Bayesian Timing Signal Subscribers' Guide 2.0

by Luke Miller, PhD

Executive Summary

The Bayesian Timing Signal (BTS) is a premier swing trading system providing a signal to long, short, close a position, or be neutral for a range of ETFs in US indices, metals, and energy. The BTS swing trading system has averaged 30% annual returns since 2007. The majority of holding periods per position are 5-15 days. The BTS uses a proprietary Bayesian learning process to probabilistically identify the optimal time to enter/exit positions. (Note: The same Bayesian learning process underlying artificial intelligence and the Google search engine.)

The BTS is a long-short swing trading system that provides a simple-to-follow signal to long, short, close a position, or be neutral for the following ETFs:

US Indices: SPY, QQQ, IWM

Metals: GLD, SLV, GDX

Energy: USO, UNG

Others: IBB, XLF, JJC, TLT,….

Bottom Line

If you're looking for a clear signal to trade popular ETFs with targeted holding periods per position of 5-15 days with a 10-year track record of 30% annualized returns, then the BTS is for you.

BTS Subscriber's Guide Layout

I developed the BTS to exclusively swing trade high net worth accounts and help Fortune 500 companies make investment decisions; as such, you will not find anything else about it anywhere in the world. This guide is an overview of the BTS and contains the base level of information necessary to understand the signal and how to trade it – it is HIGHLY RECOMMENDED you read the entire guide! This is the first time the BTS is being offered to a retail audience. Here's the layout of the Guide:

Section 1: BTS Tenets. What tenets and expectations drove the development of the BTS. Is the BTS right for you? And a short bio about the developer of the BTS.

Section 2: SHow to Trade the BTS in an ETF Portfolio. A detailed explanation and example on how to trade the signal. Can a 5th Grader trade the signal? Yes….

Section 3: BTS Results. Detailed discussion of 12-month returns since 2007, including a discussion of historical volatility following the signal

Section 4: Are You A Bayesian Trader? A brief discussion of my proprietary Bayesian learning research and how it can be used to improve investment timing decisions

Section 5: Bayesian Vibration Windows and the BTS. Bayesian vibration windows are a significant component of the BTS. What are vibrations? And what is the relationship between vibrations and the BTS?

Section 6: Thoughts On Trading the BTS. A few guidelines to consider when trading the BTS.

Section 7: Frequently Asked Questions (FAQs).

Section 1: BTS Tenets

The following tenets guided the development of the BTS:

1. The BTS is an ETF signal-based swing trading strategy targeting 5-15 day holding periods per position.

2. The BTS provides a simple and easy to follow signal to long, short, close a position, or be neutral.

3. The BTS is NOT an intraday trading strategy (i.e. not looking to take positions for several minutes to several hours).

4. The BTS takes advantage of market volatility.

5. The most effective way to use the BTS is in a diversified portfolio across all ETF signals. (Note: An example is provided in this guide.)

6. The BTS believes in proper exposure per ETF position and not overcommitting to any single trade.

7. The BTS believes that waiting to take a position is like waiting for the bus. If you miss a set-up, another one will come along shortly. And it doesn't matter where the bus has been; it matters more where it's going.

8. The BTS believes cash is a position.

9. The BTS believes you can't lose money taking profits, balanced risk management, and letting your winners run.

10. Using Bayesian learning the BTS identifies the highest probability path of an ETF over the next 5-15 days. It rarely picks exact tops and exact bottoms. Do not expect it to do so. Historically, following the signal was led to 30% annualized returns applied to ETFs for

US Indices, Metals, and Energy. (Note: Please see the Results section of this guide for historical volatility following the signal.)

If the majority of these tenets resonate with you, then the BTS is for you. The BTS will only provide an impersonal trading signal to long, short, close a position, or be neutral for a range of ETFs. Nothing more, nothing less. You may choose to trade the signal as is, or use it as an input to your existing trading strategy.

If you are looking for an intraday trading signal, the BTS is NOT for you. If you are looking to get rich quick, the BTS is NOT for you. If you are expecting the BTS or any swing trading system to identify exact market bottoms and tops, then you are being unrealistic and need to find a new hobby. If you are the expecting the BTS to be a crystal ball and "always" get it right – close your brokerage account now and put your money in a savings account. (Refence the Results section of this guide for a better understanding of the signal's performance.)

Dr. Luke Miller Bio

Luke Miller has been an active trader for over twenty years. In 2003, he earned the Gilbreth Memorial Fellowship (top PhD student in the nation) and has since published over one dozen peer reviewed journal articles and a book in his area of expertise – investment timing decisions utilizing a novel technique he developed called Bayesian Learning Option Pricing (BLOP). Luke's Bayesian timing research has been presented all over the world and most recently won Best Presentation Award at the 18th International Conference on Business & Finance in Paris in 2016. Luke is presently a college professor and investment consultant to high net worth clients.

Finally, here are links to two of my papers discussing Bayesian learning and timing decisions (Please note these papers present the Bayesian approach from a firm's decision-making perspective -- these concepts are the foundation for the Bayesian Timing Signal):

https://www.elliottwavetrader.net/r/Activation_Decision.pdf

https://www.elliottwavetrader.net/r/Learning_Options.pdf

Section 2: How to Trade the BTS in an ETF Portfolio

Swing trading with the Bayesian Timing Signal in a portfolio context is discussed below:

1. Determine the total investment amount to trade with the Bayesian Timing Signal. For this example, let's assume $100,000.

2. The Bayesian Timing Signal is produced for the following ETFs:

   a. US Indices: SPY, QQQ, IWM

   b. Metals: GLD, SLV, GDX

   c. Energy: USO, UNG

   d. Others: IBB, XLE, XLF, JJC, TLT, …..

3. The Bayesian Timing Signal is always in one of four states for each ETF: (1) Long, (2) Short, (3) Close Position, (4) Be Neutral (remain in cash)

4. The Bayesian Timing Signal is ***targeting*** holding periods between 5-15 days; however, the signal is generated real-time, so the exact holding period is unknown when a signal is triggered. Historically, holding periods between several days and several months have also been observed. As far as remaining in the trade, that's completely a function of the trader's investment time horizon; which is a function of wealth, risk tolerances, etc. The BTS does not offer an opinion. What the BTS does offer is a signal for when to open and close position -- of which traders may choose to follow or not; depending upon their investment time horizon. As the targeted holding period time-horizon the BTS is 5-15 days (this has historically varied between days and months and is determined real time, so I don't know in advance), the BTS doesn't know if this holding period expectation matches with your

holding period expectations -- as the signal is nothing more than an impersonal signal to guide investment decision making

5. Historically, following the signal in a portfolio context has led to an average 12-month return of 30% over the last 10 years. Please see Results section of this guide for more details regarding performance and historical volatility of the portfolio. It is highly encouraged you read the results section to gain a "feel" for how your portfolio may change in value following the BTS.

The Bayesian Timing Signal does NOT provide a stop loss value. The signal has a "built in" stop loss identifier, but keep in mind it is doing this in the context of Bayesian learning (i.e. don't expect a simple linear rule, in the nonlinear price world of markets). For example the BTS is programmed the following: if you are following a Long signal and the price begins to move away from you (i.e. price drops); then wait for the signal to go to Be Neutral or Short before closing your Long position. HOWEVER, depending on your risk tolerances, it may be appropriate to construct your own risk management strategies in combination with the BTS. This service WILL NOT provide any personal advice as it relates to trading the signal or risk management trading the signal. My professional status precludes me from giving you personal trading advice as it relates to when to book profits or specific risk mng strategies.

6. Trades are placed across ETFs according to the following optimized portfolio allocation plan. (Note: These allocation percentages have been determined using an exhaustive list of inputs and observations – all in the context of the Bayesian timing signal.) This is only a recommendation based on the data. You are ***highly encourage*** you to consider your personal risk preferences before placing any trades.

	US Markets			Metals			Energy		*Other	
ETF	SPY	QQQ	IWM	GLD	SLV	GDX	USO	UNG	Other1	Other2
% Portfolio	16%	14%	12%	13%	7%	6%	7%	5%	10%	10%

Other: IBB, XLE, XLF, JJC, TLT

For this example, assume a $100,000 starting portfolio value. The allocation per ETF would be:

	US Markets			Metals			Energy		*Other	
ETF	SPY	QQQ	IWM	GLD	SLV	GDX	USO	UNG	Other1	Other2
% Portfolio	16%	14%	12%	13%	7%	6%	7%	5%	10%	10%
$ Portfolio	$ 16,000	$ 14,000	$12,000	$13,000	$ 7,000	$ 6,000	$7,000	$5,000	$10,000	$10,000

An investment amount of $16,000 has been allocated to the SPY signal. This is called the SPY Bucket. When possible, see to it that investment dollars in one bucket do not mix with investment dollars in other buckets, and investment dollars within a bucket may be compounded or not, at the trader's discretion. For an example of compounding gains, let's assume the value of your SPY bucket today is $16,000. A Long signal for SPY is triggered @ $201.27 and you go long $16,000 worth of SPY. The Long signal for SPY stays active for several weeks and then switches to Neutral; as such, you close your position in SPY @ $209.68. The SPY position increased 4.2% and thus your SPY bucket now has a value of $16,669. The next time you trade the SPY signal (long or short) you allocate $16,669 to that position.

7. How about an evenly-weighted Portfolio allocation? Members may choose to allocate or use the signal at their discretion. The results of the BTS assume an optimal portfolio allocation in accordance with modern portfolio theory. However, it may be simpler to simply allocate an equal 10% per ETF bucket. Assuming a 10% allocation per ETF bucket,

the average return of the portfolio increases slightly, but with increased volatility versus the optimal portfolio. Let me quantify it:

Optimal Portfolio Average 12-month return = 30.04%

Evenly-Weighted (10% per ETF Bucket) Average 12-month return = 32.57%

Now let's talk about volatility. The evenly-weighted portfolio is expected to have 13.75% more volatility on a monthly basis versus the optimal portfolio. The simplest interpretation would be the following: Assuming steady state (i.e. meaning we have fully allocated portfolio for an entire month); if the model portfolio returned 3%, the evenly-weighted portfolio would have returned 3%*(1.1357) = 3.41%. However, if the model portfolio had returned -3%, the evenly-weighted portfolio would have returned approximately -3%*(1.1357) = -3.41%.

8. Here is a more detailed example trading the SPY signal. All other ETF signals will be traded in a similarly.

ETF: SPY

Date	ETF	Signal	Entry	$Bucket	Exit	% Return	$Bucket
10/12/2015	SPY	Neutral					
10/13/2015	SPY	Go Long	201.27	$16,000			
10/14/2015	SPY	Long					
10/15/2015	SPY	Long					
....	.....	....					
11/6/2015	SPY	Go Neutral			209.68	4.18%	$16,669
11/7/2015	SPY	Neutral					
11/8/2015	SPY	Neutral					
.....	.....	.....					
11/24/2015	SPY	Go Short	208.59	$16,669			
11/25/2015	SPY	Short					
11/26/2015	SPY	Short					
.....	.....	.....					
12/14/2015	SPY	Close Short			202.25	3.04%	$17,175
	SPY	Go Long	202.25	$17,175			
12/15/2015	SPY	Long					
12/16/2015	SPY	Long					
12/17/2015	SPY	Long					
.....	.....	.....					
1/6/2016	SPY	Close Long			198.96	-1.63%	$16,896
		Go Short	198.96	$16,896			
.....	.....	.....					

On 10/12, the SPY signal was Neutral. On 10/13, a Long in SPY was triggered and $16,000 was placed on the SPY trade. The SPY signal stays Long until 11/6, when the signal indicates Neutral and the position is closed. The SPY signal stays Neutral until 11/24, when a Short is triggered and $16,669 of SPY is shorted. The SPY signal stays short until 12/14 when a Long is triggered – two actions occur (1) the short SPY position is closed and (2) a long position of $17,175 is initiated. The signal stays long until 1/6, when a Short signal is triggered – two actions occur (1) the long SPY position is closed and (2) a short position of $16,896 is initiated……

9. Assume all the ETF signals are traded between 10/12/2015 and 1/6/2016. With each investment dollar remaining in its own ETF bucket over this time-period and gains compounded, the portfolio's value would be:

	Portfolio Value		SPY	QQQ	IWM	GLD	SLV	GDX	USO	UNG	Other1	Other2
10/12/2015	$ 100,000		$ 16,000	$ 14,000	$12,000	$13,000	$ 7,000	$ 6,000	$7,000	$5,000	$10,000	$10,000
1/4/2016	$ 105,852		$ 16,896	$ 15,039	$13,387	$13,417	$ 7,196	$ 6,514	$6,818	$5,121	$10,486	$10,978

Section 3: BTS Results

Have you noticed most stock trading services only provide calendar year results? For example, for a five-year time-period there will only be 5 return calculations…one for each year. A more complete results discussion would have not only annual results; but should have every single 12-month time period return.

Below find the 12-month return observations for ALL 113, 12-MONTH time periods between January 2007 and April 2017. The 12-month time periods analyzed include:

12-Month Increment	Time Period	Return
1	1/07-12/07	29.58%
2	2/07-1/08	33.28%
3	3/07-2/08	29.81%
4-110	…………..	……….
111	3/16-2/17	16.52%
112	4/16-3/17	6.00%
113	5/16-4/17	16.17%

In Table 1, the return characteristics for all 113, 12-month observations between January 2007 and April 2017 are itemized. Of the 113 observations, the worst 12-month return was 0.28% and best return was 72.85%. The average 12-month return was 30.04%. There were zero negative 12-month returns.

		12 month
	Average	30.04%
	Count	113
	# Negative	0
	% Negative	0.00%
	Worst	0.28%
	Best	72.85%
	5%	8.28%
	10%	12.59%
	15%	13.78%
	20%	16.45%
	25%	17.55%
	30%	20.21%
	35%	21.42%
	40%	24.37%
Percentiles	45%	26.45%
	50%	28.81%
	55%	30.29%
	60%	31.43%
	65%	34.43%
	70%	39.89%
	75%	41.88%
	80%	42.92%
	85%	45.90%
	90%	51.55%
	95%	56.16%

Table 1. BTS 12-Month Return Analysis

Let's discuss the percentiles table:

1. The 50th percentile return was 28.81% -- meaning half of the time the 12-month return was greater than 28.81% and half of the time the 12-month return was less than 28.81%.

2. 95% of the time, the 12-month return was greater than 8.28%. Or alternatively, a 12-month return less than 8.28% occurred less than 5% of the time.

3. 75% of the time, the 12-month return was greater than 17.55%

4. 25% of the time, the 12-month return was greater than 41.88%

Growth of $100,000 Using the BTS

As a subscriber, don't you want to know what you are buying – you wouldn't buy a car without test driving it or buy a house without walking through it, would you? Figure 1 shows the hypothetical growth of $100,000 using the BTS since 2007, assuming compounding. Thus, $100,000 invested in January 2007 would have grown to nearly $1.3 million today.

You are encouraged to study Figure 1 and grasp the historical volatility of using the BTS. Consider the following "negatives" noted on the plot:

- Note A: Even though the average 12-month return is 30%, this 21-month time-period had a total return of 23%.

- Note B: The largest drawdown as a function of time was down 14% over two months.

- Note C: A drawdown of 8% over 4 months.

- Note D: Eight months of back-and-forth returns with a 3% drawdown over this time-period.

- Note E: A 5-month drawdown of 9%.

- Note F: A frustrating 12-months of down 9%, then back up 9% to be the worst performing 12-month return at 0.58%

- Note G: A recent back-and-forth, 5-month, go nowhere time-period.
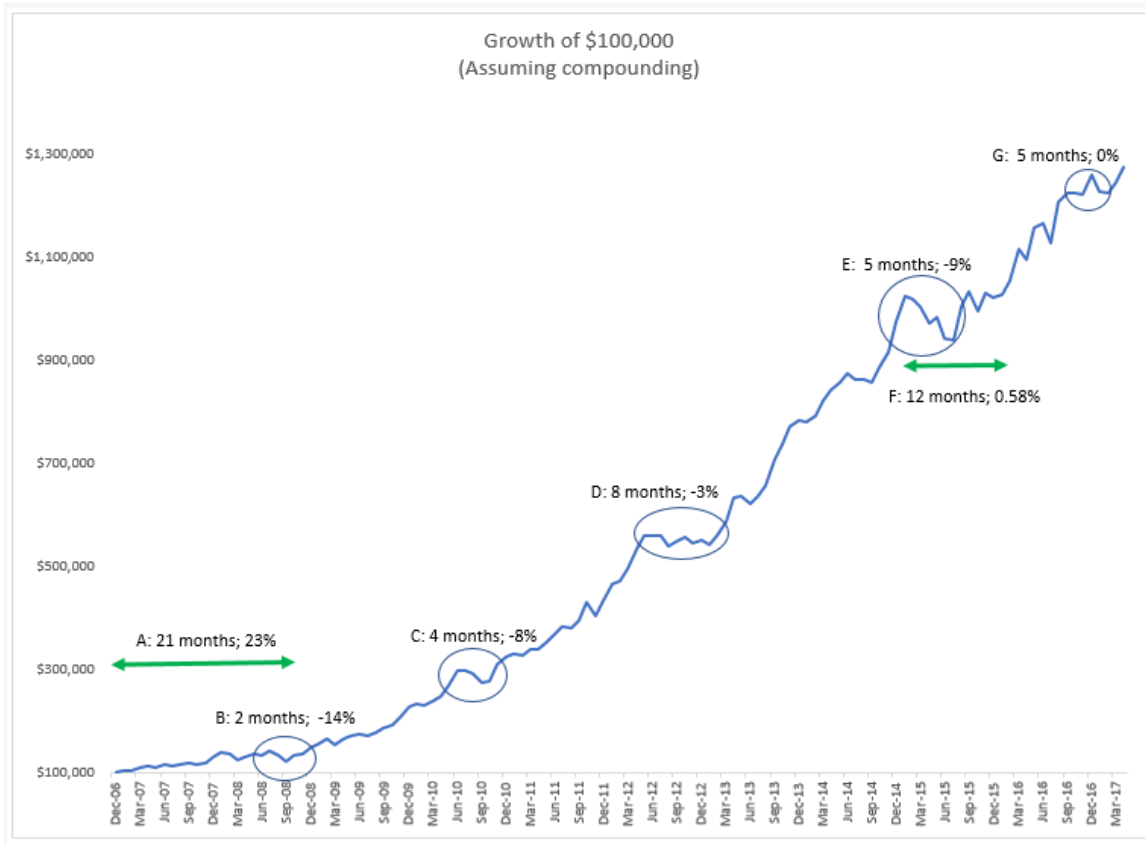
Figure 1. Growth of $100,000 Using the BTS

Why do I point these notes out; isn't it atypical for a service to highlight negatives?

1. I want to be as upfront as possible. Members have the right to know what they are buying.

2. Despite setbacks along the way, following the signal has led to a portfolio value increase of 13x over 10 years.

3. Even though the BTS has shorter-term volatility, it generates long-term success.

4. As you study the plot, keep in mind the bear and bull market cycles since 2007 in indices, metals, and energy; and make a note of how well the signals have performed in both types of market cycles.

5. The BTS has numerous market beating time-periods; quantify those on your own.

The U.S. Securities and Exchange Commission (SEC) requires the following legal notices:

There is no guarantee past performance will be indicative of future results. No assurance can be given the trading signals will be profitable or will not be subject to losses. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. No independent party has audited the performances discussed, nor has any independent party undertaken to confirm that they reflect the trading method under the assumptions or conditions specified herein.

The trading signals are an impersonal advisory service and no consideration can or is made toward your financial circumstances. All material presented within is not to be regarded as investment advice, but for general informational purposes only. It is suggested the Client/Member test all information and trading methodologies through paper trading or some other form of testing. It is recommended to consult with a registered investment advisor, broker-dealer, and/or financial advisor. If you choose to invest with or without seeking advice from such an advisor or entity, then any consequences resulting from your investments are your sole responsibility.

Section 4: Are You A Bayesian Trader?

Question: Do you think your favorite sports team is going to win the Championship? Your Answer: I give them a 60% chance.

If you immediately answered by speaking in probabilistic terms, then you're a Bayesianist.

Now, consider your team just picked up the league's two best players in a blockbuster trade deal. Again, you are asked the same question: Do you think your favorite sports team is going to win the Championship? Your Answer: I give them a 70% chance now.

You're a math genius because you just did a mathematically complicated Bayesian revision by combining your *a priori* belief (60% chance) with *new information* (blockbuster trade) to obtain your *posterior* belief (70% chance).

If you Google the word "Bayesian", you'll most likely get a complicated series of mathematical expressions and a reference to Reverend Bayes. Let's not get into the number crunching weeds here – if you can establish an *a priori* belief for an unknown event and then be open-minded enough to change your *a priori* belief when presented with new information, as appropriate; then you and Reverend Bayes see the world through a similar lens. Thus formally, for an unknown event, the Bayesian revision process is the mathematical bridge linking *a priori* to *posterior* probabilities as a function of new information. Seems like common sense… at least to a Bayesianist it does.

Bayes can be found in nearly all disciplines today. Here are a few examples:

- Bayesian models and networks are used to analyze sequences of data in finance, artificial intelligence, engineering, medicine, philosophy, sports betting, and political polling.

- Some psychologists believe the human brain itself might be a Bayesian-reasoning machine. They suggest the Bayesian capacity to draw strong inferences from data could be crucial to the way the mind perceives the world, plans actions, comprehends and learns language, reasons from correlation to causation, and even understands the goals and beliefs of other minds.

- Bayesian modeling provides a unifying framework that has made important contributions in nearly all areas of cognition, including perception, language, motor control, reasoning, learning, memory, and development.

- Bayes's ideas are used by computer scientists trying to design software with human-like intelligence.

- Bayesian reasoning now lies at the heart of leading internet search engines and automated "help wizards".

- And for those sports and political nerds, consider that Nate Silver uses Bayesian for forecasting and discussions on his popular website, www.fivethirtyeight.com and its relationship with www.espn.com

How can Bayes help traders?

Over ten years ago, I developed the Bayesian Learning Option Process (BLOP) to improve investment timing decisions and created the Bayesian Timing Signal (BTS). My research has been presented and won awards all over the world. Applied to trading, the BLOP has earned 30% per annum in both bull and bear markets. Let's break these terms down… Bayesian…Learning…Option…Process. Consider the following:

It's not a stretch to see how a <u>Bayesian</u> approach can be helpful in assessing the future path of a security. Consider that an analyst implicitly or explicitly "assigns" an *a priori* belief to a future price path. Then, as new information is observed in terms of the strength and form of the price movement, price and time divergences, indicators like RSI and MACD, etc.; the talented analyst will update their *a priori* belief to reach a *posterior* belief price path. This resulting *posterior* belief price path now becomes the new *a priori* belief, more information is observed, which leads to a *posterior* belief price path… and on and on. This <u>Process</u> becomes a series of embedded conditional probabilities in a <u>Learning</u> feedback loop as the analyst continually assesses price path and formulates a trading plan. (Note: the BLOP terms <u>Bayesian</u>, <u>Learning</u>, and <u>Process</u> are underlined above.)

How do <u>Options</u> contribute to BLOP?

<u>Options</u> contain a significant amount of information regarding the underlying security of interest; however, the most valuable information is the embedded sentiments and beliefs of price and time expectations of market participants. You have probably heard that options are leveraged bets on the underlying. Well, options contain a "leveraged" amount of information that helps the Bayesian learning process observe and explicitly incorporate valuable information into the decision process. Thus, it could be said this option information is used to update *a priori* beliefs to quantify a *posterior* belief for investment timing decisions. I term the probabilities assigned to an *a priori* and *posterior* belief, Bayesian Probabilities (BPs). When the BPs indicate the price and time for a security are at favorable odds to deploy capital, a long or short position is established.

And there you have it… the Bayesian Learning Option Process (BLOP) is a mathematical methodology to assess price path movement using option prices as inputs into a Bayesian learning feedback loop to identify optimal timing to invest. What could be simpler?

Section 5: Bayesian Vibration Windows and the BTS

1.   What is a Bayesian vibration window?

An important moment in time that reflects the sentiment of traders. The idea of a time vibration is not new – Gann and others have long held there is a timing component to investment decisions. However, Gann and others assume a linear or geometric relationship between time and price. There may be some evidence for this observation; but I took it a step further and asked myself "Can Bayesian be used to view investment timing decisions from a nonlinear perspective to match the nonlinear nature of price movement?" Here is my definition of a Bayesian vibration window:

"A Bayesian vibration window is a moment in time that serves as resistance or support in price – usually manifesting as a relative high or low in price – note that I use Bayesian Probabilities (BPs) to help identify these vibrations and their significance. Vibrations do not guarantee a sustained change in price direction – but, many times the markets at a minimum do exhibit a bounce of sorts. Vibrations are applicable to every time window – in a similar manner as an EW count. These vibrations can be found in all markets to include indices, metals, and energy.

How can one trade a vibration? Here is one example. Be in cash until a Bayesian vibration timing window – then if the market is at a relative high or low – place a trade accordingly. Trade for just a bounce, as many times a vibration is only that. And/or trade for a sustained price change as a vibration offers a good risk vs. return with clean risk management levels. If playing only for a bounce – if you have profits, take them. Can't lose money taking profits. Then you are back in cash. Wait for the next vibration window….if the market is at relative high or low, then trade accordingly…..repeat."
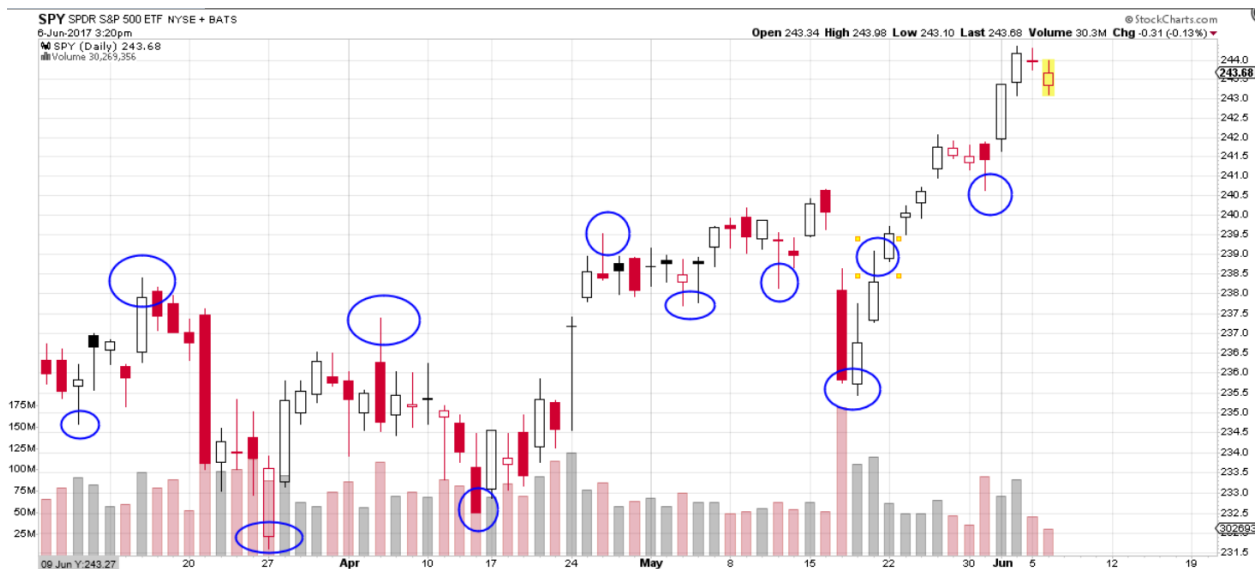
2.   How are Bayesian vibrations identified?

I've built a proprietary system that uses Bayesian learning to identify vibration dates. My Bayesian research has received recognition at conferences all over the world, I've written a book, and published over a dozen articles in peer reviewed journals on it. As an aside, Bayesian learning is what cognitive scientists use to program Artificial Intelligence (AI) and what Google uses in its search engine.

3.   When are Bayesian vibration dates identified?

Some vibration windows (or dates) are spotted in advance and then confirmed real time. But sometimes, they are only identified real time.

4.   Can the "naked eye" spot a Bayesian vibration when it is occurring?

Most of the time. Vibration windows usually manifest themselves as relative highs and lows in the market. A relative high is a High of the Day (HOD) that exceeds "obvious" other recent HODs. A relative low is a Low of the Day (LOD) that exceeds "obvious" other recent LODs. Study Chart 2 below. Each of the circled candles are vibration windows for SPY.

Figure 2. SPY vibration dates are circled in blue

5.   Are Bayesian vibration windows tradeable occurrences?

Yes. If the market is in a vibration window, and a relative high has formed then you've got a HOD

marker. Consider shorting or selling longs and then using the HOD marker for risk management

(i.e. appropriate stops or options-based hedging). If the market is in a vibration window, and a

relative low has formed then you've got a LOD marker. Consider going long or closing shorts and

then using the LOD marker for risk management.

6.   Historically, how accurate have Bayesian vibration windows been?

Approximately 66% are accurate. Thus, about 2 in 3 relative highs and lows in a vibration window

will hold for a tradeable bounce.

7.   What about the 1 in 3 times that a vibration HOD or LOD marker doesn't hold?

I term this a vibration violation. Let's do an example. Assume the HOD marker is $50. You place

a short position and the next day the price gaps above $50. With proper risk management, you

have just been stopped out; usually with a small loss. However, there's more….. Vibration windows are where traders and investors are "stacked" up or lined up to place trades. In 2 out of 3 times, the sellers for a relative high "win" and the buyers for a relative low "win". However, 1 in 3 times, the vibration is violated. As the traders are stacked in a vibration window, if the trade begins to move away from them, they run for the hills by throwing fuel on their own fire. As such, vibration violations more times than not lead to a quick and strong move in the direction of the violation. Back to our example. If the HOD marker at $50 is exceeded then expect a strong move up to $51 or more in a short amount of time. If you are nimble; then take your loss at the HOD marker for the short position you initially started with; and then immediately enter a long position. Historically, at a minimum, breaking even on most vibration trades is doable – as 2 out of 3 times the vibration holds and you get a bounce to book profits. And 1 in 3 times when the vibration is violated, swap out your short for a long or your long for a short and ride it the other way as described above.

8.   Can you provide me an example of how to trade the vibration windows and vibration violations?

Yes. See Figure 3 below and the accompanying discussion:

Figure 3. How to trade Bayesian vibration windows?

Point A: Vibration day 5/3, Relative Low. The relative low held and a $2 tradeable bounce up ensued.

Point B: Vibration day 5/11, Relative Low. The relative low held and a $2.5 tradeable bounce up ensued. AND THEN, the vibration day relative low was violated several days later. Remember the vibration day rule; if a vibration is violated, expect a fast move in the other direction -- well, notice the quick drop and $2 tradeable shorting opportunity.

Point C: Vibration day 5/19, Relative high. The relative high was violated immediately; and guess what? A $3 tradeable up scenario to date.

9. How are Bayesian vibration windows related to the Bayesian Timing Signal (BTS)?

Vibration windows were the first things I discovered using the Bayesian learning system many years ago. I traded them using the exact approach I discussed above with promising results. However, as you may have already ascertained, there are times when the rules of thumb cannot be easily applied or sometimes vibration windows are too close to one another; thus leading to conflicting rule sets.

To cut through the confusion, the BTS was born. The purpose of the BTS is to determine using Bayesian probabilities (BPs) the best course of action to enter/exit positions. More specifically, the signal factors in the current vibration window PLUS most recent and future vibration windows PLUS the quality of the move so far PLUS information extracted from options prices to determine the highest probability direction of the market over the next 5-15 days. As such, sometimes the signal may appear to contradict the most recent vibration window HOD or LOD markers -- but it's only doing that as it assesses the likelihood of a vibration holding or being violated in the context of all the information Bayes learning is evaluating. (For example, the signal could be long; but this vibration could be a relative high -- as such, from a 5-15 holding period perspective, Bayes determined the chance of a vibration violation as higher and signals accordingly. Basically, the signal is set up for a 5-15 day swing trade -- the vibrations can be stacked closer than that.)

As such, it would be coincidence if the signal were to trigger exactly on a vibration relative high or low. Finally, because the signal is targeting 5-15 day holding periods, it must do its best effort to "smooth" out vibrations and as Avi states from time to time "sometimes it isn't worth

waiting around for that last squiggle to enter a position" – and as such, the signal may trigger before or after a vibration window.

The BTS signal is real time and needs to make those its signal decisions on the fly -- while managing any opens positions (thus, to take profits or not to take profits between vibration windows). Using BPs, the BTS targets a 75% probability of success before a signal is triggered. So really there are two levels of analysis -- identifying higher probability vibration dates for relative highs and lows; and then deciphering information between vibration dates.

Section 6. Thoughts on Trading the BTS

As I've mentioned, the BTS is not explicitly designed to identify highs and lows – the BTS does a "weighted average smoothing" calculation across Bayesian vibration (or timing) windows. Looking at the data, the BTS is generally 50-50 over the long run as it relates to the exact time of the signal and the expected price movement. For example, if a signal changes to Long, then about half the time the ETF begins trending up at the approximate time of the signal and half of the time the ETF has OML (one more low) in the cards. This fluctuates across time; and even though I continue to tweak the BTS, the 50-50 observation remains. With that in mind, here are some ideas to trade the signal:

1. When the signal triggers, initiate a full signaled position in accordance with the Optimal Portfolio Allocations as discussed in this Guide. Note the results described in the Guide are based on this approach.

2. When the signal triggers, enter 1/3rd of your position, enter 1/3rd the day after, and enter 1/3rd on the third day. For US Indices, the BTS identifies near market open for best entry prices, on average, to enter positions on days 2 and 3. For commodities, the BTS identifies between 1:00-1:30 PM for best entry prices, on average, to enter positions on days 2 and 3.

3. Place ½ of your allocation upon signal trigger time, then wait for a OML/OMH to position the other half. Thus, you have half a position if it trends immediately. And you can average in a better price, if the OML/OMH happens.

4. When the signal switches from Long or Short to Neutral, consider exiting your position in a similar manner as you may have entered it. In other words, (a) exit the entire position at the time of the signal change to Neutral, (b) exit 1/3rd of your position at the time of the signal change to Neutral, 1/3rd the day after the signal change, and 1/3rd two days after the signal change, OR (c) exit half of your position at the time of the signal change to Neutral and the remaining half upon OMH/OML.

5. When the signal switches from Long or Short to Neutral, consider setting either a static or trailing Stop for your position. Even setting up a dynamically weighted static or trailing stop can be advantageous – possibly in synch with item #4 above.

Section 7: Frequently Asked Questions From Members

1. Where can I find the chart with all holdings on a daily basis?

The trade table can be accessed at the top of Bayesian Timing Trading room (see screenshot).
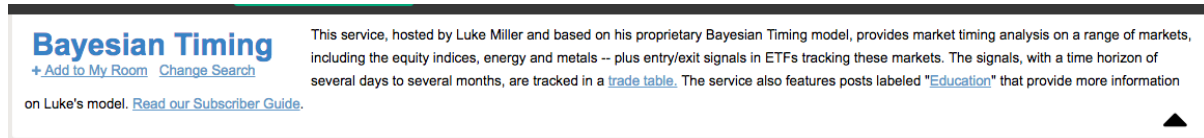
2. Where can I find the BTS guide?

It can be accessed at the top of Bayesian Timing Trading room (see screenshot above).

3. Why are there no probabilities or vibration windows in the trade table?

There are 3 discrete states in the BTS: (1) Long; (2) Short and (3) Neutral. As the Bayesian probabilities change continuously throughout the day, it would not be practical to post the BPs in the table.   As for vibration windows, there are major and minor vibration windows and can evolve and even appear real time; as such, it is not practical to have vibration window dates in the table. I will make efforts to guide users to dates of interest to improve their decision making.

4. Do you know how your system performs if you were to only follow the long trades and ignore the short trades?

I do not. However, it's very likely that the annual average return would be (substantially) lower than 30% achieved over the past 10 years. Intuition tells me in bull markets the long strategy prevails and in bear markets the short strategy prevails. The problem is when does one start and the other begin and what happens during that transition? One reason I built the BTS was to help with these issues. The only way to truly analyze it would be in hindsight when you can clearly look at a chart and say "bear market" or "bull market" -- a luxury not afforded with real-time positioning.

5. When "shorting" do you actually short the ETF or do you buy an inverse ETF?

The BTS assumes the ETF is actually shorted. However, there are inverse ETFs (or leveraged inverse ETFs, option strategies, etc.) that effectively do the same as shorting the ETF. Unfortunately, I am not in a position to offer personal advice on which of those approaches is best for you, per my professional status. I encourage you to do your own research and reach your own conclusions regarding leveraged ETFs.

6. The trade table for open trades only contains an entry price, so it is up to us to decide the exit point?

Not entirely. The signal is real time and will change from Long or Short to Neutral when the BTS determines the probability of holding a position Long or Short approaches a coin flip. You may choose to wait for the signal change (which is real time and I don't know when that will be nor what the price will be) or you may close positions at your discretion.

7. Do you have pre-determined stop levels relative to your entry level?

There are not static stop levels with the BTS. It has a built in "stop" system, which is real time. I encourage you to consider this in your decision to implement the BTS into your existing trading system and how you will implement appropriate risk management as a function of your risk tolerances. When the signal goes to either Neutral or Short (assuming the initial signal was Long) -- that is effectively your stop.

8. For the model portfolio presented in your guide, how was the Other1 and Other2 allocated when more than 2 ETFs in your OTHER bucket have active signals?

The model portfolio is set up for 10 buckets. However, sometimes I will have more than 10 ETFs with an active signal -- I will simply list the active signals and leave that decision up to you. In other words, as a function of your interests and risk tolerances you may trade the others at your discretion -- you could even do 5% each times 4 equals 20% of the allocation for example or you could just select two.

9. The target holding period of 5-15 days, is that trading days or calendar days?

It is measured in trading days. However, even though the target holding period is 5-15 days, holding periods have extended longer (even months). The BTS continually is forward looking about one week out and making its best guess of "will the ETF be higher or lower (in BP terms)?" and then aligns the signal to that analysis.

10. Have you performed actual trades based on vibration windows and the signal?

Yes. I encourage you to read my EWT posts from several years ago when I spoke directly to trading vibration windows; long before I considered being an EWT analyst.

11. How do you approach rebalancing of the Optimal Portfolio?

Here's how I've handled reallocation:

Baseline (per category): US indices (42%); metals (26%); energy (12%), other (20%)

Whenever one category exceeds a 20% variation; I reallocate accordingly. For example, if the percentage of the portfolio were to increase to (1.2)*(42%)=50.4%; then reallocate as appropriate to the other buckets. With that said, I have backtested the reallocation strategy. From a quarters perspective, the BTS has been consistent enough (to date) that the category allocations are relatively stable. In other words, historically, reallocation hasn't been a major contributing factor, statistically speaking, to returns.

12. What is the "typical" percentage of the portfolio invested?

This will fluctuate across time, but about 7 buckets (or 70% of capital allocated) are usually in a swing trade either long or short at any one time.

13. Over a 12-month horizon how is performance correlated between the instruments?

Here is an aggregated correlation matrix for the 10 years (which obviously change over time). But this should give you an idea:

	Indices	Metals	Energy
US Indices	1		
Metals	-0.14	1	
Energy	0.38	0.02	1

14. How much does the system's performance degrade if all trades are done at the close of day instead of when actually triggered?

Historically, missing the "exact" signal to the minute hasn't mattered much as many times it finds support (or resistance) before trending in the expected direction -- so sometimes it will chop around for a few days. It's not going to catch every last squiggle -- by design even as it targets 5-15 day holding periods. Hence, the close of the day is fine and the results are virtually the same.

15. Which ETFs do you track in the Other category?

IBB, XLE, XLF, JJC, EEM, EFA, TLT, ...

16. The target holding period is 5-15 trading days as I understand it. How long can a trade extend out to? The reason I ask is I will likely use options and don't want to run out of time.

Roughly speaking about 70% fall within 5-15 days depending upon the ETF -- 10% less and the other 20% is greater. However, this has also been a function of the time period of study -- when markets are trending or consolidating, the holding period tends to be longer. For example, holding periods of greater than 15 days can exceed 50% over some time periods.

17. Do you have a resource for inverse ETFs?

The following link has been suggested by one of our members:
http://etfdb.com/type/equity/all/inverse/

18. Do ex-div days affect signals?

No, since there is no financial impact. In other words, the price of the ETF drops by the amount of the dividend, say x dollars, and the holder of ETF receives x dollars, so net net it's a wash. Having said that one minor concern with ex-div days is the "drop" in the ETF value by the dividend amount -- it doesn't change any of the BP or window calculations -- only the visual inspection of a relative high or low (be sure to adjust for the dividend amount).

19. How do you interpret a relative high and low in the same vibration window?

That scenario gets a bit tricky -- and it was this exact scenario that led me to develop the BTS because I said "what do I do now? I've got both a relative high and low in the same window?" This this scenario has even occurred on a single, wide range day. Using only the vibration window as a guide; I learned the best rule of thumb to trade this situation is to go long above the previous two days HODs and short beneath the previous two days LODs -- in between, be patient. However, please not the BTS factors this situation in; plus looks at the BPs for future vibrations in combination with the quality of the price movement and option prices to "best guess" the path over the next week or two.

20. Please explain the "3-day rule of thumb" you have mentioned in a few posts.

3day Rule of Thumb for Break of Obvious Support, Resistance, Trendline, or Pattern

1. I have performed many historical studies of popular chart patterns. One of them is the break of an obvious support, resistance, trendline, or pattern.

2. This is only a 3day rule of thumb -- that means statistically the odds are in your favor to trade it. It does NOT mean it is GUARANTEED!! Plan your risk management strategy appropriately.

3. Please read this thread where I introduce the 3day rule: https://www.elliottwavetrader.net/members/atchat/?threadId=4034803

4. For an example, let's consider current GDX -- an obvious break occurred on 7/3. The LOD on Day 1 (7/3) = 21.46. The LOD on Day 2 (7/5) = 21.42. The LOD of Day 3 (7/6) = 21.44 (as of this minute). Let's assume the LOD for today (7/6) holds at 21.44. The 3day LOD is minimum(21.46, 21.42, 21.44) = 21.42. According to the 3day rule, if there is a daily close below 21.42 on Days 4-7; then historically, on average, expect a move down until Day 12 (this is just an average). If 21.42 is not breached on a daily close on Days 4-7; then tradeable odds point to a false break from the obvious which CAN lead to a strong reversal back up.

5. That's all there is to the 3day rule. Nothing more, nothing less. These are the parameters by which I did the analysis. I will not provide any further details or stats; as this is just a Rule of Thumb. Use it however you like. I will not advise on how to trade the 3day rule of thumb. Please do not ask. This is not personal. My professional status only allows for impersonal advice and stating things like the BTS or rules of thumb.