

Source Amnesia

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Extended Abstract

Source Amnesia is the inability to recall where, when, or how one has learned knowledge that has been acquired and retained. In a 2008 NY Times article, psychologists Sandra Aamodt and Sam Wang explained:

False beliefs are everywhere. Dispelling false information may be more difficult than it seems, due to the quirky way our brains store memories...in time, a fact is separated from the context in which it was learned. For example, you probably know that the capital of California is Sacramento, but you probably don't remember how you learned it. This phenomenon, known as source amnesia, can also lead people to forget whether a statement is true.

In this paper, we explore the economic implications of source amnesia. In our model, new information sources are generated every day — each one a conditionally iid signal about a payoff-relevant state of the world. Sam, the source amnesiac decision-maker (DM), consults one source each day, according to a geometric sampling process in which more recent information is more likely to be seen, but older information sources can also be selected. This possibility of resampling introduces correlation among Sam's observations: He is aware that each time he sees a signal, he cannot be certain whether, or how many times, he has already seen it.

Mostly, we posit *weak source amnesia*: Sam sees the date stamp on each signal when he first observes it, recalls all past signal realizations, and keeps track of his current posterior belief on the binary state of the world. But he does not record the sources of his observations, or his past beliefs about the state (information that would be irrelevant if not for the possibility of resampling old sources). We also discuss the implications of *strong source amnesia*, in which Sam does not see (or pay attention to) the source date stamps.

Our first main result explores the time series implications of weak source amnesia. Recall the standard result that Bayesian beliefs are a martingale. Consider an outside Observer who sees what Sam sees, but additionally keeps a record of Sam's past posteriors on the state. We find that from the Observer's perspective, Sam's beliefs are not a martingale but instead exhibit systematic drift, with periods of *momentum* followed by *mean reversion*. More precisely, assume Sam's beliefs about the state are close to the Observer's. If Sam consults an information source that he feels is new with a sufficiently high chance, then his posterior increases much today, and the Observer then expects Sam's posterior to continue

to drift up tomorrow. But when Sam’s beliefs are far from the Observer’s, *mean reversion* kicks in, and the Observer expects Sam’s beliefs to revert towards his. These two patterns jointly reflect the excess volatility of beliefs occasioned by source amnesia that we uncover.

Next, we reinterpret our model as a rational trading story, with a new myopic Bayesian trader entering the market each period. Here, the current trader’s “source amnesia” — namely, uncertainty about the extent to which her information is already reflected in the asset price — is a natural market implication, rather than a behavioral assumption. For the information behind past traders’ transactions is simply not observed. With this interpretation, our belief drift result finds some logic in technical analysis: Assume a black box, through which the current market price reflects current transactions and yesterday’s price. Then an analyst who tracks all past market prices will expect a large price increase today to be followed by a subsequent increase tomorrow, but also knows that the resulting inflated price will soon revert to fundamentals.

Next, we explore how *strong source amnesia* can lead to bubbles and false myths, and their eventual collapse. For example, why are there still so many anti-vaxxers, long after Wakefield was discredited? We show that if all source information is lost, then Sam’s Bayesian reaction to each new signal is a weighted average of his beliefs if he knew the information was fresh, and beliefs if he knew the information was stale. But the weight Sam places on his information being fresh strictly increases in the generation rate of new sources, and decreases in its similarity to his recent observations. For example, if new studies on the link between vaccines and autism emerge more slowly than Sam expects, then he will rationally overreact to antivax information which is largely recycled, believing that it *could* be new. In this case, he can become very overconfident in his belief that vaccines cause autism. For the same reason, bubbles can form in an asset market during phases when information is generated at a slower-than-average rate, and thus when there is less new information than traders anticipate. However, rationality limits bubble growth, since any new contrary information can pop a bubble.

In the final section of the paper, we touch on the behavioral implications of source amnesia when some sources are less informative or more biased than others. We relate source amnesia to confirmation bias, and show that it provides one channel through which decision-makers may fail to “de-bias” the information they’re seeing. For instance, a juror may continue to be swayed by the testimony of a witness who is later discredited.