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Memory and aging across cultures Angela Gutchess and Isu Cho

Abstract

Memory declines are commonly reported with age, but the majority of research has been conducted with narrow segments of the world's population. We argue for the importance of considering culture in the study of cognitive aging in order to have a representative, accurate understanding of the effects of aging on memory. Limited research thus far investigates the effects of culture on the use of categories and the self in memory with age, finding that cultural differences tend to be larger for older than younger adults. Frameworks drawing on top-down and bottom-up processes may account for when more or less cultural variation would be expected in cognitive performance. Promising future research directions include socio-emotional memory and expanding samples to address global inequities.

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Memory, Aging, Culture, WEIRD, Cross-cultural cognition.

Introduction

Historically, cognitive processes, including memory, have been assumed to largely operate the same across individuals [1-3]. Recent trends, however, have increased appreciation of how the variations in individuals' experiences, ranging from factors such as childhood adversity and neighborhood disadvantage [e.g., [4,5]] to gut microbiome [6] can affect cognition. These developments mesh well with the long-standing appreciation of individual differences in the field of cognitive aging. For example, personality traits [7] and motivation [8] affect older adults' memory performance. Lifestyle factors contribute to older adults' cognitive profiles, as well as risk for disorders such as Alzheimer's disease [9,10]. Cognitive reserve is based on the idea

that experiences across an individual's lifetime can buffer against detrimental effects of aging or delay symptoms of Alzheimer's disease, even when pathological neural changes are present [11,12].

In this paper, we focus on one individual difference factor-that of cultural background. We define culture as the myriad lifestyle factors that are associated with membership in a group, encompassing social values (e.g., prioritizing group harmony versus individual achievements), information processing styles (e.g., analytic vs. holistic), language, religious customs and beliefs, and even environmental, occupational, or agrarian influences. Many studies define cultural groups on the basis of shared geography at the level of nation or region (e.g., East versus West). The studies reviewed in Section 2 largely adopt such an approach, using country as a proxy for the precise dimensions that vary across groups and propagate cognitive effects. We focus on cultural influences on memory, given the state of the literature on culture and cognition, as well as the prominent effects of typical and pathological (e.g., dementia) aging processes on memory.

Why study memory and aging across cultures?

The effects of culture are important to study not only as another example of an individual difference, but also because the behavioral sciences have predominantly studied samples from WEIRD-Western, Educated, Industrialized, Rich, and Democratic-societies, such that 96 % of research samples hail from this narrow subset of the population [13,14]. This means that cognitive aging research may not be representative of a large portion of the globe; what we have considered to be universal, potentially biologically driven processes of aging may, to at least some extent, be shaped by cultural milieu. That is, the types of memory that are more prone to decline with age or the strategies that have been demonstrated to be more effective at supporting older adults' memory may reflect features of WEIRD cultures. Moreover, increasing understanding of understudied populations could identify new routes for interventions to support effective memory and cognition, should a cultural practice (e.g., tai chi) or information processing style (e.g., focus on context) be associated with better outcomes with age.

In this paper, we will first discuss literature on culture and memory with a focus on young adults, before extending our review to cover the intersection of these topics with aging. This organization reflects the relatively small number of studies that directly compare samples of older adults across two cultures. We will then present models of cultural influences on cognition with age and consider promising future directions.

Cultural influences on memory

Cultural values or information processing styles can shape cognition (see Figure 1). For example, individuals from the West tend to have independent self-construals, thinking of the self as unique and distinct from others, and analytic thinking styles, involving breaking information into parts, whereas individuals from the East tend to have interdependent self-construals, thinking of the self in relation to others, and holistic thinking styles, involving considering information relationally [15,16]. These cultural differences can impact how one views the world, functioning as a lens to direct attention and prioritize what information is selected in complex environments for further processing, including what information is encoded into memory [17,18]. The constructive nature of memory [19] means that aspects of memories are strengthened or distorted through strategies to organize and retrieve memories.

How does culture affect memory in young adults?

Initial studies focused on autobiographical memory, remembering events from one's personal history. This type of memory would be expected to be influenced by one's own subjective perspective and values; correspondingly, cultural differences emerged. Westerners elaborated on past events and used internal state or selfcentered language more than Easterners, who conveyed

Figure 1

more information about others and group activities [20]. Functionally, sharing autobiographical memories may promote feelings of closeness, with European Americans benefitting more from sharing specific memories than Easterners [21]. Several pathways—self-goals, language, emotion knowledge, and perceptual styles—could contribute to cultural differences in autobiographical memory development [22].

Extending research to assess cultural differences in memory for standardized experiences often involves testing memory in controlled laboratory tasks that present words or pictures to participants. In a number of studies [reviewed by 18], Americans exhibit more accurate memory than East Asians for perceptual details of objects, discriminating one exemplar from a similar one in memory [23]. Determining how culture influences one's memory by identifying mechanisms thus far has been elusive. One study [23] assessed several factors, including sociocultural ones (self-construal and social values) and pattern separation [24], whether cultural groups differ in their tendency to create distinct representations for similar exemplars, leading to more accurate memories for similar items. Results did not support any of these mechanisms. Perhaps the contribution of sociocultural values needs to be tested in larger, more heterogeneous samples, but it is also possible that performance on demanding memory tasks is governed primarily by cognitive ability and information processing style, leaving little room for contributions from social factors. Differences in pattern separation alone also did not account for cultural differences in memory, as Americans' memory performance was higher than East Asians' for old and similar items.



Potential cultural influences (left) that may affect memory-related processes (right).

Emphasizing different levels of representational hierarchy [25] in memory, such as memory for features (e.g., versus their conjunctions color, shape) (e.g., color + shape) [26], is another candidate mechanism that was tested. This mechanism did not explain cultural differences in memory because Americans' memory performance was higher than East Asians across multiple conditions. By extending the pattern to abstract stimuli, the findings ruled out the possibility that semantic meaning or differences in stimulus familiarity explained cultural differences in memory. Recent neuroimaging research [27] also failed to find support for cultural differences in pattern separation, a process mediated by subfields of the hippocampus, though differences in the engagement of the left inferior frontal gyrus when discriminating old from new items suggest that cultures may differ in controlled processing during retrieval.

These results identify additional candidate cognitive mechanisms that could differ across cultures, such as what information is well-encoded versus prone to interference in memory or whether controlled processes are recruited at different stages of memory [see 18 for further discussion]. Importantly, cognitive studies of culture typically include standardized neuropsychological measures to assess the overall cognitive ability of participants (e.g., working memory span) in order to ensure that cultural differences in performance on the primary memory task are specific to those conditions rather than reflecting the recruitment of samples across sites that are mismatched on general cognitive ability. This is particularly important for comparisons of older adults because sampling can be more variable than for young adults recruited through colleges.

Cultural differences in the initial perception of the event could have downstream consequences for memory. For example, Americans segment events differently than Indians. When watching a continuous stream of actions associated with an event such as doing laundry, Americans identify more event boundaries and define them by perceptual changes more than Indians, who segment based on goal changes [28]. Because event boundaries serve as important cues for memory [29,30], segmentation may contribute to cultural differences in what is remembered.

Cultural differences extend to false memories, consistent with the constructive nature of memory [19]. Americans were more prone to false memories for categorical information than Turks [31], consistent with East/West cultural differences in organizing information using taxonomies [32,33]. With a widely used false memory paradigm [34], Europeans reported more false

recollections than Chinese for related items, perhaps reflecting their lack of attention to contextual information that could help to counter the allure of related items [35].

How does culture affect memory with age?

Focusing on episodic memory, beyond autobiographical memory [e.g., [36]], few studies directly compare the effects of aging on memory across cultures. These generally fall into two topic areas. The first investigates the use of categories in memory. Building on the finding that taxonomic categories increase false memories for young Americans (see 2.1), research with older adults found the same pattern [37]. The study also found that the tendency for false memories to increase with age [34] occurred for both Americans and Turks. Prior work probed ways in which categories can support accurate memory retrieval. Compared to Chinese older adults, Americans used a categorization strategy more often during free recall, clustering by category (e.g., retrieving all of the fruits before moving to another category) [38]. Another study found that for categorically processed information, cultural differences in memory were more evident for older adults [39]. See Figure 2.

The second involves thinking about the self. The selfreference effect is the tendency to better remember information related to the self compared to others. This effect seems to be more pronounced in Western or individualistic cultures than in Eastern or interdependent ones [40]. Cultural differences in self-reference effects emerged for older, but not younger, adults from the US and Taiwan [41], such that Taiwanese older adults exhibited a smaller benefit from self-referencing than American older adults. Relatedly, younger and older Chinese outperformed their Canadian counterparts (believed to hold individualistic views) in memory for contextual information, thought to reflect cultural differences in the relative emphasis on holistic versus individualistic views [42].

The combination of culture-dependent and cultureinvariant effects of aging is also evident in neural data. When viewing object-background scenes, both American and Singaporean older adults had reduced engagement of medial temporal lobes (MTL) associated with binding together multiple pieces of information [43], in line with findings of impaired associative memory with age [44]. This pattern could indicate that reduced MTL function may be a pervasive effect of aging across cultures with implications for memory, though not directly assessed in this study. In contrast, age-related impairments in engaging the lateral occipital complex, associated with object processing, were limited to the Singaporeans, perhaps suggesting that more emphasis





Cultural differences across age groups occur for categorical strategies in memory. The top panel, drawn from data reported in [39], shows that older Chinese have poorer memory performance (d' score) when using a categorical strategy than older Canadians, whereas performance does not differ across cultures for younger adults. The bottom panel illustrates that both young and older Americans commit more categorical false memories (darker blue bars) than their Turkish counterparts, but that effects of aging on meaning-based false memories (including both darker and lighter blue bars) are consistent across cultures. Bottom panel reprinted from [37], with permission.

on object processing in American culture helps to preserve functionality in this region.

Frameworks for age and culture effects on memory and cognition

Thus far, cultural differences in memory tend to be more evident in older than younger adults. Models argue that patterns of cultural differences across age groups reflect the cognitive demands of the task. It is necessary, however, to consider other processes that could differ across age groups, such as cohort effects representing cultural change over time (e.g., have globalization or shared media increased cultural convergence for young adults compared to older generations?) or confounds. One framework [45] posited that for culture-saturated tasks, the effects of aging depend on the automatic or controlled nature of processes. For automatic tasks, cultural differences would increase with age, reflecting more years of accumulated experience in a given culture and the unconstrained ability to apply culturally determined strategies. For effortful, controlled tasks, cultures would converge with age, reflecting limitations in the cognitive resources necessary to implement culturally determined strategies. A study comparing categorization performance across younger and older Americans and Singaporeans [46] illustrates these ideas. People tend to make faster judgments for typical than atypical exemplars, and East Asians are more prone to these typicality

effects than Americans due to differences in categorical reasoning style. Na and colleagues [46] found that Singaporean older adults exhibited larger typicality effects than American older adults, although young performed similarly across cultures. Results were interpreted to indicate that young adults could overcome culturally determined disadvantages when a task—in this case, categorization—requires low cognitive resources. When cognitive resources were lacking, as was the case for older adults, performance was largely determined by cultural values (e.g., preferences for intuitive rather than formal categorization).

A revision to this framework (Figure 3), responding to the complexity and variety of task demands, strategies, and cognitive resources, instead emphasized top-down or bottom-up processes [18]. Top-down processes reflect the effects of motivations and goals whereas bottom-up processes are primarily determined by stimulus properties. Bottom-up processes (e.g., pattern separation, or accurate detailed memory) are highly resource-dependent, and thus prone to effects of aging with little variation across cultural groups. In contrast, top-down processes allow for a variety of strategies (e.g., categorization, self-reference) to be flexibly applied, supporting cultural differences in older adults.

Future directions for aging and memory across cultures

Although there is a dearth of research on older adults, there are several promising avenues. Research with young adults identifies candidate processes that may differ across cultures and be particularly vulnerable to the effects of aging, at least in the Western samples studied thus far. For example, notable increases in false memory and decreases in pattern separation and detailed memory representations occur with age [24]. Event boundaries may not enhance memory as effec-



Culture may operate through both top-down (e.g., motivations, goals) or bottom-up (e.g., stimulus properties) mechanisms. The variation that can occur across cultures is expected to be larger for top-down than bottomup processes, as bottom-up processes are highly reliant on cognitive resources, which are constrained by aging. Figure adapted from [18], with permission. tively with age [30,47]. Determining whether these changes are universal with age, perhaps reflecting biologically constrained processes (e.g., decline in MTL activity), requires assessment across multiple cultures. Thus far, effects of aging appear to be much larger than the effects of culture on memory performance, but very few studies allow for direct comparisons and a wealth of memory processes have yet to be investigated. Should research identify exceptions to declines or strategies that are more or less effective depending on cultural context, it would challenge assumptions about the inevitability of age-related declines and inform interventions (e.g., which strategies or lifestyle factors led to better outcomes with age?). One application could be bolstering resistance to remembering and spreading misinformation, given the greater vulnerability of older adults [48] and culture-invariant processes that help to combat it [49].

In addition, there is ample opportunity to investigate socio-emotional memory across cultures. Socioemotional selectivity theory argues that motivation shifts across the lifespan such that people move from seeking out new experiences to prioritizing spending time with close others with age and processing positive over negative information [50]. Across cultures, studies generally find that the positivity effect extends to Eastern older adults [51-54]. However, the literature is wide open in terms of considering how the combined effects of culture and age impact how people remember social information [55], gains and losses [8], or emotional information, perhaps in terms of tradeoffs [56] or reflecting preferred affective style (i.e., high or low arousal) [57]. Cultural differences in memory content or biases in reconstruction could have major impacts on decision-making or interactions with others.

Conclusions

In our review of cultural influences on memory, we highlight opportunities for future research building on young adult research or infusing a global perspective into existing Western approaches to the study of cognitive aging. Even the research that considers culture is typically limited to comparisons of two groups drawn from majority populations in high-income countries. Increasing study of how racial/ethnic inequalities [e.g., [58]] and global inequities [e.g., [59–61]] affect memory and cognition is critical in order to have a representative, accurate understanding of cognitive aging. Having this foundational knowledge can also inform strategies for improving healthy cognition for older adults across the globe.

Author contributions

AG & IC: conceptualization, writing - original draft, writing - review & editing, visualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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