

the product **Intuitor**<sup>™</sup>  
the technology **Intuitive Rationality**<sup>™</sup>

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***Intuitive AI Prediction Technology***

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by **NeuroFission, LLC**

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# Intuitive Rationality

## Intuitive Rationality™

*“All great men are gifted with intuition. They know without reasoning or analysis, what they need to know.”*

*Alexis Carrel, Nobel Prize winner in Physiology or Medicine*

### ***Introduction***

Intuitive Rationality™ (IR) by NeuroFission, LLC, is the new technology that is successfully projecting the behavior of complex systems. Its performance is equal to or better than conventional, highly analytical, computer-intensive statistical methods used today. IR predicts the direction and confidence of data time series generated by complex systems like the investment markets. Other IR application environments include: biomedical research and development, environmental systems, economics and statistics, gaming and wagering, and industry and robotics.

IR is the brainchild of Grant J. Renier, whose accomplishments and technological advances led him to founding five previous corporations in AI software, hardware, satellite communications, and e-commerce, as well as in PC applications and automobile components. (For a complete overview of Mr. Renier’s professional history, go to: [www.linkedin.com/in/neurofissionllc](http://www.linkedin.com/in/neurofissionllc).) Born of 27 years of research and development, IR has burst onto the intuition research scene as one of the most remarkable data management/decision-making systems in history. Its real time simulation of human decision-making includes: (1) the concept of ‘less is more’, (2) the Theory of Events, (3) memory decay, (4) reinforcement learning, (5) over-confidence and risk adversity, (6) “fast and frugal” processing logic, and (7) its “Give me the Best” function that identifies emerging super intelligence and decision points in seemingly random systems. Finally, IR is: (8) magnification independent. Sounds complex? Well, understanding human intuition is a fast growing science that needs more understanding by all of us, since it plays a key role in our everyday behavior. And, since IR is the only known commercialized computer simulation system of intuitive decision making, even more explanation is needed. So, here goes.

# Intuitive Rationality

## ***What is Intuitive Rationality™?***

*“Intuition becomes increasingly valuable in the new information society precisely because there is so much data.”*

*John Naisbitt*

Despite the complex sound of its name, the sheer beauty of NeuroFission’s technology lies in its pared down simplicity of function. Starting simply by defining its nomenclature, the word “intuitive,” as defined by Gerd Gigerenzer in his book “Gut Feelings,” refers to a judgment: “(1) that appears quickly in consciousness (2) whose underlying reason we are not fully aware of, and (3) is strong enough to act upon.” “Rationality” is the core logic that expresses intuitive decision making in computer code that chooses actions to maximize, expected performance. So, in other words, we are looking at a type of emotional based judgment that is evaluated by both mathematics and the power of computers.

## ***IR Development leads the Emergence of Behavioral Economics***

*“The economist may attempt to ignore psychology, but it is sheer impossibility for him to ignore human nature.”*

*John Maurice Clark, economist*

In the current chaotic economic and financial climate, new scientific research is focusing on the importance of social behavior, cognitive and emotional factors that are part of all economic making. This research is getting closer to knowing how consumers, borrowers, and investors are affected by all kinds of complex situations and systems. The field of 'behavioral economics and finance' is emerging. One can only look at recent choices of recipients of the Nobel Prize in Economics to notice, specifically Daniel Kahneman, and Vernon L. Smith. For the last half century, the neoclassical paradigm, featuring so-called rational decision making, efficient markets, the capital asset pricing model, and the like, has dominated economics and finance. Interestingly, psychological features of human decision making are now being combined with conventional mathematical techniques. We are getting closer to understanding the connections.

However, the uniqueness of IR leads away from the “analytical” approach altogether. 'Pure' cognitive and emotional decision making was, and continues to be, showing better performance through a wide variety of empirical studies by academia, other institutions and NeuroFission. IR is demonstrating that the belief, ‘knowledge is power’ shifts towards ‘gut feeling is power’. That could be the way it has always been, but we have been too uncomfortable to admit it.

# Intuitive Rationality

## ***The History of Intuitive Rationality Development***

*“History repeats itself only in hindsight.”  
Grant Renier*

The core of Intuitive Rationality was developed during the mid to late 1960’s to date, by Grant Renier, as an alternative to the processing intensive methodologies of regression analysis, linear programming distribution and supply models developed in the petroleum industry. Many of those applications generally answered the obvious and, by that process, separated the “wheat from the chaff,” leaving the core, complex problems identified for further subjective analysis. Those systems were two-dimensional, time-versus-data, and made it very difficult to gain a sense of the dynamic variable groupings, and especially the importance of emergent data events. It was relatively easy to be caught in the optimization of one emerging property without realizing the significance of other equally significant areas.

Conventional approaches place heavy reliance on reductive software models to emulate complex combinations of human, electronic and/or mechanical component operation and interaction. Often, the core logic of such systems depends on the translation of human “expert” knowledge into rule-based mathematical models. Models like these search for the experts and try to simulate what they do. Often this micro, bottom-up approach works well for simpler applications that have a limited number of data sources and have no dominating complexities of hysteresis and resonance. As the object systems become more complex, however, this institutionalized procedure of applying multiple regression analysis and curve-fitting methodologies in all their forms falls short. Simply put, their filtering and smoothing effects on inputted data steadily reduce responsiveness and predictive capabilities, and are usually accompanied by very dramatic increases in hardware and software data processing requirements. This heavy laden data mining process is necessary in the pursuit for proof and justification. The financial investment markets are just one example of this vicious cycle, where the overwhelming volume of data leads to the ever-increasing use of regression (historical) analysis. These practices are often protected by the statement that ‘historical results are not indicators of future performance’. IR shows that as with any complex system to which these math disciplines are applied, final human intervention in the decision-making process is understood and accepted as necessary in making final “expert” adjustments.

What’s more, the continuing revolution in communication technologies is producing exponential growth in the volume, quality, and presentation of investment market data, without a proportional improvement in analytical and decision-making techniques. Microprocessor and wireless communications have allowed significant advances in the monitoring and control of remote complex systems, like the weather, earthquake prediction, and traffic management. But in large part, we still depend on regression-based

## Intuitive Rationality

mathematics combined with human subjectivity to make final decisions, in spite of growing evidence these traditional approaches are not keeping up with the need to understand, manage and just survive in situations of exponentially greater complexities.

Academic research during the 60's, 70's and 80's began to uncover simple iterative math statements that seemed to simulate the activity of more complex systems across multiple scientific disciplines. Indications were that some very basic genetic mathematical iterative functions seemed to simulate the activity of many natural complex events. This phenomenon is observed in the fields of biology, geology, weather systems and life itself. Benoit Mandelbrott, at IBM with his magnification-independent fractal geometry; Stuart Kaufman, Professor Emeritus of the University of Pennsylvania and others, contributed to the establishment of the Santa Fe Institute and the study of the zones between chaos and complexity. Prior assumptions of data randomness and the inherent separateness between disciplines suddenly began to produce geometric shapes and curves that showed little randomness and an organization around '*strange attractors*' through the application of rather simple mathematical techniques.

The seeds of IR were born of the understanding that all human decisions are ultimately, if not wholly, a result of human emotion expressed through intuitive, "gut level" actions. As much as we like to demonstrate that we are objective, we find that we cannot be, except maybe in the very simplest of decisions like turning a doorknob. When we reduce complex situations to a top-down or bottoms-up reconstruction in the pursuit of the objective 'selection' of alternatives, we fail. Consider the intense Sunday evening meeting at the White House In October of 2008, where within hours the financial system was saved from catastrophic failure, and with no history to serve as a model. Attempts at reductionism to understand and be critical of these kinds of decisions require the understanding of individual knowledge and life-long experience. Issues as nebulous as nature-nurture complexities and one's emotional state at the time decisions are made must be considered.

IR accepts that our world, our reality, is a dynamic representation of emotionally based decisions by our species, culture, organizations, social gatherings and ourselves. Given this assumption, especially in highly emotional complex situations, how can human behavior on any level be predicted by the application of traditional, unemotional mathematical/statistical methodologies? IR's performance demonstrates that it simply cannot be done. The emergence of the combination of behavioral science with economic theory is the response to this major problem and promises to revolutionize prediction making in the general field of economics and others.

IR's important differential is its codification of the emotional/behavioral components of decision making. Its adaptive software logic attempts to imitate the effects of sub-conscious and fringe intuition processes in deciding the direction and confidence of a continuous flow of new input data. On the other hand, traditional control methodologies of complex legacy systems rely on

## Intuitive Rationality

constant human monitoring to handle non-historical events to at least prevent loss of control. IR's objective is to emulate those human-dependent functions and take over decision making for those new and unique events. IR draws from the mathematics of academic complexity studies to produce simple and highly iterative functions to understand, profit from, and in specific applications, control complexity through feedback pathways.

The first application of IR was the futures and commodities trading markets, chosen because of its well known and risky randomness, its rich source of data and highly leveraged win-loss structure. The feedback function of IR was in the form of trading alerts, with the understanding that nothing in these markets would be directly controllable. IR first "paper traded" all active contracts over extended periods, processing real time data. Success of those results were followed by the management of actual funded accounts, beginning in 1981 through 1988, yielding an average compounded return of 46% per year.

Other IR applications were developed and tested at the University of Pittsburgh in the start-up control of large power plant steam generators, various mathematical functions designed to test the system's handling of extreme resonance and with a manufacturer's CNC machine control application. IR core logic has remained generic across all applications, except for periodic upgrades, more efficient languages and faster processors.

In 1999, IR was applied to a completely new application: monitoring vehicle tire pressure, temperature, and rotations to detect and give warnings of abnormal leaks. At Cycloid Company, IR proved to be far superior to competitive tire monitoring products. The system's ability to filter noise from data signals coming from each tire transmitter allowed it to detect leaks much closer to required operating pressures. The system also included automatic adjusting for the significant effects of environmental conditions on tire pressure.

Over the years, IR has continued to be applied to the Futures and FOREX investment markets. Historical and current performance is reported throughout this web site. Currently, NeuroFission is developing applications for NFL Football point spread predictions and performing R&D in the prediction of the onset of epileptic seizures.

# Intuitive Rationality

## ***Simulating the Biology of Complex Systems***

*“ . . . I am heartened by the possibility that our social institutions evolve as expressions of deep natural principles.”  
Stuart Kauffman, theoretical biologist and complex systems researcher*

New research shows that people depend on a very minimum of regressive processing in making many of our most critical decisions. We cut corners for the sake of speed and rely on intuition, inference, and relational processing of competitive alternatives, especially when confronted with mountains of data generated by complex situations. A new understanding of this kind of complexity emerged from the studies of chaos and complexity theory in the 60's, 70's and 80's. Through development at the Santa Fe Institute ([www.santafe.edu](http://www.santafe.edu)), “attempts to uncover the mechanisms that underlie the deep simplicity present in our complex world” (Stuart Kauffman, 1995) are studied, and more recently, this simplicity is reported in journals, such as “Complex Systems” ([www.complex-systems.com](http://www.complex-systems.com)). Generally it has been discovered that many complex biological systems can be simulated with rather simple, non-regression based mathematics. MIT's successful experimentation with reactive robotics is just one example. Widespread testing and verification is showing that these new heuristic-based methodologies are, in many cases, at least as responsive as the more time-demanding regression-based methods.

The book “Simple Heuristics That Make Us Smart”, by Gigerenzer, Todd, and ABC Research Group, is an excellent resource that exhaustively covers the subject of “fast and frugal” heuristics and its relative performance compared to regression tools. While processor and communication technologies will most likely continue to propagate at the rate of Moore's Law, much of the productivity improvements of managing complex system must come from these new mathematical methodologies.

The investment markets can certainly be considered complex. In fact, standing back and taking an overall view of those systems, you could begin to describe their movements and pulsations in biological terms: they evolve, they emerge, they migrate, and they mutate.

IR is designed to take this view. The technology uses unique combinations of new simplified math and elements of ‘fast and frugal’ heuristics to ‘react’ to the biological properties of complex systems. The general result is better decision-making, a dramatic reduction of hardware and software processing requirements, and essentially no dependence on historical results and human subjective intervention.

## Intuitive Rationality

# The Components of Intuitive Rationality

### *The Concept of Less is More*

*“Everything should be made as simple as possible, but not more so.”  
-Albert Einstein*

As counter-intuitive as it sounds, ‘less is more’ when it is applied to the amount of information and analysis that is needed to make good decisions. These findings have been uncovered by research at NeuroFission, which has paralleled many university studies, and reported in recent best-selling books. “Blink: The Power of Thinking Without Thinking”, by Malcolm Gladwell; “Gut Feelings: The Intelligence of the Unconscious”, by Gerd Gigerenzer; “How We Decide”, by Jonah Lehrer; “Judgment under Uncertainty: Heuristics and Biases”, by Daniel Kahneman, Paul Slovic, and Amos Tversky, and “Wider than the Sky”, by Gerald Edelman, are of particular relevance. The results from a diverse spectrum of theories and empirical studies clearly demonstrate that, often, our decisions are better when we rely more on sub-conscious intuitive/emotional judgments. By-passing the collection and analysis of as much data as possible before making a final decision, is proving to be more reliable. We at NeuroFission have found over the years that by designing IR to selectively reduce the volume and diversity of data generated by a complex system, predictions and confidence evaluation have improved and allowed greater adaptability to current conditions. In fact, IR will ignore data that it finds to be of little value in making accurate predictions. Much like the professional .300 baseball hitter, it learns how to filter out most information coming at it, and concentrates on staying in the “zone,” staying intuitively reactive.

### *The Theory of Events*

*“It is only when we have the courage to face things exactly as they are,  
without any self-deception or illusion, that a light will develop out of events,  
by which the path to success may be recognized.”  
I Ching, Book 2*

NeuroFission has developed the “Theory of Events” that basically states that we humans receive and store information about an action in our environment in discreet lengths of time, we call, “Event Time Cells”. We not only store these event cells in our sub-

## Intuitive Rationality

conscious, but we also define them as *qualitative, quantitative, emotional* and time related values. These values are simple terms that, just recently, have been separately defined and studied by academia. NeuroFission has simulated the mathematical relationships among them. Finally, The Theory of Events creates and maintains a large array of Event Time Cells that produces a wide population of differing views of the environment, from which selections are made. (See “Wider than the Sky”, by Gerald Edleman, Yale University Press, 2004, TNGS, page 33)

Let’s say John, watching a thunderstorm approach, sees a lightening strike several miles away. He develops a ‘sense’ of that event in terms of its event time, quality and quantity and the emotional effect it has on him: a dim light, one strike and a mildly distracting surprise with little feeling of risk. The next strike, within 30 seconds and much closer, he will record a much different quality (brighter, thicker, longer, louder), quantity (one), an emotional impact (jump and duck) and clearly describe it to be in a different category than the previous strike. He can treat each of these strikes as two distinct event-times, or combine them when later telling his friend about yesterday’s storm. *This combination* could create a third sub-conscious event-time that sums up both strikes as it combines their quality, quantity and emotional impact. The Theory of Events manages all of John’s reactions to these individual and combined events and is designed to maintain a wide diversity of inputs, opinions (arguments) in making decisions.

### **Memory Decay**

*The wind blows out, the bubble dies; the spring entomb'd in autumn lies;  
the dew dries up; the star is shot; the flight is past--and man forgot.*

*Oliver Wendell Holmes, Sr.*

Human memory of events decays over time. John’s memory of yesterday’s lightening strikes may have been ‘forgotten’ and superseded by other, more major events that took place in his life since the storm. Weeks later, when asked about the storm, John may have forgotten it entirely. Surprisingly, memory decay of events seems to be at a rather fixed rate for all people.

# Intuitive Rationality

## Reinforcement Learning

*“The intuitive mind tells the thinking mind where to look next.”  
Dr. Salk*

But, if John’s memory of that first strike is *reinforced* by another lightning strike soon after the first and with nearly the same quality, quantity and emotional impact, his decay rate of memory of the combined event is essentially restarted. With repetition and constant reinforcement, *values of quality, quantity, emotional impact and time become very large. (In mathematical terms, the things we remember from life have values that have become very large).* Because memory decay continues to have its effect, years and a lifetime can pass, and these exciting and traumatic events may or may not become equal or more important than any other life experience.

## Over-Confidence and Loss Averseness

*“Listen to your intuition. It will tell you everything you need to know.”  
Anthony D’Angelo*

The *emotional impact* component of the Theory of Events contains measures of over-confidence and loss averseness that we humans always experience in making emotional decisions, and especially intuitive decisions. As a rule, our human nature causes us to wage a constant war between two emotional extremes: we are over confident, while we avoid danger.

We can make a series of correct decisions: at the roulette wheel, being in the correct lane on the highway, working with a difficult person. Yet, through the Theory of Events, overconfidence encourages us to “stay with it.” Events are reinforced, eventually leading to failure and a change in our “course”. For example, it takes just one loss in a series of successes for a person to increase loss averseness, and, fearing failure, we apply the brakes on what we are doing. Contrarily, the emotional component of over-confidence can lead to success; while with each successive correct decision we often rely on less and less data and go with the “flow”. But, usually failure is inevitable. And, since we do not like failure, loss averseness plays its emotional role in affecting intuitive decision making. How often have we changed car lanes to move ahead more quickly only to find that it would have been better to stay in the original lane? Although loss averseness often negatively affects the correctness of our intuitive decisions, it is, never the less, an integral component of intuitive decision making. For IR to truly simulate this human process, loss averseness must be included in the Theory of Events

# Intuitive Rationality

## ***“Fast and Frugal” Processing Logic***

*“Intuition is the supra-logic that cuts out all the routine processes of thought and leaps straight from the problem to the answer.”*

*Robert Graves, English poet, scholar*

The Theory of Events does not stop here. Remember the Event Time Cells, described above, and how they relate to the thousands of people experiencing the thunderstorm individually, each with their own measures of quality, quantity, emotional impact and event times. If it were possible to collect the values of these entire individual events, further analysis would show a ‘consensus’ or what could be termed *a super intelligence* about the storm. A good reporter might be able to describe this so called “super intelligence,” and, it would not stop there. That intelligence about the storm could continue to evolve as it is further modified by more individuals combining their event times, creating macro events and evolving to an intelligence of the weather last month, or the final overall analysis of, say, the hurricane Katrina, months and even years later. Applying the Theory of Events, very high values of quality, quantity and emotional impact will measure the affects on thousands of victims of Katrina through the creation of millions of individual and combined event times.

It is IR’s challenge to quickly find the emerging super intelligence about such a complex environment. It uses a tool called ‘fast and frugal’ search that *does not require* the intense and lengthy processing of all events. Explained in “Judgment under Uncertainty: Heuristics and Biases”, by Daniel Kahneman, Paul Slovic, and Amos Tversky, this methodology seems to mimic the efficient process that our brains use in intuitive decision making. NeuroFission has developed and integrated a fast and frugal search to identify emerging super intelligence of complex systems, *without having to process tens and hundreds of thousands of event times*. (The word ‘emerging’ is used instead of ‘emergence’ to differentiate the measuring of the dynamics of ‘emerging’, rather than the state of ‘emergence’.) Going back to the car lane analogy, we can’t tell if one lane is faster than the other by just observing just one event time, one car. We must be able to observe a series of cars in all lanes of traffic. If we take a single snapshot of one car, we have no sense as to the speed and flow of traffic. It is like a movie, which is *a series of event times*. When we see traffic *moving*, we can tell something about its relative speed. By design, fast and frugal ignores many event times and the information they contain, *and makes its selections more dependent on the emotional content of event times*.

# Intuitive Rationality

## ***“Give me the Best” Function***

*“Your own inner intuition, however, is often your best teacher...”*

*Christopher McDowell*

Obviously, all decisions are the result of choices. IR uses logic called “Give me the Best” in order to make good choices. It is based on the “heuristic”, or “set of rules”, which is a method used to rapidly reach a solution that is reasonably close to the best possible answer. This heuristic approach applies whenever there are multiple sources of information, time and/or alternatives, as in the example of IR analyzing hurricane Katrina. Applying this heuristic, “Give me the Best” to competing sources of information, IR scans a limited number of cues (ratings). If the first cues allow for a decision, the search process is stopped and all other information is ignored. If, on the other hand, the initial cues do not allow for a decision, the succeeding cues are evaluated, and so forth. Simply stated, *IR assumes that less is more, and by not “wasting time”, makes a quick, intuitive judgment.*

## ***Magnification independent***

*“There is deep intuitive wisdom in this American tolerance of economic variety and in our refusal to commit ourselves to any one social and economic system. It is recognition of the fact that life and truth are too varied and complex to be confined within the pattern of any single deliberately planned economic system.”*

*Dr. Earnest Morgan*

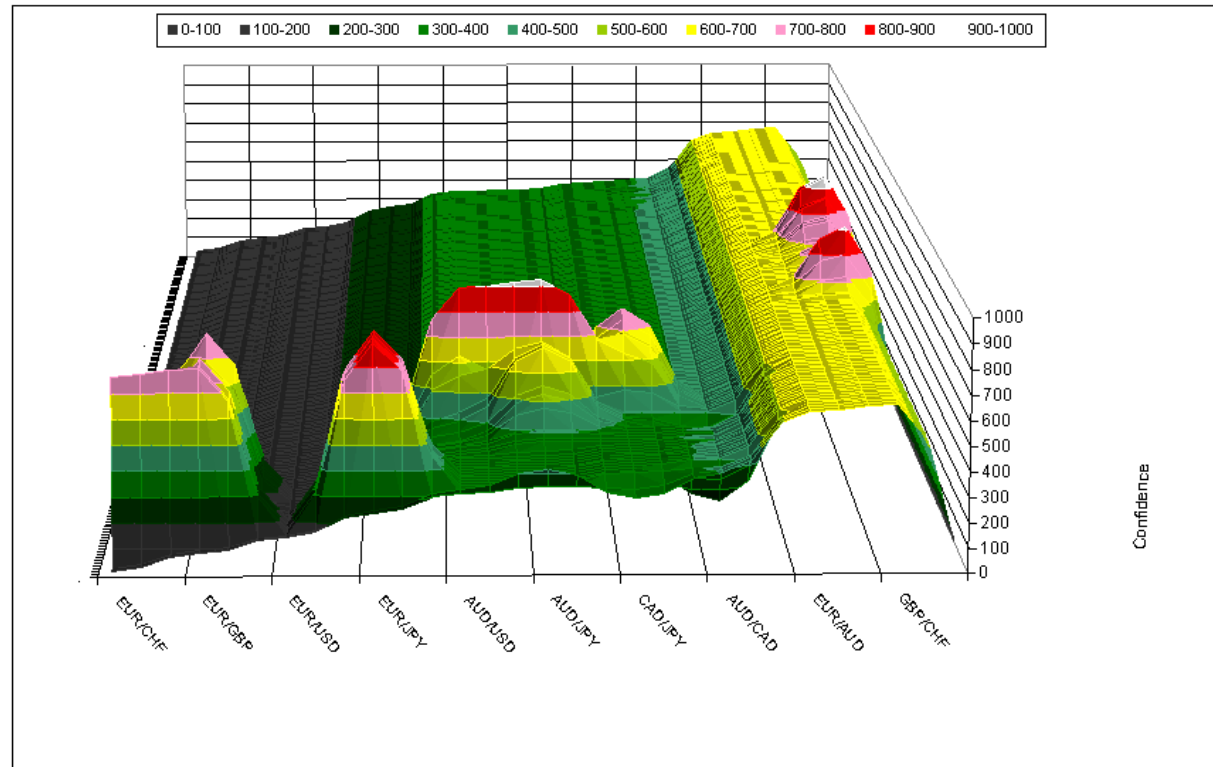
An event can be a microsecond long, or it can be years long. Applications in the first can have something to do with, let’s say, the movement of *electrons*. On the other end of the scale, the event of a weather system can be years long. For example, to study whether or not the climate is warming, you would look up events over a period of five, ten, or a hundred years. An event, in that case, is long. Conversely, the movement of electrons is a short event, measured in microseconds. The question is: does logic of IR apply to both cases? Yes, so far it seems to do just that. That is what we call magnification or resolution independence.

Because the Theory of Events is resolution independent, micro neuron levels and macro societal events are recorded and function *under the same mathematical relationships as do all resolutions between those extremes, and extend beyond either end.* Importantly, IR’s intuitive decision making is applicable in all of these resolutions. IR’s prediction of “the outcome of a baseball game” uses the same logic as “the flow of traffic” and trading in the investment market, like FOREX. Fundamentally, because of IR’s resolution independence, applications of the system appear limitless. (See below.)

# Intuitive Rationality

## The Cube

Intuitive Rationality does not stop with just making predictions and calculations of confidence and risk averseness of complex system behavior. *IR goes one major step further.* It produces a continuously undulating, three-dimensional graphic called, The Cube, that is updated at the end of every event. The Cube's three dimensions are: 1) the list of signal inputs along the X-axis, 2) the time intervals along the Y-axis, and, 3) the confidence value along the Z-axis. As each new event is processed, the terrain on the X-Z plane forms peaks and valleys that emerge, disappear or moves in waves, with each successive event, from short-term to long-term time intervals. With almost no prior training, this dynamic graphic makes it easy to have a complete understanding in real time of the dynamic behavior of the system to which it is attached. The biological nature of the system is seen as a continuum of emergence, evolution, migration and mutation. This unique graphic presents not only a view of what's happening with the system but also provides the opportunity to control its behavior through direct interaction with it. With your cursor, by pressing down, pulling up and moving sections of the terrain, you can send commands to the system through electrical/mechanical/chemical feedbacks. This interface allows for a very rapid learning curve for operators, almost regardless of the system to which it is attached. More will be written about this unique function of Intuitive Rationality. Where there is no feedback mechanism provided by the application, the Cube can be used as an overall indicator of performance, as in the case of the investment markets.



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# Intuitive Rationality

Intuitor™ is the PC-based commercial application of the Intuitive Rationality logic.

Initial applications are the real time trading of the futures, commodities, Forex and equity markets, the prediction of NFL football point spreads and future application development of the following environments.

- Industrial Product Demand
  - Infection prevention products and services
  - Biotechnology products
  - Medical devices
  - Nanotechnology products
  - Footwear products
  - Software products
  
- Economic forecasting
  - Gross domestic product
  - Corporate profits
  - Personal income and spending
  - Consumer price index
  - Balance of payments
  
- Sports forecasting
  - College and NFL football

## Intuitive Rationality

- Dog racing
- World class soccer
  
- Financial forecasting
  - Stock market
  - Foreign exchange market
  - Futures markets
  - Carbon credit market
  
- Event forecasting
  - Election forecasting
  - College enrollment forecasting
  
- Natural disaster forecasting
  - Earthquakes
  - Hurricanes
  - Weather

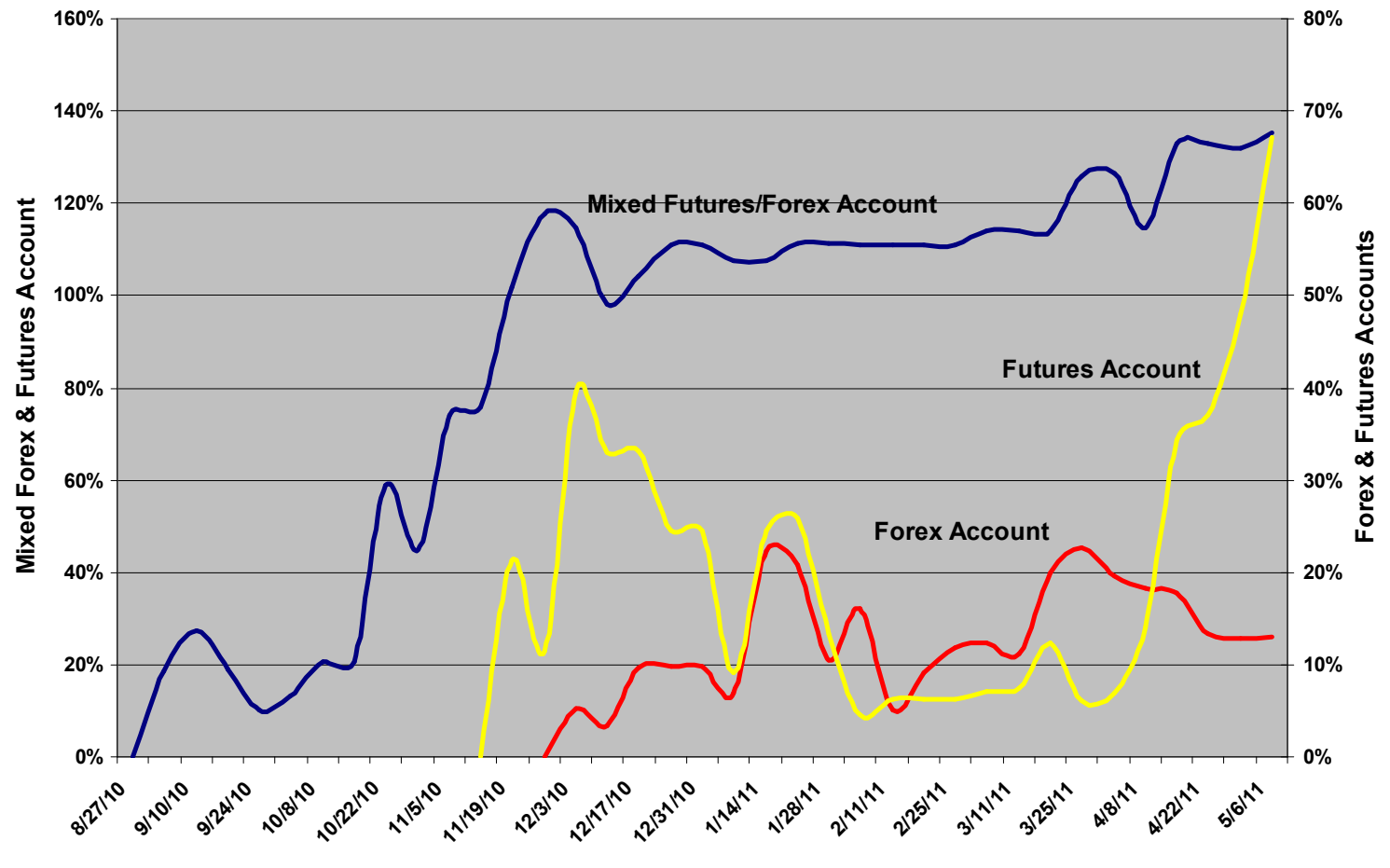


## ***Some Diverse Examples of Intuitior's Performance***

We have provided some examples of Intuitior performance in very dissimilar applications. The Intuitior logic is the same for all of these applications. No 'back-testing', 'curve-fitting' or 'regression analysis' was done. These results are all from the first and single run over data. You will note that Intuitior begins predicting from the very first data points, with no 'training' or special tuning necessary.

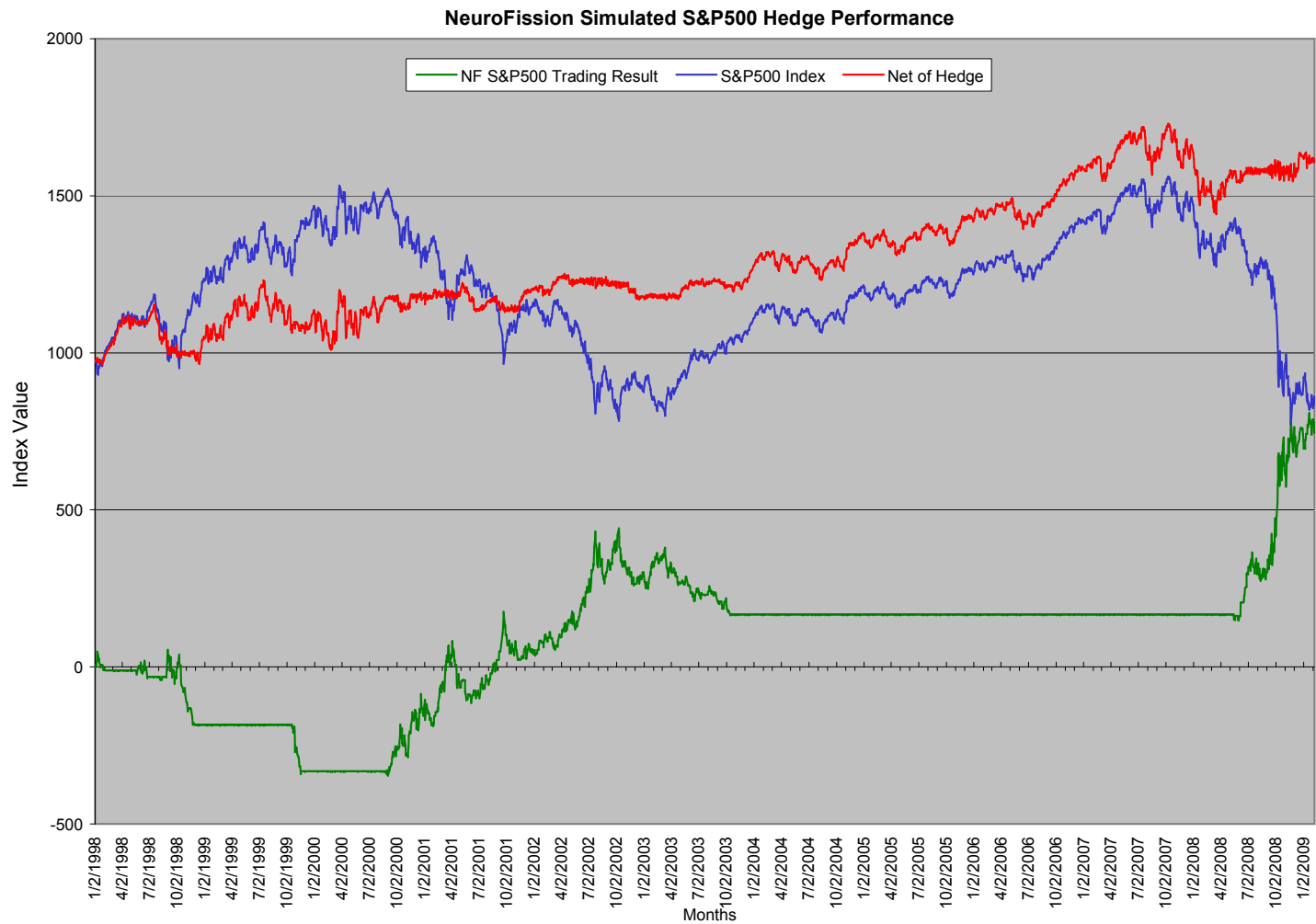
*"Often you just have to rely on your intuition."  
Bill Gates*

## IntuitiorMARKETS Real Time Weekly Performance (simulated)



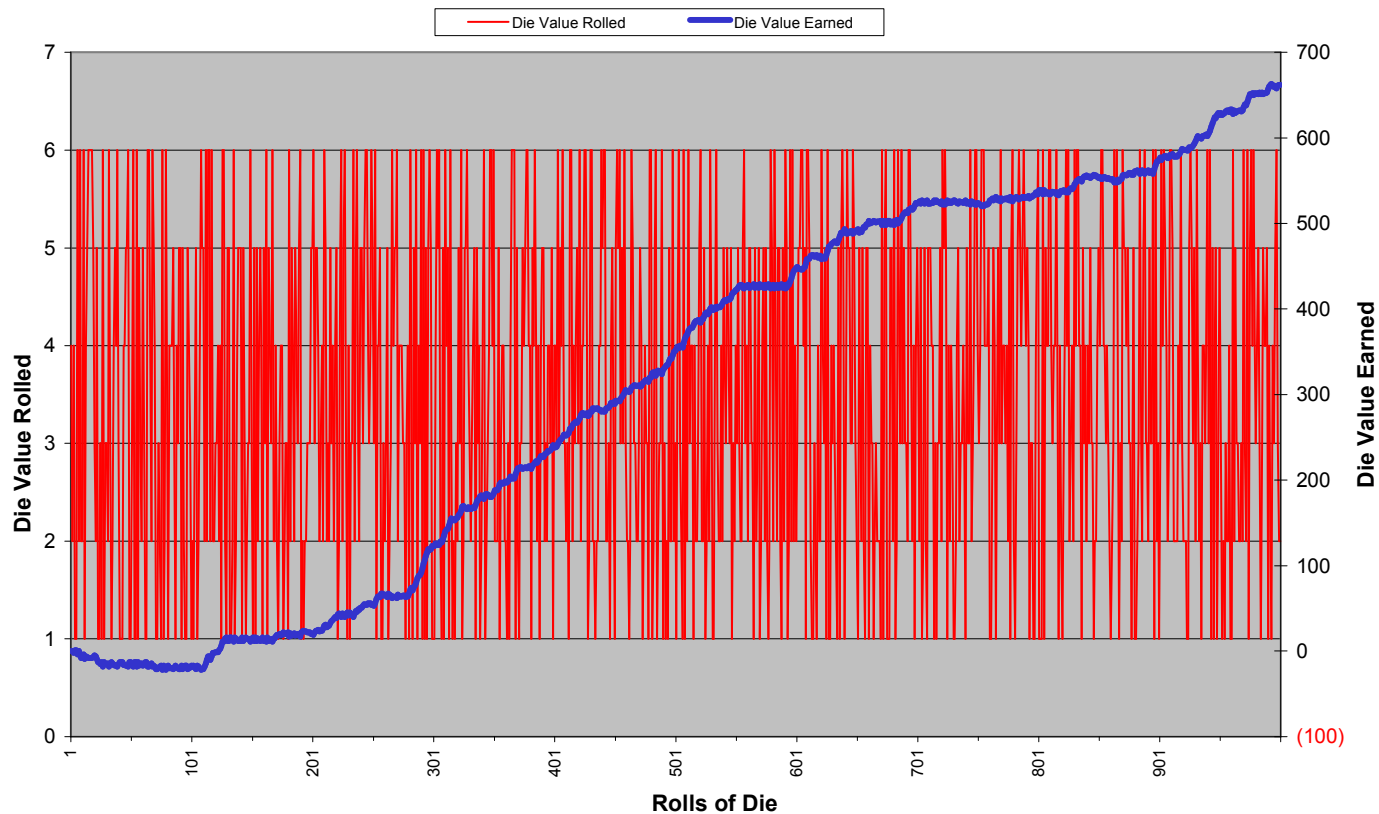
**Risk Disclaimer:** While every effort is made to evaluate the actual experience of subscribers, performance figures must be considered hypothetical, and past results are no guarantees of future performance. Because simulated results do not represent actual trading, hypothetical simulated performance results have certain inherent limitations. For those trades that have not been actually executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs are subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or may achieve profits or losses similar to those shown.





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**IR Prediction of the Direction of Die Roll Values**  
**1,000 rolls, 321 predictions of direction, 92% correct**  
 Die Values Earned: the sum of the die value differences of right and wrong predictions



# Intuitive Rationality

## IR Prediction of the Direction of Random Numbers

1,335 numbers, 578 predictions of direction, 86% correct

Random Numbers Earned is the sum of the value differences between right and wrong predictions

