

Lock-in amplifiers and human behavior: opening the toolbox of experimental physics to the social sciences

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1 Lock-in feedback: from experimental physics to the social sciences

Lock-in amplifiers are widely used in experimental physics to drive electronic feedback circuits that can keep a variable constant relative to a predetermined value. Their robustness to noise and their ability to track drift make them particularly suitable to identify and follow maxima or minima of correlation functions between two physical observables, even when the correlation function is unknown and useful data are hidden in the midst of a large volume of uncorrelated information. Here, we will demonstrate that the sequential algorithms of lock-in amplifiers can be adapted to social sciences experiments, providing unprecedented insights on a whole series of “predictably irrational behaviors” [1].

2 Examples of applications

To demonstrate the added value of the proposed approach, we will present a large scale (more than 7000 people involved) internet-based experiment that we have recently conducted to explore the scientific validity of a controversial choice reversal phenomenon: the *decoy effect* [2]. We will also present our plans to apply lock-in feedback techniques to other human preference related work. Finally, we will analyze the practical relevance of our approach in the promotion of healthy behaviors and in the implementation of efficient marketing strategies.

References

- [1] M. Kaptein and D. Iannuzzi, “Lock in Feedback in Sequential Experiments”, arXiv:1502.00598v3 (2016).
- [2] M. Kaptein, R. van Emden, and D. Iannuzzi, submitted for publication (2016).
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