GOMS as a Simulation of Cognition

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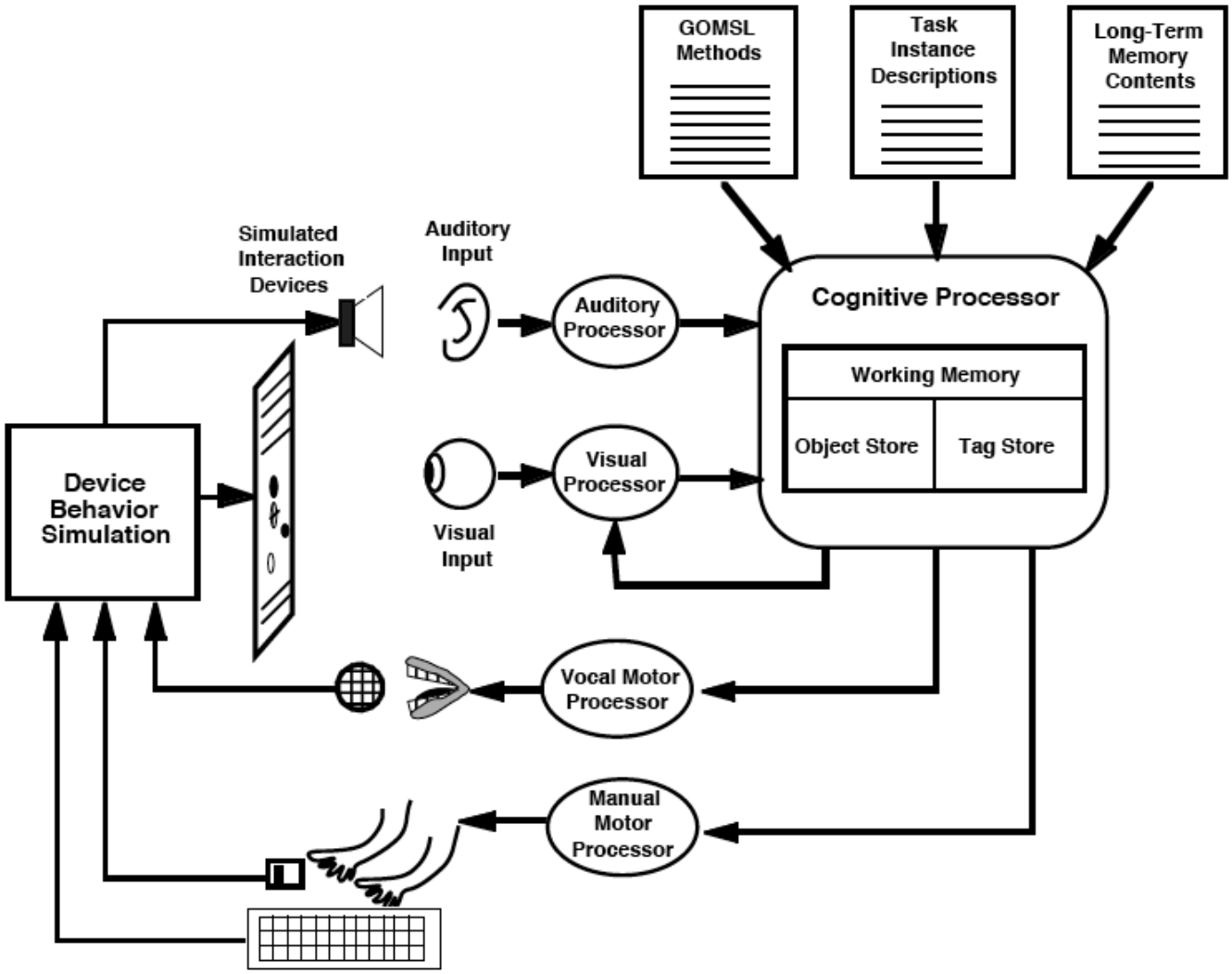
Cognitive architectures

- "Brain emulator"
  - Simulates the computation we think the brain does (for doing a given task…).
  - Provides structures to store symbols
  - Provides instructions to manipulate symbols
  - Hypothesis: Goal-driven, Problem-solving, symbolic computation.

GOMS Architecture



Example: Check email

- Procedure check_emails
  - Goal Login
  - Goal read_email
    - Goal memorize_sender's_name
    - Goal read_email_body
  - Goal reply_email(x)
    - Selection rule Select_appropriate_formulation(x)
      - Goal reply_email_friend
        - » Operator Type (Hi <x>)
        - » …
      - Goal reply_email_familly
        - » Operator Type (Dear <x>)
        - » …
  - Loop
  - Goal: Logout

Mental operations

Visual buffer

Perceived_item: John

Long term memory

(John, relation, friend)

(Jack, relation, family)

(email, name, John)

Goals

Reply_email_friend
Reply_email_family
memorize_sender's_name

Selection rule

If Perceived_item = X
And (X, relation, friend)
Then Process goal
reply_email_friend

How To Use GOMS

1. Analyze hierarchical structure of a task
   a. coarse analysis focuses more on the cognitive structure of a task
   b. fine analysis focuses more on the structure imposed by the specific interface design
2. Analyze alternative methods
3. Assign operators to base level goals
4. Assign times to operators
5. Sum the operator times

Operator Times

Press key on keyboard	280 ms
Use mouse to point to object on screen	1,500 ms
Move hand to pointing device	300 ms
Move eyes to location on screen	230 ms
Retrieve item from memory	1,200 ms
Learn a single step in a procedure	25,000 ms
Select among methods	1,200 ms

More available in ABCS, GOMSL and CM&N

Summary

- A method to describe tasks and how a user performs those tasks with a specific design
  - bridges task analysis with a specific interface design
  - error-free, goal-directed, and rational behavior
- Views humans as information processors
  - small number of cognitive, perceptual, and motor operators characterize user behavior
- To apply GOMS:
  - analyze task to identify user goals (hierarchical)
  - identify operators to achieve goals
  - sum operator times to predict performance