Dear Dr Stavroula Kousta,   
  
Hereby my co-authors Javier Ortiz-Tudela, Rasmus Bruckner, Yee Lee Shing, and I are writing a pre-submission enquiry to ensure that the work we intend to submit, entitled “The Effect of Prediction Error on Episodic Memory Encoding is Modulated by the Outcome of the Predictions”, is within the scope of *Nature Human Behaviour*.

To simplify the great amount of information which characterizes our daily life, we accumulate knowledge over time and use it to form expectations and guide our actions. Upcoming events can match or mismatch such expectations, creating a prediction error of varying degree. While there is a great amount of evidence on the effects of prediction error on learning, relatively less evidence is available regarding its effect on episodic memory. Moreover, most of the studies available so far manipulated prediction error by using monetary rewards. Since in everyday life learning does not always occur in the presence of explicit rewards, it is crucial to consider the mechanistic effect of prediction error in contexts in which no explicit information about reward is conveyed. For this reason, we designed a study in which context/object-category associations of varying degree were learned by participants from the outcomes of their correct or incorrect predictions. After learning these associations, participants were presented with trial-unique objects that could either match or violate their predictions. Finally, in a surprise memory test, participants were asked to recognize the previously shown objects among distractors.  
We used a reinforcement learning computational model to derive subject-specific trial-level prediction error at encoding and link it to subsequent retrieval. We showed that prediction error influenced subsequent memory as a function of the outcome of participants’ predictions (correct vs incorrect). Specifically, when participants’ prediction was correct, a strong prediction error (as an outcome of weak expectations) improved memory. By contrast, when participants’ prediction was not correct, a strong prediction error (as an outcome of strong expectations) impaired memory.

These results show for the first time a computationally specific effect of prediction error on memory formation in conditions in which no explicit rewards are provided. They extend previous findings on reward prediction error suggesting a dependency between hippocampal and striatal dopaminergic systems and inform future studies exploring the interactions between learning and memory.

On behalf of all co-authors,   
Francesco Pupillo.