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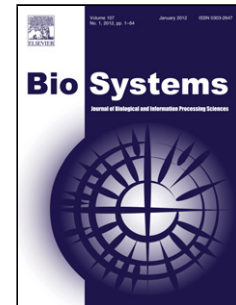
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# Boredom begets creativity: a solution to the exploitation-exploration trade-off in predictive coding

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## Abstract

Here we investigate whether systems that minimize prediction error e.g. predictive coding, can also show creativity, or on the contrary, prediction error minimization unqualifies for the design of systems that respond in creative ways to non recurrent problems. We argue that there is a key ingredient that has been overlooked by researchers that needs to be incorporated to understand intelligent behavior in biological and technical systems. This ingredient is boredom. We propose a mathematical model based on the Black-Scholes-Merton equation which provides mechanistic insights into the interplay between boredom and prediction pleasure as the key drivers of behavior.

## 1 Introduction

The value in building artificial systems with optimal predictive power is beyond question. Robots in real world missions without the capacity to infer the state of the world are unreliable and doomed to a short existence. In biological systems, the idea that organisms organize sensory data into an internal model of the outside world, goes back to the early days of experimental

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