

A Dark Glass Brightens

Prediction is very difficult, especially about the future.

Niels Bohr, Nobel Laureate (Physics)

Cognitive Trading is about to take financial forecasting to a new level; we're going [meta](#), and the financial world will probably follow...

Whilst forecasting can never be perfect (obviously!), there's enormous value in being able to predict when prediction is pointless – because if you can do that, you have a significant advantage in dealing with two of the three ways that predictions fail.

You might think there are only two ways to fail – through a weak model or because of a disruptive event – but there is a third: genuine, unequivocal, unavoidable *un*predictability.

If you could tell when you're dealing with an unpredictable system you'd know that no matter how sophisticated the algorithm, how deep the learning, or how much data you can crunch you're wasting time and money on a wild goose chase. And you'd also know when and where you are *not* wasting your time – when and where there is greater potential for profitable trading.

Fortunately, and – dare we say so? – unexpectedly, Cognitive Trading can tell when a system is more, and when it is less, predictable.

We're currently trialling a radical combination of chaos theory and machine learning to put a squeeze on forecasting uncertainties, because when it comes to forecasting, even small improvements can have big impacts.

All forecasting relies on the fact that although markets are not perfectly efficient, but they're not perfectly inefficient either – they are constantly factoring in new information. This means that large differences in the prices set by participants are very rare, and the rest are generally very small and short-lived.

To trade profitably on the *differences* between prices in different market locations (arbitrage) requires efficiencies of scale in price collection and trade execution, but at least prices *here* and *there* are market facts, they are known.

On the other hand, profitable trading on price *changes* – going long or short – depends critically on the differences between *current* prices and *future* prices, and expectations of future prices are not *facts* – they don't come from knowledge, they come from *understanding*.

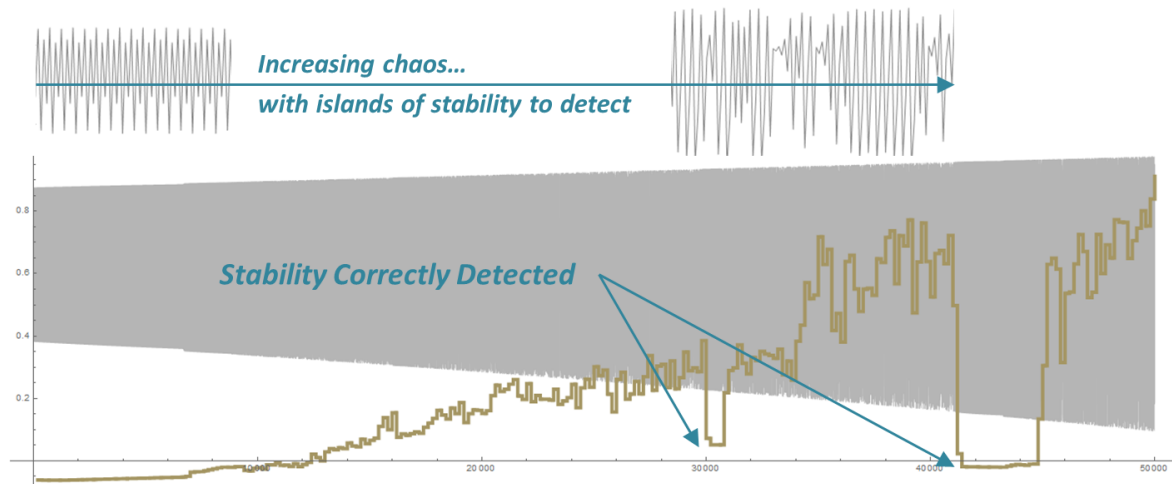
The understanding of price behaviour has historically been based on two ideas: all data is meaningful and – if we could only interpret some all or of that data correctly – the past reveals the future.

Well, the truth is, history is wrong. That's progress. Some data is meaningless and not everything can be predicted. Mathematicians have known this for over a century; now investors need to acknowledge it.

But building on advanced academic mathematical research, Cognitive Trading has developed an edge. And we can prove it.

In the graph below you can see 50 000+ samples of the [Logistic Map](#) as it evolves from mathematically certain predictability on the left to mathematically certain *un*predictability on the right. And without knowing anything about the nature of the Logistic Map, using only the data it generates, we correctly detect the high

and low predictability regions and track the trend, through a sliding window analysis. We generate hundreds of measures for each sample window and then look at the statistics...



The signal is clear – and with this information we can do more than just recommend when to stay in or when to exit a market, we can filter real-time and training data for machine learning systems so that they are responsive to real patterns – and not misled by random correlations.

This means higher quality forecasts and a narrower spread at the same confidence level. We apply a tuneable Fourier-based brick-wall filter to separate market noise from market signal and adapt the trading strategy to their relative proportions.

It also means we can develop new metrics and meta-strategies. How often is the market unpredictable? How long do unpredictable periods last? Are there patterns in volatility or the difference in prices before and after a period of unpredictability according to its strength or duration?

But there is a better way: leveraging the same approach to *Reinforcement Learning* that made Deep Mind's *AlphaGo Zero* better than any human player in a matter of days – and even here we have an edge. Whilst advanced machine learning would eventually learn when to play and when to pass, with the assistance of the predictability signal it doesn't have to, making it able to learn and exploit changes in market dynamics without having to wait for cumulative statistics to enhance the signal-to-noise ratio.

We aim to work across multiple currency pairs, avoiding uncertainty and seeking out predictability, where returns are relatively unbuffeted by the winds of chance.

We're constantly innovating to hone our edge. Faster, smarter, sharper to ensure the futures bright, the futures profitable.

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Cognitive Trading: We think, before we trade