Differentielle Psychologie
Psychologische Diagnostik
Universität des Saarlandes

Achieving Much at Little Expense - No Need to Learn the Easy Rules

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1 Goal of our Study & Theoretical Background

- **This study addresses how the performance in figural matrices tests is influenced by different extents of test preparation, i.e. knowledge concerning the construction rules that are employed in the matrices.**
- Matrices tests are one of the best predictors of general intelligence[1] and therefore, often part of high-stakes tests and personnel selection. Hence, test preparation is an important issue.
- Beyond the differences between a full training and no training at all[2], we provided some testees only with half the rules required to solve the items. Hence, a special focus lies on transfer effects, in particular how test-takers might infer the rules they did not learn from the rules they did learn.

2 Our Study in a Matrices Item

Participants:

- 287 testees (after exclusion of 4%)
- 62.7% women, 35.9% men, 1.4% diverse
- Age: M = 26.30, SD = 10.20
- 88% had German Abitur (or higher)

- Testees were randomly assigned to one of four training groups that differed in the number of rules that were learned:
  - no training
  - easy training (Add, Sub)
  - full training (Add, Sub, SEA, IS)
  - difficult training (SEA, IS)

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Procedure:

- 26 items (90s each) with 2-4 rules per item
- Training phase consisted of a thorough explanation of each rule including an example item where this particular rule was applied
- Due to a computerized matrices test, testees constructed their own answer by themselves[3]
- Hence, we had the possibility to assess each rule by itself instead of being limited to assessing each item as a whole

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Easy Rules:

Addition	
Subtraction	

Difficult Rules:

Single Element Addition	
Intersection	

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Design:

- Since our model assumptions were violated, we used the rank-based 3x2 analysis of variance-type statistic (ATS)
- Relative Treatment Effect (RTE) and 95% CI were used to compare each group and rule
- RTE is the Mean Rank of the particular group divided by the number of observations (n_{obs} = 438)
- CI overlap of not more than half the length of the average margin of error (MOE) equates to a p-value of 0.05 [4]

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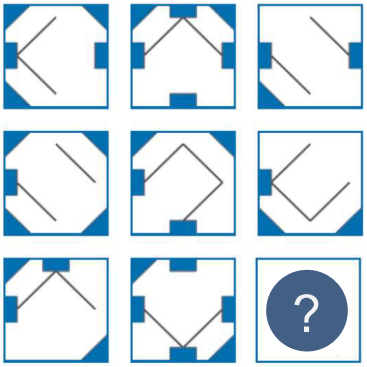
Example Item with three rules:



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Results:

Overall Psychometric Properties:

- Item Difficulty: M = 0.80, SD = 0.07
- Item total correlation: M = 0.65, SD = 0.09
- Cronbach's alpha: 0.98

3x2 ATS:

- Sig. main effect of the between-subject factor training: $F_{ATS}(3, \infty) = 7.11$, $p < .01$
- Sig. main effect of the within-subject factor rule: $F_{ATS}(1, \infty) = 38.07$, $p < .01$
- No interaction of training and rule: $F_{ATS}(3, \infty) = 0.80$, $p = 0.48$

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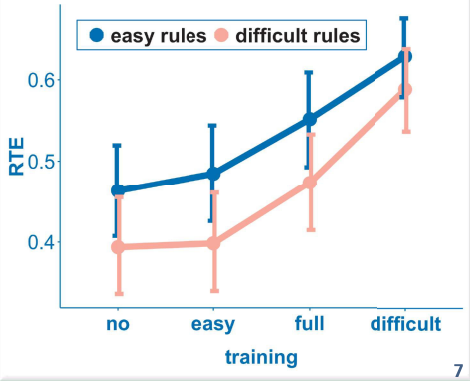
Relative Treatment Effect (95% CI):



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Comparison of 95% CI's of the RTE:

- Overall performance by training group: difficult training > full training > partial training = no training

- Performance on the easy rules: difficult training > full training > easy training = no training

- Performance on the difficult rules: difficult training > full training > easy training = no training

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Conclusion:

- Short-term training and rule knowledge significantly increases the performance in a matrices test
- No evidence for a transfer effect that testees induce the difficult rules by themselves while knowing about the easy rules
- Instead, testees might not profit from learning the easy rules at all
- First indications were found that a training consisting only of the difficult rules might be sufficient or even better than a full training

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3 Further Research

- Since we cannot rule out the possibility that teaching the easy rules is only unnecessary in a high-performance sample (cf. high educational qualifications), this effect should also be examined in a more representative sample.
- Moreover, to rule out a ceiling effect, the study should also be replicated by using a more difficult matrices test, i.e. by using more items consisting of at least three or four rules.

References:
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