Falsely Blaming Yourself

- We often make mistakes when using devices, software, etc.
- For a complex task, this is reasonable and expected.
- For a simple task (or one that *appears* so)

WE BLAME OURSELVES

CS 66-460
Introduction to Graphical Human Machine Interfaces

The Psychology of Everyday Actions

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Norman's Credo About Errors

- If an error is possible, someone will make it.
- Designers should
  - assume all possible errors will occur.
  - minimize the chance of errors.
  - minimize the effects of errors when they do occur.
  - make it easy for users to detect errors.
  - make it possible to reverse the effects of an error.

People Will Make Errors

- Complex devices (software) will always require some instruction.
- Someone using them without reading the manual (very common among computer users!) should be expected to make errors and to be confused.
- As designers, we should **design for error**:
  - minimize the possibility for error
  - make errors as "cost-free" as possible

Where To Place the Blame?

- When something goes wrong, who do we blame?
- For difficulties with technology ...
  Simple tasks (or tasks we think others can do) ...
  - **we blame ourselves**
- In more complex cases, we have a tendency to search for the cause of an event

  We find a **perceived** casual relationship between the thing being blamed and the result.
  - **we blame others**
  - **we blame the environment**
- We blame problems of other people on their personalities.
- But ... really ...

a faulty mental model is at work!

Misconceptions of Everyday Life

- Misconceptions can be due to “naive” or “folk” understandings (e.g., Aristotle’s naive physics).
- But mostly due to **faulty conceptual models** we form.
- Models are based on whatever knowledge we have (*real* or *imaginary*, *naive* or *sophisticated*).
- Models are constructed out of fragmentary evidence, with a poor understanding of what is happening.
- People do not have erroneous theories...
- Instead we form mental models to explain what we observe
- With the lack of complete information, we let our imaginations run free as long as the model accounts for the faults as we **perceive** them.

Helplessness

- **Learned Helplessness**

  Occurs when a person experiences failure numerous times and then decide that the task cannot be done (at least by them!) so, they are helpless.

- **Taught Helplessness**

  Occurs when a person generalizes his instances of failure to other similar tasks (i.e., I am no good at math or I can't cope with new technology).

  - Cycle: you fail at something; you think it is your fault; you think you cannot do that task; the next time you are confronted with that same task, you dont even try!

When Things Go Well

- Just the opposite happens!
- When we think we did something very well
  - we give ourselves credit
  - we praise our forceful personalities
  - we praise our intelligence
- Others, however, credit our success
  - to the environment

Norman's Seven Stages of Action

1. Forming the goal.

   EXECUTION

2. Forming the intention.
3. Specifying an action.
4. Executing the action.

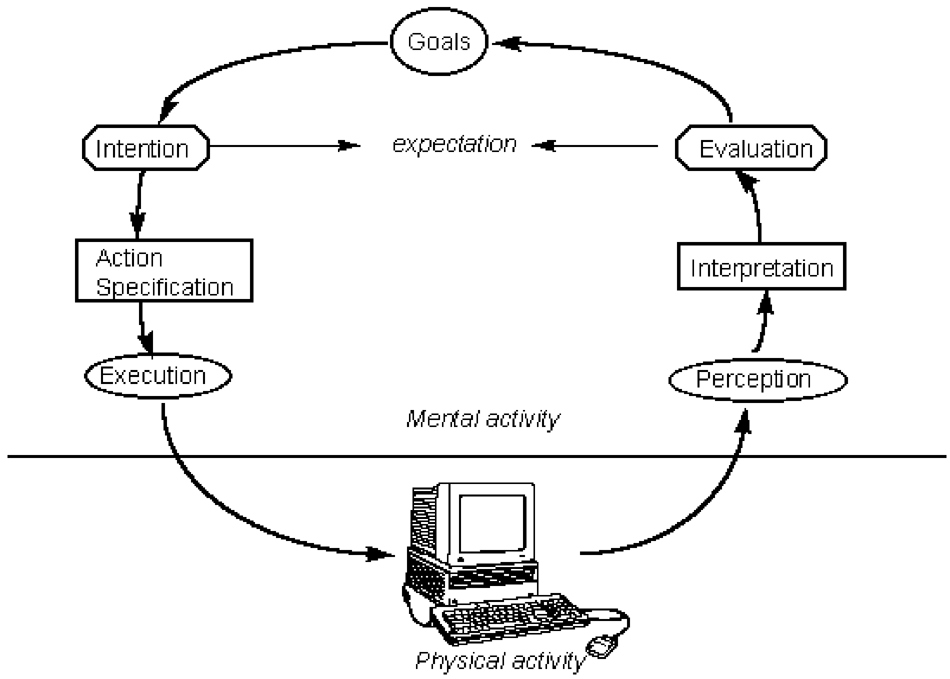
   EVALUATION

5. Perceiving the states of the world.
6. Interpreting the state of the world.
7. Evaluating the outcome.

The Nature of Human Thought and Explanation

- Not always easy to attribute the blame for a failure
- Dramatic, life-threatening accidents can result when blame is incorrectly assessed.
- When something goes wrong, we strive to find an explanation
- Once we find a **suitable** explanation, we think the discrepancy is solved!
- Can mean disaster!
  - Three-mile island
  - Lockheed L-1011

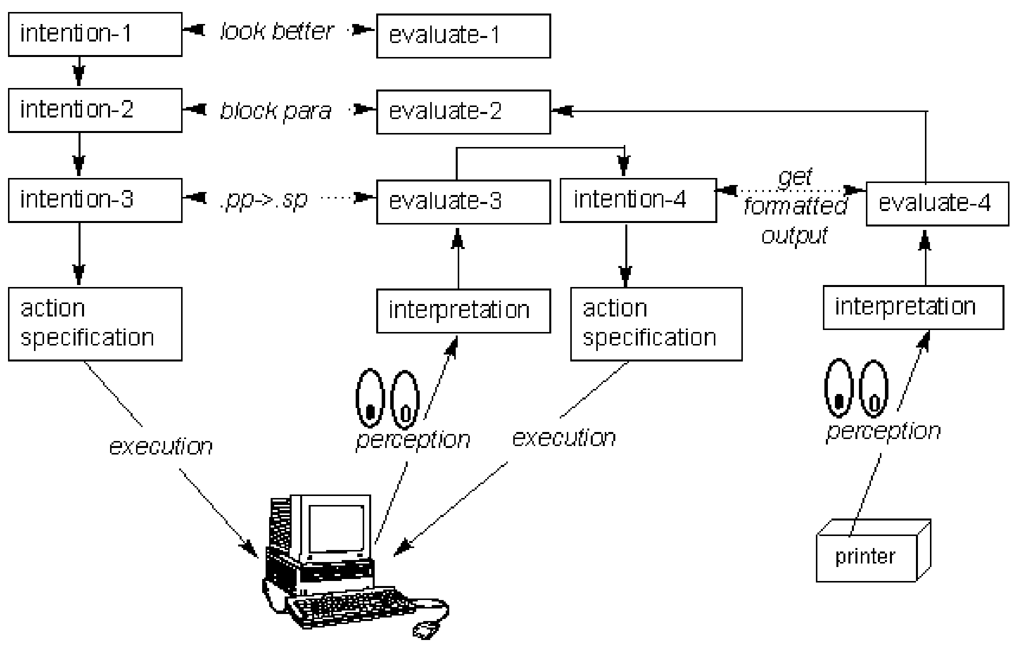
The Stages of User Activities When Performing a Task



The Seven Stages as an Approximate Model

- Stages are not discrete entities.
- Not all stages are required for every goal.
- Most goals not satisfied by a single action.
- Numerous sequences
- May span seconds or minutes or hours or days.
- Continuous feedback
  - results may spawn other goals and other actions
  - goals lead to subgoals
  - intentions lead to sub-intentions
- In a large activity, intermediate goals can be forgotten, discarded, or reformulated.

A Typical Task: Improving a Business Letter



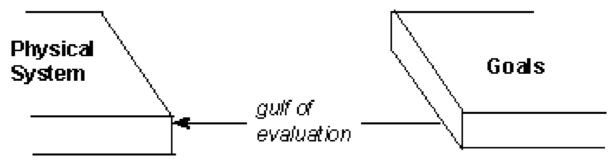
Opportunistic Actions

- Humans do not plan everything.
- We are spontaneous.
- Goals are often ill-formed and vague.
- We respond to events in the world.
- We are **data-driven**, as events in the world around us unfold, we introduce new goals, which lead to new actions, as **opportunity** allows us.

The Gulf of Evaluation

Reflects the amount of effort a person must exert to interpret the physical state of the system and to determine how well the expectations and intentions have been met.

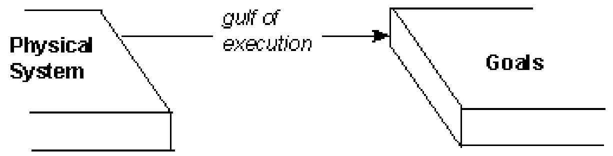
- Does the system provide a physical representation that can be directly perceived?
- Can the person easily interpret representation in terms of his intentions and expectations?



The Gulf of Execution

Refers to how well the system/device enables a person to perform the intended actions directly without extra effort.

- How well does the system allow the person to do the intended actions directly?
- Do the actions provided by the system match those intended by the person?



The Seven Stages as a Design Aid

- Questions we can ask to ensure the gulfs are “bridged”:
  How easily can the user ...

Forming the goal
Determine the function of the device?

Forming an intention
Tell what actions are possible?

Specifying an action
Determine mapping from intention to physical movement?

Executing an action
Perform the action?

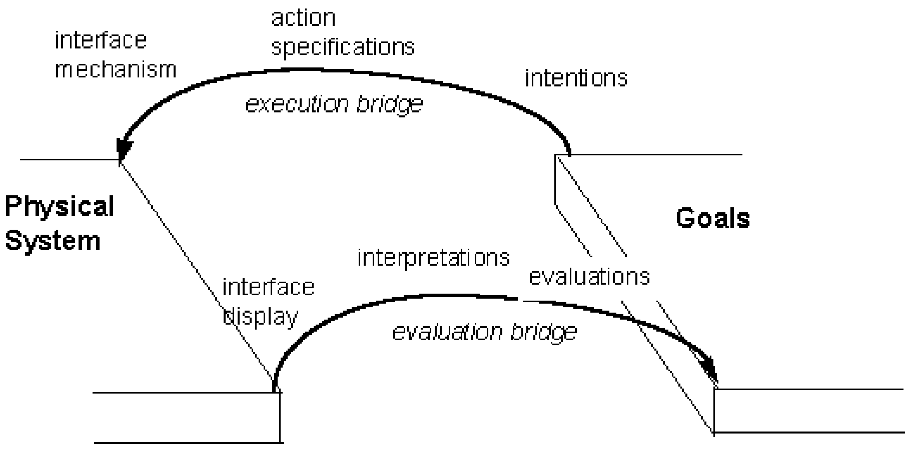
Perceiving the state of the world
Tell if the system is in the desired state?

Interpreting the state of the world
Determine the mapping from system state to interpretation?

Evaluating the outcome
Tell what state the system is in?

THE WORLD

Bridging the Gulfs



Leads Back to Our Design Principles

- Provide a **good conceptual model**

  Coherent system image.
  Consistency in presentation of operations and results.
  Metaphor?

- Make things **visible**

  Is the state of the system easily visible?
  Can alternative actions be easily found?

- Use a **good mapping**, a natural one if possible

  Show relationships between

  - actions and results
  - controls and their effects
  - system state and what is visible

- Provide **feedback**

  Continuous feedback of results and actions.