



Mental Models of Risk and Uncertainty: How they Affect and are Affected by Decision Making

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Aims

- To reflect autobiographically upon my work into the nature and role of mental models and related cognitive processes in strategy formation, horizon scanning and the management of risk
- Consider its implications for the design of tools and processes that seek to foster greater sensitivity to and awareness of weak signals indicative of the need for intervention

The major phases of my work to date



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- Cognitive bias and inertia in strategic decision making and risk assessment (circa 1986-present)
- Development and evaluation of tools and processes for attenuating cognitive bias and inertia in strategic decision making and risk assessment (circa 1995-present)
- Nature and role of emotional/affective and non-conscious cognitive processes as barriers to and enablers of personal and organizational adaptation (circa 2002-present)

Phase 1 ...cognitive bias and inertia



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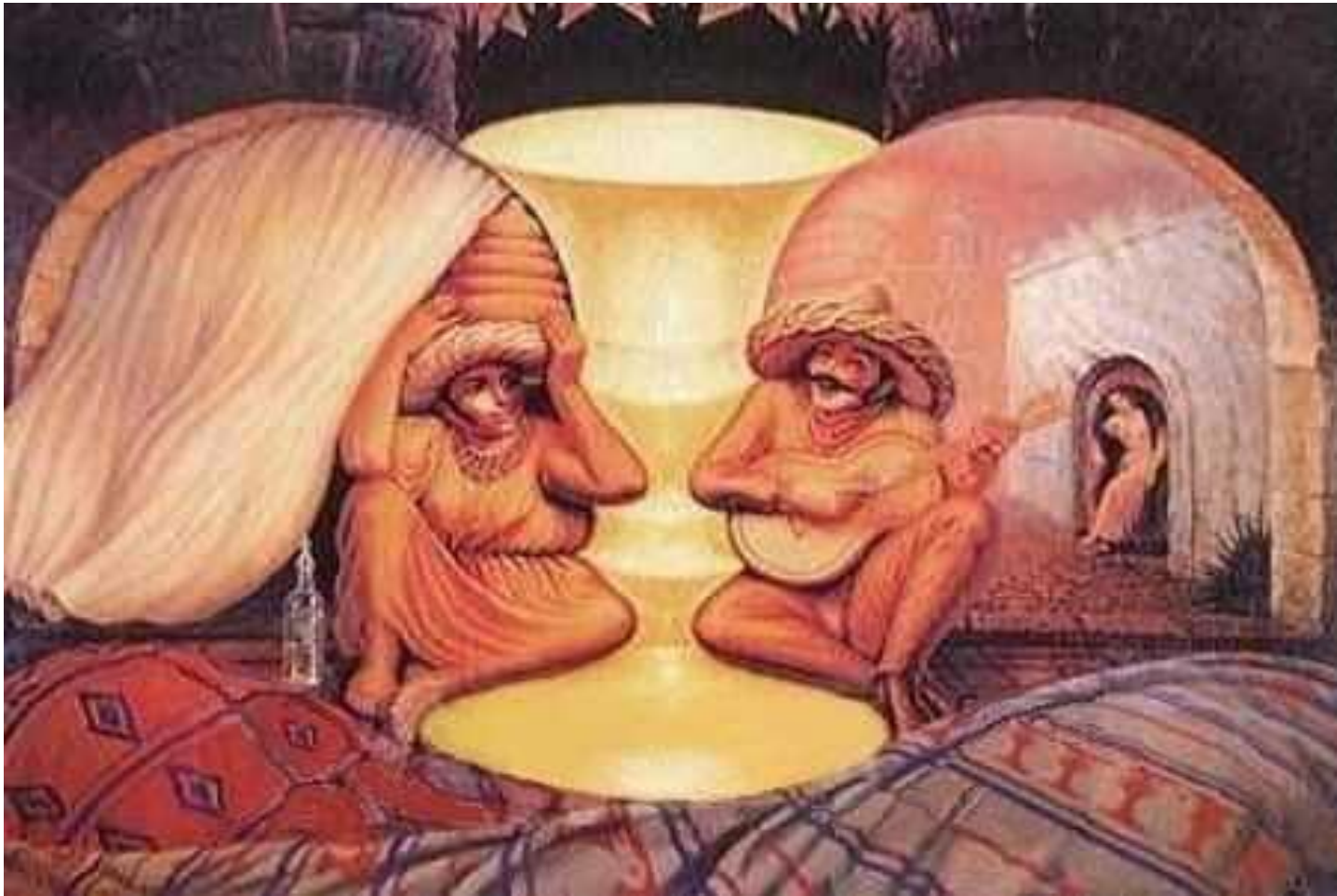
- Behavioural decision theory
- Schema theory
- Social identity theory
- Attribution theory
- Enactment theory
- Two major overarching perspectives in tension: computational versus interpretive

Hodgkinson & Healey (2008a), Cognition in organizations. *Annual Review of Psychology*, 59, 387-417.

What do you see?



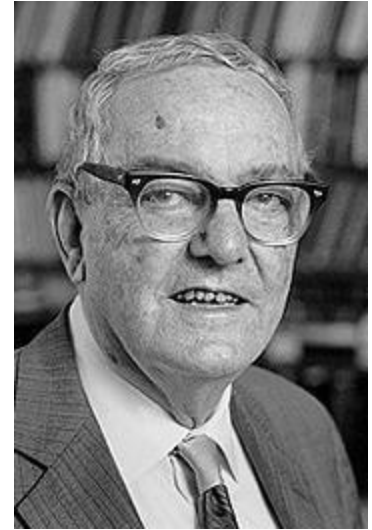
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Behavioural decision theory

- Due to processing limitations strategists adopt a number of simplifying rules of thumb (i.e. heuristics) at all key stages in the strategic decision process, leading in turn to the attendant dangers of cognitive bias and inertia (see, e.g., Maule & Hodgkinson, 2002, 2003)
- However, this lab-based research has tended to take advantage of participants' ignorance of arithmetical and statistical principles rather than focusing on their experience and knowledge to generate intuitively a final solution to a problem



*Herbert Simon
1978 Nobel Laureate*

Schema theory

- Strategists typically focus on a small subset of competitors (around 7 in number), located within one or two categories (e.g. Hodgkinson & Johnson, 1994; Porac et al, 1989)
- In a longitudinal study of UK residential estate agents (Hodgkinson, 1997, 2005), despite overwhelming objective evidence of property market decline, strategists continued to try and emulate the actions of high profile failing competitors

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Competitive enactment theory

- Over time, strategists' beliefs become highly convergent, leading firms to imitate one another's competitive positioning strategies
(Hodgkinson, 2005; Porac et al., 1995)



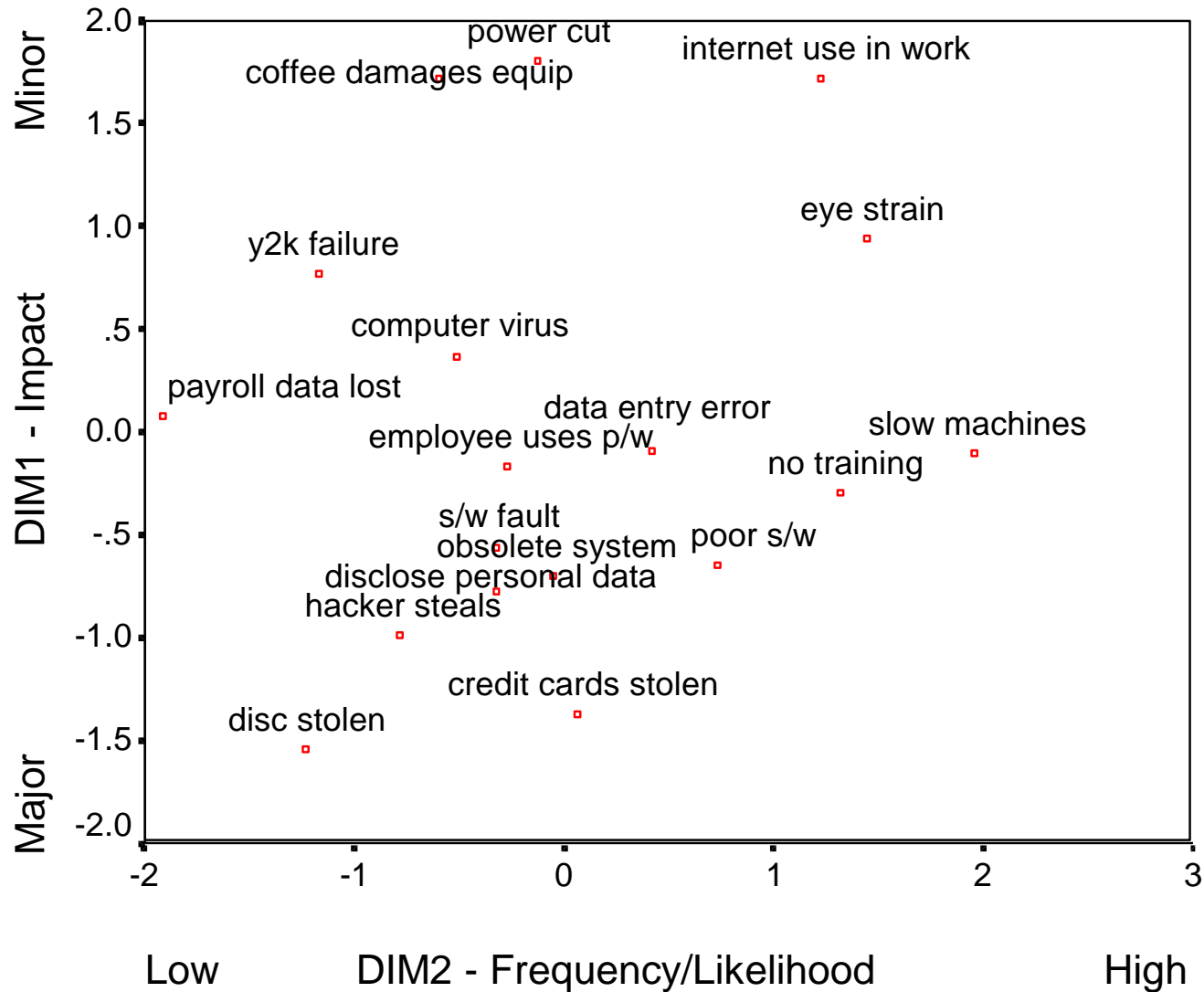
- Hence, what begin as highly lucrative niche positions rapidly become over populated, to a point where entire groups, or even mass populations, of firms can spiral into collective decline (witness the current events in the world's financial centres)



Relevance to security?

- Information technology (IT) users' representations of IT and information security risks in the workplace exhibit patterns of belief convergence and inertia very similar to those revealed in studies of representations of business competition (Coles, 2003, PhD Thesis; Coles & Hodgkinson, 2009, *Risk Analysis*)
- Highly similar representations across multiple organizations and sectors
- Highly similar representations observed before and after Y2K

Mental representations of IT/information security risks: An example





Attribution theory

- Self-serving biases in good times and bad
- In 'boom' periods, decision makers attribute success to their personal skill and the internal capabilities of the organization
- In 'bust' periods, downturns in performance are attributed to the prevailing economic climate and other external contingencies
- Hence strategists fail to learn from their past mistakes (e.g., Bettman & Weitz, 1983; Clapham & Schwenk, 1991; Lant et al., 1992)

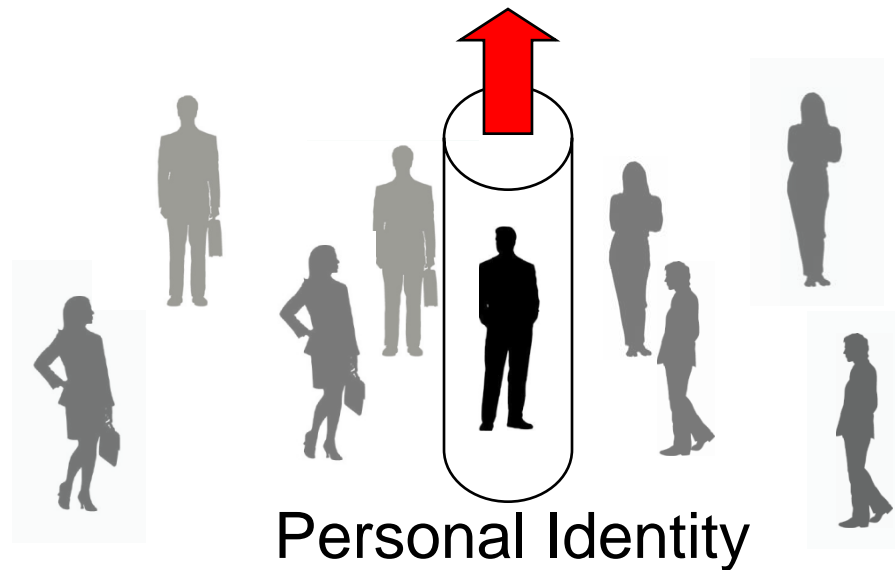


'We will not return to boom and bust'



The social identity approach

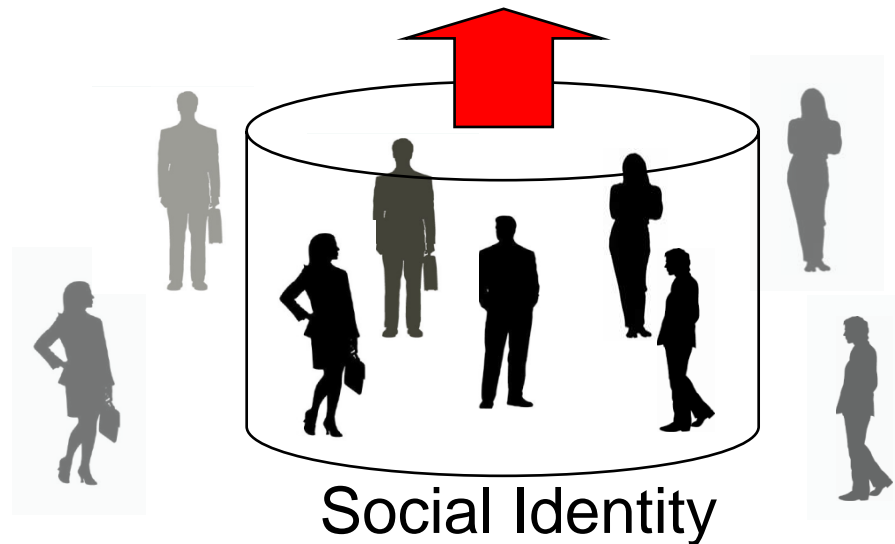
A desire for a positive self-concept will lead experts to evaluate information more favorably if it contributes to their personal and group-based sense of self





The social identity approach

In scenarios exercises over identification with the 'ingroup' can lead to biased processing of strategically important information offered by 'outgroup' members (Hodgkinson & Healey, 2008b, *Organization Studies*)



Relevance to risk assessment and national security?



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- Big challenges for any form of multiagency decision making, especially when under acute pressure
- Just look at the wars raging between the various branches of the USA security services post 9/11!



Overall Implications of Phase 1

- Need interventions for overcoming the dangers of cognitive bias and cognitive inertia (especially scenario planning)
- Individuals must not only register the nature and significance of new events, but also ensure that the strategic capabilities of the organization are realigned accordingly

Phase 2...tools



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- Moving from automatic to controlled, effortful processing is a vital prerequisite for cognitive change (cf. Reger & Palmer 1996)
- Techniques such as cognitive mapping and scenario planning can help by fostering multiple frame awareness (e.g. Hodgkinson et al. 1999, 2002; Schoemaker 1993; Strategic Management Journal)



Easier said than done

- Inappropriate use can amplify rather than attenuate cognitive biases and escalate conflict (see, for example, Hodgkinson & Wright, 2002, *Organization Studies*; Healey & Hodgkinson, 2008, *Oxford Handbook of Organizational Decision Making*)
 - **Psychological self awareness of cognitive bias and inertia is a necessary but insufficient condition - high profile decision fiascos continue**
- Tools and techniques predicated upon the cold-cognition view of decision making are inadequate

Phase 3 ...emotional/affective and non-conscious cognitive processes

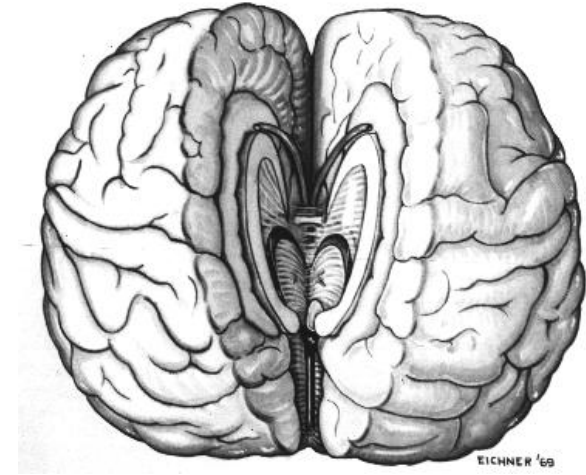


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- **Whereas previously** the ‘higher mental functions’ of the cortex were believed to correct the ‘primitive’ limbic system’s automatic and affective responses (i.e. sources of bias and irrationality to be minimized)
- **More recent work** has revealed a more complex interaction between the systems, each operating simultaneously and competing
- Hence, sub-cortical processes are **no longer viewed as mere sources of error and bias to be overcome with effort**, but integral to human cognition and critical for skilled processes such as intuition (Lieberman, 2000)

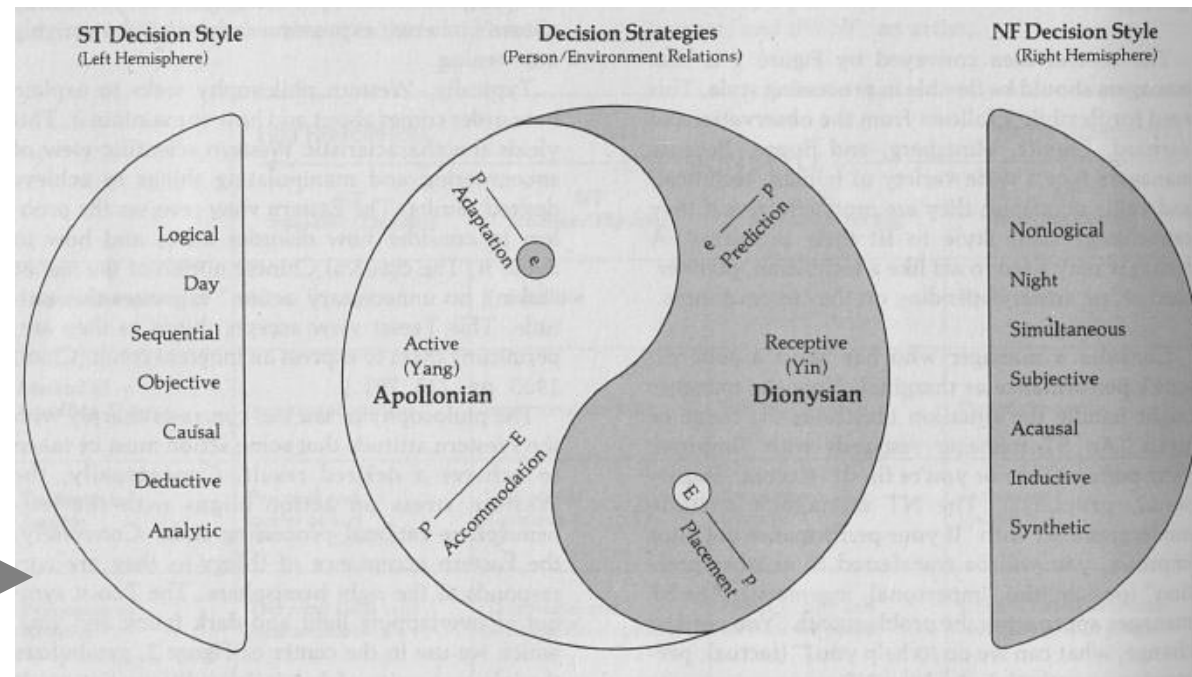
Early 'Split Brain' Neuroscience

- Hemispheric specialization, informed by Gazzaniga and Sperry's studies of so-called 'split brain' patients



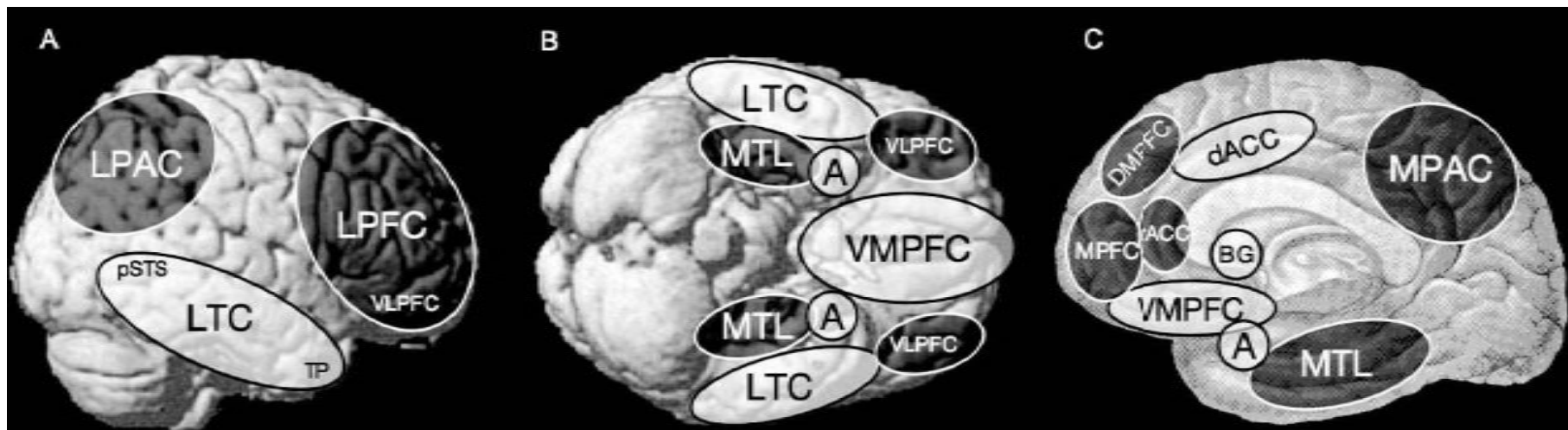
- **Strategy applications:**

- * Mintzberg (1976) 'Planning on the left side and managing on the right', *HBR*
- * Taggart & Robey (1981) 'Minds and Managers', *AMR*



Hypothesized neural correlates of the C-system supporting reflective social cognition (analogous to controlled processing) and the X-system supporting reflexive social cognition (analogous to automatic processing) displayed on a canonical brain rendering from (A) lateral, (B) ventral, and (C) medial views.

Note: the basal ganglia and amygdala are subcortical structures that are displayed here on the cortical surface for ease of presentation. **(Source: Lieberman, MD, *Annual Review of Psychology*, Vol. 58. © 2007 by Annual Reviews. All Rights Reserved.)**

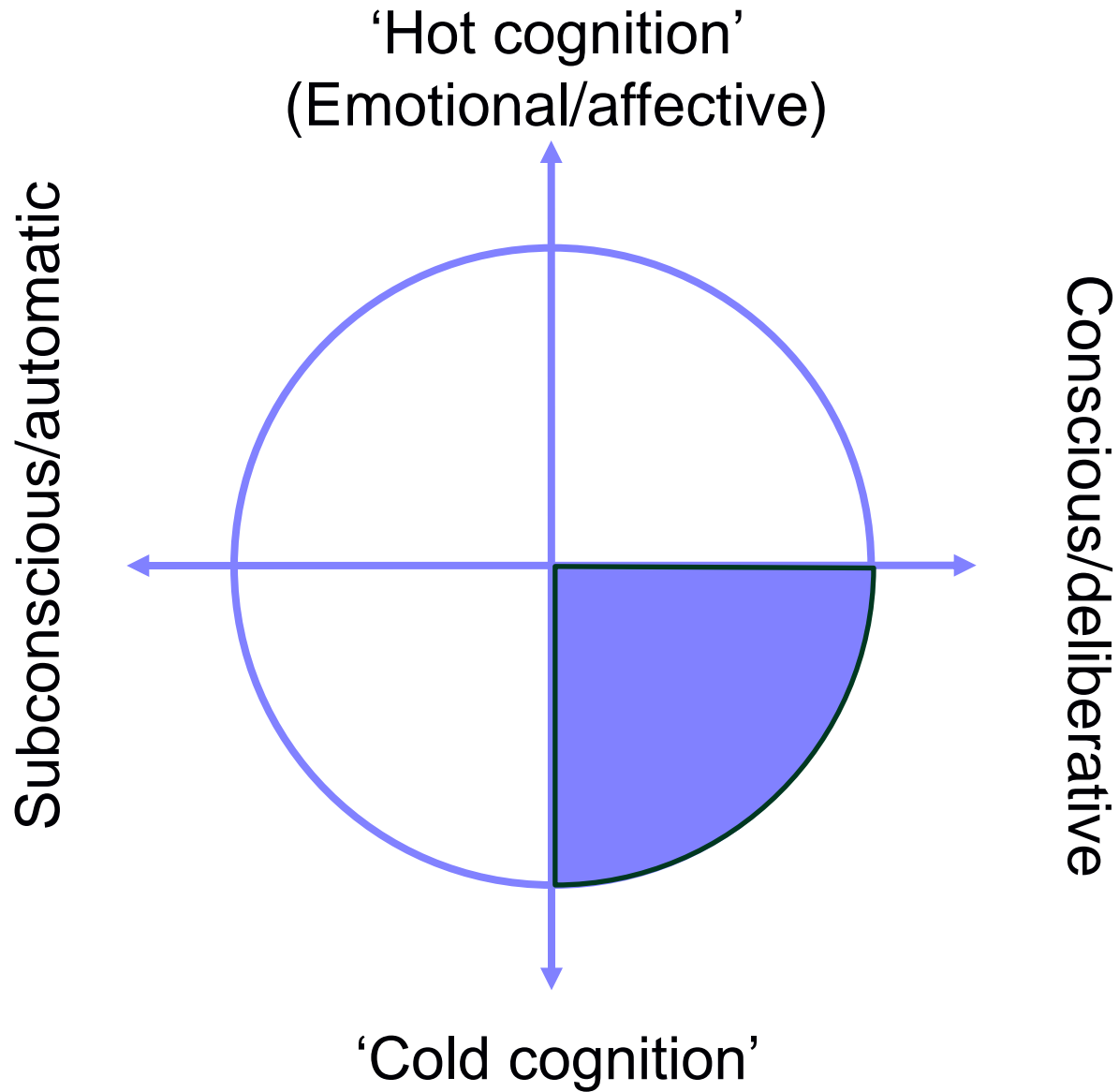


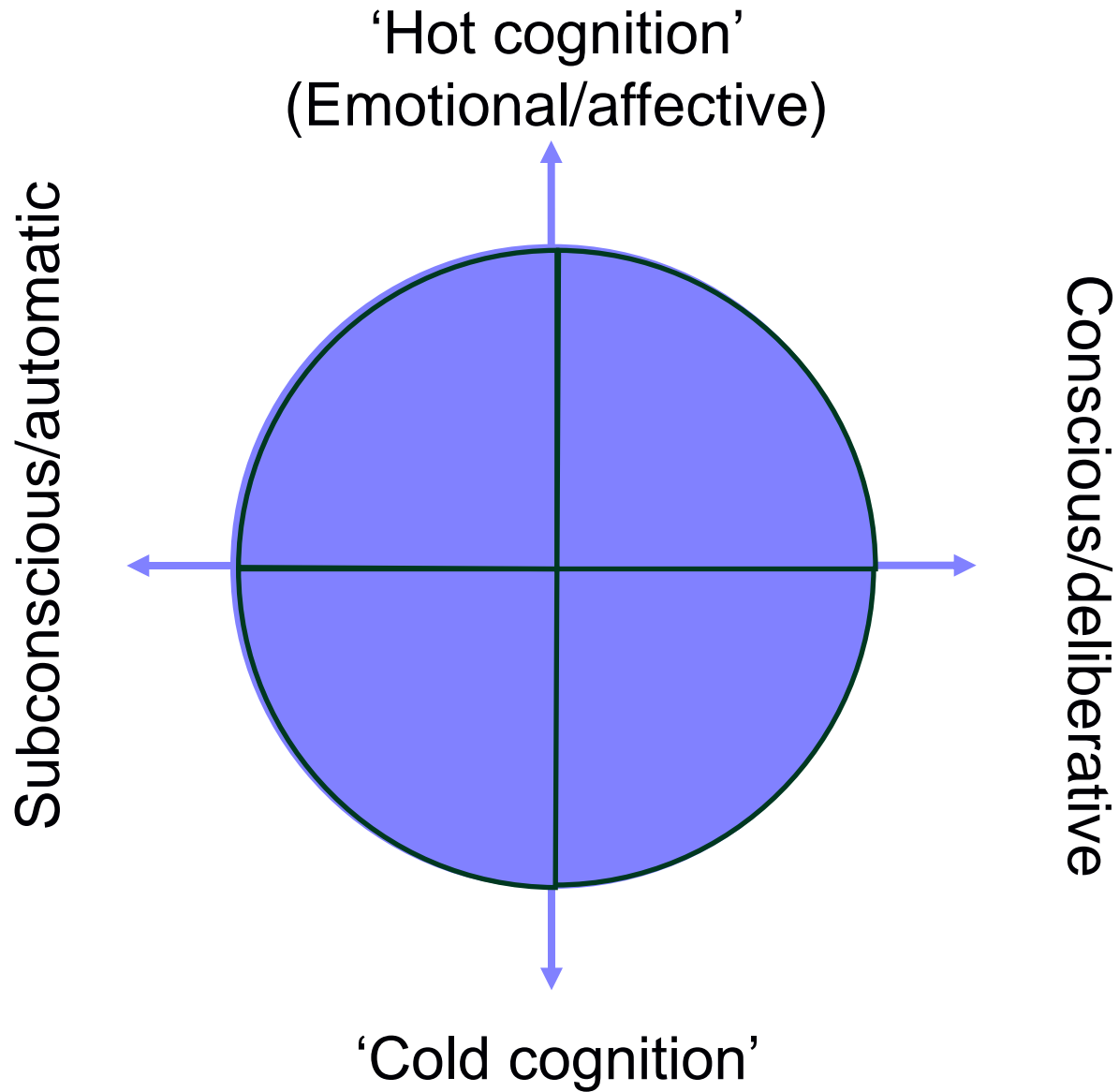
X-System (Automaticity)

- Ventromedial PFC (VMPFC) [BA11]
- Basal Ganglia (BG)
- Amygdala (A)
- Lateral Temporal Cortex (LTC)
- Posterior Superior Temporal Sulcus (pSTS)
- Temporal Pole (TP)
- Dorsal Anterior Cingulate (dACC)

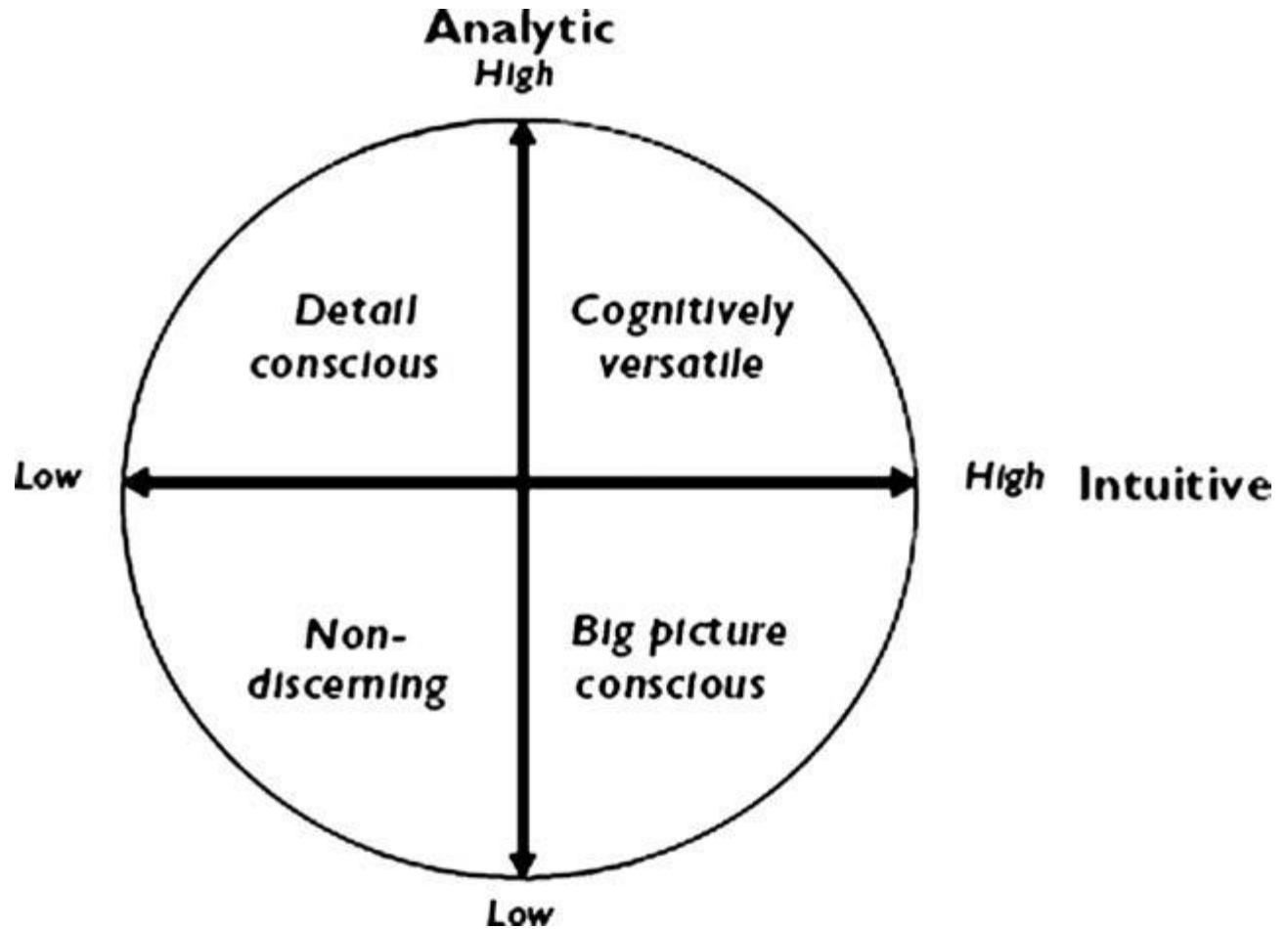
C-system (Control)

- Lateral PFC (LPFC)
- Ventrolateral PFC (VLPFC) [BA47/45/10]
- Medial Temporal Lobe (MTL)
- Medial Parietal Cortex (MPAC)
- Lateral Parietal Cortex (LPAC)
- Rostral ACC (rACC)
- Medial PFC (MPFC) [BA10]
- Dorsomedial PFC (DMPFC) [BA8/9]





Basic typology of contrasting cognitive strategies and styles



Source: G.P. Hodgkinson and I. Clarke, 2007, 'Exploring the cognitive significance of organizational strategizing: A dual-process framework and research agenda,' *Human Relations*, **60**, 243-255. Copyright © 2007 Sage Publications.



Intuitive ability

- Unresolved issue of accuracy
- Intuition may be more useful for generating hypotheses that need further testing before they are considered valid
- Sources of bias associated with intuitive judgments well documented (e.g. Kahneman, Slovic, & Tversky, 1982).
- However, as noted earlier much of this lab-based behavioural decision research exploits participants' ignorance of arithmetical and statistical principles
- Naturalistic decision research (e.g. Klein, 1998) suggests skilled experts fare rather better in generating intuitively useable solutions (in their focal domains of expertise)

- Strategizing is more than an exercise in thinking; it is both an inherently cognitive *and* affective process
- Cold cognition approaches to exploring mental models and de-biasing, predicated upon the computational perspective, are insufficient for sensing and adapting to change
- Individuals must be given time and space to surface and explore (validate?) intuitive hunches and reconcile underlying differences of interpretation (sensemaking not computation but mindful of potential bias and inertia)



True intelligence is...

- Clear and conscious AND fuzzy/vague
- Logical and justified AND unjustified
- Error-free and correct AND experimental
- Verbal and symbolic AND fantasy
- Egocentric and total AND empathic
- Rapid and decisive AND slow/receptive



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