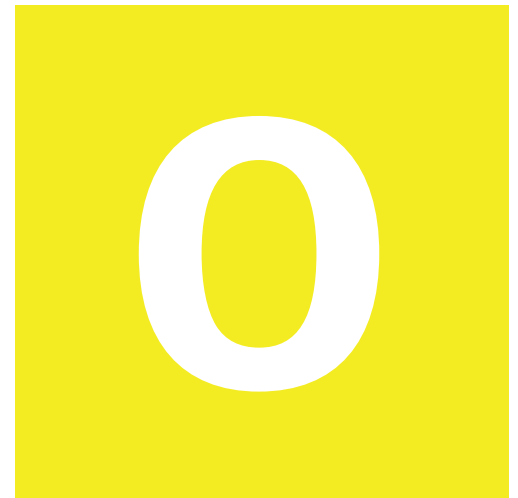



PSYCHOLOGY



Pattern recognition is the chronic genetic disorder of the financial industry, writes "Ibn Gosset"

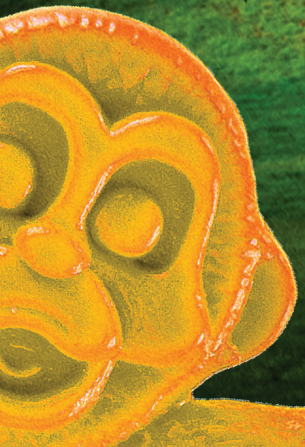
The financial industry is at the heart of our economy and fittingly comes under much scrutiny. Indeed, as a result of social and political pressure, particularly since the recent subprime crisis, more rigorous regulations have been imposed on both "authorized firms" and "approved persons" via the SEC and the FSA. It is hoped that these restrictions will continue to secure fair and honest practices within the industry, as well as restoring the public's confidence in bankers. This article will outline one risk that institutions like the SEC and the FSA have not regulated heavily enough but must address promptly if trust in them is to be preserved. This is the Unfortunate cost Of Pattern rEcognition (UTOPE), technically known as apophenia. 



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PSYCHOLOGY

Apophenia

Apophenia is the technical name for, what some may consider, a problem with human nature: that is, seeing meaningful patterns when they do not exist. This might be best illustrated with a fairly bizarre phenomenon, pareidolia,¹ i.e., seeing faces in toast/clouds/crisps, and so on. When someone believes that they see their preferred deity depicted in their morning repast

and it is not always clear that these traders and structurers understand that the patterns they are seeing may sometimes be spurious.

In this article the issue will be further explained, along with the moral and legal ramifications. As well as this, possible remedies will be suggested; however, it will be concluded that, although apophenia is certainly a dangerous problem, there is not necessarily a clear solu-

tion. The only thing that is clear is that education about the dangers of our own human nature will go a long way to tackling the problem of apophenia in finance.

survival method that has developed to help animals avoid these adverse situations is the ability to recognize patterns.⁴ Human beings tend to be more adept at noticing patterns and acting on them than other animals. For instance, understanding the dynamics of seasons gave rise to one of the greatest technological advancements of the human species: agriculture. Pattern recognition helps most

away afraid and find that there was no danger, than to stay and be eaten by a tiger.⁵

In the examples above, we see that the benefits of recognizing a true pattern can often outweigh the costs of recognizing a false pattern – even if that pattern is imaginary. However, this does not necessarily hold true for every situation. Many cases of false pattern recognition involve using premises to find a conclusion, rather than using a conclusion to verify premises. This inductive reasoning is full of problems because almost any conclusion can be reached, and it is incredibly difficult to verify. This will become apparent in the next set of examples.

Gambling

There has been much evidence of people creating “systems” to beat the roulette wheel, the lottery, and even horse racing. These people all seem to believe that, if they collate enough back data for the event on which they wish to bet, they can then recognize a pattern within this data on which they can base their bets. For instance, if I see that the number 8 in a horse race has not won for the last 100 races, I might believe that if I bet on number 8 now, there is an increased probability that it will win. The same goes for lottery numbers and rolls of the dice. However, these patterns are completely erroneous because, with all of the examples given, the events are discrete, and have no cumulative probabilistic effect. Yet, in these situations some people use a large amount of money to place bets on “certain” probabilities, which are incorrect. On some occasions, of course, they will win their money back but, more often than not, they will end up losing to potentially devastating effect.

The problem is that the rules laid out by the FSA or the SEC do not stress enough the moral and biological ramifications of the ways one chooses to present information to clients. As such, front-office employees do not get the opportunity to be guided with respect to these ramifications

tion. The only thing that is clear is that education about the dangers of our own human nature will go a long way to tackling the problem of apophenia in finance.

Biological background

Evolution requires a mixture of gene mutation and survival of the fittest.³ Essentially, genes are passed down from parents to offspring, and only those offspring who survive can pass their genes on. Thus, those less well adapted, e.g., those who are not as good at finding food and those who are not able to deal with predators, will not survive long enough to reproduce, and so will be deleted from the gene pool. In order to survive for the longest, one must be able to avoid being starved and accidentally or deliberately killed. One

animals on many different levels.

Consider: we identify that every time something eats black flowers, it dies, and so we do not eat black flowers, to prevent death. Equally, we observe that whenever the plants move and we hear a growling sound, a tiger appears and eats whatever is nearest to it. Thus, when we see the plants move and hear a growling sound, we run away as quickly as possible. If we are mistaken about the warning signs, for instance, if there is only one type of black flower that is poisonous, or if we run away quickly only to find that the movement of plants and growling come from the wind rustling the trees, we have not really sacrificed anything (other than working up a sweat). Indeed, it is surely better to run

it is most likely that their brain has misrecognized random blobs and arranged them in a way that is familiar. Observing meaningful patterns, when they are anything but meaningful, is a fairly common occurrence amongst human beings.

Apophenia generally has little cost; however, in the financial industry this is not the case: it is a manifestation of chance, and so could be dangerous.

The problem is that the rules laid out by the FSA or the SEC do not stress enough the moral and biological ramifications of the ways one chooses to present information to clients. As such, front-office employees do not get the opportunity to be guided with respect to these ramifications. If they happen to be successful without this guidance they receive reinforcement (much like Pavlov's dogs²) that their risks were justified. The system is self-perpetuating,

This is a classic example of apophenia; sometimes known as patternicity⁶ or synchronicity.⁷

Alternative therapies

Alternative therapies, such as homeopathy and faith healing, have repeatedly been shown to be ineffective.⁸ By this, it is not meant that they are evil and never provide any good side-effects; it is simply meant that they are not scientifically proven, and so the results will be incredibly limited. Nearly all alternative therapies rely on beliefs that were formed by luck and coincidence. In fact, alternative therapies can be even more effective than when a conventional doctor administers a placebo because there is an added sense of “magic” – mixing a potion is far more exciting, and belief confirming, than taking a pill distributed by a doctor. Indeed, it is true that some faith healers have managed to send cancers into remission, but this is mainly due to such a great amount of belief that adrenaline and endorphins are released when “healing” is taking place. The human body has a great ability to do amazing things, and the confidence inspired by faith healing can sometimes mimic the effects of actual medicine. However, it is almost always shown that these remissions only last for a short period of time, and soon the original malady returns. The question may be posed, what is so wrong with this form of apophenia? If people are given some respite, then surely it does more good than bad. This is true, however, unfortunately, some of those who really do believe (and so have the most miraculous remissions) decide to stop taking their conventional and tested medicines. There have been a number of cases of

cancer patients believing that they are cured and subsequently dying because they had stopped their chemotherapy. This is a terrible situation, and whether or not faith healers and homeopaths believe what they are telling other people, they have a duty as rational human beings and members of authority to check that the patterns they observe are extant.

Finance

A similar, but generally less fatal, problem occurs within the financial world. One might think that within banking

there are enough regulations, and enough statistical analysis is done, to prevent these patterns from being speciously trusted. However, there are certain types of superstition and reinforcement that results in, what is essentially, guesswork governing the way in which some financial institutions work. This is particularly the case in a number of hedge funds: they will often employ well-established econometricians and finance academics in order to attract clients. Investors see these semi-famous or well-known names and assume that they will be skilled enough to earn them a lot of money. Unfortunately, these academics, even though they act in good faith, are not always the best at investing others' funds, especially as they face very little risk themselves. If their company fails, they can easily set up another hedge fund under a different name, and it will not

take a huge amount of advertising or effort to find new investors. This problem is vast within all parts of finance, and will now be outlined more thoroughly.

Design

Inferring a creator from an object is often well justified. For example, when we see a table, although we may not know the specific carpenter, we assume that there was, nevertheless, some carpenter. In fact, so often are our inferences verified that we sometimes find it difficult to believe that there is no creator when something seems to have been created.

was always there, then why not say that the laws of nature were always there and save a step?¹⁰

The creation of the universe is an amazing phenomenon, which a creator would explain, to some extent. However, we are then posed with the problem of who created the creator. Since a creator would presumably be an incredibly impressive being, it would need an even bigger explanation for its creation. A similar problem is experienced with the Big Bang – although it makes sense that the world was created in this way, we then ask what created the Big Bang

However, there are certain types of superstition and reinforcement that results in, what is essentially, guesswork governing the way in which some financial institutions work

This is the main reason why Darwin's theory of evolution was so virulently criticized when *On the Origin of Species*⁹ was published. Animals are so intricate, and so well matched to their environment, that some struggle to believe they were not designed by an intelligent mind. Indeed, the theory of evolution is still criticized, despite the plethora of evidence in its favor. As Carl Sagan puts it:

It's a perfectly legitimate hypothesis, in my view, to say that some extremely elegant creator made those laws [of nature]. But I think if you go down that road, you must have the courage to ask the next question, which is: where did that creator come from? And where did his, her, or its elegance come from? And if you say it

itself, as we seem unable to accept that something will just begin to exist without any creating factor. This stems from apophenia: we seem to need to see some sort of pattern even where one does not exist.

Superstition and pattern recognition

Due to our innate ability to recognize non-existent patterns, we often make erroneous causal connections or “illusory correlations,”¹¹ such as believing that a pair of shoes can bring luck because they were once worn when a winning goal was scored in a particularly important football match. However, superstition is really nothing more than some apophenia mixed with reinforcement,¹² as Skinner's research seems to show.



PSYCHOLOGY

Skinner's experiment

One of Skinner's most famous experiments examined the formation of superstition in pigeons. Skinner placed a number of hungry pigeons in a number of cages attached to an automatic mechanism that delivered food "at regular intervals with no reference whatsoever to the bird's behavior." He discovered that the pigeons associated the delivery of the food with whatever chance actions they had been performing as it was distributed. They subsequently continued to perform these same actions, in the hopes of receiving more food¹³ Some of the birds turned anti-clockwise in their cages, some looked over their shoulders, and others developed a pendulum motion

and favorable consequences suffice to set up and maintain the behavior in spite of many unreinforced instances. The bowler who has released a ball down the alley but continues to behave as if she were controlling it by twisting and turning her arm and shoulder is another case in point. These behaviors have, of course, no real effect upon one's luck or upon a ball half way down an alley, just as in the present case the food would appear as often if the pigeon did nothing—or, more strictly speaking, did something else.¹⁴

Of course, the pigeons were not influencing the machines at all, but coincidence coupled with some

wear their socks.¹⁵ The same might be said for the financial industry, particularly when peers and authority figures are reinforcing beliefs that certain systems do or do not work.

Peer pressure and authority figures

Peer pressure and authority figures have a significant effect on the way we act and the beliefs we form. Solomon Asch conducted an experiment which showed what many already believed to be true, namely, that if there are enough people who disagree with what someone has said, then that person can be convinced to change their mind with nothing more than a suggestion that others' opinions differ.¹⁶ His experiment demon-

ber of participants that they were "teachers" and that their "pupil" was in another room. They were instructed to administer electric shocks, in increasing magnitude, whenever the "pupil" answered a question incorrectly. If the "teacher" objected they were given soft oral nudges to continue by the "doctor" running the test. Many of the "teachers" continued to administer shocks which were strong enough to kill their "pupil," simply because they were told that it was in the interest of the experiment.

If we couple these two ideas – that peer pressure and authority figures can have a profound effect – we can soon see how superstitions could be reinforced to highly negative consequences. This is particularly the case in the financial world, as it is highly competitive, with many people not reaching targets being made redundant, and those meeting targets being made wealthy. *Some of these bonuses and dismissals are based on chance or lack thereof, so apophenia is reinforced on many different levels: by those who are in direct competition and by those who are their superiors. In fact, this superstitious mindset could mean that a number of financiers, in good faith, could sometimes be losing their clients' money because of irrational, self-perpetuating systems.*

Apophenia in the financial industry

As has already been mentioned, unfortunately, the financial industry cannot escape the problems with apophenia. Both clients and professionals are subject to wrongly recognizing patterns; however, professionals have a duty to thoroughly investigate these patterns, *which both need to be amended, in order to stay in line with the FSA or the SEC. Some professionals*

Some of these bonuses and dismissals are based on chance or lack thereof, so apophenia is reinforced on many different levels

with their heads. Skinner suggested that the pigeons behaved as if they were influencing the automatic mechanism with their "rituals" and that this experiment shed light on human behavior:

The experiment might be said to demonstrate a sort of superstition. The bird behaves as if there were a causal relation between its behavior and the presentation of food, although such a relation is lacking. There are many analogies in human behavior. Rituals for changing one's fortune at cards are good examples. A few accidental connections between a ritual

positive reinforcement meant that they believed they were having some sort of meaningful effect. As long as the food was delivered close enough to the end of a pigeon's "ritual," the pigeon continued to think that its ritual had an influence on the machine.

Interestingly, there was less of a reaction when the food dispersal did not correlate with the ritual – the pigeons seemed to weigh a positive reaction more highly than a negative reaction. This certainly appears to be analogous to many human beings, who will believe that socks are "lucky" even if the lucky outcome has only occurred a few times out of the hundreds of times they might

strated that when shown a number of differently sized lines, many people could tell if two were the same length. However, when they were informed that their peers had given different answers, many of the participants changed their decisions. Prechter¹⁷ also refers to this as "herding" and points out that whilst it is appropriate in some survival situations, it must be eradicated in financial situations.

Similarly, Milgram expounded on the idea that if a member of authority instructs someone to act in a certain way because it is "right" then they will tend to do this, even if it goes against their own moral code.¹⁸ For instance, he told a num-

are not trained enough with respect to the asymmetry in pattern recognition to properly understand the consequences, and rightfully so since nowhere in the SEC and FSA handbooks is it mentioned that they should be extra diligent with respect to the biological ramifications of pattern recognition and finance. These ramifications will now be explored.

Sales and structured products

One of the drivers of the financial industry is the trade of structured products (pre-packaged portfolios based on derivatives) within which there is a branch called investment strategies. This aims to mix one or several underliers into long or short positions conditional on signals, which are designed to increase the marketability of the product. As we will show, the marketing technique behind these strategies relies heavily on the Unfortunate cost Of Pattern rEcognition, or what we like to call “UTOPE.”

These investment strategies can be put together in a number of “mathematical” ways. For instance, imagine one was able to simulate a set path of random numbers such that the path starts at 0 and ends at 30% at the end of the year (a Brownian bridge): these stochastic processes represent the cumulative returns of several strategies throughout the year. If one adds these Brownian bridges together (the more the better), the Sharpe ratio (SR) becomes much higher and, therefore, the investment strategy becomes very attractive.

A number of structurers, probably in good faith, focus on combining historical random bridges together in the hope of producing an appealing “story” so that the strategies they suggest sound legitimate. Due to our uncanny ability to find

patterns when they do not exist, these structurers are able to convince themselves and their clients that there is a meaningful reason to believe their stories. Added to this, these structurers can subconsciously use a “cherry-picking fallacy” or a “clustering illusion”¹⁹ to convince themselves and their clients. These kinds of behavior are biological and natural so most of the structurers and salespeople act in good faith but their reputation is impacted as a result of the perception that they did not act in good faith when a product appears not to be as valuable as promised. Essentially, both of these concepts relate to the idea that we do not always properly

assess information – sometimes we take too much from very small pieces of data (clustering) or we simply pick out the pieces of information that we want to be true, and ignore the rest. In reality, if we were to look at these patterns in an informed manner, we might not be so hasty to invest. Unfortunately, as outlined by the SEC and the FSA,²⁰ we trust traders and structurers to do their jobs properly; and even though they strive to do this in good faith, the results seem to indicate that the guidelines are not always respected. Indeed, there is also a certain amount of belief bias involved. That is, if someone has already accepted a conclusion, such as “this structured product will earn lots of money,” then they are more likely to accept the logical

argument – they are more likely to accept a poor argument that they might normally reject, if they have already accepted the conclusion.²¹ In fact, because structurers and sales stories are reinforced by statistically spurious evidence, their methodologies may sometimes be in breach of regulations pertinent to Misleading Statements and Actions as well as the Client Best Interest rule and this despite them being in good faith. One easy way to check whether the UTOPE is used as a marketing tool is to look at what the performance of a strategy was before being launched and after it was launched and study this issue

on the population level of these strategies. *Everyone can guess what the result of this study would be but somehow we would like to disregard this powerful evidence.* It is true that most of the strategies include the usual “past performance is not indicative of future performance” disclaimer. However, this warning message does not address the issue of why we might still be attracted to the strategy despite the disclaimer message. The disclaimer should also have a few words on apophenia and how this biological phenomenon might alter our judgment. *This is, however, the duty of regulators such as the SEC and the FSA to enforce. Practitioners need to be educated through the various integrity exams designed by the SEC and the FSA.*

Technical analysis, self-fulfilling prophecies, and game theory

Technical analysis is the discipline of forecasting the direction of prices through the study of past market data and charts. It has a similar problem to the methodology outlined above, in that it seems to be seeking out patterns which do not exist and has been questioned by the efficient markets hypothesis. Technical analysis cannot be verified; despite this, and in anticipation of proper scientific experimentation on the theory, some have tried to sell technical analysis as an art²² rather than a science,

whilst others have tried to hijack scientific terminology in order to make it sound more legitimate.²³

Of course, many technical analysts are aware that there are a large number of rational people in the financial industry who will criticize their theories;²⁴ thus, they try to sell technical analysis as a self-fulfilling prophecy.²⁵ They claim that although there may not be a real reason why a stock price moves in a certain way, if enough people believe that stock will move in that direction and they take the relevant position, then the stock will move in that direction. In some ways, this seems coherent. However, if one examines this argument in more depth then one would realize that it is somewhat paradoxical. Basic game theory analysis and

As we will show, the marketing technique behind these strategies relies heavily on the Unfortunate cost Of Pattern rEcognition, or what I like to call “UTOPE”

PSYCHOLOGY

recursive thinking demonstrates that a stock price will automatically revert to what is “fair” if we take the assumption that technical analysis is true. Therefore, this renders the use of technical analysis irrelevant with regard to achieving a profit.

Technical analysis actually just relies on apophenia, although it remains unclear if people invest time in this because they actually believe it to be true. In any case, technical analysis attempts to conceal the fact that trusted professionals, probably in good faith, appear to be simply gambling with clients’ money, albeit within the framework of a financial institution.

Many people are emotionally dependent upon the ticker tape, which simply reports the aggregate short-term decision-making of others. This dependence is nearly universal, even among long-term investors

Trader compensation methods

Further to the previous section, the way in which traders are compensated adds to the reinforcement of a pophenia.

Essentially, for people who consider a good trader to be one who makes money and a bad trader to be one who loses money, it is essential to show that this way of defining such a matter exposes a system which is purely driven by luck. Indeed, consider the following game: there are 100 players who are split into pairs, one of whom tosses a coin 10 times; for every toss, they each pick a different side of the coin. For every tail result they earn one pound, and for every

head result they lose one pound. On average, each player should end the game on £0, having had an equal number of heads and tails. However, some of the luckiest traders could gain around £8, whereas the unluckiest traders will lose around £8. There is no doubt that positive results are based on luck, rather than skill. Therefore, in this game, there is no difference between the ability of the players and there is no reason why they should be rewarded differently. In the case of trading there may be instances where the trader, because he/she has a superior understanding of the physical drivers of supply and demand in his/her market, could in these instances

take advantage of this knowledge to make a profit beyond the assumptions of luck, but these cases happen less often than one may assume because we happen to be biologically blinded by the UTOPE.

However, some trader compensation schemes use this sort of data to determine who to give bonuses to and who to dismiss. For instance, one known method is to align traders from “best” (the one who appears to have made the most money) to “worst” (the one who appears to have lost the most money) based on their P&L, and fire the bottom $x\%$. For the $1-x\%$ remaining, generous bonuses are distributed in order to make sure these traders stay within the

firm – in anticipation that their skill will earn their employers a similar amount in the future. This is made even worse by the fact that toward the end of the year traders take even bigger risks in an effort to push up their profits.²⁶ If the bonus system worked in a different way, then unlucky traders would not take such huge risks to prevent themselves from being fired. Indeed, lucky traders would also be limited in the risks that they took if they were not being offered such huge incentives. Obviously, the whole system is nonsensical unless one believes luck to be a personality trait, or if someone believes that the pattern they are

C. Merton with LTCM.

This is catastrophic for the financial industry because the money made by the lucky traders is precisely there to make up for the losses from the unlucky traders. The trading system is a closed system. If somebody is making money, somebody else has to be losing this money. *Even if this system was successful, it is a harrowing thought that billions of pounds may sometimes be in the hands of unskilled people who believe, in good faith, that they are skilled.*

This phenomenon has been criticized multiple times,²⁷ but unfortunately there is still not always a solution that is implemented, perhaps because we do not know of any solution that could be implemented.²⁸ The next section attempts to deal with this problem.

Current status and proposed solutions

Legality question

In both of the cases above, there seems to be some question as to whether professionals know that the patterns they are seeing are erroneous, or whether they believe these patterns to be real and are simply wrong. Either way, there is a problem. *On the one hand, it seems as though some people within the finance industry subconsciously overuse the power of UTOPE in order to convince themselves and sell, although in good faith, potentially bad products to their clients. On the other hand, it seems as though they do not know that they are investing time, money, and thought into “patterns” which have no significance. It is not apparent which of these is worse, particularly when dealing with large amounts of money. Both practitioners and clients need to be educated with respect to UTOPE and its application to the financial*

industry. This section will attempt to address this issue.

Scope

Regulating bodies have arisen to ensure that the financial industry does not take too many risks that could lead to what may be classed as fraud, general loss of trust in the sector itself, and the demise of the entire economy. These bodies have become particularly pertinent in the last few years, especially after the subprime crisis, which has led to a global recession, resulting in social uproar. Since then politicians and regulators have had to enforce harder regulations on the financial industry. The regulations that are the most relevant to this article include the Client Best Interest rule and the Misleading Statements and Actions rules,²⁹ which state that if one works for an authorized financial firm and also sells financial products, then one must act with integrity, for instance, by not misleading clients. *This is to protect clients from being led into adversity by those professionals who, although in good faith, may convince them to invest by using easily recognizable, but spurious, patterns.*

Definition: approved persons

The duties of an approved person are given in Section 2 of the Financial Services and Markets Act (FSMA 2000). This also spells out the purpose of regulation by specifying the FSA's four statutory objectives:

- Maintaining confidence in the financial system.
- Promoting public understanding.
- Protecting consumers.
- Reduction of financial crime.

The Statements of Principle for

approved persons are the following:

- Integrity.
- Skill, care, and diligence.
- Proper standard of market conduct.
- Dealing with the regulator in an open way.
- Proper organization of business.
- Skill, care, and diligence in management.
- Compliance with regulatory requirements.

Similar objectives are set out by the SEC.

Example: possible misleading statement

Authorized firms and approved persons are bound by their status to accept and abide by the rules of the SEC and FSA handbooks. There are many places where statistical tools should be used with care. It is in the best interest of the salesperson to attract as many investors as possible toward their products. *A salesperson who markets a product by utilizing apophenia, despite knowing that the product will not follow the pattern that was outlined (that is, in bad faith), could be liable for a breach of an FSA rule – the Customer Best Interest rule or the Misleading Statements and Actions rules.*

Moral importance of misleading information

As has already been outlined above, approved persons have some legal duties, for instance, not misleading their clients by providing irrelevant statistical-related data, anticipating their misinterpretation. When trust is given to a person, that person is expected to act in a respectful way: we do not live in a state of nature.³⁰ Parties promise to do things for

each other and if these contracts are broken on a regular basis then there will no longer be any reason to make them and the whole banking business would collapse. Indeed, the “tit-for-tat” strategy demonstrates the importance of cooperation.³¹ *Structurers and salespeople have a lot of moral obligations. If there is to be cooperation then they must not mislead the clients, even in good faith.*

The SEC and FSA rules mean that there is a duty on an approved person to provide correct information for their clients. Thus, they ought to be expected to

low the herd because they do not have firsthand knowledge adequate to form an independent conviction, which makes them seek wisdom in numbers.

They rely on those they employ to invest their money for them, because they are the experts. If everyone appears to be wrong, this should not be an excuse to take on the same path. It is the responsibility of the approved person to check and confirm that what they are telling their clients is correct. If their information is not accurate, they are clearly in the

We see that the benefits of recognizing a true pattern can often outweigh the costs of recognizing a false pattern – even if that pattern is imaginary

properly research all the areas that could appear as misleading to their clients. If they do not, then they are clearly providing misleading information – the client has faith in them to present information in a way that can be understood, and in a way that is honest. Indeed, as Prechter³² points out:

[Clients] think who am I to check? These other people are supposed to be experts. Many people are emotionally dependent upon the ticker tape, which simply reports the aggregate short-term decision-making of others. This dependence is nearly universal, even among long-term investors. They are driven to fol-

wrong. Clients cannot be expected to be able to check whether what they are being told is veracious when the FSA so clearly outlines that the role of an approved person is to provide correct information. Ignorance cannot be used as an excuse.

In many cases, apophenia can fool both professionals and clients. We so badly want to see patterns, particularly ones that can work to our advantage, that we see them, in good faith, even when they do not really exist. However, in certain cases, professionals may use clients' human nature against them by providing coherent back-stories to erroneous patterns in order to get the sale. If this operation is done in bad faith, then it should clearly be addressed by the SEC and the FSA.



PSYCHOLOGY

What is currently being done, and what could be done, to improve the industry?

Current legislation has gone some way to improving fraud and overt risk-taking in the financial industry. More and more people are listening to what is being said by regulators, particularly as there is currently so much media coverage. However, there is still more that could be done, for instance, preventing institutions from using correlation when it is inappropriate.³³ Also, many traders and structurers should get the opportunity to realize and be educated with respect to our biologi-

Although regulators like the FSA attempt to prevent legal and moral issues arising, they have not gone far enough

cal predispositions to believe erroneous patterns, because it puts them and their clients at risk of misjudging information.

Regulators need to go further in their legislation, particularly when it comes to bonuses and hiring policies. As mentioned previously, the way in which traders are split into performance groups and rewarded accordingly *could be unreasonable* as it is, at least in part, the consequence of apophenia and because it feeds a system the wrong way and prevents or at least slows down its moral maturity. Particularly as, when it nears bonus time, there is a steep incline in the amount of work done by unsuccessful traders, in order to maximize their own benefits (usually reaching P&L target), which in turn means that unsuccessful traders tend to take more risks toward bonus time.³⁴ *The reward system is sometimes*

flawed and needs to be changed in these cases. Sharpe's ratio, on which pay is based, focuses on both earnings and risk. However, the earnings one takes still do not account for the amount of chance involved when things are taken in a larger perspective (the trader's population). If luck could be taken into consideration and included when considering traders' compensation, then the system could truly reward those who are good at their job, rather than those who are simply lucky. Recently, there have been some occasions where traders

who take too many risks have been fired; however, the industry needs to address this on every level, not just when extremes occur.

It is apparent that some members of the financial world are aware of the problems with apophenia, as many articles have been written about the subject (e.g., Elliman). However, these articles tend to be written by academics and published in academic journals, which many professionals will never read. Equally, the fact that figures of authority and colleagues continue with *sometimes potentially doubtful* practices means that some professionals will not really even realize that they have done anything wrong. Similarly, it is unlikely that many of them check that what they are doing is legal, because it is what they have always done. Despite SEC and FSA

regulations, it is difficult to convince people to change what they have been doing for the whole of their life.

It seems that professionals in the financial industry need more education on good practice and analysis of the way that they work. Although there are compulsory compliance courses, these courses do not yet address the issue of UTOPE and its application to the financial industry.

For most members of the banking industry, compliance courses are often short and skim over details because nobody has taken the time to educate them with respect to the UTOPE. Indeed, even those disclaimers that are of a decent length do not address even remotely such phenomenon. Professionals need to be informed of their base natural instincts to find patterns and take them as meaningful when they are not: if they were aware of this then there might be more scrutiny into practices that already exist, and ones that are being created. The hope would be that members of the industry would become more careful and observant, if they were to properly understand how much apophenia influences them. Perhaps, it would be advantageous to give Approved Professionals a small crash course on apophenia and concepts such as order statistics so that they get the opportunity to be able to properly inform their investors.

People need to be made aware of their own pitfalls, and the problem of apophenia needs to be more widely discussed. This is the only way that progress can really be made.

Conclusions

Erroneously recognizing patterns when they do not exist, i.e., apophenia, is a natural part of human beings' survival. It is often very helpful, and costs very little. However, in the finan-

cial world, it is truly problematic. Throughout this article, the problems with apophenia have been outlined: it is practically, morally, and legally wrong to use apophenia, which is an otherwise legitimate biological phenomenon, to encourage investment. Indeed, the idea that those who indulge in either buying or selling strategies that are clearly inconsistent may not realize what they are doing is incorrect, is very worrying. *Although in good faith, professionals may trick themselves and ultimately their clients into investing money based on stories fabricated to fit statistics, which are wrong.* Some professionals are being convinced of the veracity of their own arguments because humans are so adept at spotting patterns, even when they do not exist. This problem could be losing the financial industry billions of pounds, as well as harming individuals and whole economies.

Clearly, something needs to be done to ensure that we are protected from ourselves and those who are in charge of our money. Although regulators like the FSA and the SEC attempt to prevent legal and moral issues arising, they have not gone far enough. Professionals and their clients need to be further educated on how to carry out appropriate practice, and how to question those whom they suspect to be acting in an improper manner. If they are made aware of their instinct to recognize patterns which are not meaningful, then they may begin to be more diligent in their investigation of potential investment strategies. Ignorance should be no excuse for misleading statements and actions. Once people stop being rewarded and punished for occasions of luck, we can start to work on the legal and moral issues more thoroughly. Apophenia is a problem, but it can be solved through education and debate.

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