

A seasonal behavioral stock buying pattern in the United States stock exchange.

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Humans, like all life, are sensitive to their environment. Human and animal individuals can be triggered into impulsive and even violent activities from spikes in serum serotonin. Serum histamine level is directly proportional to environmental allergen levels producing dreaded seasonal allergic symptoms. But serum serotonin level, or the control of the level, is inversely proportional to serum histamine levels. Examples are presented where analysis over time of stock buying, as measured in the daily closing level of the United States stock exchange, shows a seasonal "J" shaped pattern that correlates with serotonin falls and spikes (histamine spikes and crashes) induced by the rise and fall of environmental allergens. A logical predictive strategy is thus presented where, excluding very large shocks like wars, market players could "buy low" an exchange-traded fund (ETF) i.e., indexed "stock," every fall season (between August 25 to September 5) and then subsequently "sell high" (between October 17 and October 31) as increased serotonin in the aggregate population leads to the increase in impulsive and speculative (over-confident) stock buying before "normalizing" around November.

*"We are all animals, my lady. Most are too afraid to see it!"*  
-- Darkness -- Legend

*"In all the known history of Mankind, advances have been made primarily in physical technology; in the capacity of handling the inanimate world about Man. Control of self and society has been left to chance or to the vague gropings of intuitive ethical systems based on inspiration and emotion... Psychohistory was the quintessence of sociology; it was the science of human behavior reduced to mathematical equations. The individual human being is unpredictable, but the reactions of human mobs, Seldon found, could be treated statistically."*  
-- Isaac Asimov -- Second Foundation

*"We human beings are part of nature and therefore we are more likely to find out about our 'inner' nature, to understand ourselves, by looking outside ourselves, at our role and place as animals. In John Gray's words, 'A zoo is a better window from which to look out of the human world than a monastery.' This is not paradoxical, and without some such realignment of approach, the modern incoherence will continue."*  
-- Peter Watson -- Ideas a history of thought and invention, from fire to Freud

*"Wouldn't economics make a lot more sense if it were based on how people actually behave, instead of how they should behave?"*  
-- Dan Ariely -- Predictably Irrational: The Hidden Forces That Shape Our Decisions

*"Pages and pages of data... efficiency functioning on multiple levels and in multiple dimensions... there it was all the time, staring you in the face. Buried within the message itself."*  
-- S.R. Hadden -- Contact

**Serotonin:** ...serotonergic neurons play an important part in a variety of psychiatric conditions from anxiety disorders to schizophrenia as well as behavioral impulse-related disorders (violence, substance abuse, obsessive control, gambling, etc....)

Humans, like all life forms, are sensitive to their environment. So much so, in fact, that mentally ill or mentally unstable individuals can be triggered into impulsive and violent activities (Fig. 1) from spikes in serum serotonin (Cetin et. al., 2017). But serotonin spikes also affect "normal" humans as well. Also, serum histamine levels are directly proportional to environmental allergen levels producing the obvious and dreaded seasonal allergic reaction symptoms. But serum serotonin level, or the control of the level in the brain, is inversely proportional to serum histamine levels (Hough, 1999, and Munari et. al., 2015, and Ryo et. al., 2006). Also note that male humans have 52% more serotonin than females (Nishizawa et. al., 1997).

Analysis over time of stock market stock buying, as measured in the daily closing level of the United States stock exchange (also the S&P 500 and Dow Jones Industrial Average indexes), shows a seasonal “J” shaped pattern that correlates with serotonin falls and spikes (histamine spikes and crashes) induced by the rise and fall of environmental allergens (Fig 2.).

A logical predictive strategy is thus presented where, excluding very large shocks like wars or Presidential election scandal before November voting day, market players could “buy low” an exchange-traded fund (ETF) i.e., indexed “stock,” every fall season (between an approximate date range of August 25 to September 5) and then subsequently “sell high” (between an approximate date range of October 17 and October 31) as increased serotonin in the aggregate population leads to the increase in impulsive and speculative (over-confident) stock buying before “normalizing” back to the normal regression curve around November 1 each year.

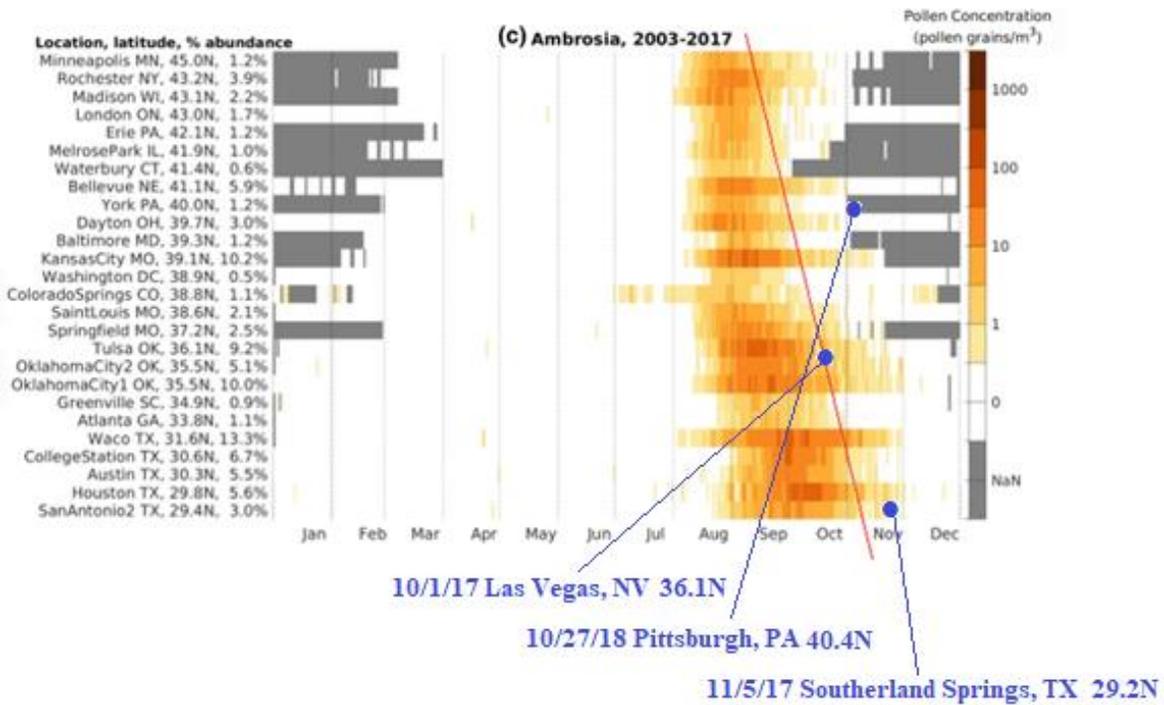
A scientific motto, often demonstrated to be true, is that “biology drives psychology.” The advent of near real-time tracking of allergen levels in given cities has led to a possible predictive model from known human serum biochemistry of histamine and serotonin interactions versus observed year-over-year acts of violence a la mass shootings from mentally unstable individuals or even stock market overly optimistic buying akin to impulsive gambling. “Normal” individuals can be observed and analyzed tracking simple impulsive behaviors from similar, albeit manageable, increases in blood serum serotonin levels leading to excess confidence and risk taking from the biochemistry of the associated crash in airborne allergens of pollen that thus lowers serum histamine levels.

Examples of the phenomena can be seen in both fall and spring allergy seasons but the fall season with ragweed is very consistent with the dates of start, peak, and end each year while the spring season involves various trees that pollenate and the start, peak, and end can vary by a month or so given the length of a year’s winter. The fall “J” shaped event is also more obvious and significant in size compared to spring example events. The fact that fall pollen start and stop dates “moves” down the latitudes (spring moves up) still only leads to a date range that is a most 10 days to two weeks in length and this can be seen in examples. Fall and spring of 2020 and 2021 are shown (Fig 3.) with the original graph followed by the diagramed graph for comparison. The same is done using the years 2004 and 2005 (Fig. 4) to show fall season buy and sell ranges and the “J” shaped drop and larger increase. Note it is interesting to observe that the market almost never fully drops below the higher level reached at the top of the “J.” Part of this is growth in human population, investors, and transactions but this could also help explain the aggregate growth in the stock market period; perhaps human bias is too optimistic. Also if our assumed correlation with pollen/histamine/serotonin/stock buying is accurate, then note how exogenous factors like climate change (increases number of pollination weeks before frost), antidepressant (selective serotonin uptake inhibitor SSRI) medications and even gym related exercise, stimulants, and steroids could all in theory have an effect on a population of investors or stock traders that in the end are still making a decision or bet with serotonin influencing their judgment to one degree or another whether any individual actor understands or admits this. Note too that this investment strategy must involve and indexed stock as any individual stock is too correlated with events specific to a given company or industry versus the aggregate effect noticed at scale with the entire market and with indexed stocks.

The goal of this essay is only to propose the possible correlation and to promote additional considerations for behavioral economics if not environmental, sociological, bio-chemical, psychological economics or finance research. The data exists so that experienced analysts can do full regression analysis to carefully exclude minor shocks and to compare every annual season as far back as the data allows to confirm or refute the given hypothesis with formal regression analysis. Thus, the limitations of this proposal are known and understood in depth.

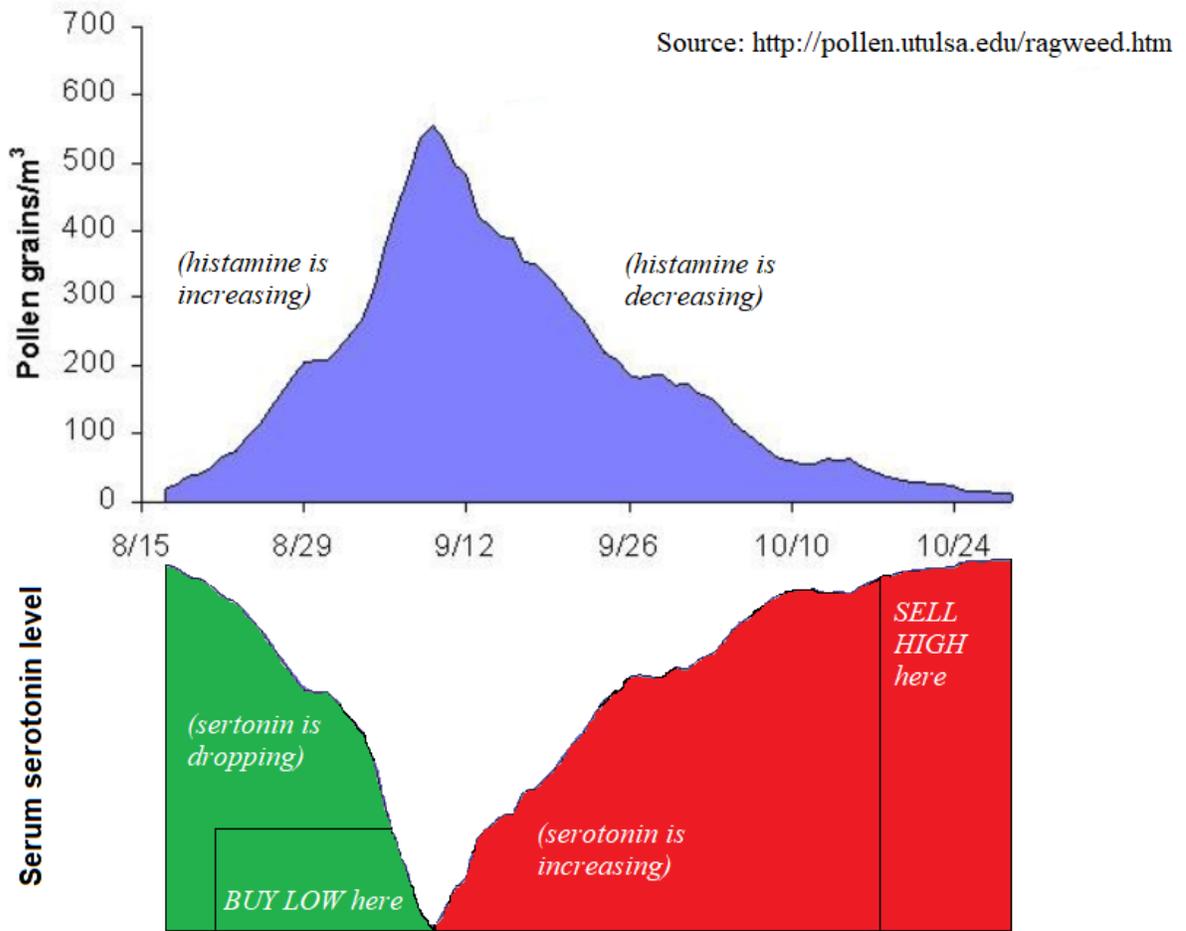
## Figures

**Fig 1.** Fall ragweed pollen levels by city listed by decreasing latitude vs serotonin (mass shootings).



Source: <https://link.springer.com/article/10.1007/s10453-019-09601-2>

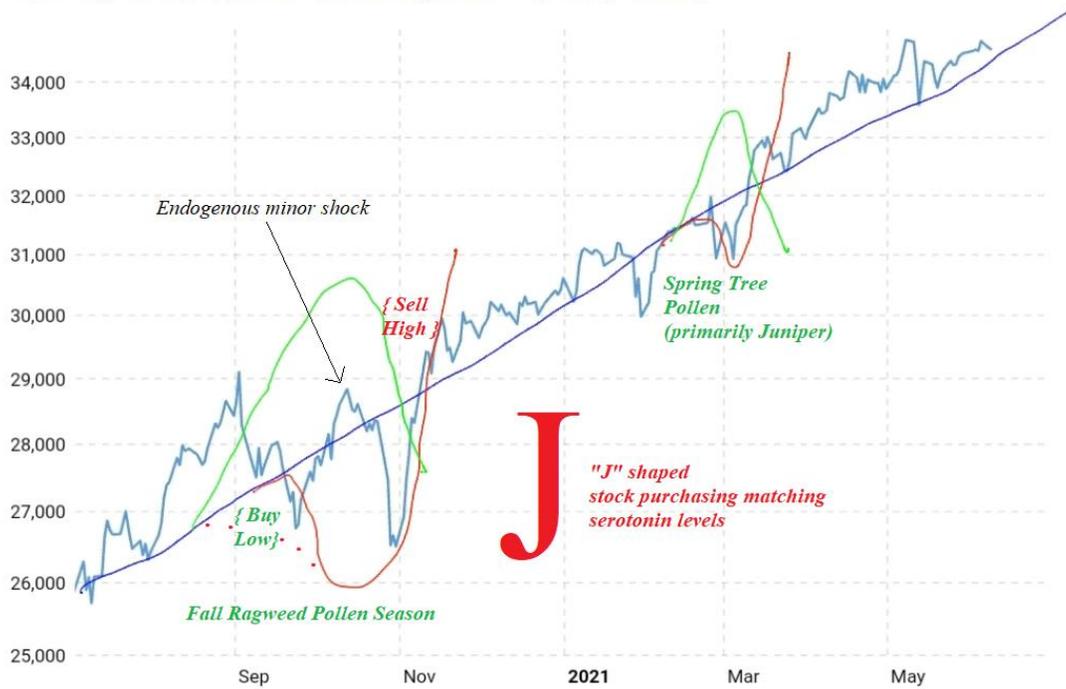
**Fig 2. BUY/SELL strategy timeline dates vs fall seasonal allergen/histamine/serotonin levels.**



**Fig 3. Original and overlay of Fall 2020 to Spring 2021 of Dow Jones (DJIA) index vs pollen/serotonin.**



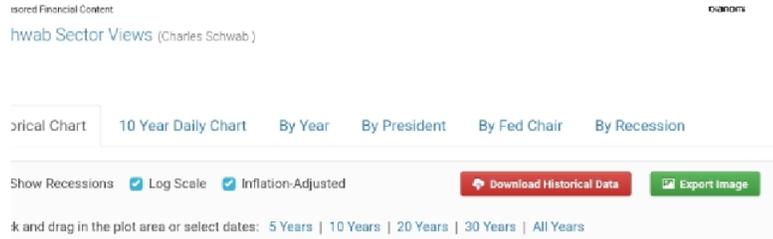
Source: <https://www.macrotrends.net/1358/dow-jones-industrial-average-last-10-years>



**Fig 4. Original and overlay of fall 2004 and 2005 S&P 500 vs serotonin vs BUY/SELL date ranges.**

### S&P 500 Index - 90 Year Historical Chart

Interactive chart of the S&P 500 stock market index since 1927. Historical data is inflation-adjusted using the headline CPI and each data point represents the month-end closing value. The current month is updated on an hourly basis with the S&P 500's latest value. The current price of the S&P 500 as of June 11, 2021 is 4,247.44.



Source: <https://www.macrotrends.net/2324/sp-500-historical-chart-data>

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