

Theories and Constructs

Theory development and testing

- Theories as organizations of observables
- Constructs, latent variables and observables
 - Observables
 - Multiple levels of description and abstraction
 - Multiple levels of inference about observables
 - Latent Variables
 - Latent variables as the common theme of a set of observables
 - Central tendency across time, space, people, situations
 - Constructs as organizations of latent variables and observed variables

Theories as metaphors and analogies-1

- Physics
 - Planetary motion
 - Ptolemy
 - Galileo
 - Einstein
 - Springs, pendulums, and electrical circuits
 - Models of simple harmonic motion
 - The Bohr atom
- Biology
 - Evolutionary theory
 - Genetic transmission

Theories as metaphors and analogies-2

- Business competition and evolutionary theory
 - Business niche
 - Adaptation to change in niches
- Learning, memory, and cognitive psychology
 - Telephone as an example of wiring of connections
 - Digital computer as information processor
 - Parallel processes as distributed information processor

Examples of psychological constructs and their operationalization as observables

- Anxiety
 - Trait
 - State
- Love
- Conformity
- Intelligence
- Learning and memory
 - Procedural - memory for how
 - Episodic -- memory for what
 - Implicit
 - explicit

Models and theory

- Formal models
 - Mathematical models
 - Dynamic models - simulations
- Conceptual models
 - As guides to new research
 - As ways of telling a story
 - Organizational devices
 - Shared set of assumptions

Psychological Theories: the organization of constructs

- Examples from Cognitive Psychology
 - Ratcliff's diffusion model
 - Atkinson and Shiffrin model of memory
 - Broadbent's Maltese Cross metaphor
- Examples from Personality and Motivational Psychology
 - Revelle and Humphreys personality-motivation-performance model

Ratcliff Diffusion model

- Basic description of speed of processing and errors in decision making
- Unification of speed and accuracy
- Accuracy as a tradeoff between willingness to say yes, and willingness to say no
 - Signal detection theory of Yes/No judgments
 - Sensitivity (d') and bias (β) of decision making

Semantic Priming and word recognition

- You will be shown a series of slides, some of them are words, some are non-words.
- Say yes if it is a word, no if it is a non-word

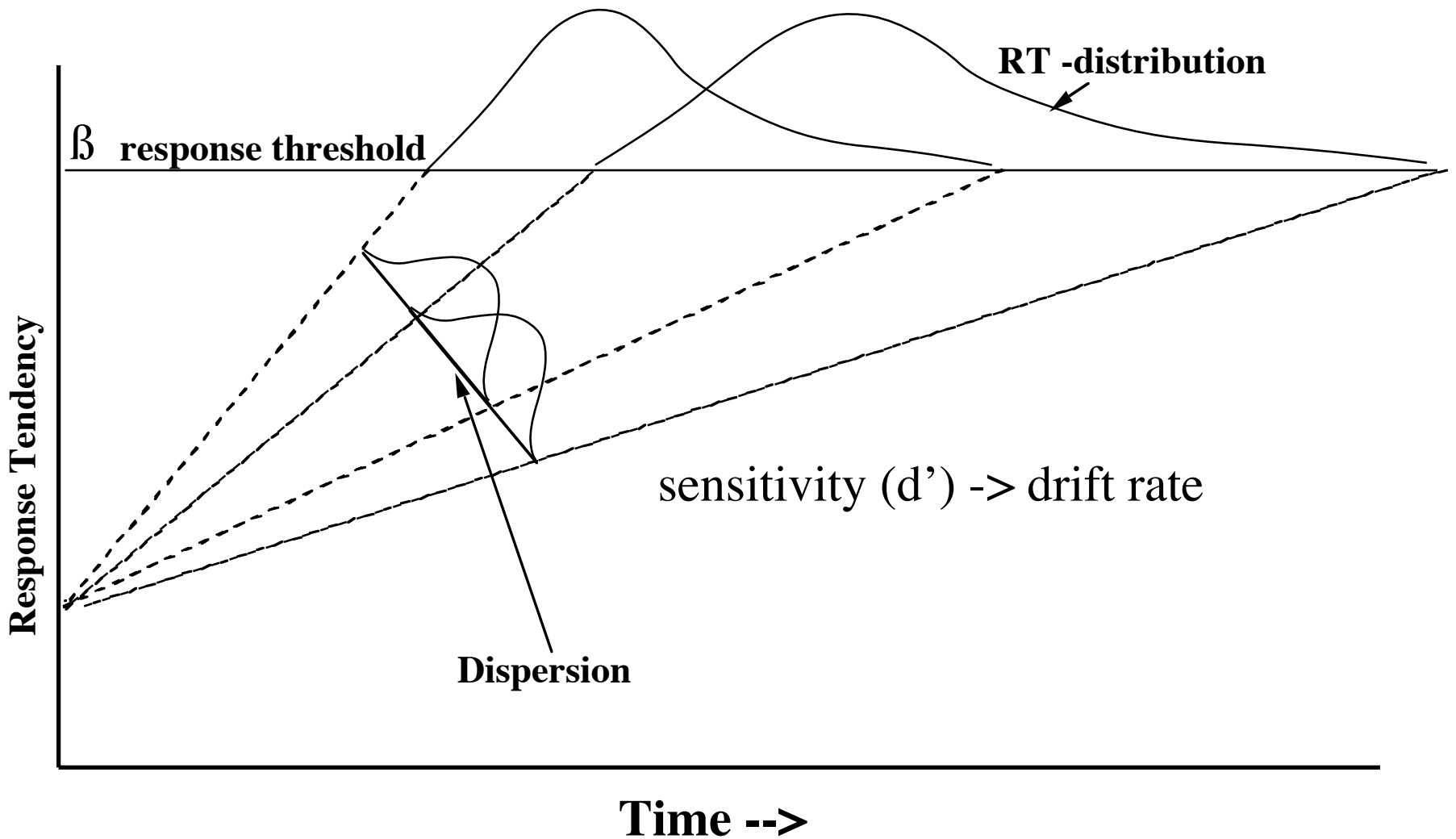
+

death

exam

daeth

fail



Random Walk - Diffusion Model of Reaction Time

RT distributions resulting from identical normal error dispersion and differing drift rates

Example of limited sensory register from Sperling

- What is the size of the sensory register?
- How many items can you detect at one time?
- 2 8 5 3 9 6 1 7 4
- report

+

8 1 7 2 5 6 3 4

Report

+

2 8 5 3 9 6 1 7 4

Report

Example of limited sensory register from Sperling

- What is the size of the sensory register?
- How many items can you detect at one time?
- Did the previous slides assess the size of the sensory store or were they affected by the recall process?
- How could we separate the two?

Example of limited sensory register from Sperling

- What is the size of the sensory register?
- How many items can you detect at one time?
- Confounding sensory store with ability to dump from sensory store (short term memory)
- Present a series of slides, each with 3 rows of numbers, following the slide, cue which row to report

Example of limited sensory register from Sperling

3 8 7 4

4 5 6 3

6 4 7 2

- high, medium, low tone to signal row to report

+

3 7 2 1

5 4 6 2

1 5 3 8

3 7 2 1

5 4 6 2

1 5 3 8

Report

+

7 6 9 4

3 1 5 4

2 8 3 5

Report

Sperling study of sensory store

List 1:

7 6 9 4

3 1 5 4

2 8 3 5

List 2

3 7 2 1

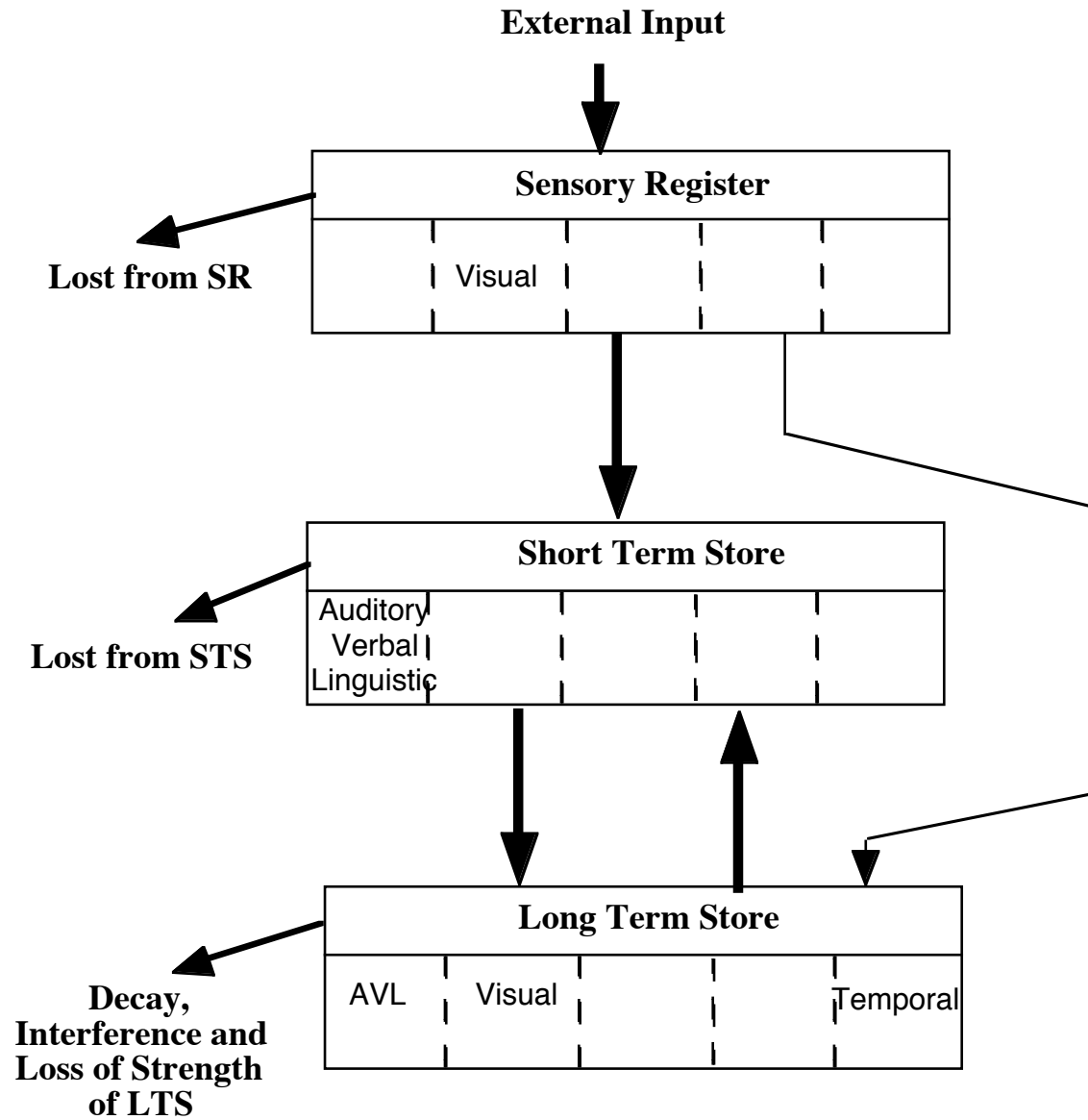
5 4 6 2

1 5 3 8

Theoretical integration

- Atkinson and Shiffrin combined studies from sensory memory, working/short term memory and long term memory and suggested a multiple store model of memory

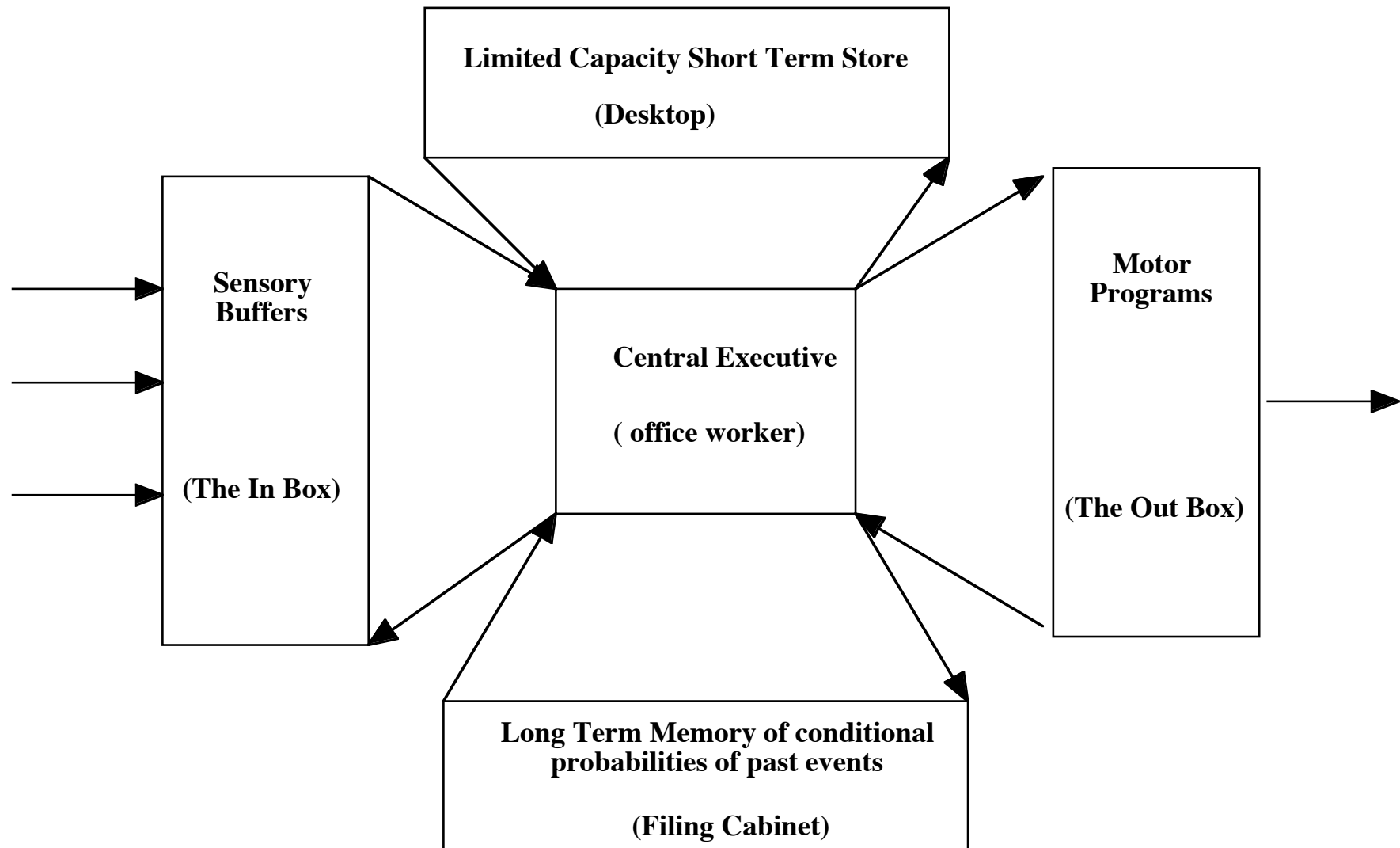
Atkinson and Shiffrin, 1968 Human Memory: A proposed System



Donald Broadbent and the “Maltese Cross”

- Donald Broadbent:
 - One of the intellectual founders of Cognitive Psychology
 - Applied Psychology Unit at Cambridge, then Oxford
 - what were the determinants of efficient performance
 - known for elegantly simple models of cognition
 - Attention and Stress

Broadbent's Maltese Cross model of information processing



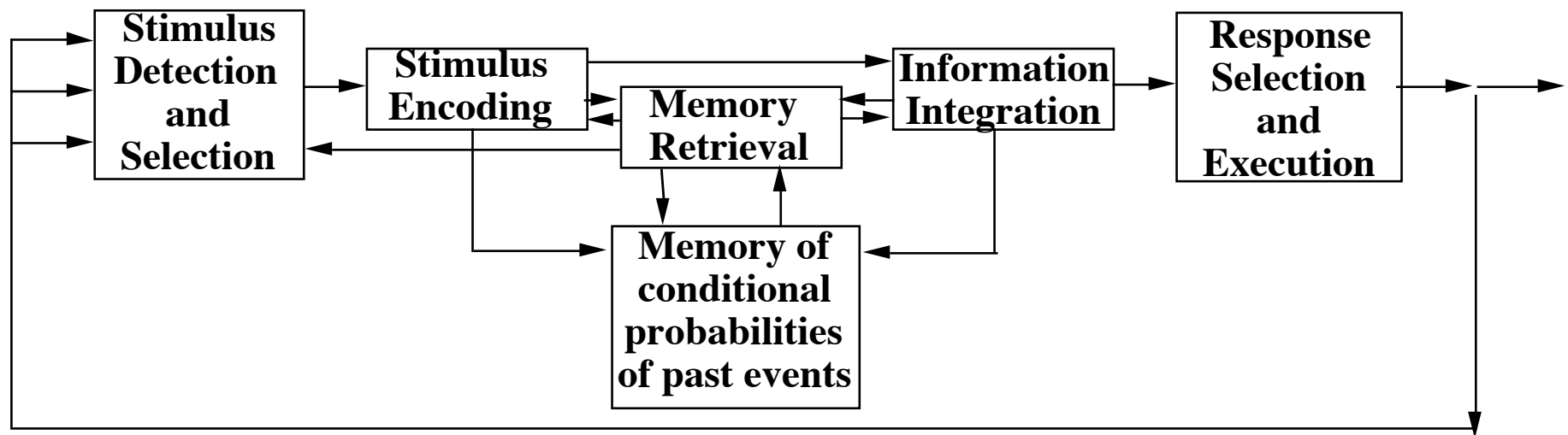
Stage models of Processing

- Information flow models (“boxology”)
- Psychophysiology and Cognition
 - Mulder/Sanders/Gopher
- Levels of control (derived and extended from Broadbent)

Conceptual Stages of Information Processing

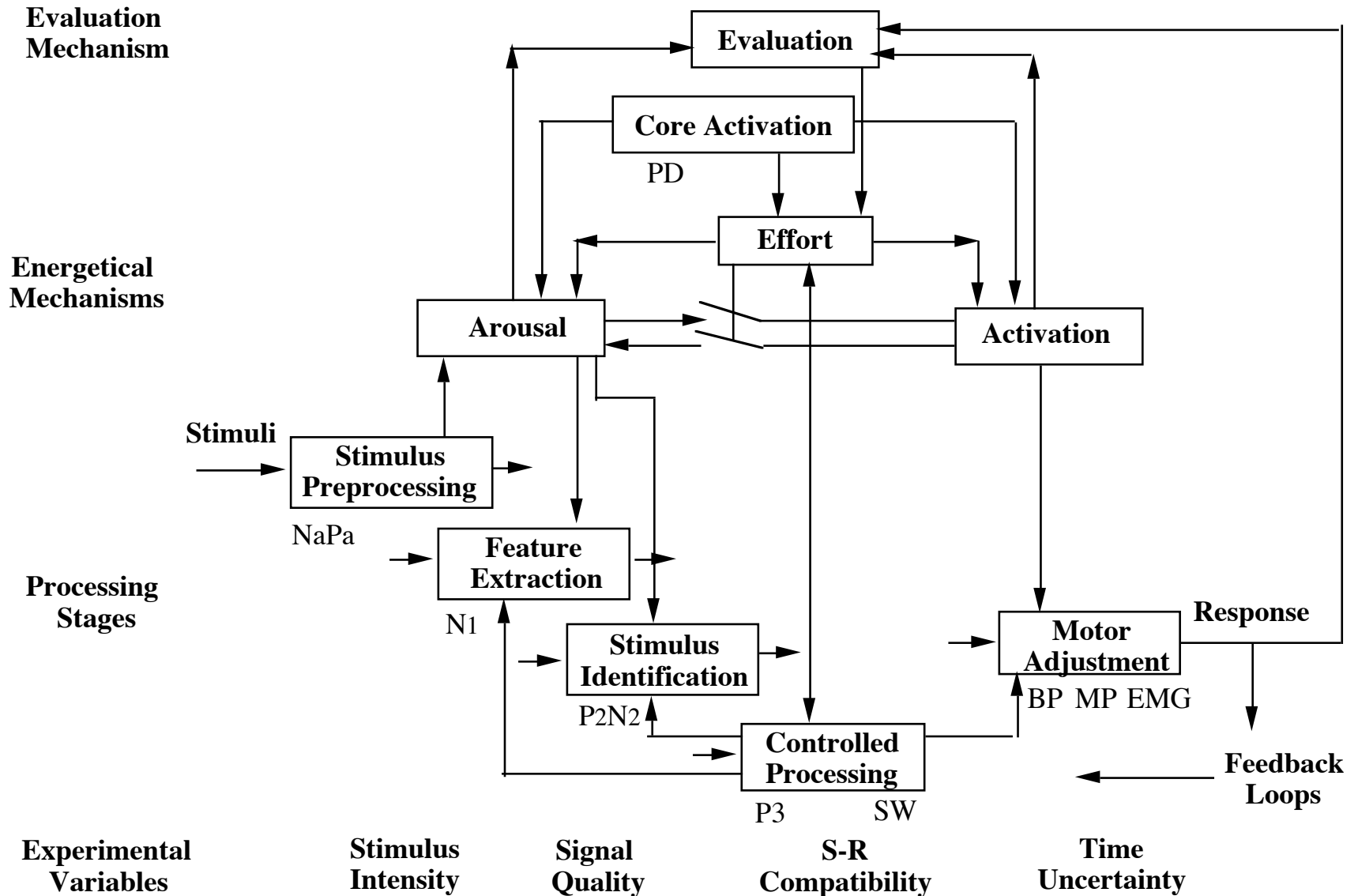
Stimulus

Response

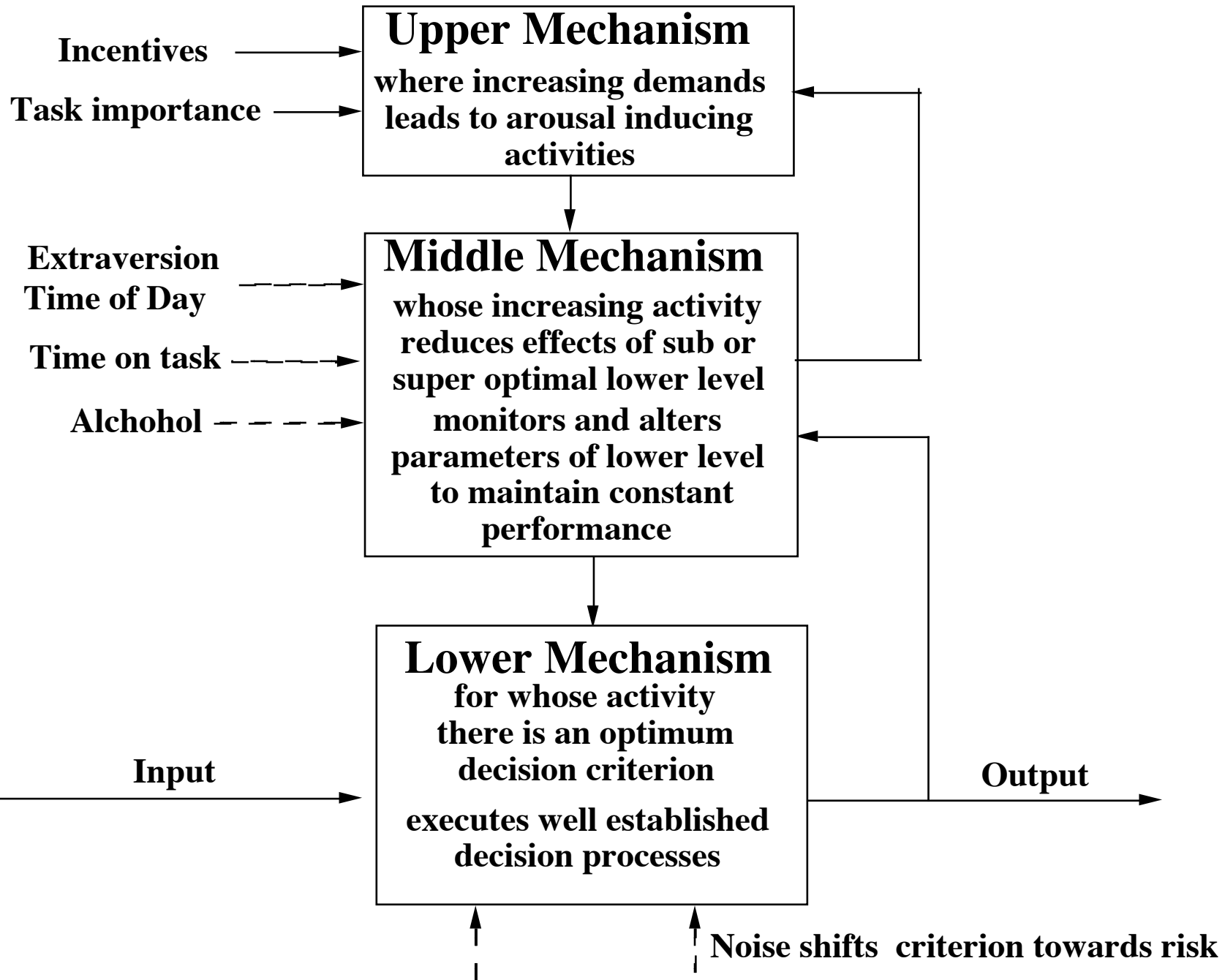


Feedback Loops

Mulder/Sanders model of energetic-cognitive processing links



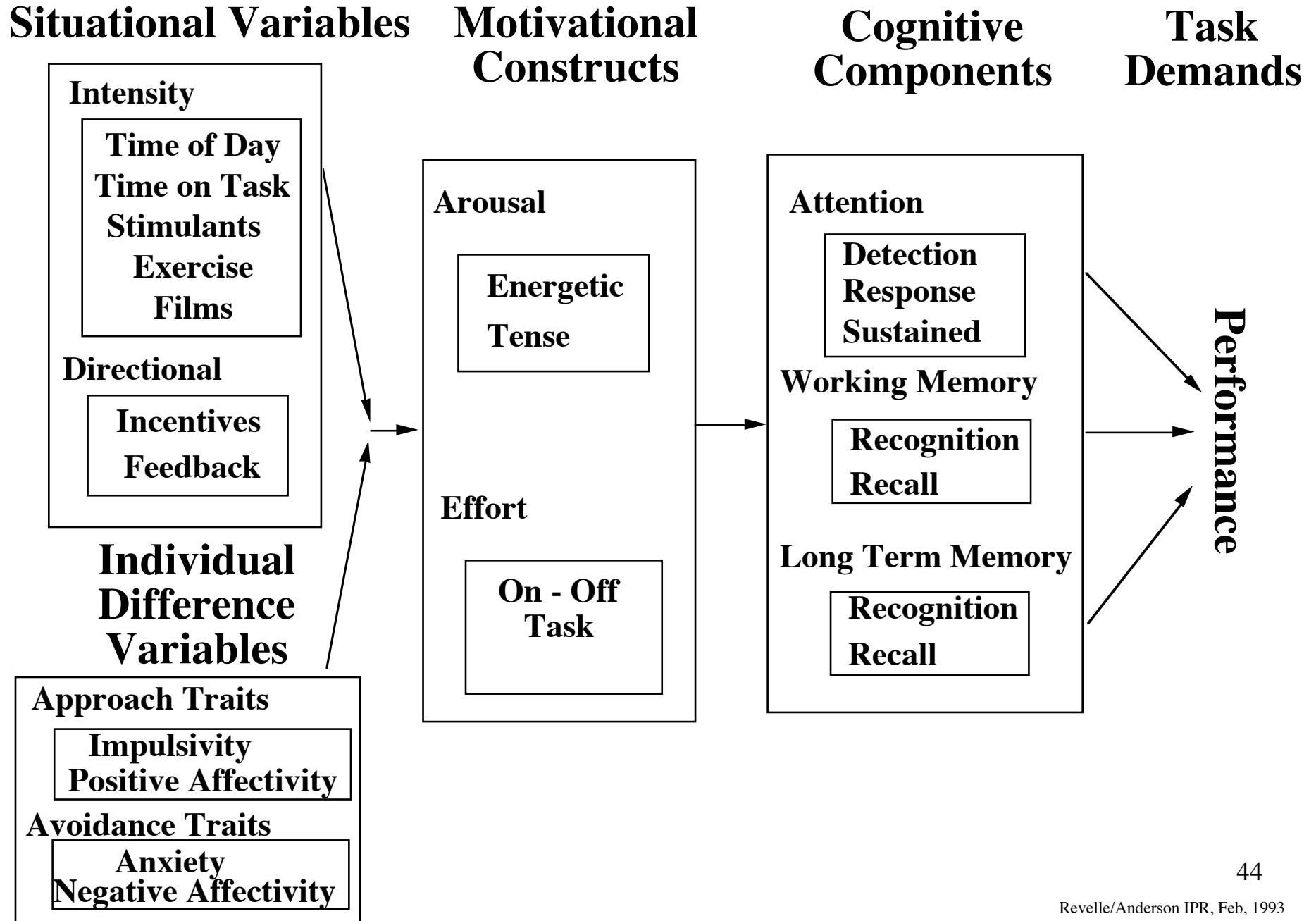
(Adapted from Gopher, 1986 and Mulder, 1986)



Personality and Motivation

- Individual differences in sensitivity to environmental cues
- Motivational States
 - Approach, Avoidance, and Arousal
- Cognitive Processes
 - Working Memory
 - Sustained Information Transfer

Elaboration of a motivation mediated model of performance



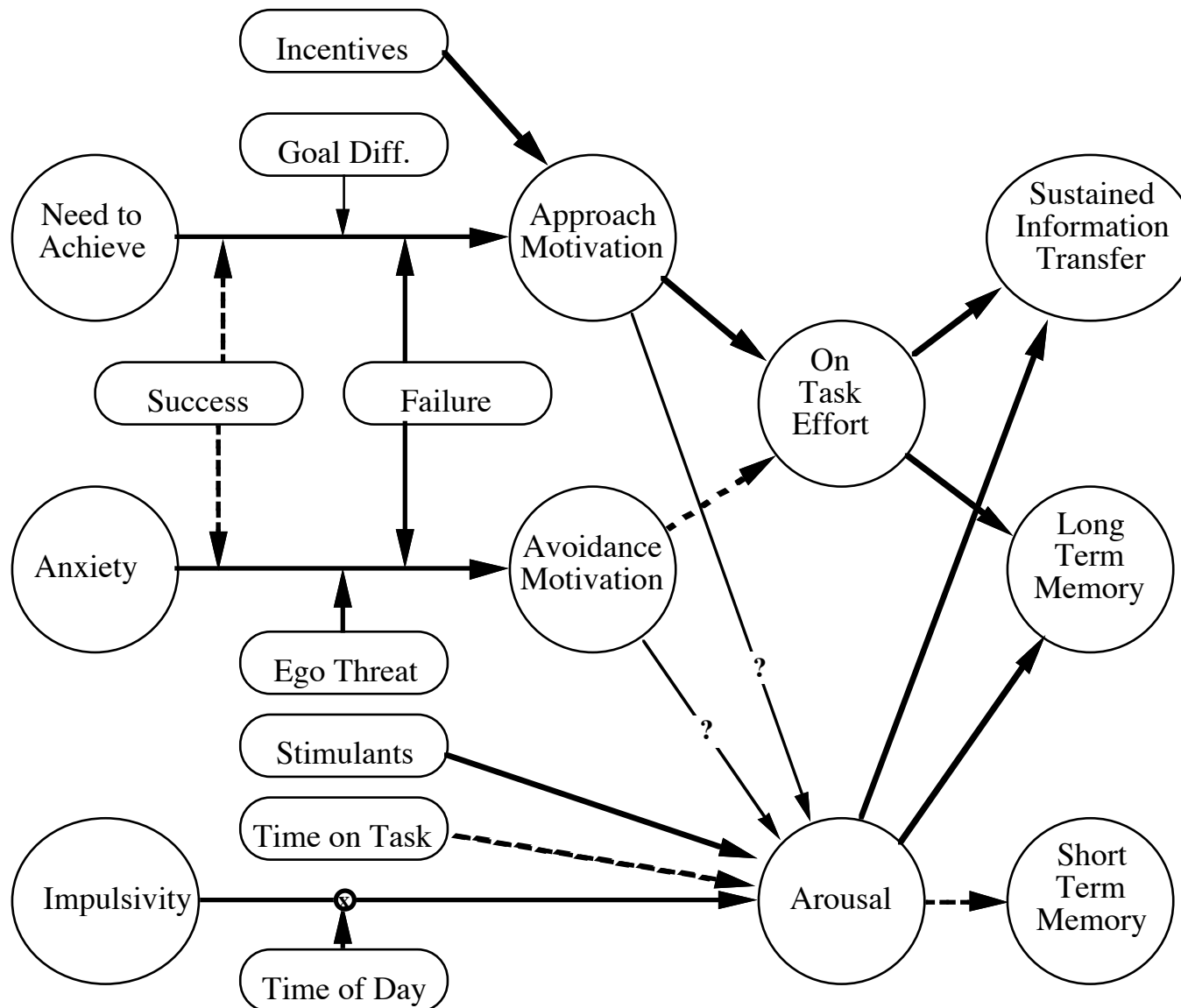
Individual Differences

Situational Manipulations

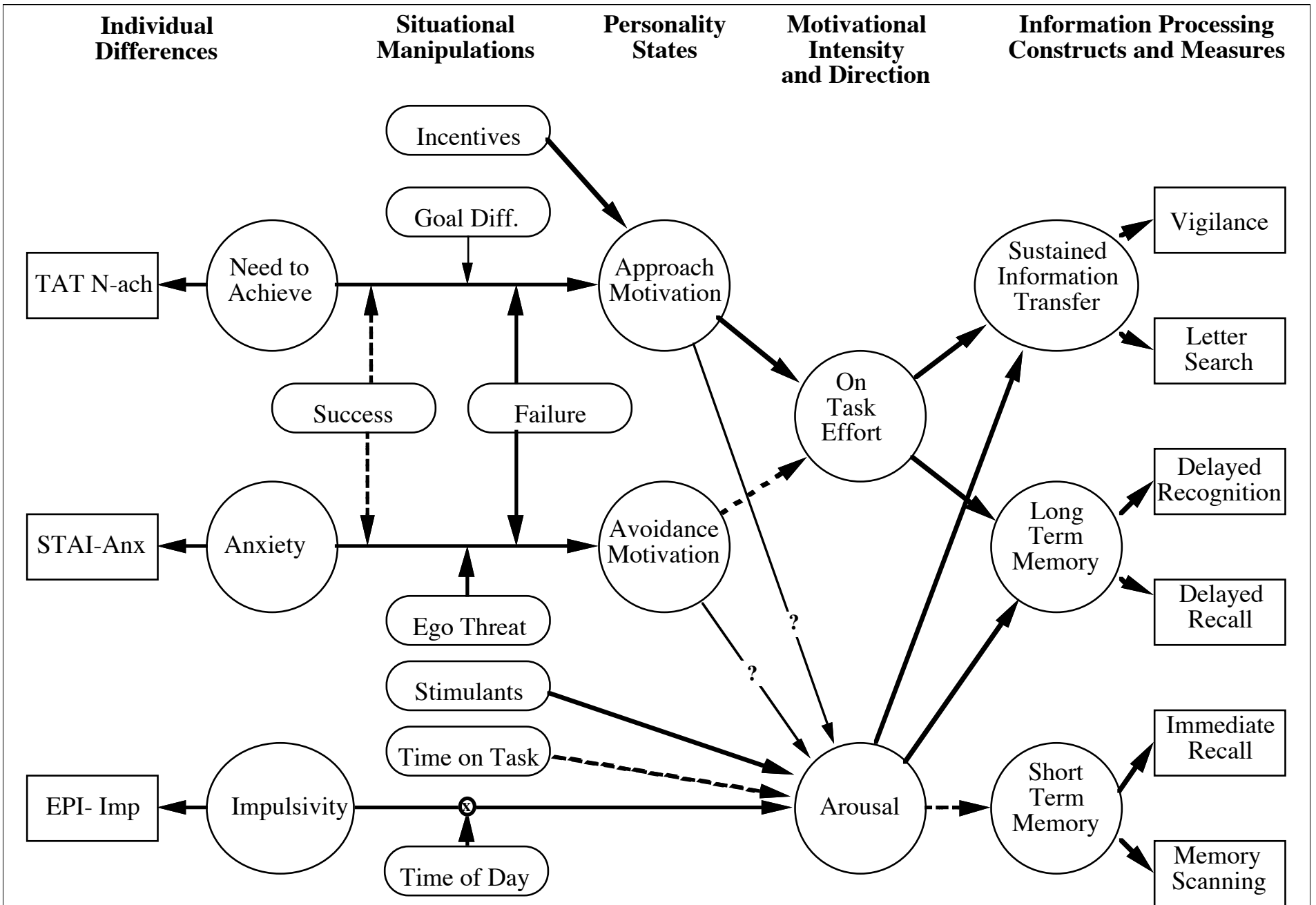
Personality States

Motivational Intensity and Direction

Information Processing Constructs and Measures



Adapted from Humphreys & Revelle, 1984; Revelle, 1989



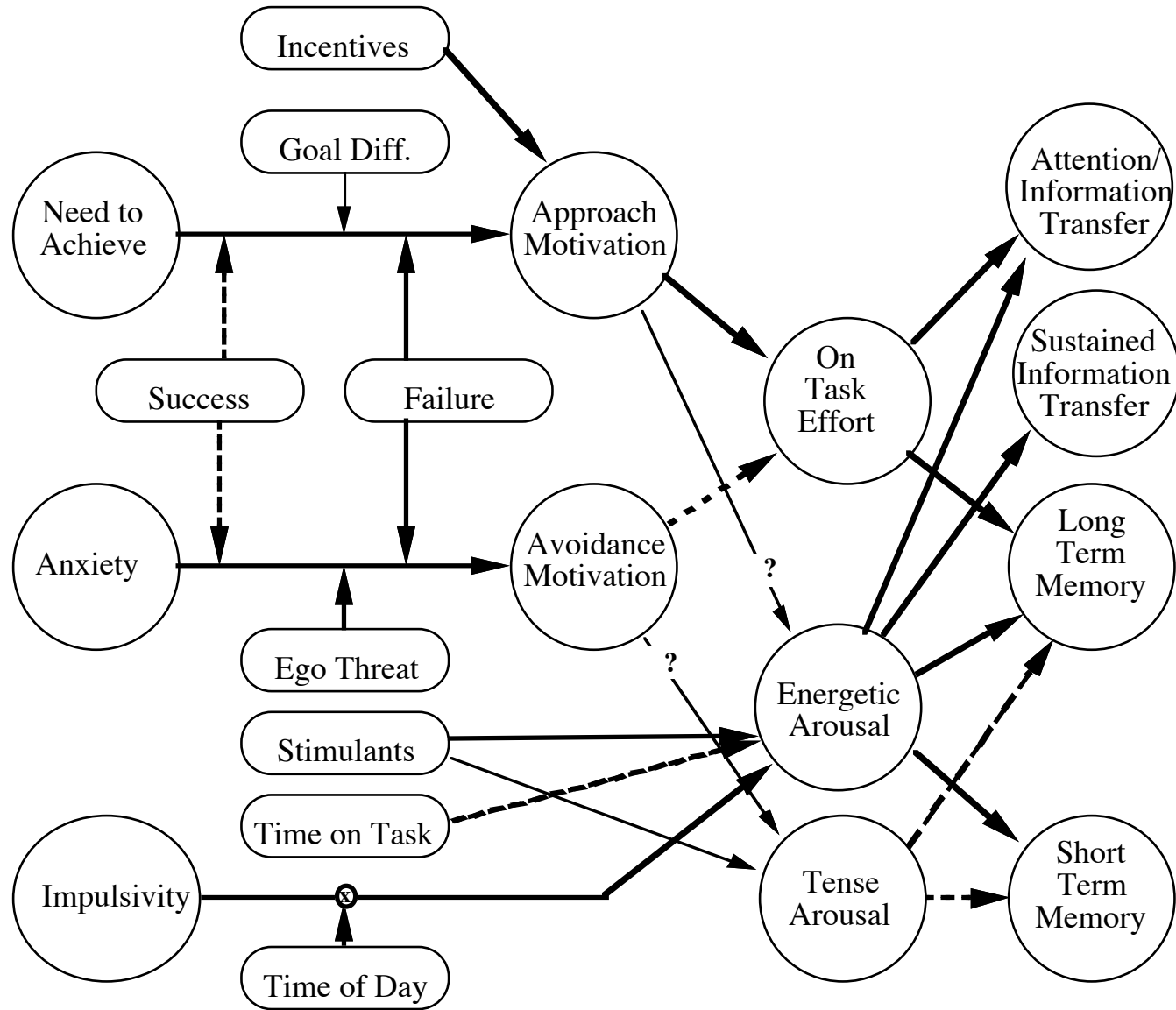
Adapted from Humphreys & Revelle, 1984; Revelle, 1989

Individual Differences

Situational Manipulations

Personality States

Motivational Intensity and Direction



Theories and Constructs

- Theories as a way of integrating diverse observations into coherent model
- Constructs as unobservables representing common influences on observed variables
- Goal of parsimony in theoretical description
- Goal of testability of theory
 - How can we show the theory is wrong?