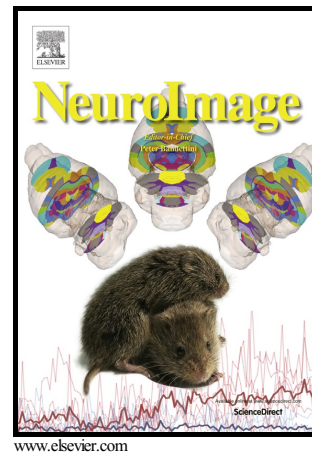


## Author's Accepted Manuscript

Adaptive behaviour and feedback processing  
integrate experience and instruction in  
reinforcement learning

Anne-Marike Schiffer, Kayla Siletti, Florian  
Waszak, Nick Yeung



PII: S1053-8119(16)30449-9  
DOI: <http://dx.doi.org/10.1016/j.neuroimage.2016.08.057>  
Reference: YNIMG13415

To appear in: *NeuroImage*

Received date: 10 May 2016  
Revised date: 25 August 2016  
Accepted date: 26 August 2016

Cite this article as: Anne-Marike Schiffer, Kayla Siletti, Florian Waszak and Nick Yeung, Adaptive behaviour and feedback processing integrate experience and instruction in reinforcement learning, *NeuroImage* <http://dx.doi.org/10.1016/j.neuroimage.2016.08.057>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

Adaptive behaviour and feedback processing integrate experience and instruction in  
reinforcement learning

Anne-Marike Schiffer<sup>1,2,3\*</sup>, Kayla Siletti<sup>1</sup>, Florian Waszak<sup>2,3</sup>, Nick Yeung<sup>1</sup>

<sup>1</sup>Department of Experimental Psychology, University of Oxford, OX13UD, Oxford, UK

<sup>2</sup>Université Paris Descartes, Sorbonne Paris Cité, Paris, France

<sup>3</sup>CNRS (Laboratoire Psychologie de la Perception, UMR 8158), Paris, France

\*corresponding author: annemarike.schiffer@gmail.com

## Abstract

In any non-deterministic environment, unexpected events can indicate true changes in the world (and require behavioural adaptation) or reflect chance occurrence (and must be discounted). Adaptive behaviour requires distinguishing these possibilities. We investigated how humans achieve this by integrating high-level information from instruction and experience. In a series of EEG experiments, instructions modulated the perceived informativeness of feedback: Participants performed a novel probabilistic reinforcement learning task, receiving instructions about reliability of feedback or volatility of the environment. Importantly, our designs de-confound informativeness from surprise, which typically co-vary. Behavioural results indicate that participants used instructions to adapt their behaviour faster to changes in the environment when instructions indicated that negative feedback was more informative, even if it was simultaneously less surprising. This study is the first to show that neural markers of feedback anticipation (stimulus-preceding negativity) and of feedback processing (feedback-related negativity; FRN) reflect informativeness of unexpected feedback. Meanwhile, changes in P3 amplitude indicated imminent adjustments in behaviour. Collectively, our findings provide new evidence that high-level information interacts with experience-driven learning in a flexible manner, enabling human learners to make informed decisions about whether to persevere or explore new options, a pivotal ability in our complex environment.

## 1. Introduction

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات