The Creativity of Invented Alien Creatures: The Role of Invariants

Yana Durmysheva (YanaD@brooklyn.cuny.edu)
Aaron Kozbelt (AaronK@brooklyn.cuny.edu)
Department of Psychology, Brooklyn College, CUNY
2900 Bedford Ave., Brooklyn, NY 11210 USA

Purpose

In his study on structured imagination, Ward (1994) found that in general people are not very creative. When asked to imagine alien creatures, participants usually draw beings that resemble common animals and stereotypical science-fiction characters. However, this result does not address why some aliens might be judged as creative, or if creativity can be enhanced, e.g., by certain instructions. Kaplan and Simon (1990) suggested that creative insights may be achieved by actively noticing "invariants," i.e., characteristics that attempted solutions all have in common. Ward (1994) found that most invented creatures had two eyes, four limbs and bilateral symmetry. If these invariants are given to participants in Ward's creature generation task, do they boost creativity? Also, what aspects of the drawing or description of the creature predict its judged creativity?

Method

Creation Task

Sixteen undergraduate students at Brooklyn College participated in the Creation Task, which was similar to that of Ward (1994). The session consisted of six trials (seven minutes each) in which participants were asked to imagine, draw, and describe an alien creature. Participants invented a new creature on each trial. In trials 1-3, participants were given "General" instructions, without any constraints or suggestions. In trials 4-6, they were given "Invariants" instructions and told that their creature should not have 2 eyes, 4 limbs, or bilateral symmetry.

Coding

Coding systems were developed for the drawings and paragraphs. Two raters independently coded each creature. One coding system categorized each drawing in terms of following each of the three invariants. Drawing coding was mostly high (Cohen's kappa = .88 and .79, and .56, for eyes, limbs, and symmetry, respectively). In the paragraph coding system, each proposition in each paragraph was coded into one of 14 categories, e.g., Analogies, Extraordinary abilities, Planet conditions, etc. Inter-rater reliability on coding paragraph categories was also high: r (1342) = .85, p < .0001. All coding was done prior to the Evaluation Task.

Evaluation Task

Ten undergraduates at Brooklyn College participated in the Evaluation Task. Participants were asked to rate the creativity of each of the 96 creatures from the Creation Task, taking into account both the drawing and the paragraph, on a scale from 1 (very low creativity) to 6 (very high creativity). Participants rated the creatures by sorting them into six piles. They could define creativity any way they liked, but they were advised to think about the originality of the drawings and paragraphs.

Results

Performance in the General condition replicated Ward (1994): participants mostly drew creatures with two eyes, four limbs, and bilateral symmetry. In the Invariants condition, almost all participants avoided two eyes and four limbs; fewer followed instructions to avoid bilateral symmetry. In general, there was a strong association between instructions and invariants: for eyes, χ^2 (4 df, N = 96) = 42.5, p < .001, for limbs, χ^2 (4 df, N = 96) = 27.8, p < .001, and for symmetry, χ^2 (4 df, N = 96) = 49.3, p < .001.

Do instructions affect creativity? Evaluations were refined using Rasch analysis (Wright & Masters, 1982), which generates an interval-scale dependent measure of creativity for each creature. A paired t-test, conducted using each participant's average rating for the three creatures in the two conditions, showed no reliable difference, t (15) = 1.06, p = .30. Therefore, the instructions had no discernible effect on the judged creativity of the creatures.

If instructions do not predict creativity, what does? To assess this, a multiple regression was performed using drawing and paragraph coding categories for each creature. The full 17-predictor regression was highly significant, F (17, 78) = 3.66, p < .0001, adjusted-R^2 = .32. Non-significant predictors were dropped, yielding a final 5-predictor model, F (5, 90) = 9.86, p < .0001, adjusted-R^2 = .32. Significant predictors (Betas) were: Activities (.21), Explanations (.26), Extraordinary abilities (.27), Feature description (.19), and Personality characteristics (.32).

Conclusion

Results suggest that constraining participants to avoid common invariants does not enhance the creativity of their productions. However, creativity can be predicted by a several verbal description categories given by participants.

References

Kaplan, C. A., & Simon, H. A. (1990). In search of insight. *Cognitive Psychology, 22,* 374-419.

Ward, T. B. (1994). Structured imagination: the role of conceptual structure in exemplar generation. *Cognitive Psychology, 27,* 1-40.

Wright, B.D. & Masters, G.N. (1982). *Rating scale analysis: Rasch measurement.* Chicago: MESA Press.