Contextual modulation of to-be-remembered information in visual working memory

Humans exhibit a remarkable cognitive flexibility to adapt to novel contexts. This great flexibility for new contexts relies on three cognitive abilities in concert. First, one must maintain goal-relevant representations in working memory (WM). Second, achieving one's goal depends on the anticipation of upcoming events, and one must act in such a way that the future outcome will be in accordance with the desired outcome. Third, such anticipation relies on one's past experiences associated with goal-relevant information for a particular context. Together, one must use past experiences or prior knowledge to prepare for appropriate actions while adjusting behaviors toward the goal based on the context.

WM allows us to hold and manipulate information that is relevant to our current task goals for a given contextual episode over a short period of time. The critical role of WM is to bridge the gap between perception and higher-level mental processes such as long-term memory, thinking, reasoning, and language. However, the capacity of WM is highly limited. While previous investigations have revealed that attention is important in controlling the contents of WM, it remains unexplored whether task context can influence WM. This study aimed to investigate whether context-driven selection history can modulate the efficacy of attention allocation in WM (Kuo, 2016). In this study, the participants performed a visual WM task in which a display of one item (low WM load) or three/four items (high WM load) was shown for the participants to hold in their WM. Following a short retention interval, the participants judged whether a probe item was in the memory display. Selection history was defined as the number of items attended across trials in the task context within a block, manipulated by the stimulus set-size in contexts with fewer possible stimuli (4- or 5-item context) or more possible stimuli (8- or 9-item context) from which the memorized content was selected. In the context of fewer possible stimuli, fewer memorized contents from the previous trials interfered with the processing of task-relevant items in the current trial. In the more possible stimuli context, more representations from previous trials interfered with stimulus processing in the current trial.

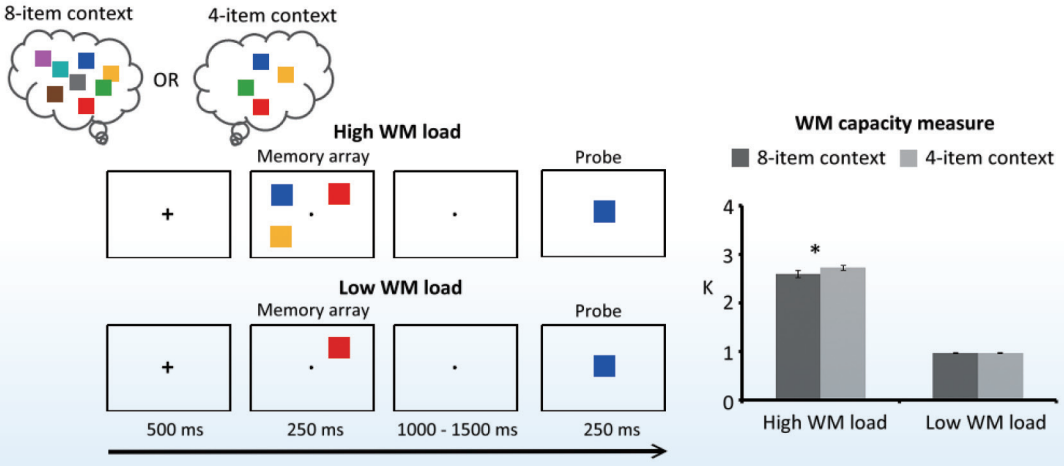

Figure 1. Across four behavioral experiments, the results revealed that the WM capacity was significantly reduced in the more possible stimuli context relative to the fewer possible stimuli context.

Across four behavioral experiments, the results revealed that the WM capacity was significantly reduced in the more possible stimuli context relative to the fewer possible stimuli context (see Figure 1). Moreover, the reduction in capacity was significant for high WM loads but was not observed when the focus was on only a single item. Together, these findings indicate that context-driven selection history and focused attention influence WM capacity. The findings from this study also provide the intellectual impetus for in-depth work on this essential aspect of human cognition, namely, the manner in which task contexts can proactively affect behavior.

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Deep-sea corals and coral-bioeroding foraminifera in the South China Sea

Coral reefs are shallow-water ecosystems that occur in tropical and subtropical seas. They feature very high biodiversity and primary productivity, as well as beautiful scenery. The species diversity and ecology of the coral reefs bordering Taiwan have been the focus of marine biology studies in the past several decades. However, the biodiversity of deep-sea corals in the seas surrounding Taiwan has not been investigated. From 2013 to 2016, we conducted field surveys on the species diversity and distribution of deep-sea corals in the South China Sea using R/V Ocean Researcher I. In total, 76 localities encompassing Dongsha Atoll, Macclesfield Shoal, and Spratly Island and located at depths ranging from -262 to -3732 m were surveyed. The approximately 8,000 specimens that were collected and examined include 190 species of deep-water scleractinian corals belonging to 15 families and 55 genera, including 1 new genus and 15 new species (Figure 1). Moreover, the species compositions of the coral communities found at the different localities vary widely, indicating that the species diversity of deep-sea corals in the South China Sea is high. Phylogenetic analysis based on two mitochondrial sequences (16S and 28S rRNA) reveals that several cryptic or new species may exist in our collections; thus, the species diversity is likely higher than expected. The high species diversity and the abundance of deep-sea corals found at several localities suggest that deep-sea reefs likely exist in the South China Sea. The calcium carbonate structures formed by deep-sea corals provide essential habitats that promote the survival of fish and invertebrates in marine ecosystems. Based on the high species diversity and the abundance and uniqueness of coral fauna, we propose designating the Dongsha continental shelf, Zhongsha Reef and An-Da Reef in the Spratly Islands as marine protected areas for the conservation of marine resources in the South China Sea.

Among the coral specimens, we found fifteen individuals of *Hyrrokkin sarcophaga*, a large commensal or parasitic foraminifer, on corals belonging to three species collected at depths ranging from -339 to -552 m. The study reporting this discovery was the first reported occurrence of a coral-bioeroding foraminifer in the Pacific Ocean [1]. *H. sarcophaga* is a large foraminifer that has tests of up to 7 mm in diameter and is mainly parasitic on deep-sea corals. It has previously been reported as occurring on hexacorals or oc-