Exercise walk-through

1.3 Cognitive ergonomics and human error

International Baccalaureate · IB Diploma · Design Technology · HL

Shape the grip to the hand

small, hard: a tight pinch
painful with arthritis



thin metal handle

open hand, less force:
easier for everyone

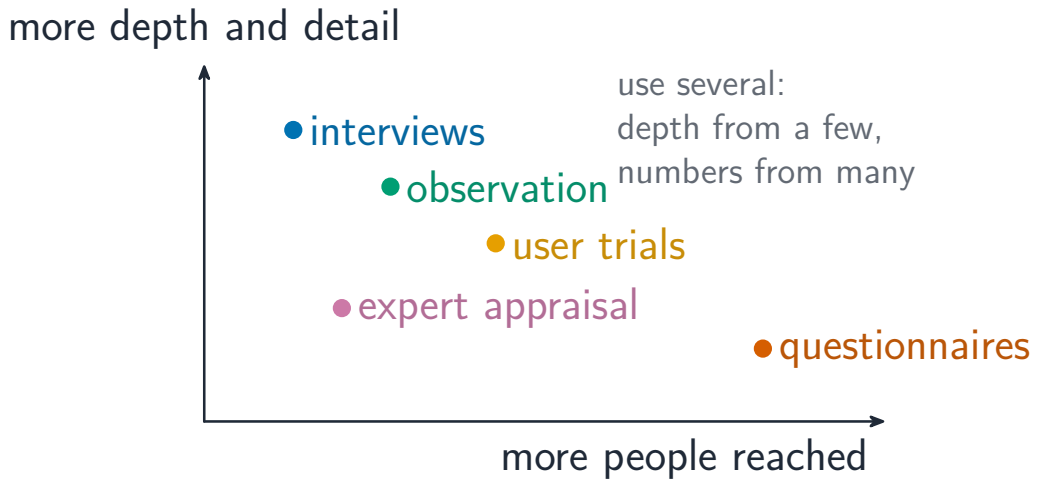


large soft oval grip with fins

design for the users who struggle most, and everyone benefits

> A grip designed for weak hands works for everyone

Depth against reach



> Choose the method by what you need to find out

Slip or mistake?

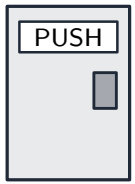
slip
right goal, wrong action
presses the button next door
fix: bigger, spaced controls;
confirm important actions

mistake
wrong goal or plan
a poor mental model
fix: clear signifiers, feedback,
consistent interfaces

> Fix slips with layout; fix mistakes with signifiers and **feedback**

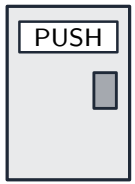
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2.1 Define **affordance** and **signifier**. [2]



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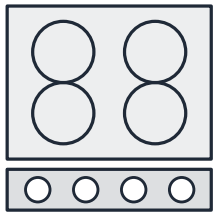


2.1

affordance: the actions that a design allows / suggests, e.g. a flat plate affords pushing; signifier: a signal that shows where or how to act, e.g. a “push” sign

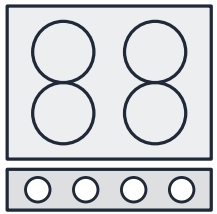
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2.2 A cooker has four burners in a square and four knobs in a row. Explain why users often turn on the wrong burner, and suggest an improvement. [3]



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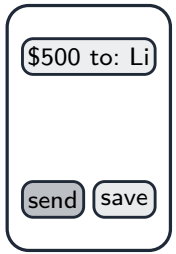


2.2

poor mapping: the layout of the knobs does not match the layout of the burners; so users cannot tell which knob controls which burner; improvement: knobs arranged in a square like the burners / a burner diagram next to each knob

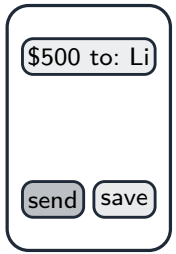
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2.3 Distinguish between a **slip** and a **mistake**, with an example of each when using a banking app. [4]



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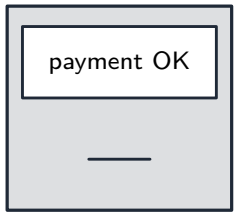


2.3

slip: the right intention but the wrong action; e.g. tapping “send” instead of the button next to it; mistake: the wrong goal or plan, from a poor mental model; e.g. sending money to a saved contact the user thought was someone else

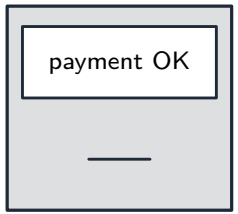
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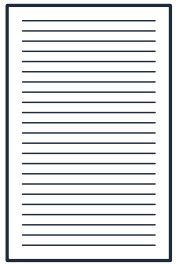


2.4

feedback shows that an action has worked, e.g. a beep and “payment accepted” on the screen; so the user does not press again or pay twice / knows what to do next

Exercise 2.5

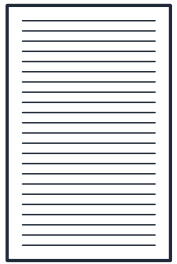
2.5 A settings menu shows 24 options in one long list. Using **information overload** and **Hick's law**, explain how it could be redesigned. [3]



24 options

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24 options

2.5

Hick's law: each extra choice makes a decision slower, so 24 options are slow to scan; group the options into a few labelled categories / show the most-used options first; so users recognize what they need instead of holding many options in memory

Exercise 3.1 (a)

3.1 Many passengers buy the wrong ticket from a railway ticket machine, and some press **cancel** by accident when they want to pay.

(a) State what is meant by a **mental model**. [1]

Exercise 3.1 (a)

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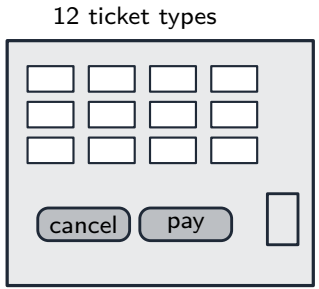
(a) State what is meant by a **mental model**. [1]

(a) the user's own idea of how the product works, which they use to predict what will happen

Exercise 3.1 (b)

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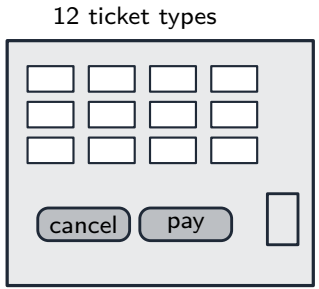
(b) Explain how **one** slip and **one** mistake could happen with this machine. [4]



Exercise 3.1 (b)

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(b) Explain how **one** slip and **one** mistake could happen with this machine. [4]



(b) slip: the cancel and pay buttons are next to each other and look the same, so a user aiming at pay presses cancel; mistake: 12 similar ticket buttons with unclear labels, so a user who misunderstands the ticket types chooses the wrong one

Exercise 3.1 (c)

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(c) Suggest **two** design changes that use feedback or constraints to reduce errors. Explain each change. [4]

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(c) Suggest **two** design changes that use feedback or constraints to reduce errors. Explain each change. [4]

(c) any two, explained: a summary screen of the chosen ticket and price before payment, so users can check (feedback); cancel asks “are you sure?” / is moved away from pay (constraint); pay is disabled until a ticket is chosen (constraint)

Exercise 3.1 (d)

3.1 Many passengers buy the wrong ticket from a railway ticket machine, and some press **cancel** by accident when they want to pay.

(d) The redesigned machine will be tested. Evaluate using user trials rather than expert appraisal for this test. [7]

Exercise 3.1 (d)

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(d) The redesigned machine will be tested. Evaluate using user trials rather than expert appraisal for this test. [7]

(d) award up to [7]: user trials use real passengers, including tourists, older people and people in a hurry; they show real errors and give measurable data, e.g. wrong tickets per 100 sales, time to buy; but they take time, need many users and informed consent; expert appraisal is quick and cheap and uses knowledge of usability principles; but experts are not typical users and may miss problems; judgement: use expert appraisal first to fix obvious problems, then user trials, because only trials show whether passengers' errors really fall