

Predictability Emergence Trend

Expert Advisor Documentation

PLATFORM	TYPE	TIMEFRAME	WEBSITE
MetaTrader 5 (MT5)	Trend Following (Regime Emergence)	M15 – H1	www.algobot.live

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Overview

Predictability Emergence Trend aims to catch a trend at the exact moment it becomes *predictable*. Rather than waiting for a price level, a candlestick pattern, or a moving-average cross, it measures the underlying *complexity* of recent price action and enters the instant that complexity collapses — the transition from a noisy, directionless market into an organised, directional one.

The engine is **Approximate Entropy (ApEn)**, a complexity statistic introduced by Steve Pincus in 1991. ApEn measures how regular and self-similar a short window of price is by counting how often short template patterns recur and whether those recurrences survive when the pattern is extended by one bar:

$$\text{ApEn} = \Phi^m(r) - \Phi^{m+1}(r)$$

- **High ApEn** — patterns rarely repeat, so the series looks random and choppy: a directionless market with no exploitable structure.
- **Low ApEn** — patterns recur reliably, so the series is organised into either a clean directional glide or a smooth wave. This is a *predictable* market.

Before ApEn is measured, the closing prices inside the window are **z-scored** (rescaled to mean 0 and standard deviation 1). This makes the match tolerance  scale-free — expressed in standard-deviation units

— so the statistic is invariant to the symbol's price level and current volatility. It responds only to the *shape* of recent price action, never its magnitude.

Core idea: a falling ApEn means chaos is condensing into structure. When ApEn crosses *down* through a threshold, a trend is emerging from the noise — and that transition, not any fixed level, is the trade trigger.

How It Works

The entropy engine

On every completed bar the EA maintains a rolling buffer of closes. Once enough history exists it z-scores the most recent `EntropyWindow` closes and computes ApEn with embedding dimension `m = 2` (the classic default) and tolerance `r = EmbedTolerance`. Template similarity is measured with the Chebyshev (max-norm) distance, and self-matches are counted so the logarithm inside Φ is always finite.

Entry logic — the emergence cross

The EA compares this bar's ApEn to the previous bar's. It enters only on a fresh **down-cross** of the threshold — ApEn was at or above `EntropyThreshold` last bar and is below it now. This "chaos → structure" collapse is the emergence signal, and because it must be a fresh crossing, the strategy never re-fires while ApEn simply stays low.

Direction is taken from the drift already present inside the window, confirmed by price sitting on the correct side of its baseline EMA (both computed over `SlopePeriod`):

- **Long:** ApEn collapse *and* a positive least-squares slope *and* the last close above the baseline EMA.
- **Short:** ApEn collapse *and* a negative least-squares slope *and* the last close below the baseline EMA.

If the slope and the baseline disagree (an ambiguous, two-sided drift), no trade is taken — the strategy requires a clean, one-sided move to attach itself to.

Worked example

EURUSD on M15 has been chopping sideways; ApEn reads 0.63, above the 0.55 threshold. On the next completed bar ApEn prints 0.48 — a down-cross. The 12-bar least-squares slope is positive and the close is above the baseline EMA, so the EA sends a *LONG* at the ask with a stop $1.6 \times \text{ATR}$ below and a take-profit $2.2 \times$ that distance above.

Exit logic — stop, target, and trailing lock

Each position is opened with a fixed protective bracket and then actively managed on every tick:

- **Initial stop:** $\text{AtrStopMult} \times \text{ATR}$ behind the entry — kept compact so a failed emergence is cut near scratch.
- **Take-profit:** $\text{RewardRiskRatio} \times$ the stop distance, giving a fixed reward-to-risk target.
- **Breakeven lock:** once price advances $\text{BreakevenAtr} \times \text{ATR}$ in favour, the stop jumps to just past the entry (a small locked profit of $0.05 \times \text{ATR}$).
- **ATR trail:** beyond breakeven the stop trails $\text{TrailAtr} \times \text{ATR}$ behind price and only ever tightens — it never loosens.

Low-drawdown design

The strategy targets roughly 1% drawdown through several guards working together:

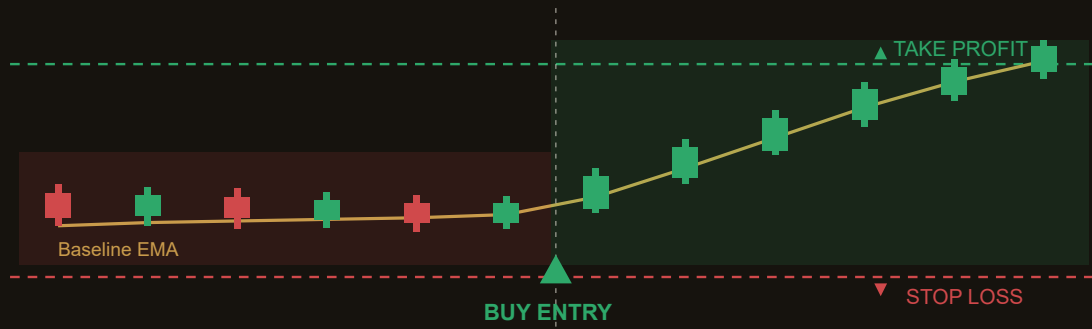
- Only **one position per magic number**, entered only when flat.
- Entries fire only on a **fresh down-cross** — no stacking or re-firing.
- A **tight ATR stop** paired with a **breakeven-then-trail** mechanism cuts most losers near zero while letting winners run to target.

Single timeframe: every bar reference uses the chart's primary timeframe, so the EA runs on whatever timeframe you attach it to. A liquid FX major such as EURUSD on M15–H1 is the suggested home, but nothing is hard-coded.

Strategy in Action

The illustration below shows an example of how the strategy identifies a setup and triggers its entry and exit. This is a simplified, illustrative example for educational purposes — not real market data.

Price



Approximate Entropy (ApEn)



Choppy / high-entropy regime (left) → predictable trend emerges (right)

Illustrative example only. Actual market behaviour varies.

Parameters

Parameter	Default	Description
EntropyWindow	30	Number of z-scored closes fed to the ApEn estimator. Range 16–60, step 2. Larger windows give smoother, slower entropy readings.
EmbedTolerance	0.20	Match tolerance r in standard-deviation units (the window is z-scored so $\text{std} = 1$). Range 0.10–0.50, step 0.05. Larger values count more templates as matching.
EntropyThreshold	0.55	The ApEn level whose down-cross flags the chaos→structure transition (a trend emerging). Range 0.20–1.20, step 0.05.
SlopePeriod	12	Bars used for the least-squares drift slope and the baseline EMA that together decide trade direction. Range 5–30, step 1.
AtrPeriod	14	Averaging period for the ATR that scales the stop, target, breakeven and trail. Range 5–40, step 1.
AtrStopMult	1.6	Stop-loss distance as a multiple of ATR. Kept tight for low drawdown. Range 0.5–4.0, step 0.1.
RewardRiskRatio	2.2	Take-profit distance as a multiple of the stop distance (reward-to-risk). Range 1.0–5.0, step 0.1.
BreakevenAtr	1.0	Favourable advance, in ATR, that triggers the stop to lock to breakeven-plus. Range 0.3–3.0, step 0.1.
TrailAtr	1.4	ATR trail distance applied once past breakeven. The trail only ever tightens. Range 0.5–4.0, step 0.1.
Lots	0.10	Fixed order volume in lots. Range 0.01–1.0, step 0.05.
Magic	460517	Magic number identifying this EA's positions, so it manages only its own trades.

Recommended Settings

The defaults are tuned for a liquid FX major on an intraday timeframe. Use them as a starting point and validate on your own broker's data before going live.

- **Symbol:** a liquid FX major such as EURUSD (tight spreads keep the compact ATR stop meaningful).
- **Timeframe:** M15 to H1. Lower timeframes see more emergence signals but more noise; higher timeframes see fewer, cleaner ones.

- **EntropyThreshold:** the primary sensitivity dial. Lower it (e.g. 0.45) to demand a deeper collapse into structure — fewer but higher-conviction entries. Raise it for more frequent signals.
- **Risk sizing:** keep `Lots` conservative relative to account equity. The strategy is built around a ~1% drawdown target, which only holds when position size is proportionate.

Tip: optimise `EntropyWindow` and `EntropyThreshold` together — a wider window naturally produces lower, smoother ApEn values, so the threshold that best separates chop from trend shifts with it.

How to Install on MetaTrader 5

- 1 Copy `PredictabilityEmergenceTrend.ex5` to your MT5 `MQL5\Experts\` folder
- 2 Restart MetaTrader 5 and refresh the Navigator panel
- 3 Drag the EA onto a chart matching the recommended symbol and timeframe
- 4 Configure the input parameters and click **OK**
- 5 Enable **Algo Trading** in the MT5 toolbar

Risk Warning

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