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Inhibitory control and semantic richness moderate the relationship between autism spectrum characters and creative thinking

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ABSTRACT

Previous studies have reported inconsistent findings regarding creativity in individuals with autism spectrum condition (ASC). The present study treated ASC as a continuum and examined whether inhibitory control and semantic structure moderate the relationship between autistic characteristics and the originality and creative quality of divergent thinking. A mixed sample (n = 334), including participants on the autism spectrum and individuals from the general population, completed the Alternate Uses Task, which requires generating creative uses for common objects. The object probes differed in semantic richness: some were semantically scarce, with few associations, whereas others were semantically rich, with many associations. Although total ASC scores did not predict overall creative quality (considering originality and appropriateness of ideas), ASC was negatively associated with originality (probe-idea semantic distance) in responses to semantically rich probes but not to scarce probes. This effect was strongest among individuals with weaker inhibitory control. Analyses of specific autistic traits showed that difficulties with *attention switching* predicted *greater* originality. Moderating effects of inhibition and semantic structure also emerged for *attention to patterns/details* and *imagination*. Together, these findings highlight the importance of considering both the semantic richness of task prompts and individual differences in inhibitory control when investigating creativity in neurodivergence.

1. Introduction

Research on neurodevelopmental differences increasingly recognizes cognitive strengths alongside challenges. Creativity has received particular attention, with several studies suggesting enhanced or distinctive creative processes in individuals with neurodevelopmental conditions such as attention-deficit/hyperactivity disorder (ADHD) (Hoogman et al., 2020) or autism spectrum condition (ASC) (Pennisi et al., 2021). However, findings particularly concerning ASC remain inconsistent. ASC is characterized by persistent deficits in social communication and social interaction across multiple contexts and restricted, repetitive patterns of behavior, interests, or activities (APA, 2017). The cognitive abilities in the autism spectrum are heterogeneous, and there are substantial individual differences in the type of difficulties the persons with ASC experience (Geurts et al., 2009).

Autistic traits—measured continuously using instruments such as the Autism Spectrum Quotient (AQ) (Baron-Cohen et al., 2001) or its short version (AQ-S) (Hoekstra et al., 2011)—exist on a spectrum across the general population. AQ-S encompasses traits including *social skills* (comfort and ease in social interaction), *routine* (preference for sameness), *switching* (shifting attention flexibly), *imagination* (imaginative and mentalizing abilities), and *attention to detail/patterns* (focus on details, categories, patterns).

ASC traits have been linked in heterogeneous ways to creative thinking. A meta-analysis (Pennisi et al., 2021) reports elevated originality in autistic individuals in some verbal tasks, but standard divergent thinking tasks, such as the Alternate Uses Task (AUT) (Guilford, 1967), have rarely been used in comparisons between autistic vs. nonautistic adults. AUT asks participants to produce alternate, novel uses for common objects. The responses can be scored for *fluency* (number of responses), *originality* (novelty or statistical rarity; or response's semantic distance from the probe, Beaty & Johnson, 2021), *elaboration* (details), or *creativity* (response is both original and appropriate; Runco & Jaeger, 2012). Taylor et al. (2025) did not find any difference in AUT between autistic and nonautistic groups. Dimensional studies, considering ASC as a continuum in the general population, show mixed patterns: some report relationships between divergent thinking and AQ total scores (Best et al., 2015; Jankowska et al., 2019) or with specific ASC

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dimensions (Baron-Cohen et al., 2001; Stolte et al., 2022), while others report null associations (Abu-Akel et al., 2020; Claridge & McDonald, 2009; Zabelina et al., 2014). It is, however, typical that ASC is associated with reduced fluency (i.e., number of responses) (Pennisi et al., 2021).

Creative ideas in the idea generation phase of divergent thinking are formed by combining distantly related concepts in semantic memory — the network that stores general knowledge, concepts, and the meanings of words (Tulving, 1972). According to the *associative theory of creativity*, a distinguishing characteristic of creative persons is their associative thinking, the ability to make new connections between remotely associated or previously unrelated concepts in semantic memory (Beaty & Kenett, 2023; Mednick, 1962). Thus, the ability to access distant concepts is central to the originality of creative thinking. In AUT, the probes may differ in the richness of their connections with other concepts. Rich semantic probes/cues (RSC) have many closely connected concepts, whereas scarce semantic probes/cues (SSC) have fewer closely related connections (Nelson et al., 2004). Therefore, the SSCs spontaneously activate semantically more distant concepts than RSCs (Koivisto & Toivanen, 2026), and the AUT responses to SSCs are more original (Beaty et al., 2023; Koivisto, 2026). RSCs, on the other hand, activate close concepts efficiently, which is reflected in higher fluency but lower originality (Beaty et al., 2023; Koivisto, 2026). The activation of close concepts interferes with access to semantically distant concepts, and therefore, according to the *controlled-attention theory* (Beaty et al., 2014), executive processes are required to inhibit these sources of interference and to shift attention to distant concepts. These views can be combined into the hybrid (or dual-process) theory (Beaty et al., 2014; Benedek et al., 2014), which assumes that both associative and controlled executive processes contribute to creative idea generation.

Inhibitory control is a critical component of executive processes. It refers to the ability to suppress responses that are inappropriate or irrelevant in a given context, such as close concepts in AUT. ASC has been associated with difficulties in inhibitory control and in suppressing inappropriate behavior, although there is considerable inter-individual variation (Bausela-Herreras, 2024; Geurts et al., 2009; Hlavatá et al., 2018). The role of inhibition in divergent thinking has not been directly studied in ASC. On the one hand, reduced inhibition may increase the information available in awareness that can be combined to form original ideas (Carson, 2011; Radel et al., 2015) — this might explain the possible originality in ASC. On the other hand, inhibitory abilities may help to suppress salient and unoriginal responses, particularly when AUT probes (e.g., RSCs) activate rich associative networks, placing ASC individuals with inhibitory problems at a disadvantage.

The present study investigates how autistic traits, measured dimensionally, relate to divergent thinking performance while accounting for inhibitory control and semantic probe characteristics. We measured originality, subjectively rated creative quality, and fluency in responses to RSCs and SSCs. Inhibitory control was measured with a go/nogo task (Wright et al., 2014). We hypothesize, based on dual-process theories, that inhibition and semantic richness would interact with autism scores on creativity measures such that participants high in autism traits and disinhibition would be at a disadvantage, specifically in response to RSCs that require inhibition of strong associates, compared to SSCs with smaller inhibition demands.

2. Methods

2.1. Participants

The participants were recruited via Prolific (prolific.com) for an online study using PsyToolkit platform (Stoet, 2010, 2017). The participants were paid £3.30 for their participation. Using Prolific's prescreeners, participants whose primary language was English and who resided in the UK, USA, Ireland, Australia, Canada, or New Zealand were invited. The participants had to be 18–65 years old, without dyslexia, and able to use either a laptop or desktop computer in responding to the study.

To get the full spectrum of ASC characters, we recruited 230 participants from Prolific's general pool (nonautism) and 120 participants from the autism pool. The data from the nonautistic sample have been analyzed and reported previously as a function of schizotypy (Koivisto & Toivanen, 2026). The participants in the autism pool had agreed that they had received a formal clinical diagnosis of ASC either as a child or as an adult (including Asperger's syndrome, Autism Disorder, High Functioning Autism or Pervasive Developmental Disorder), made by a psychiatrist, psychologist, or other qualified medical specialist.

Prolific automatically replaced participants who retired or were inactive ($n = 55$) with new participants. The data from 8 participants were excluded due to at least 2 errors in three easy control questions (see Section 2.4). In addition, 14 participants were rejected because they were inactive during the go/nogo task (see Section 2.3) and scored 3SD fewer hits than participants on average. The rest of the rejected participants did not produce any responses to either semantically scarce or rich AUT probes. The final sample in the analyses included 324 participants: 111 participants from the ASC subsample (57 female, 54 male) and 213 participants from the general subsample (108 female, 105 male).

The study was conducted in accordance with the Declaration of Helsinki and with the understanding and consent of each participant. The study was accepted by the Ethics Committee for Human Sciences at the University of Turku, Finland (approval no. TY/695/06.01.01/2023).

2.2. Alternate Uses Task (AUT)

Each participant performed four AUT tasks, two with semantically scarce probes (SSC) and two with rich semantic probes (RSC) in random order, each for 1 min. RSCs were connected to many associates, SSCs to a few. See Supplementary Materials for details of probes, instructions, and scoring. The task was to come up with original and creative uses for an object. The instructions followed those of Beaty and Johnson (2021) and emphasized creative quality rather than quantity.

The SemDis platform (Beaty & Johnson, 2021) was used to calculate the semantic distance between the object probes and the responses in semantic space (for a detailed description of the spaces, see Beaty & Johnson, 2021). Semantic distance in AUT correlates primarily with originality (Acar et al., 2023; Beaty et al., 2022; Beaty & Johnson, 2021). Therefore, the semantic distance between the probe and the responses indexed the *originality* of the responses by measuring the conceptual difference or remoteness between concepts in a semantic space.

The *creativity* (or creative quality) of the AUT responses was subjectively scored by 5 independent raters, considering both the originality and appropriateness/meaningfulness of the responses, and using a scale from 1 (*not at all creative use/usual use/nonsense use*) to 5 (*very creative use*). Intraclass Correlation (ICC; model = twoway, type = consistency) was 0.91 and 0.92, for SSC and RSC, respectively.

The final individual AUT *originality* and *creativity* scores were averages of the *maximum* scores of the two probes in SSC and RSC conditions. The *fluency* score was the number of responses per probe.

2.3. Go/nogo task

Inhibitory control was measured with a go/nogo task. A letter “x” or “y” was presented in random order at the center of the screen for 100 ms. Participants had to press the spacebar as quickly as possible whenever they saw an “x” letter and to withhold from pressing it when they saw a “y” letter. The next trial started immediately after the spacebar was pressed or automatically after 1000 ms when the participant withheld responding. The task included 96 (80%) “go” stimuli (“x”) and 24 (20%) “nogo” stimuli (“y”). The number of false alarms (i.e., pressing the key to nogo stimuli) served as the measure for lack of *inhibition* (Wright et al., 2014).

2.4. Scales and control questions

Autism Spectrum Quotient—short (AQ-S) scale (Hoekstra et al., 2011) was used to measure ASC characteristics. It consisted of 28 statements (e.g., "*I prefer to do things the same way over and over again*"), measuring 5 dimensions of ASC: Social skills, Routine, Switching, Imagination, and Patterns/details. The agreement with each statement was rated by choosing one of the alternatives: *Definitely agree* (score = 1), *Slightly agree* (score = 1), *Slightly disagree* (score = 0), or *Definitely disagree* (score = 0). The Cronbach's alpha of AQ-S was 0.88.

To control for the effects of possible coincident ADHD traits, the participants filled in the 18-item Adult ADHD Self-Report scale (ASRS) (Kessler et al., 2005). In addition, the participants completed a scale measuring schizotypy and an associative thinking task with 2 SSC and 2 RSC probes for another study.

Three control statements were embedded among the scales to test how carefully and attentively the participants performed the tasks. They included nonsense statements in which the participants were expected to disagree (e.g., "*Did you learn to drive a car when you were only one year old?*"). The participant's data was rejected if two or more statements were "incorrectly" responded to.

2.5. Statistical analyses

Linear regression analyses on FAs were conducted with basic R (R Core Team, 2021), and linear mixed-effect models (LMM) on the AUT task were performed with the lme4 package (Bates et al., 2015) in R. The *p*-values for the mixed-effect models were computed with lmerTest (Kuznetsova et al., 2017). The results were illustrated with sjPlot (Lüdecke, 2024) and ggplot2 (Wickham and Sievert, 2016). The other statistics were computed using the GUI of Jamovi (https://www.jamovi.org).

For the LMMs, all the AUT variables and the number of FAs in the go/nogo task were normalized and standardized ($M = 0$, $SD = 1$) according to Blom's procedure with the rcompanion package (Mangiafico, 2023). Other continuous variables were standardized, and the categorical factor Set size (SSC vs. RSC) was simple coded. Age, Education, and ADHD traits (ASRS) were used as covariates in the model on FAs. In addition to these variables, Fluency was used as a covariate in the analyses of originality and creativity of AUT responses, as fluency is known to be a confounding factor in analyses of AUT variables (Dygert & Jarosz, 2020). Random intercept for participants served as a random effect. No problems in collinearity were detected in any of the models (VIFs < 3).

3. Results

The data matrix and R-scripts are available at osf.io: https://osf.io/uta34/.

3.1. Background variables and their intercorrelations

The distributions of AQ-S scores in the recruitment groups (autism, nonautism) and in the whole sample are described in Fig. 1. Descriptive statistics and intercorrelations for background variables and the AQ-S scores and ASRS scores are presented in Table 1. The intercorrelations revealed that age correlated negatively with education, AQ-S sum, routine, switching, imagination, patterns, and ASRS score, whereas education did not correlate with any other variables. The AQ-S subscales correlated with each other and with ASRS.

3.2. False alarms

The observed number of false alarms in the go/nogo task was 7.3 ($SD = 4.3$). A linear regression model with AQ-S as a predictor and Age, Education, and ASRS as covariates did not reveal any effect for AQ-S, $B = -0.04$, $SE = 0.06$, 95% CI [−0.16, 0.08], $t(319) = -0.70$, $p = .484$. Age was negatively related to false alarms: the higher the age, the fewer false alarms were made, $\beta = -0.18$, $SE = 0.06$, 95% CI [−0.30, −0.07], $t(319) = -3.22$, $p = .001$.

3.3. Alternate Uses Task

The observed originality (operationalized as semantic distance) was 1.02 ($SD = 1.05$) for SSC and 1.01 ($SD = 1.05$) for RSC, and the observed creativity was 2.82 ($SD = 0.05$) for SSC and 2.95 ($SD = 0.06$) for RSC.

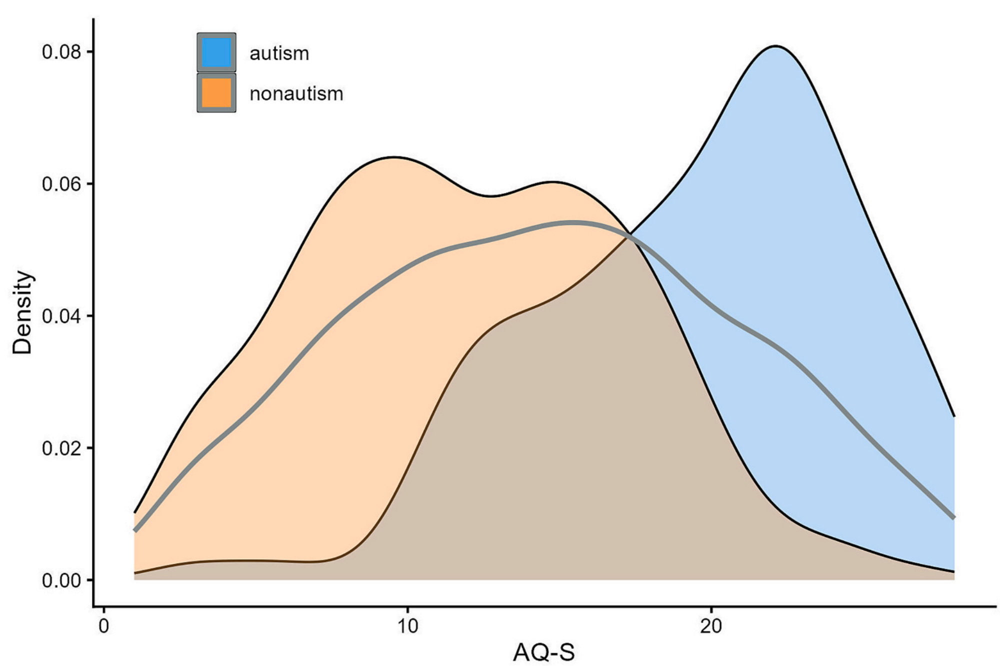

Fig. 1. Distribution of the AQ-S scores in the participant recruitment group reporting an autism spectrum diagnosis ($n = 111$) and in the general (nonautism) recruitment group ($n = 213$). The gray line indicates the density in the whole sample ($n = 324$).

Table 1
Descriptive statistics and the intercorrelations between the background variables and AQ-S and ASRS scores.

	1	2	3	4	5	6	7	8	9
1. Age	–								
2. Education	0.12*	–							
3. AQ-S	−0.128*	0.021	–						
4. Social skills	0.019	−0.072	0.781***	–					
5. Routine	−0.126*	0.040	0.734***	0.506***	–				
6. Switching	−0.162**	0.061	0.718***	0.417***	0.538***	–			
7. Imagination	−0.114*	0.045	0.750***	0.425***	0.451***	0.520***	–		
8. Patterns	−0.112*	0.031	0.496***	0.222***	0.255***	0.223***	0.171**	–	
9. ASRS	−0.281***	0.062	0.464***	0.239***	0.296***	0.529***	0.301***	0.361***	–
M	40.45	2.49	14.57	4.12	2.66	2.34	3.00	2.46	49.22
SD	13.79	1.07	6.9	2.42	1.27	1.32	2.27	1.75	13.17
min	18	1	1	0	0	0	0	0	20
max	78	4	28	7	4	4	8	5	90

Note. The *p*-values were not corrected for multiple comparisons. Education was measured with a 9-point scale that was reduced to 4 levels for the statistical analyses: 1. High school or equivalent or lower ($n = 86$), 2. Vocational/Trade school or Associate's degree ($n = 54$), 3. Bachelor's degree ($n = 124$), 4. Master's degree, Doctorate or PhD ($n = 60$). The recruitment groups did not differ in their education level, $\chi = 2.21$, $p = .529$.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

The model on *originality* (Table 2; Fig. 2) with FA as a moderator (AQ-S × Set size × FA + ASRS + Age + Education) revealed that Set size had an effect such that the originality was higher for SSC than RSC. Set size interacted with false alarms, showing that the greater the number of false alarms, the higher the originality in response to SSCs. The AQ-S had a negative fixed effect on originality, but this effect was modified by AQ-S × Set size, and AQ-S × Set size × FA interactions. These interactions show that AQ-S was negatively related to originality in response to RSC probes when the false alarm rate was mean, $\beta = -0.17$, $SE = 0.06$, 95% *CI* [−0.28, −0.06], $t(593) = -3.00$, $p = .0028$, or high (mean + 1*SD*), $\beta = -0.25$, $SE = 0.08$, 95% *CI* [−0.40, −0.10], $t(607) = -3.26$, $p = .001$. AQ-S was not associated with originality in responses to SSC probes. Of the covariates, Fluency and Education were positively associated with originality.

The corresponding analysis of Creativity with FA as moderator showed that creativity was higher in response to RSCs than to SSCs (Table 2), but AQ-S did not have any fixed effect or interactions with any of the variables. Although Fig. 2 (lower panel) seems to suggest that there was a positive effect for AQ-S in response to RSC probes, the relevant interaction was not statistically significant. Fluency and Education were positively associated with creativity.

Although fluency was not our primary outcome variable (the instructions stressed quality instead of number of responses), we explored the relationship between AQ-S and fluency to test the hypothesis (Pennisi et al., 2021) that ASC is associated with reduced fluency. The model (AQ-S × Set size × FA + ASRS + Age + Education) revealed that AQ-S was negatively related to fluency, $\beta = -0.26$, $SE = 0.06$, 95% *CI* [−0.37, −0.15], $t(317) = -4.632$, $p < .001$, whereas ADHD traits (ASRS) were positively related to fluency, $\beta = 0.16$, $SE = 0.06$, 95% *CI* [0.05, 0.27], $t(317) = 2.73$, $p = .007$. In addition, fluency was higher in response to RSC than SSC probes, $B = 0.26$, $SE = 0.03$, 95% *CI* [0.19, 0.33], $t(320) = 7.56$, $p < .001$.

3.4. ASC traits

The association of autistic traits with originality and creativity in AUT was explored initially with a LMM including all the AQ-S subscales (Social skills, Routine, Switching, Imagination, Patterns) and their interactions with Set size and FA as fixed effects. The covariates were Age, Education, Fluency, and ASRS score. Including all fixed effects in the original analysis resulted in a complex model that has a risk of overfitting. Therefore, after running the original model, we dropped the fixed effects that did not reach the alpha level of 0.05, with the exception that the main effects of all autism traits were included.

The model on originality (Table 3) revealed that difficulties in *switching* were positively associated with originality (Fig. 3). Problems in *imagination* were related to decreased originality, but this effect was moderated by false alarms and set size: participants with many false alarms were able to maintain high originality in response to SSC probes, independently of imagination level. The *patterns* × set size × FA

Table 2
The results from the models examining the fixed effects of the total AQ-S score and its interactions with set size (SSC vs- RSC) and false alarms (FA).

Predictors	Originality				Creativity			
	B	*SE*	95% *CI*	*p*	*B*	*SE*	95% *CI*	*p*
(Intercept)	−0.31	0.10	−0.50 to −0.11	0.002**	−0.27	0.11	−0.49 to −0.05	0.018*
AQ-S	−0.09	0.04	−0.18 to −0.00	0.039*	0.02	0.05	−0.08–0.13	0.635
Set size	−0.29	0.07	−0.43 to −0.16	<0.001***	0.18	0.06	0.06–0.29	0.002**
FA	0.04	0.04	−0.04–0.12	0.304	−0.03	0.05	−0.12–0.06	0.475
Fluency	0.28	0.04	0.20–0.36	<0.001***	0.28	0.04	0.19–0.36	<0.001***
Education	0.12	0.04	0.05–0.20	0.001**	0.11	0.04	0.02–0.19	0.011*
Age	−0.07	0.04	−0.15–0.01	0.102	−0.02	0.05	−0.11–0.07	0.696
ASRS	0.08	0.05	−0.01–0.17	0.067	0.07	0.05	−0.03–0.17	0.185
AQ-S × Set size	−0.15	0.07	−0.28 to −0.02	0.026*	0.09	0.06	-0.02–0.20	0.116
AQ-S × FA	0.01	0.04	−0.07–0.08	0.802	−0.00	0.04	−0.09–0.09	0.999
Set size × FA	−0.13	0.07	−0.26–0.01	0.069	−0.03	0.06	−0.15–0.08	0.556
AQ-S × Set s. × FA	−0.18	0.07	−0.31 to −0.05	0.007***	−0.04	0.06	−0.15–0.07	0.446

* $p < .05$.
** $p < .01$.
*** $p < .001$.

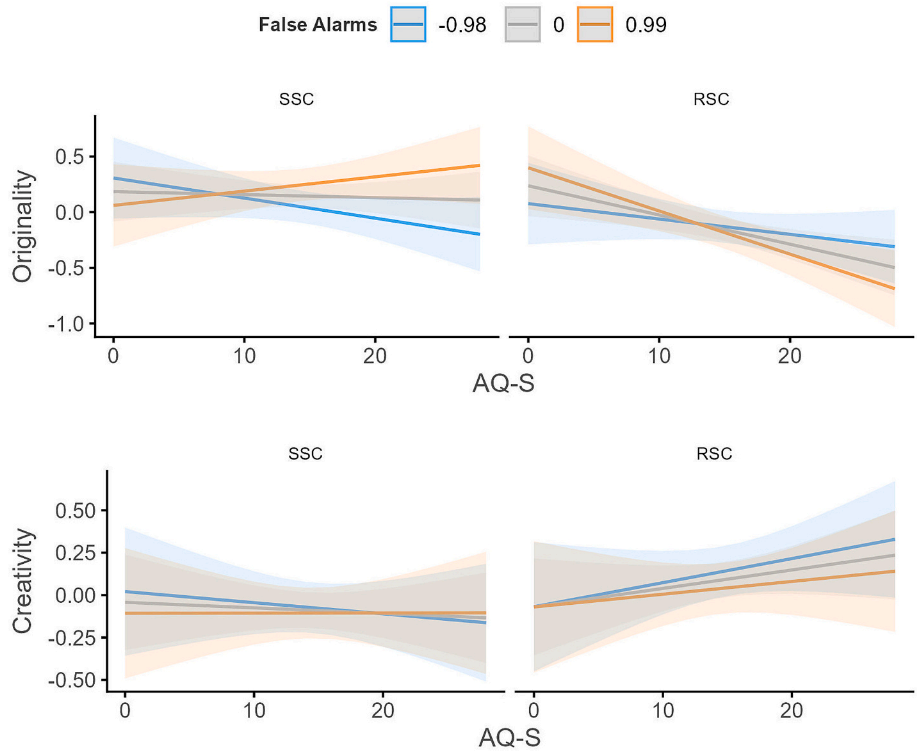

Fig. 2. Originality (upper panel) and creativity (lower panels) as a function of AQ-S total score, set size (SSC vs. RSC), and false alarms (FA). The shaded areas represent 95% confidence intervals.

Table 3
The results from the models examining the fixed effects of the AQ-S traits and their interactions with set size (SSC vs. RSC) and false alarms (FA).

Predictors	Originality				Creativity			
	B	*SE*	95% *CI*	*p*	*B*	*SE*	95% CI	*p*
(Intercept)	−0.34	0.10	−0.53 to −0.15	0.001***	−0.29	0.11	−0.51 to −0.06	0.012*
Social skills	−0.01	0.05	−0.11–0.08	0.767	0.09	0.06	−0.02–0.20	0.126
Routine	0.01	0.05	−0.09–0.11	0.862	0.00	0.06	−0.11–0.11	0.990
Imagination	−0.16	0.05	−0.26 to −0.07	0.001**	−0.06	0.05	−0.17–0.05	0.267
Set size	−0.30	0.07	−0.44 to −0.17	<0.001***	0.17	0.06	0.06–0.29	0.003**
FA	0.05	0.04	−0.03–0.13	0.210	−0.03	0.05	−0.12–0.06	0.485
Switching	0.16	0.05	0.06–0.26	0.001**	0.09	0.06	−0.02–0.21	0.104
Patterns	−0.05	0.04	−0.13–0.03	0.219	−0.05	0.05	−0.14–0.04	0.250
Fluency	0.30	0.04	0.22–0.38	<0.001***	0.30	0.04	0.21–0.39	<0.001***
Education	0.13	0.04	0.06–0.21	<0.001***	0.11	0.04	0.03–0.20	0.007**
Imagination × Set size	−0.12	0.07	−0.26–0.01	0.074				
Imagination × FA	0.04	0.04	−0.04–0.12	0.385	−0.07	0.05	−0.16–0.03	0.161
Set size × FA	−0.10	0.07	−0.23–0.04	0.168				
Set size × Patterns	−0.08	0.07	−0.21–0.06	0.254				
FA × Patterns	0.00	0.04	−0.07–0.08	0.939				
Imagin. × Set size × FA	−0.16	0.07	−0.30 to −0.02	0.027*				
Patterns × Set size × FA	−0.19	0.07	−0.32 to −0.06	0.004**				

* $p < .05$.
** $p < .01$.
*** $p < .001$.

interaction reflects predominantly the finding that as the scores in Patterns and FA increased, the more the positive slope for SSCs and the negative slope for RSC differed from each other.

The model on *creativity* did not detect any fixed effects associated with ASC traits. We explored the relationships between ASC traits and fluency with the same procedure as that for originality and creativity (but without fluency as a covariate). It revealed that problems in *social skills* were associated with lowered fluency, $\beta = 0.39$, $SE = 0.09$, 95% CI [−0.57, −0.21], $t(316) = -4.16$, $p < .001$.

4. Discussion

The present study examined the relationships between ASC characteristics and divergent thinking using the AUT, manipulating the semantic richness of the probes and testing inhibitory control as a potential moderator. Creativity was scored by blinded raters, whereas originality was operationalized as the semantic remoteness between the probes and responses in semantic space. Drawing on dual-process models of creativity (Beaty et al., 2014), we hypothesized that inhibition and semantic richness would interact with autism scores such that participants high in autistic traits and low in inhibition would be

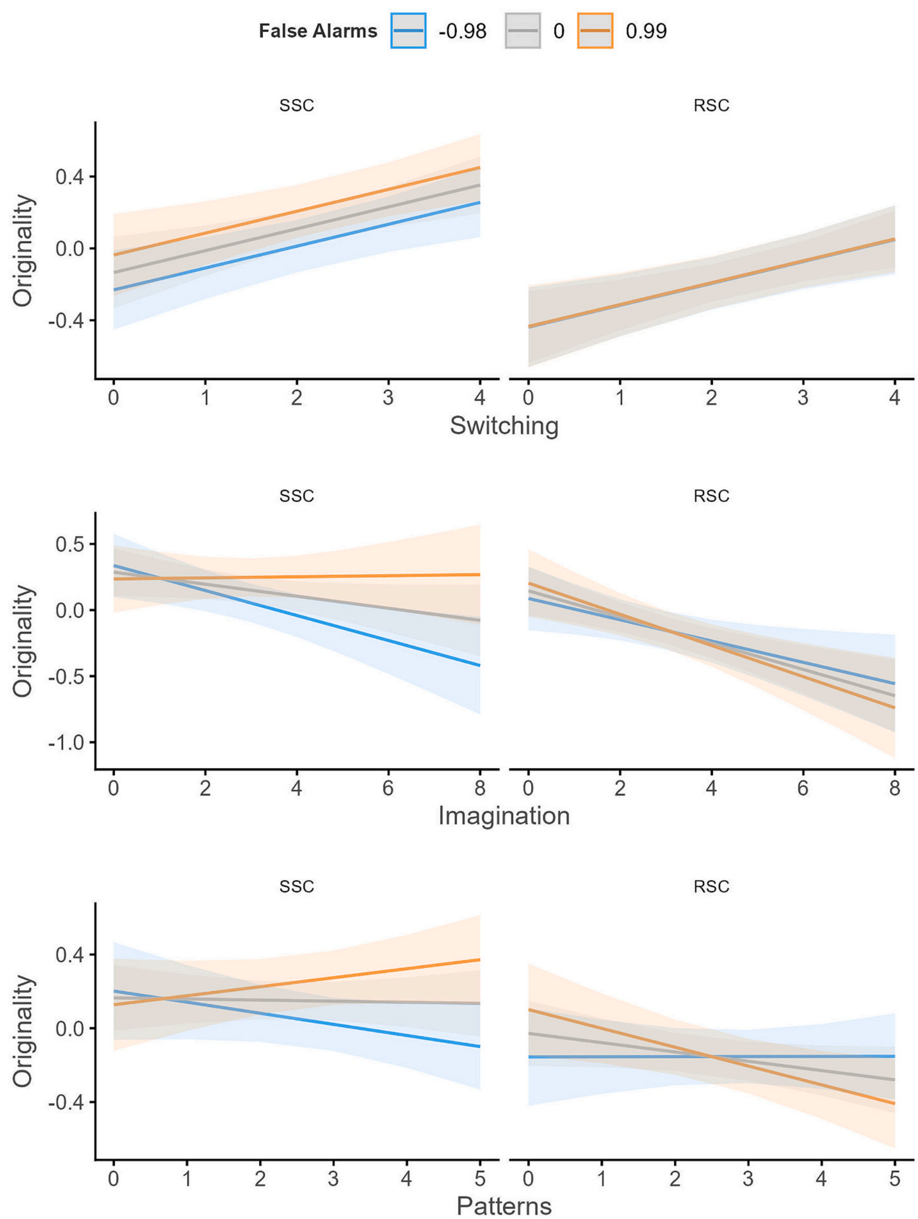

Fig. 3. Originality as a function of set size (SSC vs. RSC), false alarms (FA), and switching (upper panel), imagination (middle panel), and attention to patterns/details (lowest panel). The shaded areas represent 95% confidence intervals.

disadvantaged when responding to semantically rich stimuli (RSC). The originality results supported this hypothesis. First, higher total ASC scores were associated with lower originality to RSC probes compared with those with a scarce neighborhood (SSC). Second, this relationship was moderated by inhibitory control: individuals with high ASC traits and average or weaker inhibition showed lower-than-average originality. These findings align with dual-process accounts (Beaty et al., 2014; Benedek et al., 2014), which propose that when strong associations must be suppressed, reduced inhibition can impede originality. Conversely, when probes provide limited associative structure, inhibition appears to play a smaller role, consistent with the absence of trait–originality relationships in the SSC condition.

The trait-level analysis may help to interpret why specifically ASC was associated with reduced originality in responses to semantically rich probes. Autistic individuals are often described as detail-oriented and systematic thinkers (Happé & Frith, 2006; Happé & Vital, 2009), which may facilitate unconventional ideation. Prior work found that attention to detail correlated positively with originality in the AUT (Abu-Akel et al., 2020). In the current study, the *attention to patterns/details* dimension interacted with semantic richness and inhibition in a manner similar to the total AQ-S score (see Figs. 2 and 3). Individuals high in pattern/detail focus produced more original ideas for SSC probes than for RSC ones when inhibition was weak. One interpretation is that in the RSC condition, the strong associations interfered with *attention to details.* Thus, high-ASC participants could not use their preferred attentional processing style, attention to detail, to access remote ideas. Recent findings show that SSC probes in associative thinking spontaneously activate more remote associations than RSC probes (Koivisto & Toivanen, 2026). Therefore, one can assume that SSCs did not interfere to the same extent as RSCs with the ASC-associated detail-focused search for semantically remote ideas.

Analyses of total AQ scores did not support claims that ASC traits are associated with enhanced originality (Pennisi et al., 2021). However, trait-level analyses revealed that *switching* difficulties predicted higher originality. Because switching reflects problems in shifting attention between tasks or activities, this finding contrasts with classic models

(Guilford, 1967) that view cognitive flexibility, the ability to shift between representations or sets, as central to originality. One interpretation is that individuals with switching difficulties may become intensely absorbed in a single line of thought. Although this may reduce the breadth of ideas, such focused absorption could enhance the depth or uniqueness of certain responses.

Social norms may constrain autistic individuals less (Baron-Cohen et al., 2001), potentially supporting unconventional ideation. Nevertheless, we found no association between originality and the AQ-S social ability subscale, suggesting that social cognition was not directly related to originality in divergent thinking. However, poorer social abilities were associated with reduced fluency, perhaps reflecting motivational or other non-cognitive influences on idea generation. We also replicated prior findings (Stolte et al., 2022) showing that *imagination* difficulties are linked to lower originality. Notably, low-inhibition participants maintained high originality for SSC probes regardless of imagination scores, indicating that disinhibition can compensate for some cognitive challenges under specific conditions.

Although ASC was related to fewer original responses to RSC probes, the creativity of responses, rated by independent judges, did not depend on ASC. Creativity ratings incorporated not only originality but also appropriateness or usefulness (Runco & Jaeger, 2012). Thus, despite being less original, the responses of individuals high in ASC traits were not judged as less creative. Moreover, although responses to RSC probes generally were more frequent and less original than those to SSC probes (see also Beaty et al., 2023), they received higher overall creativity ratings. This may reflect the fact that mere semantic distance/originality does not guarantee creative quality; ideas also need to be useful or appropriate, which may be better supported by semantically rich neighborhoods and their connections to everyday practical associations. Also, the raters may have emphasized more the usefulness than the originality of the ideas.

Although we did not directly measure general cognitive ability, we used education level as a rough proxy. Because most participants were relatively highly educated, the results may not generalize to individuals with greater cognitive, linguistic, or communicative challenges. However, recruiting through Prolific allowed for a more socio-economically diverse sample than typical university participant pools (Bazelmans et al., 2024). Another limitation is that only one verbal divergent-thinking task was used, with a limited number of SSC and RSC probes, restricting generalizability. Future work should incorporate a broader range of semantic stimuli to better examine the interplay of inhibition, flexibility, and creativity in neurodivergence. Finally, inhibitory control is a heterogeneous construct (Hlavatá et al., 2018). It remains unclear how findings based on the go/no-go task generalize to other inhibitory tasks. For example, Stroop interference tasks index semantic inhibition and may be particularly informative for studying the relationship between creative thinking and semantics.

In conclusion, autistic traits interacted with inhibitory control and semantic richness to shape specific aspects of divergent thinking. These findings highlight that the creative performance of individuals high in autistic traits is context dependent: originality was reduced when semantically rich cues required the suppression of dominant associations—especially under weaker inhibition—but could be maintained or even enhanced when semantic cues were sparse and associative interference was low. This pattern aligns with major accounts of autistic cognition that emphasize differences in executive functioning, detail-focused processing, and context sensitivity. Without manipulating semantic richness or considering inhibition, such nuanced effects would likely remain undetected. Future research that systematically incorporates structural properties of task stimuli alongside individual differences in executive control may help reconcile inconsistencies in the literature and offer a more precise understanding of how neurodiverse cognitive profiles give rise to both strengths and challenges in creative thinking.

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CRediT authorship contribution statement

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Declaration of competing interest

We have no conflict of interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2026.113977.

Data availability

The data and R-scripts are available in OSF.io (manuscript includes the link)

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