An eye-tracking analysis of irrelevance processing as moderator of Openness and creative performance

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Abstract

Openness has been identified as one of the personality traits with stronger association to creativity into the Five-Factor-model of personality. But what are the psychological mechanisms that relate Openness and creative performance? The present paper aims at responding to this question, exploring in particular whether the attentional processing of apparently irrelevant information (*irrelevance processing*) can act as a moderator within the relation between Openness and creativity. To this aim, a visual version of the Unusual Uses Task was developed and, using an eye-tracker methodology, the attentional processing of both information that is central to the task and information that is "apparently" irrelevant for its execution was measured. The results showed a moderating effect of irrelevance processing on the role of Openness in both creative achievement and originality of the uses produced by the participants, with creativity reaching higher levels in individuals who gave attention to irrelevant information and were characterized by a high level of Openness. These findings establish attentive processing as a central psychological mechanism to explain the relationship between Openness and creativity.

Keywords: creativity; Openness; eye-tracker

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> We keep moving forward, opening up new doors and doing new things, because we're curious… and curiosity keeps leading us down new paths.
> – Walter Elias Disney –

A broad set of core characteristics has been associated to creative behavior, such as high consideration of aesthetic qualities in experiences, broad interests, or attraction to complexity (Barron & Harrington, 1981). However, meta-analytical research has identified Openness as one of the personality traits that is more highly associated with creativity into the Five-Factor-model of personality (Costa & McCrae, 1992), especially when creativity was measured by divergent thinking tasks and a measure of originality was included (Batey & Furnham, 2006; Feist 1998; Kaufman, 2013). Openness was described by Costa and McCrae (1992) as involving aesthetic sensitivity, preference for novelty, intellectual curiosity, and leaning toward nontraditional values. Open-mindedness therefore seems to be a personal characteristic highly associated to creativity. But what are the psychological mechanisms that relate Openness and creative performance? Which are the specific abilities that can act as moderators between this personality trait and creativity? Recent research tried to address some of these questions and showed that the relation between creativity skills and Openness could be mediated by attentional mechanisms. The relationship between Openness and creativity has indeed been hypothesized to be mainly related to the lower tendency of open people to effectively filter out irrelevant information, which then enters the idea-generating process (Batey & Furnham, 2006). The aim of the present paper was to test this hypothesis, exploring whether the attentional processing of apparently irrelevant information,

here identified as *irrelevance processing*, could act as a moderator within the relation between Openness and creative achievement.

The study of the attentional mechanisms involved in creative behavior has been recognized to be of relevant interest in creativity research. Two research lines in particular explored and proved the existence of different attentional abilities in highly creative people. The first line concerns the fact that the breadth of attention is a main correlate of creative performance (Kasof, 1997; Mendelsohn, 1976; Mendelsohn & Griswold, 1964, 1966; Mendelsohn & Lindholm, 1972; Necka, 1999). As defined by Kasof (1997), the concept of breadth of attention "refers to the number and range of stimuli attended to at any one time". While individuals characterized by a narrow breadth of attention focus on a small range of stimuli at any one time and filter out extraneous or irrelevant stimuli from awareness, individuals with a wider breadth of attention focus on a larger range of stimuli and allow inputs from apparently irrelevant stimuli. These works demonstrated that creative people are characterized by an ability to notice and use irrelevant stimuli, which may actually reveal themselves to be highly relevant a posteriori. These results were in accordance with Simonton (1988), who suggested that intuitive thought, in contrast to analytical reasoning, has a much larger pool of associations that pass the threshold of attention. A wider breadth of attention in creative individuals can indeed be explained by assuming that their attentive filter is not selective enough to prevent the inclusion of unwanted information into the current processing (Necka, 1999).

Coherent findings have been reached by the second research line, focused on the neuroscientific study of the influence of latent inhibition on creative behavior (Carson, Peterson, & Higgins, 2003). Latent inhibition is defined as the variable capacity of the human brain to screen from the current attentional focus those stimuli previously experienced as irrelevant (Lubow, 1989). This mechanism is a gating mechanism that allows to cease

responding to stimuli with no apparent value (Peterson, Smith, & Carson, 2002). Even if reduced latent inhibition scores have been usually associated with psychotic states or psychotic proneness, they turn out to be also associated with high levels of creative achievement, creative personality, and the originality facet of divergent thinking (Carson et al., 2003). A further result is that latent inhibition has been associated with higher levels of Openness (Peterson et al., 2002). According to this result, individuals with a higher Openness level are characterized by a higher access to complexity, which means a wider span of information. Therefore, the analysis of the literature shows that separate bilateral relationships between attentive processing, creativity, and Openness have been already demonstrated, but no work has yet proved whether irrelevance processing can act as a moderator mechanism between Openness and creativity, considering these three variables jointly in a single study.

In order to explore the above, in the present paper an experiment to measure attentional processing during the execution of a divergent thinking task using an eye-tracker system was designed. A visual version of the Unusual Uses Test (Guilford, 1967) that contains both relevant (the target object of which the participants were asked to produce all possible uses they could think of) and irrelevant information (random objects apparently unrelated to the execution of the task) was expressly created. Using eye movement tracking, the processing of relevant and irrelevant information by the participants was measured. Differently from the attentional research that usually tests attentional abilities using either a trait approach (e.g., using a measure of the trait breadth of attention; Mehrabian, 1977) or cognitive tasks (e.g., using a latent inhibition task; Carson et al., 2003), the present study analyzed the attentional processing during a task that is frequently used to elicit divergent thinking. This approach allowed to explore how attentional processing during the execution of the divergent task influences the outcome of the creativity task and, in particular, the

responses originality. Originality is indeed considered to be the most central feature of creativity (Runco & Acar, 2012). An extended debate exists in the literature on the most effective modality to measure creativity in divergent thinking test (Runco & Acar, 2012; Silvia, Winterstein, Willse, Barona, Cram, Hess, et al., 2008). Often only a fluency measure is used, linking creativity to a mere measure of productivity. In the same way, originality is frequently defined in terms of novelty or statistical infrequency, linking this measure to the productivity of the particular sample tested in each study. Actually, a series of new methods have been proposed to measure originality on the basis of an external consensus, i.e., using external raters who judge originality on the basis of a reliable shared criterion. In line with this approach, in the present study the influence of Openness and of the different attentional processing on participants' originality scores was tested. In addition, the Creative Achievement Questionnaire (CAQ; Carson, Peterson, & Higginns, 2005) was administered to measure the participants' lifetime creative achievement. The intention was to study the influence of attentional processing and Openness both on the general creative achievement (measured through the CAQ) and on everyday creativity as measured by the divergent task.

Specific hypotheses were as follows:

H1) Openness should be associated to a high level of irrelevance processing.

H2) A high level of irrelevance processing should be associated with higher creative achievement scores.

H3) The influence of Openness on creative achievement should be effective only at a high level of attention towards irrelevant information.

Moreover, as for the divergent thinking outcomes, there were the following hypotheses:

H4) Consistent with past literature (Runco & Acar, 2012; Silvia, 2008; Silvia et al., 2008), fluency and originality should be significantly correlated.

H5) In addition, when controlling for the effect of fluency, Openness should be associated with the originality scores and this effect should be a function of the amount of irrelevance processing. In other words, it was predicted that the level of irrelevance processing should moderate the effect of Openness on originality.

Method

Participants

A total of 30 undergraduate students (16.7% female; mean age = 25.28 years, *SD* = 5.30, ranging between 21 and 45 years) enrolled at the University of Padova (Italy) took part in the study. Participants had normal or corrected-to-normal vision and completed the study individually. Completion of the experimental session took about 40 minutes. Each participant had to complete two different tasks. The first task was completed using a computer, an audio-recorder, and an eye-tracker system, whereas the second task asked participants to complete two paper and pencil questionnaires.

Materials and procedure

The first task contained 15 screens organized as a circle that encloses a target object surrounded by 8 different objects (see Figure 1). They were constructed by placing the target object (the object for which the participants had to find as many uses as they could) in the center of the circle and the 8 different objects along the circumference, each at the same distance from the center (see Figure 1).

----- Insert Figure 1 about here-----

The peripheral, or "irrelevant for the task" stimuli were randomly chosen within a series of 120 objects, so that each of the 15 target objects was always surrounded by different stimuli. Participants were presented with three different blocks of stimuli, and each block included five different target stimuli. Stimuli were presented randomly, but each stimulus (both target and peripheral) could only appear once in the three blocks.

Participants' eye-movements were measured with a Tobii T120 eye-tracker. All stimuli were presented using the Tobii Studio (the Tobii eye-tracker's proprietary software). In order to measure information acquisition we determined, for each figure, nine different fixed non-overlapping areas-of-interest (AOIs). All nine AOIs had the same size, 4.2 cm (4°) in width and 3.1 cm (3°) in height, and corresponded to the nine different objects depicted in the figure: a central AOI corresponded to the target object, while eight peripheral AOIs corresponded to the eight stimuli irrelevant for the task.

Participants sat in a chair placed 60 cm away from the stimulus monitor. The room lights were lowered and at the start of the experimental session participants were informed about the eye-tracking equipment and how it worked. Before the beginning of the task participants were presented with an example trial. They were instructed to produce as many possible uses as they could only for the objects they saw at the center of the screen (target objects). They were informed that before the appearance of the target object, a fixation cross would appear at the center of the screen. They had to fixate this cross and the target object would have appeared in its correspondence. Moreover, they were informed that the target object would be surrounded by other objects, that they could decide to look at or not, but that their task was related only to the production of uses for the central object. For a schematic representation of the procedure see Figure 2. Participants could look at the target object for as long as they wanted. Once ready to answer, they were instructed to press the space key, then a blank screen appeared and they had 30 seconds to produce all possible uses for the target object they could think of. They were presented with three blocks containing five different target stimuli each (Figure 2). An eye-tracker calibration was performed before each block of trials. Between different trials, participants were presented with the central fixation cross that appeared for 2 seconds. All uses produced by the participants were recorded by an audio-recorder and transcribed off-line by the experimenter.

----- Insert Figure 2 about here-----

At the end of this computer task, participants were asked to complete the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992), which assesses personality and consists of 60 items. It provides a measure of the Big Five personality traits of Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A) and Conscientiousness (C). Participants responded to complete sentences (e.g., the Openness item "Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement") on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The NEO-FFI is widely used and possesses adequate reliability and validity (Costa & McCrae, 1992). Moreover, Creative Achievement was assessed by the Creative Achievement Questionnaire (CAQ; Carson et al., 2005). This questionnaire measures creative accomplishments in 10 domains: Visual Arts, Music, Dance, Architectural Design, Creative Writing, Humor, Inventions, Scientific Discovery, Theater and Film, and Culinary Arts. The CAQ focuses on significant, observable accomplishments. Only people with significant achievements in at least one domain receive high scores on the CAQ. A total score of creative achievement was obtained for each participant.

The participants in the study generated 1569 responses. Two raters evaluated the originality of each response to each target object. Each recorded response was previously transcribed into a spreadsheet and then sorted alphabetically within each target object. This method ensured that the raters were blind to several factors that could bias their ratings: the response serial position in the set, the total number of responses in the set, and the preceding and following responses. The raters read all the responses prior to scoring them, and they scored the responses separately. Each response received a rating on a 1 (not at all original) to 5 (highly original) scale using the procedure proposed by Silvia and colleagues (2008). In particular, they used the scoring criteria proposed by Wilson, Guilford, and Christensen

(1953) on individual differences in originality. In their model, creative responses are uncommon, remote, and clever. The raters were told to consider all three dimensions when making their ratings, and they were told that strength in one facet could balance weakness in another facet (Silvia et al., 2008). Inter-rater reliability calculated on all the uses produced by the participants was good (Cohen's $\kappa = .65$). In case of important discrepancies in ratings, raters reviewed and assigned scores by consensus. Moreover, the fluency in the production of uses for each participant was calculated. Finally, each use frequency (use appearance/total uses for the target object) was calculated and a mean frequency score for each participant was obtained.

Results

Preliminary analyses

Mean fixation length and mean number of fixations (fixations count) for the target and the peripheral objects were calculated for each participant considering the duration of all fixations and the number of fixations to the target and to the peripheral objects made during the presentation of the stimuli. Descriptive statistics and correlations between all study variables are presented in Table 1.

----- Insert Table 1 about here-----

As expected, as a consequence of the task requirements, participants looked for a longer time, $t\ (29) = 18.51$, $p < .001$, $d = 5.19$, and more times, $t\ (29) = 9.12$, $p < .001$, $d = 2.02$, to target objects than to peripheral objects. Moreover, correlation analyses showed that the information processing was in particular associated to the level of an unique personality trait: Openness. Accordingly to the hypothesis that the Openness personality trait is related to a higher accessibility to irrelevant information (H1), we found that the higher the participants' Openness level, the longer the fixation on peripheral information ($r = .476$). At

the same time, the analysis showed that Openness was negatively associated to the fixation duration of the central information (r = -.433), i.e., the target objects.

Creative Achievement

The correlational analyses reported in Table 1 showed that the processing of the different kind of information was also associated to the creative achievement: in particular, accordingly to H2, the longer the observation of peripheral information, the higher the creative achievement level (r = .501). While no association emerged between the level of processing of the central information and creative achievement (see Table 1), this result showed that the level of achievement was associated to the processing of information that was apparently not relevant to the task. A positive but not significant association emerged between Openness and creative achievement. However, since we previously found that the processing of irrelevant information was highly associated to Openness, we explored whether the peripheral information observation length could act as a moderator of the relation between this personality trait and the creative achievement scores. In particular, on the basis of H3, we expected that the highest creative achievement scores were associated to a high level of Openness and irrelevance processing.

----- Insert Table 2 about here-----

A hierarchical multiple regression (Table 2) confirmed the length of observation of peripheral objects as a significant predictor of the creative achievement; moreover, an interaction effect between Openness and irrelevant information processing highlighted a moderation by this latter variable. A simple slopes computation, indeed, showed that Openness predicted creative achievement only at a high level of irrelevance processing (ß = .69, SE = .26, p = .01), but not at medium (ß = .17, SE = .17, p = .33), and low levels (ß = -.35, SE = .21, p = .10) of this moderator.

Originality

A further association, supporting H4, emerged from the correlation analyses conducted on the unusual uses task outcomes and showed that the number of uses produced (fluency) was highly associated to the originality of the uses (r = .501). This association is consistent with a vast amount of literature (e.g., Runco & Acar, 2012; Silvia, 2008; Silvia et al., 2008) demonstrating that the more abundant production of uses, the higher the likelihood to generating new or original uses to common objects. Even if in a verbal production task such as that used in the present study a high association between fluency and originality is expectable, substantial and fundamental differences exist between these two indexes (Silvia, 2008; Silvia et al., 2008). Controlling for the effect of fluency, we explored the predictive value of Openness, of the observation of irrelevant information, and of their interaction on the originality scores. A hierarchical multiple regression (Table 3) confirmed the predictive value of the fluency on the originality scores; moreover, accordingly with the correlational analyses, no direct effect of Openness nor of irrelevance processing emerged. However, an interaction between Openness and the length of observation of peripheral objects explained a significant and important part of the originality variance, showing the moderating role of the processing of irrelevant information on the association between Openness and originality.

----- Insert Table 3 about here-----

A simple slopes computation, indeed, confirmed H5, showing that Openness was not a significant originality predictor when participants looked at low (ß = - 0.02, SE = 0.01, p = 0.25) and medium (ß = 0.02, SE = 0.01, p = 0.08) levels the peripheral objects, but only when the irrelevant information was looked at for a longer time (ß = 0.06, SE = 0.02, $p < 0.01$).

Interestingly, the effect found in the creative achievement analysis is comparable with the effect emerged in originality. In particular, as shown in Figure 3, longer irrelevance processing produced a significant change both in creative achievement and in originality if

joined with open-minded individuals, producing a creativity increase with the increase of Openness.

----- Insert Figure 3 about here-----

Discussion

The present work explored the interaction between the Openness personality trait and attentional processing in influencing creative achievement and the outcomes of a divergent thinking task. In order to achieve this aim a visual version of the Unusual Uses Task was developed, that, with the use of an eye-tracker system, allowed the measurement of the attentional processing of both information which is central for the execution of the task and information which is "apparently" irrelevant for its execution.

As an evidence of the correct comprehension and execution of the computer task, a first result showed that the participants' attentional resources were mainly directed to the processing of the target object. They indeed looked for a longer time and more times to the central object, as this information was essential for the execution of the task. On the contrary, the processing of peripheral objects was significantly more scattered than the processing of the target, as these did not represent crucial information, and indeed could be seen as "distractions".

Still, the results revealed that, although apparently irrelevant, this information was a main determinant of the outcomes of the creativity measures tested in this study. First of all, irrelevance processing resulted to be highly associated to creative achievement scores. Consistent with results by Carson et al. (2003), the findings of the present study showed that the processing of apparently irrelevant information was associated with participants' creative achievement: the longer they looked at peripheral objects, the higher their creative achievement scores. Moreover, the results highlighted some individual differences in information processing, which were mainly related to the Openness personality trait.

Openness was indeed both negatively associated with the processing of central information and positively related with the processing of irrelevant information. As hypothesized, and consistently with the latent inhibition results (Peterson et al., 2002), these data confirmed that this personality trait is positively associated with the processing of irrelevant information. This association demonstrated that the Openness trait is related to a broader accessibility to the environment information and to the processing of a wider span of information. This association offers an information processing support to the McCrae and Costa's claim (1997) that open-minded persons are permeable to new ideas and experience and motivated to enlarge their experiences by searching for novelty, even in familiar situations.

More importantly for the aim of the present study, the results showed a relation between Openness and irrelevance processing in determining creativity. First of all, the existence of a moderating effect of irrelevance processing on the role of Openness in creative achievement was demonstrated. More specifically, these two variables interacted in predicting the highest creative achievement scores. The results showed that creative achievement reached high levels in those individuals who gave attention to irrelevant information and were characterized by a high level of Openness, and low levels when individuals were characterized by low Openness. This result highlights the direct relation between Openness and irrelevance processing, demonstrating, in particular, the importance to direct attention to apparently irrelevant information and to be open minded enough to elaborate this information to reach high level of creative achievement. On the basis of this data, irrelevant information seems to be a central element to reach highly creative outcomes.

This trend was confirmed also by the analysis conducted on the divergent thinking scores, and in particular on originality. Besides a direct effect of fluency, originality was significantly predicted by the interaction between irrelevance processing and Openness. In particular, originality was predicted by the level of Openness when participants looked for the

longest time to irrelevant information. The highest originality scores were reached when participants processed for longer time irrelevant information and were characterized by a high Openness level. Consistently with the creativity achievement results, these data showed that at a high level of attention towards irrelevant information the level of Openness plays a fundamental role for the production of more original uses, with originality increasing with the increase of Openness. Moreover, notwithstanding the expected strong correlation between fluency and originality, these results revealed the intrinsic difference between these two features of divergent thinking. Consistently with Silvia et al. (2008), these findings highlighted that the analysis of qualitative (originality) and quantitative (fluency) aspects must be clearly distinguished in the use of divergent thinking tests. In particular, if the target of assessing divergent thinking abilities is to infer about an individual's creativity, the originality score should be considered the most appropriate measurement.

The findings of the present paper highlighted the close relationship between Openness and irrelevance processing in creative behavior. These results testify that this relation is important for both actual creative performance (as measured by the CAQ) and everyday divergent thinking (tested by the Unusual Uses test). On the one hand, the results confirm the centrality of gathering information from multiple sources, from the more conventional to the more unconventional, to reach a high creative achievement and more original ideas. On the other hand, they suggest the necessity of an open mind to accept using this information and including it in our thinking process. This interpretation is consistent with the postulation by Batey and Furnham (2006) that Openness consists of two sub-factors: the first is a "perceptual openness" (i.e., an inability to inhibit irrelevant information), the second is an "attitudinal openness" (i.e., a readiness to new experience). Accordingly, the present paper proved both a strong relation between Openness and irrelevant information processing (perceptual openness) and a tendency to accept and elaborate this information to reach

highest creative levels (attitudinal openness). The results indeed showed that the processing of apparently irrelevant information allowed open minded people to reach the highest level both in their actual creative performance and in their everyday use of divergent thinking.

Using a new methodology in the study of creative behavior, the present paper confirmed the results emerged in the attentional analysis of creativity. Moreover, an interaction between information processing and personality in influencing creativity outcome emerged, establishing attentive processing as a central psychological mechanism to explain the relationship between Openness and creativity. However, even if the eye-tracking research often uses moderate sample sizes, as the one used in the present study, further data would be useful to confirm the results emerged in this paper, as a minimum by replicating the present findings with a different sample of participants. In particular, we believe that the use of the eye-tracker device can consistently improve the study of information processing and of its relation with Openness during the execution of creativity tasks. Moreover, while the present study explored creativity in a single divergent task, further studies should analyze this phenomenon in different creative tasks and across different domains.

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Table 1. Descriptive statistics and correlations among the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Openness	-												
2. Conscientiousness	-.198	-											
3. Extraversion	.026	.332	-										
4. Agreeableness	-.014	-.077	.077	-									
5. Neuroticism	.141	.141	-.358	-.141	-								
6. Obs. Length Target Obj.	-.433	.049	.212	.182	-.031	-							
7. Obs. Length Periph. Obj.	.476*	-.339	-.348	-.113	-.006	-.589*	-						
8. Fixations Target Obj.	.278	-.057	-.144	-.211	-.067	.287	.081	-					
9. Fixations Periph. Obj.	-.168	.132	-.093	-.040	-.122	-.507*	.709**	.262	-				
10. Fluency	.158	-.383*	.148	.120	.131	-.304	.285	.080	.366*	-			
11. Frequency	-.140	.125	-.269	-.311	-.008	.354	-.190	.248	-.219	-.671*	-		
12. Originality	.179	-.509*	.035	.004	.120	.161	.054	.029	-.136	.501**	-.405*	-	
13. CAQ	.276	-.034	0.61	-.048	.012	-.211	.501**	-.059	.027	.010	-.223	.183	-
Mean	25.10	40.93	37.8	26.87	29.13	1.40	.03	2.30	.68	51.97	.07	1.45	5.43
SD	4.59	6.73	6.74	3.54	9.93	.37	.05	.76	.84	13.15	.01	.33	4.75

Note: *p<.05; **p<.01

Table 2. Hierarchical multiple regression on creative achievement scores.

	Creative Achievement		
	Step 1	Step 2	Step 3
Openness	0.28	0.05	0.16
Obs. Length Peripheral Objects		0.48*	-0.27
Openness x Obs. Length Peripheral Obj.			0.84**
R^2	0.04	0.20	0.41
ΔR^2	0.04	0.16	0.21
F	2.31	4.56*	7.67**
ΔF	2.31	6.37*	10.63**
df	28	27	26

Notes: Step 1: Openness; Step 2: Observation Length Peripheral Objects; Step 3: Openness x Observation Length Peripheral Objects. Numbers in the first three rows represent standardized regression coefficients; * $p < .05$, ** $p < .01$

Table 3. Hierarchical multiple regression on originality scores.

	Originality			
	Step 1	Step 2	Step 3	Step 4
Fluency	0.50**	0.48**	0.52**	0.69**
Openness		0.10	0.18	0.30
Obs. Length Peripheral Objects			-0.18	-1.08**
Openness x Obs. Length Peripheral Obj.				0.91**
R^2	0.22	0.21	0.20	0.43
ΔR^2	0.25	0.01	0.02	0.23
F	9.38**	4.77*	3.47*	6.55**
ΔF	9.38**	0.37	0.89	11.59**
df	28	27	26	25

Note: Step 1: Fluency; Step 2: Openness; Step 3: Observation Length Peripheral Objects; Step 4: Fluency x Observation Length Peripheral Objects. Numbers in the first four rows represent standardized regression coefficients; * $p < .05$, ** $p < .01$

Figure Captions

Figure 1. Example of an experimental trial. The target object is depicted at the center of the circumference, surrounded by eight different peripheral objects.

Figure 2. Schema of the experimental procedure.

Figure 3. Effect of Openness on creative achievement and originality at high levels of irrelevance processing.

Figure 1.

Figure 2.

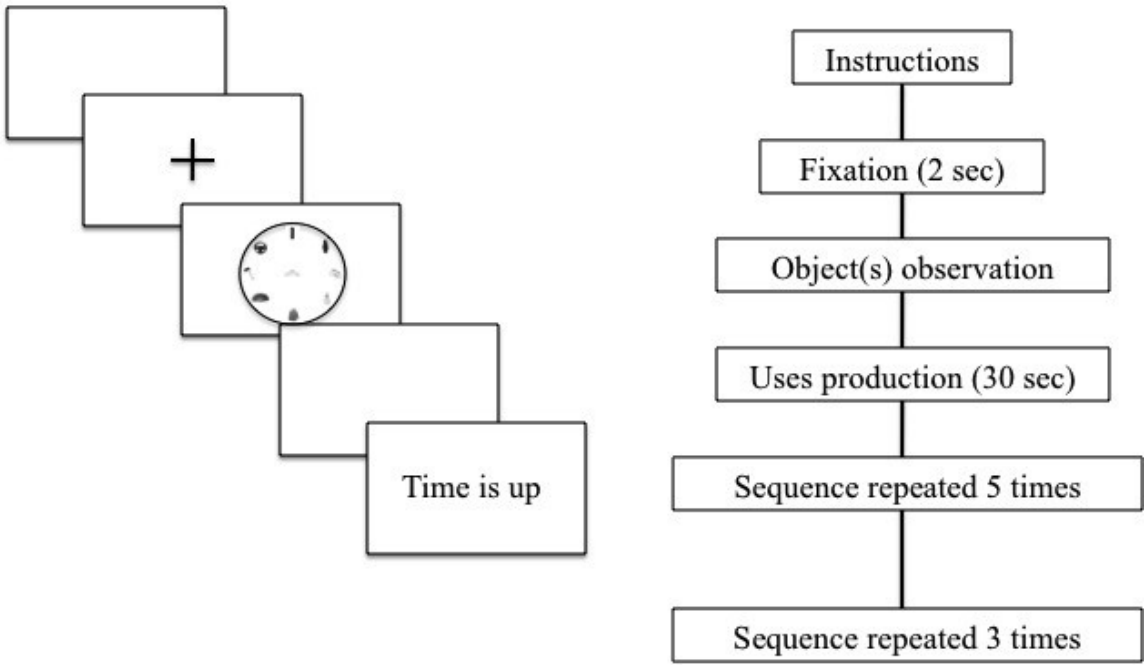
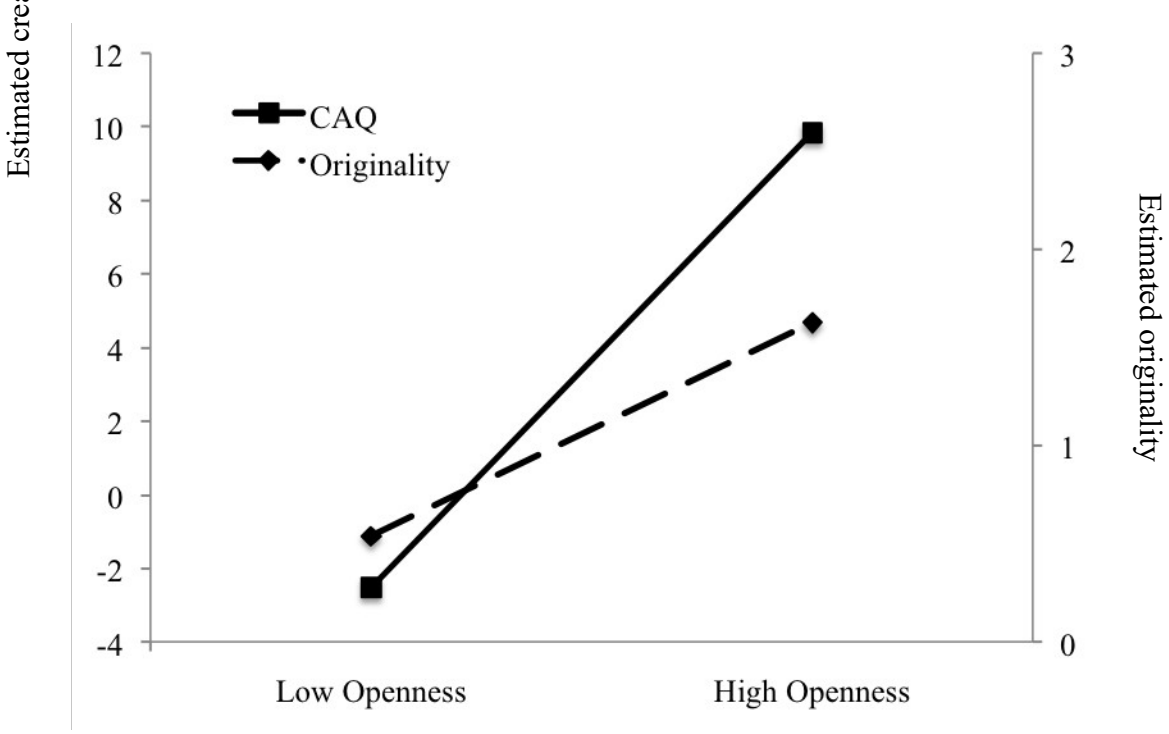

Time is up
Instructions
Fixation (2 sec)
Object(s) observation
Uses production (30 sec)
Sequence repeated 5 times
Sequence repeated 3 times

Figure 3.


Estimated creative achievement
12
10
8
6
4
2
0
-2
-4
CAQ
Originality
3
2
1
0
Estimated originality
Low Openness
High Openness