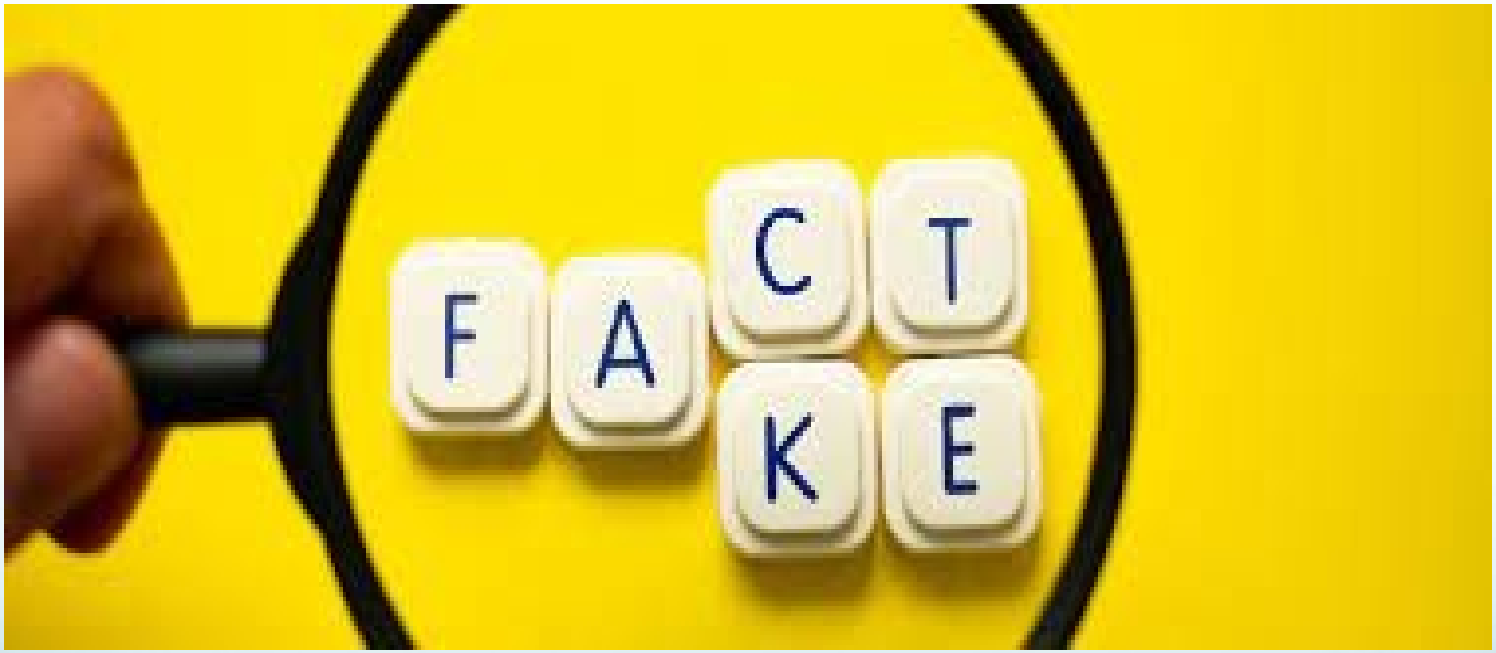
Science and Pseudoscience

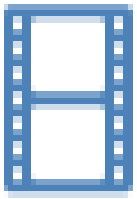
Alan Potter - December 2021

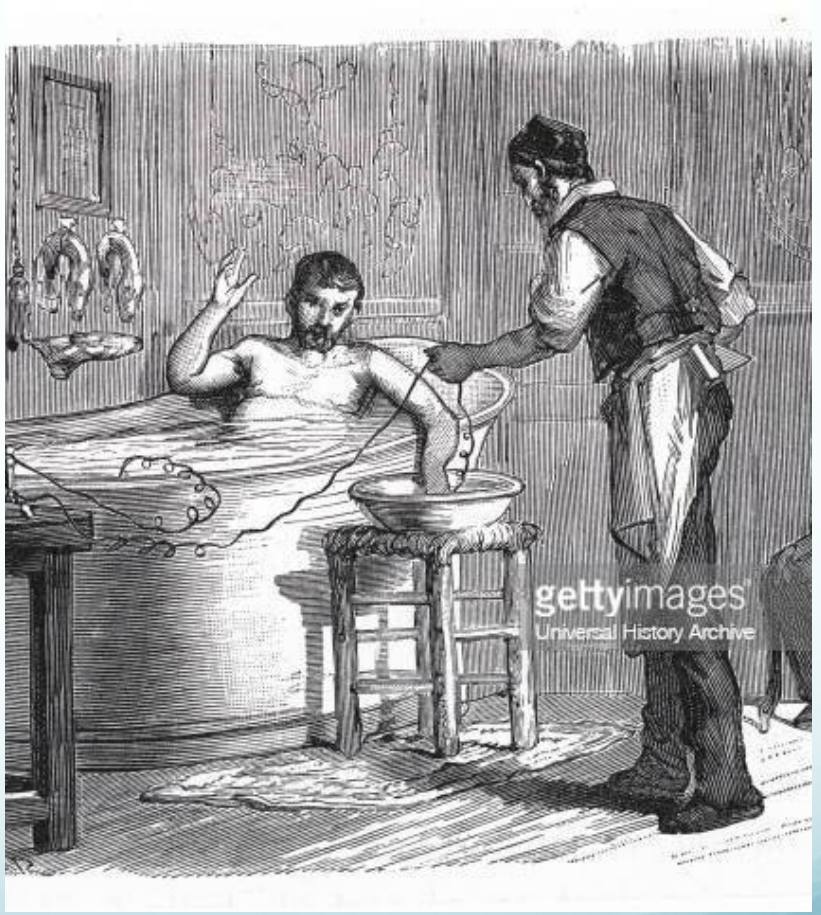


Science and Pseudoscience

- Introducing pseudoscience
- Defining and comparing science and pseudoscience
- Outlining the underlying features of pseudoscience
- Describing the unscientific world we live in
- Adopting a 10 step scientific approach
- Revealing examples of old and new pseudoscience
- Using science to establish facts and reveal the truth

Try Electric ShockTherapy





Some underlying features of Pseudoscience

- We can have faith in ‘professionals’ such as doctors
- We can be in awe of machines we don’t understand
- We can be swayed if other people are supportive
- We can be ‘informed’ by those with vested interests
- We can be blindsided by ‘scientific’ language
- We can mistake belief for knowledge and facts
- We can be biased for things that make us feel good

Science versus Pseudoscience

What is Science ?

the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment.

from "*The World of Science and Technology*"

What is Pseudoscience ?

a collection of beliefs or practices mistakenly regarded as being based on scientific method.

from "*The New Pseudoscience of 'counselling*'"

Living in a ‘Post-Truth’ World

- It is often accepted that we now live in a ‘post-truth’ world where opinions count for as much as, or even more than, well-established findings.
- Many people do not, and in some cases cannot, distinguish what is true from what they wish to be true.
- There is a tendency to judge the value of truth on the basis of our emotional reaction to it – accepting things that ‘warm the cockles of our hearts’ as we reject well-supported assertions that ‘rub us up the wrong way’.
- We are all prone to this error but one of the hallmarks of an educated person is their capacity to recognise ‘bias’ and, to some degree, compensate for it.

Step 1: Accept that we are all biased

- Bias is perhaps a product of natural selection
- We are predisposed to false positive errors
- It is assumed to always be better safe than sorry
- Bias is deeply ingrained in human cognition

Astrology


Libra
Virgo
Scorpio
Leo
Sagittarius
Cancer
Capricorn
Gemini
Aquarius
Taurus
Pisces
Aries
wikiHow

Step 2: Comprehend that we are largely unaware of our biases

- This is often known as ‘bias blind spot’
- We can identify cognitive biases in others but not readily in ourselves
- We often believe ourselves immune to serious errors in thinking affecting others
- We can be overconfident in our beliefs whether they are false or not

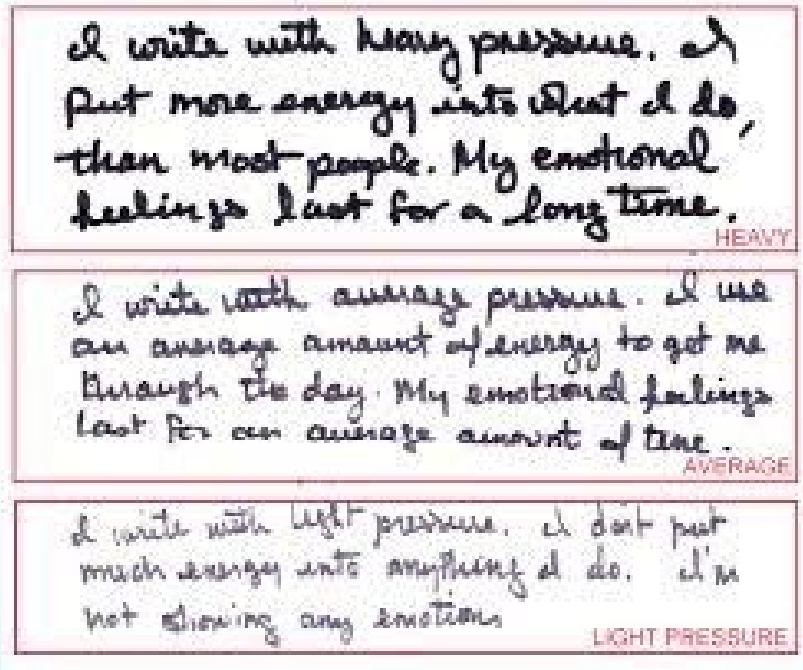
Numerology


Understanding Numerology
1 PRIMAL FORCE
2 ALL KNOWING
3 CREATIVE CHILD
4 SALT OF THE EARTH
5 DYNAMIC FORCE
6 THE CARETAKER
7 THE SEEKER
8 BALANCE AND POWER
9 THE CARETAKER
11 THE INTUITIVE
22 MASTER BUILDER
33 MASTER TEACHER
spiritualmotivationclub.com

Step 3: Appreciate that science is a systematic set of safeguards against bias

- There is probably no one single ‘scientific method’
- Science is a finely honed set of tools to can compensate for our species’ biases
- Science can help us to overcome ‘confirmation bias’ as we selectively seek out and recall evidence that supports our hypotheses

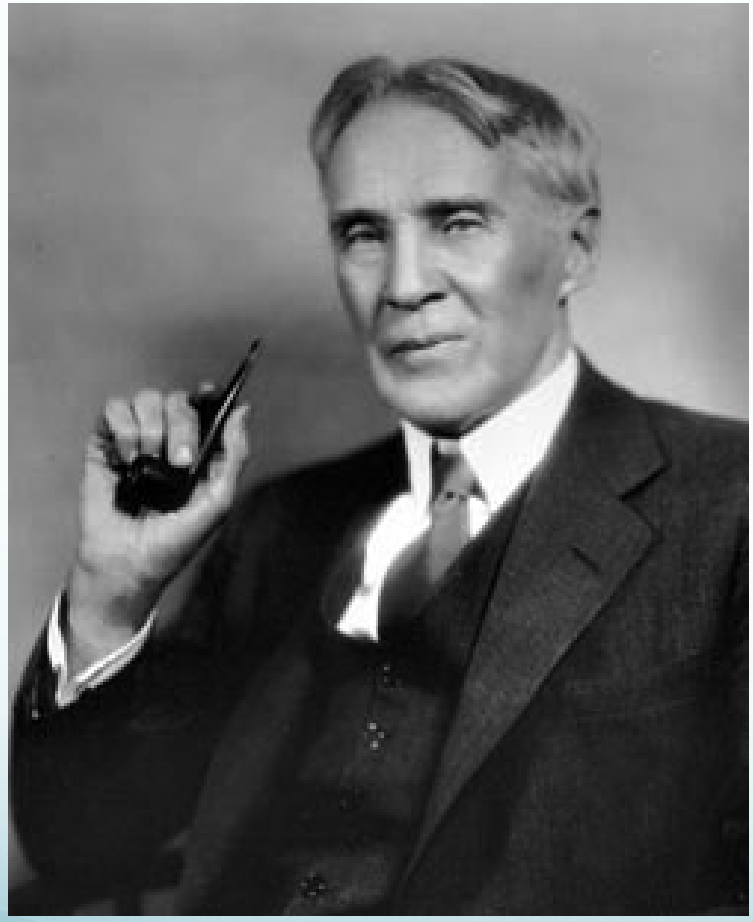
Graphology


I write with heavy pressure. I put more energy into what I do, than most people. My emotional feelings last for a long time.
HEAVY
I write with average pressure. I use an average amount of energy to get me through the day. My emotional feelings last for an average amount of time.
AVERAGE
I write with light pressure. I don't put much energy into anything I do. I'm not showing any emotions
LIGHT PRESSURE

Step 4: Grasp that scientific thinking doesn't come naturally to the human species

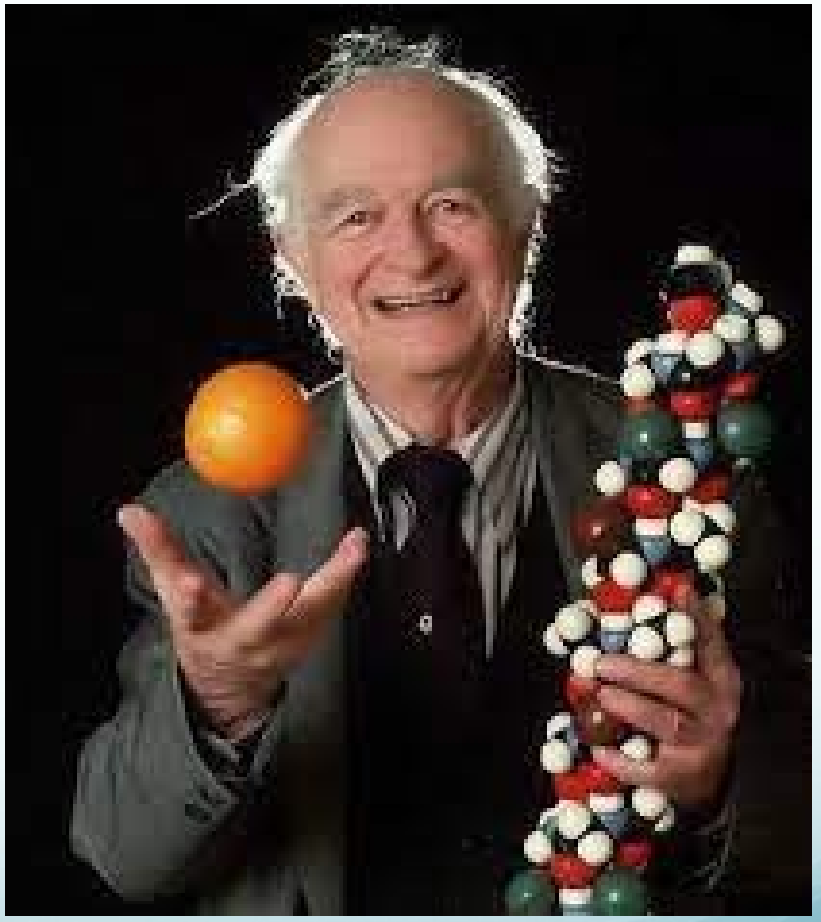
- Scientific thinking needs to be acquired and practiced assiduously
- We can, too often, believe first and question later
- Science emerged relatively late in human history
- Being curious, observant and seeking patterns is, on their own, not science

N-Rays

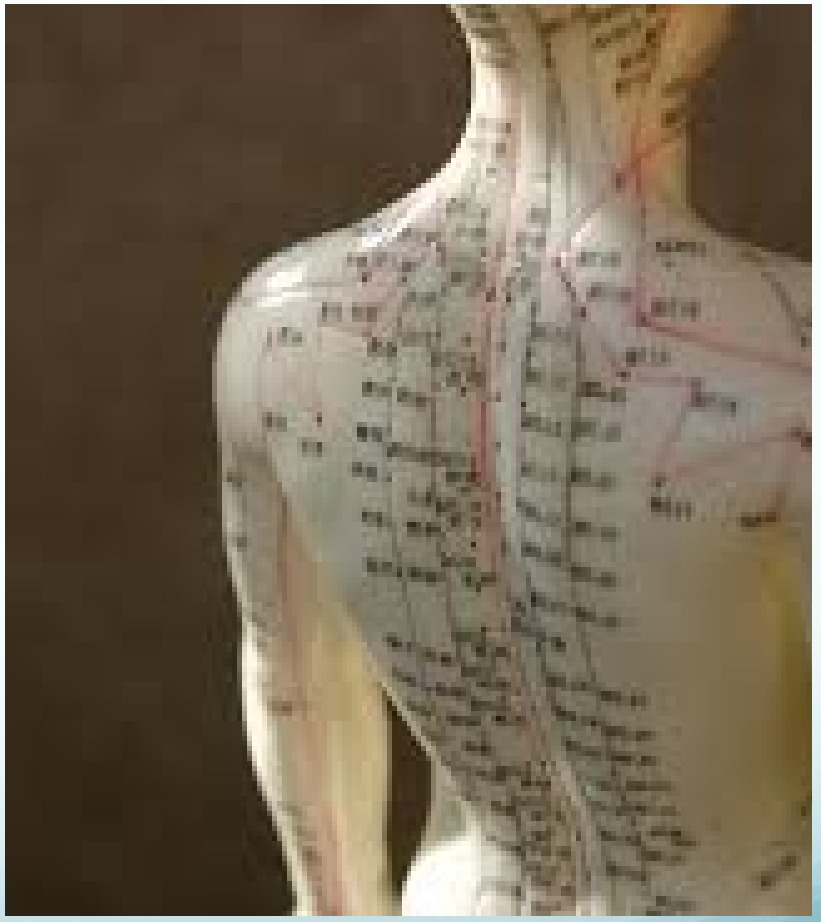


Step 5: Recognise that scientific thinking is, largely, domain specific

- Scientific thinking differs across different fields
- It is difficult to teach scientific thinking as a broad transferrable skill
- Scientific Nobel Prize winners know little about fields outside their own
- None of us is immune to the attractive temptations of spurious claims



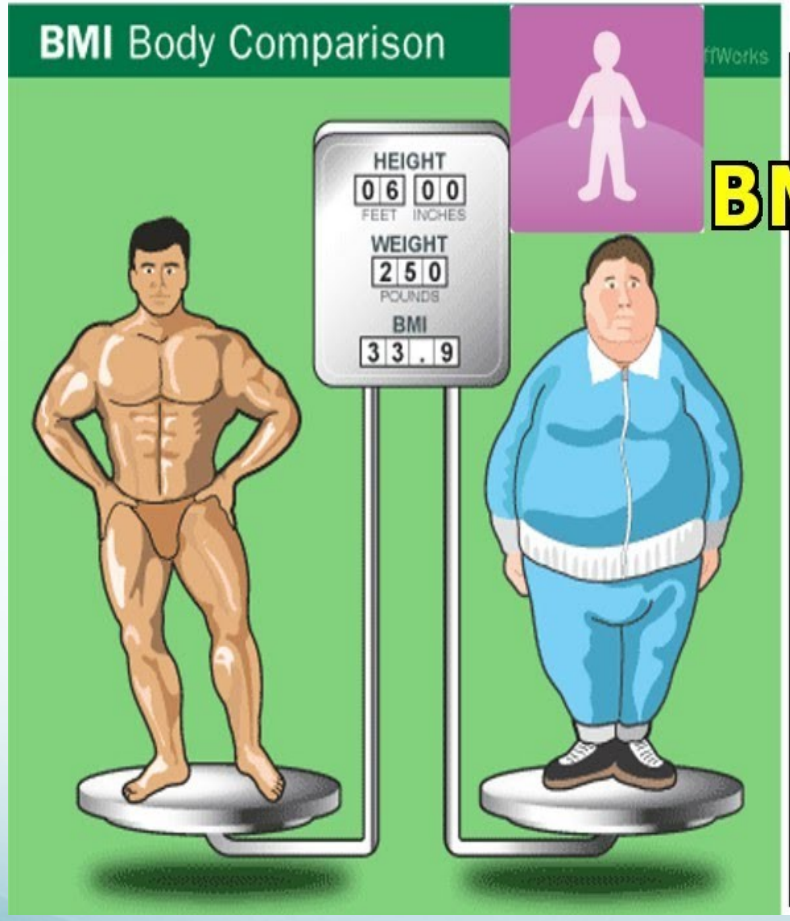
Acupuncture

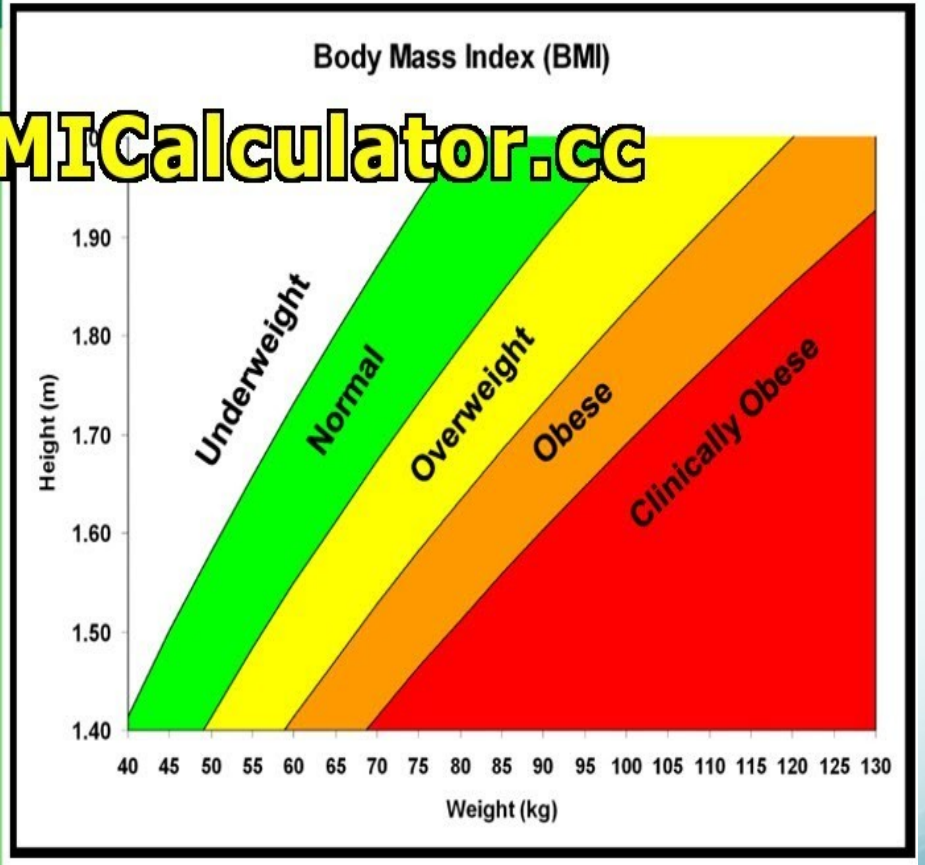


Step 6: Realise that pseudoscience and science lie on a spectrum

- There is no bright line that distinguishes science from pseudoscience
- When is a hill a mountain or when does a large pond become a small lake ?
- This does not mean we cannot or should not distinguish between them
- We must focus on clear-cut exemplars of each concept

What is BMI?

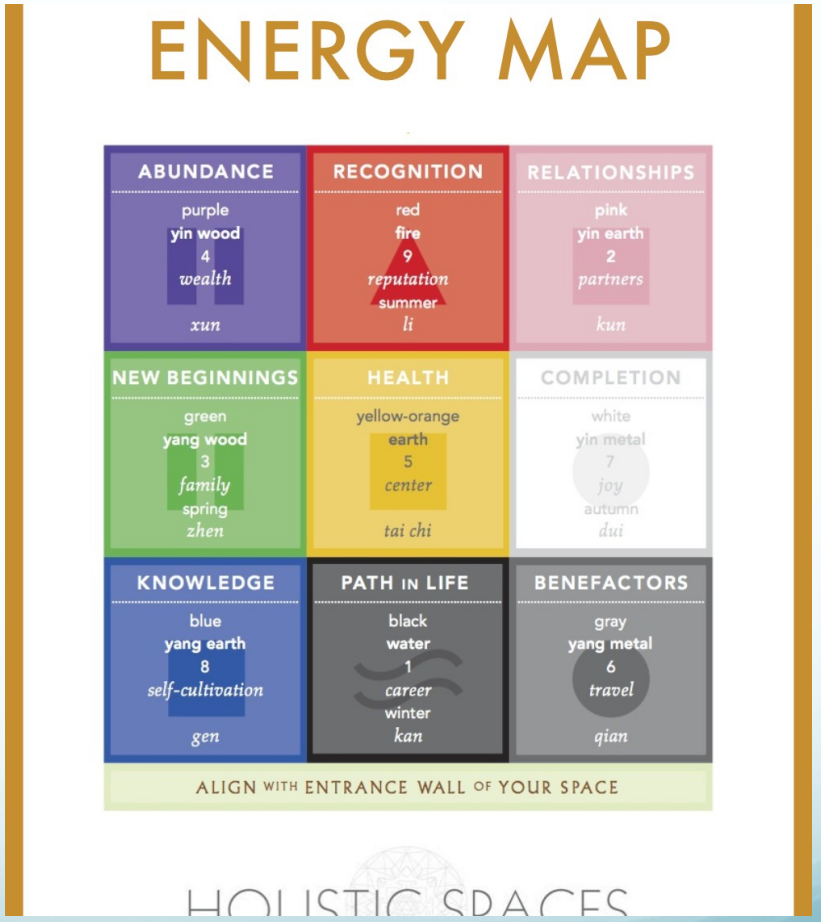

BMI Body Comparison
HEIGHT
06 00
FEET INCHES
WEIGHT
250
POUNDS
BMI
33.9


Body Mass Index (BMI)
BMICalculator.cc
Underweight
Normal
Overweight
Obese
Clinically Obese
Height (m)
1.90
1.80
1.70
1.60
1.50
1.40
40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130
Weight (kg)

Step 7: Be aware that pseudoscience is characterised by a set of fallible but useful warning signs

- It has an absence of self-correction inbuilt
- It uses maneuvers to refute claims made against it
- It uses ‘scientific’ but often vacuous language
- It lacks compelling evidence
- It avoids peer review
- It employs anecdotal and testimonial assertions

Feng Shui


ENERGY MAP
ABUNDANCE
purple
yin wood
4
wealth
xun
RECOGNITION
red
fire
9
reputation
summer
li
RELATIONSHIPS
pink
yin earth
2
partners
kun
NEW BEGINNINGS
green
yang wood
3
family
spring
zhen
HEALTH
yellow-orange
earth
5
center
tai chi
COMPLETION
white
yin metal
7
joy
autumn
dui
KNOWLEDGE
blue
yang earth
8
self-cultivation
gen
PATH IN LIFE
black
water
1
career
winter
kan
BENEFACTORS
gray
yang metal
6
travel
qian
ALIGN WITH ENTRANCE WALL OF YOUR SPACE
HOLISTIC SPACES

Step 8: Know that pseudoscience claims differ from erroneous claims

- False news is incorrect – it is simply being wrong
- Fake news is deceptive and often intentionally so
- If a scientific claim is erroneous it does not then make it pseudoscience
- Pseudoscientific claims can, at first, fool us and appear to be the real thing

MMR / Autism Vaccination Error

Step 9: Acknowledge that scientific and pseudoscientific thinking are similar

- Mental shortcuts, called heuristics, are very valuable in managing everyday life
- They are helpful and lead to approximate correct answers and can keep us safe
- However they can be misapplied and lead to mistaken conclusions
- Homeopathic medicines use heuristic representativeness

Detoxification

Step 10: Understand how scepticism differs from cynicism

- Scepticism means ‘to consider carefully’
- It requires us to keep an open-mind and seek compelling evidence
- Cynicism implies a knee-jerk dismissal of claims before investigation
- We must guard against rejecting assertions that challenge our preconceptions

Anti-vaxxers

Ten Steps within Scientific Thinking

1. Accept that we are all biased
2. Comprehend that are largely unaware of our biases
3. Appreciate that science is a systematic set of safeguards against biases
4. Grasp that scientific thinking does not come naturally to the human species
5. Recognise that scientific thinking is, largely, domain specific

Ten Steps within Scientific Thinking

6. Realise that pseudoscience and science lie on a spectrum
7. Be aware that pseudoscience is characterised by a set of fallible but useful warning signs
8. Know that pseudoscience claims differ from erroneous claims
9. Acknowledge that scientific and pseudoscientific thinking are psychologically similar
10. Understand how sceptism differs from cynicism

Be Aware of the Following Features of Life

The Media: For example, **The Daily Mail** on cancer

Causes - Divorce, WiFi, Toiletries, Coffee

Preventions - Crusts, Red Peppers, Licorice, Coffee

Fiction: When reading or watching fiction, we cannot assume those involved have engaged in 'suspension of belief'

Facts: Can be incomplete and are often only half-understood

Uncertainty: Inevitable even within science but it is manageable

Beliefs: People can often wrap themselves so tightly in their beliefs that they cannot be set free even by the truth

People are entitled to their own beliefs but not their own facts


Thank
You