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Psychological pain is an emotional response that results from the loss of an expected reward. Previous work studying reward downshifts with rats and other mammals has shown that there are many parallels between psychological pain and physical pain, including shared brain areas and common neurotransmitter systems. Demonstrations of psychological pain in non-mammals are rare, with honey bees as the only invertebrate which are documented to show this emotion.

The present experiment provides the first investigation into psychological pain in the praying mantis, *Tenodera sinensis*. Mantids were raised from oothecae collected from the wild and tested at the L4-L5 stage. In 9 sessions, each mantis was exposed to three visual conditioned stimuli. One stimulus was always reinforced with a small fly, one stimulus was never reinforced, and the third stimulus was reinforced on sessions 1-6 but shifted to extinction for sessions 7-9.

The results show that mantids learn to discriminate between reinforced and nonreinforced stimuli. On the critical session 8 that immediately followed the downshift experience, mantids exhibited significantly lower goal-tracking behavior to the downshifted stimulus compared to the other stimuli. An additional group was given the opioid antagonist Naloxone to determine whether the opioid system is involved in mantis psychological pain, but results were inconclusive due to the drug's effect on locomotor behavior. Though the effect is transient, this is the first evidence of psychological pain in the praying mantis, and may provide insights into the evolution of the pain system in invertebrates. This work was supported by NASA WVSGC.