

Examining the Effect of a Paradigm-Relatedness Problem Framing Tool on Idea Generation

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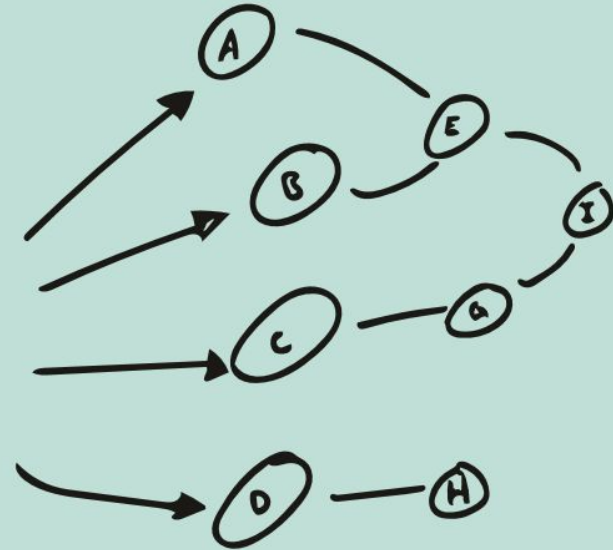
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It is important for designers to be able to explore the entire solution space

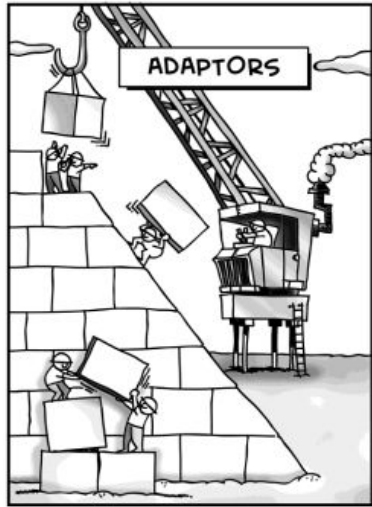


Design Problem



Solution Space

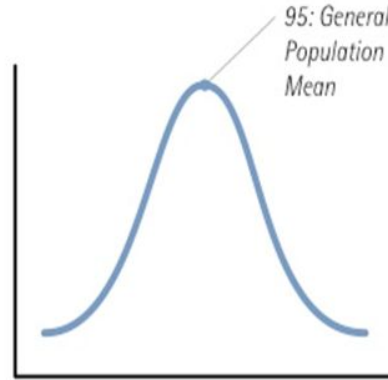
The types of ideas generated are influenced by that individual's cognitive style



45: Lowest Recorded Score

More Adaptive
Accept and work within the defined problem definition.

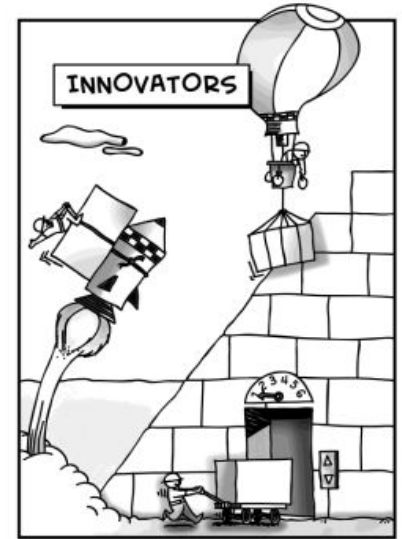
Doing things better



145: Highest Recorded Score

More Innovative
See the definition as part of the problem

Doing things differently



Kirton's Adaption-Innovation Theory

We can measure these ideas along the paradigm-relatedness spectrum

Design a way for individuals without lots of skill and experience skiing or snowboarding to transport themselves on snow.



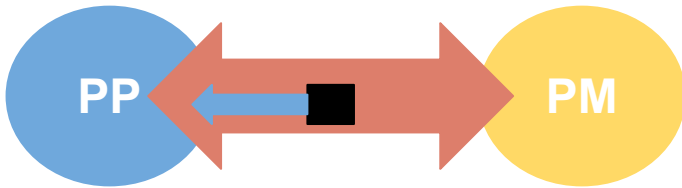
Paradigm-Preserving
(PP)



Paradigm-Modifying
(PM)

An ideation **SHIFT** is the change in the type of ideas generated along the paradigm-relatedness spectrum

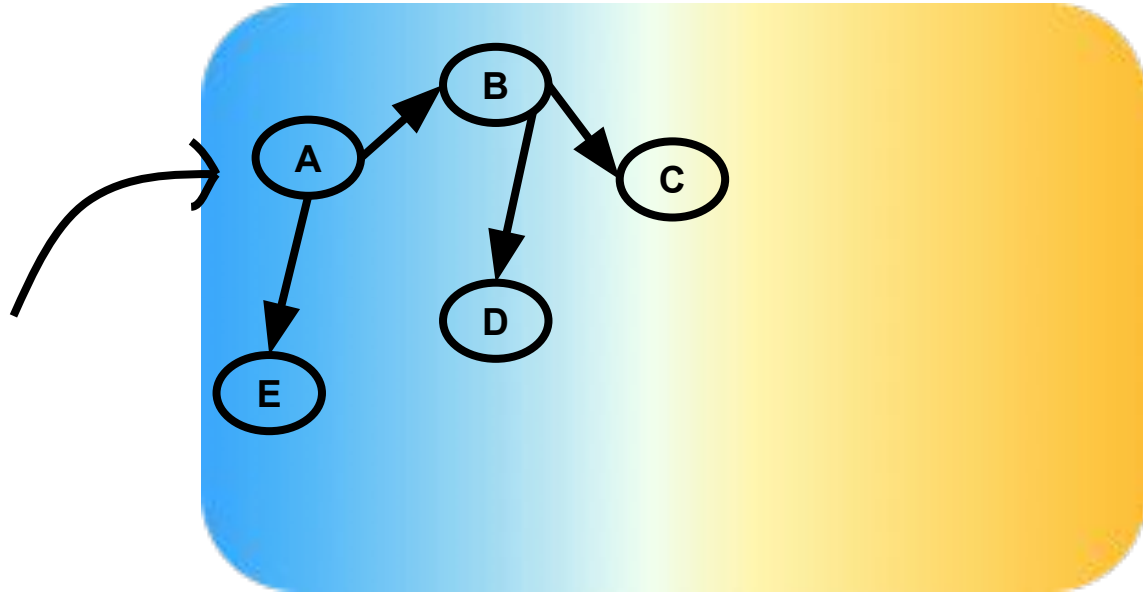
Adaptive Shift



Innovative Shift



It can be difficult for designers to explore all areas of the solution space



PP



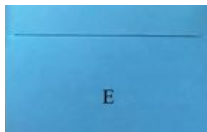
PM

To what extent does a design problem framing tool shift the paradigm-relatedness of users' ideas?

Incremental Framing
Strategies 1

Neutral + Incremental Frame

Your solutions should focus on improving existing designs or adapting familiar ways of approaching the problem or similar problems.



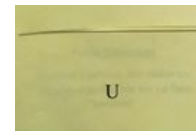
Neutral Statement

Design a way for individuals without lots of skill and experience skiing or snowboarding to transport themselves on snow.

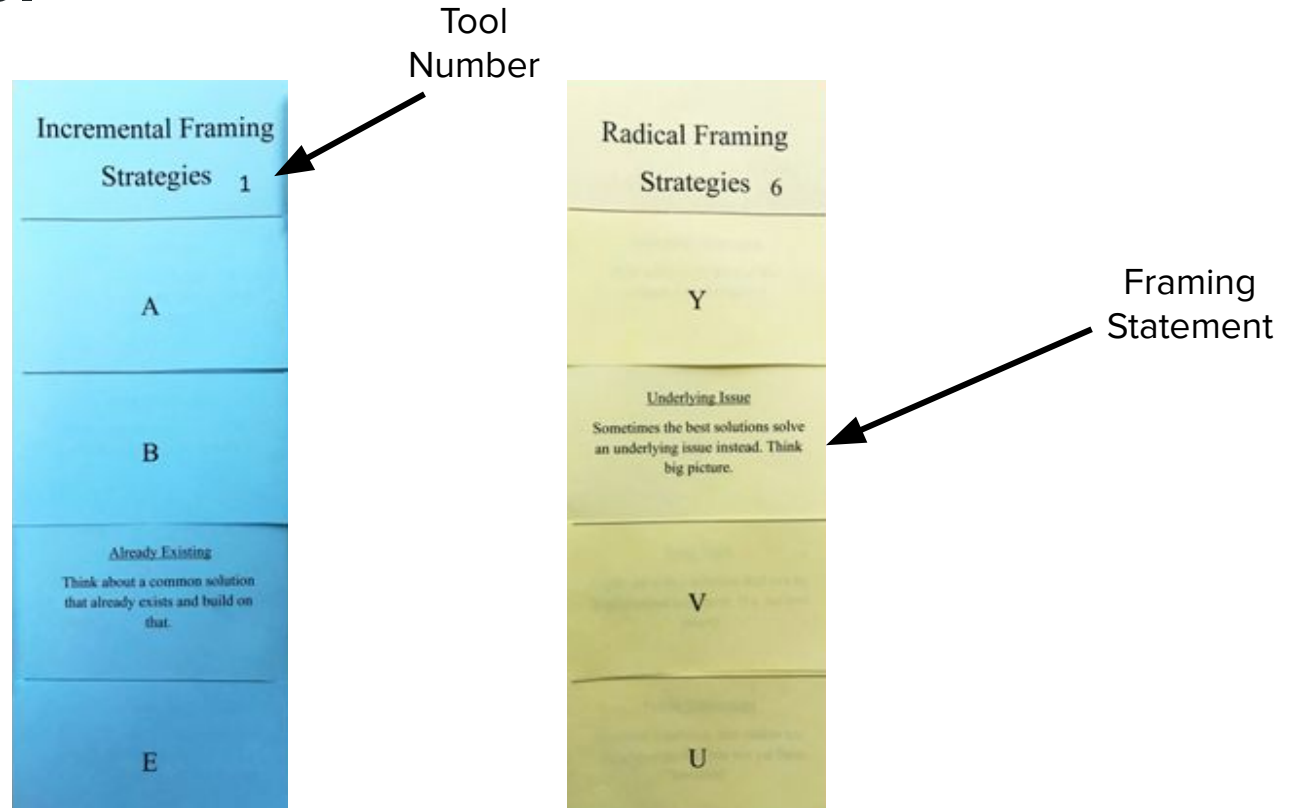
Radical Framing
Sentences 2

Neutral + Radical Frame

Your solutions should focus on creating totally new designs or developing totally new ways of approaching the problem.



Framing Tool

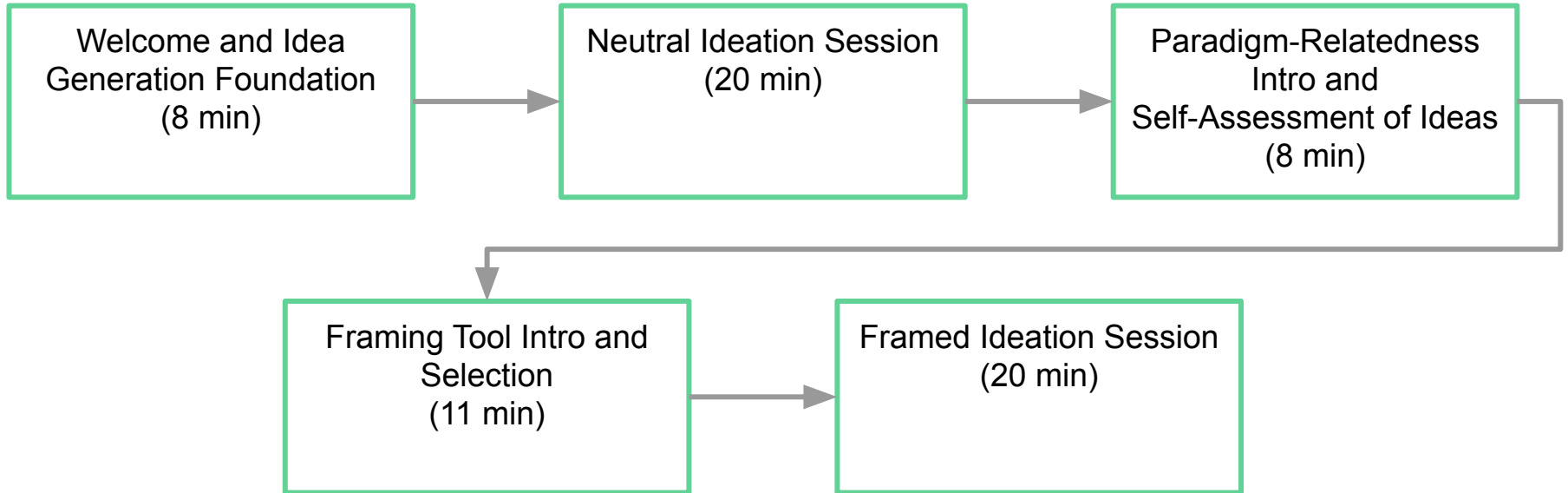


Our study was done with high school students interested in science and engineering

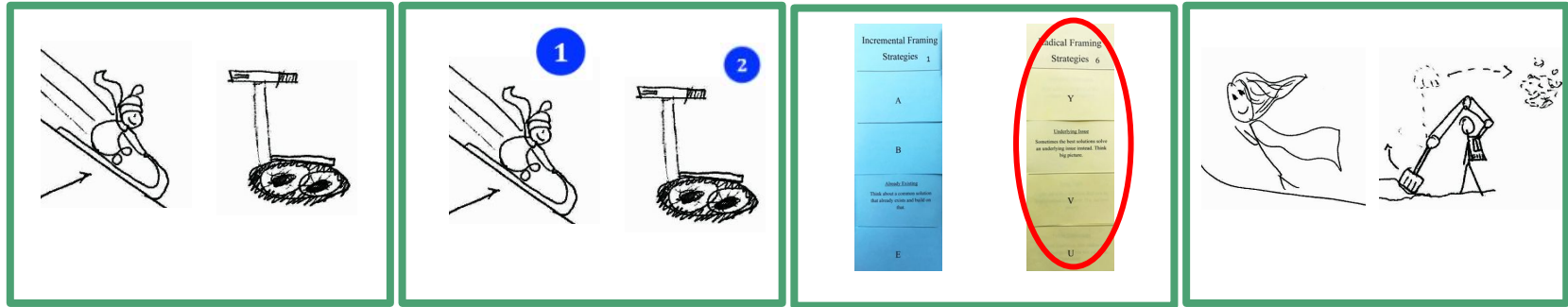


- Study consists of 45 participants
- 24 male, 21 female
- Attending a summer engineering camp at large Midwestern university
- Age range: 14-18
- Students range from incoming high school sophomores to incoming high school seniors

Data Collection Procedure

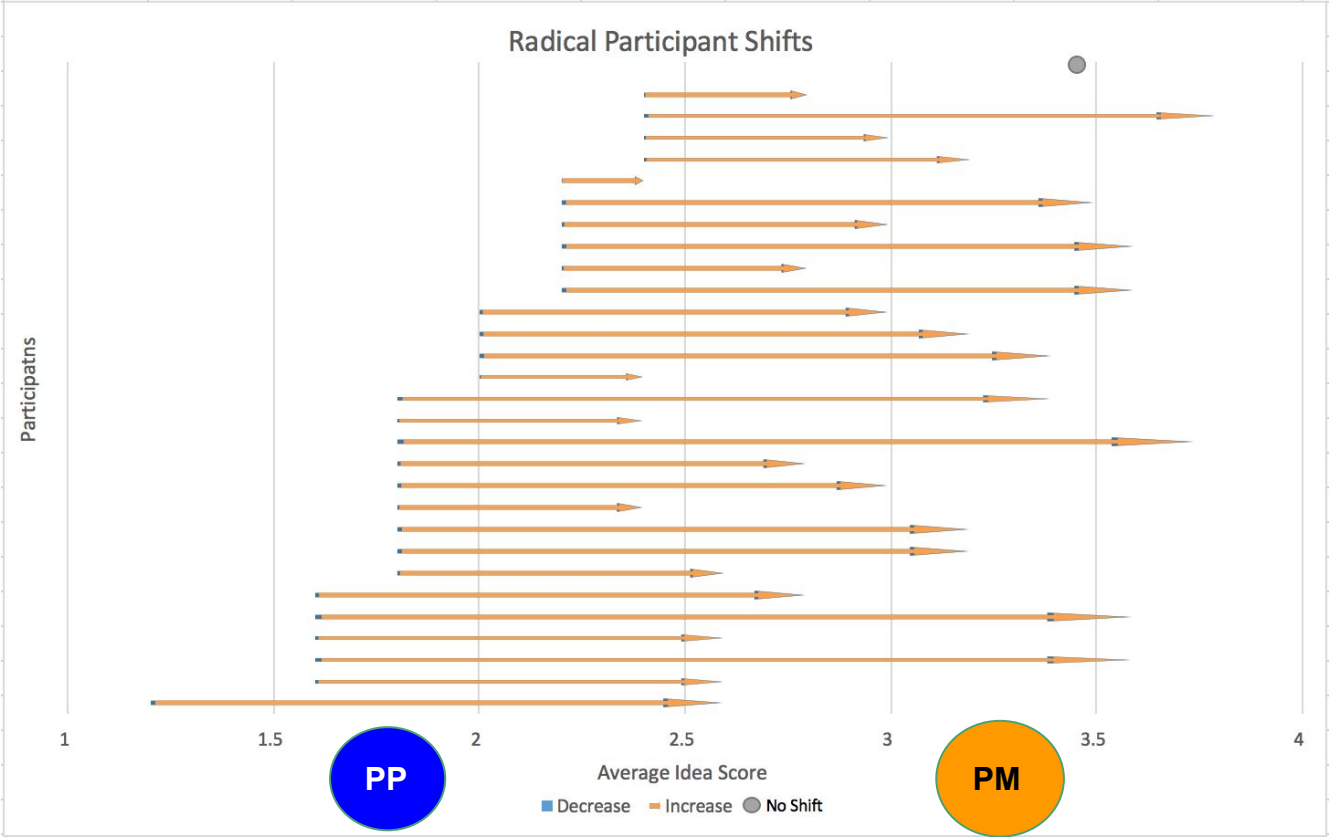


Participants self-assessed their original ideas and chose a framing tool to generate new ideas

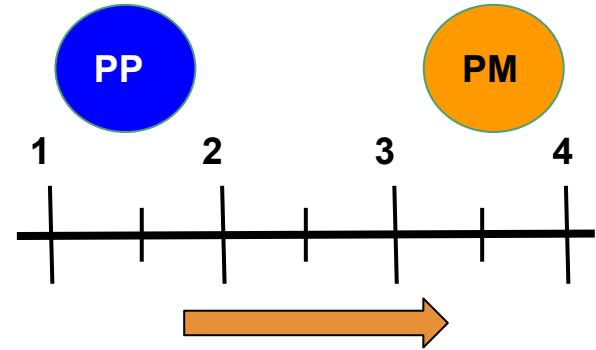
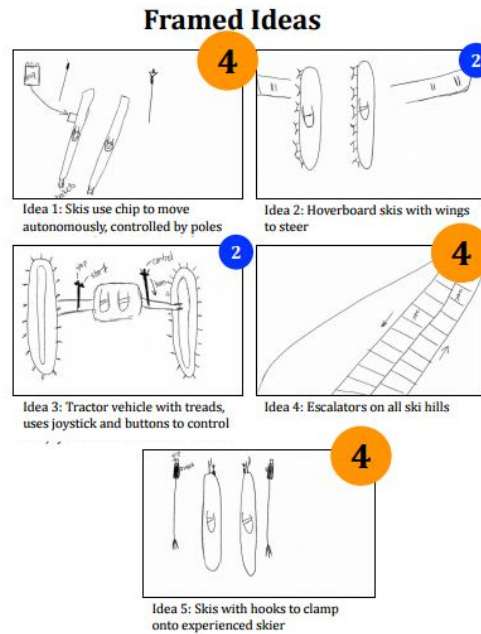
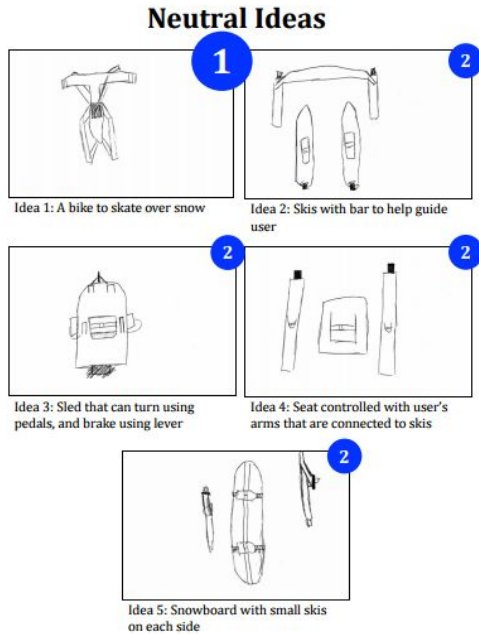


- 1** Strongly Paradigm Preserving
- 2** Somewhat Paradigm Preserving
- 3** Somewhat Paradigm Modifying
- 4** Strongly Paradigm Modifying

All participants who chose the radical tool shifted in the intended direction

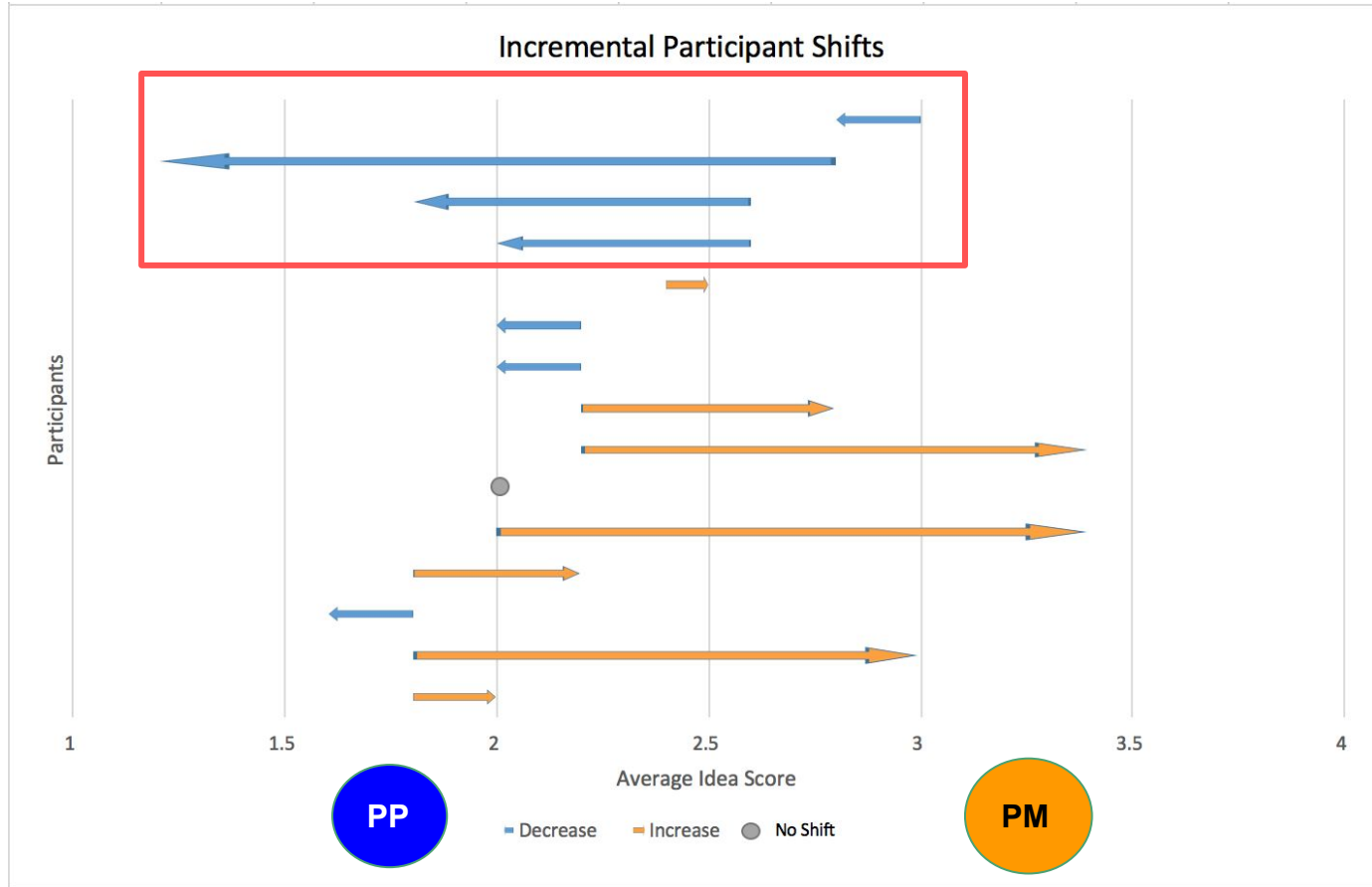


Radical frames can open up the solution space in the innovative creativity direction




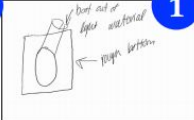
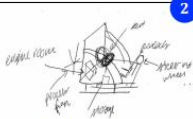


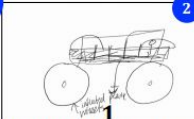

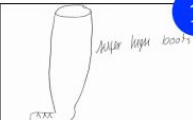


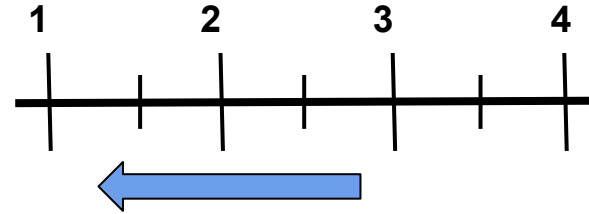
“It opened up my eyes that I could have really creative answers that seem impossible, but you don’t have to worry about those things. Helped me think more radically.”

Incremental tool caused shifts in both directions



Incremental frames can ground a set of ideas in the adaptive creativity direction

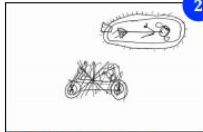
| Neutral Ideas | | Framed Ideas | |
|--|---|---|---|
|  <p>Idea 1: Box mobile where wind comes out back to propel user</p> |  <p>Idea 2: Person stands on snowboard that hovers over snow</p> |  <p>Idea 1: Snowmobile with brakes</p> |  <p>Idea 2: Snow shoes that minimize sinking in the snow</p> |
|  <p>Idea 3: Fan-like propeller to move mobile</p> |  <p>Idea 4: Person in snowball, hooks pull snowball up hills</p> |  <p>Idea 3: Dog sled for icy snow</p> |  <p>Idea 4: Dune buggy with tires that "float" on snow</p> |
|  <p>Idea 5: Jet pack for user to fly above trail, avoiding the snow</p> | |  <p>Idea 5: Boots to walk in snow without getting cold</p> | |



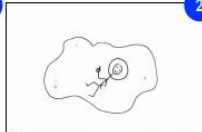
"I looked at it when I was lost and its statements sparked ideas within me."

Incremental framing strategies may be applied in radical ways

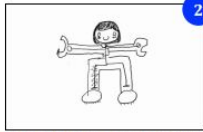
Neutral Ideas



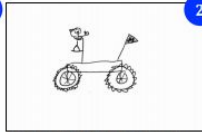
Idea 1: A pod with tank tracks around it



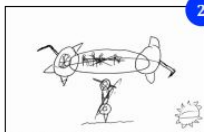
Idea 2: A gelatinous mass that moves like an amoeba, directed using GPS



Idea 3: Robotic shirts and pants with feet specialized for snow and ice

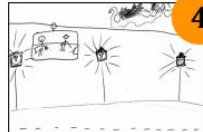


Idea 4: Motion sensing rover with ice/snow tires

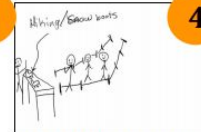


Idea 5: Vehicle latched onto spikes hooking into ground and flips

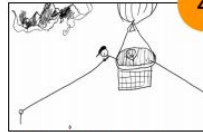
Framed Ideas



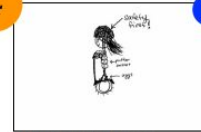
Idea 1: Public access ski lifts



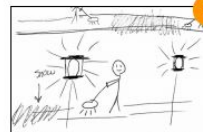
Idea 2: Hiking/snow boot stations



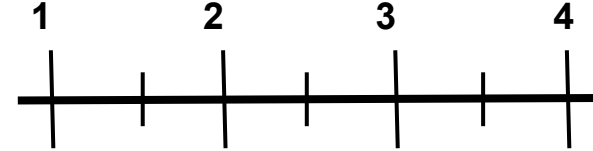
Idea 3: Hot air balloon travel



Idea 4: Snow tire segways



Idea 5: Personal snow melter using heating lamp in a metal detector



"I feel it restricted my creative process."

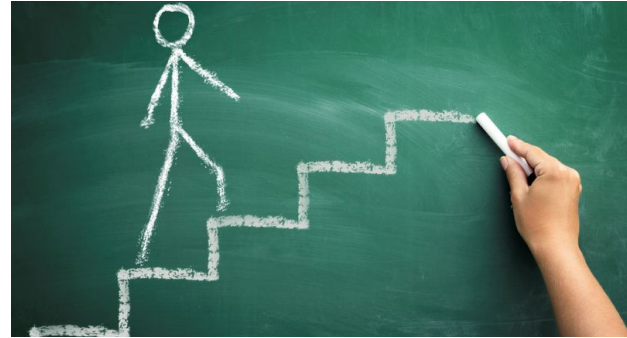
Conclusions and Next Steps

Conclusions

- Radical tool showed more consistent shifts
- Some incremental frames were interpreted in radical ways

Next Steps

- Provide clearer language for incremental frames
- Explore asymmetry between incremental and radical tools
- Can be used in academic and professional settings



Thank You! Questions?

<http://www.ideationflexibility.org/>

Frames

Incremental

| | |
|---|--|
| A | <u>Limited Budget</u> You have a limited budget for this project. Keep your idea within a tight budget. |
| B | <u>Meet Constraints</u> Focus on a key constraint of the problem and be sure to follow it. |
| C | <u>Already Existing</u> Think about a common solution that already exists and build on that. |
| D | <u>Simple</u> Sometimes the best solutions are the ones that are most easily understood. Keep your solution simple. |
| E | <u>Short Term</u> Come up with a solution that can be implemented within the next week. |
| F | <u>Current Technology</u> Generate a solution that only uses technology that currently exists. |

Radical

| | |
|---|---|
| Z | <u>Unlimited Budget</u> You have an unlimited budget to complete this project. Don't worry about the cost. |
| Y | <u>Disregard Constraints</u> Pick a key constraint of the problem and disregard it. |
| X | <u>Unexpected</u> Think about a common solution that already exists and introduce something unexpected. |
| W | <u>Underlying Issue</u> Sometimes the best solutions solve an underlying issue instead. Think big picture. |
| V | <u>Long Term</u> Come up with a solution that you have a timeframe of several years to implement. |
| U | <u>Future Technology</u> Generate a solution that makes use of technology that has not yet been invented. |