How Do Testing Conditions Affect Creative Performance?
Meta-Analyses of the Effects of
Time Limits and Instructions

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Creativity is difficult to measure due to its multidimensional nature.
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Testing conditions ➔ Creative Performance
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How to create optimal conditions for testing creativity?
Testing conditions

- Atmosphere (test-like vs. game-like)
- Setting (individual vs. group)
- Time limit (different time limits)
- Instructions (different instructions)

Creative Performance
Time limits

most widely studied

Instructions
Time limits

Short time vs. Long time
Timed vs. untimed

Instructions

most widely studied
Time limits

- Short time vs. Long time
- Timed vs. untimed

Instructions

- Most widely studied
- Standard instructions vs. explicit instructions to “be creative”
Time limits

Short time vs. Long time
Timed vs. untimed

Instructions

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Standard instructions vs. explicit instructions to “be creative”

e.g.:
- How many uses of pencil you can think of? (standard)
- How many creative uses of pencil you can think of? (explicit)
Time limits

- Short time vs. Long time
- Timed vs. untimed

Instructions

- Standard instructions vs. explicit instructions to “be creative”
  
  e.g.:
  - How many uses of pencil you can think of? (standard)
  - How many creative uses of pencil you can think of? (explicit)

Inconsistent results
Objective

To undertake a meta-analysis of studies that addressed the effects of time limits and instructions on performance on creativity tests.
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To undertake a meta-analysis of studies that addressed the effects of **time limits and instructions** on performance on creativity tests:

1. Does the manipulation of time limits (short vs. long) affect creative performance?
2. Does the manipulation of instructions (standard vs. explicit “be creative”) affect creative performance?
3. Which variables moderate the effect of time limits or instructions on creative performance?
Creativity \sim \textit{Combinatorial process} (Amabile et al., 2002)
Creativity ~ *Combinatorial process* (Amabile et al., 2002)

Shaping multiple associations among concepts

Selecting most creative responses
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- Shaping multiple associations among concepts
- Selecting most creative responses

**Hypotheses**

- Short time
  - Inhibiting exploration
  - Less creative / original ideas

**Time limits**
Creativity ~ *Combinatorial process* (Amabile et al., 2002)

Hypotheses

**Time limits**

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- **Long time**
  - Exploring concepts and playing with ideas
  - More creative/original ideas

Shaping multiple associations among concepts

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- Shaping multiple associations among concepts
  - Selecting most creative responses
    - Short time: Inhibiting exploration
      - Less creative / original ideas
    - Long time: Exploring concepts and playing with ideas
      - More creative/original ideas

- Increase *originality* (no. of creative ideas)
- No effect on *fluency* (no. of ideas) or *flexibility* (no. of categories of ideas)
The *path of least resistance hypothesis (PLR)* (Ward (1994))
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A tendency to generate the most accessible ideas

Giving up when it becomes harder

Least creative ideas
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Standard

- Follow PLR
  - Less creative/original ideas

Explicit

Least creative ideas
The *path of least resistance hypothesis* (PLR) (Ward (1994))

- A tendency to generate the most accessible ideas
- Giving up when it becomes harder

**Instructions**

- **Standard**:
  - Follow PLR
  - Less creative/original ideas

- **Explicit**:
  - Skip PLR
  - Extended exploration strategy
  - More creative/original ideas

**Hypotheses**

- Least creative ideas
The *path of least resistance hypothesis* (PLR) (Ward (1994))

A tendency to generate the most accessible ideas

Giving up when it becomes harder

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Method

Data Sources

- **Databases**: ERIC, JSTOR, PsycARTICLES, and Web of Science.
- **Backward search** (Bibliographies of relevant studies)
- **Forward search** (Searching databases for papers that referred to relevant papers)
Criteria for including studies

- Journal articles, conference papers, or dissertations.
- Published up to May 31st, 2017.
- Written in English.
- Address the effect of time limits (short vs. long) and/or instructions (standard vs. explicit) on creative performance.
- Report the statistics needed to calculate the effect size (e.g., $M$ and $SD$, $t$, $F$, or $d$).
Moderator variables

- Culture (USA / Non-USA)
- Gender (% male)
- Measurement approach (process / product)
- Domain of creativity (verbal / figural)
- Educational level (college / non-college)
- Quality (weak / moderate / strong)  

  EPHPP (Thomas, Ciliska, Dobbins, & Micucci, 2004)
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**Analyses**
- Hedges’ g for effect sizes
- A meta-analytic three-level model (between-study/ within-study / sampling variances)
- A sensitivity analysis for outliers
- Funnel plots and Egger’s regression test for publication bias
Results

**Time limits meta-analysis**

- 9 studies (35 effect sizes)
- Overall analysis
  - Relatively large overall effect size ($0.89, p = .02$) in favor of long time limits.
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  - Significant mean effect size for originality ($0.88, p = .04$) in favor of long time limits.
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- **Moderator variables**: None was significant.
**Results**

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  - Significant mean effect size for *originality* (0.92, \( p = .03 \)) in favor of explicit instructions.
  - Not significant for *fluency* (0.08, \( p = .82 \)) and *flexibility* (-1.38, \( p = .35 \)).
- Moderator variables: Only educational level significantly moderate the effects of instructions on fluency (49.62%) and originality (60.85%).
Sensitivity analysis

* Extreme effect sizes ($2 \text{SD}$) > or < mean

Time limits

- Overall analysis (3)
- Subscale analyses (0)

Instructions

- Overall analysis (7)
- Subscale analyses [fluency (1), originality (2), flexibility (0)]

Estimates were fairly robust
Publication bias

Time limits

Overall analysis

Fluency

Flexibility

Originality

$z = 1.89, p = .06$

$z = 2.71, p = .007$

$z = 5.004, p < .0001$

$z = 0.26, p = .80$
Publication bias

Instructions

Overall analysis

z = 1.15, p = .25

Fluency

z = -0.95, p = .34

Flexibility

z = -8.09, p < .0001

Originality

z = 5.55, p < .0001
Implications

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- Time limits & instructions matter in measuring creativity (researchers and educators).
- Considering testing conditions when comparing results of studies.
- Feasibility of applying the three level model to study variations between and within studies.
- Reinvestigating the effects of the tested moderator variables with further data.
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**Future research**

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- Validating the moderating role of educational level.
- Investigating other creativity aspects (e.g., elaboration & abstractness of titles).
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- Validating the moderating role of educational level.
- Investigating other creativity aspects (e.g., elaboration & abstractness of titles).
- More studies on school age children.
thank you...