Risk, Uncertainty, Psychology and Judgement

By Tan Suee Chieh, President Elect IFoA for

COVID-19 Actuaries Response Group - Learn. Share. Educate. Influence.

By TAN SUEE CHIEH, IFoA's President Elect

Keywords

Risk. People (p). Risk of mortality and morbidity (q). Transmission (T). Reproduction Rate (R_0). D.O.T.S & Attack Rate. Uncertainty. Fat Tails. Unknown Unknowns. Societal Responses. Fear & Madness of Crowds. Suppression & Risk Mitigation. Judgement. Personality Types and Risk Preferences. Culture and Governance Systems. Top Down and Bottom Up. Self-Awareness and Reflection. The Longer Term.

Introduction

We are confronted with a crisis which is unparalleled in a generation. We could not have conceived of this unprecedented event at the beginning of this year, how the threat of contagion could shut down the world, have such enormous impact on our daily lives and psychological well-being.

Since January, we have been inundated with wall-to-wall coverage of COVID-19, ranging from the latest alarming statistics and political debates to practical medical (and lay) advice. In this narrative, I have drawn on my background as a student of actuarial science, risk, psychology, judgement and biases to create my own interpretation and narrative of these events.

The perspective which I want to present to you is not about telling you what right or wrong information is especially in a period of great uncertainty, but how we process information and decide on what information to take in and how we make good judgments. Judgement is invoked when we do not and cannot know what to do, when we do not have the data or the logic to make largely objective choices. Instead we rely on personal qualities, knowledge and experience, to make decision and opinions – very often they are a combination of intuition, discernment, common sense, perceptiveness et.al.

I would like to stress that these are my personal observations and views, and do not represent those of the IFoA or professional experts in the healthcare sector.

Background – a personal timeline

Whilst news surrounding the outbreak started earlier this year, the grave severity of the situation dawned on me around 7-10 February. There was panic buying and massive food (and toiletry) related hysteria, leading to long queues at grocery stores and shelves being emptied within hours. This was followed by the raising of Disease Outbreak Response System Condition (Dorscon) alert in Singapore from Yellow to Orange, following the increasing number of emerging new cases from unknown sources on 7 February. What drove the people to panic buying? Were they rational? I was also due to travel to the UK for the IFoA's Management Board and Council meetings, but these trips were cancelled due to the resulting travel restrictions.

Within the span of a few weeks, economic and travel activities slowed down sharply across East Asia with the epidemic starting to show signs of spreading across Europe. On 7 March, Italy locked down Lombardy, oil prices plummeted, and stock markets worldwide were plunged into a downward spiral. This was my "Northern Rock" moment. [Northern Building Society had to close down in the summer of 2007 , one year before the Global Financial Crisis of 2008, as it was unable to liquidate its securities. Economic historians have identify this as one of the early signals of the GFC] This was followed by President Trump shutting down inbound flights from 26 European countries. Since then, an increasing number of countries worldwide started imposing various degrees of national movement control and event and travel restrictions.

It was in this weekend, that I started contacting longevity specialists and epidemiologists in my LinkedIn network, which led to the formation of the COVID19- Actuaries Response Group. The primary aim of this informal group of senior IFoA actuaries, is to learn, share, educate and influence actuaries in matters of relevance in a speed manner. So far, the ARG has produced more than a dozen bulletins of relevance to actuaries.

Risk

I now address the crisis by analysing it from an actuarial and risk modelling perspective.

Albert Einstein once declared that "compound interest is the most powerful force in the universe", and this is precisely why we have to control the magnitude of the reproductive rate (R_0), one of the key parameters driving the COVID-19 spread.

Broadly speaking, the R_0, which is a measure for the average number of people infected by a single infected person, may be represented as a function of Duration (D), Opportunity to Infect (O), Probability of Transmission (T) and Susceptibility (S) – D.O.T.S in short. If R_0 has a value of 2, then the 3rd generation of a single infected person will have 8 infected people (2^3), and the 4th generation will have 16 infected people (2^4), and so forth. The WHO estimated on 23 January that the R_0 for COVID-19 globally was between 1.4 and 2.5, while in comparison, the R_0 for the common flu and SARS were 1.3 and 2.0 respectively.

Another key variable is the serial interval – the mean length of the generation. Various studies suggest that the current estimate for COVID-19 is in the range between 4.4 and 7.5 days. Taking 6 days as the assumed serial interval, and a R_0 value of 2, we can estimate that COVID-19 infections would grow tenfold between the 3rd and 4th interval, i.e. 18 and 24 days.

Using these simple methods and applying these figures on the number of cases as at 7 March, I estimated that the number of cases worldwide would reach 1 million within one month. The 1 million figures were reached on 2 April. [My figures were sent to two epidemiologists to verify. Using more sophisticated modelling they thought the figures would be reached within six weeks.

The symptoms are fairly consistent throughout the world. Around 81% of infections are mild (full recovery at home with self-quarantine), 14% are severe (shortness of breath/pneumonia) and 5% are critical (respiratory and multiple organ failures), with approximately 2% of reported cases leading to fatality. However, fatality rates vary by country – very often a function of the amount of testing. Those above age 65 and with serious pre-existing conditions are the most at risk. And the number of hospital beds required to meet peak demand of those needing care will be exceeded even in the

most developed countries unless we can "flatten" the curve of infections. It is no surprise that many countries around the world are currently ramping up on social distancing enforcements and emphasising the importance and effectiveness of it in an effort to keep R_0 as low as possible.

There are debates around strategies of suppressions (bringing R_0 to less than 1) and one of mitigation (allowing R_0 to be above 1), and the economic, social and mortality price that has to be paid. There is now an emerging debate across the world, frame around when "exit strategy" from the lock down should be implemented.

Uncertainty

Whilst risks can be measured, quantified and managed, uncertainty cannot be. It is difficult to accurately predict the "unknown unknowns", popularised as Black Swans by Nassim Taleb.

However, this crisis is not really a black swan. It is a major disaster waiting to happen. Back in March 2015, Bill Gates presented a TED talk to highlight that mankind was not prepared for the next pandemic outbreak – this talk seems prescient just five short years later. For years, insurers have held capital in respect of future pandemics – but they were considered abstract possibilities, not events lurking around the corner.

Although researchers are discovering new things about COVID-19 almost daily, many questions remain unanswered, such as the actual case fatality rate and how the virus survives outside the human body and in different climates – one key question now is, will it be less prolific or fatal in the warmer summer months?. Meanwhile, concerns over asymptomatic carriers and uncertainty around the timeline for vaccines continue to loom worldwide.

It is apparent that we are dealing with fat-tailed event owing to increased societal interdependence – in lay terms, every walk of life has been massively affected by the pandemic; in actuarial terms, there are very high dependencies between pandemic risk, market risk and operational risk. As such, conventional risk management approaches have not been appropriate, and – as is often the case – too much of our thinking about risk identification, risk quantification and risk management has consisted of refighting (hypothetically) the last war, not fully imagining how widespread and multifaceted this new war could be.

Psychology and Culture

Invariably, the never-ending stream of COVID-19 news articles and the exponential growth in positive cases have led to detrimental impacts on our mental wellbeing. Fear surrounding the unknown aspects of this virus (of which there are still many) has led to anxiety, and in some instances awakened a more primal human instinct, manifesting itself in uncommon behaviour such as food and toilet-paper hoarding. What appear to be irrational, may indeed not be irrational at all – when viewed from the perspectives of evolutionary psychology.

 Increased xenophobia and racism towards the Chinese community and to those from similar ethnic origins were also observed in some quarters, many swayed by the media and politicians' reports and statements.

It is also notable, that the risk preferences of individuals are derived from their personality profiles, personal contexts and experience. At the earlier stages of the epidemic, attitudes towards decisions

like travelling or congregating for meetings vary widely reflecting different risk appetites. Mothers of young children displayed understandably strong maternal instincts to protect their children from social contact even though they are relatively insusceptible to this virus.

In a wider context, different personality types will react to prolonged lockdowns differently – anxiety, worry, fear, avoidance, depression, paranoia, denial, detachment, neglect and sense of loneliness – this will vary with the underlying state of psychological health and circumstances. However, it is possible to frame the lockdown positively, be more mindful and take opportunity to do things we ordinarily would not do, for e.g. doing an online program, learning a new skill.

As governments worldwide continue to try and suppress R0 with testing, contact tracing, home quarantine, closure of schools and universities and population lockdowns, the impact on vulnerable groups need to be assessed. Gig workers, low income groups, contractors and the unemployed will struggle financially over the course of the next few months at least, and important steps need to be taken to support these groups financially. This is in addition to the huge social, psychological and economic cost of shutdowns.

Until the middle of March, the four Asian Tigers of the 1980s – Singapore, South Korea, Hong Kong SAR and Taiwan SAR – as well as China have far demonstrated that they can handle the COVID-19 crisis competently, largely learning from their SARS experience of 2003. Also, they have a generally co-operative populace, strong (in some cases authoritarian) government and leadership. Some commentators have drawn attention to differences in leadership style and governance between these countries and the West.

However, recent weeks have shown that the problem of second and third wave infections occurring still remains especially for "naïve" populations for these Asian countries. Naïve populations are populations like that of Singapore – where the bulk of the people have been protected or not immunised. So, the challenges are indeed far from over.

The impact of COVID-19 will no doubt be felt over the next few years. Looking forward to when the crisis ends, it is likely that COVID-19 will have a transformative impact on our lives, and potentially lives of our future generations. Significantly, there has been an acceleration in the use of technology in education and work, and this pandemic may redefine our attitudes towards travel, wildlife and the planet. Beyond any doubt, COVID-19 gives us much to reflect on; on how we can prevent such a crisis from recurring, the trade-offs we need to make, and the kind of society we want to live in.

Judgement

An important element of our self-journey is our "capability" as it unfolds over time. Capability is how we use our judgement when we do not and cannot know what to do in the usual 'data-driven' ways. The prerequisite for sound judgement is being able to get one's head around the complexities and volatilities of the challenges.

A match between capability and challenge gives individuals a sense of being 'in-flow', confident, competent and enthusiastic. The importance of presence of mind, self-awareness and reflexivity is key to extracting relevant signals from noises.

In times such as this, organisations would benefit from the power of thoughtful, far sighted and resilient decisions. There is a lot of literature on uncertainty and judgement.

A recent presentation was by Professor Andrew Likierman from the London Business School. He summarised into six questions to ask yourself in the midst of these uncertain and strange times:

1. Listening and reading – Have I understood?
2. Can I trust the information and people?
3. Do I have the relevant experience and knowledge?
4. How do my beliefs and feelings, including risk, affect my choice?
5. Are these the right options for my choice?
6. Delivery (including timing) – Is this practical?

As uncertainty increases in society, we have to continue to learn and appreciate the importance of judgment. We have to get familiar with the notion of uncertainty, in particular radical uncertainty. Computations and models in themselves are clearly insufficient in a world where there are many unknown unknowns, where risks cannot be anticipated let alone modelled.

Whilst judgment cannot be explicitly taught, it can learnt and be acquired over time.

As we navigate our way through this challenging period, it may be wise for us to reflect on the limits of the efficacy of risk models with its implied and known probabilistic distributions, and reflect on the nature of uncertainty and how we can bring good judgement to bear in making decisions.

Zoom Presentations

27 March 2020 Actuarial Society Malaysia and IFoA Malaysia 100 participants
3 April 2020 Actuarial Society Malaysia and IFoA Malaysia 240 participants
8 April 2020 IFoA Singapore& Singapore Actuarial Society 8 April 200 participants
10 April 2020 IFoA Indochina, Indonesia, Thailand, and Philippines 60 participants

COVID-19; Risk, Uncertainty, and Judgement

Tan Suee Chieh
A Personal Narrative and Discussion with
IFoA South East Asia
10 April 2020

Caveats and Qualifications

Structure

Risk
- **People (p)**
- **Risk of mortality and morbidity (q)**
- **Transmission (T)**
- **Reproduction Rate (Ɍ)**
- **D.O.T.S & Attack Rate**

Uncertainty
- **Fat Tails**
- **Unknown Unknowns**
- **Societal Responses**
- **Fear & Madness of Crowds**
- **Suppression & Risk Mitigation**

Judgement
- **Personality Types and Risk Preferences**
- **Culture and Governance Systems**
- **Top Down and Bottom Up**
- **Self Awareness and Reflection**
- **The Longer Term**

Personal Narrative

The Second Wave – COVID-19

- **22 January** China lock down Hubei. Sharp rise in xenophobia in the West.
- **7 February** Singapore saw panic buying in the supermarkets following the arising of DORSCON to orange.
- **12 February** Economic activity and travel slowed down sharply across East Asia and now the epidemic has spread to Europe. The West is bracing for a sharp rise in panic and fear, as the media present asymmetric information negative and dramatic news.
- **26 February** Invitation to speak at ASM (SUSS and DBS)
- **7-8 March** Italy Lockdown on Lombardy and Italy. OPEC
- **9 March** Predicting 1 million Infections
- **11 March** Presentation at SUSS
- 11 March Trump bans all travel from 26 European countries.
- **12 March** Johnson speech to the nation
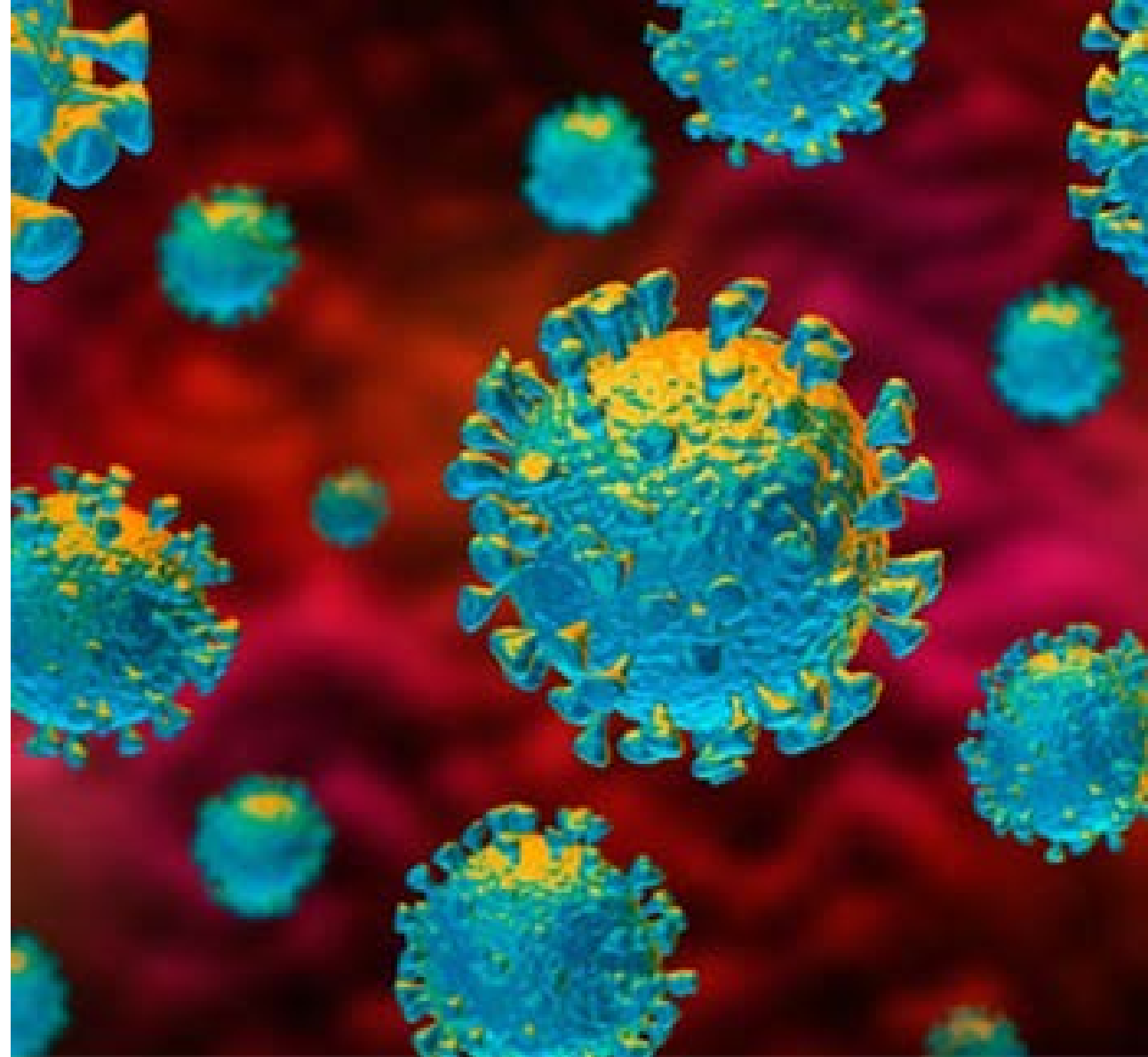
COVID-19 Coronavirus

The Third Wave - UK shuts down; and Singapore

- **16-30 March** Malaysia MCO –Ban on Events, Economic Stimulus, Panic Buying, Stay at Home

- **20-24 March** Johnson Shuts down UK

- **22 March** Launch of IFoA COVID-19 Actuaries Response Group

- **25-26 March** IFoA Online Exams

- **27-28 March** Numbers going up. Singapore Tightening of Suppression. Lifts and entertainment places.

- **9 to 31 March** Trump capitulation and false optimism

- **12 March** (Thursday)–
- Stock Markets - Bloodbath

- **3-7 April** Singapore
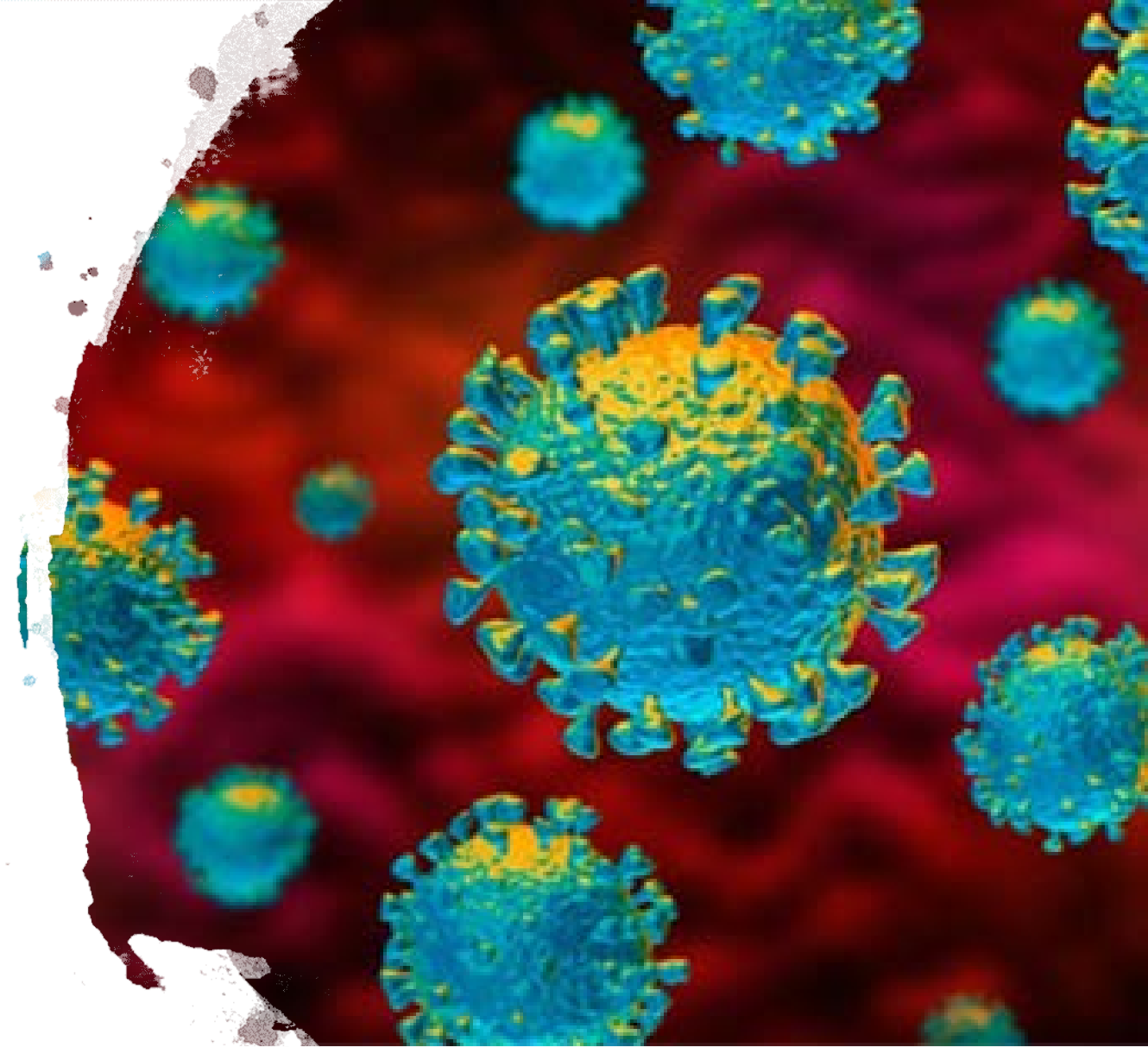
19 Coronavirus

The Countries on Full Nationwide Lockdown

Country	Date	Country	Date
Italy	Since March 9	Poland	March 20
Norway	March 12	Slovenia	March 20
Denmark	March 13	Rwanda	March 21
Lebanon	March 15	Bolivia	March 22
Spain	March 15	Iraq	March 22
Czech Republic	March 16	Tunisia	March 22
France	March 16	Greece	March 23
Malaysia	March 18	Colombia	March 24
Belgium	March 17	El Salvador	March 24
Venezuela	March 17	UK	March 24
Argentina	March 20	India	March 25
Morocco	March 20	New Zeland	March 25
		South Africa	March 26

12 March Trump Bans Europe entries. NBA cancelled matches. WHO declare pandemics

12 March Johnson and PM Lee Herd immunity speech

20 March Johnson closes pubs

26 March Olympics cancelled

27-28 March Singapore tightens further

7 April Singapore shuts down

Structure

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- The Longer Term

Judgement

- Judgement ; when we do not and cannot know what to do

- Use of personal qualities, knowledge and experience, to make decision and opinions.

Coronavirus

No precedent – increases daily

3. What I know about this

Moves as more known

1. What I take in

5. My choices

Danger of filtering, including anxiety

6. Delivery

4. What I feel & believe

2. Who and What I trust

Starting biases and risk appetite/tolerance

Also depends on secondary factors

Do they really know? Fake news / social media

Prof. Andrew Liekerman, LBS

Risk

COVID-19 Risk In Summary

- Bottom Up

- Risk of mortality low
- Majority of infections are mild
- The bulk of people recover
- Most at risk are people above age 65
- Especially those with pre-existing conditions
- Fatality rate varies by country

1-19 Coronavirus

Risk of Mortality

COVID-19 mortality rate by age

Mortality rate

Age	Mortality rate
10–19	0.2%
20–29	0.2%
30–39	0.2%
40–49	0.4%
50–59	1.3%
60–69	3.6%
70–79	8%
80+	14.8%

Source: Chinese Center for Disease Control and Prevention

BUSINESS INSIDER
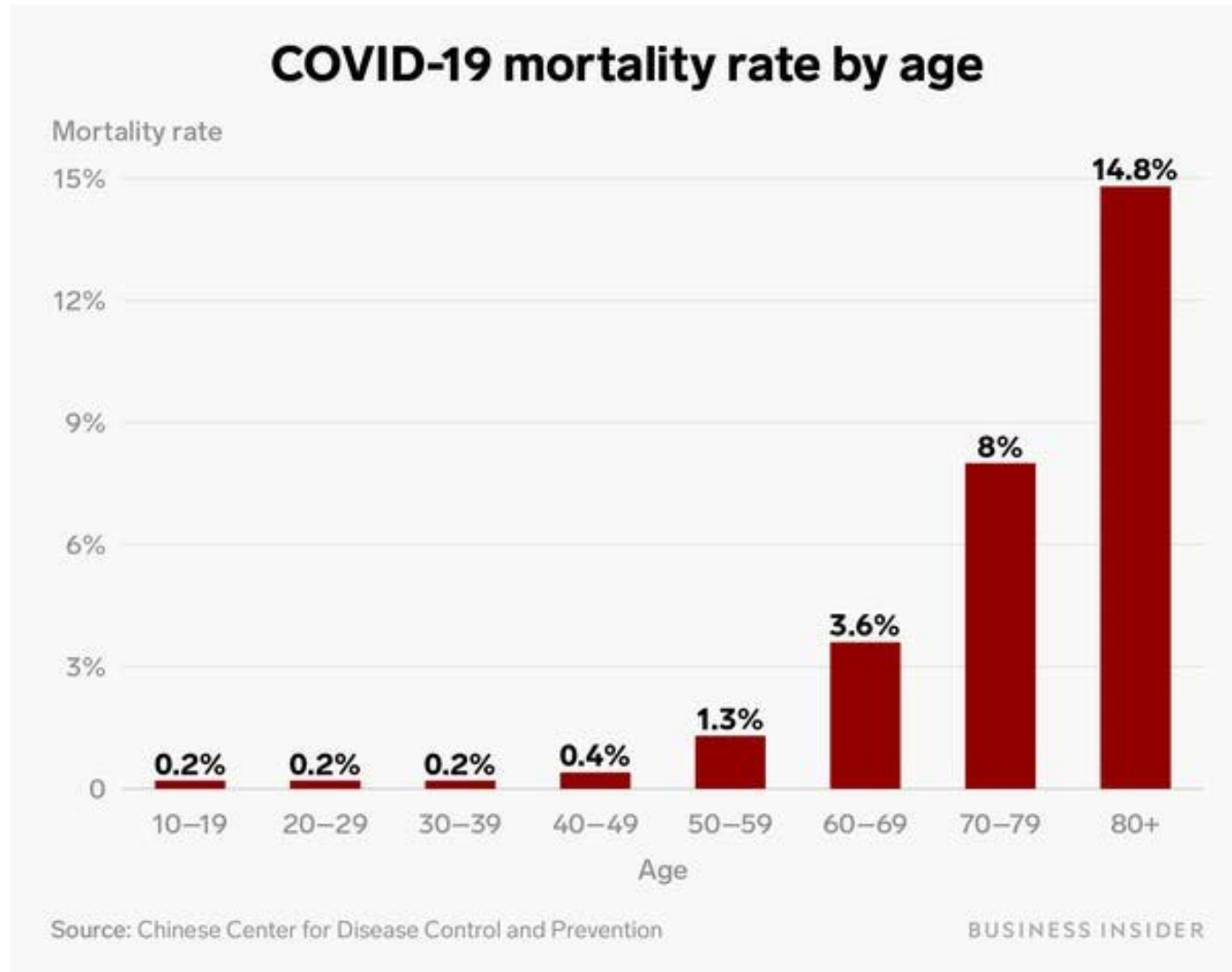
Worldometer 2020

Risk Based Approach

For comparison, mortality rates of Singaporean males are:

Age 60 – 0.686%

Age 65 – 1.076%

Age 70 – 1.842%

Age 75 – 3.034%

Age 80 – 5.172%

2018 Life table
Singapore Dept of Statistics

Risk of Morbidity and Severity

- **80.9**% of infections are mild and can recover at home.

- **13.8%** are severe, developing severe diseases including pneumonia and shortness of breath.

- **4.7%** as critical and can include: respiratory failure, septic shock, and multi-organ failure.

- in about **2%** of reported cases the virus is fatal.

Risk of death increases the older you are.

Relatively few cases are seen among children.

Mortality by Co-Morbidity (as at 3 March 2020)

PRE-EXISTING CONDITION	DEATH RATE confirmed cases*	DEATH RATE all cases #
Cardiovascular disease	13.2%	10.5%
Diabetes	9.2%	7.3%
Chronic respiratory disease	8.0%	6.3%
Hypertension	8.4%	6.0%
Cancer	7.6%	5.6%
no pre-existing conditions		0.9%

WHO and CDC China

The percentages do not have to add up to 100%, as they do NOT represent share of deaths by condition * laboratory confirmed # incl. suspected or asymptomatic cases

Risk of Mortality and Morbidity

Risk of morbidity = People (O) x Prob of Transmission (T) x Risk of morbidity (i_x)

Risk of death = People (O) x Prob of Transmission (T) x Risk of (q_x)
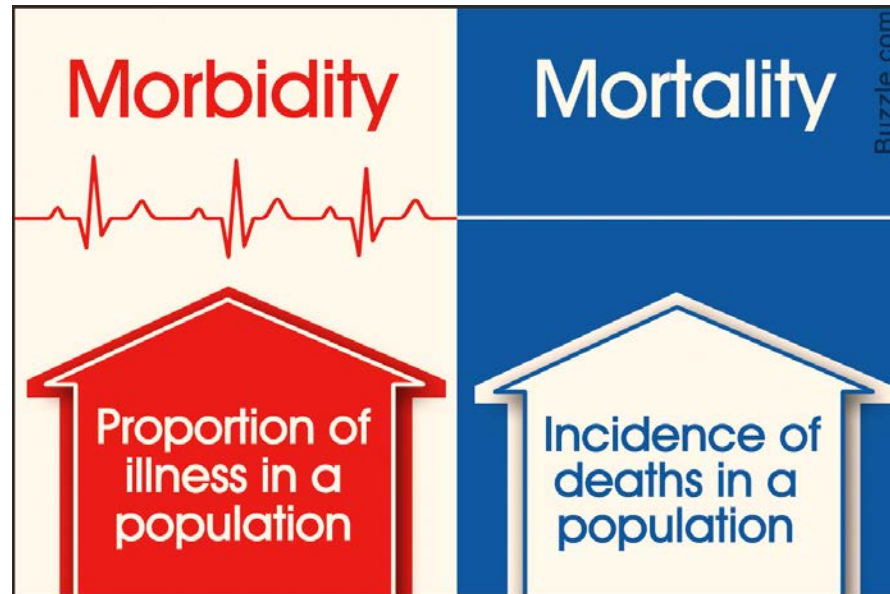
Data on Countries
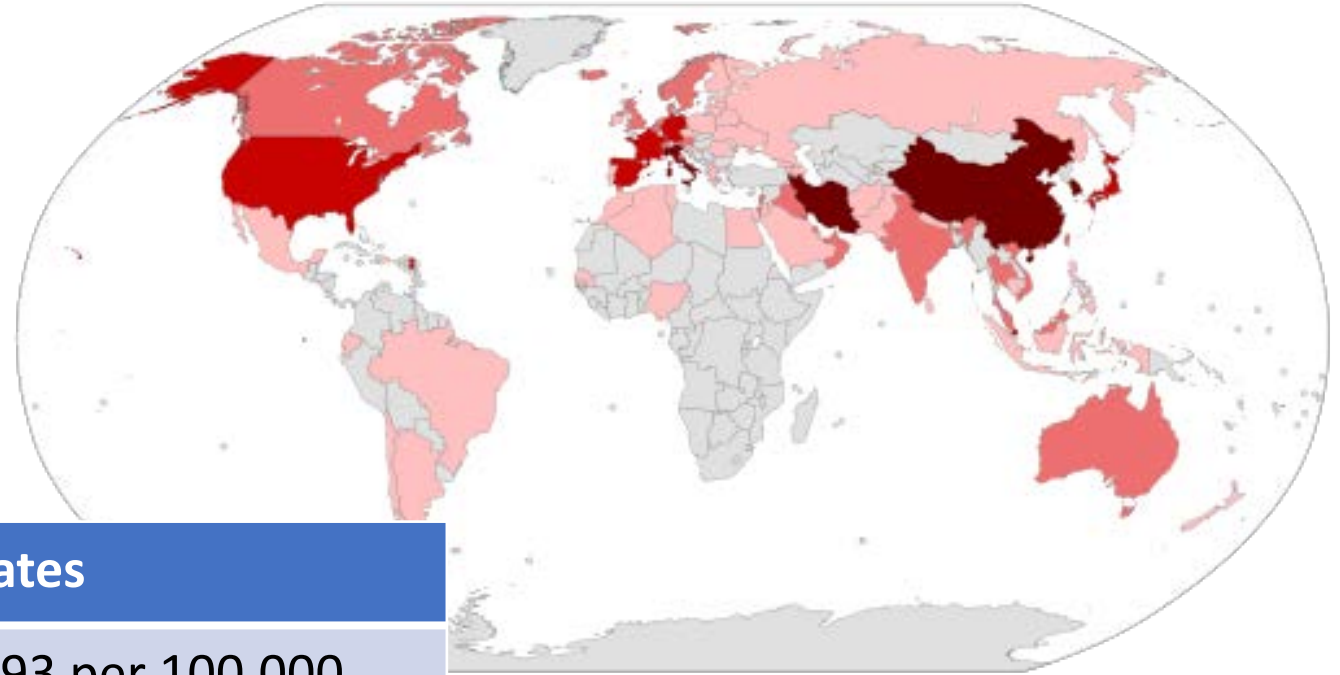
Number of infections as of 4 March 2020

Countries	Infection	Population	Rates
Singapore	110	5,700,000	1.93 per 100,000
Hong Kong	101	7,210,000	1.4 per 100,000
India	22	1,444,000,000	0.02 per 1,000,000
China	80,270	1,435,000,000	5.59 per 100,000
World	93,186	7,700,000,000	1.21 per 100,000

Worldometer and Wikipedia

Data on Countries

Number of infections as of 25 March 2020
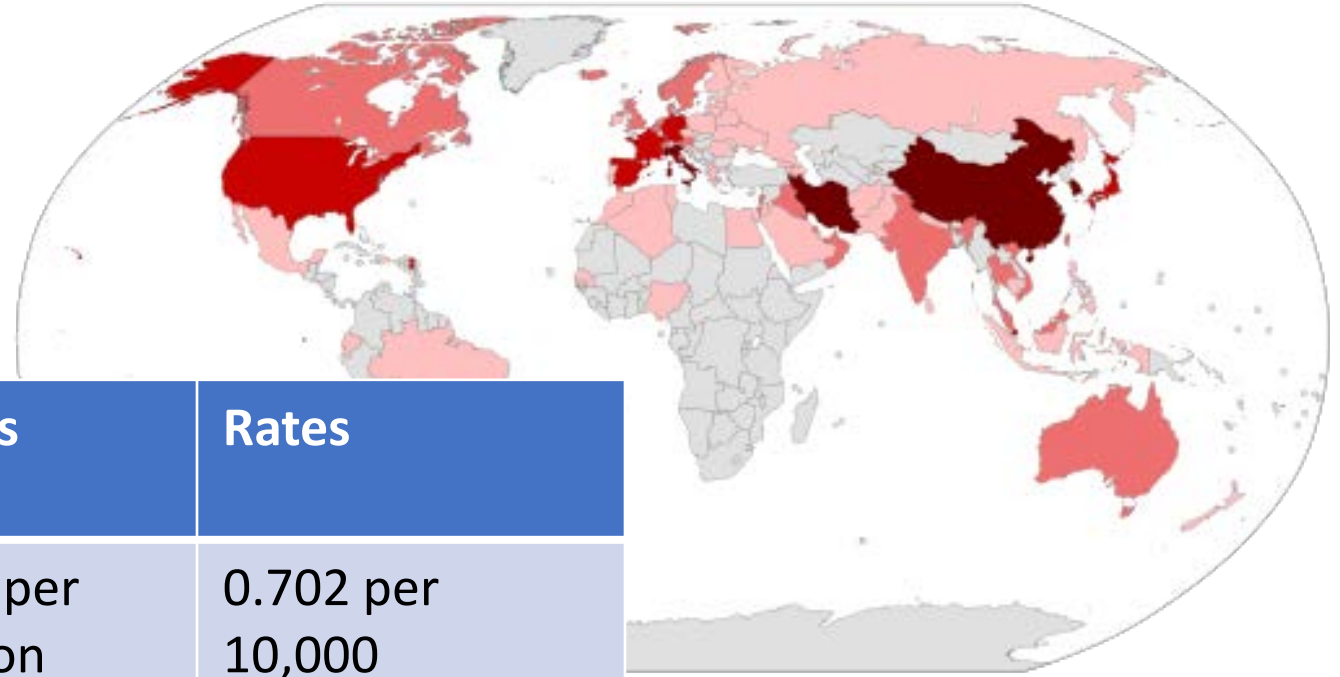
Countries	Active Cases	Population	Rates	Rates
Singapore	400	5,700,000	70.2 per million	0.702 per 10,000
Malaysia	1,425	31,620,000	45.06 per million	0.451 per 10,000
United Kingdom	7,520	66,870,000	112.45 per million	1.1245 per 10,000
China	80,270	1,435,000,000	55.9 per million	0.559 per 10,000
World	294,855	7,700,000,000	38.3 per million	0.383 per 10,000

Worldometer and Wikipedia

Insurance Companies (end Feb 2020)

COVID-19 Risk In Summary - Bottom Up

- Risk of mortality low
- Majority of infections are mild
- The bulk of people recover
- Most at risk are people above age 65
- Especially those with pre-existing conditions
- Fatality rate varies by country
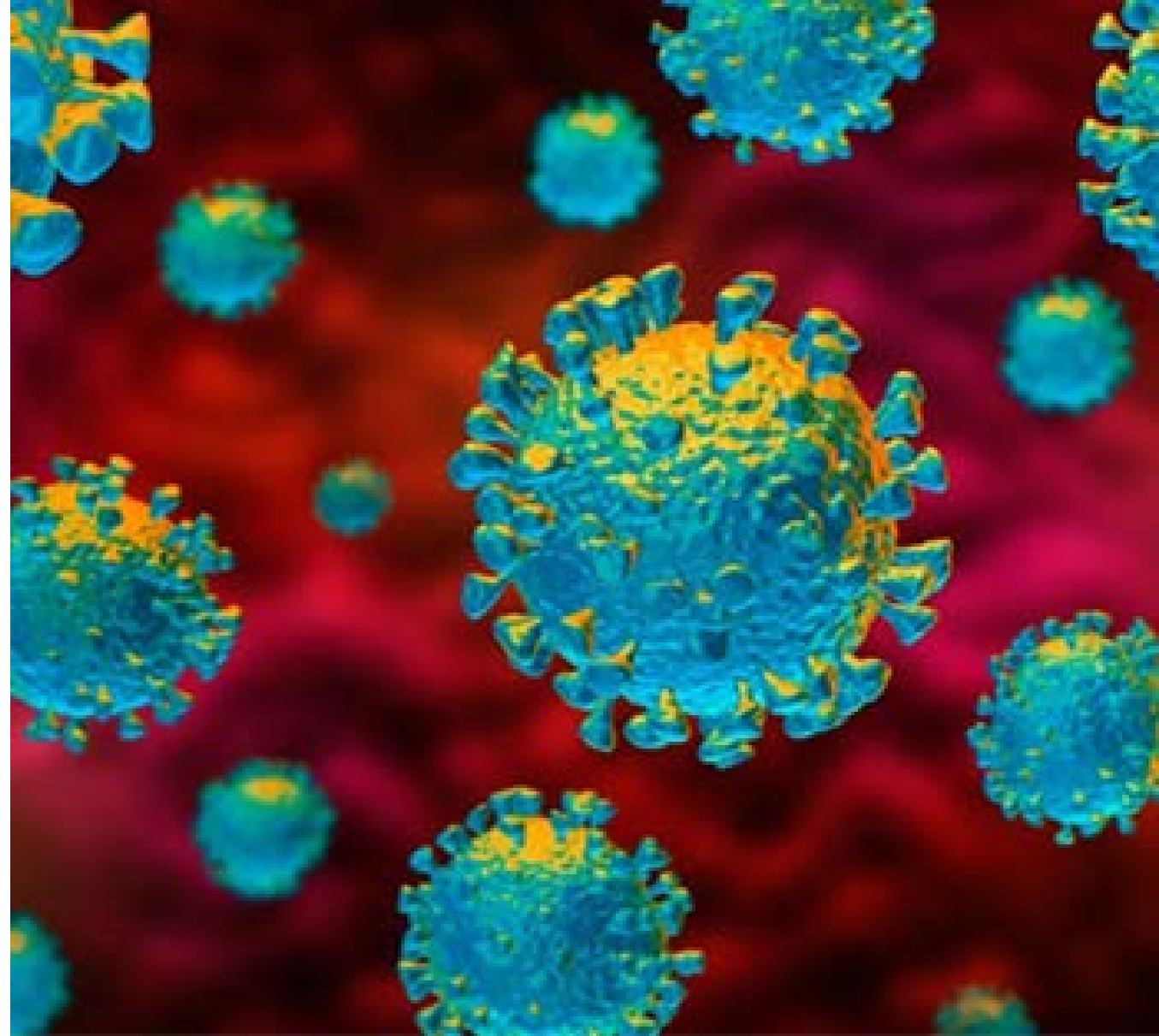
COVID-19 Coronavirus

WHO, MoH and Medical Authorities

Reduce your risk of coronavirus infection:

Clean hands with soap and water or alcohol-based hand rub

Cover nose and mouth when coughing and sneezing with tissue or flexed elbow

Avoid close contact with anyone with cold or flu-like symptoms

Thoroughly cook meat and eggs

No unprotected contact with live wild or farm animals

World Health Organization

R_0 and D.O.T.S

Reproductive Rate R_0

Reproductive Rate R̀ a function of

- *Duration (D)*

- *Opportunity to Infect (O)*

- *Probability of Transmission (T)*

- *Susceptibility (S)*

D. O. T. S.

Chains of transmission between hosts
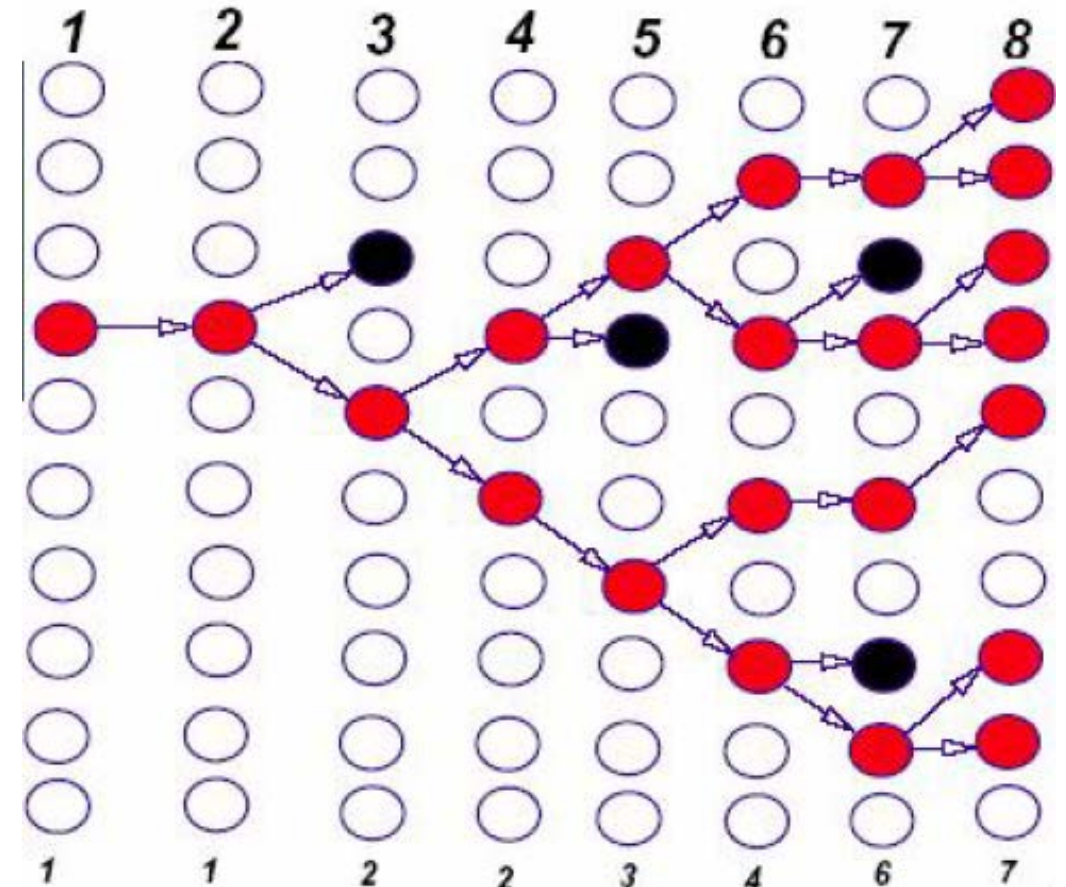
Important Parameters

REPRODUCTION RATE (R_0) (estimated range)	**FATALITY RATE (CFR)** (WHO EARLY estimate)
2 – 4 (average number of people to which a single infected person will transmit the virus)	**2% (?)** (a precise estimate of the case fatality rate is therefore impossible at present)
INCUBATION PERIOD (estimated)	**COUNTRIES AND TERRIORIES** (affected by COVID-19)
2 – 14 days (possible outliers: 0 – 27 days)	**80** (expected to increase)

Worldometer March 2020
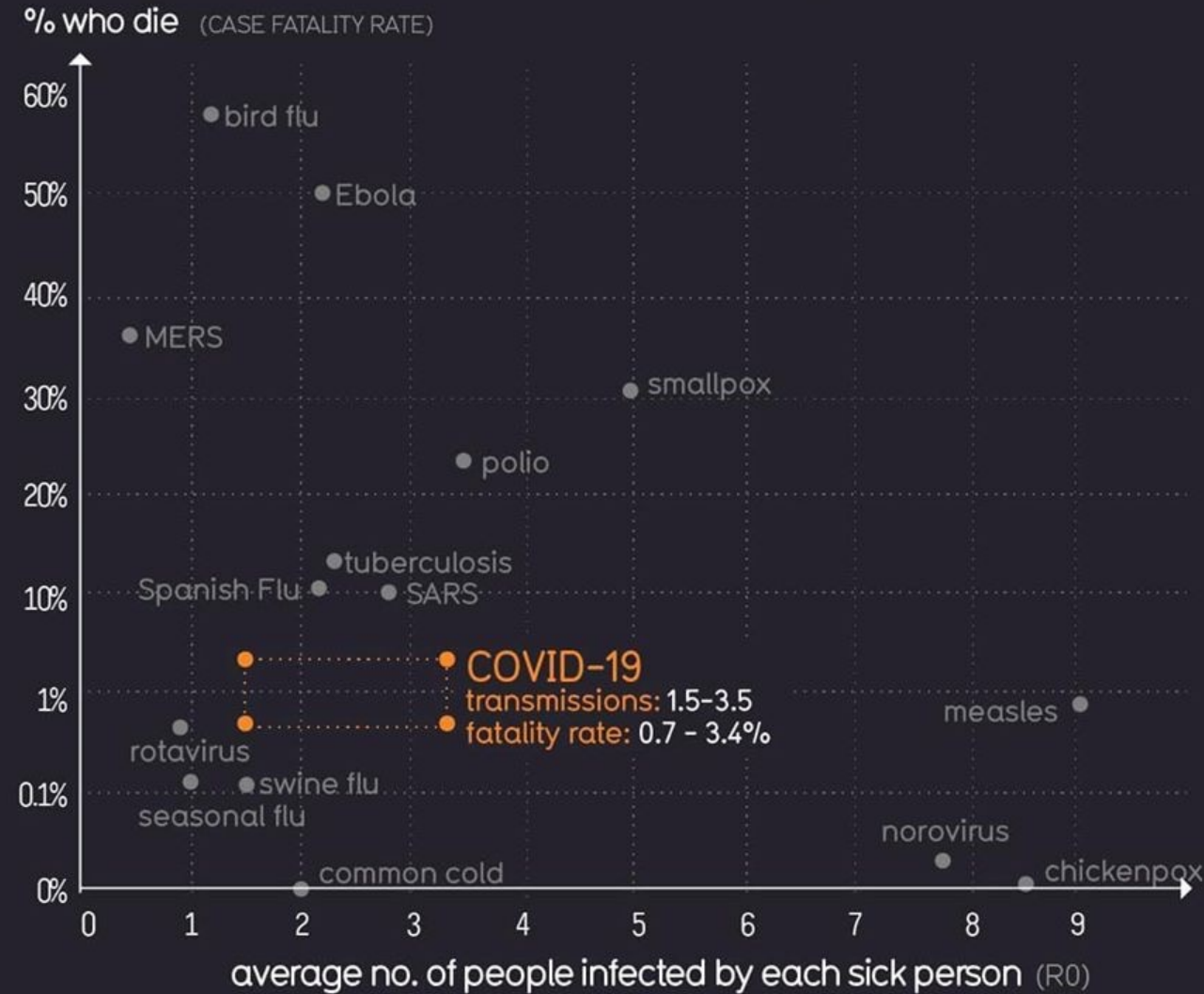
Tan Chuan Jin
10 March 2020

FB Linked-in Posting – Getting R̶0 Down 7 March

Getting to 1 million infections within the next month.

Two parameters drive the COVID-19 spread. Assume R̶0 = 2. N = 6 days. If R̶0 is = 2, then the 3rd generation will have 2^3 infected i.e. 8 persons, and the 4th generation will have 2^4 infections i.e. 16 persons.

So, infections will be 10 times between the 3rd and 4th interval, i.e. between 18 and 24 days.

On January 22, there were 580 infections, at the end of 45 days on 6 March, 102,000 cases. (102,000/580)^(1/45) is a growth rate of 1.12. **In 21 days from having 102,000 you would expect to have 102,000 * 1.12^21 cases, or 1.1 million.** In 30 days, there would be over 3 million!

Actual epidemiological modelling suggest that we will hit a million in April.

Cases will double in 3 – 4 cycles
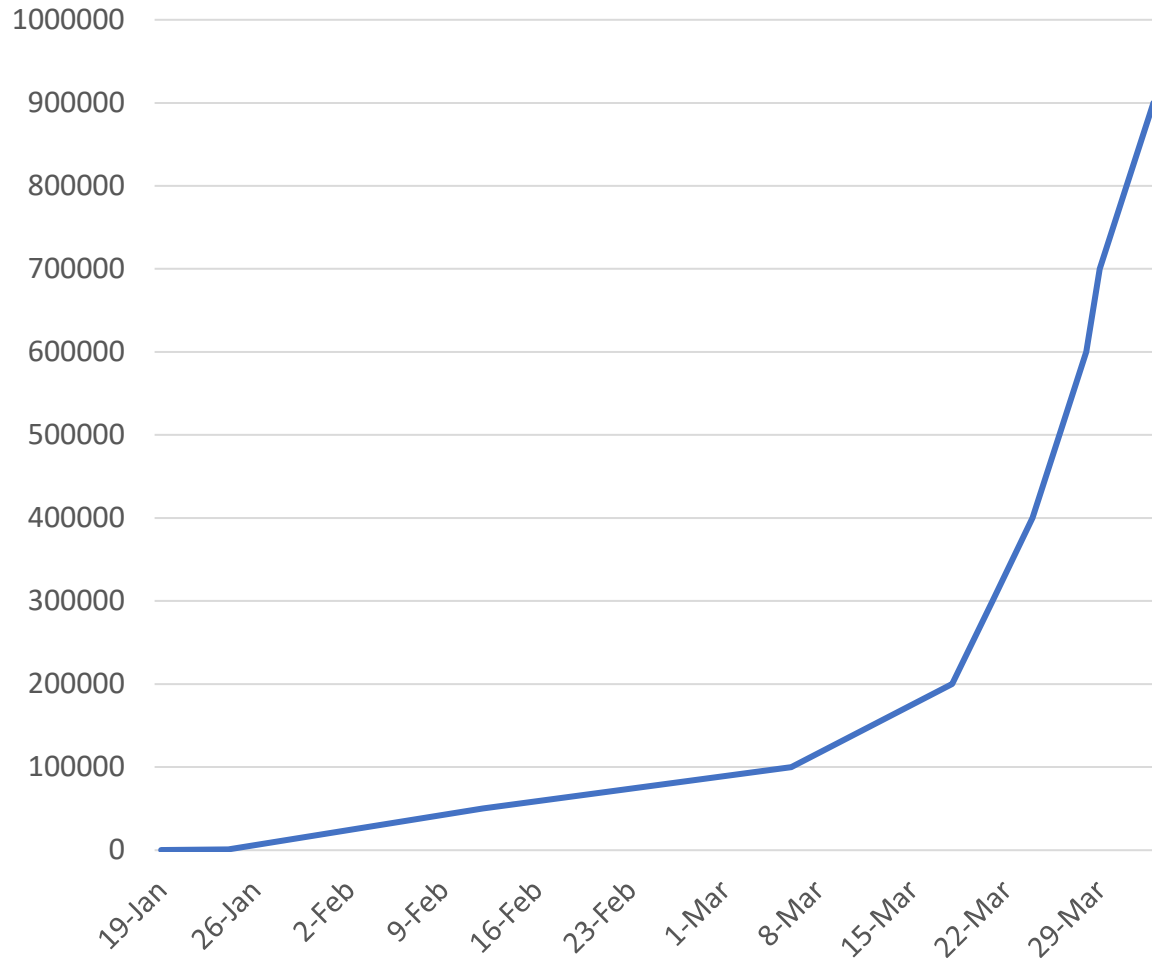
Date	Cases
19 January	100
24 January	1,000
12 February	50,000
6 March	100,000
18 March	200,000
21 March	300,000
24 March	400,000
26 March	500,000
28 March	600,000
29 March	700,000
31 March	800,000
1 April	900,000
2 April	1,100,000

The Attack Rate

$$\text{Attack Rate} = 1 - 1/R_0$$

If R_0 is 2.5, Attack rate is 60%

Uncertainty

Epicentre Moves to Italy

Risk and Uncertainty

In **risk** you can predict the possibility of a future outcome, while in **uncertainty** you cannot.

Risks can be managed while **uncertainty** is uncontrollable. **Risks** can be measured and quantified while **uncertainty** cannot.

Unknown Unknowns

- Infection (p) –concern about asymptomatic carriers

- Reproduction Rates (R_0) [estimated 2 – 4]

- Survival of virus on surfaces

- Vaccines and Weather Conditions

Uncertainty and Fat Tails

- We are dealing with an extreme fat-tailed process owing to an increased connectivity, which increases the spreading in a nonlinear way
- Fat tailed processes have special attributes, making conventional risk-management approaches inadequate
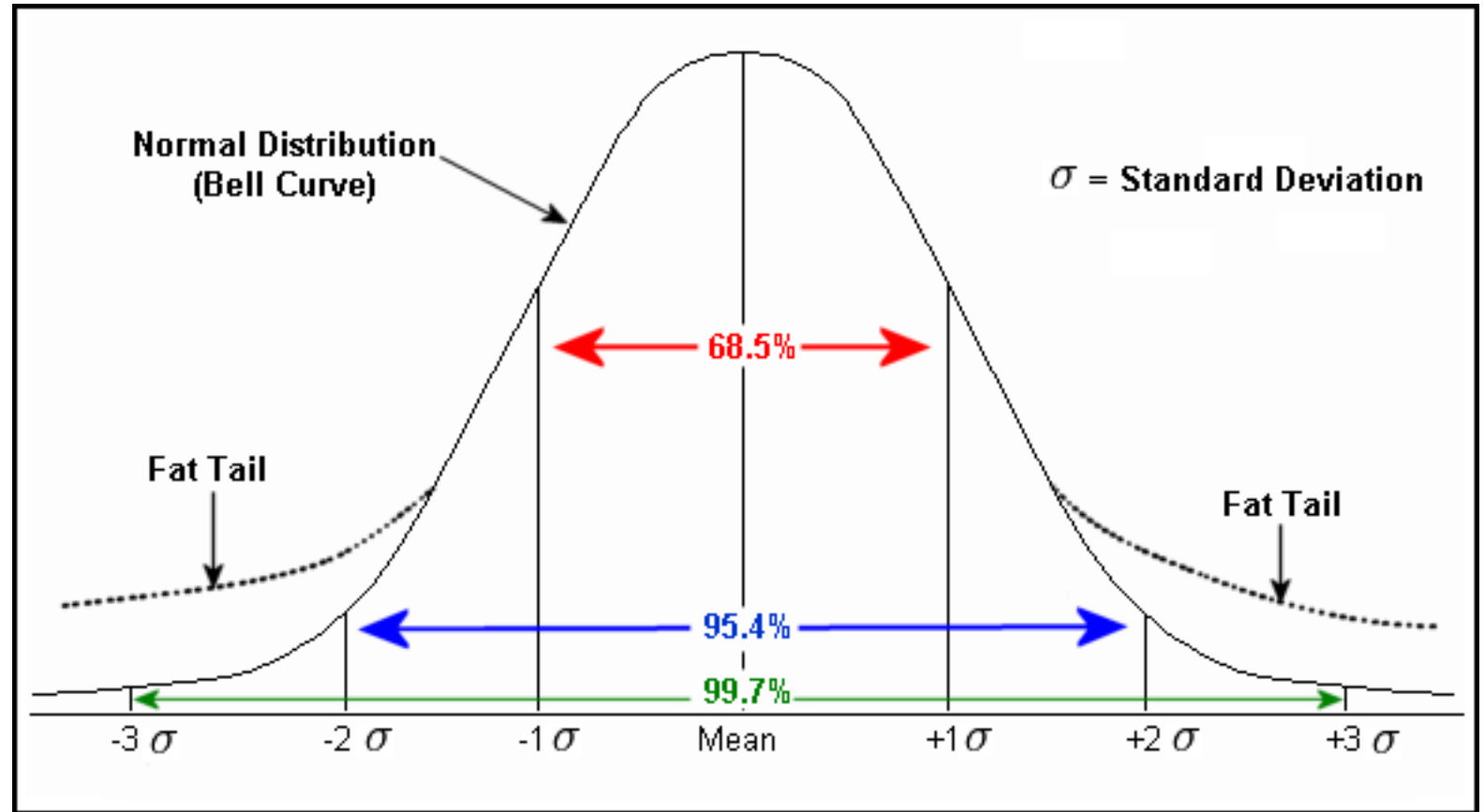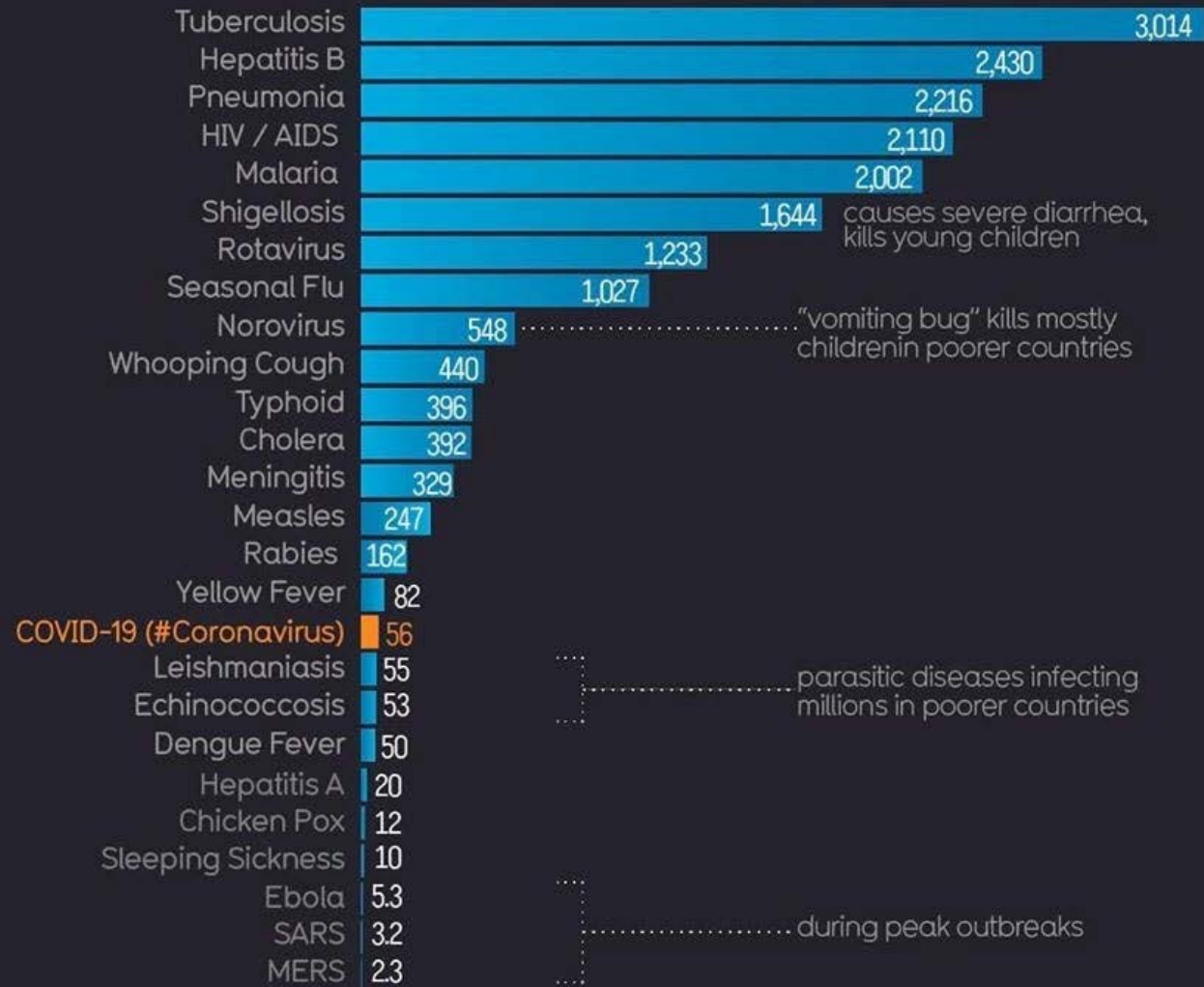
Tan Chuan Jin
10 March 2020

Societal Responses

Societal Responses and Food Panic (after 7 Feb 2020)
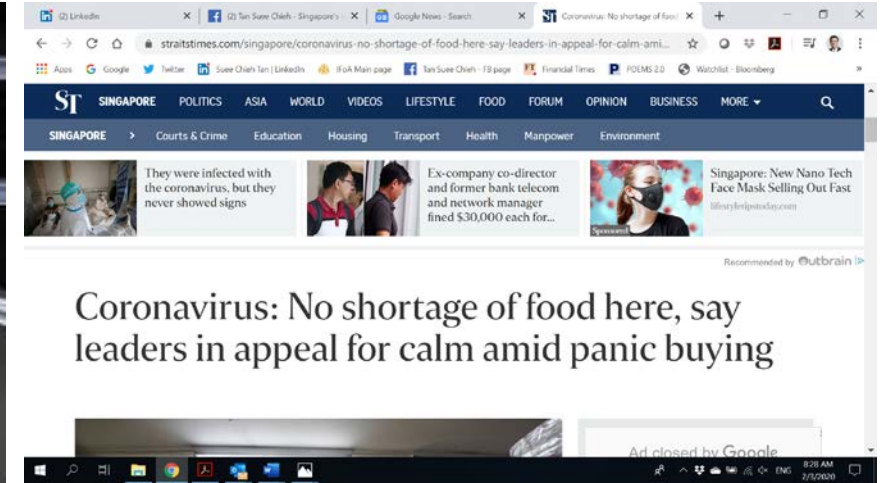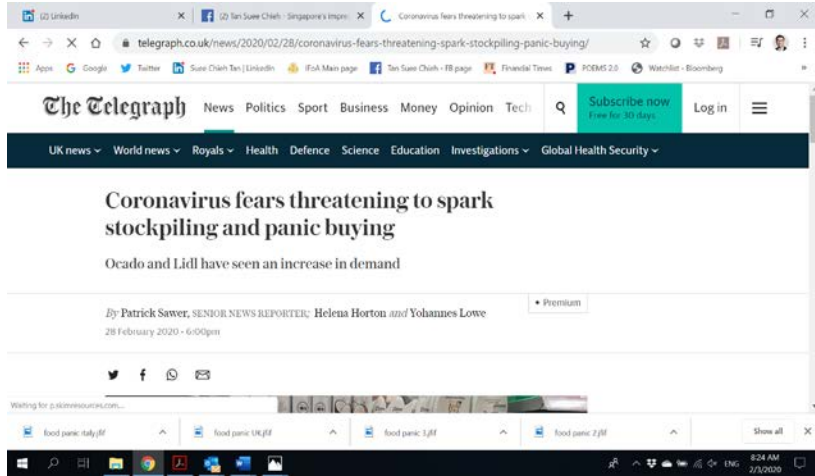
COVID-19 Racist Attack in London (Mar 2020)

A Singaporean student in London said he was assaulted after he reacted to passers-by who were making comments about his race and COVID-19.

Attacked along Oxford Street

Xenophobia and Media Response (end Feb 2020)

Second Wave in the UK and US (end Feb 2020)

Behavioural Psychology

COVID-19 Actuaries Response Group 10 March

Implications of Johnson's Speech and the Imperial College Model

- Case isolation in the home - CI
- Voluntary   home quarantine - HQ
- Social distancing of those over 70 years of age - SDO
- Social distancing of entire population - SD
- Closure of schools and universities - PC

12 to 20 March 2020

Implications of Exeter Model (Early march)

- Peak from 74 to 241 days.

- 'Best-guess' was 133 days from of person to person transmission within the UK 1-March – takes us to July.

- They estimate an attack rate of 82%.

- The peak number of new cases over 1 million people per day .

- Fortunately, seasonality to the transmission

- A 50% due to summer would reduce the attack rate to 70%, and the peak incidence would fall to 330, 000 new cases per day.

E&W spatial mode Exeter
et al March 2020

Mitigation

- Figure 2: Mitigation strategy scenarios for GB showing critical care (ICU) bed requirements. The black line shows the unmitigated epidemic. The green line shows a mitigation strategy incorporating closure of schools and universities; orange line shows case isolation; yellow line shows case isolation and household quarantine; and the blue line shows case isolation, home quarantine and social distancing of those aged over 70. The blue shading shows the 3-month period in which these interventions are assumed to remain in place.
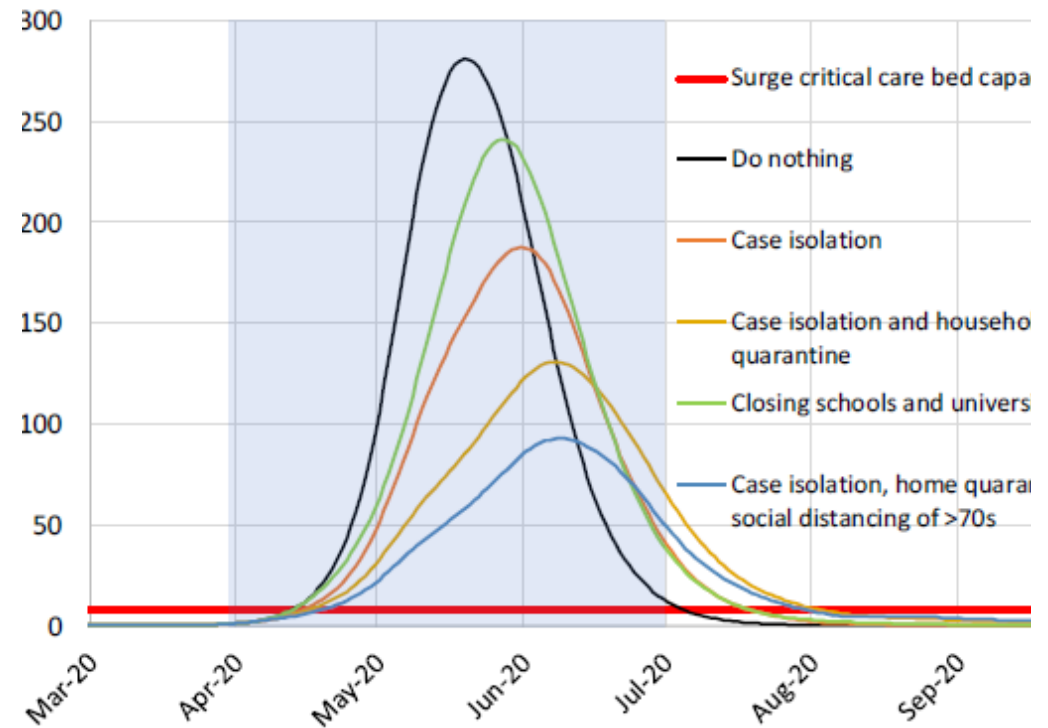
Structure

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- **Top Down and Bottom Up**
- **Self Awareness and Reflection**
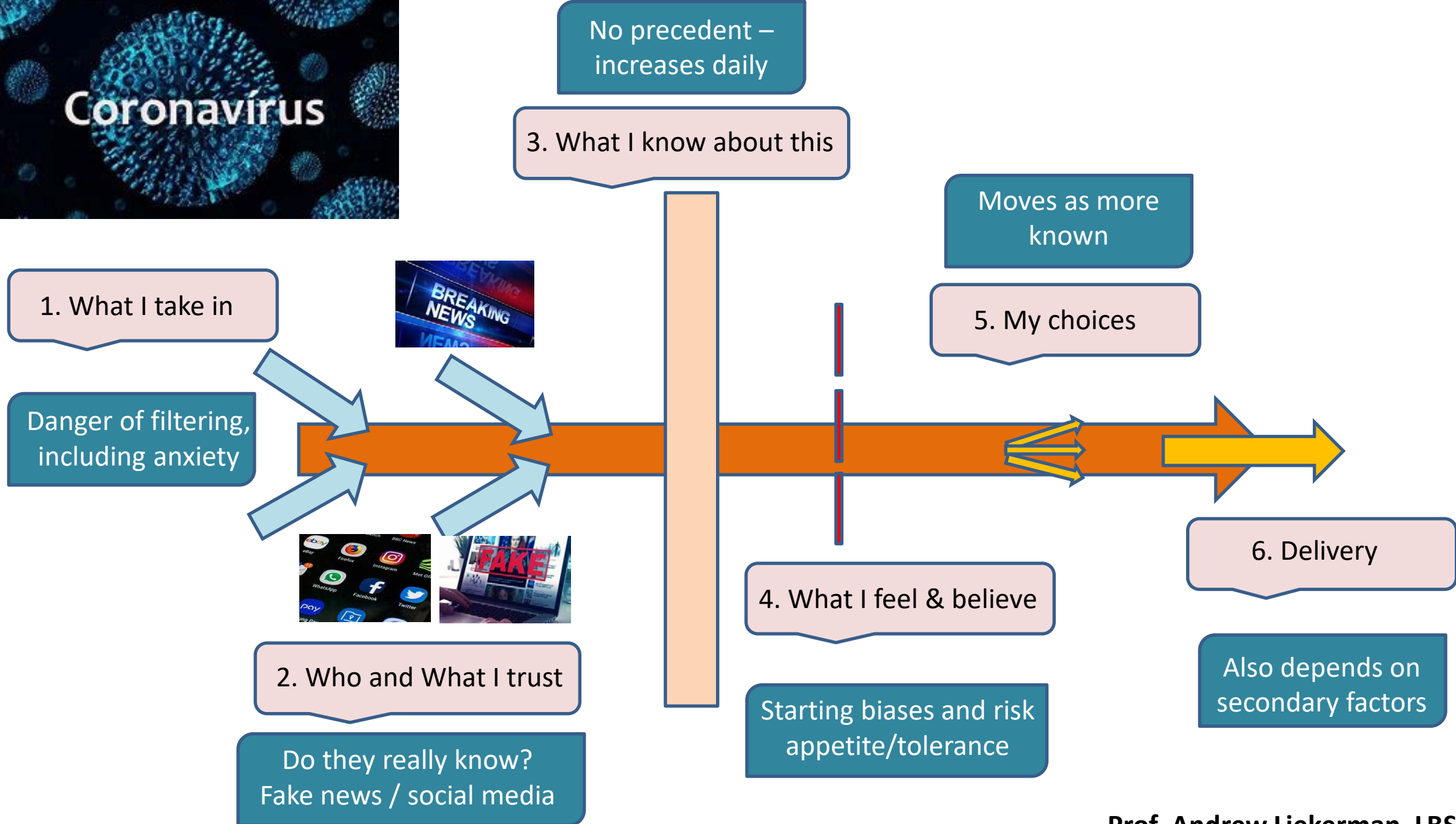- **The Longer Term**

COVID -19 and Judgement

- How can we be best behave?
- What is truth?
- What is rational ?
- The limits of models and logic
- The usefulness of emotion
- Self Awareness
- Navigating across Paradigms
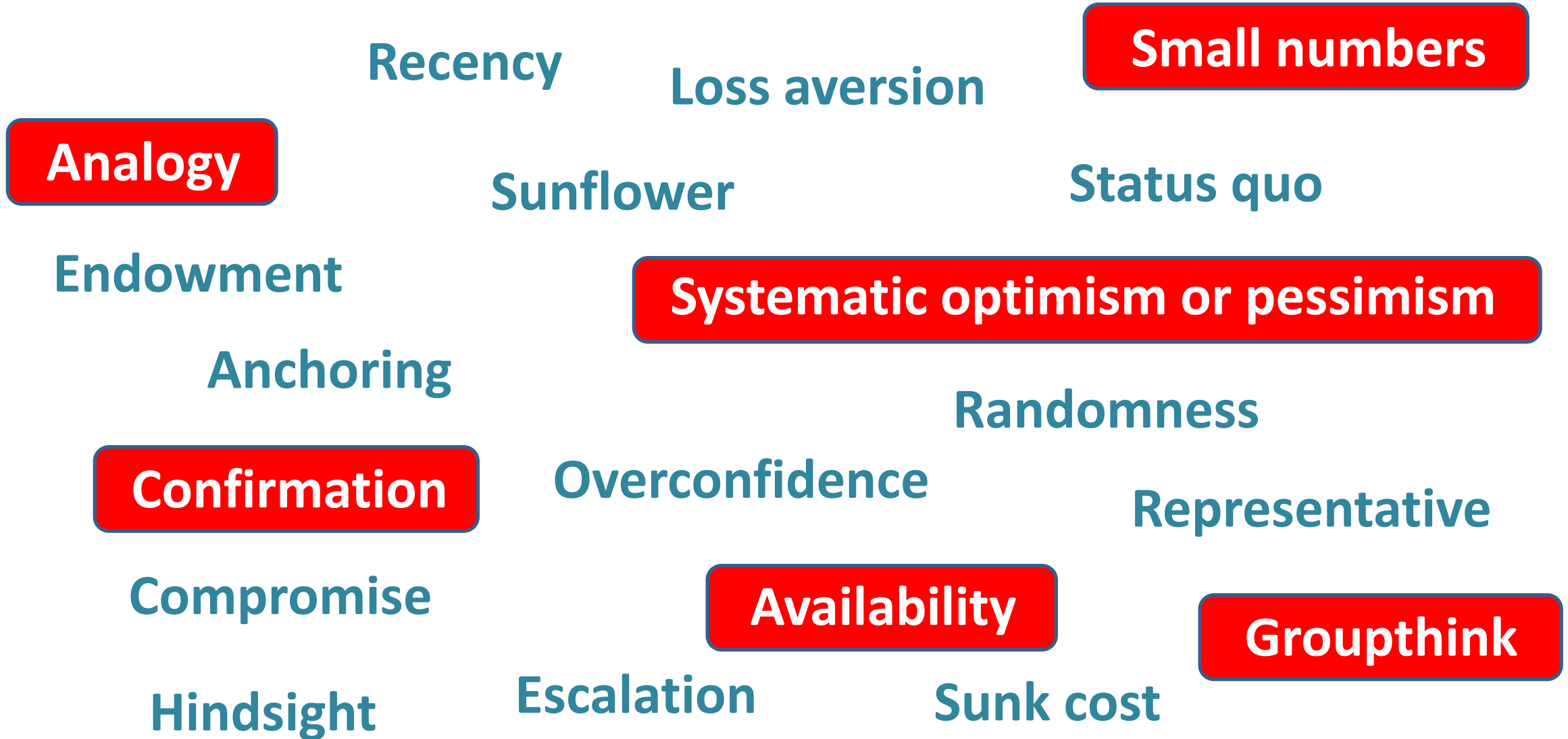- Top down and bottom up approaches

How do we extract signal from the noise?

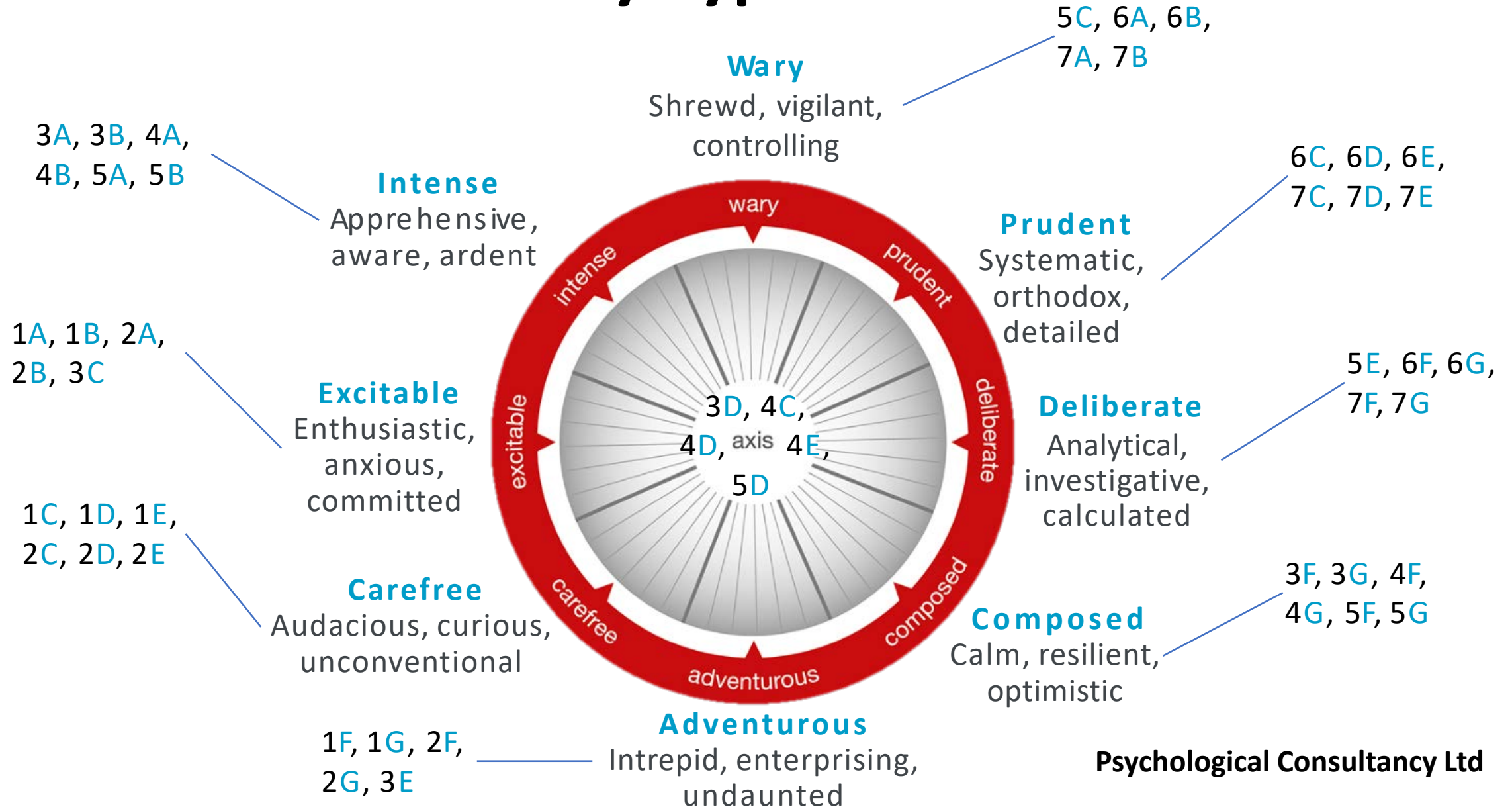# PERSONAL QUALITIES

Intuition

Common sense

Reason

Intelligence

Character

Gut feel

Judgement

Insight/Self-awareness

Perceptiveness

Emotional Intelligence

Acumen

Wisdom

Experience

Discernment

Risk assessment

Prof. Andrew Liekerman, LBS

Coronavírus

No precedent – increases daily

3. What I know about this

Moves as more known

1. What I take in

BREAKING NEWS

5. My choices

Danger of filtering, including anxiety

6. Delivery

FAKE

2. Who and What I trust

4. What I feel & believe

Also depends on secondary factors

Do they really know? Fake news / social media

Starting biases and risk appetite/tolerance

Prof. Andrew Liekerman, LBS

SOME BIASES*

Recency

Loss aversion

Small numbers

Analogy

Sunflower

Status quo

Endowment

Systematic optimism or pessimism

Anchoring

Randomness

Confirmation

Overconfidence

Representative

Compromise

Availability

Groupthink

Hindsight

Escalation

Sunk cost

Risk and Personality Types

Wary
Shrewd, vigilant, controlling

5C, 6A, 6B, 7A, 7B

Intense
Apprehensive, aware, ardent

3A, 3B, 4A, 4B, 5A, 5B

Prudent
Systematic, orthodox, detailed

6C, 6D, 6E, 7C, 7D, 7E

Excitable
Enthusiastic, anxious, committed

1A, 1B, 2A, 2B, 3C

Deliberate
Analytical, investigative, calculated

5E, 6F, 6G, 7F, 7G

Carefree
Audacious, curious, unconventional

1C, 1D, 1E, 2C, 2D, 2E

Composed
Calm, resilient, optimistic

3F, 3G, 4F, 4G, 5F, 5G

Adventurous
Intrepid, enterprising, undaunted

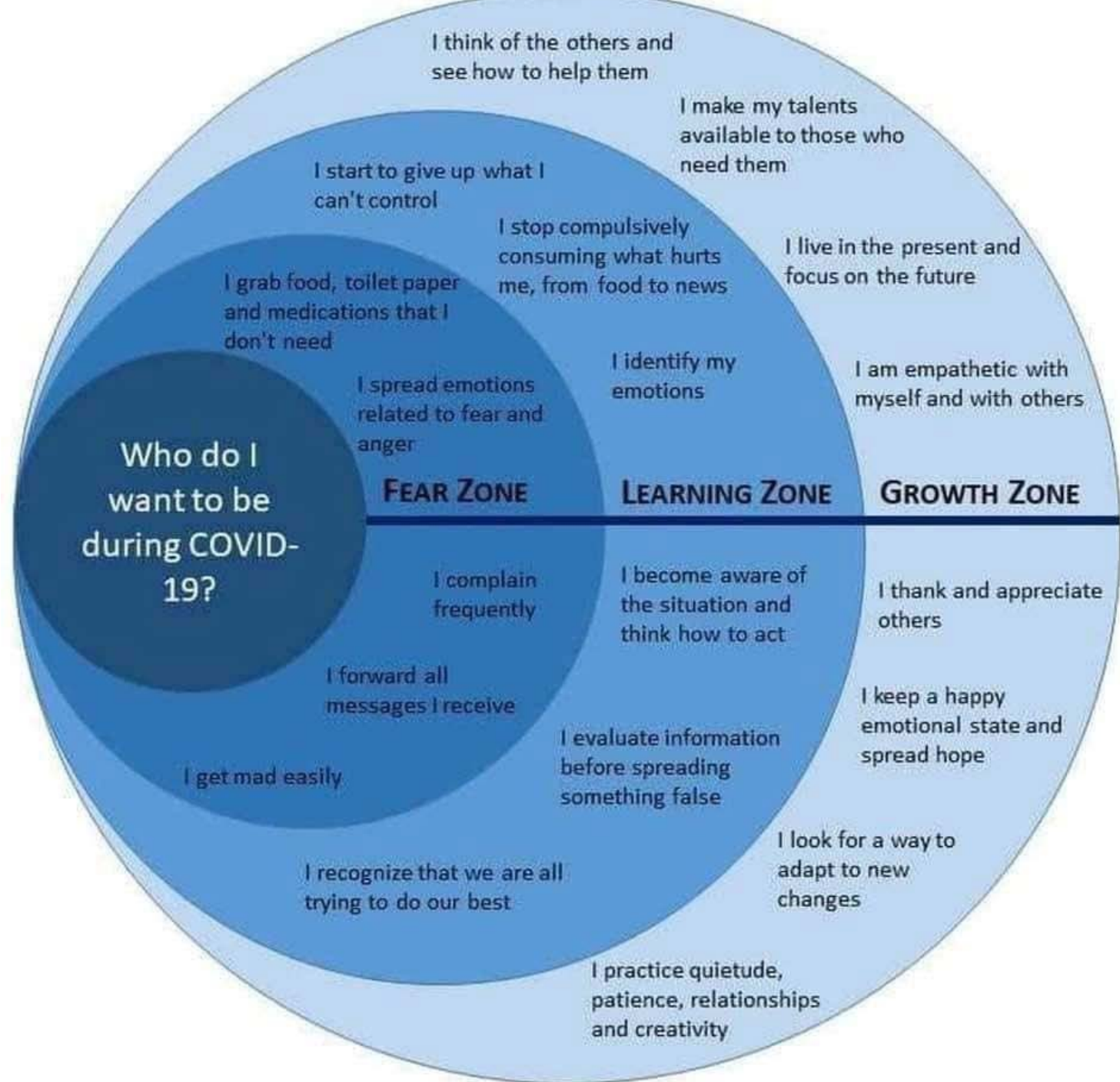1F, 1G, 2F, 2G, 3E

3D, 4C, 4D, axis 4E, 5D

Psychological Consultancy Ltd

Enneagram – Personality Types
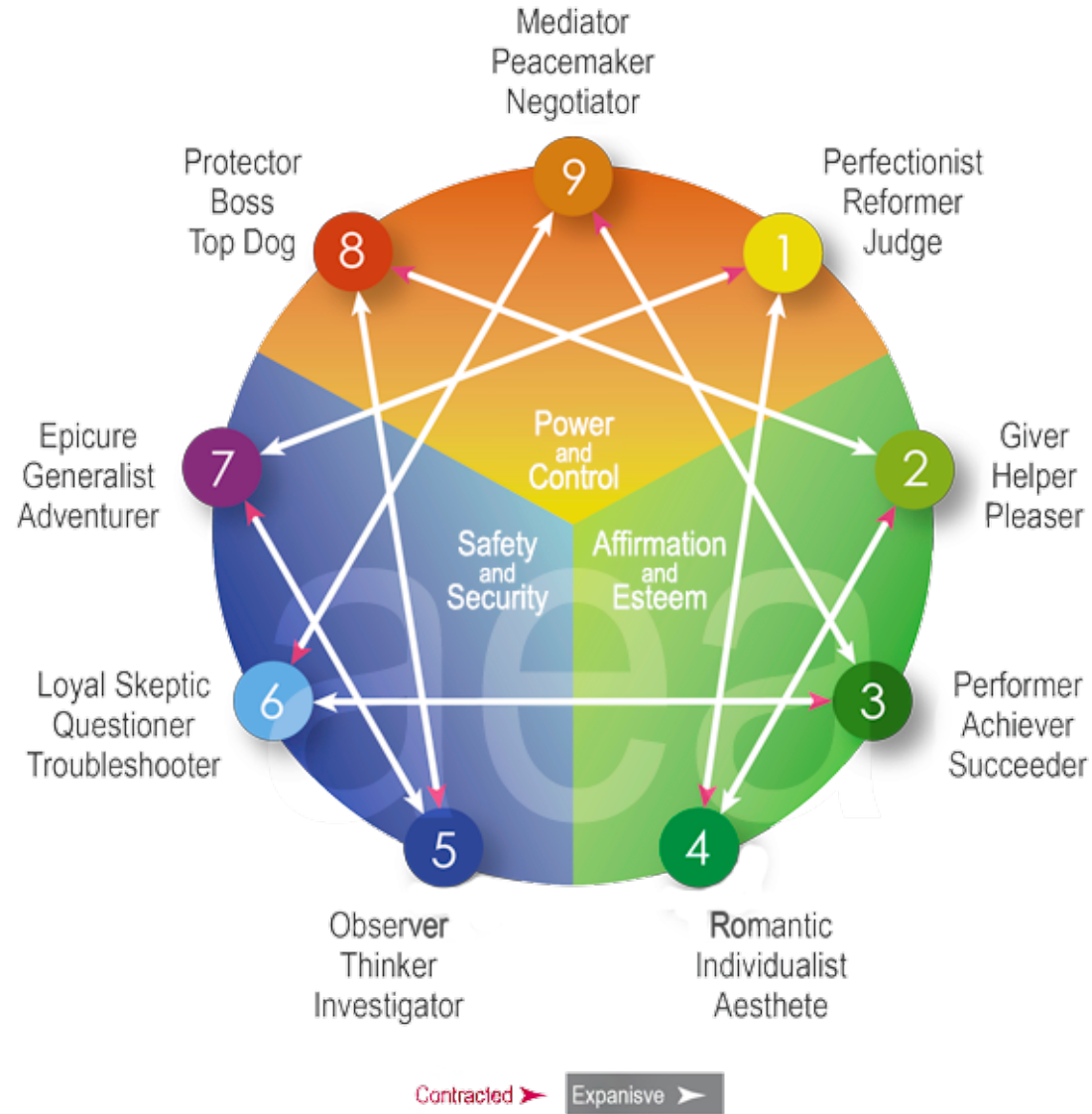
Mindsets

Judgement

JUDGEMENT – 6 QUESTIONS TO ASK YOURSELF

- **Listening and reading – Have I understood?**
- **Can I trust the information and the people?**
- **Do I have the relevant experience and knowledge?**
- **How do my beliefs and feelings (including about risk) affect my choice?**
- **Are these the right options for my choice?**
- **Delivery (including timing) – Is this practical?**

Structure

Risk
- **People (p)**
- **Risk of mortality and morbidity (q)**
- **Transmission (T)**
- **Reproduction Rate (Ʀ)**
- **D.O.T.S & Attack Rate**
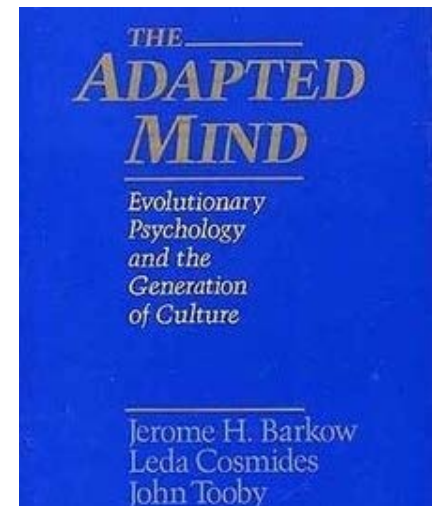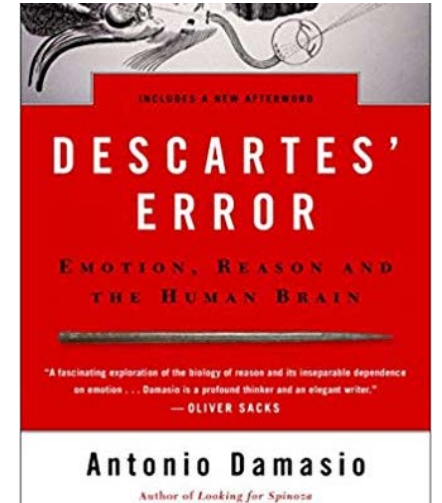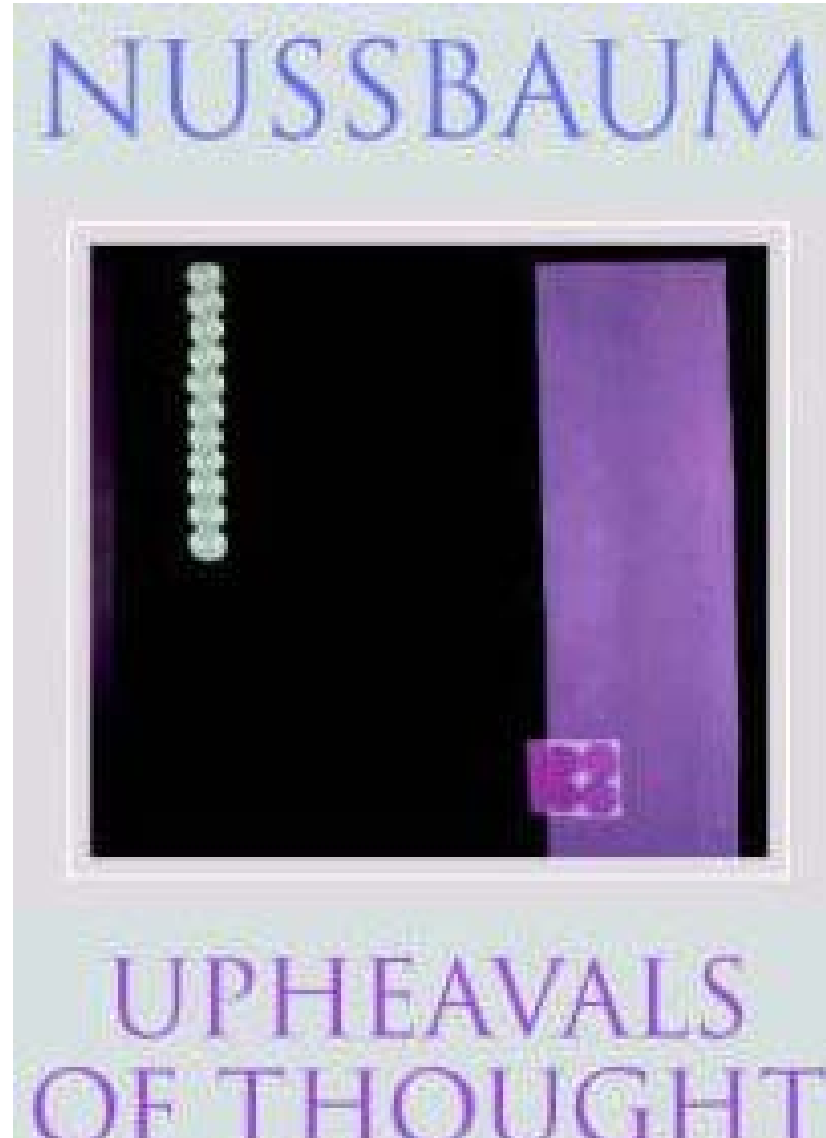
Uncertainty
- **Fat Tails**
- **Unknown Unknowns**
- **Societal Responses**
- **Fear & Madness of Crowds**
- **Suppression & Risk Mitigation**

Judgement
- **Personality Types and Risk Preferences**
- **Culture and Governance Systems**
- **Top Down and Bottom Up**
- **Self Awareness and Reflection**
- **The Longer Term**

Knowledge and its Limits

- Nussbaum
- Damasio
- Evolutionary Psychology

Integrating Various Disciplines

- Actuarial Science and Risk Theory
- Contagion and Networks
- Framing and Cognitive Behaviour Therapy
- Risk Appetite and Personality Theories
- Fear, Panic and Anxiety – evolutionary psychology
- Governance and Cultures
- History, Politics & Philosophy
- Bias, Heuristics and Judgement
- Radical Uncertainty
- Self Awareness, Reflexivity and Navigation

How do we extract the signal from the noise?
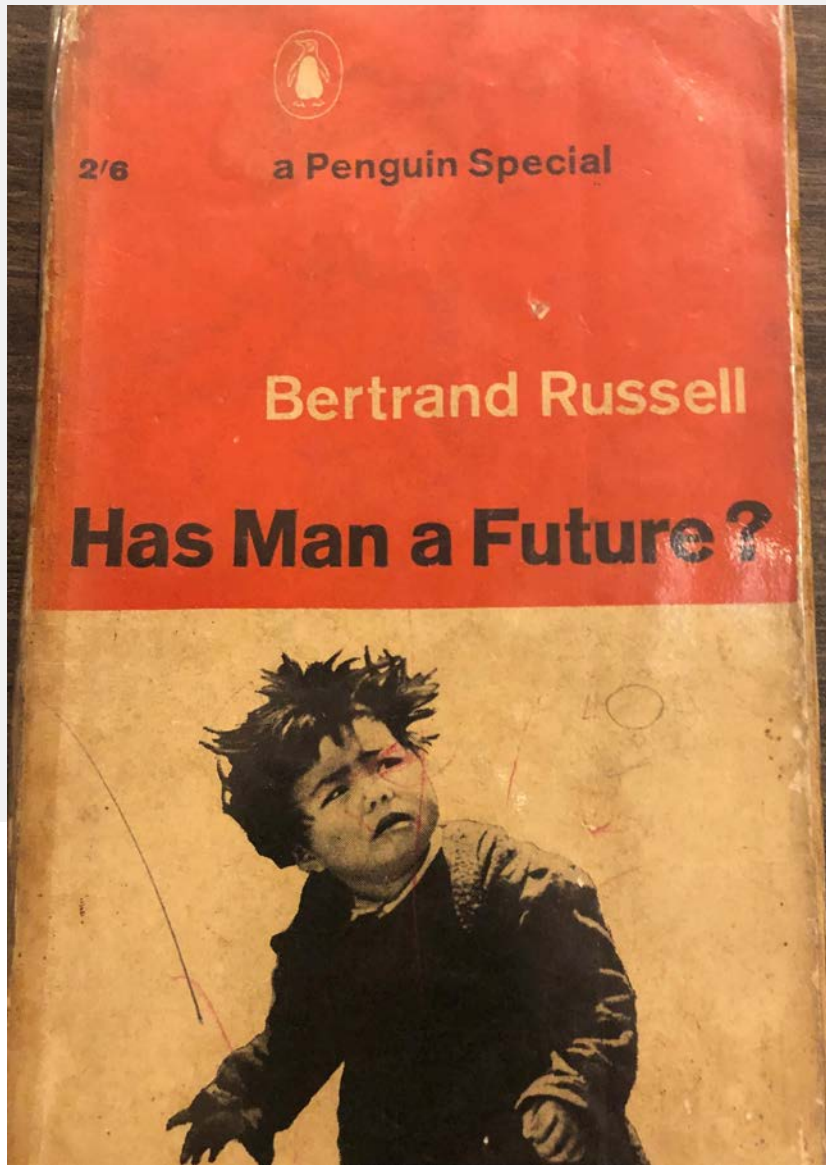
Has Man a Future?

Navigating Across Paradigms

27 March 2020

Tan Suee Chieh