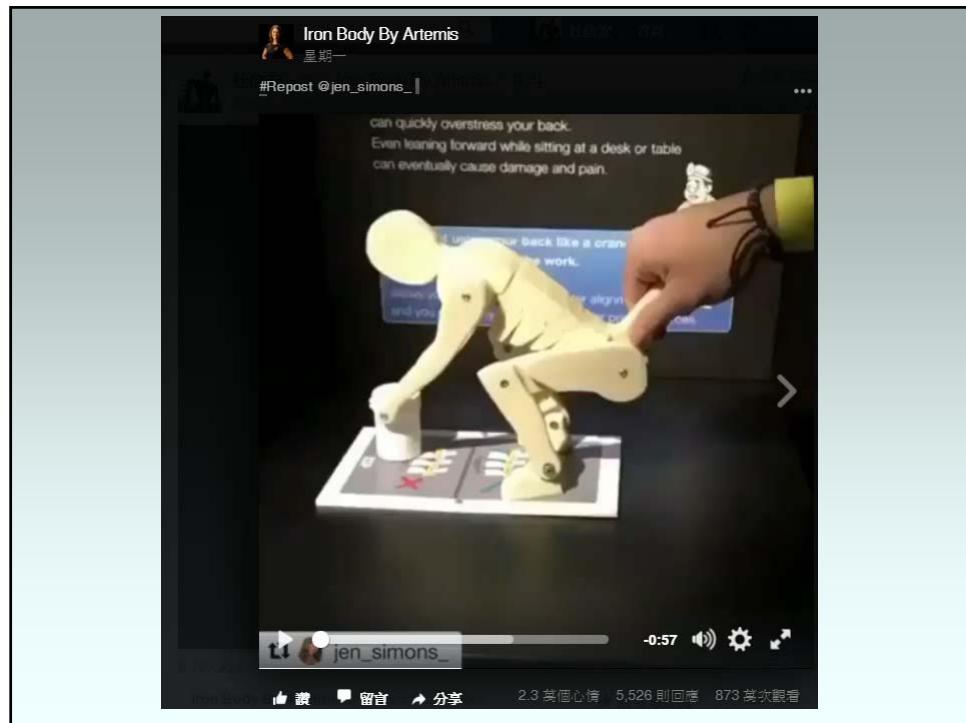


Figure 7.4 Graphic representation of vertical and horizontal coordinates (adapted from NIOSH, 1994).

9. “工作”也衝擊” 體能負荷”

- 耗能分析
- 疲勞與體溫調控



工作改善實例－塑膠料包裝機



工作改善實例—塑膠料包裝機



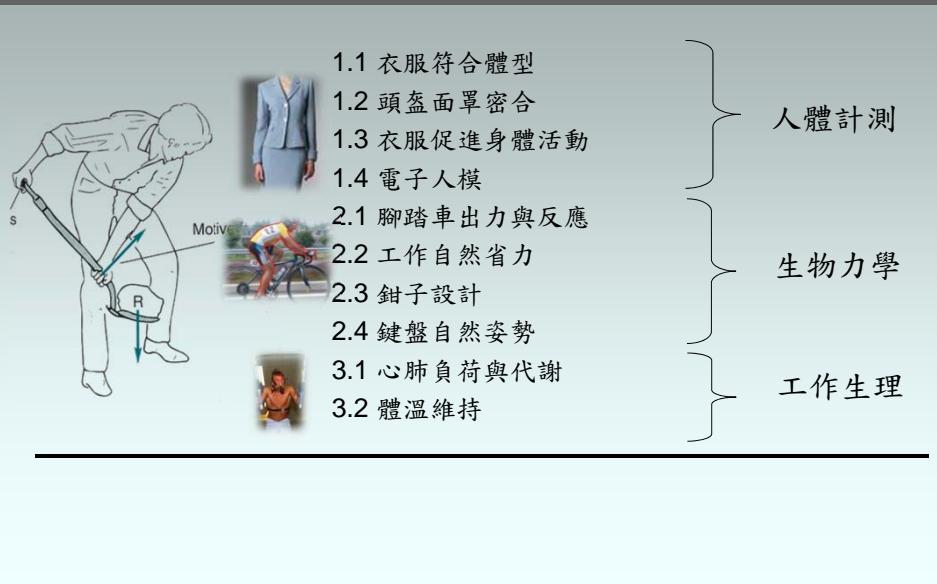
產品設計實例



一条 Yitiao 授權使用

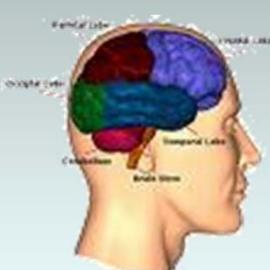
SETN 三立新聞網

人因工程？



人因工程？

與心理有關的

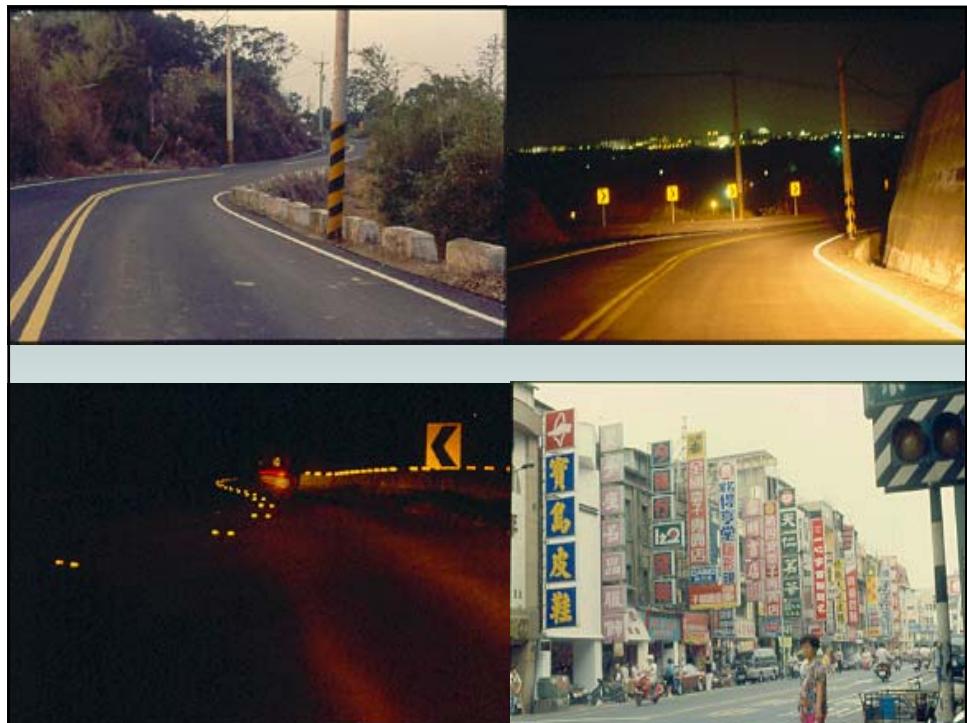


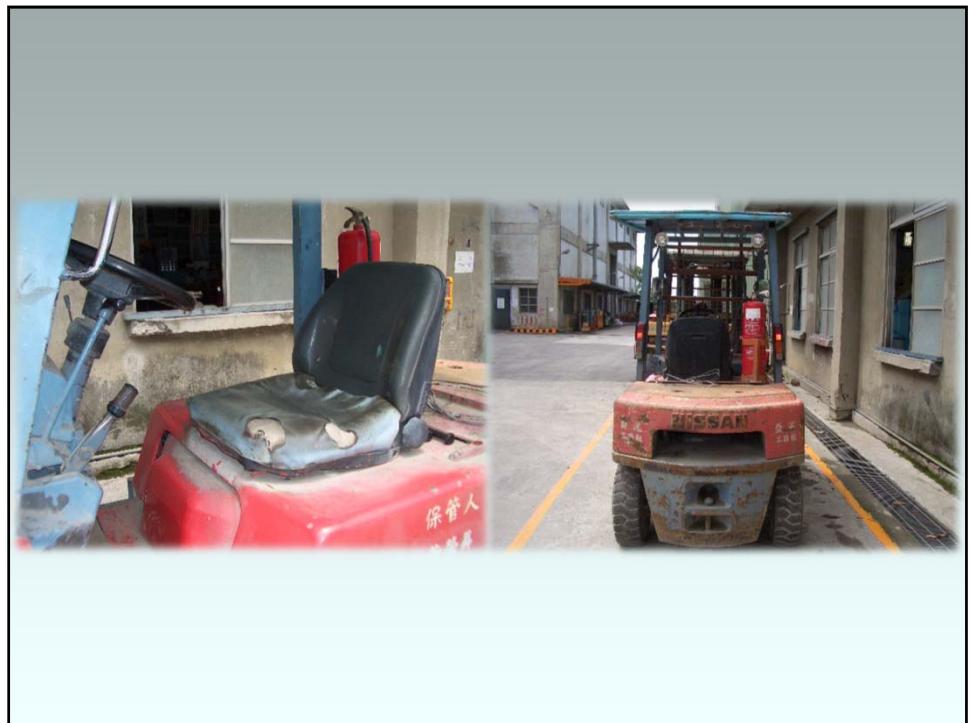
- 1.1 看（聽、觸）得到 感覺接收
- 2.1 降低記憶容量
- 2.2 資訊簡化
- 3.1 訊息群組
- 3.2 訊息標準化 訊息處理
- 4.1 空間相容性
- 4.2 移動相容性
- 5.1 觸覺感知(I)
- 5.2 觸覺感知(II) 人機介面

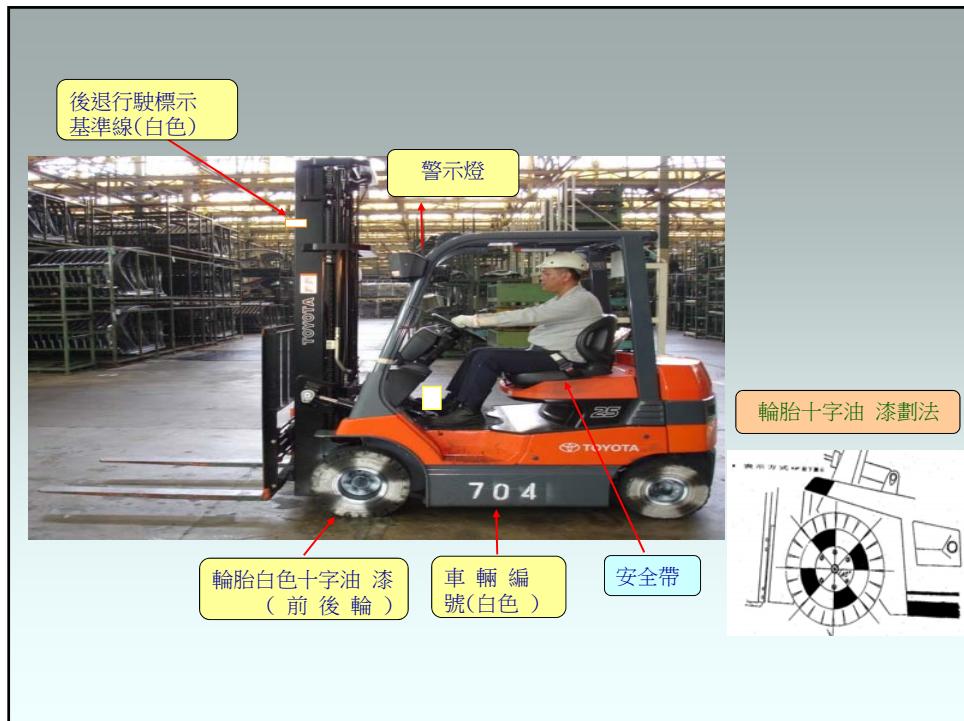
實例
公車系統設計 方向盤設計

1. 讓“訊息” – 在“感受”範圍

- 光線太暗；顏色不佳
- 聲音太小：吵雜







2. 讓"訊息" - 相容

- 相容性
 - 空間相容
 - 運動相容
 - 視覺與聽覺相容

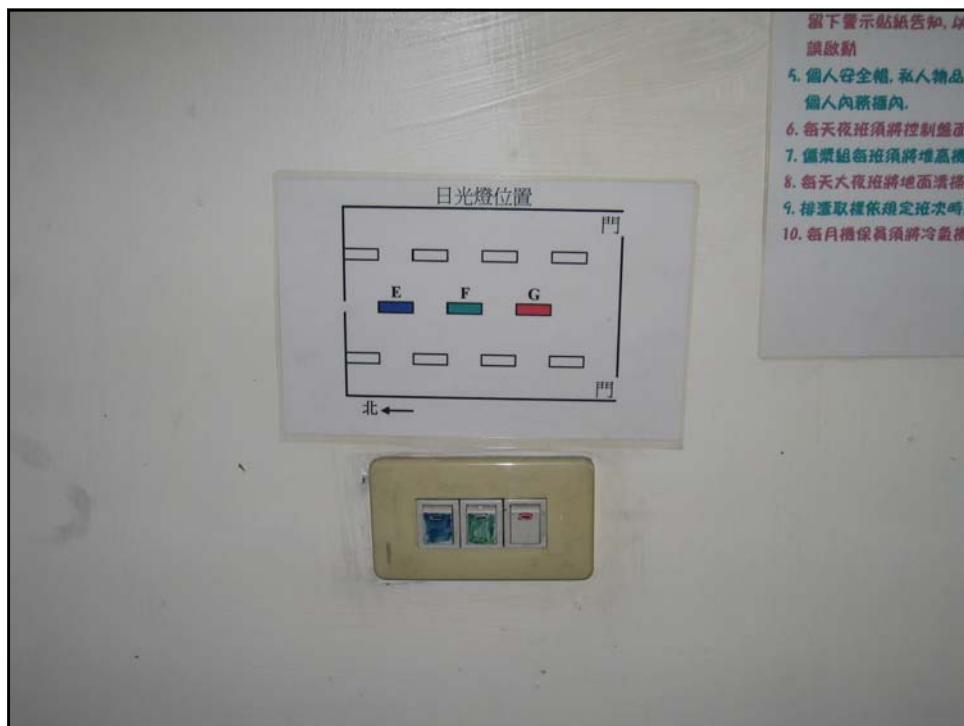
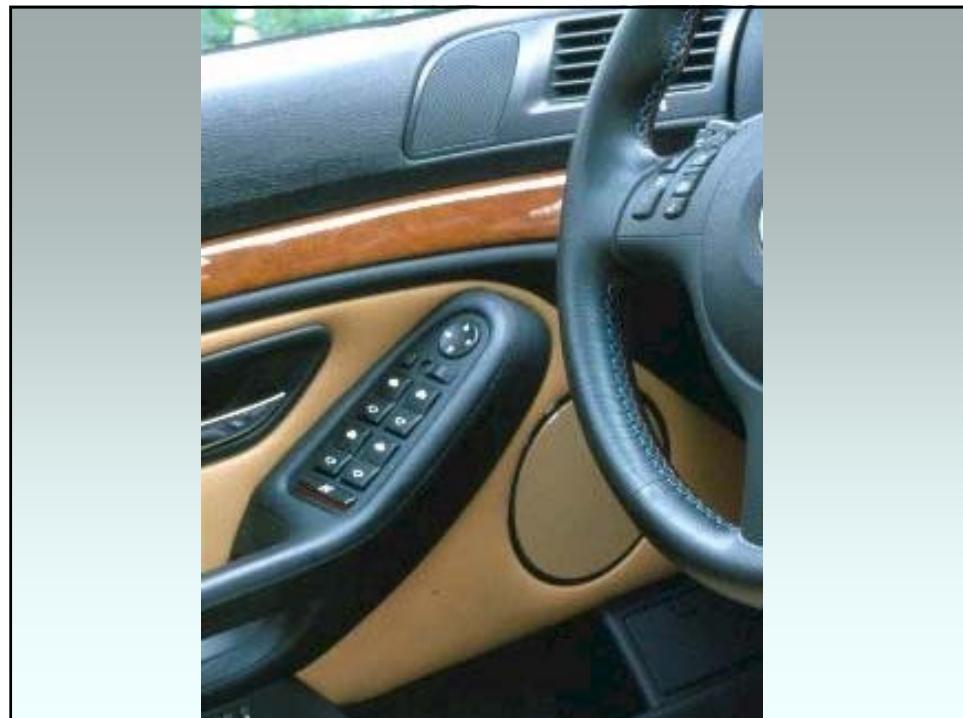
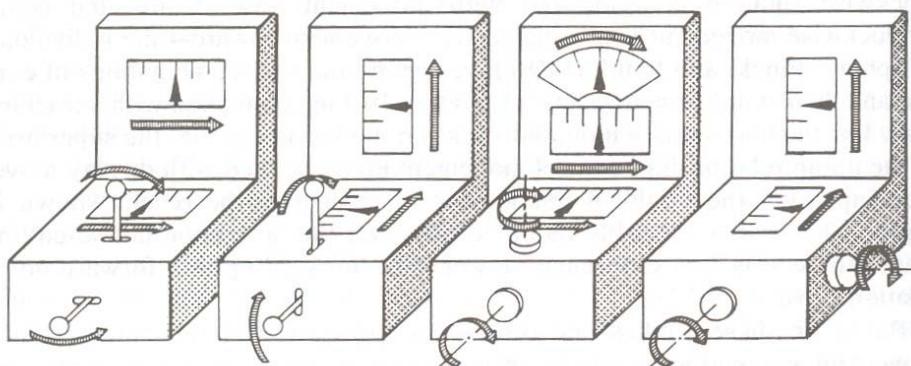


FIGURE 10-8.

Recommended movement relationships for rotary and stick-type controls and linear displays located in various planes. (Source: Grandjean, 1988, Fig. 112.)

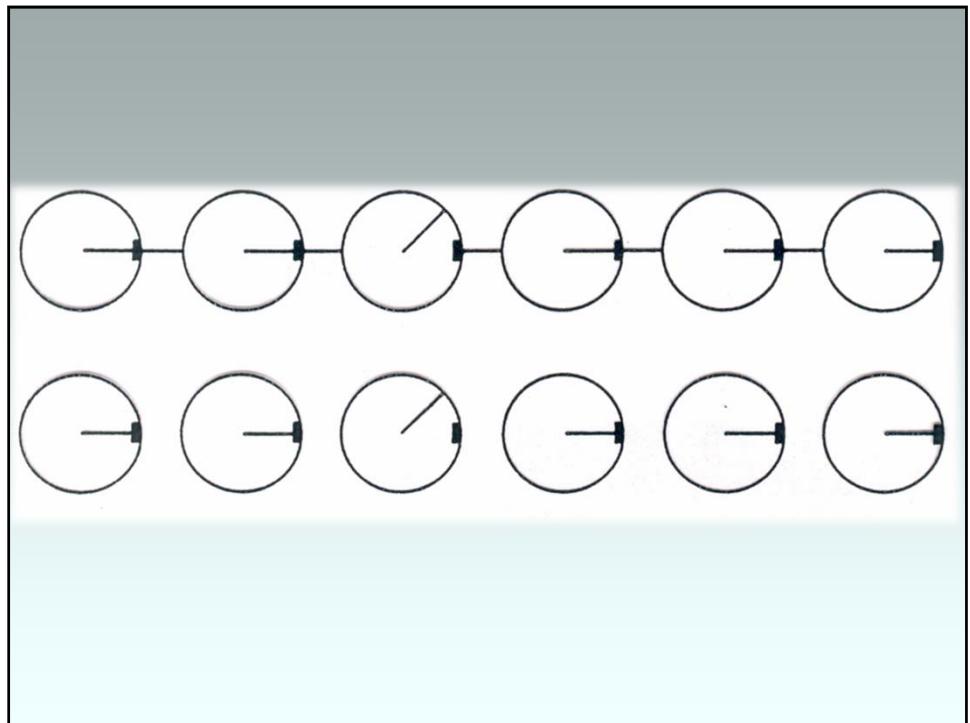


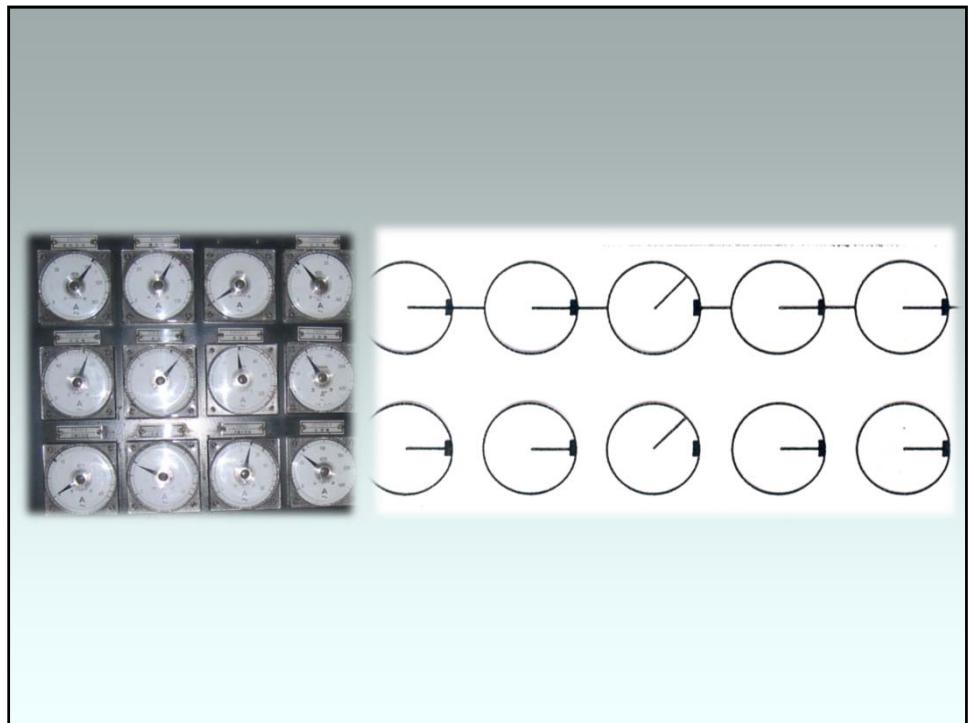


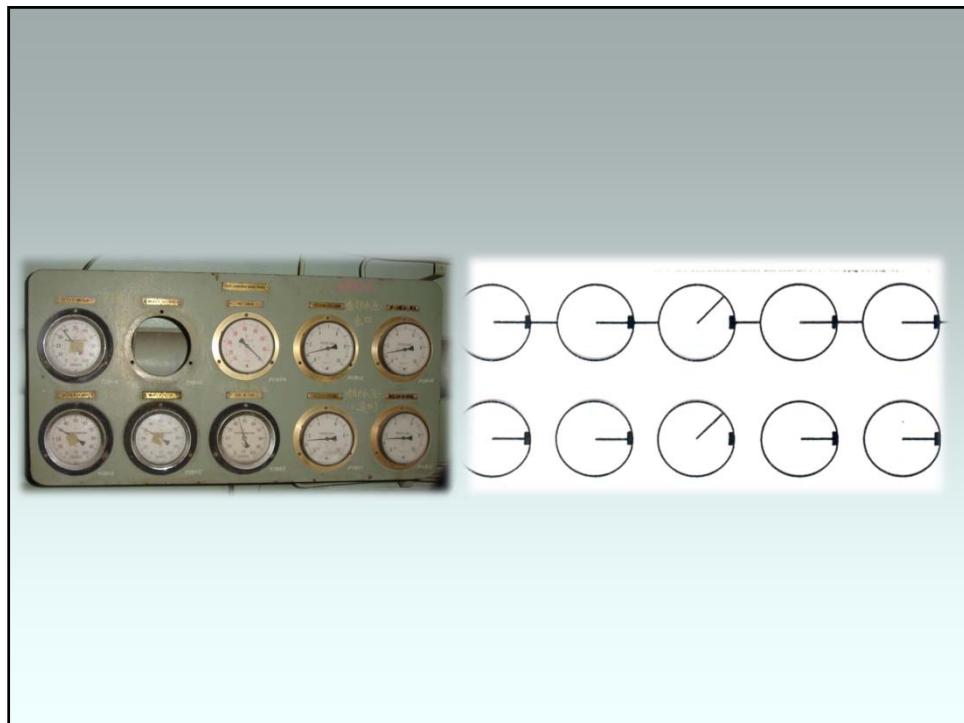


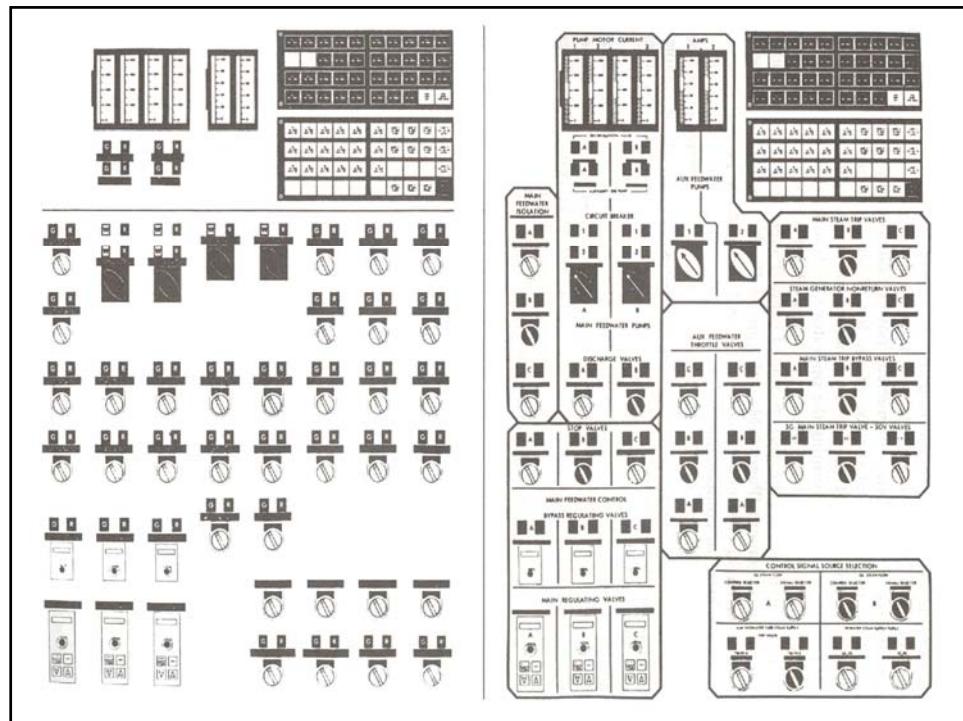
與心理有關的 - 3. 訊息簡化

- 簡化訊息處理
 - 檢核讀取
 - 儀表整合
 - 配電板分割
 - 表單







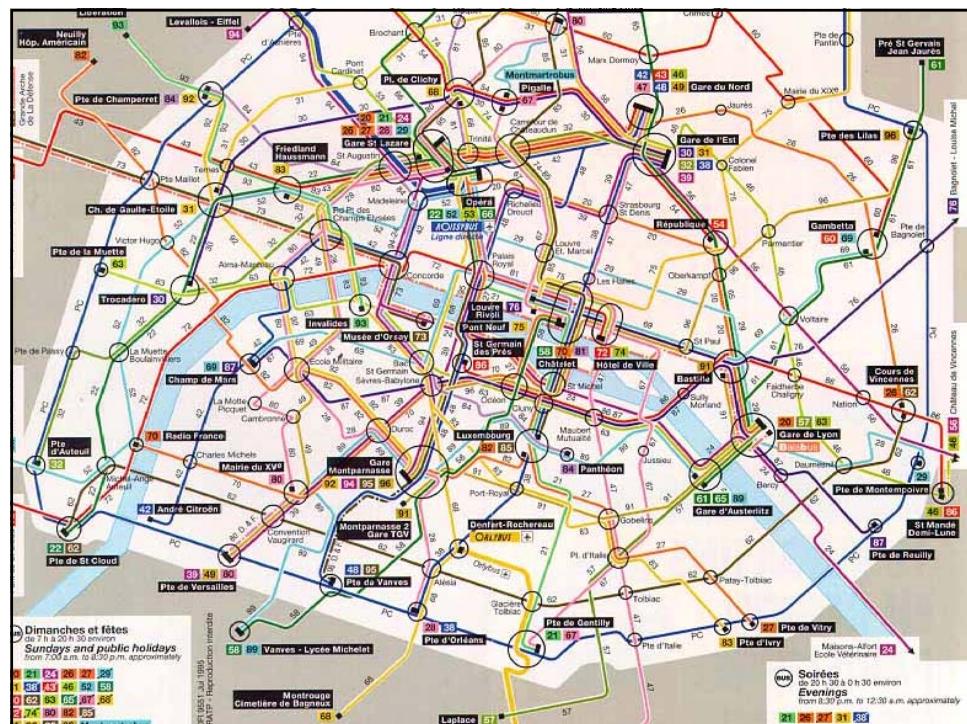
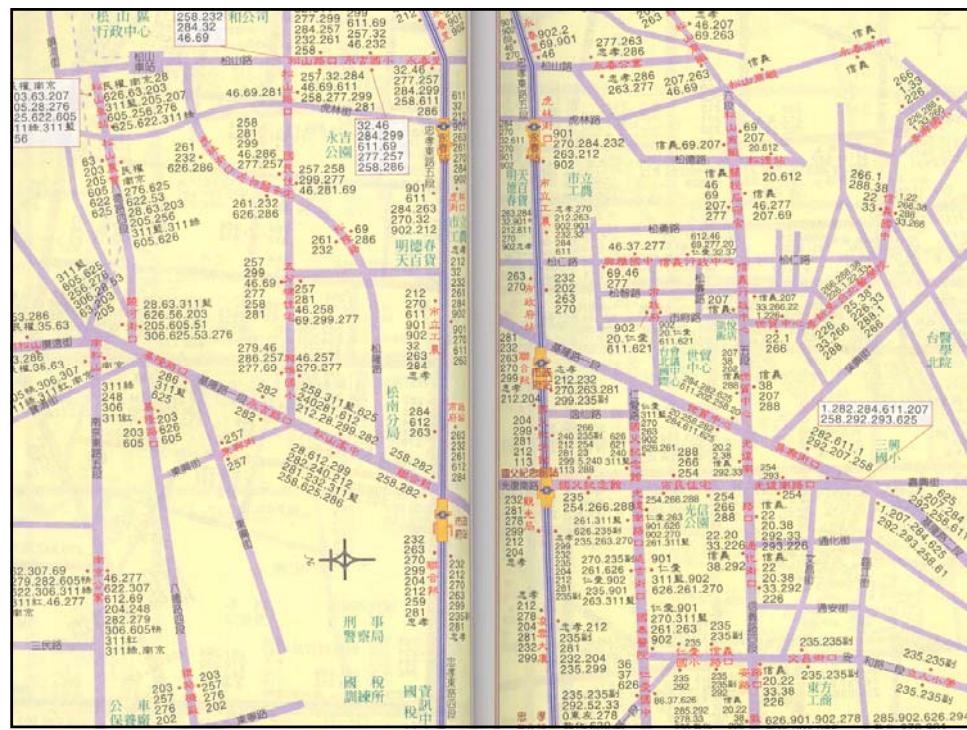


與心理有關的 - 4. 訊息直接化

● 訊息直接化輸入

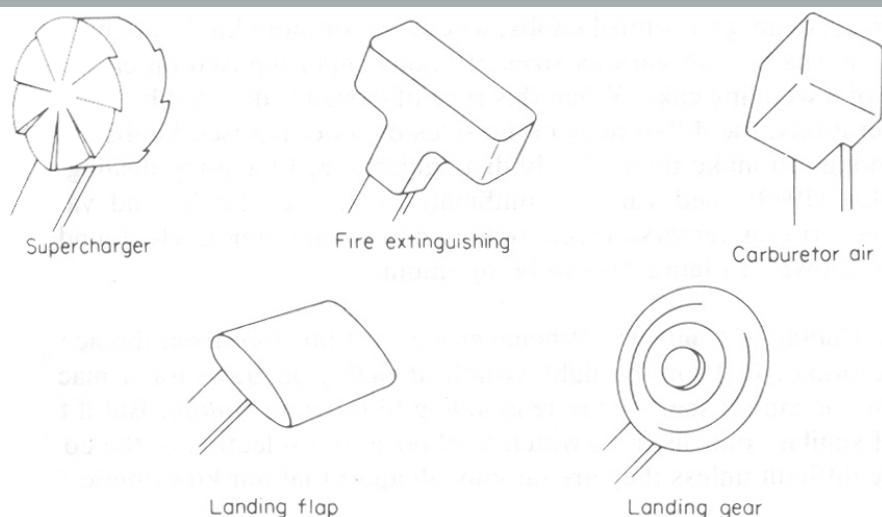
- 控制旋鈕
- 台北公車圖
- 巴黎公車捷運圖

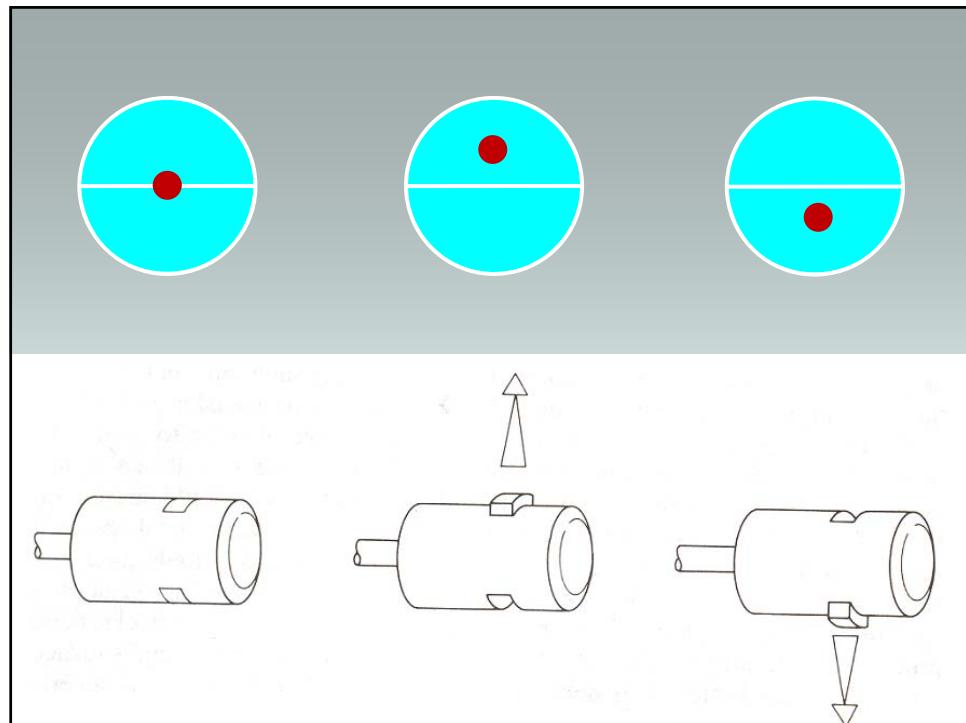




與心理有關的 - 5. 感知分攤

- 讓“觸覺”分攤視覺及聽覺的訊息處理
 - 飛機控制桿
 - 直昇機的水平
 - 遙控器設計

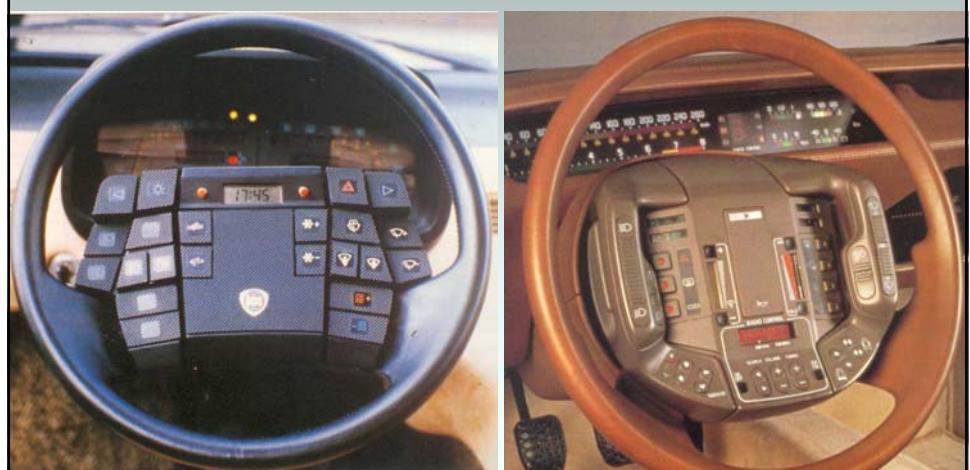






與生理有關的 - 設計實例

● 車子方向盤設計



人因工程是

瞭解人的性質、能力與限制，並將之應用於器具、系統、環境和工作的設計，以達到舒適、安全與效率。