

## The Assimilator – Explorer styles and creativity.

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*Abstract.* This study looked at the relationship between the Assimilator–Explorer (A-E) cognitive styles and creativity. A measure of creative activities, four divergent thinking tasks used as controls, and a measure of the A-E styles, where Explorers have higher and Assimilators lower scores, were included and completed by a sample of 342 participants. Participants completed the measures during three waves and there were three months between the first and third waves. Results showed that there were weak, but significant positive correlations between the A-E styles and verbal and figural fluency. Moreover, the relationship between the A-E styles and creative activities was positive and significant, also when controlling for fluency and gender. Implications are discussed.

Key words: creativity, cognitive style, divergent thinking

### **The Assimilator – Explorer styles and creativity.**

The Assimilator – Explorer (A-E) cognitive styles describes a continuum from rule-oriented, experience-oriented problem solving strategy use, to exploratory, novelty seeking problem solving strategies. The theory originated in a study (Kaufmann, 1979) where the empirical observation was made that some participants seemed to cling to established problem solving strategies in a series of water jar tasks (Luchins, 1942), even when the task demanded a novel approach. Other participants seemed to more easily change their perspective and find a novel approach. Based on the theory and these observations, the A-E inventory (Kaufmann, 1989) was later developed, measuring a continuum with preferences for rule based, familiarity seeking strategies at one end (Assimilators – lower scores) and exploratory, novelty seeking problem solving strategies at the other end (Explorers – higher scores).

The A-E dimension seems rooted in several personality constructs and has been found to correlate with all the five domains in the five-factor model of personality (Martinsen & Diseth, 2011). Specifically, it correlated negatively with Neuroticism, Agreeableness, and Conscientiousness, and positively with Openness and Extroversion. Thus, Assimilators seem less emotionally stable and less open to experience, and more agreeable, conscientious, and introverted. The opposite pattern was the case for Explorers. In another study, the A-E continuum correlated positively with approach motives, negatively with avoidance motives, and was uncorrelated with cognitive tests of vocabulary, verbal analogies, number series, and spatial abilities (Martinsen & Kaufmann, 2000).

Research using this inventory has shown that the A-E styles explain performance on insight problems/creative problem solving tasks, although the style-performance relationship itself has not been strong and moderated by prior experience, the type of problem solving task, achievement motive arousal, and more (Martinsen, 1993, 1994; Martinsen & Furnham, 2015).

Based on this, the properties of the A-E styles seems to correspond well with a definition of cognitive styles (Martinsen, Kaufmann, & Furnham, 2011; Messick, 1994), where personality influence is important, as well as the existence of zero or low correlations with measures of intellectual abilities. People with the two styles also seem to process information quite differently, which necessarily is a consequence of the several moderating influences that have been identified in prior studies. Riding and Rayner (1998) categorized the A-E theory in the Wholist–Analyst category of style constructs along with e.g., the well known theory of Adaption-Innovation (Kirton, 2003).

Beyond these ideas and findings, it is noteworthy that the relationship between the A-E styles and creativity has not yet been investigated. Although, as noted above, effects of the A-E styles have been studied previously on creative problem solving performance, creative problem solving seems unrelated to everyday creative achievement (Beaty, Nusbaum & Silva, 2014). Thus, the relationship between the A-E styles and creativity seems important to investigate further since novelty seeking is a characteristic associated both with the A-E styles and creativity. Novelty is evident in the definition of creativity, where it is seen as a capacity to come up with novel and useful products, widely understood (Runco, 2004). Unlike Kirton (2003), who posits that there are two kinds of creativity, we rather agree that there is one main kind of creativity.

Creativity has a multifaceted nature and has been studied from different angles, including cognitive, affective, physiological, intellectual, and personality perspectives (Furnham, 2008; Mumford, 2003). Because of this there is a criterion problem in this research area (e.g., Martinsen, Kaufmann & Furnham, 2011). However, among the several potential criteria, participation in creative activities has been suggested to be one of the more valid (Hocevar, 1981). It can be noted that Runco, Noble and Luptak (1990) found that ratings given by mothers concerning their sons' creativity were significantly related to the ratings of

their sons, indicating cross-observer validity for such measures. In the present context, we base ourselves on a creative activities check list as the criterion of creativity.

Clearly, it seems natural to expect that people with an exploratory, novelty seeking approach in problem solving should be more creative than people with a rule oriented, familiarity seeking approach. Novelty seems to be the core element in creativity (Furnham, 2008) and because of the novelty seeking element (Explorers) in the A-E styles (Kaufmann, 1979), we posit that there is a positive relationship between the A-E styles and creativity. Because the relationship between styles and performance in previous research often has been contaminated by abilities (McKenna, 1984) it seems important to control for creative potential/ability when investigating the relationship between styles and creative performance. Thus, we included controls for fluency in the present study, and also, by routine, gender.

## **Method**

### **Participants**

The study was based on data from three waves and the sample consisted of 359 to 192 pupils, depending on participant attrition in the second and third waves. Effective sample size based on listwise deletion for the study variables was 171. Out of these there were 131 females and 40 males. Gender was used as a control variable. The sample was from the third grade in upper high school in Norway. Age was not registered in the study but is normally in the range of 17-22 for students at this stage, with an expected average of approximately 18 years. The schools were randomly selected from a pool of public schools (by far most Norwegian schools are public) situated in and around a Norwegian city. Schools were both academically and practically oriented.

### **Measures**

**The Assimilator-Explorer Inventory.** The A-E inventory (Kaufmann, 1989) is a thirty-two item forced choice inventory, requiring that subjects choose either an explorer, an assimilator or an “in-between” statement for each item. Explorer statements are scored 2, in between statements 1, and assimilator statements 0 points. Alpha reliability was .90 for this inventory. An example item is:

Assimilator: I prefer to stick to set principles when I solve problems.

Explorer: I prefer to develop new principles when I solve problems.

In between: I use both when I solve problems.

**Fluency.** Two verbal (alternate uses for a paper clip and a newspaper) and two figural divergent thinking tasks (based on two illustrations adapted from Wallach & Kogan, 1966) were used as a measure of verbal and figural fluency. Subjects were given 4 minutes on each task. The number of ideas on each item was used as scores. The correlation between scores on the two verbal items was .63 and between the scores on the two figural tasks it was .59. The sum score for the two verbal items and the sum score for the two figural items were used in the further analyses. We used fluency scores only and not other indices of creative ability because e.g., originality has been shown to be confounded by fluency (Hocevar, 1979; Runco & Albert, 1985).

**Creative activities.** An adapted version of the Wallach and Wing (1969) creative activities checklist was used as the criterion of creativity. Here the subjects are asked to respond to eight items describing participation and accomplishments in diverse creative activities such as artistic work, the writing of poetry, etc. Each item has five levels (including no participation in the activity), and responses received the values 0, 1, 2, 3, and 4 depending on which level the students checked. The sum of scores across activities was used in the subsequent analyses and this measure was considered formative such that alpha reliability would not be meaningful.

## **Procedure**

Participants completed the A-E inventory in wave 1 and the fluency tasks in wave 2, three weeks later. The fluency tasks were timed and participants were allowed four minutes on each task. Trained research assistants gathered the data, which was done in ordinary classrooms. When possible, participants were seated with maximum space between each. In the third wave, three months after the first wave, participants completed the creative activities check list outside the school setting (at home) and subsequently handed it in to the research assistants. Names were used to combine responses from the three stages. Data were fully anonymized when the third wave had been completed. The subjects were encouraged to participate by the school staffs, but volunteered, and were free to leave the setting to do ordinary school work if they rather wished to do so. Participants were informed about the purpose of the study before it started and were debriefed when the study was over.

## **Results and discussion**

The variables were normally distributed and the correlations between the five variables, including gender, are shown in Table 1.

Insert Table 1 here

In Table 1 it is shown that the A-E styles, as style theory predicts (Martinsen, Kaufmann, & Furnham, 2011), correlates only weakly with the two measures of fluency, conceived as measures of creative ability. Females tend to have higher verbal fluency scores and also higher scores on creative activities.

When testing our hypothesis that the A-E styles predict creative activities, we used multiple regression and controlled for the two measures of fluency and gender. The results are shown in Table 2 below.

Insert Table 2 here

In Table 2 it can be seen that the relationship between the A-E styles and creative activities is significant when controlling for creative potential gender. This is clear since the incremental R square, because of adding the A-E styles, is significant in model two. This finding supports our prediction from the introduction, where we posited that the novelty seeking tendencies of Explorers should manifest itself in participation in creative activities.

However, as can be seen from Tables 1 and 2, the relationship between the A-E styles and creative activities is not very strong, although significant and theoretically meaningful. Despite a clear theoretical link between novelty seeking problem solving behaviour and creativity, this finding may indicate that the relationship between the A-E styles and creativity, and not only creative problem solving, is more complex than initially anticipated and may possibly be moderated by other variables. Future research will shed light on this. In this respect, motivational, affective variables have been shown to moderate effects of the A-E styles on creative problem solving, and it seems relevant to further investigate if such variables moderate the style – creativity relationship also (Martinsen, 1993; Martinsen & Furnham, 2015; Martinsen, Kaufmann, & Furnham, 2011).

A limitation of the present study is that there was missing data. Despite this, results were in line with theoretical predictions and based on a relatively strong design with three waves.

## References

- Beaty, R. E., Nusbaum, E. C., & Silva, P. J. (2014). Does insight problem solving predict real-world creativity? *Psychology of Aesthetics, Creativity, and the Arts*, 8, 287-292
- Furnham, A. (2008). *Personality and Intelligence at Work*. London: Routledge
- Hocevar, D. (1979). Ideational fluency as a confounding factor in the measurement of originality. *Journal of Educational Psychology*, 71, 191-196.
- Hocevar, D. (1981). Measurement of creativity: Review and critique. *Journal of Personality Assessment*, 45, 450–464.
- Kaufmann, G. (1979). The Explorer and the Assimilator: A cognitive style distinction and its potential implications for innovative problem solving. *Scandinavian Journal of Educational Research*, 23, 101–108.
- Kaufmann, G. (1989). The Assimilator–Explorer-inventory. *Unpublished inventory*. University of Bergen, Department of General Psychology. Bergen: Norway
- Kirton M.J. (2003). *Adaption and Innovation. In the Context of Diversity and Change*. London: Routledge.
- Luchins, A. S. (1942). Mechanization in problem solving. *Psychological Monographs*, 54 (248).
- Martinsen, Ø. (1993). Insight problems revisited: The influence of cognitive styles and experience on creative problem solving. *Creativity Research Journal*, 6, 435–449.
- Martinsen, Ø. (1994). The effect of individual differences in cognitive style and motives in solving insight problems. *Scandinavian Journal of Educational Research*, 38, 83–96.
- Martinsen, Ø. L., & Diseth, Å. R. (2011). The Assimilator–Explorer Cognitive Styles: Factor Structure, Personality Correlates, and Relationship to Inventiveness. *Creativity Research Journal*, 23, 273-283



- Martinsen, Ø. & Furnham, A. (2015). Cognitive style and performance on complex, structured tasks. *Learning and Individual Differences, 42*, 106-109
- Martinsen, Ø., & Kaufmann, G. (2000). The Assimilator–Explorer cognitive styles and their relationship to affective-motivational orientations and cognitive performances. In R. Riding & S. Raynor (Eds.), *International perspectives on individual differences vol. 1: New developments in learning/cognitive styles* (pp 3–41). Stamford, CT: Ablex Publishing Corporation.
- Martinsen, Ø. L., Kaufmann, G., & Furnham, A. (2011). Cognitive style and creativity. In M. A. Runco & S. R. Pritzker (Eds.), *Encyclopedia of creativity, Second Edition, vol. 1* (pp. 214–221). San Diego: Academic Press.
- McKenna, F. P. (1984). Measures of field dependence: Cognitive style or cognitive ability? *Journal of Personality and Social Psychology, 47*, 593—603
- Messick, S. (1994). The matter of style: Manifestations of personality in cognition, learning, and teaching. *Educational Psychologist, 29*, 121–136.
- Mumford, M. D. (2003). Where have we been, where are we going? Taking stock in creativity research. *Creativity Research Journal, 15*, 107–120.
- Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies*. London: David Fulton.
- Runco, M. A. (2004). Creativity. *Annual Review of Psychology, 55*
- Runco, M. A., & Albert, R. S. (1985). The reliability and validity of ideational originality in the divergent thinking of academically gifted and nongifted children. *Educational and Psychological Measurement, 45*, 483-501.
- Runco, M. A., Noble, E. P., & Luptak, Y. (1990). Agreement between mothers and sons on ratings of creative activity. *Educational and Psychological Measurement, 50*(3), 673-680.

Wallach, M. A. and Kogan, N. (1965). *Modes of thinking in young children: A study of the creativity- intelligence distinction*. Holt, Rinehart, & Winston , New York

Wallach, M. A., & Wing, C. W., Jr. (1969). *The talented student*. New York: Holt.

Table 1

*Means, standard deviations (std.dev.), and correlations (pairwise deletion) between Gender, the Assimilator – Explorer styles, Figural fluency, Verbal fluency, and creative activities.*

	Mean	Std.dev	1	2	3	4
1. Gender						
2. Fluency figural	31.82	10.09	-.01 <sup>(359)</sup>			
3. Fluency verbal	12.49	4.96	-.15** <sup>(345)</sup>	.43** <sup>(342)</sup>		
4. A-E	14.24	5.92	.07 <sup>(408)</sup>	.15* <sup>(286)</sup>	.14* <sup>(271)</sup>	
5. Creative activities	6.16	3.84	-.20** <sup>(242)</sup>	.30** <sup>(217)</sup>	.24** <sup>(209)</sup>	.26** <sup>(192)</sup>

Note. \* $p < .05$ , \*\* $p < .01$ . Sample size for each correlation is provided in parenthesis. For gender, females = 1 and males = 2.

Table 2

*Prediction of creative activities. Predictors are gender, figural and verbal fluency, and the Assimilator-Explorer styles.*

	Model 1	Model 2
Gender	-.154*	-.163*
Figural fluency	.269**	.247**
Verbal fluency	.032	.001
A-E styles		.218**
R square	.124**	.169**
Rsq change		.045**

Note. \* $p < .05$ , \*\* $p < .01$ . Model 1 shows effects of gender and the two fluency measures on creative activities. Model 2 shows the incremental effect of the A-E styles beyond gender and the two fluency measures on creative activities. Sample size was 171 (listwise deletion).