

The impact of physical spaces on divergent and convergent problem-solving performance



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BACKGROUND

Physical environment can influence problem solving

- Ceiling height → abstraction (Meyers-Levy & Zhu, 2007)
- Room color → approach/avoid motivation (Mehta & Zhu, 2009)
- "Thinking outside the box" (Leung et al., 2012)

Physical constraints → **cognitive** search constraints?

- Larger spaces → better divergent, but not convergent problem solving

PILOT STUDY

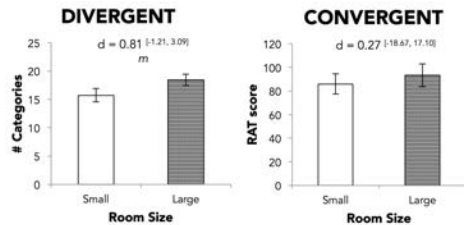
Small (in-class, hallway) vs. **Large** (outside)

X

Divergent (alternate uses) *SHOE* → footwear, container, bludgeon vs.

Convergent (RAT) *BROKEN-CLEAR-GLASS* → eye

20 intro psych students (11 small, 9 large)



MAIN STUDY

Small (small room) vs. **Large** (large room)



Divergent (alternate uses, invention task)

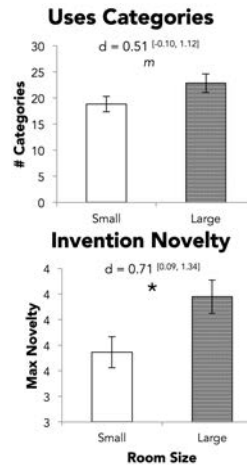


vs. **Convergent** (RAT, series extrapolation) aaabbbccdd_ _ _ _

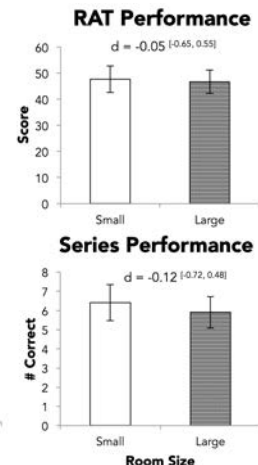
44 participants from community (23 small, 21 large)

Additional measures: PANAS, cognitive load

DIVERGENT



CONVERGENT



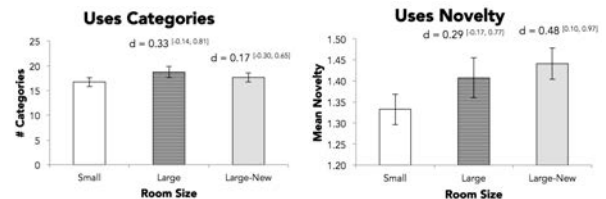
REPLICATION & EXTENSION

Small vs. Large vs. Large-New (diff. large room) → generalizability?

Divergent (uses, invention) vs. **Convergent** (RAT, series), diff items

106 intro psych students (38 small, 34 large, 34 large-new)

DIVERGENT



DISCUSSION

Implications

- Embodied/situated problem solving
- Matching of cognitive search in memory to external foraging conditions (Hills, Todd, & Goldstone, 2008) ?
- Tease apart divergent and convergent aspects of creativity

Next steps:

- Mechanisms?
- Implicit? Metacognition?

REFERENCES

Hills, T. T., Todd, P. M., & Goldstone, R. L. (2008). Search in external and internal spaces: evidence for generalized cognitive search processes. *Psychological Science*, 19(8), 802-808.
 Leung, A. K. Y., Kim, S., Polman, E., Ong, L. S., Qiu, L., Goncalo, J. A., & Sanchez-Burks, J. (2012). Embodied metaphors and creative "acts". *Psychological Science*, 23(5), 502-509.
 Mehta, R., & Zhu, R. J. (2009). Blue or red? Exploring the effect of color on cognitive task performances. *Science*, 323(5918), 1226-1229.
 Meyers-Levy, J., & Zhu, R. J. (2007). The influence of ceiling height: The effect of priming on the type of processing that people use. *Journal of Consumer Research*, 34(2), 174-186.