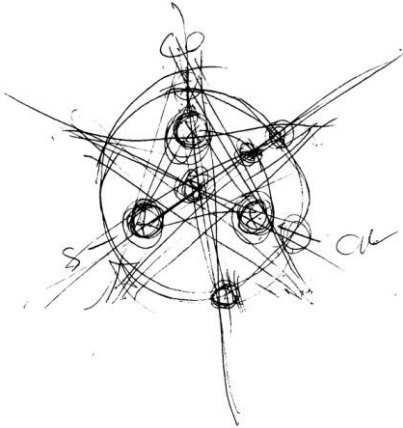Developed from earlier notes 1993-2015. A revisit to understanding the way humans experience the world around themselves - from cradle to grave…. Developing memories and experiences for future reference.   **IN PROGRESS**   **6/03/2016 11:40**

CRC - COMPREHENSION, RATIONALISATION AND CONCLUSION

This doodle started it all.

It represented three states of awareness, and the progression of understanding over time, as perception evolved and eventually revisited the same point of view with a new perspective.

I called it a 'progressive helix'.

We often return to the same place with a different view – and that allows us to learn and evolve our understanding of the things around us.

1. Introduction & Background

These ideas have been rattling around in my mind, and documented since 1993, closely following my career - spanning visual media, broadcast, production operations, and digital technology… and the simultaneous observation of infant children developing – alongside an educated adult whom experienced traumatic brain injury, and their subsequent re-learning basic life skills.

This is the third major revision of this document. The original was a fractured 'stream of consciousness', which was inadvertently lost in the days of floppy disks. A copy was scanned in from paper, and tweaked a little before I got tired of having to explain the various 'out of context' references… so it took another 15 years to begin work on this update.

The aim of this revision is to simplify and break down the core concepts and possibilities of the CRC model. Incidentally, I've applied them in a few projects with spectacular results that had my peers fascinated by the 'knowledge' held in the structure.

The genesis of CRC was a simple project called Acquisitive – which simply monitored every keystroke on multiple desktop PCs, indexed and correlated the relationships between the context, characters, words and other elements over time, and 'learned' well enough to predict words and complete sentences in real-time. The code was only about sixty lines of CB-86 under MS-DOS. The knowledge was contained in context – not the actual data elements.

At that point I started documenting CRC itself, but it was always a hobby pursuit, interleaved with the birth of our children, and life's minutiae. I found that academics were not interested to talk – as I am not *qualified* to think in this domain!

Background of the Author

An unusual path through life – with diversity, success, failure and personal crises sprinkled with happiness and despair! Born into a happy middle-class suburban family as the third of three

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children (youngest by 8 years!). I travelled overseas at the age of five with the family to spend 3-1/2 years circumnavigating the world by ship during the early 1960's.

Educated at a 'private' boys-only school from years 4-11, and completed final exams informally while working full time. As a result of this stimulating - but highly disrupted upbringing, I believe I developed an 'attachment' phobia as opposed to 'commitment' phobia… a very strange place to live your life. Highly engaged, but unable to establish roots.

In 1974, I started working as a trainee technician in television production, followed closely by a shift to technical operations. Progressed up through both technical and operational/creative roles over thirteen years before moving to SE Asia in an administrative role, developing these skills in other people. During that period 1974-1987, I also spent a significant time working and engaging with early computer hardware and software technologies.
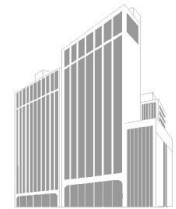
Upon returning to Australia in the late 1990's, I continued in high-level technology systems design and engineering. Ultimately creating a software project of my own in 2001 which was converted into a successful product and company - which is still operating today with a global customer base.

Due to health issues, I withdrew from that company, and was subsequently 'cheated' out of my equity in the ongoing success.

These diverse activities exposed me to a broad range of stimulation and learning environments, as well as languages, cultures and 'trigger environments'.

I also realised that in many ways, I don't think like a lot of other people – and wanted to find out why!

CRC is the result.

2. Possible Applications of CRC principles

    a. Early childhood development & Education
    b. Medicine & Psychiatry / Psychology
    c. Behaviour modification
    d. Law & Criminology / Rehabilitation
    e. Design and Engineering
    f. Data management
    g. Synthetic Intelligence

3. The Allocation of Brain Resources

Opportunistic 'on-demand' vs pre-determined allocation of resources
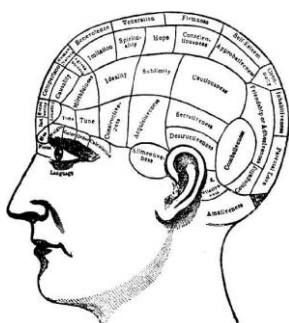
The physical growth of the brain is well documented, but the relationship of allocation to functionality is not as well understood.

In most current opinions, apart from the fundamental physical connections, the allocation of brain function is distributed across 'known' geographic positions throughout the brain's geography.
Think phrenology.

My first proposition is that intellectual function is assigned to portions of the brain - on-demand, 'first-come-first-served' as each physiological or

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mental capability evolves through infancy and childhood – in synchronisation with the physical availability of the actual brain capacity.

Retraining after injury

This mechanism may partially account for those *exceptions to the norm* that have experienced displaced mental functionality, as well as that ability to re-learn fundamental skills after traumatic brain injury which affects a specific portion of the brain.

It may also contribute to understanding of childhood conditions that appear from unknown neo- or post-natal circumstances.

Those people with isolated brain, nerve or sensory damage can be re-trained to develop new awareness by introducing a new set of 'index' *priorities.* Sounds like brain washing... in effect, it is.

The old primitives are not 'erased', since they are the sub-tree of old experiences that are locked in long-term memory. The newly retrained situations and trigger events are bound to those pre-existing nodes previously rendered inaccessible.

4. Memory Structures

I believe the existing scientific leaning toward clearly defined short- and long-term memory is overly complex in the mechanisms used to define acquisition and evolution of memory, yet too simple in the structure of the physical instances involved. There's more to it – with less moving parts!

BINARY... not necessarily on/off. yes/no. The simplicity is there, but the values are bias - toward harmony/unity of away-from the same. This fits ambiguous, evolving systems over generations... far better than absolute black & white states!

I. Short-Term (*Waking Period*) memory

My proposal is that rather than 'short term' memory in the traditional sense – being measured in minutes or hours, that newly experienced situations are remembered in a sequentially ordered 'volatile' memory which fills over time – our <u>waking</u> period.

This might explain why we become less able to absorb or respond to new inputs as awake time passes, and a short nap is needed before further learning becomes viable – with ever decreasing efficiency until a full sleep cycle is completed.

II. Sequential, forward only access

This sequential short term 'waking period' storage is <u>not</u> indexed against prior memories or experience, and necessitates a more labour intensive rewind, and play forward strategy for recall of recent events & situations.

III. Sleep & Dreaming

The mechanism used in the CRC model to reconcile new events or situations against experience or long-term memory is engaged during REM and long-wave sleep phases.

- REM sleep provides a search mechanism when the chemical index generated by each 'new' event or situation is resolved against long-term memory. Flashes of 'crosstalk' or

leakage between newly acquired situations and existing memories may manifest in our semi-conscious as a daydream or similar.

- Long-Wave sleep is that period when these newly indexed and merged events and situations are bound into our long-term memory as experience and memories.

Subsequent access to those new experiences will be much faster and more reliable once they are submitted to the indexed long-term memory.

IV.   Long-Term memory & the Experience Tree

Visualise our long-term memory or 'experience tree' as a complex geodesic sphere that grows outward from a single point at the centre… our moment of conception if you will.

Initially the sphere is an *empty shell of potential*… 'what might be'… with no internal populated structure – that will fill and bind together as new experiences are added to the maze of connections.

Nodes in the z-axis of the tree are upside-down Y-shaped junctions… each indexed to a specific real-life situation or experience as discussed above.

New Y nodes are added during REM/Long-Wave sleep, either *between* existing nodes (as better matches to existing experiences), or as new nodes on the 'surface' of the sphere.

One leg of the inverted Y forms part of the path back to that central 'core' node – our 'chemical normal' state.

The other leg of the Y will typically be unterminated, or when experience tells us about an alternative node (outcome unknown), the tree will progress in that direction (more detail later).

In summary, when a situation is encountered, an 'index' is generated when it is put into waking-period memory… that same index is passed to our experience engine to resolve as 'positive' tending toward chemical normal, or 'negative' which routes *away* from chemical normal. Nested negative branches may ultimately lead to mental collapse or a coma – while the brain prioritises recovery over the resolving of a new situation.

One additional *important* element of each Y node is a 'currency' or 'relevance' value which Is incremented each time that specific node is traversed, and decremented/decays over time when not 'touched' – hence repetition and frequency keep some pathways more elevated than others. When a choice is available, the highest relevant is followed first unless it leads to a negative – whereupon the path is retraced and then follows the next most relevant node outcome
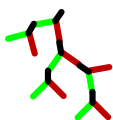
When a *new* situation index 'jumps into' the tree, this currency/relevance variable will allow the experience parser to choose the most likely outcome when there is more than one partial match resolving an index.

This nested, recursive structure accommodates the chaotic nature of the human learning and response model, yet also accommodates the incredible structure it permits – and demands.

To add a level of capability- remember this tree started from a single point – our 'core' node at the moment of conception… As the tree grows outward, it is not evenly distributed or symmetric around the sphere.

Different trunks and branches represent varying *traits* of the individual… perhaps stubbornness, a heart murmur, or a disposition in favour of athletics, technology, law, music or other specialisations – formed from pre-birth and early experiences, along with repeated transit of particular neural routes through the tree structure.
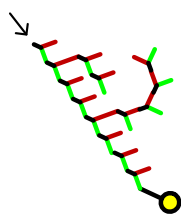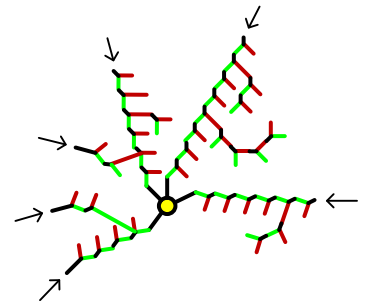
A *non-resolving* branch will backtrack if *another* 'less relevant' path is available from the parent node, or has the potential to recurse indefinitely – overwhelming the conscious and other 'low-priority' functions. Possibly leading to coma, unconsciousness, collapse or other mental fatigue.

5. Consciousness, and Subconscious states

At the superficial level, we have already discussed waking-period and long-term memory. We also mentioned the risk of nested negative branches in resolving new experiences against long-term memories.

It's also worth considering these storage and recall mechanisms against unconsciousness, comas, dementia and other diagnosed conditions.

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The following diagram illustrates the relationships described.
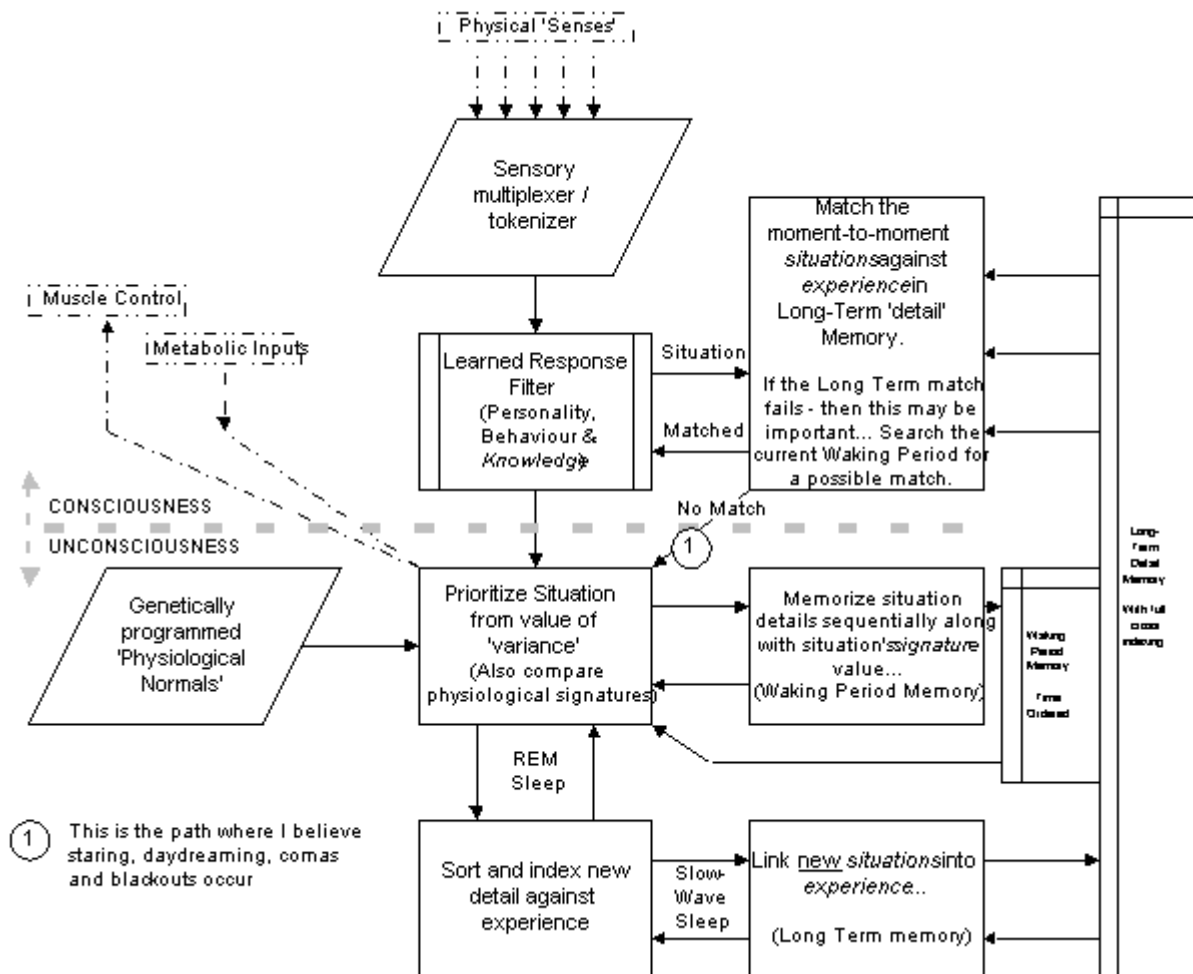
This diagram (from my original notes) illustrates the relationship between the different elements of sensation, situations, conscious memory, experience and response.

6. The Chemical Normal proposition

The influences of DNA & RNA in evolving responses over time.

DNA identifies our genetically inherited *disposition* to body-chemistry events and physiological stimuli, while **RNA** introduces an active ageing factor that modifies our physiological response with the varying biochemical environment over the term of our lives - based on those unique life variables experienced by each of us individually.

These intrinsic life behaviours can be 'overloaded' with later 'learned' responses – like holding our breath, ignoring pain and other examples.

Physiology & External Senses

As we experience minute changes in our physical environment, these events trigger minute awareness in our conscious – as well as unconscious self. In simple terms, turning against the wind, elevated heart rate, dilated pupils, clammy hands etc.

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Indices to experience and past events from long-term memory

Each event in our conscious and unconscious life – sight, sound, temperature, blood pressure, blood sugar, and any number of variables are sensed by our body, to construct a signature for that specific event.
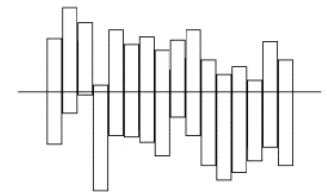
Situation Signature

That event or 'situation' signature is compared to a returned value from our long-term memory for the *fastest* response to stimulate an instinctive reaction, and only if unresolved – is used to work with our waking-period memory. This takes place almost instantaneously, so the outward effect is virtually indistinguishable to an observer.

Real-Time resolution of 'Situations' against Experience

A situation is compared to our 'chemical normal' – that broth of DNA & RNA which provides a realistic snapshot of where our physiology 'wants' to be… for *normal* metabolic and physiological function.

Chemical Normal

When that individual event signature is compared with our *chemical normal*, it reveals the differences between the various trigger variables as they vary from their ideal states.
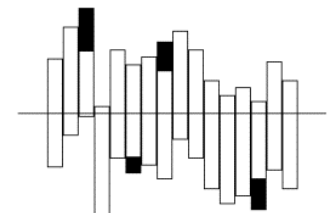
Variations from 'normal'

These identified *differences* generate an immediate, unique index into the experience tree – allowing us to rapidly jump into, and traverse the branches in search of the most relevant and positive path toward resolving that current 'normal' state.

That reaction may be an *inherited*, or a *learned* response involving physical, metabolic or other reactions within the body and mental system.

7. IQ and Perceived Intelligence

To explore the CRC model from a different perspective (our first was to determine the paths of sensory data and situations), we should consider the 'bandwidth', 'multi-processing' and resource allocation that is available. These will have a far greater impact on 'intelligence', 'responsiveness' and 'problem solving ability' than the 'interface ability' as mentioned earlier… perhaps IQ should be called the 'Interface Quotient'

My suggestion is that two significant factors determine the 'apparent' intelligence of a person.

(1) The ability to parse situations into specific details for indexing, requires access to the 'knowledge & experience' that I have already mentioned... and

(2) the ability to perform controlled 'daydreaming' which allows the parsing to occur without hampering the individual's conscious behaviour... (e.g. falling asleep at the dinner table).

Importantly, I believe these two resources can be trained into an individual quite easily...

THE END FOR NOW   **6/03/2016 11:40**

An Introduction to CRC Fundamentals

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