

The Science of Storytelling

Dr Dan Churach



Rotary Club of the Southern Districts
Gosnells Golf Club, WA - Tuesday, 20 May 2025



Three Life Passions: Number One – Writing...

My first passion is writing, whether it be academic, journalistic, or creative.

- Journalism HS and university years
- Master's and PhD theses
- Volunteer newsletter positions: ACS, Kimberley Konnection
- Wrote my own Chemistry and Physics lab manuals at SJS
- First novel manuscript (unpublished) and first published “*PROOF!*” – summer holidays in the 1980s
- “*BACK TO PARADISE*” in 1990s – almost published same month as PhD thesis... almost...



Passions Two – Teaching

I am a teacher through and through, and that necessitates my love of learning.

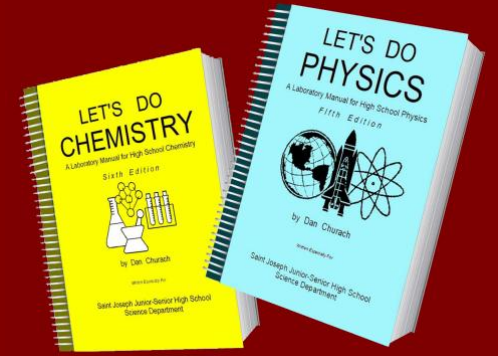
- Tea room confusion of teacher versus lecturer.
- Teaching and storytelling are both **TWO-WAY STREETS**. Teachers must listen to students and readers, although the timeframe may be different...
- To me, teachers are, **BY DEFINITION, STORYTELLERS!**



Passions Three – Science

I love science! More specifically, I love the methodology of science, not the textbook

- Not “truth”, but facts based on the scientific method. LET’S DO SCIENCE!
- Science may make mistakes, but if we LEARN by doing, there is no failed experiment.
- The scientific method is self-correcting, though timeframe can be long.

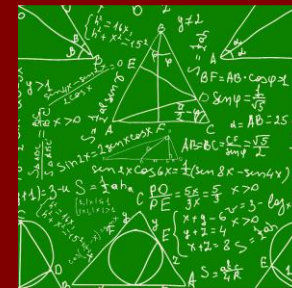


Overlap Creative Writing and Science

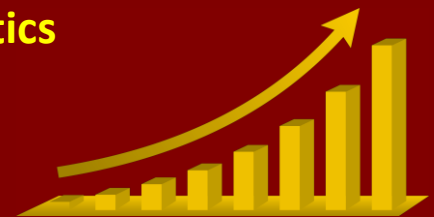
- The 'paper chase' earning credentials requires communicating via academic papers, presentations, conferences, publications...
- These reach a VERY narrow population.
- HOW can we share the thrill of scientific discovery with a broader population?
- I know how NOT to share with a wider audience – do NOT use academic papers full of...



Statistics



Mathematics



Graphs

Fact versus emotion? WE NEED STORIES!



- *Homo sapiens* think more with their guts than their heads, make decisions more on what they feel than what they think.
- Australian journalist Waleed Aly recently said that in a post-truth world, “...*facts are just irrelevant. All that matters is the narrative and how you feel about it.*”
- I disagree with Aly and argue that facts **ARE** relevant, but we need to communicate them to the public at large, not just to other scientists.
- This is where the idea of “**STORY**” comes in... Especially with the **WIDER AUDIENCE** mentioned on the previous slide.

Stories are memorable



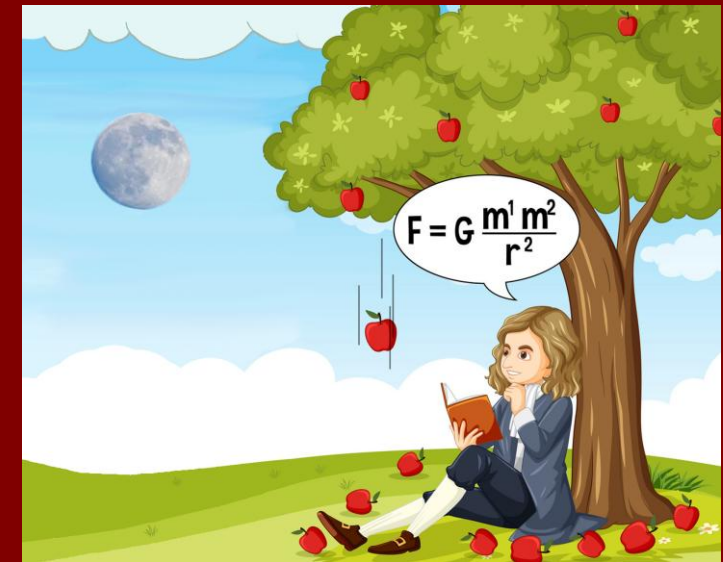
Lots of science here, but I will summarise...

- Jerome Bruner (Harvard, 1960s) found learning from narrative (stories) is retained 22 X more than what is learned from lecture alone.
- Bower & Clark (Stanford, 1969) reported memorising words by rote vs. narrative; rote learning participants displayed 13% successful recall and narrative groups remembered at a 93% rate.
- The point? [Go to larger font!] Many studies report similar results of the impact of using story over simply facts on the listener's memory, but why?
- Stories are memorable as we FEEL with gut, not KNOW with head...
- **SURPRISE!** Bruner “quoted” for 50 years in psych units, business schools, education programs and...
There is no record that he ever reported the study! I'll bet you'll recall the story though, the “22 times” bit...

Example 1: Newton's Universal Law of Gravity

- A whiteboard lesson to calculate the force of gravity between two objects often results in a sea of blank faces in front of me.
- OR... I tell the story of young Isaac Newton
- In 1666, he sat under that apple tree in England and watched the apple drop while seeing the moon. Geneus? Newton became the first person to connect both the moon and the apple to this invisible force, gravity.

$$F = G \frac{m_1 m_2}{r^2}$$



Example 2: Volume Irregularly Shaped Object

$$\rho = \frac{m}{V}$$

- I could give another whiteboard lecture on density?
- OR... tell the story of Archimedes, the third-century BC Sicilian scientist, who was asked to confirm that the king's crown was pure gold, but he needed to calculate its density. Finding the mass part was easy, but the volume of a crown?
- Water overflow? He realised that his body displaced a volume of water equal to his own volume.
- A naked Archimedes jumping from his bath and running down the Sicilian street naked is an image that kids never forget! EUREKA!



Example 3:

Emu in the Sky

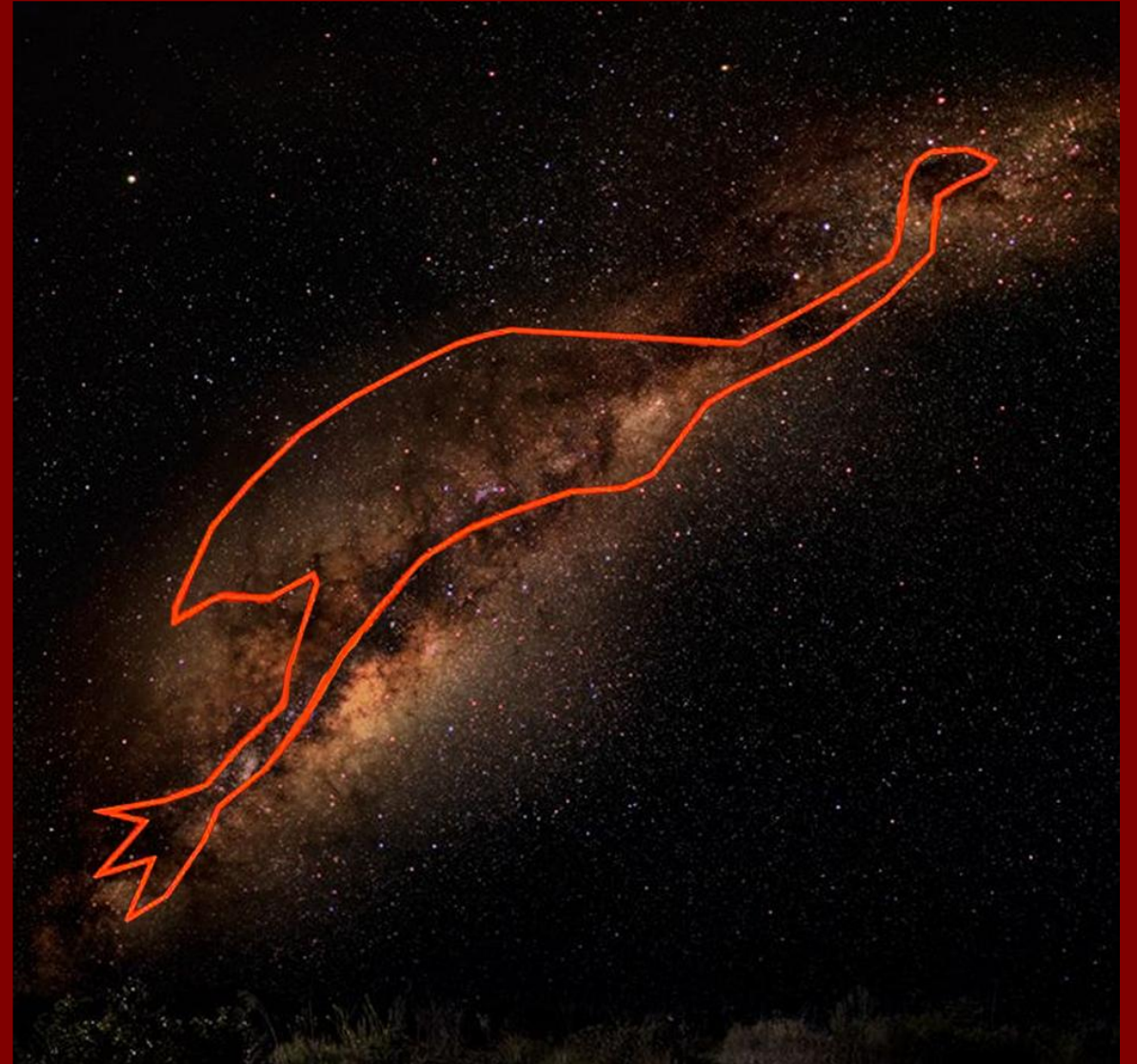
- The great 'Emu in the Sky' - interstellar dust clouds in the constellation Crux and is now named the Coalsack Nebula.
- The first interesting thing here is that the Aboriginal peoples saw the cloud. Many asterisms are 'connect-the-dots' of prominent stars (e.g., Big Dipper or Southern Cross).
- The second interesting thing is that the Aboriginal peoples used the 'Emu in the Sky' to indicate seasonal hunting.



Example 3:

Emu in the Sky

- During April and May, the Emu rises in the sky at dusk at about a 45° angle. It signals the start of the emu breeding season, and Indigenous Australian people learned from word-of-mouth stories they can safely harvest emu eggs and ensure babies next year.



Example 3:

Emu in the Sky

- During April and May, the Emu rises in the sky at dusk at about a 45° angle. It signals the start of the emu breeding season, and Indigenous Australian people learned from word-of-mouth stories they can safely harvest emu eggs and ensure babies next year.
- By June and July, the Emu shifts its position to horizontal high in the sky at dusk. By June, most eggs have chick embryos, so they must stop collecting emu eggs for food.



Other Examples of Scientific Discovery

- **Galileo** – Around 1590, he disproved Aristotle's conjecture that heavier objects fall at an accelerated rate than lighter ones. He dropped balls of varying mass from the Tower of Pisa. Big and small objects dropped at the same rate.
- **Ben Franklin** – In 1752 attempted to learn the nature of electricity in a thunderstorm using a kite and string.
- **Alexander Fleming** – 1928, Serendipitous discovery of penicillium by noticing a mold preventing growth of bacteria in Petri dish at St Mary's Hospital, London.

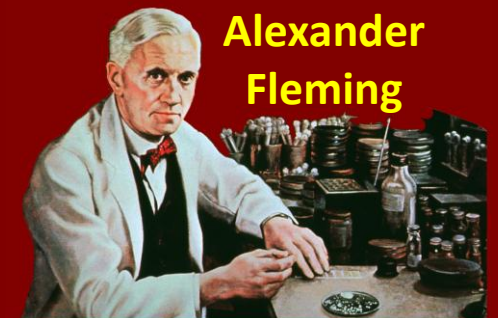


Old Idea
Heavier falls
fastest

Galileo
Both fall at
same rate



Ben Franklin



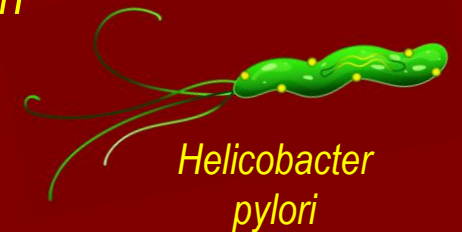
**Alexander
Fleming**

My favourite – A Western Australian Example!

- Dr Barry Marshall met Dr Robin Warren at Royal Perth Hospital in 1981.
- Hypothesised spiral bacterium, *Helicobacter pylori*, was associated with gastritis, peptic ulcers and possibly gastric cancer.
- “Experts” thought they were crazy! Stomach pH is too high to permit *H. pylori* to live.
- Hundreds of trials and then... Petri dish left by accident over a 5-day weekend, and an *H. pylori* colony was alive and well on Monday.
- The *Gastroenterological Society of Australia* rejected and ridiculed the academic paper.
- Marshall and Warren didn't give up. Tried to infect pigs with no success.
- In 1984, Marshall had a baseline endoscopy and all appropriate tests ruling out signs of gastritis, then swallowed a sample of *H. pylori* in his lab. He exhibited gastric symptoms within a few days, and 8-9 days later, stomach samples revealed massive inflammation. Testing confirmed the presence of massive colonies of *H. pylori*.



Drs Marshall and Warren



Helicobacter pylori



PERSERVERANCE!!! 2005 NOBEL PRIZE in MEDICINE

What did these examples all have in common?

- **THEY ALL EXPERIMENTED TO CONFIRM THEIR OBSERVATIONS.**
- **They each are supported by reproducible EVIDENCE!**
- **You needn't have a PhD in science to understand the stories...**

BUT THERE IS MORE!

Yes, I'm a science teacher at heart, but it's not just science...

- I come from the school of “Constructivist Education” that contends the best way to ‘teach’ is not to merely lecture (remember my Murdoch Uni tearoom), but to construct new knowledge upon information the learner already has. In that sense, we ‘construct’ new knowledge upon old.
- Jean Piaget argued that teaching must occur through social interaction, the teacher-learner give and take, allowing students to construct new knowledge based on what they already know.
- This is NOT just science. ALL WE LEARN MUST RELATE TO THAT WHICH WE ALREADY KNOW! We learn from our own life experiences.



Our symbols and/or icons are based on all our past experiences, extending far beyond just family and friends. Experiences needn't be just humans. Consider...

- A horse – Phar Lap



- A marsupial – a Rottnest Quokka



- A beach – Cable Beach in Broome

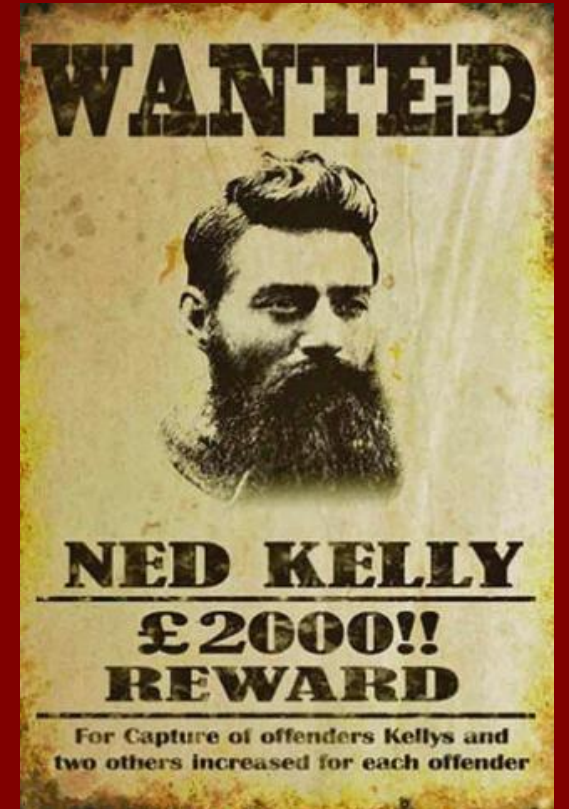


- A rock – Uluru in the NT



The Good, the Bad and the Ugly

- We've looked at stories about admirable scientific heroes and even non-human symbols, but NOT all of our stories – all of our icons – are of high moral convictions...
- Edward 'Ned' Kelly (1854 -1880).
Australia's most famous bushranger, outlaw, gang leader and convicted police murderer.... AND an iconic figure...



National Identities Tell Stories

- Our national flags are symbols...
- People don't live, die or pay taxes for a flag...
We make these sacrifices for what the flag represents – the STORY that the flag tells.
- That “shared story” may be represented by a national flag that transcends generations and is what maintains a country's identity over the centuries.



Historical Heroes and Icons



Honourable
John Curtin



Professor
Fiona Stanley



Uncle Jack
Charles



Honourable
Robert Hawke



Edith Cowen



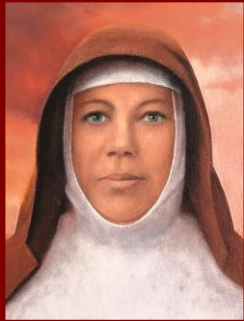
Graham 'Polly'
Farmer



Honourable
Julie Bishop



Sir Donald
Bradman



Sister Mary
MacKillop



C.Y. O'Connor



Dr Anne Aly



Cathy
Freeman



Sir John
Monash



Honourable
Julia Gillard



Eddie Mabo



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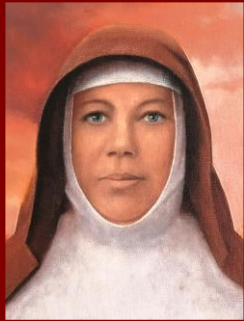
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Eddie Mabo



Dr Barry
Marshall

Monash and other business leaders established the first Australian Rotary Club in Melbourne in 1921

The Science of Storytelling



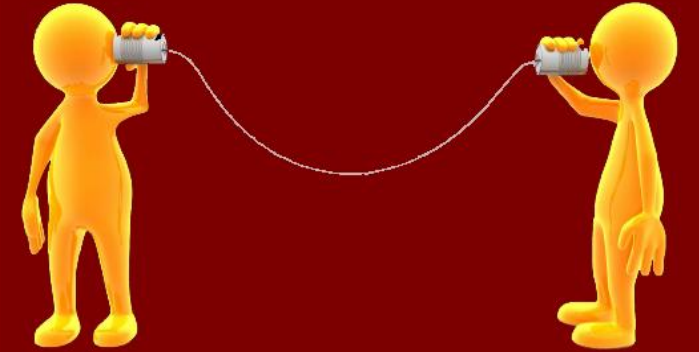
- There is no right or wrong in storytelling.
- Writing a POEM, painting a PICTURE, singing a SONG, TEACHING a class or selling a product are variations of how each of us is a storyteller.
- Whatever your vehicle of expression, let ‘who you are’ guide your approach to communicating ideas, no matter who your audience is.
- But this does not only apply to the novelist, composers or poets.



The secret is that...

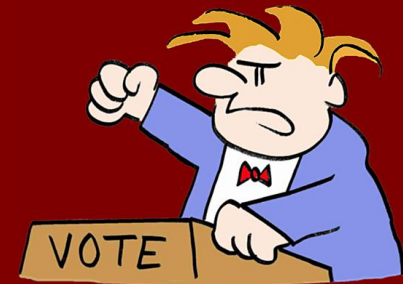
We are ALL storytellers

- We are ALL communicators...
- We are all teachers.
- When we communicate ideas with others, we simply share what we are most passionate about... like teachers do... like storytellers do...



Each of us has our own life experience of storytelling...

- Mum and dad socialise kids through story
- A salesperson sells a product through the use of a story.
- Medical doctors, nurses, and therapists treat and encourage patients using stories.
- A Minister, Rabbi, Imam, Sikh or any religious leader communicates using parables and stories.
- Rotarians form new friendships and deepen existing relationships by sharing stories.
- Politicians use stories to communicate a vision of the community they hope to lead.



But... Another
SURPRISE!

**The way we communicate with
others — the way we tell our
stories — has changed beyond
anyone's wildest dreams!**

First Nation peoples have lived in Australia for some 60,000 years. Early *Homo sapiens* could not foresee these changes... Our grandparents could hardly foretell many of these breakthroughs...

- Campfires – Face to face
- Telegraph – Great distances; Australia-UK mid-1800s
- Radio – First commercial radio ~ World War I
- Television – Sydney, Melbourne, 1955, Perth, 1959
- Phones since 1800s, but mobiles changed the world...

• And then...



Around the campfire



Telegraph



Radio



B&W Television



Colour and
Flat Screen
TV



1983-1994
MOTOROLA
DynaTAC 8000x
\$US 3,995



1997
Motorola
StarTac 70

Global Impact – the Digital Meteor Impact!

- Mid-to-late 1990s – Palm Pilot (PDAs), Black Berry, Nokia Communicator...
- QWERTY keyboards and Integrated touch screens.
- In January 2007, Apple introduced the iPhone. In a sense, EVERYONE BECAME A DATA SOURCE competing for our attention.



Could this be another EXTINCTION METEOR?

- **ANOTHER EXTINCTION BY MOBILE AND COMPUTER?**
- We now communicate instantaneously, globally...
- News has decentralised from a few networks, newspapers, and magazines to BILLIONS of people on Earth. A majority of these people are carrying a modern computer and camera in their pocket **AND ARE ALL ABLE TO COMMUNICATE WITH EVERYONE!**
- One new problem is the difficulty of fact-checking “what is the truth”.
- A second problem brought on by social media is the competition for our attention



Our ability to be heard amongst 8 billion people has become a challenge.

- We must connect with another person for our message to be heard? We must attract another person's attention.
- “*THE SIRENS' CALL*” by Chris Hayes contends that the alarm, scream or siren, whether fact or fiction, covers the globe in seconds.
- Social media allows the ‘sirens’ to call across the globe at the speed of light.



Is it any longer possible to separate the siren from the message?

- The siren now competes with the message.
- Attention is now a commodity, has great financial worth and is bought and sold on the open market.
- The more shocking a statement, the more reaction (therefore more WEB CLICKS) it may generate.
- Web clicks are governed by ALGORITHMS which aim to make sirens go **VIRAL!**
- This has become an entirely new field of study.

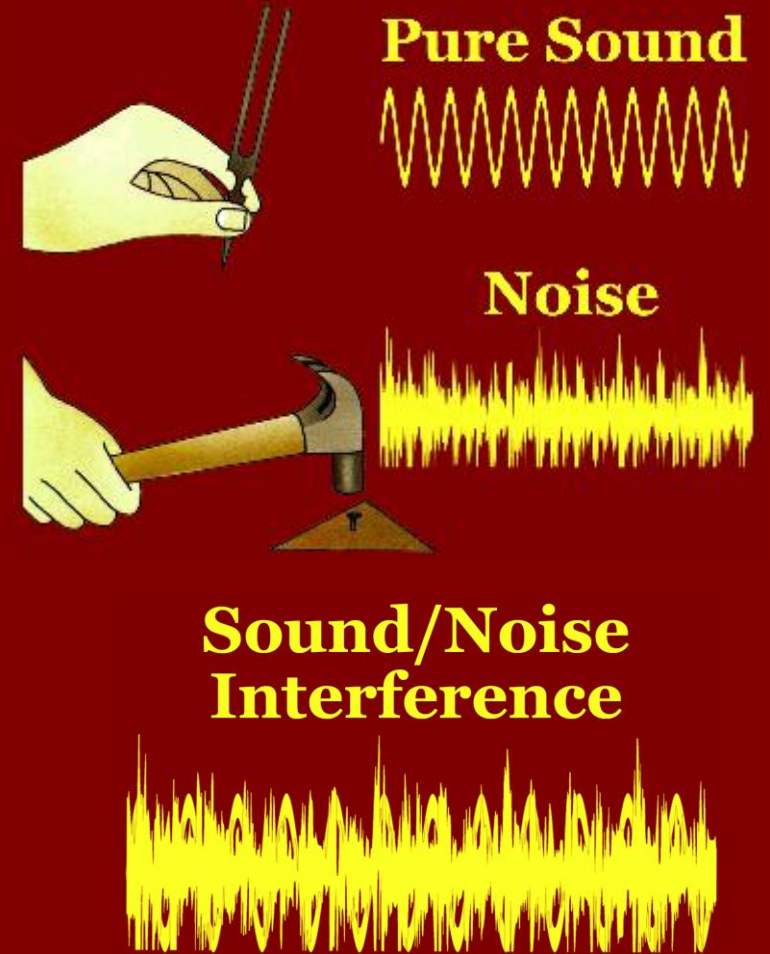


VIRAL!!!



HOW DO WE HEAR THE SIGNAL (FACTS) FROM THE NOISE (ATTENTION-GRABBING SIRENS)?

- I don't pretend to have that answer, but I try to explore the dilemma in my writing.
- We can metaphorically try to visualise the problem by comparing a pure sound wave and noise tracing on an oscilloscope.
- The NOISE can make the SIGNAL nearly invisible!



I will conclude by sharing my approach to creating a Churachian Technothriller.

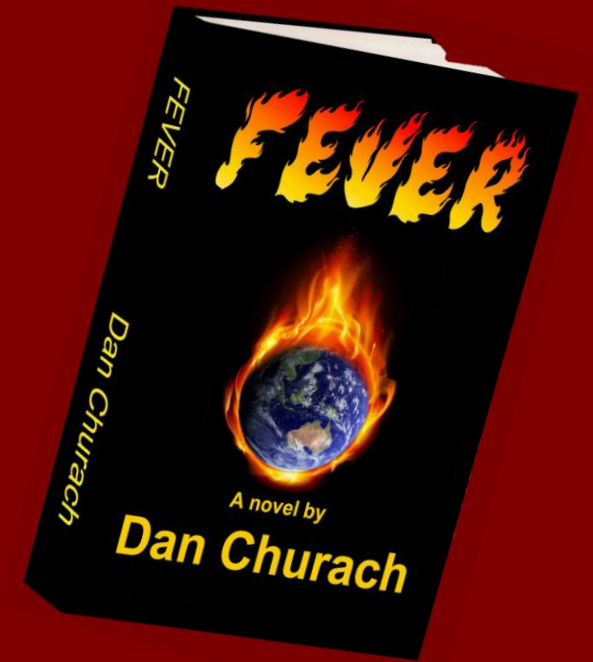
- I attempt to incorporate the latest science and technology.
- I reflect on the increasing overlap between what is public versus what is private in our modern-day cultures.
- As the story develops, I have my characters separate facts from fiction, teasing the reader with twists and turns and challenging them to decipher what is truth and what might be a dead end.
- I try to have at least one murder in the first chapter! After all, there is a TECHNOTHRILLER!

CRIME SCENE - DO NOT CROSS



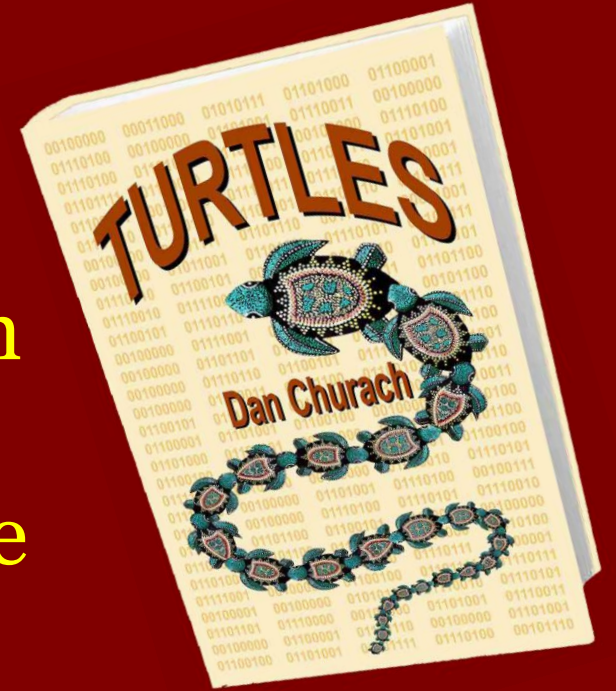
Keeping with the Story Theme... and Dan's Creative Writing Passion

- My aim is always, first and foremost, to entertain but also to reflect on the latest technology and current events.
- I could give a lecture presentation about how viruses mutate, spread and cause humanity problems, or...
- Or... I could write *FEVER*, a technothriller about Australia's first "Murder by Ebola" (written in 2018-2019 before COVID-19).



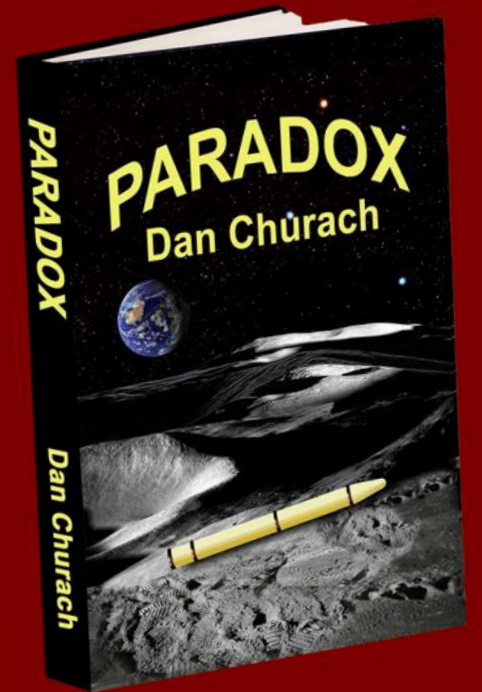
Churach 10th Novel: *TURTLES*

- I could lecture you about the latest research looking at AI – artificial intelligence – and how it might cause unforeseen problems we never anticipated or...
- Or... I could spin another technothriller about Curtin Uni and Notre Dame Australia researchers designing artificial intelligence to manage lower levels of artificial intelligence that are managing even lower levels of AI... Maybe this is already happening! [*Turtles all the way down, ma'am*...]



...and tease you with my most recent novel: “*PARADOX*”

- Talk about crazy ideas... My 11th novel was published last June...
- One of the world’s first trillionaires owns the rockets, the communications satellites, the hardware and all the software servicing them.
- The company funds the establishment of a Moon Base at the South Lunar Pole.
- What could possibly go wrong?



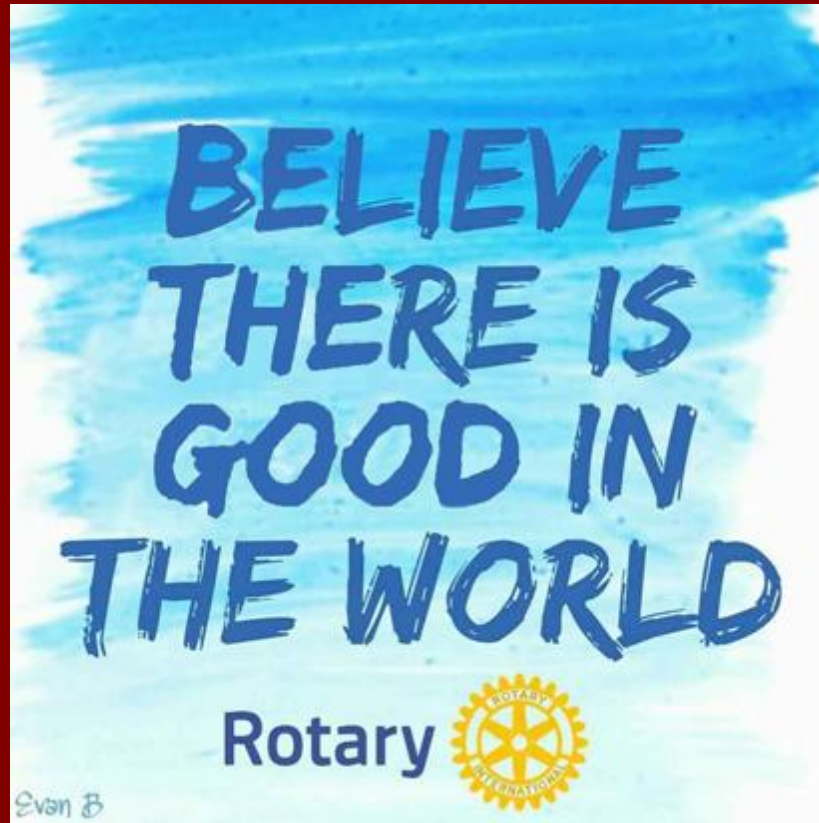
**In closing, thank you members of the
Rotary Club of the Southern Districts
and to Rotary International**



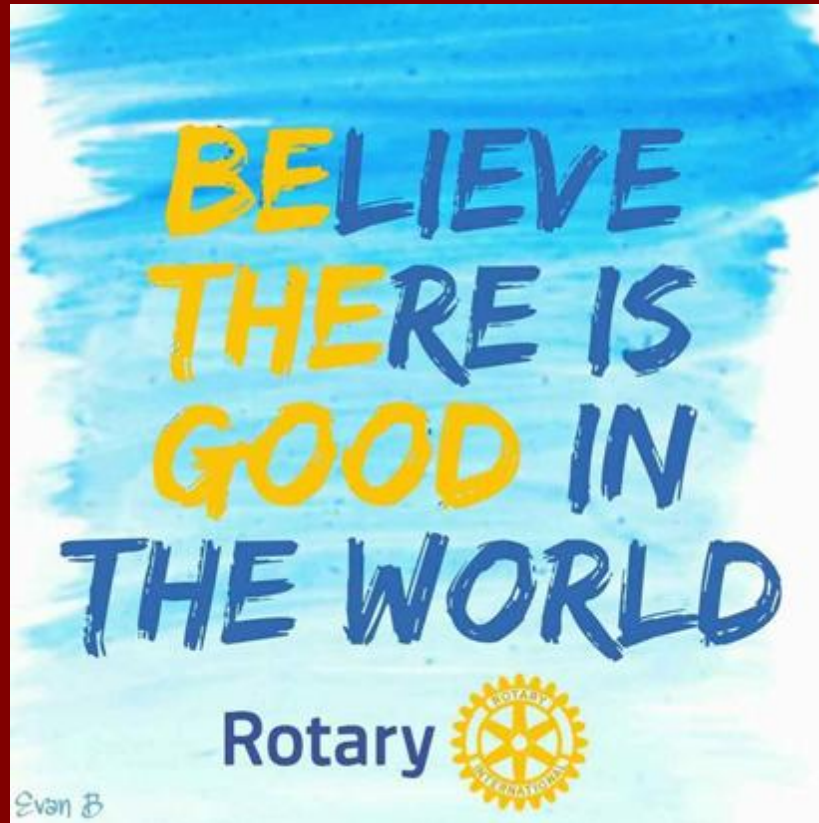
As Rotarians, you are a model for others. You follow up your words – “your Rotary story” — with actions. Words are one way to tell a story, but ACTIONS speak much louder. ACTIONS like...

- Southern District Rotary's work supplying the **Nakivale refugee settlement in Uganda** with sewing machines and computers.
- Rotary Club of Southern Districts **"Shine On"** awards to community people with disabilities.
- Rotary Club of Southern Districts **Community Grants** enabling other not-for-profit organisations to reach out to your community.

- So, Rotarians, your story, your actions, and your community concern sets an example for the Southern Districts as well as all of WA, Australia and our world.
- It may be an overused concept, but it's the only world we have, so we all need to look after our global community.



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Thank you... Questions?

Check out my website and “Dansplaining” at:

www.churach.com



All books are available at www.amazon.com.au