

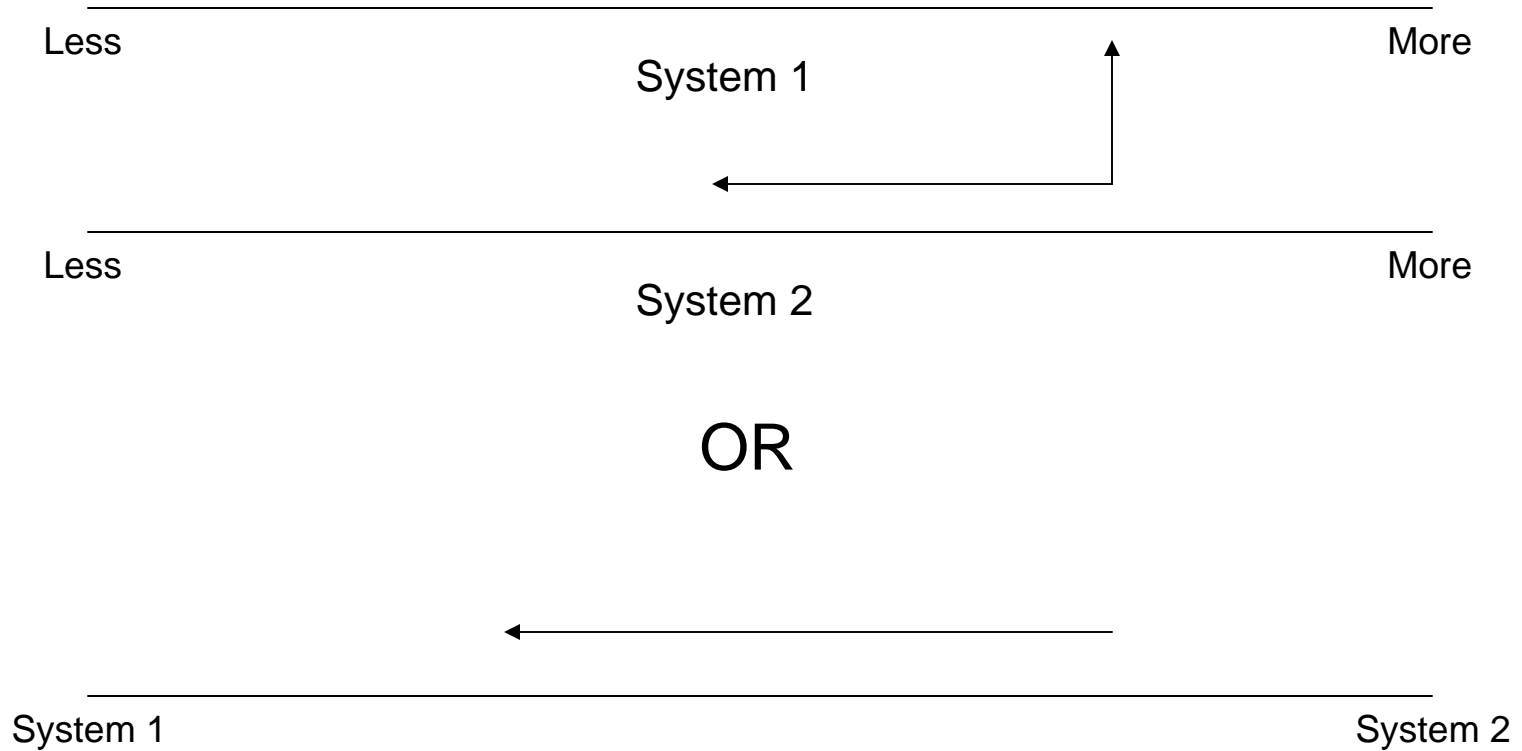
# Integrating Automatic and Controlled Processing in Decision Making

- Consumer researchers have postulated that decision makers engage in a variety of processes, some more automatic and some more controlled, e.g.,
  - Howard and Sheth (Routinized response behavior, limited problem solving, extensive problem solving)
  - Constructive preferences
- How are these different sorts of processes integrated in decision making? We now have the conceptual and empirical tools to make advances.

# Dual Process Notions

- More generally, several researchers have proposed dual process theories that postulate two different types of processing (e.g., Sloman 1996, Slovic et al. 2002, Kahneman and Frederick 2002)
  - System 1 – unconscious, automatic, parallel, rapid, associative
  - System 2 – controlled, conscious, constrained by working memory, rule-based, serial
- How are System 1 and System 2 processes integrated in decision making?
- We believe that there are continua (or a continuum?) of processes

# Continua (or Continuum) of Processes



Note: Arrows represent possible effects of load

## Integrating System 1 Processing into Decision Making - I

- Work on choice has focused mostly on System 2 processes, e.g., rule-based heuristics such as lexicographic and elimination by aspects
- One view might be that System 1 processes can be integrated by considering relational, more “perceptual” heuristics such as compromise or asymmetric dominance; however, this may be too simplified
  - Asymmetric dominance and compromise may differ in processing, though both are relational. Asymmetric dominance may be more unconscious and perceptual, compromise more cognitive (Dhar and Simonson, Shafir et al.).
  - Payne, Levav, Cabeza, and I are testing this using fMRI. We expect more activation of areas attuned to conflict (anterior cingulate cortex) and cognitive control (prefrontal cortex) for compromise (Kerns et al., Science, 2004)

# Integrating System 1 Processing into Decision Making - I(continued)

- Issue – can we use neuroscience/psychophysiology as the “new process tracing” at a greater level of detail? There are difficulties:
  - Multiple functions for any given brain region, designing “control” tasks very difficult, some regions harder to image
  - Need specific hypotheses, very sophisticated designs to disentangle effects; e.g., specific ordering predictions may be very useful (asym-comp vs. comp-asym) (see Kerns et al. 2004); in effect, we need more micro task analyses.
  - There have been some very useful results (e.g., Kerns et al. 2004, Bechara and colleagues, Cacioppo and colleagues)
- Individual differences in chronic use of System 1 vs. System 2 (e.g., Epstein et al. 1996) may be associated with frequency of asymmetric dominance and compromise choices across participants

## Integrating System 1 Processing into Decision Making - II

- A second view is that System 1 is always active, provides a quick automatic judgment (e.g., affect heuristic of Slovic et al.). This judgment can then be corrected if necessary, but correction may not be sufficient (Wilson and Brekke 1994).
- Degree of correction may depend on whether more effort leads to more elaboration of salient System 1 inputs or to correction by examining other relevant inputs – one might process the “wrong” inputs more thoroughly (e.g., effects of accuracy incentives in some cases lead to working harder but not smarter). This is a critical issue, and research on determinants of focus is needed.
- A major concern for work investigating an integrated view of decision making and adaptivity including both System 1 and System 2 notions is to ensure that the tasks used contain both possible System 1 and System 2 inputs
  - Our current choice tasks, e.g., choice among unfamiliar options, more slanted toward System 2
  - Possible System 1 inputs are habitual processes, perceptual (relational) stimuli, inherently affect-laden stimuli

# Integrating System 1 Processing into Decision Making – II (continued)

- We must develop theories regarding the implications of System 1 inputs vs. System 2 inputs for differences in processing/choices.
- General issue – Given such theories, some argue that load/dual tasks interfere with System 2, not System 1. This would provide a research tool for examining the type and implications of the processing engaged for a particular task, e.g., correction is subject to interference under load.
- However, is load moving individuals to simpler System 2 processing or to System 1?
- Two related views discussed briefly
  - Nonconscious goal pursuit
  - Habit as a system separate from attention

# Nonconscious Goal Pursuit

- People can engage in nonconscious goal pursuit (Bargh and Chartrand 1999); e.g., situation leads to automatic goal activation
- Nonconscious goal pursuit may provide a framework for theorizing about decision making processes such as constructive processing
- For example, constructive processing may involve a combination of associative and rule-based processes (called implicit intentional processes by Wood and Song)
  - involuntary attention to aspects of the environment that then triggers nonconscious goals and perhaps rule-based goal-relevant actions

# Habit and Intentional Processing

- Wood and colleagues (e.g., Wood, Quinn, and Kashy 2002) have proposed habit as a system separate from intentional processing, both in brain regions and function
- Issue – are habit and other forms of System 1 processing neurally and psychologically distinct? E.g., procedural memory, perceptual priming, and conditioning appear to be mediated by different neural substrates, and declarative and non-declarative memory are also dissociated and not unitary.
- Use of habit rather than intentional, controlled processes more likely under factors leading to decreased capacity (and hence less correction), e.g., age, time pressure, cognitive load
- Payne, Luce, and I and Wood and her colleagues are beginning to examine how habit and more controlled adaptive processes interact using repeated choice designs