THE EFFECT OF ANALOGICAL THINKING ON GENERATING CREATIVE PRODUCTS. A QUANTITATIVE META-ANALYSIS

Introduction
- Associative thinking is a key component of the problem solving ability of designers; analogical reasoning has an important role in creative thinking.
- It allows reflection by focusing on apparently unrelated data.
- Creative people take into account not only the relevant parts of the problems, but apparently the irrelevant stimuli as well.

Method
1. Selection of studies
   - PsychINFO, Ebsco and IEEEExplore
   - Key terms: analogical reasoning, analogy, creativity, divergent thinking, and originality
   - Inclusion criteria were:
     a) creativity should be measured by performance;
     b) Studies should use analogical thinking quantified in clues or cases;
     c) Studies must report quantitative data which allows us to calculate effect sizes;
     d) Studies must be written in English.

2. Coding of studies

3. Statistical analysis
   - Comprehensive Meta-Analysis program

Results

Table 1
The effect sizes of researches

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Effect sizes</th>
<th>95% C.I. [min;max]</th>
<th>v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahl and Moreau</td>
<td>2002</td>
<td>-0.61 [-1.23;0.01]</td>
<td>0.10</td>
<td></td>
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<tr>
<td>Goldschmidt and Smolak</td>
<td>2006</td>
<td>1.44 [0.13;2.75]</td>
<td>0.44</td>
<td></td>
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<tr>
<td>Çubukçu and Dündar</td>
<td>2007</td>
<td>0.94 [0.49;1.37]</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Çubukçu and Cetinathara</td>
<td>2010</td>
<td>0.33 [-0.14;0.81]</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Moreno et al.</td>
<td>2014</td>
<td>0.28 [-0.17;0.74]</td>
<td>0.05</td>
<td></td>
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<tr>
<td>Althuizen and Wiersma</td>
<td>2014</td>
<td>0.53 [-0.09;1.16]</td>
<td>0.10</td>
<td></td>
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</tbody>
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- k=6, 16 effect sizes, N= 410
- The effect of analogical thinking on creativity Cohen’s D = 0.40, Var D = 0.13, p <.001, 95% CI = [0.18; 0.63]
- Fail-safe N = 14
- Evidence for heterogeneity, Q (5) = 18.82, p <.01, I² = 73.44

- No significant moderator, Q (4, 1) = 0.08, p>.05
- Removed the first extreme value, D = 0.56, VarD = 0.01, CI = [0.32; 0.80]; Q(4) = 6.78, p > 0.05, I² = 41.02

Conclusion
- A significant medium effect of analogical reasoning on creativity
- We have found heterogeneity in the effect sizes and statistical analysis conducted did not find a significant moderator.

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