Enhancing Group Creativity: Effects of Training, Diversity, and Attitudes toward Diversity

Paul B. Paulus, Toshihiko Nakui and Jonali Baruah
University of Texas at Arlington
Low Creativity in Groups

• Evaluation

• Loafing

• Blocking

• Low Norms

• Downward Comparison

• Common Information Sharing
High Creativity in Groups

- Low Evaluation/Autonomy
- Accountability
- Low Blocking
- High Norms
- Upward Comparison
- Diversity/Dissent
Cognitive Creativity in Groups

• Associations/Priming

• Cognitive Diversity

• Attention

• Memory

• Incubation
Group Creativity Keys

- Task Focus
- Task Motivation
- Effective Information Processing
Training Creative Groups

• Some studies on benefits of facilitators

• No published experimental studies on benefits of group training for innovation

• Conducted study that incorporated some techniques that increase ideation.
Training Study

• Provide practice and feedback
• Provide additional rules
• Sensitize to diversity
• Attention to others
• Use of linking and unlinking strategies (cognitive templates—Goldenberg, Muzursky & Solomon, 1999)
• Emphasize accountability
Cognitive Template

- Creative Templates - features or characteristics of an object or an idea (Goldenberg, Muzursky & Solomon, 1999)
  - Displacement
  - Replacement
  - Division
  - Attribute dependency
  - Component control
- Serve as facilitative tools that channel the ideation process
Linkages

- Cognitive templates (Goldenberg et al., 1999)
  - 89% of the award winning ads match as few as six major templates
    - 25% matches represent simple replacement templates
  - Ideas of better quality and values

- Cognitive linking and unlinking
  - Linking and unlinking different objects or attributes of an object
Method

• Participants
  • 165 undergraduate students
  • 11 groups in 3 conditions 10 groups in the fourth

• Design
  • 2 X 2 between-group design
    • Training & no training
    • Alone-to-group & group-to-alone
# Procedure

<table>
<thead>
<tr>
<th>No.</th>
<th>Group Training Paradigm:</th>
<th>No Training Paradigm:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activities</td>
<td>Time (minutes)</td>
</tr>
<tr>
<td>1</td>
<td>Introduction</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Tips on diversity</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Osborn’s &amp; Additional rules</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Practice session I</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Feedback</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Tips on Attention</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Practice session II</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Tips on unique ideas</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Practice session III</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Accountability &amp; rules</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Actual Brainstorming</td>
<td>20+20=40</td>
</tr>
<tr>
<td>12</td>
<td>Debriefing and consent</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total time**: 120

**Total time**: 120
Results - Quantity

- Total ideas: Session 1
  - Training and group condition
  - Training was significant,
    - $F(1, 39) = 8.94, p < .005$
  - Group condition was significant,
    - $F(1, 39) = 46.10, p < .0001$
  - No interaction effect
Results - Quantity

Mean ideas per person per group

Alone-to-group
Group-to-alone

[Bar chart showing the comparison of mean ideas per person per group between Alone-to-group and Group-to-alone conditions, with Training and No-training conditions plotted separately.]
Results - Quality

- Correlations
  - Feasibility and Effectiveness: 0.82 ($p<0.0001$)
  - Feasibility and Originality: -0.52 ($p<0.0003$)
  - Effectiveness and Originality: -0.65 ($p<0.0001$)
- Total number of good and
  - Originality: $r = 0.74$ ($p<0.0001$)
  - Total quantity: $r = 0.64$ ($p<0.0001$)
Quality

Originality
- Session 1 – group and nominal
- Training
  - $F(1, 39) = 11.66, p < .005$
- No effects for group condition
Quality

- Originality – Training & Sequence
  - *Training*, $F(1, 39) = 10.15, p < .005$
  - No significant effect of sequence
Total number of Good Ideas

- Session 1 – Group vs. alone
- Training
  - $F(1, 39) = 10.63, p < .005$
  - Group condition
    - $F(1, 39) = 3.82, p = .058$
  - Interaction not significant
Discussion

• Training had a positive impact on total number and originality of ideas

  • Practice

  • Templates/diversity : cognitive stimulation

  • Motivation

  • Use of additional rules
Discussion

• Sequence effect
  • only on quantity
  • may reflect entrainment of high pace of ideas for alone participants
Diversity in Groups

- Diversity often associated with negative reactions
- Findings on performance mixed
- Mannix and Neale (2005)
- Affect and performance might be influenced by attitude toward diversity (van Knippenberg & Haslam, 2002)
Diverse Workgroup Scale (DWS)

- 21 items
- Five-alternative Likert-type scale

- I don't enjoy working with people who come from different countries.
- Working in diverse groups can increase one’s understanding of those who are different from me.
- Diverse groups will make poor decisions.
- Being a leader of a diverse group should enhance a person’s leadership ability.
- I prefer to socialize with people from my own ethnic group.
- For complicated problems, diverse groups will be able to solve the problem more easily.
- Groups whose members are diverse will be more creative.
- In general, I prefer socializing with people like myself.
- Workgroups with members from different cultural backgrounds are likely to be effective.
- Differences in political ideology within groups can stimulate one’s thinking.
- The experiences of group members who come from different countries can be helpful in groups that are trying to generate novel ideas.
- I enjoy working in diverse groups.
- I prefer working with people who are very similar to me.
- It is easier to be motivated when working with people who are like me.
- I find interacting with people from different backgrounds very stimulating.
- The experience of working with diverse group members will prepare me to be a more effective employee in an organization.
- Diverse groups can provide useful feedback on one’s ideas.
- I seek out opportunities to meet people who are likely to be different from me in experience and perspective.
- Solutions of complex problems require groups with diverse experiences or backgrounds.
- Conversations in diverse groups tend to be somewhat uncomfortable.
- I enjoy working with people who have different beliefs or backgrounds.
Experimental Design

• Predictor variables → cultural diversity, attitude toward diversity, identity orientation, and awareness of attitude toward diversity

• Group diversity and attitude toward diversity were allowed to vary naturally
Experimental Design

- 2 X 2 Factorial Design
- Awareness of shared value similarity (i.e., awareness of positive attitude toward diverse workgroups or no awareness)
- Identity orientation (i.e., individuation or recategorization)
Predictions

• Diversity of group composition in terms of ethnicity and language background should lead to generating higher quality of ideas (McLeod & Lobel, 1996), more varied perspectives (Watson et al., 1993), and more elaboration for groupwork (van Knippenberg, et al., 2004).

• This effect should be stronger for high-DWS members since high DWS members are assumed to enjoy interacting other members whose backgrounds are different and possess high motivation to work.
Participants

• Participants -- 163 undergraduates
• Randomly assigned to a group composed of 3 or 4 members
• Demographic information
  Gender; Males 37%, Females 63%
  Ethnicity; White 49%, Black 18%, Asian 21%, Hispanic 12%;
  Native Language; English 77%, Spanish 3%, Asian Languages 15%, Others 5%
  mean age; 22.4 years old
Materials

• The DWS (taken by all participants at the beginning of the semester).
• Pre-experiment questionnaire
• Brainstorming rules
• Audio and video recorder
• Group identification scale (Bouas-Henry et al., 1999)
• Psychological safety items (Edmondson, 1999)
• Post-experiment questionnaire
Manipulation of awareness of shared positive attitude toward diverse workgroups

Half of participants were manipulated awareness of shared positive attitude toward diverse workgroups as follows;

“all you have taken this questionnaire at the beginning of this semester. This scale measures a degree to which you like working with people who have different characteristics or background, such as ethnicity, gender, age, culture, major, personality, and so on. Based on the questionnaire, all of you have a higher score than average. That means all of you like working in a group composed of members who have various types of characteristics. Now, please introduce yourself for 5 minutes”.
Procedure

- Brainstorming Session (FtF setting, audio and videorecorded)
  1) Instruction (i.e., brainstorming rules)
     1  "Criticism is ruled out"
     2  "Freewheeling is welcome"
     3  "Quantity is wanted"
     4  "Combination and improvement are sought"
     5  "Stay focused on the task"
        ("Do not tell stories" & "Do not explain ideas")
  2) Practice session (e.g., "tourist problem")
  3) Brainstorming session (15 mins)
     → "UTA problem"
  4) Post-session questionnaire
Predictor Variables

• **Cultural Diversity** → Tsui, et al.’s formula (1992): how an individual differs from other group members in terms of cultural diversity (the sum of ethnicity and native language; $M=0.77$, $SD=0.44$)

Regression analysis with multilevel application for Windows (MlWiN 1.10 version 2; Centre for Multilevel Modeling, 2002)
Results – Psychological Reactions -

- Motivation to work
  Awareness ($z=1.78$, $p<.10$)
  DWS ($z=1.65$, $p<.10$)

- Affect (uncomfortable or nervous)
  DWS ($z=1.90$, $p<.10$)
Results – Psychological Reactions

• Feelings toward specific other members (e.g., willing to support ideas, future work, likeability)
  • Cultural diversity had negative impacts on self evaluation of leadership ($z=-2.88$, $p=.01$), leadership ratings from others ($z=-1.68$, $p<.10$), self evaluation of future work ($z=-2.41$, $p<.05$).
  • DWS showed positive effects on evaluation of leadership of others ($z=1.90$, $p<.10$) and future work of others ($z=2.52$, $p<.05$).
Number of Ideas

• **Quantity**
  Cultural diversity
  \( z=-2.96, \ p<.01 \)

• **Perspectives**
  Cultural diversity
  \( z=-3.55, \ p<.01 \)
Awareness and Ideas

• **Quantity**
  Awareness ($z=2.55, p<.05$)

• **Perspectives**
  Awareness ($z=1.85, p<.10$)
DWS, Diversity and Quality

- Quality

Cultural diversity
$(z=2.02, p<.05)$

Interaction effect between cultural diversity and the DWS
$(z=2.45, p<.05)$
DWS and Awareness for High Diversity Groups

- High DWS members with awareness of shared positive attitude toward diverse workgroups demonstrated the highest quality of ideas.
Discussion

• Cultural Diversity

  • Negative impact on number of unique ideas and perspectives (Jehn, et al, 1999; Milliken, et al, 2003; Watson et al., 1993)

  • Positive impact on quality of ideas (McLeod & Lobel, 1996)
Discussion

• Diversity inhibits ideation
• Awareness of High DWS enhances ideation
• High DWS and awareness of High DWS can enhance quality of ideation in diverse groups
• May be related to motivational factors
• Independence of quantity and quality
• Possible application to cognitive diversity in science teams