Individual Differences in Object Imagery, Spatial Imagery, Verbal Skills, and Personality in Relation to Centrality of Positive and Negative Events

Ilayda E. Algin

Aylin Ayalp

Olesya Blazhenkova

Sabanci University, Turkey

Author Note

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Correspondence: Olesya Blazhenkova, Sabanci University, Faculty of Arts and Social Sciences Orta Mahalle, Üniversite Caddesi No:27, 34956 Istanbul, Turkey, olesya@sabanciuniv.edu

Highlights

- Individual differences in object imagery predicted positive event centrality
- Individual differences in verbal skills predicted positive event centrality
- Individual differences in spatial imagery did not predict event centrality
- Sex predicted negative event centrality
- Sex effect disappeared after controlling for neuroticism

Abstract

Event centrality refers to the extent to which an individual integrates a meaningful life event into their identity. Our study explored the relationships between different types of imagery, verbal skills, personality traits, and the centrality of autobiographical events. Object imagery and verbal skills predicted the centrality of positive events, which remained significant independent of sex and personality traits. These findings highlight the roles of object imagery and verbal skills in centrality of positive autobiographical events and suggest that both vivid pictorial representations and narrative construction of positive memories are crucial for their integration into one's self-concept. However, none of cognitive individual differences (object imagery, spatial imagery, and verbal skills) predicted centrality of negative events, which might be more influenced by other factors. Sex predicted centrality of negative events, with females reporting higher centrality than males. However, we observed the disappearance of the sex effect after controlling for neuroticism. Neuroticism seems to play a critical role in how negative experiences are processed and integrated into one’s self-concept, overshadowing direct effects of sex. Recognizing individual differences in imagery, verbal skills, and personality can enhance our understanding of autobiographical memory mechanisms and improve the effectiveness of psychological treatments, potentially increasing positive event centralization.

Keywords: Object imagery, spatial imagery, verbal skills, event centrality, autobiographical memory, individual differences, sex differences, personality.

1. Introduction

One major function of autobiographical memories is the construction of personal identity (Wilson & Ross, 2003). Current self-views influence the perception of a self in the past, while memories from the personal past influence current self-identity. Autobiographical memories may differ in their impact on identity construction; certain significant autobiographical events (e.g., finishing school or losing job) may be perceived as landmarks in the organization of other memories. This phenomenon, termed event centrality, refers to the extent to which an individual integrates a personally meaningful life event into their identity and self-concept (Rubin, 2020).

Autobiographical memory typically exhibits a bias towards positive events, which reinforces a positive self-view and perception of the past. This bias may be attributed to positive events aligning more easily with cultural life scripts (Berntsen & Rubin, 2004), and more frequently rehearsed (Walker, Skowronski, Gibbons, Vogl, & Ritchie, 2009), while negative memories fade more quickly (Walker, Vogl, & Thompson, 1997), and get suppressed (Anderson & Levy, 2009). Across cultures, people are inclined to conceptualize positive events as pivotal to their identity (Zaragoza Scherman, Salgado, Shao, & Berntsen, 2015). Positive event centrality is common among healthy individuals, and is associated with life satisfaction (Berntsen, Rubin, & Siegler, 2011). Negative event centrality is linked to post-traumatic stress disorder (PTSD) symptoms even when controlling for measures of anxiety, depression, and dissociation (Berntsen & Rubin, 2007), while therapy emphasizing trauma decentralization, can reduce PTSD symptoms (Boals & Murrell, 2010).

Stable individual differences were found for different aspects of people's autobiographical memories (Rubin, 2021), and were linked to other individual differences such as personality, cognitive skills, and psychopathology. Event centrality has been examined in

relation to various individual characteristics. Neuroticism was found to have both direct and indirect effect on negative event centrality (Fitzgerald, Berntsen, & Broadbridge, 2016). This personality trait contributes to the development of PTSD symptoms (Rubin, Boals, & Berntsen, 2008) by intensifying the emotionality, availability, and centrality of trauma memories (Ogle, Siegler, Beckham, & Rubin, 2017).

While imagery has been often considered in autobiographical memory literature (Butler, Rice, Wooldridge, & Rubin, 2016; Greenberg & Knowlton, 2014; Lenormand et al., 2024), the link between individual differences in imagery and event centrality has not been directly tested. Visual imagery is the ability to mentally simulate experiences or construct vivid representations of the world in the absence of direct sensory input. Imagery functions as an analogous "weak form" of sensory perception, experienced as seeing in the ‘minds’ eye’, and supported by the shared brain mechanisms with perception (Pearson, 2019). It is involved in remembering past events and allows us to re-construct and simulate visual experiences from autobiographical memories (Rubin & Umanath, 2015). The vividness of imagery as an individual trait has been positively linked with the severity of PTSD symptoms or intrusive memories and frequency of flashbacks (Morina, Leibold, & Ehring, 2013; Pearson & Krans, 2017). Mental imagery plays a role in bridging the initial experience of a traumatic event with its memory and subsequent intrusive recollections (Clark & Mackay, 2015). Involuntarily intrusive memories involving reexperiencing a traumatic event in a visually vivid and emotional way are clinical features of PTSD (Ehlers & Clark, 2000). Besides, imagery may amplify pathological emotion, such as anxiety or mood instability in bipolar disorder (Holmes, Geddes, Colom, & Goodwin, 2008). Imagery, combined with self-relevance and involvement of self-concept in a particular event, significantly contributes to long-term episodic recall (Lenormand, Fauvel, & Piolino, 2024).

Visual imagery, however, is not a unitary phenomenon but comprises object and spatial dimensions (Kozhevnikov & Blazhenkova, 2013), which were suggested to play differential roles in autobiographical memories (Aydin, 2018).

1.1. Individual differences in object vs. spatial imagery

Object imagery refers to mental representation and processing pictorial high-resolution object properties in terms of color, shape, vividness, and texture. *Spatial imagery* refers to the representation and processing of spatial locations, relationships among different positions in space, movements or manipulations (Blazhenkova & Kozhevnikov, 2009). The distinction between object and spatial dimensions of visual imagery was supported by the dissociation between ventral and dorsal cortical pathways (Farah, Hammond, Levine, & Calvanio, 1988; Mazard, Tzourio-Mazoyer, Crivello, Mazoyer, & Mellet, 2004).

This dissociation was also observed in individual differences of processing visual information. Based on neuroscience and neuropsychological evidence, a new Object-Spatial-Verbal model of cognitive style (Kozhevnikov, Kosslyn, & Shephard, 2005) separately considered object and spatial visualization, in addition to the verbal dimension. It demonstrated better data fit (Blazhenkova & Kozhevnikov, 2009) than the traditional visual-verbal model of cognitive style (Paivio, 1991). Individuals proficient in object imagery are not necessarily proficient in spatial imagery, and vice versa. Object and spatial visual imagery have distinct cognitive correlates.

Vividness of *object imagery* experiences was related to better perceptual and memory skills, such as the ability to identify incomplete or obscured objects (Wallace, 1990), detect salient changes (Rodway, Gillies, & Schepman, 2006), or remember pictorial details (Marks,

1973). Vividness of imagery may serve as an index of availability of long-term sensory traces, facilitating access to long-term memories (D'Angiulli, Runge, Faulkner, Zakizadeh, Chan, & Morcos, 2013). Aydin (2018) found that visual object imagery related to experience of sensory-perceptual details, coherent story-like format, and emotional intensity. Cooper and Ritchey (2022) reported the link between subjective memory vividness and memory for gist information and remembering specific perceptual details. Individuals with high object imagery generated more involuntary and voluntary autobiographical memories with more sensory detail and faster retrieval times than those with low object imagery (Vannucci, Pelagatti, Chiorri, & Mazzoni, 2016). Individuals with hyperphantasia (extremely high object imagery) reported elevated autobiographical memory, whereas individuals with aphantasia (absence of visual imagery) exhibited deficits in autobiographical memory (Zeman, 2024). Individuals with severely deficient autobiographical memory reported poor visual imagery (Palombo, Alain, Soderlund, Khuu, & Levine, 2015). Notably, the difference between aphantasics and non-aphantasics is evident beyond autobiographical memory, indicating the role in visual object imagery in supporting different memory components (Monzel, Vetterlein, & Reuter, 2022).

Spatial imagery was found to be associated with better spatial working memory, spatial executive control (Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001), and successful performance in STEM (Science, Technology, Engineering, and Mathematics) disciplines (Kozhevnikov, Blazhenkova, & Becker, 2010). However, spatial imagery has been mostly studied in terms of task performance and less commonly in terms of subjective imagery experiences, which often were found to be unrelated to each other (McAvinue & Robertson, 2007; Poltrock & Brown, 1984; but see Blazhenkova, 2016; Dean, & Morris, 2003). It remains a relatively less explored dimension in autobiographical research; only a few studies addressed

spatial imagery skills in this context, yielding mixed results. Aydin (2018) reported that spatial imagery had a unique role in episodic specificity and facilitates the retrieval of event context. Fan, Abdi, and Levine (2021) found that autobiographical episodic memory abilities and spatial navigation involve separate mental processes, whereas autobiographical memory overlapped with object imagery, spatial navigation and reinstatement of geographic locations overlapped with spatial imagery. Clark and Maguire (2020) described the differences in cognitive constructs assessed by measures of autobiographical memory and navigational skills. Overall, these studies suggest that while some aspects of spatial imagery may contribute to autobiographical memory, others might be unrelated.

1.2. Our research

The present study explores the relationships between event centrality and cognitive individual differences while considering the emotional valence of the events. Specifically, we focus on individual differences in object and spatial visual imagery in relation to positive and negative event centrality.

Previous research reported significant sex differences in imagery, event centrality, emotional processing and other related measures. Females generally outperform males in object imagery, while males excel in spatial imagery (Blazhenkova & Kozhevnikov, 2009; Voyer, Voyer, & Bryden, 1995). Females rate their most vivid memories higher in vividness, emotional intensity, and personal importance (Niedzwienska, 2003), and they have greater accessibility to emotional memories, regardless of valence (Davis, 1999). Females are more likely than males to consider negative events central to their identity (Boals, 2010) and are significantly more prone

to developing PTSD after a traumatic event (Tolin & Foa, 2006). Therefore, we included sex as an additional factor in our study.

Moreover, we considered the verbal dimension of the Object-Spatial-Verbal model (Blazhenkova & Kozhevnikov, 2009). As previous studies suggested that verbal narratives are an important part of autobiographical memories (Crespo, & Fernandez-Lansac, 2016), and conversational narration plays role in constructing self-event relations (Pasupathi, & Weeks, 2011), better skills in articulating and narrating experiences can lead to a more detailed and coherent integration of events into one's life story. Thus, we expected that individuals with stronger verbal skills exhibit higher event centrality.

To summarize, we predicted a positive link between object imagery and event centrality since sensory-perception details and vividness of object imagery may contribute to enhancing recall and could be involved in the centralization of that salient experience onto one’s identity. We also expected a positive, though, weaker link between spatial imagery and event centrality, as at least some aspects of spatial imagery were previously found to be involved in autobiographical memories. Possibly, individuals with strong spatial imagery represent events involving physical spaces and spatial relationships as more central to their personal narratives. Since most previous studies have mainly focused on the centrality of traumatic negative experiences, we did not have specific predictions regarding the differences between negative and positive centrality, keeping this aspect of the study exploratory.

2. Method

2.1. Participants

The participants were 94 university students (57 females, 37 males, 0 other, mean age 21.72). They got course credit as compensation for their participation. All participants received informed consent.

2.2. Assessments and Measures

2.2.1. Object-Spatial Imagery and Verbal Questionnaire (OSIVQ). OSIVQ (Blazhenkova & Kozhevnikov, 2009) is a self-report instrument measuring individual differences in object imagery, spatial imagery and verbal cognitive styles. Participants rated their agreement with 45 statements assessing object (color and pictorial detail), spatial (spatial relations and transformations), and verbal (language) information processing.

2.2.2. Centrality of Events Scale (CES). CES is a self-report questionnaire that measures the extent to which a memory for a significant life event is integrated in personal identity. The original CES (Berntsen & Rubin, 2006) assesses the centrality of the most stressful or traumatic events. We used the valenced version of 7-item CES (Broadbridge, 2018), assessing both positive and negative event centrality (e.g., "This event has become a *(positive/ negative)* reference point for the way I understand myself and the world").

2.2.3. Phenomenological Characteristics of Autobiographical Events. We selected 5 items from Aydin (2018) to assess phenomenological characteristics of memories such as emotional and perceptual experiences related to the event (Table 1). Such items tap diverse phenomenological characteristics; therefore, they are typically analyzed individually without computing composite scale scores.

2.2.4. Big Five Inventory-10 (BFI-10). BFI-10 is a self-report questionnaire to assess the five major dimensions of personality: openness, conscientiousness, extraversion, agreeableness, and neuroticism (Rammstedt & John, 2007**)**. This shortened version of the original Big Five Inventory consists of 10 statements, with 2 items per personality trait (e.g., "I see myself as someone who … gets nervous easily").

2.3. Procedure

Participants were administered the study via Qualtrics survey. First, participants completed demographics and personality questions, OSIVQ, then they answered questions related to one positive and one negative event. The questions related to the same event appeared in a block, which started with the following instruction: "Think about a *(positive/ negative)* significant life event that you have experienced in the past". Then, on the next page, participants were asked to answer the questions in relation to this event. Within each block, Phenomenological Characteristics questions were followed by CES questions. The order of positive and negative blocks was randomized, and the order of items was randomized within each questionnaire (OSIVQ, Phenomenological Characteristics, and CES). For all these questionnaires, participants rated their agreement with statements on a 5-point scale.

3. Results

3.1. Centrality of Events and Individual Differences

CES-positive and CES-negative as well as OSIVQ object, spatial, and verbal scores were computed by averaging the items for each scale. The reliability was acceptable for both positive (Cronbach's α = .84) and negative (Cronbach's α = .89) CES scales. The reliability was

acceptable for OSIVQ object (Cronbach's α = .83) and verbal (Cronbach's α = .74) scales, but questionable for spatial (Cronbach's α = .61) scale.

A Multivariate Analysis (Pillai's Trace) was conducted to predict positive and negative event centrality based on object imagery, spatial imagery and verbal skills. Additionally, sex (male, female) was added as a factor. The results revealed a significant positive effects of object imagery, $F(2, 88) = .627$, $p = .031$, $\eta_p^2 = .076$, and verbal skills, $F(2, 88) = 6.197$, $p = .003$, $\eta_p^2 = .123$, while sex effect was only trending ($p = .078$), and spatial imagery effect was absent ($p = .735$). *Object imagery* predicted the centrality of *positive* events, $F(1, 89) = 4.648$, $p = .034$, $\eta_p^2 = .050$. *Verbal skills* predicted the centrality of *positive* events, $F(1, 89) = 12.386$, $p = .001$, $\eta_p^2 = .122$. None of the cognitive style assessments (object imagery, spatial imagery, or verbal skills) predicted the centrality of *negative* events, whereas *sex* did so, $F(1, 89) = 4.767$, $p = .032$, $\eta_p^2 = .051$. Females scored higher than males on CES-negative, $p = .032$. When sex was removed from the model, both object imagery, $F(1, 90) = 5.877$, $p = .017$, $\eta_p^2 = .061$, and verbal skills, $F(1, 90) = 12.579$, $p = .001$, $\eta_p^2 = .123$, remained significant predictors of positive event centrality.

When Big-5 personality traits were added as additional predictors, then again, both object imagery, $F(1, 84) = 5.253$, $p = .024$, $\eta_p^2 = .059$, and verbal skills, $F(1, 84) = 5.408$, $p = .022$, $\eta_p^2 = .060$, remained significant predictors of positive event centrality, however, sex did not any longer predict negative centrality, $p = .251$. Neuroticism positively predicted negative centrality, $F(1, 84) = 9.612$, $p = .003$, $\eta_p^2 = .103$. Conscientiousness negatively predicted negative centrality, $F(1, 84) = 4.480$, $p = .037$, $\eta_p^2 = .051$, but positively predicted positive centrality, $F(1, 84) = 8.397$, $p = .005$, $\eta_p^2 = .091$.

When we included only conscientiousness, it, again, negatively predicted CES-negative, $F(1, 89) = 5.523$, $p = .021$, $\eta_p^2 = .058$, and positively predicted CES-positive $F(1, 89) = 8.520$, p

= .004, η_p^2 = .087, while object imagery, $F(1, 89) = 6.544$, $p = .012$, η_p^2 = .068, and verbal skills, $F(1, 89) = 9.744$, $p = .002$, η_p^2 = .099, predicted positive event centrality, and sex, $F(1, 89) = 5.985$, $p = .016$, η_p^2 = .063, remained significant predictor of negative centrality. However, when we instead included neuroticism, it predicted CES-negative, $F(1, 89) = 9.031$, $p = .003$, η_p^2 = .092, object imagery, $F(1, 89) = 4.703$, $p = .033$, η_p^2 = .092, and verbal skills, $F(1, 89) = 12.821$, $p = .001$, η_p^2 = .126, remained significant predictors of positive event centrality, however, sex effect became insignificant, $p = .376$. Partial Correlations controlling for neuroticism demonstrated that the correlation between CES-negative and sex was no longer significant (r = .064, $p = .540$). This suggests that the initial correlation between CES-negative and sex (r = .224, $p = .030$) can be accounted for by neuroticism.

Participants scored higher on CES-positive than on CES-negative, $t(93) = 4.79$, $p<.001$, and these scales were uncorrelated (r = .056, $p = .591$). Neuroticism was negatively related to spatial imagery (r = -.347, $p<.001$). Extraversion correlated with verbal skills (r = .356, $p<.001$) and marginally with object imagery (r = .176, $p = .089$). Conscientiousness marginally correlated with verbal skills (r = .173, $p = .095$). There was a positive correlation between Conscientiousness and Agreeableness (r = .259, $p = .012$), marginal positive correlation between Extraversion and Openness (r = .185, $p = .074$), as well as negative correlations between Neuroticism and Extraversion (r = -.271, $p = .008$), Neuroticism and Conscientiousness (r = -.205, $p = .048$), as well as Neuroticism and Agreeableness (r = -.313, $p = .002$).

3.2. Phenomenological Characteristics of the Centralized Memories

To examine the relationship between Phenomenological Characteristics, OSIVQ and CES, Pearson Correlations were computed separately for each item (Table 1). Only object

imagery scale yielded significant correlations with both phenomenological characteristics of items related to both positive and negative events. Overall, correlations of phenomenological characteristics with object imagery were somewhat more pronounced for positive events. Phenomenological characteristics were also correlated with CES ratings mostly for positive events, and mostly when referring to the same event. CES-negative was correlated only with emotion and relieving phenomenological ratings. Emotional intensity ratings were correlated with object imagery regardless of the event valence. Pairwise t-test comparisons revealed no significant differences between phenomenological characteristics related to negative vs. positive events (only intensity of emotions ratings tended to be higher for negative events, $p = .079$).

Table 1

Pearson's Correlations between Phenomenological Characteristics*, OSIVQ, and CES scales*

Phenomenological Characteristics / Event valence (+ positive, - negative)		**OSIVQ Object**	**OSIVQ Spatial**	**OSIVQ Verbal**	**CES Positive**	**CES Negative**
1. My memory/thought for this event involves visual details.	+	.473**	-.101	.104	.205*	-.137
	-	.298**	-.065	.012	.035	.167
2. The event comes to me as a coherent story not as isolated scenes.	+	.114	-.001	.171	.238*	-.098
	-	.021	.085	.158	.120	.017
3. The intensity of my emotions regarding this event is very intense.	+	.251*	-.057	.120	.306**	.139
	-	.230*	-.138	.112	.269**	.313**
4. While I remember the event, I feel as though I am reliving it.	+	.306**	-.104	.102	.230*	-.042
	-	.165	-.202	.108	.182	.338**
5. As I remember the event, I feel as though I see the event as an outside observer.	+	.035	.053	-.045	.030	.146
	-	.187	-.061	.064	-.052	.074

Note. The *italicized* correlations were computed based on measures related to different events.

** $p < .001$ (two-tailed), * $p < .05$ (two-tailed).

3.3. Sex differences

Independent samples t-test (two-tailed) revealed that females scored significantly higher than males on OSIVQ-object, $t(92) = 2.73$, $p = .008$, but they were significantly lower on OSIVQ-spatial $t(92) = -3.583$, $p<.001$, whereas no sex difference was observed on OSIVQ-verbal, $p = .340$. This is consistent with previous findings (Blazhenkova & Kozhevnikov, 2009), favoring females in object imagery, but favoring males in spatial imagery.

Females had higher phenomenological experiences' ratings than males on two items, related to *negative* event: 'My memory/thought for this event involves visual details', $t(92) = 2.12$, $p = .037$, and 'The intensity of my emotions regarding this event is very intense', $t(65.213) = 2.65$, $p = .01$. Consistent with other studies, our findings indicate that females have superior visual pictorial and emotional processing, which is even more pronounced for negative experiences.

Females scored higher than males on Neuroticism, $t(92) = 4.82$, $p<.001$, and Agreeableness, $t(92) = 2.57$, $p = .01$. This aligns with previous findings that neuroticism exhibits the largest sex differences across cultures (Schmitt, Realo, Voracek, & Allik, 2008).

4. Conclusions

The present study explored the relationships between object and spatial imagery, verbal skills and the centrality of positive and negative autobiographical events. Our findings revealed that object imagery and verbal skills predicted centrality of positive events, whereas spatial imagery did not predict either positive or negative event centrality. Individuals with higher object imagery and verbal abilities were more likely to consider positive events central to their identity. Therefore, both vivid pictorial representations and narrative construction may play a role in

integration of autobiographical memories into one's self-concept. Our research highlights the differential effects of imagery and verbal skills as well as sex and personality on positive vs. negative event centrality.

5. Discussion

5.1. Object Imagery and Verbal Ability in Relation to Event Centrality

Object imagery predicted event centrality, supporting its role in augmenting the vividness and accessibility of autobiographical memories (Aydin, 2018). The vividness and sensory-perceptual richness likely contribute to the enhanced centrality of events, making them more memorable and easier to integrate into one's identity. Besides, object imagery was linked to emotional processing (see also Blazhenkova & Kozhevnikov, 2010), which influences long-term memory consolidation and recall (McGaugh, 2004). Previous studies also demonstrated the association between event centrality and emotional intensity (Boals, 2010). Distinctive and emotional events are typically more accessible, vividly remembered, and more likely to become central to one's life story and identity (Fitzgerald et al., 2016). Future research is needed to disentangle the roles of emotion and object imagery in forming event centrality.

Verbal skills also predicted event centrality. The ability to create coherent narratives might facilitate the organization and integration of autobiographical memories by allowing individuals to articulate and reflect on their experiences. Storytelling and linguistic narratives play role in shaping self-concept and life story (McLean, Pasupathi, & Pals, 2007), and verbal techniques like expressive writing have been effective in trauma-related disorders **(**van Emmerik, Reijntjes, & Kamphuis, 2013). Verbalizing of events may enhance the perceived centrality by reinforcing their significance through narrative construction and elaboration.

5.1.1. Positive vs. negative centrality

Our study assessed both positive and negative event centrality, unlike previous research that focused mainly on traumatic events. The intriguing finding is that individual differences in object imagery and verbal skills were linked only to *positive* event centrality. This effect was somewhat greater for verbal skills potentially due to their larger role in structuring autobiographical memories or more frequent verbal rehearsal of positive events during social interactions. Imagery and verbal skills did not predict negative centrality. The finding of only positive centrality effects could be due to our sample of university students, who may have a higher socio-economic status and fewer negative life experiences compared to the general population. Also, possibly, centralization of negative rather than positive events could be less prone to individual differences in cognitive skills. The differential impact of cognitive skills on positive and negative event centrality may reflect complex interactions with other factors (e.g., encoding vs. retrieval memory stage, voluntary vs. involuntary processing etc.) that play role when negative experiences are integrated into one's identity. For example, sensory richness and emotional distinctiveness may influence the encoding and retrieval of both positive and negative events. Verbal skills may play a greater role during retrieval than encoding, especially for positive memories, as they are more voluntarily accessible. Previous research showed that emotional stress during encoding affects voluntary and involuntary recall accessibility, but voluntary memories tend to have higher narrative content and vividness (Hall & Berntsen, 2008**)**. Since positive memories are more easily recalled voluntarily and negative memories become suppressed (Brewin, 2014), we may observe greater connection between visual imagery and verbal cognitive skills with positive event centrality.

Furthermore, object imagery and verbal ability may jointly enhance memory and reflective processing, and subsequently influence event centrality. While verbal and imagery cognition involve distinct systems, they are interconnected, therefore combining verbal and imagery codes can facilitate memory (Paivio, 1991). Linguistic narratives can support processing and integrating memories of visual experiences, while vivid pictorial representations can support verbal representation of life stories. Visual and verbal processing may also interact. Previous research showed that long-term memory has a massive capacity to store visual information preserving feature-based details but is conceptually structured (Konkle, Brady, Alvarez, & Oliva, 2010). Memory generalization can occur at the expense of detailed recollection (Melega & Sheldon, 2023). Possibly, visually rich detailed memories may be differentially suppressed or supported by verbal skills depending on the emotional valence and stage of memory process, which have yet to be examined. More research is needed to understand the roles of object imagery and verbal skills in autobiographical memory formation and retrieval, and specifically their relative contributions and potential interactions in shaping negative and positive event centrality.

5.2. Spatial Imagery and Event Centrality

Contrary to our expectations, spatial imagery did not significantly predict event centrality, suggesting it plays a lesser role compared to object imagery. This may be because spatial imagery lacks the connection with emotion (Blazhenkova & Kozhevnikov, 2010), which consequently may reduce its effects on autobiographical memories. Notably, spatial imagery was negatively linked to neuroticism, indicating a potential protective function for centralizing

negative memories. Possibly, spatial imagery did not relate to event centrality, as it involves less metacognition and reflection than object imagery. As shown by Poltrock and Brown (1984), even though successful performance on spatial tests required maintenance of a high-quality image and efficient image transformation and inspection processes, subjective imagery vividness was unrelated to spatial test performance (but see Blazhenkova, 2016). Besides, spatial imagery may play a greater role during the encoding than during the retrieval.

One potential problem limiting our conclusions was relatively low reliability of spatial scale. Another limitation is that OSIVQ spatial scale primarily assesses small-scale visualization skills (mental rotation of 3D geometric figures, constructing from blocks, using schematic diagrams, interest in geometry or engineering specializations), and not large-scale spatial abilities, which are at least partially dissociated from small-scale spatial abilities (Hegarty, Burte, & Boone, 2018; Wang, Cohen, & Carr, 2014**)**. However, OSVIQ-spatial was connected to navigational skills but dissociated from object imagery and episodic memory **(**Fan et al., 2021). Clark, Hotchin, Monk, Pizzamiglio, Liefgreen, and Maguire (2019) suggested that navigation skills reflect more schematic spatial imagery and dissociated from autobiographical memory. There is a need for further studies to explore different facets of spatial ability, such as way-finding, orientation skills, sense of location, and vividness of spatial representations in relation to event centrality.

5.3. Phenomenological characteristics of the Centralized Memories

We found that phenomenological characteristics and event centrality were predominantly correlated when referring to the same events, consistent with reports that CES scores correlate with phenomenological descriptions of the target memory (Gehrt, Berntsen, Hoyle, & Rubin,

2018). Berntsen and Rubin (2008) explained positive relationship among various memory measures for the same event as indicating overall accessibility.

We observed positive associations between object imagery and phenomenological ratings related to visual details, perceptual strength, emotional intensity, and vividness of re-experiencing. This aligns with previous findings that object imagery enhances the sensory and emotional vividness of memories (Vannucci et al., 2016; Vannucci, Chiorri, & Marchetti, 2020). However, spatial imagery did not correlate with any of the phenomenological ratings. In part, this could be due to the absence of spatial items in our (and most other) phenomenological memory assessments. However, spatial imagery can be assessed using vividness questionnaires (Blazhenkova, 2016). There is a need for more comprehensive instruments to explore the possible link between event centrality and spatial phenomenological characteristics.

While object imagery was associated with both positive and negative experiences, it showed stronger associations with phenomenological characteristics for positive events. Possibly, object imagery mostly supports the integration of positive events into autobiographical memory due to psychological mechanisms that avoid vividly re-experiencing negative events.

5.4. Sex and Personality Differences

Sex was a significant predictor of the centrality of negative events, with females reporting higher centrality than males. This aligns with previous research showing that females, compared to males, are more likely to construct negative events as central to their identity (Boals, 2010), evaluate memories as more emotionally intense and personally important (Niedzwienska, 2003), exhibit higher levels of neuroticism (Schmitt et al., 2008), and develop PTSD (Olff, Draijer, Langeland, & Gersons, 2007). However, the effect of sex on the centrality of negative events

disappeared after controlling for neuroticism. This suggests that the differences between males and females in how they perceive negative events as central to their identity may be attributable to differences in neuroticism levels rather than sex per se. We also found a significant relationship between neuroticism and the centrality of negative events, consistent with studies showing that neuroticism influences the centralizing of traumatic events and the development of PTSD symptoms (Fitzgerald et al., 2016). Our results indicate that neuroticism plays a critical role in how negative experiences are processed and integrated into one's self-concept, potentially overshadowing direct effects of sex.

This research adds to the understanding of personality traits and their impact on event centrality. We found that conscientiousness and neuroticism traits were negatively correlated and had the opposite effects on negative and positive memories integration. Conscientiousness, characterized by being systematic, ordered, and aware, may enhance more healthy positive memory integration of memories into self-concept, protect against negative memory integration and PTSD (Broadbridge, 2018**)**, and potentially promote post-traumatic growth (Henson, Truchot, & Canevello, 2021)**.** Other studies showed that conscientiousness was linked to dispositional mindfulness, which negatively correlated with both PTSD symptoms (Hopwood & Schutte, 2017) and neuroticism (Hanley, 2016). Our study found that the impact of conscientiousness was smaller than that of neuroticism (consistent with Fitzgerald et al., 2016), while neuroticism played the most significant role in event centrality among all personality traits.

5.5. Implications

The present research contributes to a nuanced understanding of how different cognitive abilities influence the centrality of autobiographical memories. The results highlight the

importance of considering multiple dimensions of imagery and verbal processing as well as personality traits when studying identity formation and memory integration into self-concept. The finding that object imagery and verbal skills predict positive event centrality suggests that interventions enhancing these skills or increasing the reliance on these skills might increase the perceived centrality of positive events in individuals' lives. Recognizing individual differences in imagery and verbal skills can be valuable for selecting effective treatments for various mental disorders. Notably, visual and verbal experiences vary by disorder; for example, worry often manifests verbally, while PTSD symptoms are often visual, but both imagery-based and verbal techniques (e.g., imagery rescripting and writing) can be equally effective in treating trauma-related disorders and reducing intrusive memories (Rijkeboer, Daemen, Flipse, Bouwman, & Hagenaars, 2020). Future research should further explore the roles of different imagery facets in autobiographical memory and event centrality across diverse populations, including clinical samples. Understanding individual cognitive differences can improve the precision and effectiveness of psychological treatments, tailor the use of imagery and verbal-based techniques in therapy, potentially enhancing positive event centralization (Boals & Murrell, 2016). This can be relevant for the aiding positive centralization of events, or even, indirectly, negative centralization, as it may lead to post-traumatic growth (Barton, Boals, & Knowles, 2013). Clinical research should consider cognitive individual differences, as manipulating imagery and verbal representations holds promise for therapeutic interventions.

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