Psikiyatride Güncel Yaklaşımlar-Current Approaches in Psychiatry 2021; 13(3):605-618
doi: 10.18863/pgy.836486

Emotionality and Valence in Autobiographical Remembering

Duygu Yoğunluğu ve Duygu Değerliğinin Otobiyografik Hatırlamadaki Rolü

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Abstract

Current review focused on the effects of emotionality and valence of experienced events on their memorability and the phenomenology of remembering both in its theoretical context and in terms of empirical evidence. Different ways how remembering operates in post-traumatic stress disorder, flashbulb memories, and mood disorders are discussed using evidence from behavioral and neuroimaging studies. On the basis of the evidence, an integrated perspective is presented for future research on the relationship of autobiographical recollection with the emotional content and valence of events.

Keywords: Autobiographical memory, valence, arousal, emotion, psychological disorders

Öz

Bu derleme çalışması duygu yoğunluğu ve duygu değerliği gibi duygu bileşenlerinin olayların erişilebilirliği ve hatırlama özellikleri çerçevesinde teorik yaklaşımlar ve ampirik bulgular ışığında değerlendirmeye odaklanmaktadır. Bu bağlamda farklı otobiyografik belleğin fenomenolojik özellikleri dışında flaş bellek, travma sonrası stres bozukluğu ve duygudurum bozuklukları ele alınmakta ve duygu bileşenlerinin etkisi davranışsal ve beyin görüntüleme çalışmaları çerçevesinde tartışılmaktadır. Literatürdeki bulgulardan yola çıkarak gelecek çalışmalar için yoğunluk ve değerlik gibi duygu bileşenlerinin otobiyografik hatırlamadaki rolünü açıklayabilecek alternatif bütüncül bir yaklaşım önerilmektedir.

Anahtar sözcükler: Otobiyografik hatırlama, duygu yoğunluğu, duygu değerliği, duygu, duygudurum sorunları

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Received: 07.12.2020 | Accepted: 06.03.2021 | Published online: 03.06.2021

AUTOBIOGRAPHICAL memory refers basically to memory for the events in an individual's life. It has been considered as a multimodal representation of experiences typically including various sensory (i.e. visual, auditory, olfactory) as well as spatial, temporal, emotional, and narrative features (Rubin 2005). More than one psychological mechanism are involved in autobiographical remembering such as self-representations, expectations and goals, and higher order control mechanisms, all of which dynamically interact in the organization of autobiographical memory (Conway 2005, Holland and Kensinger 2010).

When we look back to our past, some memories are on the spot, but for some we need to put much effort to retrieve specific details. At times, a search process is not required, and we remember past experiences involuntarily. Memories may differ in terms of a number of qualitative characteristics, as well. Some memories are remembered with greater sensory and perceptual detail, as if they were recurring whereas others seem as vague happenings. In addition, affective features, such as intensity and valence, importance, consequentiality, self-relevance, and the frequency of rehearsal constitute the qualitative characteristics that are involved in the representation of autobiographical memories. Accordingly, previous research demonstrated supporting evidence that not all memories are remembered with equal ease or with the same phenomenological quality (Bertnsen and Rubin 2002, D'Argembeau et al. 2003, Talarico et al. 2004).

Affective quality has been widely investigated as a primary factor influencing the encoding and retrieval of personal experiences. Despite the variability regarding valence-specific or intensity-specific changes, in general, findings consistently revealed that emotional memories are better remembered than the neutral memories (Buchanan 2007). Conceiving upon this, current discussion focuses on various explanations proposed to account for the interactions between emotion and autobiographical memory.

Emotion in autobiographical remembering

It was previously demonstrated that degree of arousal associated with the event influence the amount and type of detail that is remembered, (Christianson 1992, Wessel and Merckelback 1994). Tunnel memory phenomenon (Safer et al. 1998) was proposed to explain for the findings, which overall suggested that highly emotional events are remembered with more central (event-related, episodic) rather than peripheral details. Emotional arousal was found to improve the qualitatively, as well. Highly arousing memories, irrespective of the valence, were rater higher on the majority of memory characteristics, such as recollection, vividness, sensory features, and rehearsal (Talarico et al. 2004). Heightened attention, preattentive processing, and post event elaboration signal the significance of the event, which may further guide the individual, not only to attend for the gist information, but also to retain a richer representation for the highly intense experience (Christianson 1992).

As also suggested previously, emotional arousal has major survival value, therefore, emotional intensity associated with the experience favors the information useful for the organism. Also this type of information tends to be preferentially retained to be accessed easily. When we say "survival value", it may connote potential threats, actually, most of

the time it does, any condition, positive or negative, may have survival value. Also, as will be discussed later in more detail, individuals strive for more higher-order, self-relevant instrumental or hedonic goals. Therefore, actual or expected intensity in a particular condition may bias memory for what will be remembered and how it will be remembered (Levine 2002, Conway 2005, Levine and Edelstein 2009).

Neuroscientific research provided concurrent evidence for arousal linked memory enhancement. Despite autobiographical memory processes are represented in a diverse neural network (Greenberg et al. 2005, Cabeza and St Jacques 2007), the role of amygdala has been emphasized for the affective valuation of cues in order significant details encoded and reactivated (Markowitsch and Staniloiu 2011). After all, the role of amygdala has been implicated in emotional memory with its dense connections to sensory, temporal, and frontal cortices (Cole et al. 2010). To briefly reiterate, when amygdala receives the sensory information, engages in automatic or conscious appraisal processes and selects the details that are more significant for the individual and the context, which makes more details more memorable, but not others (McGaugh 2013). Confirming evidence was reported in lesion studies that damage to amygdala impaired only for memory for central, gist related information but peripheral details (Adolphs et al. 2005).

As Phelps and Sharot (2005) discussed in detail, arousal driven amygdala activity is not only linked to enhanced recall of sensory-perceptual details, but also boosts sense of recollection and confidence when recalling emotional memories. The functional role of this mechanism was explained that memories that are remembered with greater sense of accuracy and vividness are also highly accessible, which in turn, facilitated rapid decision making even in ambiguous situations. Therefore, in general, it is an adaptive mechanism of the organism to hold better memories of intense events, especially the most crucial details for the ease of subsequent access.

It is important to note that in a series of studies Berntsen (2002) the moderating role of valence on arousal such that greater central, than peripheral details were reported only for highly arousing negative but not highly arousing positive memories, behavioral and neural evidence suggested that memory experience is more likely to be mediated by emotional intensity. Observed differences regarding conflicting findings proposed by Berntsen (2002) and Talarico et al. (2004) could be best explained by the methodological differences such that asking about specific emotions may be somewhat problematic due to the different levels of arousal associated with each emotion. More specifically, Berntsen (2002) compared happy memories to shocking ones, for which the latter case is likely to trigger higher arousal. On the other hand, Talarico et al. (2004) compared memories reported in response to 20 high- and low-intensity emotion words. Not all emotion words represent pure emotional states (i.e. guilt, embarrassment, satisfaction) but likely to involve a variety of appraisals which may trigger different levels of emotional intensity. However, they concluded based on the comparison of happy and anger-related memories. Although, anger has been associated with rapid and intense arousal, at least, they are considered as basic emotions, which are more comparable. Overall, current knowledge suggested that arousal enhances memory

for significant details, sense of recollection, and accessibility of autobiographical memories, however, in addition to physiology of emotions, cognitive elements of emotion or the appraisals may differentially influence the phenomenology of remembering.

What about intensity? Arousal and flashbulb memories

In addition to personal experiences, affective characteristics have been investigated extensively in public events, especially with respect to the concept of flashbulb memory. Brown and Kulik (1982) termed flashbulb memory referring to extremely vivid and detailed recollection for the time when they first heard about very emotional and consequential public events. They suggested that flashbulb memories are different than other emotional and significant memories and there exists a specific neural mechanism triggered with such extremely intense events, which results in such "live quality" memories. To date, a number of studies have examined memories for flashbulb events such as September 9/11 terrorist attacks (Fivush et al. 2003, Tekcan et al. 2003, Talarico and Rubin 2003) natural disasters (Neisser et al. 1996, Er 2003), or events with world-wide effects (Bohannon et al. 2007, Bohn and Berntsen 2007). Findings reported in these studies were in line with the Brown and Kulik's (1982) proposal that individuals reported high levels of vividness, coherence and confidence for memories of flashbulb events, and emotional valence and intensity tended to be preserved.

Inconsistency in memory qualities has been reported for flashbulb events. Neisser and Harsch (1992) tested memories for the explosion of Challenger space shuttle with a 30-month interval, which revealed significant decreases in intensity and accuracy ratings between two assessments. In a subsequent study, Neisser and colleagues (1996) tested memories for the Loma Prieta earthquake in a sample of individuals who directly experienced, had relatives directly experienced, or had no such connection. They emphasized the role of personal relevance, rather than the arousal, such that as the individuals' personal involvement increased they tended to report more consistent memories. Further research (Talarico and Rubin 2003, 2007) compared 9/11 attacks and an ordinary event, and demonstrated that despite high ratings of emotionality, significant decreases were observed over time. Also, in line with previous research (Rubin and Kozin 1984, Thomsen and Berntsen 2003), recollective experience and confidence remained relatively stable even over long delays and distinguished flashbulb and everyday events.

Although there has been an ongoing debate on what specifically characterizes flashbulb memory, a more integrative approach would be to consider factors that preserve the vividness and confidence ratings. As Talarico and Rubin (2007) argued, flashbulb memories are one-shot memories, therefore, what is encoded at the time of *reception*, correct or not, is very likely to be retained. It may not be the event itself that dictates a distinct memory form as flashbulb memory, but rather enhanced functions of the perceptual-attention network operating at the time of encoding may account for that strong sense of recollection, as it does for personal memories.

Considering Valence Effects with Arousal

Although arousal has been argued to be a better predictor of memory experience (Talarico et al. 2004, Ford et al. 2012), mnemonic effects of valence, mostly favoring positive events has been demonstrated in several studies. In general, a memory enhancement effect has been observed positive events compared to the negatives, in terms of, accessibility (Walker et al. 2003), the amount of peripheral (Berntsen 2002) and contextual (D'Argembeau et al. 2003, Kensinger and Schacter 2006), vividness and reliving (Talarico et al. 2004, Rasmussen and Berntsen 2013). In addition, positive memories tended to be dated more recent than the recent memories (Berntsen 2002, Berntsen and Rubin 2006a, Rasmussen and Berntsen 2009).

Evidence has been less consistent regarding rehearsal. Compared to negative memories, higher rates of voluntary (Rasmussen and Berntsen 2009, 2013), as well as, involuntary rehearsal were reported for positive, than negative memories (Berntsen 1998, Berntsen and Hall 2004). In addition to studies demonstrating the reverse pattern for voluntary memories (D'Argembeau and Comblain 2005, Berntsen and Rubin 2006b) and voluntary memories (Rasmussen and Berntsen 2009), some studies reported null effects for valence in the frequency of involuntary memories (Johannessen and Berntsen 2010, Rasmussen and Berntsen 2013). The way they asked for the frequency may be one potential reason underlying the contrasting findings. Some of them used sampling with the diary method (Berntsen 1998, Berntsen and Hall 2004, Johannessen and Berntsen 2010) whereas the others directly asked for valenced memories and compared the retrospective ratings. Therefore, since online ratings were collected without no effect of accessibility bias (at least to a lesser degree), it is more likely that former method reflects the natural patterns for the frequency of rehearsal.

Positivity bias in autobiographical remembering

Several mechanisms have been proposed to account for the enhanced remembering of positive experiences.

Fading affect bias

Fading affect bias (Walker et al. 2003) has been one of the most influential explanation, referring to the observed notion that negative affect disappears or fades out more rapidly than positive affect, has been one of the most Therefore, when we look back to our past, we tend to remember greater number of positive than negative memories (Walker et al. 2003, Ritchie et al. 2006). The trend for positivity was maintained even when event intensity was controlled such that although emotional intensity tends to decrease gradually by the time for both negative and positive memories, the decay is faster for the negatives (Walker et al. 2009). Habermas and Berger (2011) showed concurrent evidence regarding the narrative structure; in that, compared to positives, negative events tended to be narrated in a more condensed and distanced manner over time.

Social sharing and personal importance was found to interact with the event valence, such that, sharing of negative experiences facilitated the fading of negative affect whereas

for positive events, affect was even more strengthened and remained more stable. On the contrary, affective intensity associated with personally important events tended to decrease slower and this effect was more salient for negative memories (Ritchie et al. 2006). One possible explanation could be that highly important events are very likely to reflect current goals of the individuals, thus, associated with high levels of affect despite the passage of time.

Levels of processing explanation

Potential implications of affective priming of how the event-related information is processed constitute the main premise of this explanation. In general, positive affect associated with the event may facilitate relational-cognitive processing, which results in enhanced attention for related peripheral details and interpretive processing of conceptual information details (Clore and Storbeck 2006). Accordingly, more event elaboration is possible regarding the events, allowing for better integration of the event into the relational network. On the other hand, negative affect signals threat, and individuals tend to engage in stimulus bound, referential processing. It is actually similar to the *tunnel memory phenomenon*, as discussed above. This type of referential processing favors particular details over the others, limiting the information available at the time of encoding, therefore, at the retrieval.

Both fading affect bias and levels of processing accounts may explain intensity and positivity related biases in autobiographical remembering, they fall short of accounting for combined effects of arousal, valence and personal significance (Ritchie et al. 2006, Kensinger and Schachter 2006). In their recent review, Holland and Kensinger (2010) suggested that arousal may influence negative and positive memories in different ways. Negative affect trigger referential processing focused on specific details, since negativity, as well as, arousal signal potential threats to the organism, however, for high levels of arousal associated with positive events do not need to call for such threat-oriented processing. Accordingly, strong memory traces for negative, significant events, specificity, and ease of access may have particular function for the individual, which is somehow reinforced, and retains its functional quality (Rasmussen and Berntsen 2009).

Potential functions of memories: considering emotionality and valence

Potential functions that autobiographical memories served have been emphasized since past ten years. Three major functions were proposed as self, social, and directive. A single memory is not necessarily associated with only one of the functions, but rather, may serve any of them with varying degrees (Bluck et al. 2005, Harris et al. 2013). Self-function mainly serves the individual's sense of continuity, holding a coherent view of life-story, representing significant goals and expectations and defining features of identity (Bluck and Habermas 2000, Conway 2005, Bluck et al. 2005). Social-function becomes more remarkable especially when sharing of autobiographical memories. In that sense, they are involved in social bonding, regulating interpersonal experiences, and giving or receiving support (Alea and Bluck 2003, 2007). Directive functions, on the other hand, represent more action-oriented states, serving either

instrumental or self-relevant goals. As Pillemer (2003) argued they may have substantial value in pursuing survival goals, guiding future behavior, and decision making.

Building upon this framework, Rasmussen and Berntsen (2009) argued that events with different affective value may predominantly serve specific functions. Considering individuals as motivated to hold a positive self-schema (Taylor and Brown 1988), self-functions are more salient in positive memories. Rich contextual, relational details represented in positive memories (Walker et al. 2003) allow the individual to develop or update self-schemas. Positive memories also involve social-functions, facilitating greater elaboration of social relationships, motivation for social bonding, and long-term adaptation. On the other hand, negative memories have substantial directive function, such that, the ease of accessibility of central details in these memories provides the means for learning from past mistakes, which are further utilized for rapid decision making. Overall, whereas negative memories have more directive and instrumental value, positive memories serve to maintain a "positive illusion of life" (pg. 480, Rasmussen and Berntsen 2009).

Empirical investigation of this functional approach provided confirming evidence. In the first study, individuals reported memories having served self, social, or directive functions. In the second study, most, positive and negative memories were coded for the functions they served. In general, findings were in line with expectations with positive memories were associated with social- and self-functions, tended to relived with high ratings of vividness, reliving, and coherence whereas negative memories served directive-function, retrieved in shorter time and less effort (Rasmussen and Berntsen 2009).

Since the functional approach to the link between emotion and memory has been relatively new, few studies were conducted to expand on this view. However, we could also look through reminiscence bump studies from this functional approach. The term reminiscence bump refers to the consistent observation that adults over 40 years age tend to retrieve significantly greater memories from the period of 15-30 years of age (Rubin and Schilkind 1997, Demiray et al 2009). However, in a number of studies using different ways of cuing, reminiscence bump was observed only for negative events (Berntsen and Rubin 2002, Rubin and Berntsen 2003, Demiray et al. 2009, Haque and Hasking 2010).

In order to explain positivity of the reminiscence bump, Berntsen and Rubin (2004) argued that life-scripts, events representing the culturally shared timetable of expected events form the reminiscence bump. Building upon the life-script account, Gluck and Bluck (2007) suggested for a life-story account, with arguing that, personally significant events that are experienced with a high sense of control and make up one's life story characterize reminisce bump. As also mentioned above, positive memories tend to serve self- and social-functions. From the view of life-script account, culturally shared timetable represents a shared area of interest on which individuals in the same culture talk about, discuss their experiences, and convey knowledge about routine practices. This may facilitate not only rehearsal of particular experiences but also may provide a sense of belongingness. In a similar vein, with the self-function, positive experiences are more likely to become central aspects defining identity, providing the individual accessible reference points for the attribution of meaning to other

autobiographical experiences. Also, when relating to other people, individuals use this self-knowledge, which further results in increased rate of rehearsal for these experiences. Overall, it is possible that events from the period of reminiscence bump, as being predominantly positive, may be associated with more self- and social-functions, leading them to be easily accessed and better remembered.

Evidence from clinical samples

Previous evidence on clinical samples have demonstrated systematic differences in autobiographical remembering (Dalgeish et al. 2007, Williams et al. 2007). Intrusive and incoherent nature of remembering the trauma event (von der Kolk and Fisler 1995) was considered as one of the core features of posttraumatic stress disorder (Ehlers and Clark 2000). In addition, overgeneral memory, or difficulty in retrieving a specific episodic memory, has been studied as a vulnerability factor for depressive symptomology. Until today, the dominant view emphasized arousal linked dysfunctions for PTSD whereas for depression, motivational accounts attempted to explain the valence-related biases in memory. However, several decades of research expanded current knowledge for the necessity of more integrative accounts considering cognitive, motivational, and biological factors to explain the link between affective features and autobiographical retrieval in clinical, as well as nonclinical samples.

Different mechanism of remembering for trauma memories-or not?

Traumatic events are typically represented in fragmented, difficult to voluntarily access, involuntary memory networks (Brewin and Holmes 2003). Intrusive and incoherent nature of remembering was explained as a function of arousal at the time of the experience. In their *dual-representation theory*, Brewin et al. (1996) argued that high arousal at the time of trauma experience prevents relational information processing but facilitates the encoding of sensory-perceptual details, which is very similar to notion of tunnel memory. Conscious, strategic recall of verbally accessible memories of the trauma event tends to be poor. however, neither frequency nor the content is alike for involuntary memories, they are very rich in terms of the episodic details, tends to be rapidly retrieved without effort and have great influence on the individual's emotional state (Berntsen 2009). This view pertains to the basic systems approach, suggesting for a specific mechanism for trauma memories (Brewin 1998, Brewin and Holmes 2003). The opposing view challenged the idea that processing of trauma memories involves distinct mechanisms other than the ones involved in autobiographical memory for nontraumatic or ordinary events (Rubin et al. 2008, Berntsen 2008). They discussed a number of factors that may be underlying differences in traumatic versus ordinary events. Heightened level of arousal at the time of the experience consolidates memory, at least for central details of the memory, as discussed above for tunnel memory phenomenon (McGaugh 2006). Since trauma events are not typical in one's life, distinctiveness feature increases its accessibility and also the recency of the trauma makes the event memory even more salient, as well (Rubin et al. 2008). As the

individuals attempt to suppress for the memory for the trauma event, the common rebound effect tends to occur, leading increased accessibility of trauma memory. On the other hand, in cases when individuals keep ruminating on trauma events, goals to reconcile or overcome keep the memory active for the individual, which in turn enhances their accessibility as well (Berntsen 2009).

This latter mnemonic view (Berntsen 2009) clearly opposed the basic mechanism view, in that, any other autobiographical memory that is as affective, vivid as the trauma memory, would be processed in the way that traumatic memories do. The inaccessibility of all details is also observed when recalling ordinary events, and in relation to this, Berntsen and Rubin (2004) investigated content of memories for tsunami occurred in 2004, also with considering their level of exposure. The most recurrent theme appeared to be the most emotional (i.e. escaping) and most central aspects of the event (i.e. searching for loved ones) for the ones who were most involved in the experience. Interestingly, for the ones, who just heard about the event, the dominant theme appeared to be the potential threats associated with the event. Results also suggested that the experience of recurrent memories did not differ across individuals depending on their level of involvement.

Although previous research has provided evidence in line with both of the explanations, the mnemonic account received relatively more support (see Watson and Berntsen 2015), underlining similar operating principles for trauma, and flashbulb memories as for the ordinary autobiographical memories. Factors involved at the time of the initial experience (i.e. arousal, level of attention) determine the amount and type of information to be encoded, integrated into the broad associative network, as well as, the extent of consolidation, influence both the ease of access and the phenomenological qualities of the experience. For individuals who experienced a traumatic event, and also developed PTSD, integration of basic components of autobiographical memory could be altered (Rubin 2005), however, the interaction of individual-level factors (predisposing vs. resilience) with memory processes is very likely, which needs further may be specified further (Rubin et al. 2008).

Overgeneral memory in depression

Overgeneral autobiographical memory (OGM) phenomenon refers to the failure to retrieve specific memories from one's past. For example, when asked to recall a happy event, an individual may report " when i was with my family", which would be an overgeneral recall while "that day we went to vacation with my family", would be specific memory response. Overgeneral memory has received substantial research interest both as a characteristic feature of and a vulnerability factor for depression. Studies with the classical paradigm to assess memory specificity using Autobiographical Memory Test (AMT; Williams and Broadbent 1986) that involves asking individuals to recall specific events in response to given cue words. Evidence has been consistent in that depressed individuals tend to report more overgeneral, less specific memories in response to both to emotional and neutral cue words (Williams et al. 2007, Moore and Zoellner 2008).

This robust phenomenon has been best explained by the generic model of *CaR-FA-X* (Capture/Rumination-Functional Avoidance-Executive Resource Depletion; Williams et al. 2007). *CaR* refers to the processes in which self-relevant information triggered by the retrieval cues interferes the strategic search, inability to ignore that self-relevant information, further triggers the activation of self-schemas and ruminative processes. Since self-schemas, at least the ones that are active in depressive episodes, tend to be negative and rumination on negative self-relevant information captures the focus at the level of where more abstract, conceptual information is represented, which represents the representational level retrieval is completed with more overgeneral, less specific information. *FA* serves emotion regulation (adaptive or maladaptive). Since individuals are motivated to feel positive about themselves, they attempt to keep unpleasant information inaccessible. Other possibility may be that individuals may avoid specific positive information in order to maintain self-coherence (Kohn et al. 2012), or remain distant after a break-up, or last opportunities. The specific function may vary, but in the end, emotional information is selectively retrieved depending on the information that function favors. Executive function play substantial role in the selection, monitoring, and sustaining retrieval goals. Executive resource depletion cognitive load, suppression efforts, specific memories can not be retrieved efficiently (e.g. Ros et al. 2009, Watson et al. 2013).

Basically, CaR-FA-X model argues for the essential interplay of these three mechanisms. Attentional capture at higher levels of generative retrieval is more likely when the retrieval targets affective information, taxing sustained attention and resulting in individuals deviate from the active retrieval goal. Not only with affective cues, self-relevant information also makes it more difficult to retrieve specific memories and this tendency became more salient in individuals with higher rate of rumination (Crane et al. 2007). Also, for depressed individuals, a self-discrepancy challenge, which required individuals to put more effort to reconcile conflicting information, resulted in less memory specificity and updating and inhibition functions mediated the link between depressive state and the proportion of specific to overgeneral memories (Sumner et al. 2011).

Moving towards a more integrative approach

Event intensity and valence have been investigated in relation with the accessibility, specificity and the phenomenology (e.g., recollection, rehearsal) of autobiographical memories. Existing evidence indicated that emotional intensity is a better predictor of memory experience at retrieval (Talarico et al. 2004, Ford et al. 2012). Intense experiences are remembered with rich sensory, perceptual, and semantic elements. Along with higher sense of recollection, emotional intensity increased one's belief in the accuracy in memory reports. In addition, intensity also influences rehearsal, highly intense experiences, especially positive ones, tend to be rehearsed more often (Walker et al. 2003, Berntsen and Hall 2004). Intense experiences tend to be rated as more important and consequential, and this effect in enhanced for negative memories (Rasmussen and Berntsen 2009). Experiences perceived as more self-relevant were reported to be higher for vividness, and recollective features. They tend to be less distant and more positive, as well, suggesting for their role for self-functions

(Johannassen and Berntsen 2010, Demiray and Bluck 2011). Although, personal meaning attached to the event is very much related to the intensity as well as the valence of the event (Kensinger and Holland 2010), emotional intensity has a much robust effects as supported by previous evidence on memories for flashbulb (Fivush et al. 2003, Talarico and Rubin 2007, Tinti et al. 2009), emotional (Ritchie et al. 2005, Ford et al 2012), trauma (Berntsen et al. 2003, Berntsen and Rubin 2006b), earliest (Penelope 1999), and childhood s (Ikier et al. 2004) events.

However, in all these studies, similar to valence and arousal factors, memory phenomenology has been measured using single questionnaire items. However, these are highly correlated items, which characterize the higher order components representing autobiographical remembering (i.e., Fitzgerald and Broadbridge 2013, Öner and Gülgöz 2015). In line, future research could emphasize the how emotionality and valence influence the higher order constructs of remembering in clinical and nonclinical samples, which would then allow us to identify facilitating or suppressive influence of single items that form the components. In the next subsection, an integrative approach of memory phenomenology is presented aiming to improve our understanding for the role of emotionality in remembering.

Conclusion

Research so far emphasized the role of valence and arousal on the memory phenomenology. However, phenomenological factors are highly correlated, their interactive effect may have a different meaning than the single factor. Also, as we understand the interplay of higher memory constructs, we will be able to identify the relative strength of unique features for memory components. For example, when individuals make judgment for imagery, salient visual information triggers associated event-specific information and as long as visual memory representations, they tend to report high ratings for visual imagery. However, when specific visual imagery of an event is reinstated, high ratings are not limited to imagery but also for ratings for emotional intensity and reliving. Next question here is whether this operates similarly when memory traces of conceptual information are activated. For example, when participants are cued with abstract emotional states (i.e. recall a happy, excited vs. angry experience), does it lead to similar rates of activation in different modalities of imagery supporting recollective experience? Talarico and colleagues (2004) did not directly test this but they demonstrated that recollective experience was higher for particularly anger memories, which may be related to the fight motivation underlying the anger experience. Amygdala driven attentional processes at the time of the event may facilitate the encoding of central, specific details in multiple modalities. On the other hand, for happy memories, despite high sense of reliving at the time of recall, the retrieval could be more at a conceptual level. Sensory imagery may not be well activated with the retrieval cue, but rather a top-down feedback driven by motivational goals, support the reactivation. Therefore, the pattern of relationships across phenomenological factors could differ and as we better understand how these patterns vary depending on valence and arousal, we will better understand the operational and motivational mechanisms underlying remembering.

For psychological disorders characterized by anxiety and depression, the way specific phenomenological components operate may differ than nonclinical samples. For example, vivid imagery of a negative event may fully reactive the event memory for individuals with PTSD while for depressed individuals reliving rating could be still low despite vivid imagery. Not only the threshold and the capacity to process emotional information differs but also recalling a vivid and vague event memory in anxiety and depression respectively has a functional value for the individual, which at the same time maladaptive as such a form of memory maintains the problems and impair the course of prognosis.

Overall, a more comprehensive framework could explain the effect of emotionality and valence on autobiographical remembering. Arousal and valence are important elements of emotion (Holland and Kensinger 2010), however, future research should focus also on the appraisals associated with distinct emotional states, which will then allow us to go beyond the arousal and valence and to characterize the impact of affective information on remembering.

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Authors Contributions: The author attest that she has made an important scientific contribution to the study and has assisted with the drafting or revising of the manuscript.

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the author.

Financial Disclosure: The author declared that this study has received no financial support.