Model of Scientific Method: A Process of Inquiry

Observation/initial idea

- Observe students drinking caffeine before exam.
- Caffeine Enhancement Theory

Theory

- Caffeine Enhancement Theory

Research Question

- Does caffeine enhance mental performance?

Abstract world

Rationalism

Real world

Empiricism

Operational definitions

- Caffeine = 8 oz. regular coffee
- No caffeine = 8 oz. decaf coffee
- Mental performance = quiz scores

Research design

- IV: Caffeine (Regular Coffee)
- DV: Quiz Scores

- No Caffeine (Decaf Coffee)
- Quiz Scores

Results

- Caffeine group: M = 86
- No caffeine group: M = 72

Hypothesis

- Confirmed

The caffeine group quiz scores will be higher than the no caffeine group quiz scores.
Observation

Research Problem

Does caffeine enhance mental performance?

Decaf Coffee

Randomly Assigned

Regular Coffee

Independent Variable

Dependent Variable

<table>
<thead>
<tr>
<th>Caffeine (8 oz. Regular Coffee)</th>
<th>Quiz Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>No Caffeine (8 oz. Decaf Coffee)</td>
<td>Quiz Scores</td>
</tr>
</tbody>
</table>
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Observation/Initial Idea
Observe students drinking caffeine before exam.

Theory
Caffeine Enhancement Theory

Research Question
Does caffeine enhance mental performance?

Abstract world
Rationalism

Real world
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Operational definitions
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Research design
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Hypothesis
The caffeine group quiz scores will be higher than the no caffeine group quiz scores.

Independent Variable
Dependent Variable

Caffeine (8 oz. Regular Coffee) Quiz Scores
No Caffeine (8 oz. Decaf Coffee) Quiz Scores

Hypothesis:
The caffeine group quiz scores will be higher than the no caffeine group quiz scores.
Independent Variable                        Dependent Variable
Caffeine (8 oz. Regular Coffee)             Quiz Scores

No Caffeine (8 oz. Decaf Coffee)            Quiz Scores

Higher Scores for Caffeine Group

HYPOTHESIS CONFIRMED

Observation/Initial idea
Observe students drinking caffeine before exam.

Theory
Caffeine Enhancement Theory

Research Question
Does caffeine enhance mental performance?

Abstract world
Rationalism

Empirical world
Empiricism

Operational definitions
Caffeine = 8 oz. regular coffee
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Mental performance = quiz scores

Research design
IV
DV

Caffeine (8 oz. Regular Coffee) Quiz Scores: M = 86
No Caffeine (8 oz. Decaf Coffee) Quiz Scores: M = 72

Hypothesis
The caffeine group quiz scores will be higher
than the no caffeine group quiz scores.
Theory

Two main functions:
1. Organize empirical findings
2. Guide future research

Caffeine Enhancement Theory
Research Problem: Does caffeine enhance mental performance?

Research design

<table>
<thead>
<tr>
<th>IV</th>
<th>DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caffeine</td>
<td># puzzles solved: M = 12</td>
</tr>
<tr>
<td>(12 oz. Cola)</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>No Caffeine</td>
<td># puzzles solved: M = 8</td>
</tr>
<tr>
<td>(12 oz. Caffeine free cola)</td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis - Confirmed

The caffeine group will solve a higher number of puzzles than the no caffeine group.

Research design

<table>
<thead>
<tr>
<th>IV</th>
<th>DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caffeine</td>
<td># puzzles solved: M = 11</td>
</tr>
<tr>
<td>(Chocolate bar)</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>No Caffeine</td>
<td># puzzles solved: M = 11</td>
</tr>
<tr>
<td>(Caffeine-free chocolate bar)</td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis - Disconfirmed

The caffeine group quiz scores will be higher than the no caffeine group quiz scores.
Refined theory:

- Liquid Caffeine Enhancement Theory

The Process of Inquiry:

- Initial idea
- Research Question
- Hypothesis
- Theory
- New Research Question

Statistics:

- A tool used to test hypotheses.