Ways of learning, thinking and communicating: How differences matter in linking Science and Action

Florida Water and Climate Alliance (FloridaWCA)
WORKSHOP 9

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Overview

- How are learning, thinking and communicating connected?
- How do individual cognitive differences inform individual and group processes in the context of climate and the FWCA?
- How do differences matter in how we link science to action?

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Learning

- What is learning?
- What is required for learning to occur?
  - First, the learner has to be presented and must receive information.
  - He/she then processes that information and either compares it to other information or facts he or she already has or breaks it down into smaller bits of information to make it more manageable.
  - The, information or new knowledge is applied.

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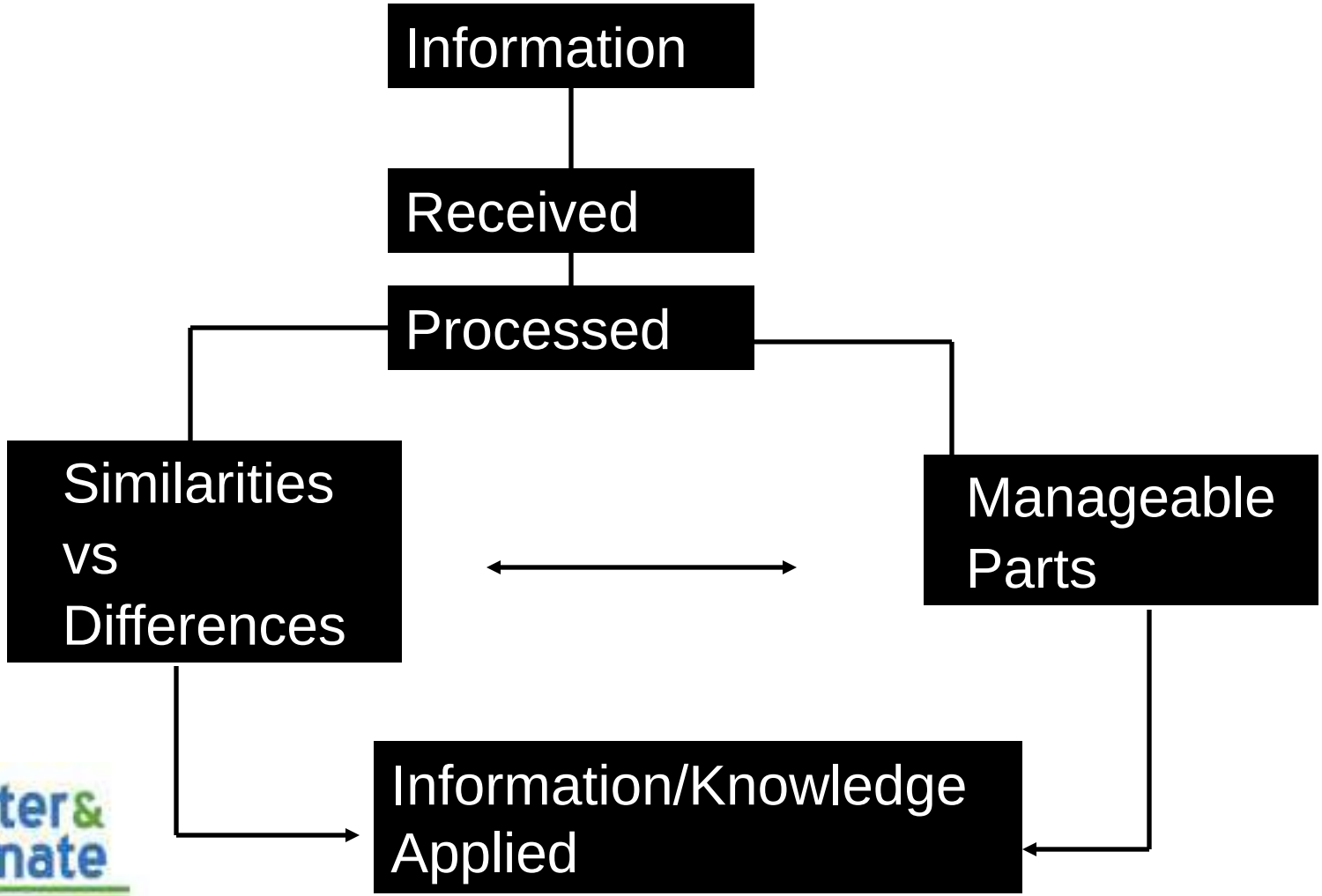
The Learning Process



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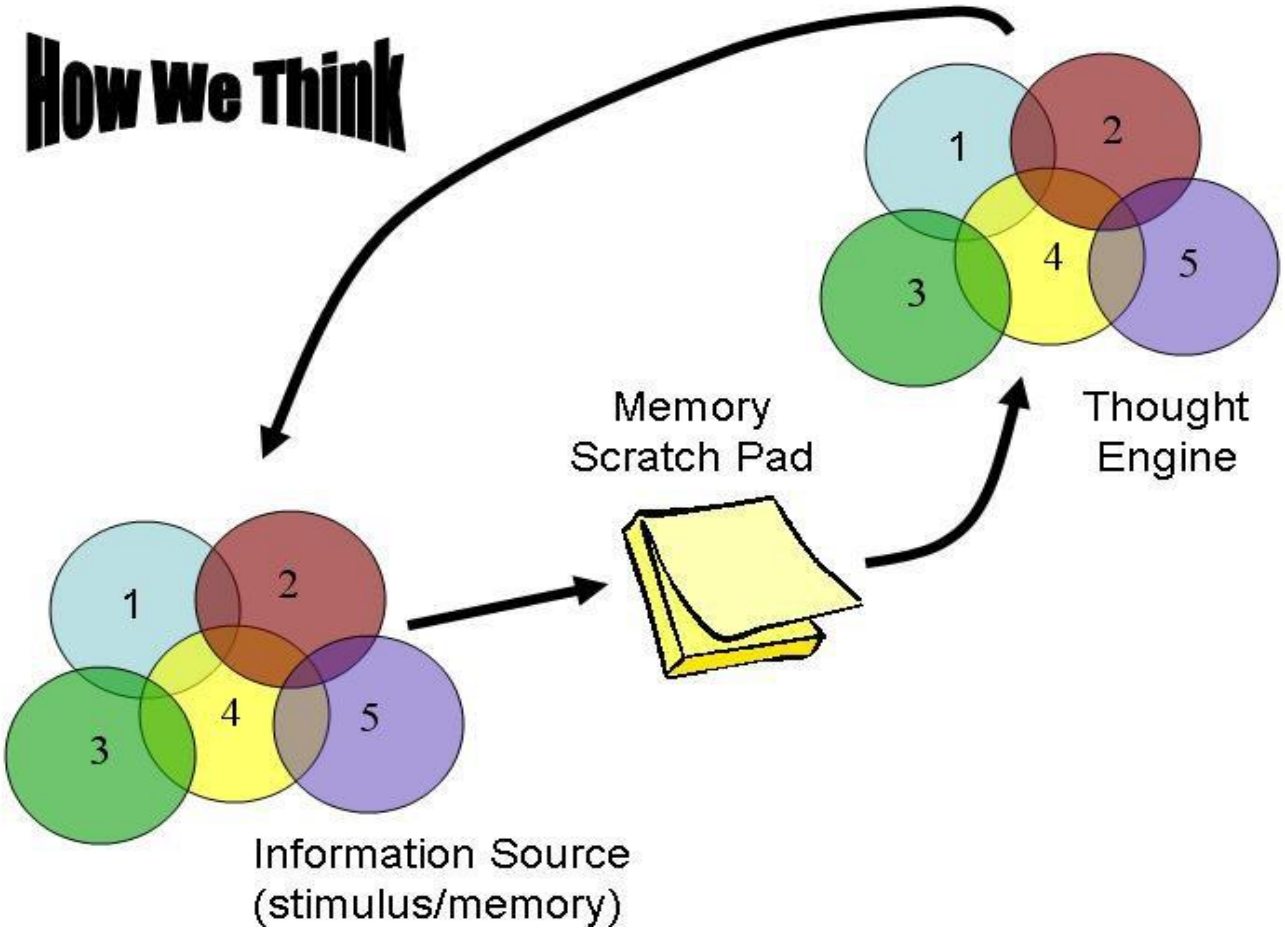
Thinking process



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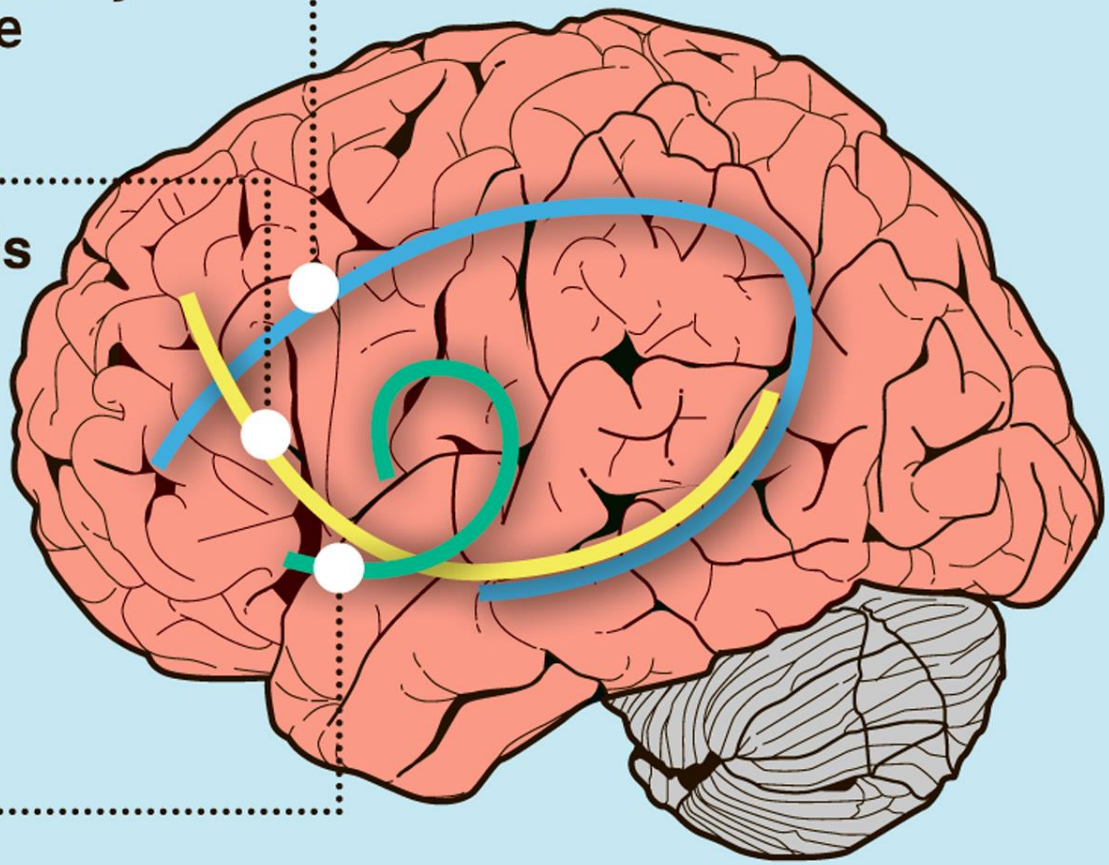
The brain and cognitive ability

Mathematical ability
Cingulum white matter fibers

Language skills
Arcuate fasciculus fibers

Memory
Fornix fibers



Cognitive process

- Cognition – The ***process*** of acquiring knowledge and understanding through thought, experience, and the senses.
- Thinking - The ***process*** of using one's mind to consider or reason about something
- Communication - The ***process*** of exchanging thoughts, messages, or information
- How we communicate is shaped by our cognitive processes-how we think, feel and believe
- We have ***cognitive dispositions***, styles or tendencies, which direct how we approach the world and relate to others

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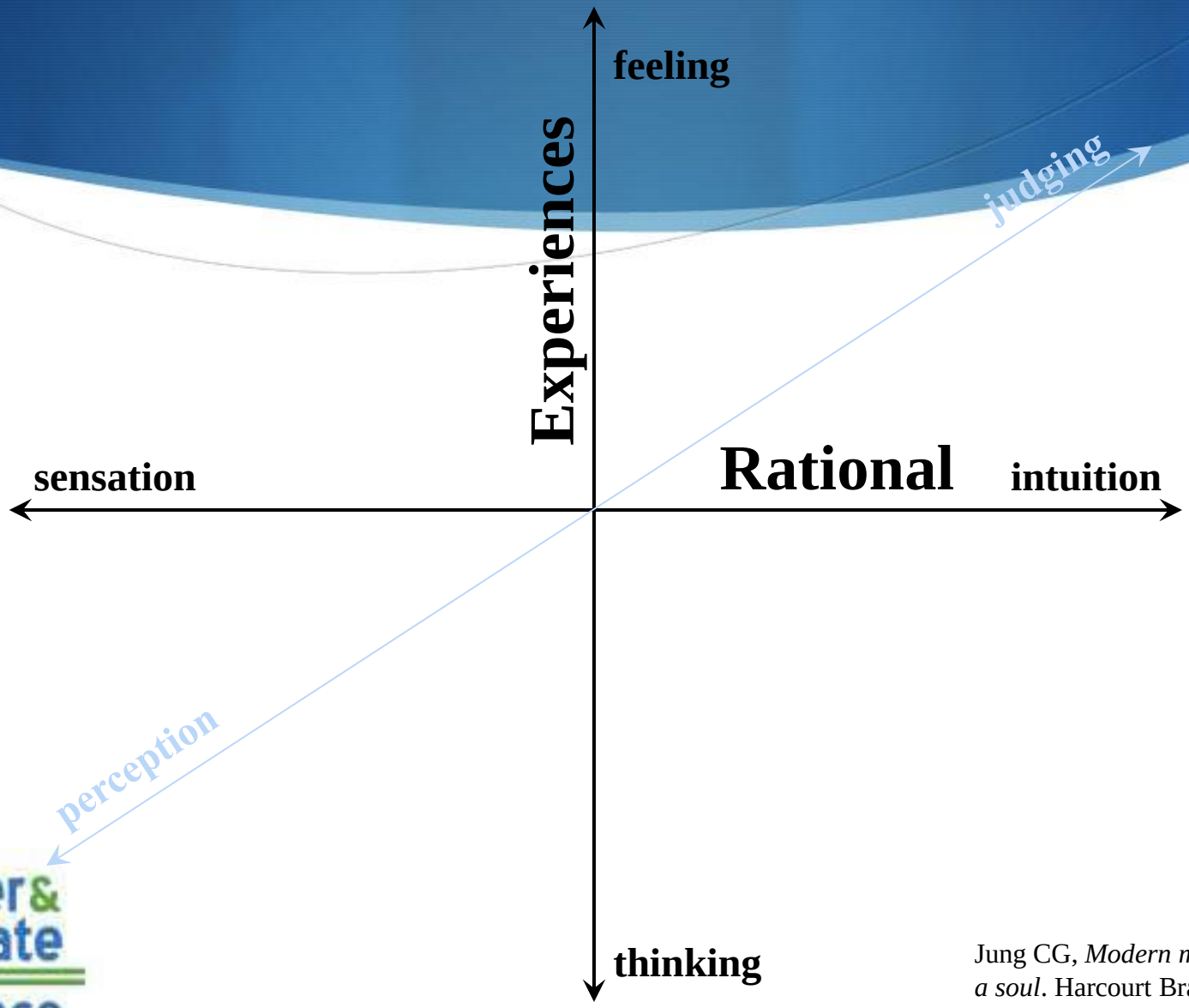
Disposition: Jung's two axes



Jung CG, *Modern man in search of a soul*. Harcourt Brace, 1933

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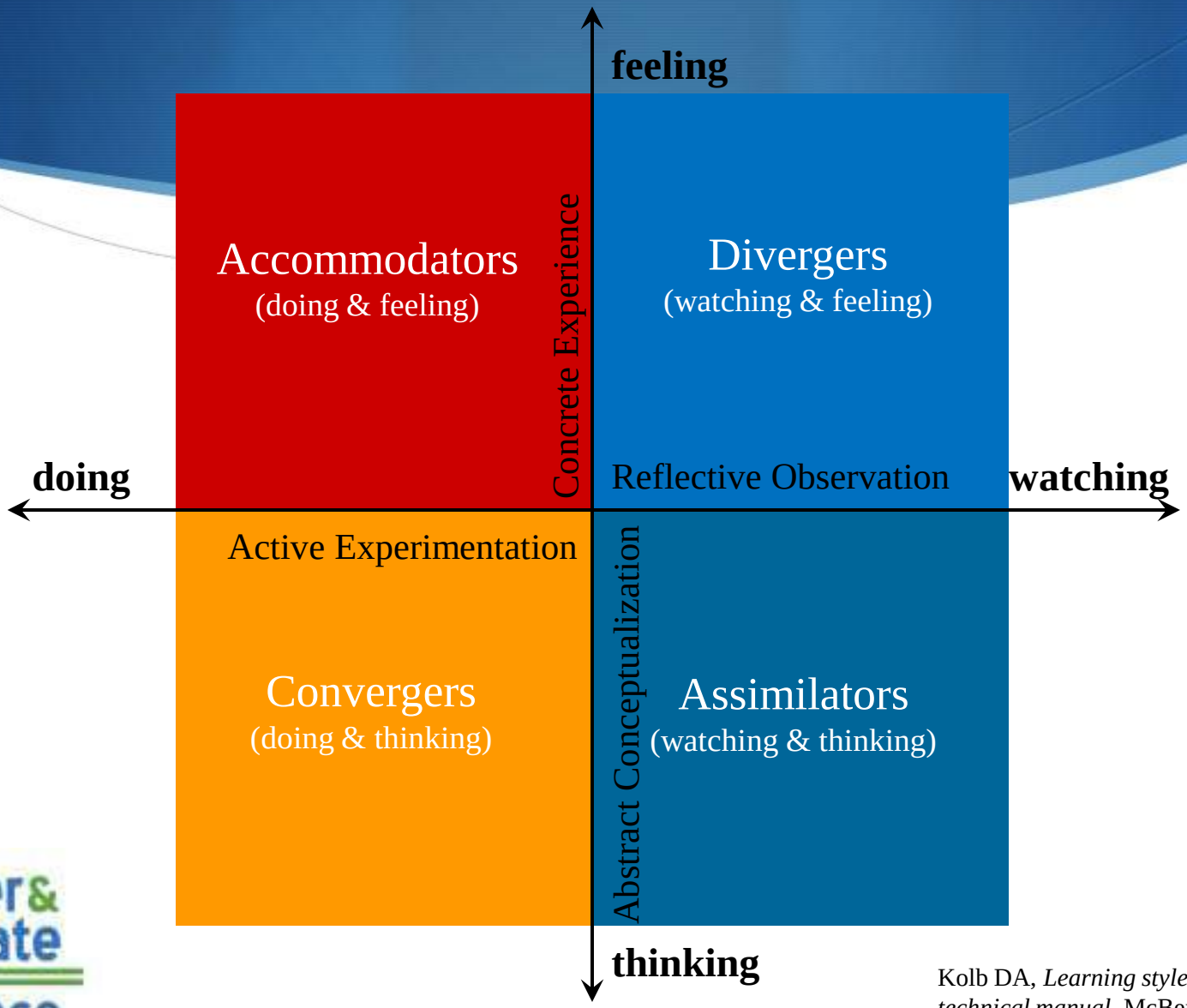
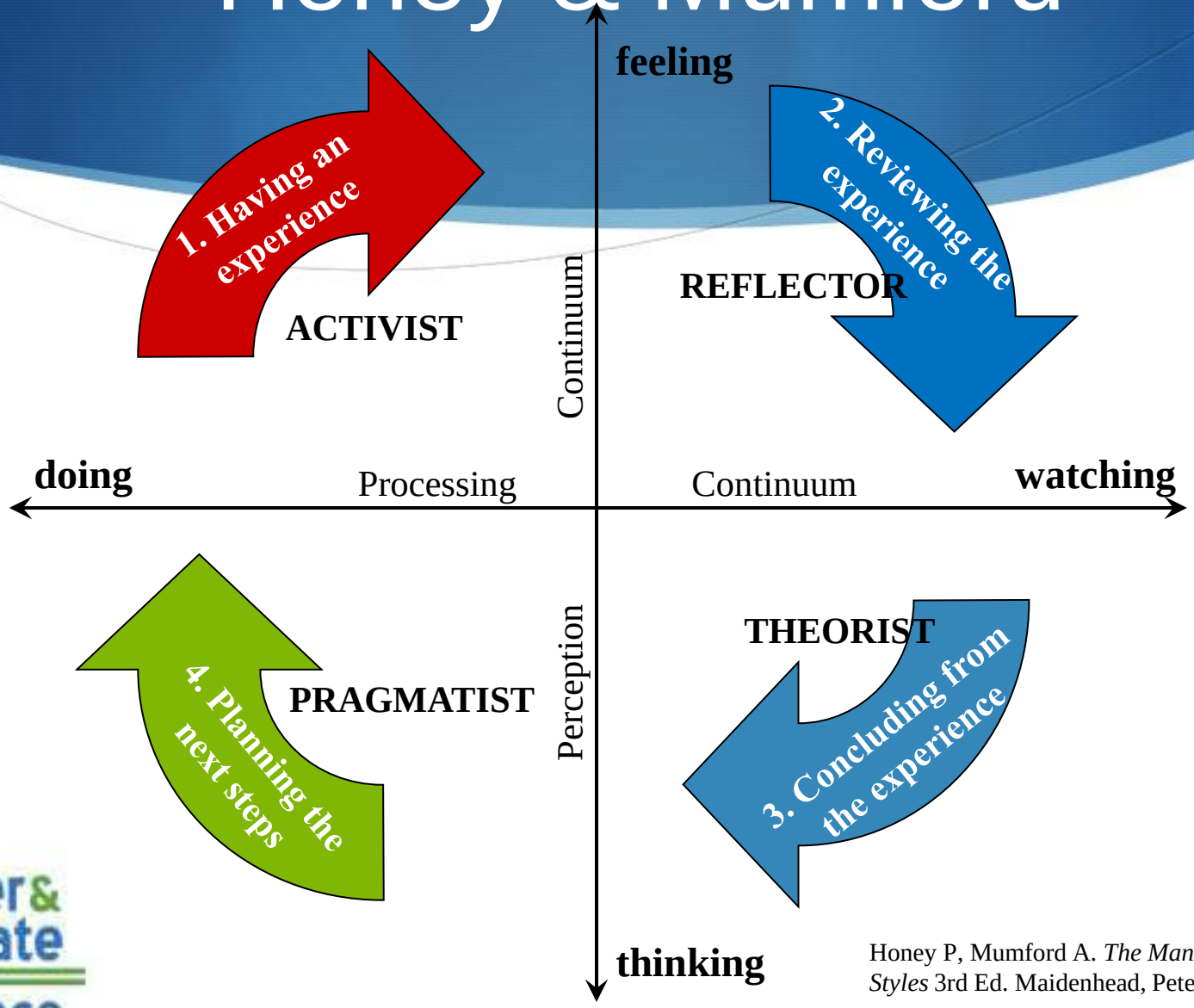
Kolb's Learning Style Indicator



Kolb DA, *Learning style inventory technical manual*. McBer and Co., Boston, MA, 1976.

Honey & Mumford



Honey P, Mumford A. *The Manual of Learning Styles* 3rd Ed. Maidenhead, Peter Honey, 1992.

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Kolb's Learning Style Inventory

- **Theorists**: Like case studies, theory readings, and thinking alone. Their strengths lie in their ability to create theoretical models.
- **Pragmatists**: peer feedback; activities that apply skills; self-directed autonomous learner. The pragmatist's greatest strength is in the practical application of idea.
- **Activists:** like practising the skill, problem solving, small group discussions, peer feedback; trainer should be a model of a professional, leaving the learner to determine her own criteria for relevance of materials.
- **Reflectors:** like lectures with plenty of reflection time; trainer should provide expert interpretation - taskmaster/guide; judge performance by external criteria. Their strengths lie in an imaginative ability.

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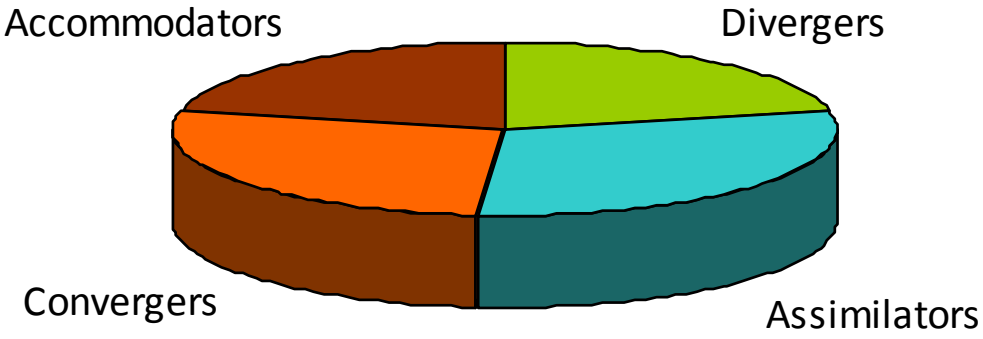
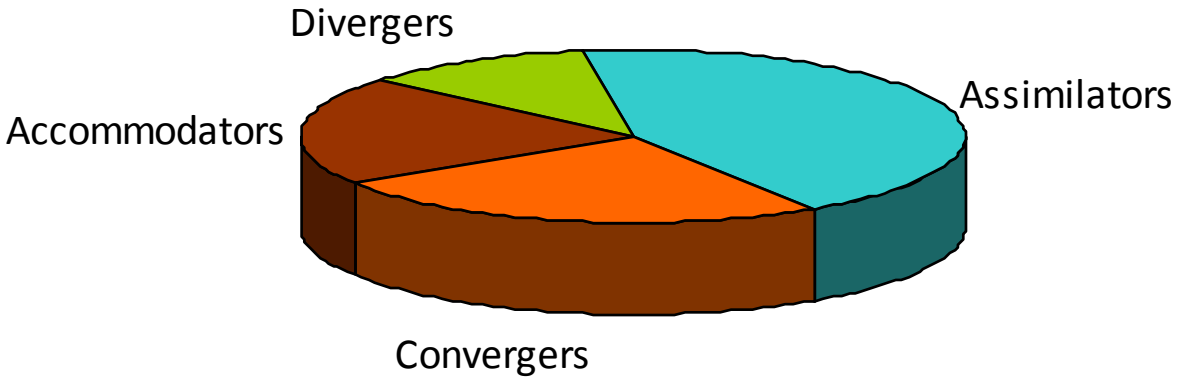
Distribution of Learning Styles

General Population[1]



Engineering faculty population[2]



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1. Philbin M, Meier E, Huffman S, Boverie P. A survey of gender & learning styles, *Sex Roles*, 32(7/8):485- 494, 1995

2. Based on Philbin et al, but adapted by Patterson, EA, 2009.

Assimilators (watching & thinking) dominate in science fields

- Assimilators are best suited to academic careers[1]
  - So assimilators most likely to shape the academic world
  - Traditional pedagogical approaches favor the assimilator
- Rationalism and objectivity are valued over intuitive, personal knowledge[2]
- Science and engineering idioms: a 'language' of models and analogies
  - may enhance problem-solving skills but tendency to become intellectual exercises

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1. Kolb D. *Learning Style Inventory*. Boston, MA: McBer & Co. 1985
2. Philbin M, Meier E, Huffman S, Boverie P, A survey of gender & learning styles, *Sex Roles*, 32(7/8):485- 494, 1995

Climate scientists differ in their personality type preferences

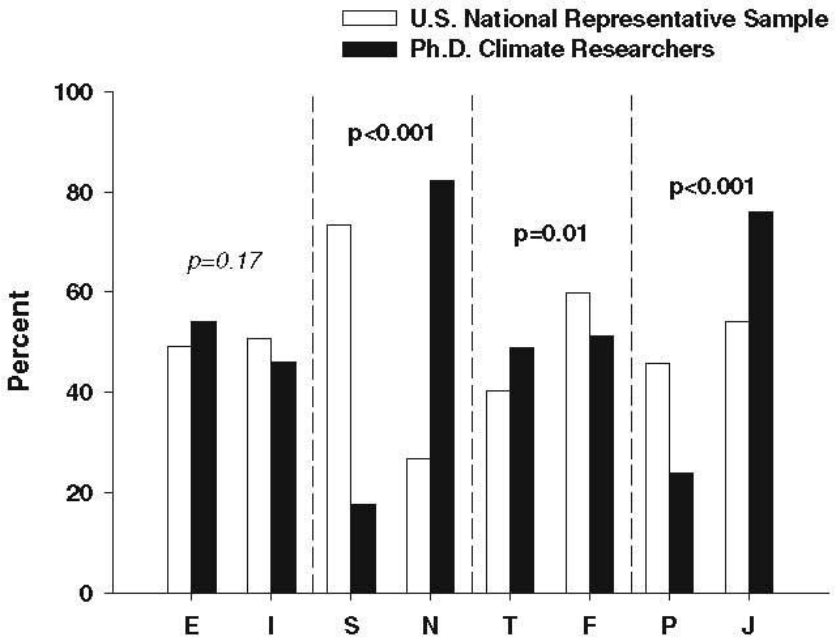

Fig. 1 Comparison of personality preferences of the National Representative Sample in the United States (open bars, N=3009, Myers et al. 1998) and interdisciplinary, early career Ph.D. climate change researchers (closed bars, N=209). For each personality type dichotomy, significant differences ($p<0.05$) based on chi-square tests are indicated in bold. Data from the National Representative Sample show 49% and 51% for the E/I dichotomy; 73% and 27% for the S/N dichotomy; 40% and 60% for the T/F dichotomy; and 54% and 46% for the J/P dichotomy. In contrast, the climate change researchers show 54% and 46% for the E/I dichotomy; 82% and 18% for the S/N dichotomy; 49% and 51% for the T/F dichotomy; and 76% and 24% for the J/P dichotomy

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Questions

- What are the implications of climate scientists differing in cognitive make up from the general population?
- How is this related to thinking process?
- How might this affect group processes?
- How might this affect communications processes?

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