Cultivating an Opposable Mind
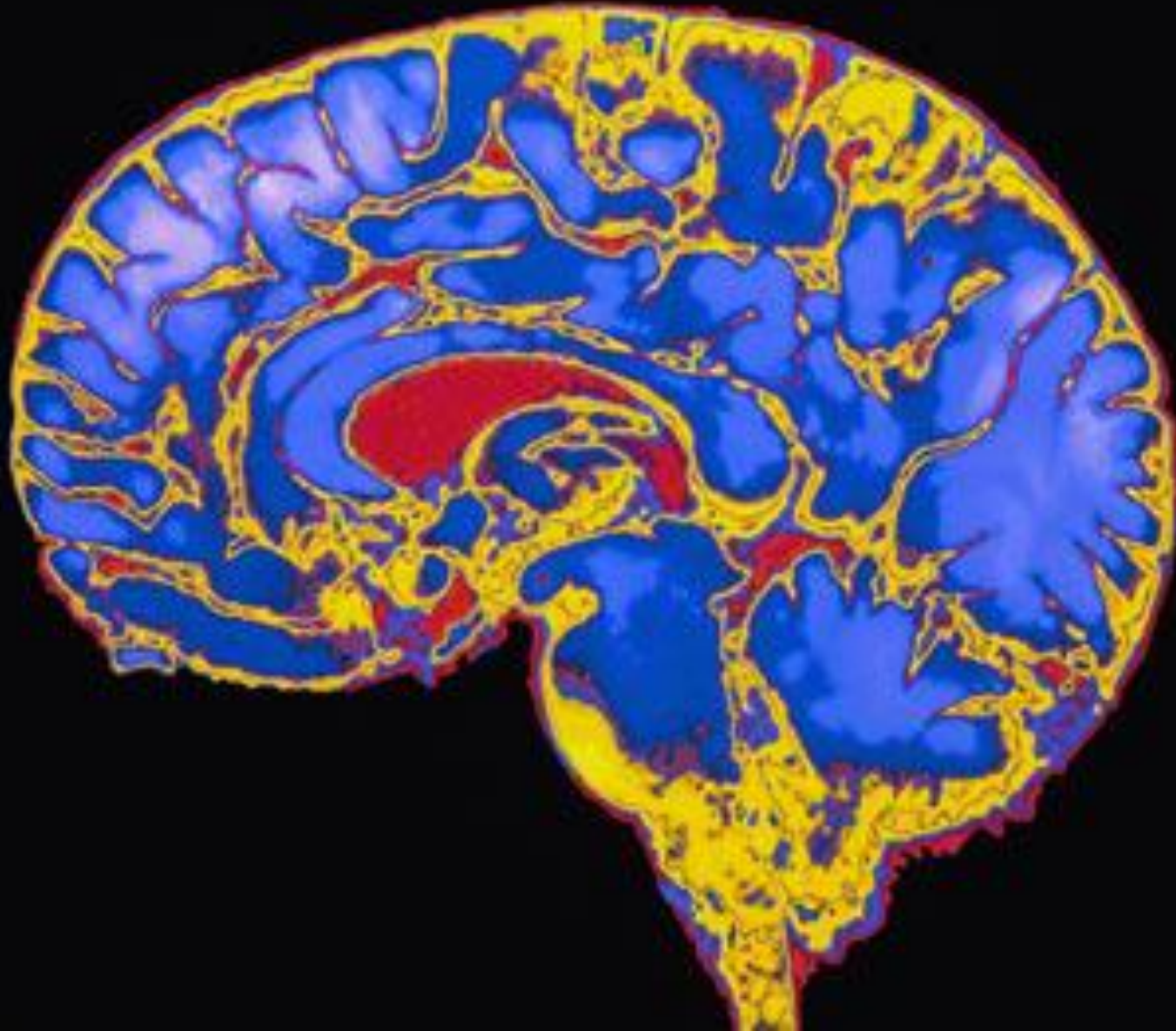
K-12 Math Forum
Creativity and Innovation in Mathematics
July 4, 2013

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Director, I-Think Initiative
Desautels Centre for Integrative Thinking
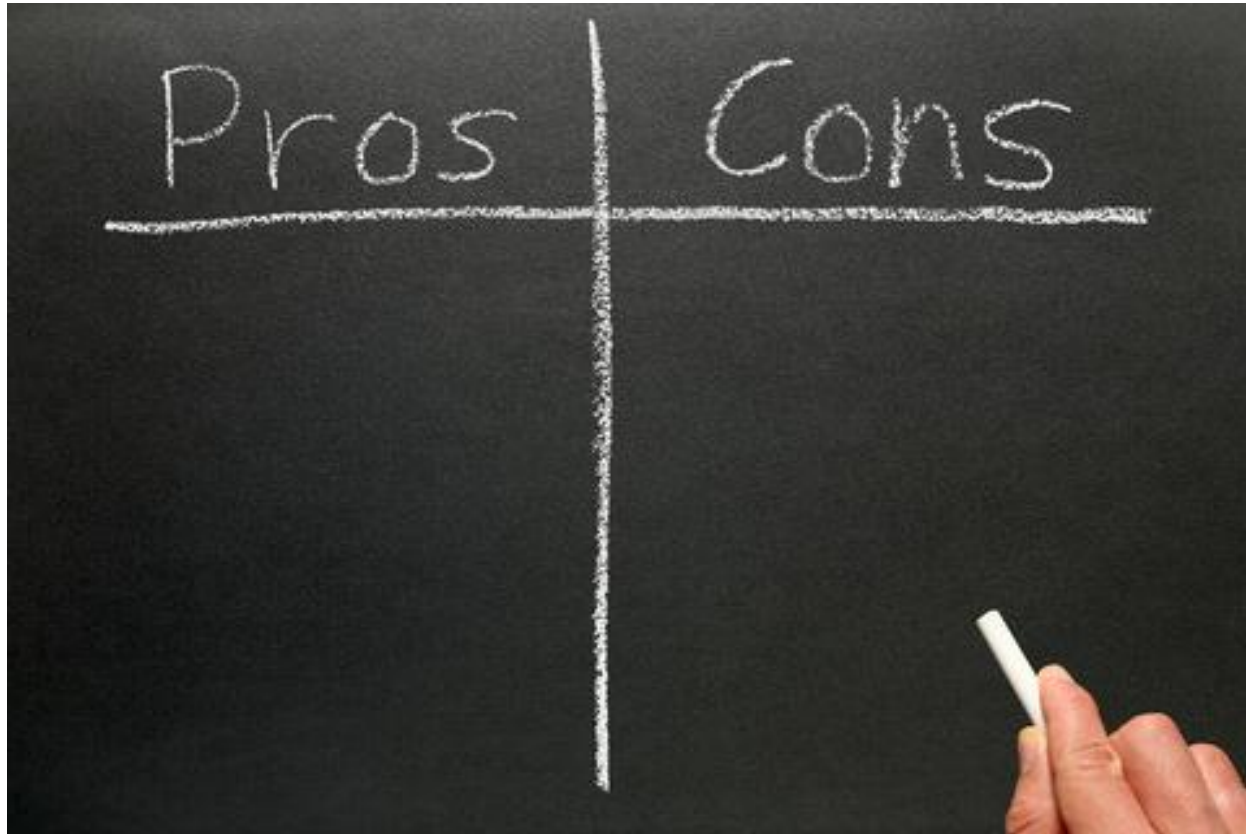**Rotman School of Management, University of Toronto**

The Prevalence of "Evaluate and Choose"

1. Work to show we know the right answer (and here's the slide to prove it!)

2. Evaluate and choose between options (isn't business all about trade-offs?)

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Problem-Solving as Evaluation

"The test of a first-rate intelligence is the ability to hold two opposing ideas in mind at the same time and still retain the ability to function. One should, for example, be able to see that things are hopeless, yet be determined to make them otherwise."

~ F. Scott Fitzgerald

Example: A.G. Lafley at Proctor & Gamble

More Innovation

Vs.

Lower Costs

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Example: A.G. Lafley at Proctor & Gamble

More Innovation

Vs.

Lower Costs

Creative Resolution:

connect + develop

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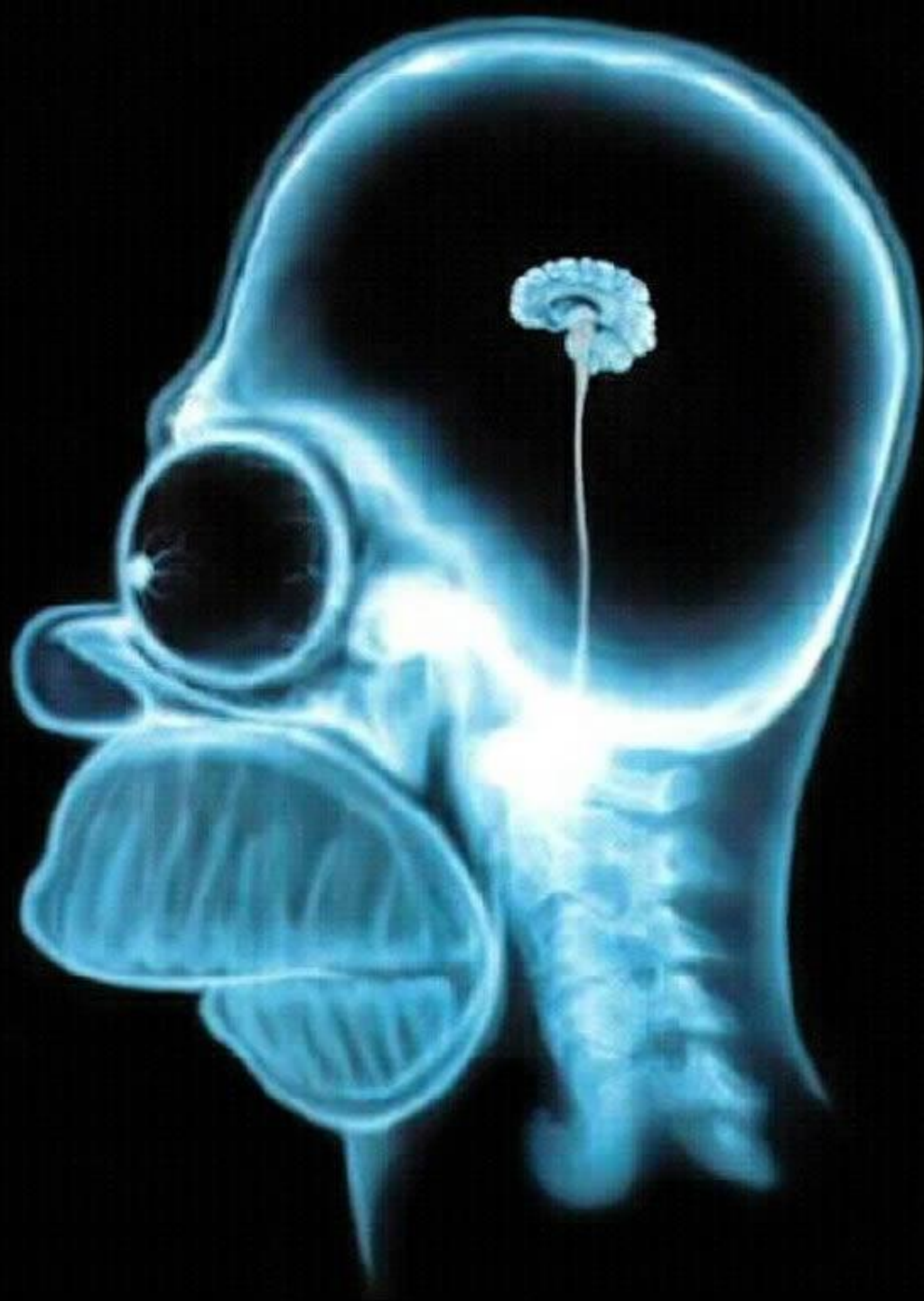I·Think
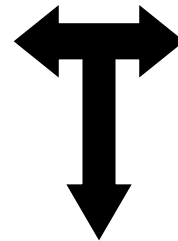
The Definition of Integrative Thinking

"The ability to face constructively the tension of opposing models and instead of choosing one at the expense of the other, to generate a creative resolution of the tension in the form of a new model that contains elements of the individual models but is superior to each."

~ Roger Martin, The Opposable Mind (2007)
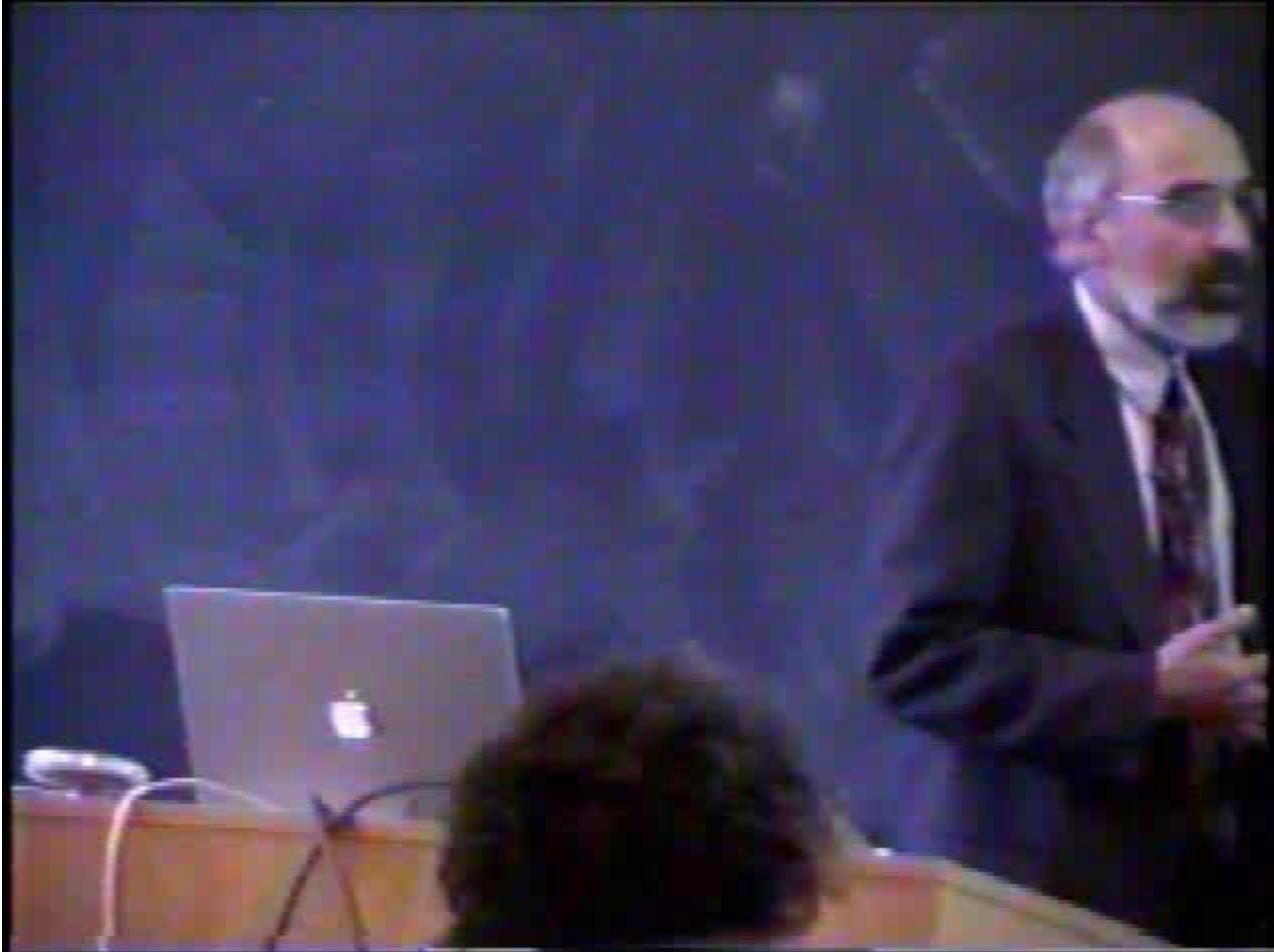
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We See This…

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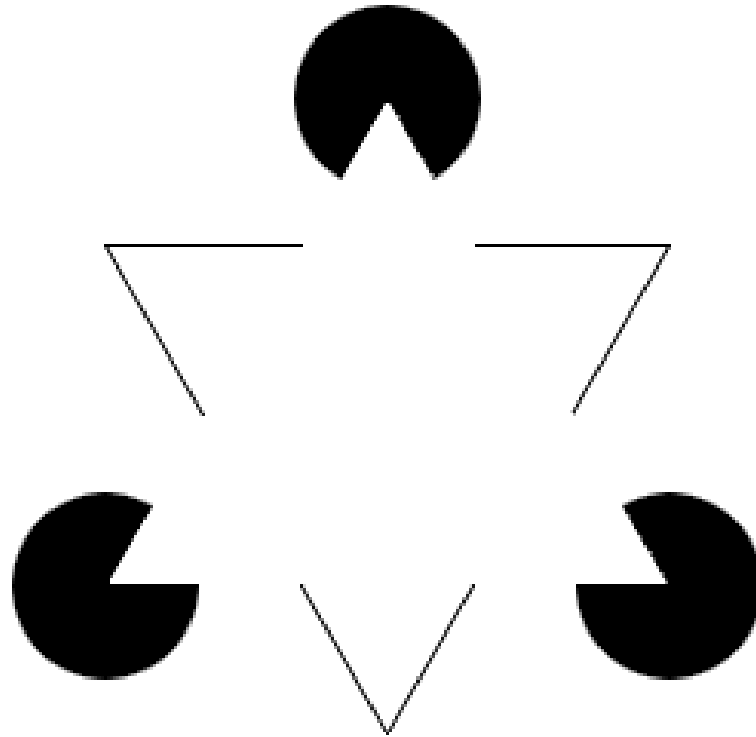
We Are Easily Framed
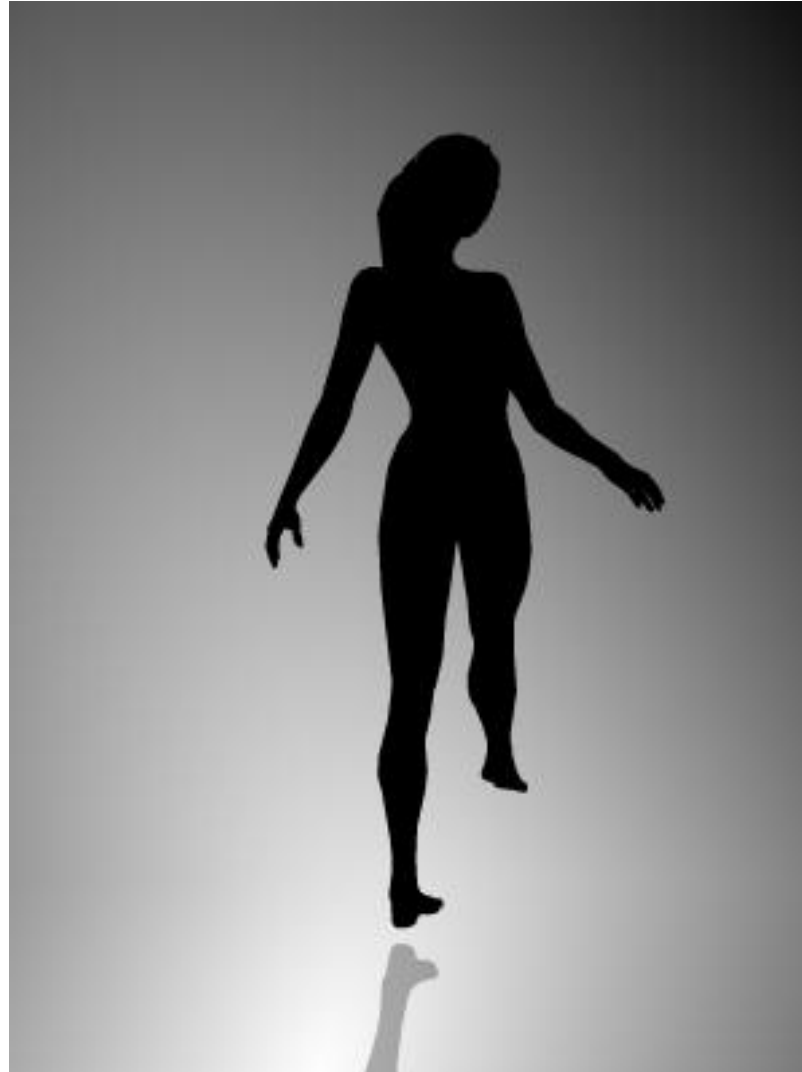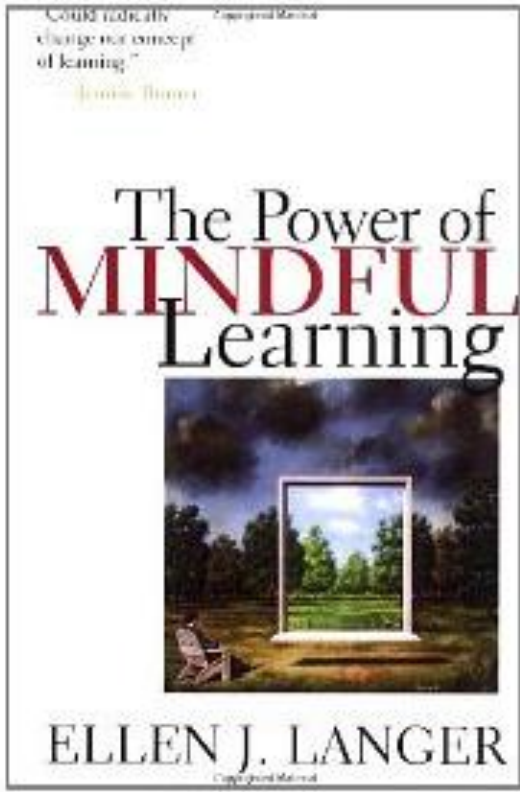
When we frame students to expect only one single "right" answer, that answer will become fixed in their minds – and unreceptive to change (Premature cognitive commitment).

Goal: **Figure out the rule governing the number series:**

2,4,6

You can:

1. Guess three numbers of your own to test if they fit the "rule"

2. Guess the rule.

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Typical Reactions to Model Clash

Fear or Avoid Conflict

Or

Evaluate and Choose

- Deny/ignore/avoid existence of clash
- Crush opposing model or cave in
- Re-confirm there is no real model clash

- Lay out the set of options
- Evaluate each of those options
- Choose the "least worst" option from the set

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Integrative Thinkers Seek Out Model Clash

- **Enjoy experiencing the tension**
- **Use the tension to tease out novel connections**
- **Drive for new insight before proceeding**

Objectives of Our Work in K-12

Teach students how to observe and evaluate their thinking process, particularly when faced with opposition or difficult choices

Introduce students to tools that help them understand and make the best use of opposing ideas, move beyond single-answer thinking, and design creative solutions

Help students use these concepts to actively broaden their stance about who they are and what they can accomplish

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Implications for Problem-Solving

Integrative Thinking

• Search for creative resolution of tensions

How do I know that I'm done?

• Whole visualized while working on individual parts

What steps do I take and in what order?

• Choose between alternatives

• Multi-directional and non-linear causality considered

What causal connections do I see?

• Think about each element separately or sequentially

• More features of the problem considered salient

What factors do I consider?

• Look for clear, simple causal relationships

Conventional Thinking

• Simplify the problem; limit the features considered

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The Importance of Mindset

$$3x + 2y = 9$$
$$5y + 10 = 30$$
What is x?

- Structured
- Solved
- Single answer(convergence)

- Messy
- Mysterious
- Many possible answers (divergence)

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Adaptive Problems, Technical Mindset

TECHNICAL PROBLEMS VS. ADAPTIVE CHALLENGES

The single biggest failure of leadership is to treat adaptive challenges like technical problems.

TECHNICAL PROBLEMS	ADAPTIVE CHALLENGES
1. Easy to identify	1. Difficult to identify (easy to deny)
2. Often lend themselves to quick and easy (cut-and-dried) solutions	2. Require changes in values, beliefs, roles, relationships, & approaches to work
3. Often can be solved by an authority or expert	3. People with the problem do the work of solving it
4. Require change in just one or a few places; often contained within organizational boundaries	4. Require change in numerous places; usually cross organizational boundaries
5. People are generally receptive to technical solutions	5. People often resist even acknowledging adaptive challenges.
6. Solutions can often be implemented quickly—even by edict	6. "Solutions" require experiments and new discoveries; they can take a long time to implement and cannot be implemented by edict

Adapted from Ronald A. Heifetz & Donald L. Laurie, "The Work of Leadership," Harvard Business Review, January-February 1997

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An Integrative Mindset

About the world:
1) Existing models do not represent reality; they are constructions
2) Opposing models are to be leveraged, not feared
3) Better models exist that are not yet seen

About my role in it:
4) I am capable of finding a better model
5) I wade into and get through the necessary complexity
6) I give myself time to create and develop a new insight before proceeding

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