

Economy

Science
& Technology

Environment
& Energy

Long-term
Planning

Industry
& Innovation

Physical
Infrastructure

Health

Human
Capital

Higher
Education

Society

Education

We will bounce back

A real-time coronavirus diary

Prof. (emer.) Shlomo Maital
Ella Barzani

April
2020

ABOUT THE SAMUEL NEAMAN INSTITUTE

The Samuel Neaman Institute was established in 1978 in the Technion at Mr. Samuel Neaman's initiative. It is an independent multi-disciplinary national policy research institute. The activity of the institute is focused on issues in science and technology, education, economy and industry, physical infrastructure and social development which determine Israel's national resilience.

National policy research and surveys are executed at the Samuel Neaman Institute and their conclusions and recommendations serve the decision makers at various levels. The policy research is conducted by the faculty and staff of the Technion and scientists from other institutions in Israel and abroad and specialist from the industry.

The research team is chosen according to their professional qualifications and life achievements. In many cases the research is conducted by cooperation with governmental offices and in some cases at the initiative of the Samuel Neaman institute and without direct participation of governmental offices.

So far, the Samuel Neaman Institute has performed hundreds of exploratory national policy research projects and surveys that serve decision makers and professionals in economy and government. In particular the institute plays an important leading role in outlining Israel's national policies in science, technology and higher education.

Furthermore, the Institute supports national projects, such as the Ministry of Industry, Trade & Labor clusters - the MAGNET program in nano-technologies, media, optics and communication, chemistry, energy, environmental and social projects of national importance. The institute organizes also comprehensive seminars in its leading fields of research.

The Samuel Neaman Institute's various projects and activities can be viewed at the Institute website.

The chairman of Samuel Neaman Institute is professor **Zehev Tadmor** and the director is professor **Moshe Sidi**. The institute operates within the framework of a budget funded by Mr. Samuel Neaman in order to incorporate Israel's scientific technological economic and social advancement.

Mailing address:

Samuel Neaman Institute, Technion City, Haifa 32000, Israel

Phone: 972-4-8292329

Fax: 972-4-8231889

e-mail: info@neaman.org.il

Website : <https://www.neaman.org.il/en/Home>



We will bounce back

A real-time coronavirus diary

By Prof. (emer.) Shlomo Maital / smaital@tx.technion.ac.il

With Ella Barzani

April 2020

No part of this publication may be reproduced without prior written permission from the Samuel Neaman Institute except for the purpose of quoting short passages in review articles and similar publications, with an explicit indication of the source.

The opinions and conclusions expressed in this publication are in the opinion of the author(s) and do not necessarily reflect the opinion of the Samuel Neaman Institute.

Abstract

This book compiles over 65 short blogs, written during the novel coronavirus pandemic, mostly during March and April.

Contents

Abstract.....	2
Introduction: <i>We Will Bounce Back</i> – Resilience	3
Chapter One. Thinking Systemically – Big Picture.....	7
Chapter Two. Early Days: Peering Through the Fog	11
Chapter Three. Bringing Out the Best In Us	26
Chapter Four. Enlisting Technology: Creativity vs. Corona.....	33
Chapter Five. Asia Shows the Way	47
Chapter Six. Teaching Online.....	52
Chapter Seven. Failures.....	56
Chapter Eight. Measuring the Plague	63
Chapter Nine. Leadership.....	71
Chapter Ten. Emerging from Plague	79
Conclusion: Save Lives, Save Jobs.....	98

Introduction: We *Will* Bounce Back – Resilience

My Neaman Institute colleague Dr. Reuven Gal is eminently qualified to help me answer the key question, how will we Israelis bounce back?

Dr. Gal is a social and clinical psychologist, formerly Chief Psychologist of the IDF, and Deputy National Security Advisor for Domestic Policy at the National Security Council. Gal has published several excellent research papers on social resilience. Four years, he and I chaired a Workshop in Beijing, China, on “Strengthening Social Resilience: Perspectives from Israel and China”.

Let us begin with what we mean by ‘bounce back’. Individual resilience is a person’s strength and coping behaviors that sustain him or her during stressful life events (like COVID-19). Resilient persons function normally during hard times and bounce back to their original state when the hard times end. Social resilience is the same idea, applied to the community, neighborhood, city and nation. It is the capacity of a society to prepare itself, to contain and manage major national crises, and to bounce back expeditiously to an enhanced functioning.

All nations are today undergoing extreme stress. In the past Israel has had more than its share, and has had a lot of practice in social resilience. But it has never encountered a pandemic. Will we measure up?

I interviewed Dr. Gal digitally.

Box: Psychological Impact of Quarantine

Memo to our leaders and officials: Here are key findings for managing the psychological impact of quarantine:

* Information is crucial for people who are quarantined -- they need to understand the situation with clear simple facts; effective rapid communication is essential; The quarantine period should be as short as possible and the duration should not be changed unless in extreme cases; Most of the adverse effects come from legal imposition of restrictions of liberty, voluntary quarantine has less distress and fewer long-run complications; Public health officials should emphasize altruism – stay away from others to protect *them*.

From: Brooks et al., The psychological impact of quarantine, Rapid Review March 20/2020

Dr. Gal, you did pathbreaking research on posttraumatic stress disorder (PTSD) among soldiers who fought in the Yom Kippur War. You found that for tank crews, crews that fought as an organic team (i.e. trained together, knew each other well over time, in reserves) had far less PTSD later, than tank crews thrown together quickly and randomly, with members who did not previously know each other.

This suggests that social resilience is in part a function of our social network, social support.

In these days of virus, we are asked to engage in social isolation (my wife Dr. Sharona Maital prefers to call it 'spatial separation' or 'stay connected, stay apart').

How can we maintain our social support systems, so crucial in remaining resilient, when we are asked to isolate, with increasing severity?

Gal: "Social interaction, indeed, is crucial in times of crises. And Sharona is right: It is a spatial separation – since the social interactions are flourishing these days, more than ever.

"Look at the flood of social media that's taking place now, 24/7. In fact, the need for social interaction now is doubled: Both the fear (of the pandemic) and the separation.

"The comparison to the soldiers in the Yom Kippur War is not completely valid – first, since among the tank crews it was the level of trust in their comrades' efficacy during critical moments that gave the organic teams the better hand; this is not exactly the case here. Second, the so-called 'dependent variable', namely the PTSD, is not the relevant one in the present situation. Now it is fear, trust in authorities, uncertainty, helplessness. Similar, but not at all as critical as combat reaction.

"That being said, it is still very true that we need to maintain our social support systems in times like this. They are more unique now, though, under the circumstances: The primary support system under the current conditions is the 'small family unit' (parallel to what we call in the military the 'small combat unit', usually referring to a squad or small platoons). It relates to those family members who find themselves isolated together at home.

"For many families this is quite an irregular situation -- Mom & Dad at home for the whole day??? – but this is the framework where most of the support/reassurance/Q&A's etc. will come from. Other support systems can be in the municipality -- Ivria and I were very moved when they called from the Social Welfare department and asked if we need anything... It was very supportive!

"Our friends' circle is another support system which becomes super important now days. And yes – as during war periods, when we see bursts of patriotism and solidarity, such as food stands for soldiers at road intersections, special greeting programs on radio etc., where it is clear that those 'bursts' serve not only the soldiers but even more the public itself. Here too, you can see the need for that kind of solidarity, with people coming up with creative ideas of balcony-gatherings etc.

"The overt purpose is to praise and thank the health professionals, but the hidden (and unconscious) function is to strengthen solidarity."

Box: Second Intifada

Dr. Gal studied Israeli resilience during the Second Intifada, September 2000 to 2004. During this period, there were frequent, often daily, attacks by Palestinians on crowded civilian targets – shopping malls, restaurants and buses. Many attacks were carried out by suicide bombers. The attack on the Park Hotel in Netanya killed 30 civilians. Gal measured resilience through behavior (attendance or absence from work and school, visiting malls, banking transactions, hotline calls, and recreation and leisure, e.g. movie and theater attendance, vacationing, travel abroad). He also measured public

attitudes, including a sense of patriotism. Gal's main conclusion: over the three-year period observed, the Israeli public showed the ability to bounce back expeditiously to its earlier functioning level, or to degrade gracefully to its normal standards. ...the Israeli society showed a relatively high level of national-social resilience as reflected in their mass-behavioral indicators.

Source: Reuven Gal, Social Resilience in Times of Protracted Crises: An Israeli Case Study. Armed Forces & Society, 2014.

If you could do so, what research project would you design, during these critical times, to explore social resilience? For instance, I did a quick Survey Monkey study, one question, asking, what acts of kindness have you done during this crisis?

Gal: "We have actually initiated a study already, within our group of resilience-researchers at the S. Neaman Institute -- an on-going survey, with repeated measures, which includes questions regarding level of fear, sources of information, compliance with instructions etc.

"Dr. Carmit Padan, together with Dr. Carmit Rapaport, is managing this survey. From my point of view, the main finding will be not a single-measure picture, but rather looking at and measuring the changes over time. For example, did the fear level change after the first case of death was announced; how did public trust in governmental authorities change as the pandemic evolves; and so on."

To what extent can technology (Whatsapp, Facebook, Facetime, Zoom, etc.) provide social support, in the absence of face-to-face family gatherings?

"It sure can and it does! For example, just five minutes ago my two grandchildren, ages 6 and 10, from Givat Nili called me on Whatsapp video, in order to interview Saba for their "Ruth & Shaul's Podcast Program".

" It became a wonderful opportunity not only for me to tell them how much I miss them and love them and to compliment them for their creative way of coping, but no less important – it was an opportunity for them to express their love to me and thus supporting me in my desperate state of grandkids deprivation... In fact, I believe that for the first time, information technology is welcomed (rather than detested) by most parents, as it became a useful and creative tool to engage their kids (and themselves!) not only as a remote-learning substitute for closed schools, but also as a mind-opening opportunity (see "Ruth & Shaul" example...).

Box: My Apology to Technology

Dear Technology, OK – I know. I've written many hard words about you, especially about social media, how they distribute fake news, ruin our trust in experts and in one another, waste our time, destroy face-to-face social contact...ruinous! And then – the coronavirus. We have organized family Whatsapp gatherings, with our kids and grandkids in Los Angeles, New York City, Ra'anana, and Lachish...seeing those beautiful faces keeps us healthy. Yesterday we had a regular class with our Rabbi Elisha, with 11 participants, including Q&A and lively discussion, on Zoom. A whole

program of lectures has been organized by our Synagogue. I've been videotaping (with Zoom) lectures on entrepreneurship and startups, and recycling old tapes, these have a new life as everyone is at home and often online. We are counselled to stay together, but stay apart, and the only way to do this safely is through technology. Thank heavens for Outlook, Zoom, Whatsapp, Facetime, Facebook...and, yes, hard to say it, but yes, for Twitter. So – sorry, Technology. This is my abject apology. We need you more than ever now. You are coming through for us just when we need you. If we did not have you, it would be hard to bear the isolation, especially for us grandparents and seniors. Yours truly, Shlomo Maital

-- From my Wordpress blog

There is a fierce tradeoff between public health measures (isolation), and measures that preserve our economy and economic activity and jobs – we are ostensibly heading toward a staggering one million unemployed; half a million have already registered at the employment office.

I asked Dr. Gal, if he had any insights on this tradeoff, when decisions are made under extreme uncertainty, and economists and public health experts are fiercely divided on it, and when we know that economic distress also creates casualties?

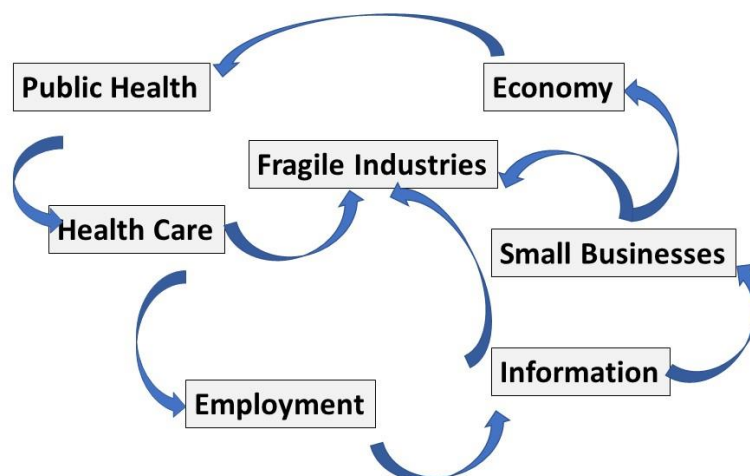
Dr. Gal replied, admirably, that he needed to think more deeply about this.

So do our government experts. We need more big-picture analysis and we need to weigh the consequences of shutting down an entire economy for a very long time.

Note: A shorter version of this blog appeared originally in the Jerusalem Report fortnightly, April 9, 2020, pp. 40-41.

Chapter One. Thinking Systemically – Big Picture

COVID-19: Who's In Charge? And Who Should Be in Charge?



OK – who's in charge? Who is running the coronavirus pandemic show?

I think it's pretty obvious – it's the doctors, medical experts, epidemiologists and public health officials. As it should be. Right?

No, I'm not so sure. Initially the focus worldwide was on stopping the spread of COVID-19 from China to the world. That pretty much failed, as expected – with millions of people travelling every week, and with some countries reluctant to share information, drastic quarantine measures came a bit too late. And now, COVID-19 is in some 70-80 countries. So – it has spread. Now what?

Public health officials are in charge. And lacking medicine or vaccines, their tool is mainly that of quarantine. In Israel, a small country, with very few causes of new coronavirus, some 100,000 people are in self-imposed quarantine, for 2 weeks, largely because they have been in countries like France and Italy, where coronavirus existed.

Quarantine may be rather ineffective in halting the infectious spread. And it is disastrous for the economy. You cannot simply shut down the world economy – people have to eat and drink and keep the wheels of commerce moving. It cannot really be done efficiently from home... the Internet is not yet up to it.

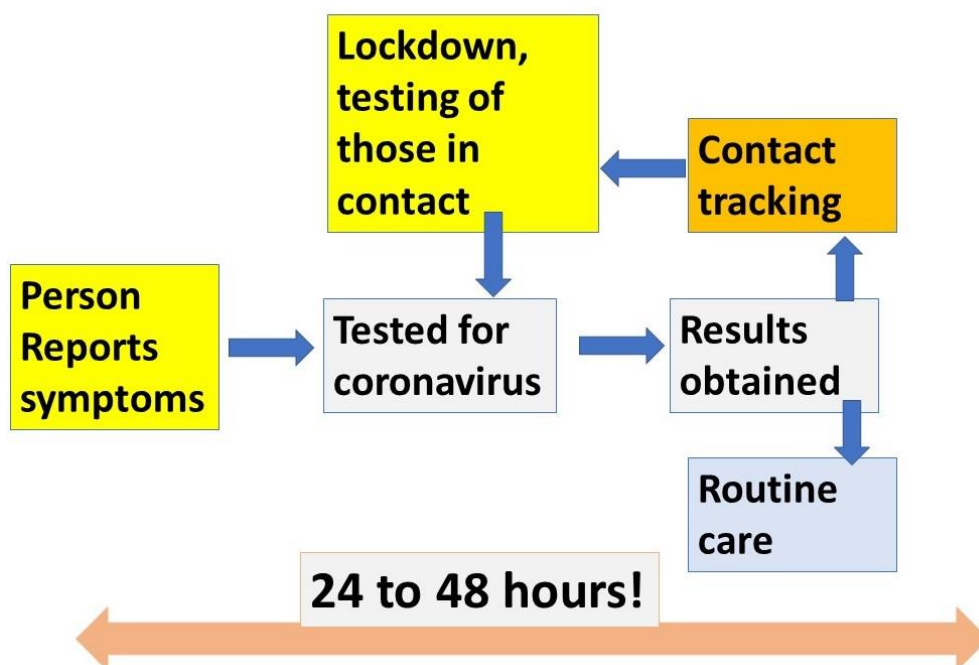
So who is running the show? What we need is a small, powerful interdisciplinary team made up of political leaders, public health experts, epidemiologists, and yes, perhaps economists, and psychologists, and information experts, who will focus on the system – the big picture. How to deliver accurate information. (America gets a big 'F' on this one, largely due to its President, who brags that he is terrific at numbers and maybe should have been a doctor rather than an amateur politician). How to weigh cost-benefit in quarantine policies. How and when and whom to test for COVID-19. How to deal with public transportation and flights. How to run schools.

You could in principle simply shut everything down and tell everyone to stay home. That would be disastrous, immensely costly, and harmful to the mental health of the nation. I don't believe this is an option. So the question is, how to keep things running more or less smoothly, in the face of the coronavirus that is here to stay? For that we need a systems approach.

This is all new territory. We have not faced a real pandemic, post-1989 global economy. Each country needs an integrated team to make policy, and the world needs a similar integrated team to coordinate policies among nations.

Perhaps, if something good will emerge from the COVID-19 crisis, it will be the understanding of how interdependent all of us are, everywhere, and how concrete and steel walls are not the answer.

How to Emerge from Lockdown: Speed is Vital!



Question: how does coronavirus resemble standup comedy?

Answer: For both, timing is crucial.

As countries begin to emerge from lockdown (Denmark has opened its kindergartens, because 90% of families with children have both parents working), fears arise whether this is wise. One answer is, yes, but... The diagram above shows how emergence can best be done. And everything, EVERYthing, depends on timing and speed --

- ▶ test for virus among those with symptoms, and some who are asymptomatic,
- ▶ get the results super-fast, within hours (this is possible with some tests),
- ▶ track those in contact with persons testing positive,
- ▶ lock down those with the virus, and
- ▶ do this again and again.

All this depends on revising current testing procedures (some results have been lost, some take 6-8 days for results, far too long to be useful). Timing and speed are crucial. Why? Because, in the 6 days it takes now for results to be provided, the person potentially infected can infect many many other people, even unknowingly.

Does *your* country have test results within minutes or even hours? There are such tests. We need millions of them.

Compassionate Capitalism: Filling in the Details



Compassionate capitalism

In an earlier blog, I proposed that businesses adopt a new formula for free-enterprise capitalism: Price at cost. I called this “compassionate capitalism”, suitable for this new era of unprecedented unemployment, hardship and economic collapse. The goal: Preserve jobs, keep businesses alive, but help the people stretch their diminishing incomes.

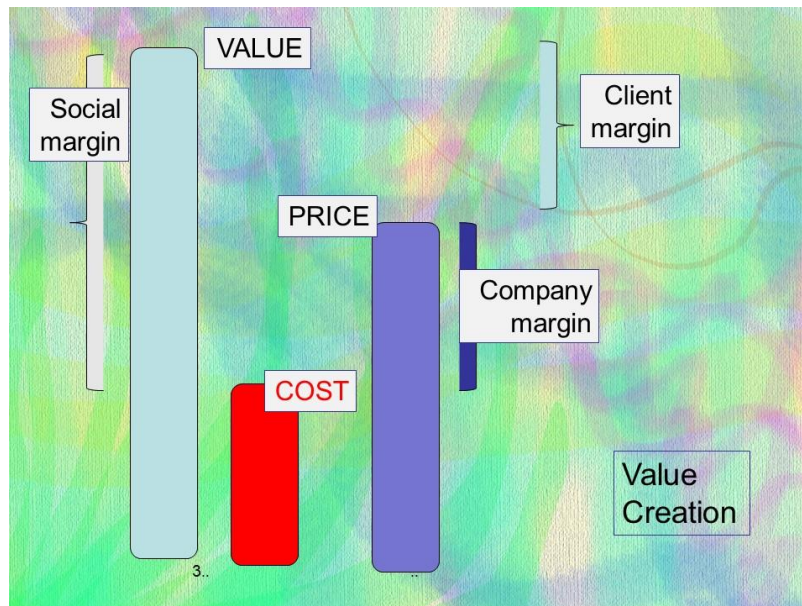
My close friend in Vietnam, Tran Luong Son, reports that the idea is resonating in his country, but there remain many practical questions. Let me try to answer some of them. In general, I propose to launch a voluntary group of visionary business leaders, willing to embrace C c (the capital C is for compassion, the small ‘c’ is for capitalism), and to commit to a small number of Cc principles.

Can you outline a clear simple methodology for applying Cc?

1. Open an Excel sheet for each of your products and services.
2. Begin with variable costs (costs of production and distribution). Wages: lower than pre-plague but reflecting the needs and productivity of workers; senior management take proportionately bigger cuts. Materials: Take into account second sourcing – businesses that used a single source are, in many cases, in trouble.
3. Cost of capital: This is an opportunity cost. The risk-adjusted return on capital has declined, but is recovering. Use again the principle of fairness: Owners of capital need a return on their money, but not as high as pre-plague. They too must take cuts, as do wage-earners.
4. Fixed costs: Governments are part of this. They need to contribute as well, by reducing income and profit taxes and property taxes. Many governments have job-preservation schemes, to replace unemployment insurance with partial wage subsidies.
5. Prioritize: Apply the McCabe principle. Tom McCabe was the legendary CEO of Scott Paper, making it a great global company. He had every senior manager put this plaque on the wall: Whom do we serve? 1. Customers 2. Our community 3. Our country

4. Our employees. 5. Our shareholders. Shareholders last???? McCabe had a simple answer. Of course. If you serve the other four well, you will best serve your shareholders, in the long run. This applies more than ever now. In Cc compassionate capitalism, serve your customers, your community and your country, and your employees. They come first. This is what capitalism should look like, if we are to sustain it.

6. Use the “value sharing” principle. When I taught this to MBA students, there was blood on the floor. They were taught to profit maximize. This is more than obsolete, it is immoral in today’s plague-ridden world.



a) Estimate the value your product or service creates, by the average amount your clients would be willing to pay for it, if you ‘squeezed’ them at the maximum. (\$). B) estimate the cost of providing the product or service, taking into account maximum productivity and hidden costs (opportunity cost of capital – see above). C) set the price as close as you can to cost, while sustaining the business and its jobs. To maximize client margin (the net value your clients get from your product). These days, ‘value’ is way down, for most products and services, because our income and disposable income are way down. If you still manage to generate ‘client margin’ (net value for clients), you will have loyal customers for three generations or for a century. We customers will not forget who served us (McCabe principle) and who ripped us off.

Capitalism can no longer afford to maximize ‘company margin’. The game today is to maximize ‘client margin’.

Chapter Two. Early Days: Peering Through the Fog

Why COVID-19 Will Hurt the Global Economy

The 'new coronavirus' dubbed boringly COVID-19 has brought to mind an insight of Charles Darwin:

It is not the species best adapted to their environments, that thrive and prosper, but rather, those who learn fastest to adapt to changes in their environment.

The reason? Environments are constantly changing. Living species have to adapt, and some do it far better than others.

Viruses are an example. Keep in mind- viruses are not actually living things, as cells are. A virus is a small infectious agent that reproduces only inside the living cells of an organism. It inserts its ribonucleic acid (RNA) into the DNA of the cell, reproduces, kills the cell, bursts out and continues with its marauding raid on the human body, like Genghis Khan's pony-mounted fighters.

Viruses can infect all types of life forms. And they have learned, through evolution and mutation, to defeat the human body's antibodies – soldier cells that attack and kill foreign invaders, or antigens. Viruses learn and adapt fast.

And we humans?

The damage to the global economy from the COVID-19 virus will be greater than we expect. World capital markets, down 10% and more, are now waking up to this fact. But why?

Most economic downturns occur on the demand side of the supply-demand nexus. Some shock occurs, people cut back, spend less, invest less, governments slash spending, exports fall – and the fall in demand slows the economy. This is standard, and it describes every single economic downturn.

When President Reagan implemented huge tax cuts in 1981 and then again in 1984, he ascribed them to 'supply side economics' – desire to boost the supply of saving and capital, by putting more income in the hands of the wealthy. It worked – but not in the way Reagan thought. The rich spent the money, there was a huge demand boom, and America had a decade-long demand-side stimulus boom.

COVID-19 is unique, because it is the first major supply-side disaster, since the global economy's architecture was redesigned and rebuilt at Bretton Woods, NH, in July 1944, 76 years ago. China produces a great many of the world's manufactured goods and parts. Most of its factories have slowed or closed. This is a huge disruption to the intricate system of global supply chains.

What can be done? Very little, because we have neglected supply side policies, and have underestimated how fragile and delicate the global supply chain system is.

Central banks can slash interest rates, but interest rates are already rock bottom. Governments can spend money, but they already are running big deficits.

And anyway, these are demand-side policies. Yes, they can help soften the demand problems arising from the supply shocks – tourism is collapsing, airlines are in trouble, etc. But these are secondary symptoms.

How to restore the global supply chain? That's the key issue. It requires a meeting of the world's leading countries; meanwhile countries like Apple are scrambling to find quick temporary fixes, and there are few good ones.

Darwin was right. Our environment has changed, when a tiny virus originating in Wuhan, China, set out to spread itself. How fast we learn to adapt will determine how costly that little virus will be to the world.

COVID-19: Mitigate, Not Decimate

Professor Zvi Bentwich is an Israeli doctor, who teaches and researches at Ben Gurion University, in Beersheva. Before quoting his views on COVID-19, let me establish his credentials first.

Bentwich serves as the head of the Center for Emerging Tropical Diseases and AIDS at the Ben-Gurion University (BGU). He founded the first AIDS center in Israel in the mid 80's. His groundbreaking research uncovered the link between Neglected Tropical Diseases (NTDs) , particularly intestinal worms, and immune system deficiencies, pioneering the concept that NTDs play a major role in the pathogenesis of HIV/AIDS. He is a leading advocate for public health and human rights.

So, this is a public health expert who is worth listening to, right? Here is his take, printed in today's Haaretz daily newspaper:

The heading on his Op-Ed piece: "Tight border isn't the answer to virus". Today the Israeli government announced that EVERYone returning from abroad must undergo self-imposed quarantine for two weeks. Everyone? Yes, so that Prime Minister Netanyahu will not appear to be singling out the US, thus angering his friend and colleague Donald J. Trump. (Such quarantines were already in effect for most travelers incoming from Europe).

The main point: "Is there an alternative approach to fighting the disease right now? [alternative, to closing down the borders and shutting down the economy for weeks and weeks?]. ...Yes, it's called mitigation. It involves using less drastic methods that are likely to yield similar results regarding the damage caused by the virus but that significantly reduce the negative social and economic consequences of containment."

Mitigation. Not decimation of our economy.

And this is coming from a distinguished physician, expert on virus containment.

"The coronavirus too will pass and until it does the damage should be minimized as far as possible. We must accept the possibility that it won't be the last viral epidemic and *that it's important to find the optimal way to cope with such epidemics, at a reasonable cost*".

Social Isolation? No! Spatial Separation: Yes!

My wife is a school psychologist, with long experience, including times of emergency, when Israel was under attack.

She has an important observation regarding the widespread calls for “social isolation”, to maintain distance among us and slow the spread of the coronavirus.

I want to share her observation.

Words matter. The last thing we need in times of crisis is “social isolation”. This is especially true of my country Israel. As Judy Meltz notes in today’s Haaretz daily, “In a country where personal space is virtually nonexistent, many Israelis are struggling”. We are a touchy-feely nation, in good times we fight like hell, and in hard times we pull together and help one another.

So how in the world are we to manage ‘social isolation’?

Answer: Words matter! This is NOT social isolation. We are still in close touch by social media. Our own family Whatsapp is feverishly active.

What we are called to do is simply spatial separation. Separate one another in space. That does not mean isolating one another socially.

Look, words do matter. I hope our leaders will embrace this term, spatial separation, which is precisely what it is, and abandon ‘social isolation’.

Thank you, Sharona.

Why Don't Kids Get COVID-19?

Why does the COVID-19 virus afflict us seniors, but small children seem immune?

Today’s Haaretz daily has an interesting article by science writer Asaf Ronal, addressing this question.

First, the data, from Worldometers. The probability of death from COVID-19, by age group: 21.9% of those 80+, 8% for those 70-79, 3.6% for those 60-69, 1.3% for those 50-59, 0.4% for those 40-49, 0.2% for those 30-39, 0.2% for those 20-29, 0.2% for those 10-19..... and, amazingly, zero %, for those 0-9. (No known fatalities, among the world’s 180,000 cases, for young children)!.
 Why?

Why?

Here are the five main hypotheses.

1. Young kids have more flexible, adaptable immune systems, better able to adapt to new diseases, because this is what kids’ immune systems are learning to do from the start.
2. Young kids have a much smaller number of ‘damaged’ immune cells...such cells are more susceptible to the invasion of COVID-19 clever viruses, whose spikes poke into cells and invade them.
3. Young kids’ cells have far fewer ‘receptors’, that viruses use to penetrate them and reproduce inside them.

4. Young kids' lungs have surface membranes that are far less likely or susceptible to 'housing' the virus and enabling them to reproduce there.

5. Young kids still do not have the sex hormones, that may induce proteins in human cells that help the viruses reproduce, when they get inside those cells.

We don't know which, if any, of these theories is the right one. One day, maybe soon, we will find out – and perhaps that will help us old seniors as well.

COVID-19: Why Do More Men Die Than Women?

Women live longer than men. It's true. Here are the facts, from the World Health Organization:

In 2019, more than 141 million children will be born: 73 million boys and 68 million girls.

Based on recent mortality risks the boys will live, on average, 69.8 years and the girls 74.2 years – a difference of 4.4 years.

Life expectancy at age 60 years is also greater for women than men: 21.9 versus 19.0 years.

Women have a longer life expectancy than men at all ages.

Many years ago, when I studied demography at Princeton (Ansley Coale's famed Office of Population Research), this fact was true even then – and I read a study of monks and friars, in a monastery, whose life expectancy reflected the same advantage for women – so, it is not environmental factors that cause it.

In fact, we're not really sure why women live longer. There are many theories.

And now, comes COVID-19. Writing in the daily Haaretz, Asaf Ronal observes that the mortality rate from COVID-19 for men is 2.8%, while the mortality rate for women is 1.7%. That is a massive difference. This is adjusted for age, and other factors.

Why?

There are theories. Behavioral: Men are 'heroes' and seek medical care less than women. Physiological: Female hormones protect them. Immunological: Female immune systems work better. Biological: the 'receptors' viruses like to invade on human cells reside in part in Chromosome X, women have two copies of it, thus they are more susceptible, so their immune systems are more alert and wary to attack invaders.

These are all theories. None have really been fully tested.

And finally, my own observation: As we observe spatial separation here in Israel, and as I watch both men and women experts explain things and advise us on TV – again, as always, *I am struck by how much better women are at delivering information, credibly, authentically, than men, given the same level of expertise and training.*

If only the men would leave it to the women – and just shut up. US President, are you listening? And Israeli PM?

Know the Enemy! Understanding the Coronavirus

Let's try to understand this coronavirus enemy better, with the help of experts. (from the Washington Post, by Sarah Kaplan, William Wan and Joel Achenbach). Sorry, this blog is long, 1,500 words.

How long have viruses evolved? Are they actually 'alive'?

"Viruses have spent billions of years perfecting the art of surviving without living — a *frighteningly effective strategy that makes them a potent threat in today's world*. That's especially true of the deadly new coronavirus that has brought global society to a screeching halt. It's little more than a packet of genetic material surrounded by a spiky protein shell one-thousandth the width of an eyelash, and it leads such a zombielike existence that it's barely considered a living organism. But as soon as it gets into a human airway, the virus hijacks our cells to create millions more versions of itself.

OK, so coronavirus is not alive ...but how come it is so darn SMART?!

"There is a certain evil genius to how this coronavirus pathogen works: It finds easy purchase in humans without them knowing. Before its first host even develops symptoms, it is already spreading its replicas everywhere, moving onto its next victim. It is powerfully deadly in some but mild enough in others to escape containment. And for now, we have no way of stopping it. As researchers race to develop drugs and vaccines for the disease that has already sickened 350,000 and killed more than 15,000 people, and counting, this is a scientific portrait of what they are up against.

How to respiratory viruses like coronavirus make us ill?

"Respiratory viruses tend to infect and replicate in two places: In the nose and throat, where they are highly contagious, or lower in the lungs, where they spread less easily but are much more deadly. This new coronavirus, SARS-CoV-2, adeptly cuts the difference. It dwells in the upper respiratory tract, where it is easily sneezed or coughed onto its next victim. But in some patients, it can lodge itself deep within the lungs, where the disease can kill. That combination gives it the contagiousness of some colds, along with some of the lethality of its close molecular cousin SARS, which caused a 2002-2003 outbreak in Asia. Another insidious characteristic of this virus: By giving up that bit of lethality, its symptoms emerge less readily than those of SARS, which means people often pass it to others before they even know they have it. It is, in other words, just sneaky enough to wreak worldwide havoc.

So, we have to hand it to COVID-19 – it's pretty darned smart. Even without a brain. All, through millions of years of evolution.

"Viruses much like this one have been responsible for many of the most destructive outbreaks of the past 100 years: the flus of 1918, 1957 and 1968; and SARS, MERS and Ebola. Like the coronavirus, all these diseases are zoonotic — they jumped from an animal population into humans. And all are caused by viruses that encode their genetic material in RNA. That's no coincidence, scientists say. The zombielike existence of RNA viruses makes them easy to catch and hard to kill. Outside a host, viruses are dormant. They have none of the traditional trappings of life: metabolism, motion, the ability to reproduce. And they can last this way for quite a long time. Recent laboratory research showed that, although SARS-CoV-2 typically degrades in minutes

or a few hours outside a host, some particles can remain viable — potentially infectious — on cardboard for up to 24 hours and on plastic and stainless steel for up to three days. In 2014, a virus frozen in permafrost for 30,000 years that scientists retrieved was able to infect an amoeba after being revived in the lab. When viruses encounter a host, they use proteins on their surfaces to unlock and invade its unsuspecting cells. Then they take control of those cells' molecular machinery to produce and assemble the materials needed for more viruses.

How does coronavirus “proofread” errors, as it multiplies within the human body?

“Let’s say dengue has a tool belt with only one hammer,” said Vineet Menachery, a virologist at the University of Texas Medical Branch. This coronavirus has three different hammers, each for a different situation. Among those tools is a proofreading protein, which allows coronaviruses to fix some errors that happen during the replication process. They can still mutate faster than bacteria but are less likely to produce offspring so riddled with detrimental mutations that they can’t survive. Meanwhile, the ability to change helps the germ adapt to new environments, whether it’s a camel’s gut or the airway of a human unknowingly granting it entry with an inadvertent scratch of her nose.

Where did coronavirus come from?

“Scientists believe that the SARS virus originated as a bat virus that reached humans via civet cats sold in animal markets. This current virus, which can also be traced to bats, is thought to have had an intermediate host, possibly an endangered scaly anteater called a pangolin. “I think nature has been telling us over the course of 20 years that, ‘Hey, coronaviruses that start out in bats can cause pandemics in humans. Such viruses usually simply cause colds and were not considered as important as other viral pathogens, he said. think of them as being like influenza, as long-term threats,” said Jeffery Taubenberger, virologist with the National Institute of Allergy and Infectious Diseases. Funding for research on coronaviruses increased after the SARS outbreak, but in recent years that funding has dried up.

Why is it proving so hard to come up with ‘weapons’ to fight coronavirus?

“Most antimicrobials work by interfering with the functions of the germs they target. For example, penicillin blocks a molecule used by bacteria to build their cell walls. The drug works against thousands of kinds of bacteria, but because human cells don’t use that protein, we can ingest it without being harmed. But viruses function through us. With no cellular machinery of their own, they become intertwined with ours. Their proteins are our proteins. Their weaknesses are our weaknesses. Most drugs that might hurt them would hurt us, too.

“For this reason, antiviral drugs must be extremely targeted and specific, said Stanford virologist Karla Kirkegaard. They tend to target proteins produced by the virus (using our cellular machinery) as part of its replication process. These proteins are unique to their viruses. This means the drugs that fight one disease generally don’t work across multiple ones. And because viruses evolve so quickly, the few treatments scientists do manage to develop don’t always work for long. This is why scientists must constantly develop new drugs to treat HIV, and why patients take a “cocktail” of antivirals that viruses must mutate multiple times to resist.

“Modern medicine is constantly needing to catch up to new emerging viruses,” Kirkegaard said. SARS-CoV-2 emerges from the surface of cells cultured in a lab. (National Institutes of Health/AFP). SARS-CoV-2 is particularly enigmatic. Though its behavior is different from that of its cousin SARS, there are no obvious differences in the viruses’ spiky protein “keys” that allow them to invade host cells. Understanding these proteins could be critical to developing a vaccine, said Alessandro Sette, head of the center for infectious disease at the La Jolla Institute for Immunology. Previous research has shown that the spike proteins on SARS are what trigger the immune system’s protective response. In a paper published this month, Sette found the same is true of SARS-CoV-2.

“This gives scientists reason for optimism, according to Sette. It affirms researchers’ hunch that the spike protein is a good target for vaccines. If people are inoculated with a version of that protein, it could teach their immune system to recognize the virus and allow them to respond to the invader more quickly.

“It also says the novel coronavirus is not that novel,” Sette said.

And if SARS-CoV-2 is not so different from its older cousin SARS, then the virus is probably not evolving very fast, giving scientists developing vaccines time to catch up.

“In the meantime, Kirkegaard said, the best weapons we have against the coronavirus are public health measures, such as testing and social distancing, and our own immune systems.”

Man oh man – this baby is a formidable enemy. And it’s not even alive. Maybe we all-powerful all-knowing human beings should be in future a little more modest about who we are and what we can do.

Viral Shedding Peaks – BEFORE Symptoms

A very large number of research papers are now emerging from China, by Chinese scientists and scholars, related to biology, medicine, education, and other areas. China is sharing with the world what it has learned.

Yesterday’s Nature Medicine features a very important article by a large group of Chinese researchers, which shows this:

“We report temporal patterns of viral shedding in 94 patients with laboratory-confirmed COVID-19 and modeled COVID-19 infectiousness profiles from a separate sample of 77 infector–infectee transmission pairs.

We observed the highest viral load in throat swabs at the time of symptom onset, and inferred that *infectiousness peaked on or before symptom onset*. We estimated that 44% (95% confidence interval, 25–69%) of secondary cases were infected during the index cases’ presymptomatic stage, in settings with substantial household clustering, active case finding and quarantine outside the home. Disease control measures should be adjusted to account for probable *substantial presymptomatic transmission*.”

Meaning? Three rather scary words: substantial pre-symptomatic transmission. We spread the coronavirus even before we feel symptoms.

This is why social distancing will need to be enforced for quite some time, until tests are widely available and can provide results within hours. If you have no symptoms, then anybody can be a carrier and spreader. Anybody.

Finally, we are learning about this insidious enemy – is anyone expressing some gratitude to the Chinese for sharing?

Well, a small gesture – here are the names of the researchers who co-authored this paper: Xi He, Eric H. Y. Lau, Peng Wu, Xilong Deng, Jian Wang, Xinxin Hao, Yiu Chung Lau, Jessica Y. Wong, Yujuan Guan, Xinghua Tan, Xiaoneng Mo, Yanqing Chen, Baolin Liao, Weilie Chen, Fengyu Hu, Qing Zhang, Mingqiu Zhong, Yanrong Wu, Lingzhai Zhao, Fuchun Zhang, Benjamin J. Cowling, Fang Li & Gabriel M. Leung

Hydroxychloroquine: Some Answers

What is the truth about hydroxychloroquine, the drug that is alleged to be helpful in treating coronavirus? This piece from the New York Times may be helpful.

What is hydroxychloroquine?

Hydroxychloroquine is a prescription medicine that was approved decades ago to treat malaria. It is also used to treat autoimmune diseases like rheumatoid arthritis and lupus. It is sometimes referred to by its brand name, Plaquenil, and is closely related to chloroquine, which is also used to treat malaria.

Why has hydroxychloroquine even been considered as a possible treatment for the coronavirus?

There are several reasons. A promising laboratory study, with cultured cells, found that chloroquine could block the coronavirus from invading cells, which it must do to replicate and cause illness. However, drugs that conquer viruses in test tubes or petri dishes do not always work in the human body, and studies of hydroxychloroquine have found that it failed to prevent or treat influenza and other viral illnesses.

Reports from doctors in China and France have said that hydroxychloroquine, sometimes combined with the antibiotic azithromycin, seemed to help patients. But those studies were small and did not use proper control groups — patients carefully selected to match those in the experimental group but who are not given the drug being tested. Research involving few patients and no controls cannot determine whether a drug works. And the French study has since been discredited: The scientific group that oversees the journal where it was published said the study did not meet its standards.

A recent study from China did include a control group, and suggested that hydroxychloroquine might help patients with mild cases of Covid-19, the disease caused by the coronavirus. But that study had limitations: It was also small, with a total of only 62 patients, and they were given various other drugs as well as hydroxychloroquine. The doctors evaluating the results knew which patients were being treated, and that information could have influenced their judgment. Even if the findings hold up, they will apply only to people who are mildly ill. And the researchers themselves said more studies were needed.

Can hydroxychloroquine protect you from catching the virus?

There is no evidence that hydroxychloroquine can prevent coronavirus infection. However, researchers at the University of Minnesota are testing the drug in people who live with coronavirus patients to see whether it can protect them

Is hydroxychloroquine approved by the Food and Drug Administration?

Yes, but for malaria, lupus and rheumatoid arthritis, not for Covid-19. For decades, doctors have been legally allowed to prescribe it for any condition they think it might help, a practice called off-label use. However, because of hoarding and high demand for hydroxychloroquine, some states like New York have ordered pharmacists to fill prescriptions only for F.D.A.-approved uses of the drug or for people participating in clinical trials.

Is hydroxychloroquine being given to coronavirus patients now?

Yes. Many hospitals are giving it to patients because there is no proven treatment, and they hope it will help. Clinical trials with control groups have begun across the world. A nationwide trial began on April 2 in the United States; it is to enroll 510 patients at 44 medical centers. Researchers say those studies are essential to find out whether the drug works against the coronavirus. If it does not, time and money can be redirected to other potential treatments.

Is there any danger in taking hydroxychloroquine?

Like every drug, it can have side effects. It is not safe for people who have abnormalities in their heart rhythms, eye problems involving the retina, or liver or kidney disease. Other possible side effects include nausea, diarrhea, mood changes and skin rashes.

The leaders of three professional societies in cardiology warned on April 8 in the journal *Circulation* that hydroxychloroquine and azithromycin can each cause dangerous disruptions in heart rhythm, and they wrote, "There are very limited data evaluating the safety of combination therapy."

If I can get hydroxychloroquine, should I take it to prevent coronavirus infection?

No, especially not without consulting a doctor who knows your medical history and what other medications you are taking. There is no proof that it works. And if it is being sold on the street or via the internet, it may be fake or unsafe.

An Arizona man in his 60s died last month after swallowing an aquarium cleaning product that had chloroquine on its label. He and his wife, who also became critically ill, had thought the product would protect them from the virus.

At this point, the best way to avoid infection is to practice the social-distancing and quarantine measures recommended by public health authorities. The Centers for Disease Control and Prevention also recommends that people wear cloth masks in public and wash their hands regularly.

What Do We NOT Know?!

After more than four months of nonstop news/debate/discussion around COVID-19, it is astonishing how much we do not know. And as the saying goes, what you don't know that you don't know -- is the worst; it can literally kill you.

So here is my attempt to list, what it is we don't know, that we NEED to know, about this tiny virulent enemy and hopefully, scientists are working on it.

- ▶ For those who get COVID-19 and recover, are they immune? For life? For a short time? How long does the immunity last?
- ▶ Like many viruses, can this novel coronavirus mutate quickly and attack those who contracted an older version? Are COVID-19 cases in the US characterized by the same genetically-identical virus as say in China, or different? If so, how different? And does it matter?
- ▶ Intubation: Are we in too much of a hurry to put people on intubation (ventilators)? If such a small percentage of those intubated, survive, should we rethink this? And how different are the various kinds of ventilators (those used by anesthetists, oxygen ventilators, standard ventilators, etc.)?
- ▶ Why are the death rates (those who die from COVID-19, as a % of those who are seriously ill, or in general % of those who contract the virus) different, radically, between one country and another? How much of this is due to ICU expertise?
- ▶ How exactly does COVID-19 spread? As aerosol (tiny droplets that hang in the air for hours?) As big droplets (that fall to the ground fairly quickly)?
- ▶ Are there drugs proven to be effective against COVID-19? What about the recently-approved anti-influenza drugs? Xofluza, Tamiflu, Relenza, Rapivab ? And, of course, hydroxychloroquine? (which seems to have severe heart side-effects among some patients).
- ▶ Why are African-Americans more afflicted than Caucasians? Men more than women?
- ▶ Will there be a second wave? And a third? How will we know in time?
- ▶ How soon will we have a proven vaccine, and how quickly can doses be produced, to inoculate billions of people? How much will it cost? Can it be provided for free? How can the many companies working on a vaccine, in many countries, work together, to save time and save lives?
- ▶ What countries have managed the COVID-19 crisis best, and what can be learned from them? There have been many variations on lockdown, ranging from easy (Sweden) to draconian (China, Singapore). Which works best?
- ▶ Somewhere, as we speak, a new virus is brewing and mutating somewhere; this is not the last pandemic. Can we organize a world-spanning organization (broader in span than WHO, with far more resources) that will be ready to tackle the next pandemic quickly and efficiently? With massive resources?

I'm certain there are a thousand more things we do not know. Add your own questions... for each question above, there are multiple answers online, and many of them are fake or conspiratorial. This simply adds to the fog.

COVID-19: Calibrate Your Risk Perception

How risky is COVID-19 to me, personally? How do I process the news, numbers, fake news, and hysteria, to evaluate the seriousness of the threat to me, personally?

Behavioral economics knows a lot about risk perception. Many years ago, Kahneman and Tversky showed, with simple this-or-that choice experiments, that we humans overwhelmingly overestimate small probabilities.

This seems to be the case with COVID-19. Writing in the New York Times, medical doctor and psychiatrist Richard Friedman observes:

Throughout the country, people are stockpiling food in anticipation of a shortage or a quarantine. Supplies of Purell hand sanitizer flew off the shelves in local pharmacies and are now hard to find or even unavailable online. I understand the impulse to secure one's safety in the face of a threat. But the fact is that if I increase the supply of medication for my patients, I could well deprive other patients of needed medication, so I reluctantly declined those requests. As a psychiatrist, I frequently tell my patients that their anxieties and fears are out of proportion to reality, something that is often true and comforting for them to realize. But when the object of fear is a looming pandemic, all bets are off.

Friedman continues:

In this case, there is reason for alarm. The coronavirus is an uncertain and unpredictable danger. This really grabs our attention, because we have been hard-wired by evolution to respond aggressively to new threats. After all, it's safer to overact to the unknown than to do too little. Unfortunately, that means we tend to overestimate the risk of novel dangers. I can cite you statistics until I am blue in the face demonstrating that your risk of dying from the coronavirus is minuscule compared with your risk of dying from everyday threats, but I doubt you'll be reassured. *For example, 169,000 Americans died by accident and 648,000 died of heart disease in 2017, according to the Centers for Disease Control and Prevention. As of Sunday morning 19 Americans had died from the coronavirus.*

OK – so what SHOULD we be doing, then, in the face of panic that the objective risk does not justify?

Find ways to help and reassure others, notes the wise Dr. Friedman.

The good news is that even in the face of fear, we do have the capacity to act in ways that would help limit contagion during an epidemic. Specifically, we can behave altruistically, which benefits everyone. For example, research shows that when people are told that it is possible — but not certain — that going to work while sick would infect a co-worker, people are less willing to stay home than when they are reminded of the certainty that going to work sick would expose vulnerable co-workers to a serious chance of illness. Stressing the certainty of risk, in other words, more effectively motivates altruism than stressing the possibility of harm. *The lesson for the real world is that health officials should be explicit in telling the public that selfish responses to an epidemic, such as going to work while sick or failing to wash your hands, threaten the health of the community.*

And what should our great leaders do?

Specifically, public figures need to convey loudly and clearly that we should not go to work or travel when we're sick and that we should not hoard food and medical supplies beyond our current need — not just give us health statistics or advise about how to wash our hands.

Let us all try to recalibrate our risk perceptions. COVID-19 will spread, it will afflict a lot of people, it IS NOT possible to put it back in Pandora's box. But there are a lot of other scary things going on in this world that threaten each of us. Because we have known them for a long time (ordinary flu, traffic deaths, etc.), we are habituated. COVID-19 is new, scary and rather unknown. We will in time come to know it. We will overcome it. And in the meantime, help and reassure your family and your friends. Take it from Dr. Friedman.

Roubini's Black Swan, Coronavirus Variety

Nuriel Roubini is famous for his book on Black Swans – totally unexpected events, whose possibility is denied (as people denied there were such things as black swans) and which occur with massive impact on our lives. COVID-19 is definitely the blackest of black swans....

Roubini is massively pessimistic While I myself am far more optimistic – I see the 'apex' of the plague coming fairly soon, and then as the curve declines, optimism, stock prices and businesses recover and bounce back and spend to 'catch up' -- I feel I should bring you readers the other side of the moon, the dark side, the black (swan) side. So, here is Roubini's 'take'. Everybody should figure out their own personal scenario... [Warning, this blog is twice as long as usual]

NEW YORK – The shock to the global economy from COVID-19 has been both faster and more severe than the 2008 global financial crisis (GFC) and even the Great Depression. In those two previous episodes, stock markets collapsed by 50% or more, credit markets froze up, massive bankruptcies followed, unemployment rates soared above 10%, and GDP contracted at an annualized rate of 10% or more. But all of this took around three years to play out. In the current crisis, similarly dire macroeconomic and financial outcomes have materialized in three weeks.

Earlier this month, it took just 15 days for the US stock market to plummet into bear territory (a 20% decline from its peak) – the fastest such decline ever. Now, markets are down 35%, credit markets have seized up, and credit spreads (like those for junk bonds) have spiked to 2008 levels. Even mainstream financial firms such as Goldman Sachs, JP Morgan and Morgan Stanley expect US GDP to fall by an annualized rate of 6% in the first quarter, and by 24% to 30% in the second. US Treasury Secretary Steve Mnuchin has warned that the unemployment rate could skyrocket to above 20% (twice the peak level during the GFC).

In other words, every component of aggregate demand – consumption, capital spending, exports – is in unprecedented free fall. While most self-serving commentators have been anticipating a V-shaped downturn – with output falling sharply for one quarter and then rapidly recovering the next – it should now be clear that the COVID-19 crisis is something else entirely. The contraction that is now

underway looks to be neither V- nor U- nor L-shaped (a sharp downturn followed by stagnation). Rather, it looks like an I: a vertical line representing financial markets and the real economy plummeting.

Not even during the Great Depression and World War II did the bulk of economic activity literally shut down, as it has in China, the United States, and Europe today. The best-case scenario would be a downturn that is more severe than the GFC (in terms of reduced cumulative global output) but shorter-lived, allowing for a return to positive growth by the fourth quarter of this year. In that case, markets would start to recover when the light at the end of the tunnel appears.

But the best-case scenario assumes several conditions. First, the US, Europe, and other heavily affected economies would need to roll out widespread COVID-19 testing, tracing, and treatment measures, enforced quarantines, and a full-scale lockdown of the type that China has implemented. And, because it could take 18 months for a vaccine to be developed and produced at scale, antivirals and other therapeutics will need to be deployed on a massive scale.

Second, monetary policymakers – who have already done in less than a month what took them three years to do after the GFC – must continue to throw the kitchen sink of unconventional measures at the crisis. That means zero or negative interest rates; enhanced forward guidance; quantitative easing; and credit easing (the purchase of private assets) to backstop banks, non-banks, money market funds, and even large corporations (commercial paper and corporate bond facilities). The US Federal Reserve has expanded its cross-border swap lines to address the massive dollar liquidity shortage in global markets, but we now need more facilities to encourage banks to lend to illiquid but still-solvent small and medium-size enterprises.

Third, governments need to deploy massive fiscal stimulus, including through “helicopter drops” of direct cash disbursements to households. Given the size of the economic shock, fiscal deficits in advanced economies will need to increase from 2-3% of GDP to around 10% or more. Only central governments have balance sheets large and strong enough to prevent the private sector’s collapse.

But these deficit-financed interventions must be fully monetized. If they are financed through standard government debt, interest rates would rise sharply, and the recovery would be smothered in its cradle. Given the circumstances, interventions long proposed by leftists of the Modern Monetary Theory school, including helicopter drops, have become mainstream.²

Unfortunately for the best-case scenario, the public-health response in advanced economies has fallen far short of what is needed to contain the pandemic, and the fiscal-policy package currently being debated is neither large nor rapid enough to create the conditions for a timely recovery. As such, the risk of a new Great Depression, worse than the original – a Greater Depression – is rising by the day.

Unless the pandemic is stopped, economies and markets around the world will continue their free fall. But even if the pandemic is more or less contained, overall growth still might not return by the end of 2020. After all, by then, another virus season is very likely to start with new mutations; therapeutic interventions that many are

counting on may turn out to be less effective than hoped. So, economies will contract again and markets will crash again.

Moreover, the fiscal response could hit a wall if the monetization of massive deficits starts to produce high inflation, especially if a series of virus-related negative supply shocks reduces potential growth. And many countries simply cannot undertake such borrowing in their own currency. Who will bail out governments, corporations, banks, and households in emerging markets?

In any case, even if the pandemic and the economic fallout were brought under control, the global economy could still be subject to a number of “white swan” tail risks. With the US presidential election approaching, the COVID-19 crisis will give way to renewed conflicts between the West and at least four revisionist powers: China, Russia, Iran, and North Korea, all of which are already using asymmetric cyberwarfare to undermine the US from within. The inevitable cyber attacks on the US election process may lead to a contested final result, with charges of “rigging” and the possibility of outright violence and civil disorder.¹

Similarly, as I have argued previously, markets are vastly underestimating the risk of a war between the US and Iran this year; the deterioration of Sino-American relations is accelerating as each side blames the other for the scale of the COVID-19 pandemic. The current crisis is likely to accelerate the ongoing balkanization and unraveling of the global economy in the months and years ahead.²

This trifecta of risks – uncontained pandemics, insufficient economic-policy arsenals, and geopolitical white swans – will be enough to tip the global economy into persistent depression and a runaway financial-market meltdown. After the 2008 crash, a forceful (though delayed) response pulled the global economy back from the abyss. We may not be so lucky this time.

Does the Novel Coronavirus Mutate?

Writing in today’s New York Times, Nathaniel Lash and Tala Schlossberg try to answer the key question, does the novel coronavirus mutate? If so, how and when?

Here is why it is important for us to know this. The pandemic crisis will end only when we have a vaccine, produced in billions of doses. The vaccine will work by stimulating the body to produce antibodies that neutralize the virus by binding to it in a very specific way. If the virus can mutate to defeat the vaccine, then the vaccine will not stop working. The key is the “spike protein” – the protein the virus makes that penetrates the cell walls and lets the virus invade (and kill) it. Those are the spikes you see in the graphic illustrations of corona. Vaccines can defeat the spike.

Here is what the authors of the article have found:

“Among the thousands of samples of the long strand of RNA that makes up the coronavirus, 11 mutations have become fairly common. But *as far as we know, it’s the same virus infecting people all over the world*, meaning that only one “strain” of the virus exists, said Peter Thielen, a molecular biologist with the Johns Hopkins Applied Physics Laboratory. Only one of those common mutations affects the “spike protein,” which enables the virus to infect cells in the throat and lungs. Efforts to produce

antibodies that block the spike protein are central to many efforts to develop a vaccine. *Since the spike protein has changed little so far, some scientists believe that's a sign that it can't alter itself very much and remain infectious.*"

So – we have a small piece of good news. The measles vaccine, for instance, was developed in 1950. And it is still effective. Measles hasn't mutated in a manner that neutralizes the vaccine. Evolution is powerful – but apparently it cannot surmount EVERY obstacle. So hopefully the same will apply to the COVID-19 vaccine – and we will bid this insidious deadly enemy good-bye, with an effective vaccine... until the next one.

Chapter Three. Bringing Out the Best In Us

Love in the Time of COVID-19

Love in the Time of Cholera (in Spanish: *El amor en los tiempos del cólera*) is a novel by the Colombian Nobel prize winning author Gabriel García Márquez. First published in 1985, an English-language movie adaptation was released in 2007.

In the novel, a young national hero, Dr. Juvenal Urbino, meets Fermina and begins to court her. Despite her initial dislike of Urbino, Fermina gives in to her father's persuasion and they marry. Urbino is a physician devoted to science, modernity, and "order and progress". He is committed to the eradication of cholera and to the promotion of public works. He is a rational man whose life is organized precisely and who greatly values his importance and reputation in society. He is a herald of progress and modernization and the love of others.

It's a good time, as many of us hang out at home, to reread this novel. Because, there is a great deal of love in the time of COVID-19.

Utah Jazz star Rudy Gobert, who has COVID-19, joked on-line about it, thrust microphones at journalists, purposely touched surfaces – the kind of bravado that athletes often show in the time of danger and fear. The public reaction was fiercely negative. Gobert has apologized and donated \$500,000 to COVID-19 victims.

Christiano Ronaldo, perhaps the world's greatest football player, is at home, in Portugal (Madeira), in his incredible pad – but announced that he is converting the hotel chain he owns into hospitals, at his personal expense.

But these two are celebs. What about ordinary people?

I am very fond of Boston, MA., having taught 20 summers there, at MIT. "Boston strong" was the city's reaction to the terrible bombing at the Boston Marathon.

Now, Boston radio station WBZ reports on these acts of kindness, by ordinary people:

* Norfolk/Worcester County restaurants feed kids for free It started with Goodstuff Smokehouse in Blackstone, MA announcing "any student that comes in during weekday lunchtime (parents or not) will be given a free kids meal to go. No questions asked. We will continue to do this until area schools are back to normal. "That generous idea has since caught on among several other local eateries, including PJ's Smoke 'N' Grill in Medway, and 140 Pub N Club in Bellingham.

Many kids in the US are fed in schools...some, breakfast lunch and dinner. Closing the schools can bring hunger to these kids. Time for others to step up, including restaurants, that are empty anyway.

* The Greater Somerville Homeless Coalition is raising money to help some of the people who are at the highest risk for catching coronavirus; Boston's homeless population. Since the outbreak of coronavirus forced them to cancel their Gala, the Somerville Coalition has taken their fundraiser online. As of Saturday afternoon the Coalition is more than \$13,000 towards its \$70,000 goal. To help support Boston's homeless population during the COVID-19 outbreak, [click here](#).

* A group called Violence In Boston Inc. is providing free meals for BPS kids, and is accepting donations to help low income families around Boston impacted by the coronavirus pandemic. Starting Sunday March 15 until Friday March 20, volunteers will be collecting supplies like soap, toilet paper, and hand sanitizer to donate to Boston's families in need. They will be serving lunch and dinner for any BPS child in need of a meal.

* Thanks to the Charles River Mutual Aid Program, activists from various universities are mobilizing to provide mutual aid to students and other Boston-area residents who are in need of resources amid the COVID-19 outbreak. For students who have been kicked off their campuses, the organization will try to provide housing and storage space, although it is limited. They will be pooling funds in a Mutual Aid Fund to purchase food, medical supplies, and other necessities, and organizing to provide these resources to the community. When universities decreed hasty closing, and emptied the dorms, they have not given thought to students who have nowhere else to live.

* The Boston Music Maker Relief Fund has been set up by The Record Co. to help Boston-based musicians whose work has been impacted by the coronavirus outbreak. The organization will pay out \$200 relief grants on a first come first serve basis.

* A Harvard Med Group Is Caring For The Senior Population. A group from Harvard Medical School says it is "making itself a hub for local efforts to care for the aged, isolated & needy during coronavirus."

* The so-called Neighborhood Aid Network is helping people in need from Cambridge to Jamaica Plain by helping pick up groceries, giving rides to doctors appointments, and simply letting people know they are not alone.

There is a terrible paradox in how we must react to COVID-19: Social and individual resilience is driven by our network of love and support, among family friends and even strangers. Yet we are asked to maintain 'social separation' – the exact opposite. We will find ways to navigate this dilemma and come through it. Meanwhile, love in the time of COVID-19 will triumph over fear, panic and shelf-emptying hoarding.

Small Acts of Kindness...Are Really Big!

This morning, I rose early and went to shop for food at our local small grocery store. As first in line, I got to shop quickly -- Y., the shopkeeper, was strict in limiting contact between shoppers and only let one or two of us in, at a time.

When I exited, loaded the groceries in the car and returned the shopping cart, a truck driver spotted me; he was delivering sanitary supplies. He cautioned me gently to use gel on my hands because the cart handle could have been infected. I think he noticed my grey hair and was concerned. I did as he said, and then – he gave me a pair of rubber gloves from his truck, and some highly prized alco-gel. I wished him well, he did the same...

This small incident touched me deeply. This truck driver is in the front line – he sees many people daily, some may be infected.... And yet, he is concerned for my wellbeing, and he doesn't even know me. Same for Y. the shopkeeper. He too is in the front line.

He makes sure we are all well stocked with groceries, including fresh fruits and vegetables, which Israel has aplenty.

These tiny acts of kindness, perhaps not so tiny, are happening all over the world. They embody a Hebrew saying, “All Israel is bonded one to another”... and I interpret that to mean, all humanity. We are NOT socially isolated, we are spatially separated and socially bonded. Tiny acts of kindness prove it.

Thanks, truck driver. And yes, I will indeed pass it forward – and so will we all.

On Dealing With Isolation: From an Astronaut

Many of us are currently in one form or another of isolation. How to deal with it? Astronaut Scott Kelly spent a year on the International Space Station – a pretty lonely place, away from his family and friends, and loved ones. How did he manage it? Here are a few of his tips, from The New York Times:

When I lived on the International Space Station for nearly a year, it wasn't easy. When I went to sleep, I was at work. When I woke up, I was still at work. Flying in space is probably the only job you absolutely cannot quit. But I learned some things during my time up there that I'd like to share — because they are about to come in handy again, as we all confine ourselves at home to help stop the spread of the coronavirus. Here are a few tips on living in isolation, from someone who has been there.

Follow a schedule: *On the space station, my time was scheduled tightly, from the moment I woke up to when I went to sleep. Sometimes this involved a spacewalk that could last up to eight hours; other times, it involved a five-minute task, like checking on the experimental flowers I was growing in space. You will find maintaining a plan will help you and your family adjust to a different work and home life environment. When I returned to Earth, I missed the structure it provided and found it hard to live without.*

But pace yourself *When you are living and working in the same place for days on end, work can have a way of taking over everything if you let it. Living in space, I deliberately paced myself because I knew I was in it for the long haul — just like we all are today. Take time for fun activities: I met up with crewmates for movie nights, complete with snacks, and binge-watched all of “Game of Thrones” — twice. And don't forget to include in your schedule a consistent bedtime. NASA scientists closely study astronauts' sleep when we are in space, and they have found that quality of sleep relates to cognition, mood, and interpersonal relations — all essential to getting through a mission in space or a quarantine at home.*

Go outside *One of the things I missed most while living in space was being able to go outside and experience nature. After being confined to a small space for months, I actually started to crave nature — the color green, the smell of fresh dirt, and the feel of warm sun on my face. That flower experiment became more important to me than I could have ever imagined. My colleagues liked to play a recording of Earth sounds, like birds and rustling trees, and even mosquitoes, over and over. It brought me back to earth. (Although occasionally I found myself swatting my ears at the mosquitoes.) For an astronaut, going outside is a dangerous undertaking that requires days of preparation, so I appreciate that in our current predicament, I can step outside any time I want for a walk or a hike — no spacesuit needed. Research has shown that spending*

time in nature is beneficial for our mental and physical health, as is exercise. You don't need to work out two and a half hours a day, as astronauts on the space station do, but getting moving once a day should be part of your quarantine schedule (just stay at least six feet away from others).

You need a hobby When you are confined in a small space you need an outlet that isn't work or maintaining your environment. Some people are surprised to learn I brought books with me to space. The quiet and absorption you can find in a physical book — one that doesn't ping you with notifications or tempt you to open a new tab — is priceless. Many small bookstores are currently offering curbside pickup or home delivery service, which means you can support a local business while also cultivating some much-needed unplugged time. You can also practice an instrument (I just bought a digital guitar trainer online), try a craft, or make some art. Astronauts take time for all of these while in space. (Remember Canadian astronaut Chris Hadfield's famous cover of David Bowie's Space Oddity?)

Keep a journal: NASA has been studying the effects of isolation on humans for decades, and one surprising finding they have made is the value of keeping a journal. Throughout my yearlong mission, I took the time to write about my experiences almost every day. If you find yourself just chronicling the days' events (which, under the circumstances, might get repetitive) instead try describing what you are experiencing through your five senses or write about memories. Even if you don't wind up writing a book based on your journal like I did, writing about your days will help put your experiences in perspective and let you look back later on what this unique time in history has meant.

Take time to connect: Even with all the responsibilities of serving as commander of a space station, I never missed the chance to have a videoconference with family and friends. Scientists have found that isolation is damaging not only to our mental health, but to our physical health as well, especially our immune systems. Technology makes it easier than ever to keep in touch, so it's worth making time to connect with someone every day — it might actually help you fight off viruses.

Listen to experts: I've found that most problems aren't rocket science, but when they are rocket science, you should ask a rocket scientist. Living in space taught me a lot about the importance of trusting the advice of people who knew more than I did about their subjects, whether it was science, engineering, medicine, or the design of the incredibly complex space station that was keeping me alive. Especially in a challenging moment like the one we are living through now, we have to seek out knowledge from those who know the most about it and listen to them. Social media and other poorly vetted sources can be transmitters of misinformation just as handshakes transmit viruses, so we have to make a point of seeking out reputable sources of facts, like the World Health Organization and the Johns Hopkins Coronavirus Resource Center.

We are all connected: Seen from space, the Earth has no borders. The spread of the coronavirus is showing us that what we share is much more powerful than what keeps us apart, for better or for worse. All people are inescapably interconnected, and the more we can come together to solve our problems, the better off we will all be. One of the side effects of seeing Earth from the perspective of space, at least for me, is feeling more compassion for others. As helpless as we may feel stuck inside our homes, there

are always things we can do — I've seen people reading to children via videoconference, donating their time and dollars to charities online, and running errands for elderly or immuno-compromised neighbors. The benefits for the volunteer are just as great as for those helped. I've seen humans work together to prevail over some of the toughest challenges imaginable, and I know we can prevail over this one if we all do our part and work together as a team.

Meet Andrea Ray: Heroine

In our pandemic crisis, there are a huge number of unsung everyday heroes. Truck drivers who continue to drive the long hauls, delivery people, supermarket workers, police, Israel's Home Front soldiers....

And, in particular, Andrea Ray, featured on Channel 12 this evening. Andrea was born in Venezuela and made Aliyah to Israel when she was 16. She studied hotel management and had a senior job in the Dan Hotels system.

Israel has taken over some of the Dan Hotels in Tel Aviv, and brought those who have tested positive for COVID-19, especially those flown home from abroad. The area housing these patients is of course strictly quarantined, and the hotel is run jointly by the Home Front soldiers and Dan management.

Why is Andrea a hero? Who will care for the corona patients? Seriously? Spend many hours of the day mingling with those ill with the deadly virus?

You cannot tell someone to do this. You can only ask for volunteers.

And Andrea volunteered. This is what she does, every day, for hours and hours – cares for the needs of the patients, cheers them up, laughs with them, and brings them joy with her smile.

What if she falls ill? Well, I'll get the virus and then I'll get better, she says.

So, you've met Andrea Ray, heroine. Do you know other such heroes and heroines?

Find Meaning in Plague

New York Times Op-Ed columnist David Brooks reminds us, today, that there is "moral meaning to plague". He quotes Victor Frankl, whose book *Man's Search for Meaning* has influenced millions; in it Frankl describes how he survived the Holocaust death camps. He found meaning.

How can each of us find meaning, in this plague epidemic?

"Frankl saw three possible sources for meaning: in work (doing something significant), in love (caring for another person) and in courage during difficult times. Suffering in and of itself is meaningless; we give our suffering meaning by the way in which we respond to it."

Work. Love. Courage. Pretty straightforward.

Work – we do what we normally do, only at home and online. Amazing how adaptable many people are, in their work. Special kudos to moms (and dads), who also care for young children.

Love. Care for others. Let's follow a formula I find useful, that I have borrowed: When you wake, ask 2 questions: What shall I do for myself today? (If you are not happy, strong, healthy, fit, effective, it's hard to help others). What shall I do for others today? And, when you fall asleep, ask, What did I do for myself today? And – what did I do for others today?

Courage. This may involve facing danger, opposition, humiliation. What is going wrong, that you can see, understand, and try to fix, or at least bring attention to it?

There IS meaning in this epidemic. I see it everywhere, everyone, every day. Let's all work hard to find it and leverage it.

The Big Winners: Dogs

There is one big winner in the COVID-19 “shelter at home”: Our dogs. Like Pixie, our mixed-breed part-Yorkshire. We're always at home, so any time is play time, and she brings us her rope and her weasel, to throw and play fetch. Then it's walk time – it's legal under partial ‘shelter at home’ to walk dogs, so she gets many daily walks, and we benefit from the fresh air.

When it's TV time, she curls up on our laps, and as an equal opportunity dog, divides her presence between myself and my wife. She does her little circle – legacy of her wolf origins, who circle before lying down to sleep – and tucks in at our feet, her right ear straight in the air, alert and listening even when she sleeps. All this, in 4 kilograms (8.8 pounds).

Dog cognition expert Alexandra Horowitz, Barnard College, writing in today's New York Times, observes, “[Dogs'] simple presence, and their willingness to be touched, is viscerally satisfying. Time spent reading on the couch is massively improved by a dog's head resting on my leg, a warm snuffling muzzle directed at me is instantly calming. ...there are some 90 million dogs in the US and in some ways we have treated dogs as quasi-people all along. “.

Horowitz notes that normally dogs experience social isolation, as the owners are at work. They stay alone for most of their days. Now that WE are in ‘social isolation’, we are giving dogs ‘more of what they deserved all along – our companionship’.

One of the benefits of COVID-19 is a major rise in dog adoption. “...shelters that recently put out calls seeking foster care for homeless animals reported being inundated with applicants...”.

Concludes Horowitz: “I hope we will maintain some of our current abnormal condition, giving our dogs the companionship they need. I hope we will come out of this with a fuller appreciation of the privilege that it is to keep the company of animals.”

Pixie: Thanks! We love and need you.

Corona Commandos to the Rescue

No question, the heroes of the pandemic are the doctors nurses and healthcare workers. But there are other heroes... rather unusual ones, here in Israel.

Raviv Drucker, writing in the daily Haaretz, notes the key role played by Israel's elite special forces (commando) unit, known as "Mat'kal" or simply, in slang, "THE unit", and Israel's intelligence unit known as The Mosad.

Mosad managed to obtain 10 million surgical masks, ventilators, and 500,000 coronavirus tests – rumor has it, from Saudi Arabia!

And the Corona Commandos? They were given the mission of tracking down chemical reagents, used in the key coronavirus tests, in very short supply. And they succeeded, I believe, by finding a way to quickly produce the reagent, or a close substitute for it, close enough to be suitable. A second mission? Find those known to have COVID-19 who have gone missing... and in this too they are succeeding, with technology and persistence.

The city in greater Tel Aviv known as Bnei Brak houses 200,000 persons, mostly Ultra-Orthodox. It took a long time to get the message across there, not to congregate in synagogues and yeshivas (halls of Torah study). As a result many Bnei Brak residents have become infected. It has thus been necessary to send Border Police into the area, to ensure lockdown, and at the same time, a brigade of paratroopers, with their red berets, have been distributing door-to-door food parcels, for Passover, to families that generally have many children.

These are unusual roles for soldiers and officers. But the Army is uniquely equipped, in organization, planning, discipline and dedication, to carry out Corona Commando missions. Perhaps other countries, too, can learn from this. In general Israelis accept the presence, and orders from, the army, and cooperate. There is a huge gap between the immense technical capabilities of the Israel Defense Forces and the rather backward Ministry of Health. In these times, we can use nothing less than the very best.

Thanks, Custodian & Sanitation Workers!

If you click on your Google logo today, say when you do a Google search, you'll see the above graphic – and the (hidden) words, thanks, custodian and sanitation workers!

Well done Google.

Our daughter is a family physician who runs a large clinic in the south of Israel. Her protocol is to have those who feel ill, to call and a time is set up. The patient enters by a separate door, into a 'clean room'... which is disinfected after the visit. Our daughter explains: The heroes are the cleaning personnel. They do the hard, dirty dangerous work. She made sure, in her clinic, to assemble them all, and recognize their dedication and heroism, on several occasions.

So good for you Google. I hope lots of people do read the hidden text behind the graphic, on Google's logo....

Chapter Four. Enlisting Technology: Creativity vs. Corona

COVID-19: AI to the rescue?

Today's daily Haaretz * carries a brief report of how three brilliant Israeli scientists have tackled a pressing problem – the need to know where the COVID-19 hotspots are, in order to focus spatial separation without shutting down the economy of the entire country.

The three are Prof. Eran Segal, an expert in computational and systems biology, Weizmann Institute, Rehovot; Prof. Benny Geiger, also from Weizmann; and Prof. Yuval Dor, Hebrew University.

Segal notes that experience from studying previous epidemics, as well as knowledge about how COVID-19 spreads, show that the virus spreads through *clusters of infection and that early identification of such clusters can help stop the virus from spreading, or at least slow it considerably.*

We have seen such clusters, or hot spots, in New Rochelle, NY, in Washington State (Seattle), and initially, in Wuhan, China.

Segal notes that one possibility is to use massive testing, as they did in South Korea. More than 10,000 persons are tested daily there for COVID-19.

Israel can't do such extensive testing, at this stage, he notes. Hence, the solution the team found was to ask members of the public to fill out online daily questionnaires, which take less than two minutes to complete, that include details about various symptoms and place of residence, including street and zip code.

This information will be analyzed, Segal notes, using machine learning algorithms that give researchers and the Health Ministry a variety of information. If enough data are collected, the tool will help give up-to-date assessment of the spread of the illness.

This 'early warning' system can help spot these clusters, long before other methods do. The AI algorithms could also determine the effectiveness of public health measures, such as self quarantine, to limit COVID-19's spread.

The information, noted Segal, is collected using Google DOCS. No privacy is violated.

Segal says we need as many people as possible to fill out the questionnaire, in the initial pilot stage.

I wonder whether Israel can offer this approach to the US, where testing remains quite limited.

* Haaretz. "Israeli Researchers Hope AI Can Tame COVID-19, and They Want Our Help." Asaf Ronel. March 17 2020.

Creativity Is the Answer: Oxford's New Ventilator!

In times of crisis, like the ones we are living today, resources and time are scarce – but creativity is plentiful. For example: Creative British doctors and scientists who have designed a primitive, simple, easy-to-produce ventilator, which SONY may mass produce. NY Governor Andrew Cuomo said today that his state has 10,000 ventilators, but it needs 30,000, as the coronavirus is spreading rapidly in his state – and the US Federal Govt. (FEMA) has sent...400 of them, even though there are 20,000 of them in an emergency US stockpile.

[A ventilator is a device that pumps air into the lungs of coronavirus victims, who struggle to breathe].

Here is the story.

Interviewer: “In just one week, a team at Oxford University and King’s College London have built a simple ventilator that could potentially save thousands of lives as part of the UK and the world’s fight against coronavirus. The OxVent is a rapid prototype ventilator that could keep people breathing while they battle the worst impacts of COVID-19. Andrew Farmery of the University of Oxford, one of the people involved in its development, talks about its past, present, and potential. ... How are you?

Prof. Andrew Farmery: ” I’m very well, although slightly knackered. It’s been a very long week. It’s been absolutely incredible, from nothing a week ago when we first had an idle chat Monday morning last week, to this afternoon, when we pitched it to the Cabinet and the MHRA (Medicines and Healthcare Products Regulatory Agency). We’re waiting to hear whether they think it’s a goer or not.”

“It’s laughably simple in some ways. It’s a compressible bag, a bit like a child’s rugby ball. It’s a compressible squeezy bag – the sort you use to resuscitate patients who have collapsed from cardiac arrest. Ambulances carry them around. But we’ve trapped it inside a rigid Perspex box and we inject compressed air into the rigid Perspex box that squeezes this bladder and pushes air out through some valves which we already have, and inflates the patient’s chest. There’s a second set of valves that allows gas to come out of the patient’s chest and also out of the rigid Perspex box. So it’s a sort of electro-pneumatic device. The air is injected into the box through what’s called a solenoid valve, which is controlled electronically, and we can regulate the flow of air compression gas that goes into the box, the speed with which it goes in, how much time is allowed for inspiration and expiration. We can control the pressures generated in the patient’s airway. All the things you would want, and we’re just doing it with this simple feedback controller.”

Farmery continues: “As well as an academic, I’m also a consultant anaesthetist, so I deal with ventilating patients every week. That’s what I do. The design had come out of what the clinicians want. We were slightly worried at the start when Boris [Johnson, UK PM] announced Land Rover and JCB were going to be making ventilators. I was slightly alarmed that they knew sod-all about ventilators and nobody had really taken the opinions of people like me and doctors and anaesthetists around the country.”

“The electronics is based around a very simple circuit board called an Arduino – basically a tiny little circuit board used to teach kids about coding and electronics. It’s

basically a toy, but that's what the prototype is based on. We might even base the whole thing on that. It depends on whether we can knock PCBs out quickly enough. So the control engineers are still working on that, refining it. You've got to tell the solenoid valve what to do and then you've got to measure and monitor the pressures at various points with sensors to make sure that the solenoid is doing what you told it to do. That's classic control engineering and they love that sort of thing, and they're off on it already."

SONY is exploring the possibility of making 5,000 of the new ventilators weekly I hope the design can be shared with other countries, including my own, Israel.

A Vaccine is Coming – from Pittsburgh

Before the good news about a COVID-19 vaccine – a piece of history.

In 1947, native New Yorker Jonas Salk accepted an appointment to the University of Pittsburgh School of Medicine. In 1948, he undertook a project funded by the National Foundation for Infantile Paralysis to determine the number of different types of poliovirus. Salk saw this was a golden opportunity to extend this project towards developing a vaccine against polio. He built a research team and devoted himself to this work for the next seven years. The field trial set up to test the Salk vaccine involved 20,000 physicians and public health officers, 64,000 school personnel, and 220,000 volunteers. Over 1.8 million schoolchildren took part in the trial.

On March 26, 1953, Salk announced on a national radio show that he had successfully tested a vaccine against poliomyelitis, the virus that causes the crippling disease of polio. In 1952—an epidemic year for polio—there were 58,000 new cases reported in the United States, and more than 3,000 died from the disease. Dr. Salk was celebrated as the great doctor-benefactor of his time.

Fast forward. A press release from the NIH: <https://www.nih.gov/news-events/nih-research-matters/microneedle-coronavirus-vaccine-triggers-immune-response-mice>

"After the identification of SARS-CoV-2, the genome sequence of the new coronavirus was rapidly released to the public by scientists in China. Several weeks later, National Institute of Health-funded scientists produced a detailed picture of the part of the virus, called the spike protein, that allows it to infect human cells. This spike protein is currently the target of several vaccine development efforts. And we see the graphic version of the corona 'spikes' everywhere...

"Researchers led by Drs. Louis Falo, Jr. and Andrea Gambotto from the University of Pittsburgh have been working to develop vaccines for other coronaviruses, including the one that causes Middle East Respiratory System (MERS). They adapted the system they had been developing to produce a candidate MERS vaccine to rapidly produce an experimental vaccine using the SARS-CoV-2 spike protein.

The team developed a method for delivering their MERS vaccine into mice using a microneedle patch. Such patches resemble a piece of Velcro, with hundreds of tiny microneedles made of sugar. The needles prick just into the skin and quickly dissolve, releasing the vaccine. Since the immune system is highly active in the skin, delivering

vaccines this way may produce a more rapid and robust immune response than standard injections under the skin.

“When delivered by microneedle patch to mice, three different experimental MERS vaccines induced the production of antibodies against the virus. These responses were stronger than the responses generated by regular injection of one of the vaccines along with a powerful immune stimulant (an adjuvant). Antibody levels continued to increase over time in mice vaccinated by microneedle patch—up to 55 weeks, when the experiments ended.

“Using knowledge gained from development of the MERS vaccine, the team made a similar microneedle vaccine targeting the spike protein of SARS-CoV-2. The vaccine prompted robust antibody production in the mice within two weeks.

“The vaccinated animals haven’t been tracked for enough time to see if the long-term immune response is equivalent to that observed with the MERS vaccines. The mice have also not yet been challenged with SARS-CoV-2 infection. However, the findings are promising in light of results from the similar MERS vaccine.

“The components of the experimental vaccine could be made quickly and at large-scale, the researchers say. The final product also doesn’t require refrigeration, so it could be produced and placed in storage until needed. The team has now begun the process of obtaining approval from the U.S. Food and Drug Administration to launch a phase 1 trial within the next several months.

“Much work still needs to be done to explore the safety and efficacy of this candidate vaccine. “Testing in patients would typically require at least a year and probably longer,” Falo says. “This particular situation is different from anything we’ve ever seen, so we don’t know how long the clinical development process will take.”

OK – it works in mice. Now for humans. A vaccine is on the way – and it may emerge again from Univ. of Pittsburgh.

The Race to a COVID-19 Vaccine: Q&A

Where do we stand in the quest for a safe effective COVID-19 vaccine?

More than 2.2 million persons worldwide have contracted the virus and of those, 154,783 have died. That is a 6.8% death rate. But wait – there are far more cases worldwide than those we know about. Deaths are certain; cases are a guess. If we use a 1% to 1.5% death rate, we can guess that between 10 million and 15 million persons worldwide have contracted the illness. Only an effective vaccine will put a clear end to this crisis, in which COVID-19 is already the #1 cause of death in the US.

This Q&A is based on an informative survey published in a reputable website, [livescience.com](https://www.livescience.com), by staff writer By Nicoletta Lanese, two days ago:

* <https://www.livescience.com/coronavirus-covid-19-vaccine-timeline.html>

When will a vaccine be ready?

“Here’s why it probably can’t be developed any sooner than 12 to 18 months.

“More than 60 candidate vaccines are now in development, worldwide, and several have entered early clinical trials in human volunteers, according to the Some groups aim to provoke an immune response in vaccinated people by introducing a weakened or dead SARS-CoV-2 virus, or pieces of the virus, into their bodies. The vaccines for measles, influenza, hepatitis B and the vaccinia virus, which causes smallpox, use these approaches, according to the U.S. Department of Health & Human Services. Although tried-and-tested, using this approach to develop these conventional vaccines was labor-intensive, requiring scientists to isolate, culture and modify live viruses in the lab.

That initial process of just creating a vaccine can take 3 to 6 months, "if you have a good animal model to test your product," Raul Andino-Pavlovsky, a professor in the Department of Microbiology and Immunology at the University of California, San Francisco, told Live Science. “

Are there short cuts? How fast is the US working on a vaccine?

“The first COVID-19 vaccine to enter clinical trials in the United States, for example, uses a genetic molecule called mRNA as its base. Scientists generate the mRNA in the lab and, rather than directly injecting SARS-CoV-2 into patients, instead introduce this mRNA. By design, the vaccine should prompt human cells to build proteins found on the virus' surface and thus trigger a protective immune response against the coronavirus. Other groups aim to use related genetic material, including RNA and DNA, to build similar vaccines that would interfere with an earlier step in the protein construction process. *But there's one big hurdle for mRNA vaccines. We can't be sure they will work. As of yet, no vaccine built from a germs' genetic material has ever earned approval,* Bert Jacobs, a professor of virology at Arizona State University and member of the ASU Biodesign Institute's Center for Immunotherapy, Vaccines and Virotherapy, told Live Science. Despite the technology having existed for almost 30 years, RNA and DNA vaccines have not yet matched the protective power of existing vaccines, National Geographic reported.

In this high-stakes competition, is there also collaboration?

“Assuming these unconventional COVID-19 vaccines pass initial safety tests, "will there be efficacy?" Jacobs said. "The animal models suggest it, but we'll have to wait and see." "Because of the emergency here, people are going to try many different solutions in parallel," Andino-Pavlovsky said. The key to trialing many vaccine candidates at once will be *to share data openly between research groups, in order to identify promising products as soon as possible, he said.*

Could a COVID-19 vaccine be potentially dangerous and do damage?

For sure.

“Designing a vaccine that grants immunity and causes minimal side effects is no simple task. A coronavirus vaccine, in particular, poses its own unique challenges. Although scientists did create candidate vaccines for the coronaviruses SARS-CoV and MERS-CoV, these did not exit clinical trials or enter public use, partly because of lack of resources, Live Science previously reported. "One of the things you have to be careful of when you're dealing with a coronavirus is the possibility of enhancement," Fauci said in an interview with the journal JAMA on April 8. Some vaccines cause a dangerous

phenomenon known as antibody dependent enhancement (AED), which paradoxically leaves the body more vulnerable to severe illness after inoculation. *Candidate vaccines for dengue virus, for example, have generated low levels of antibodies that guide the virus to vulnerable cells, rather than destroying the pathogen on sight*, Stat News reported. Coronavirus vaccines for animal diseases and the human illness SARS triggered similar effects in animals, so there's some concern that a candidate vaccine for SARS-CoV-2 might do the same, according to an opinion piece published March 16 in the journal Nature. Scientists should watch for signs of AED in all upcoming COVID-19 vaccine trials, Fauci said. Determining whether enhancement is occurring could happen during initial animal studies, but "it is still unclear how we will look for AED," Jacobs said.

Are there specific dangers in developing a COVID-19 vaccine?

A successful coronavirus vaccine will snuff the spread of SARS-CoV-2 by reducing the number of new people infected, Andino-Pavlovsky said. COVID-19 infections typically take hold in so-called mucosal tissues that line the upper respiratory tract, and to effectively prevent viral spread, "you need to have immunity at the site of infection, in the nose, in the upper respiratory tract," he said. These initial hotspots of infection are easily permeated by infectious pathogens. *A specialized fleet of immune cells, separate from those that patrol tissues throughout the body, are responsible for protecting these vulnerable tissues*. The immune cells that protect mucosal tissue are generated by cells called lymphocytes that remain nearby, according to the textbook "Immunobiology: The Immune System in Health and Disease" (Garland Science, 2001).

"It's like your local police department," Andino-Pavlovsky told Live Science. But not all vaccines prompt a strong response from the mucosal immune system, he said. The seasonal influenza vaccine, for example, does not reliably trigger a mucosal immune response in all patients, which partly explains why some people still catch the respiratory disease after being vaccinated, he said.

"Even if a COVID-19 vaccine can jumpstart the necessary immune response, researchers aren't sure how long that immunity might last, Jacobs added. While research suggests that the coronavirus doesn't mutate quickly, "we have seasonal coronaviruses that come, year in [and] year out, and they don't change much year to year," he said. *Despite hardly changing form, the four coronaviruses that cause the common cold keep infecting people — so why haven't we built up immunity?*

Could the COVID-19 virus pose special problems?

"Perhaps, there's something odd about the virus itself, specifically in its antigens, viral proteins that can be recognized by the immune system, and that causes immunity to wear off. Alternatively, coronaviruses may somehow fiddle with the immune system itself, and that could explain the drop-off in immunity over time, Andino-Pavlovsky said. To ensure a vaccine can grant long-term immunity against SARS-CoV-2, scientists will have to address these questions. In the short term, they'll have to design experiments to challenge the immune system after vaccination and test its resilience through time, Jacobs said. In a mouse model, such studies could take "at least a couple of months," he said. Scientists cannot conduct an equivalent experiment in humans, but can

instead compare natural infection rates in vaccinated people to those of unvaccinated people in a long-term study. "When you have the luxury, you look at this for five years, 10 years to see what happens," Andino-Pavlovsky added.

How will they ensure that a COVID-19 vaccine is safe?

"Unlike an antiviral treatment for COVID-19 that can be given to patients already infected with the virus, a vaccine must be tested in diverse populations of healthy people. "Because you give it to healthy people, there's an enormous pressure to make sure it's absolutely safe," Andino-Pavlovsky said. What's more, the vaccine must work well for people of many ages, including the elderly, whose weakened immune systems place them at heightened risk of serious COVID-19 infection. "Initially, safety studies will be done in small numbers of people," likely fewer than 100, Jacobs said. A vaccine may be approved based on these small studies, which can take place over a few months, and then continually monitored as larger populations become vaccinated, he added. "That's just my guess."

[Note: The high and growing death toll from COVID-19 may justify some speed-up and short-cuts].

So what are the various stages that a vaccine must undergo, before it can be mass produced?

"Any potential vaccine will need to pass a safety trial, known as a Phase 1 trial, which also helps determine the needed dose. The next step is a larger trial in 100 to 300 people, called a Phase 2, which looks for some biological activity, but can't say for sure if the drug is effective. If a vaccine candidate prompts a promising immune response in Phase 2 clinical trials, after passing safety tests in Phase 1, it's possible that the FDA could approve such a vaccine for emergency use "before the 18-month period that I said," Fauci said in the JAMA interview. "If you get neutralizing antibodies," which latch onto specific structures on the virus and neutralize it, "I think you can keep moving forward on it," Jacobs said. Normally, a vaccine would then enter Phase 3 clinical trials, which include hundreds to thousands of people.

"So adding up these steps, each of which will likely take 3 to 6 months, it's very unlikely we would be able to find a vaccine that is safe and effective in less than 12 months — even if many of these steps could be done in parallel.

Can it be mass-produced? How?

"Then comes the issue of manufacturing billions and billions of doses of a new vaccine whose ingredients we don't yet know. Bill Gates has said that the *Gates Foundation will fund the construction of factories for seven coronavirus vaccine candidates, equipping the sites to produce a wide variety of vaccine types, Business Insider reported.*

[Neanderthal Conservative groups have attacked Gates, making false and inflammatory claims about him].

"Even though we'll end up picking at most two of them, we're going to fund factories for all seven, just so that we don't waste time in serially saying, 'OK, which vaccine works?' and then building the factory," Gates said. Even if a fairly promising vaccine surfaces by 2021, and can be mass-produced, the search won't end there. "Especially

with trying to get something out this quickly, we may not get the best vaccine out there right away," Jacobs said. Ideally, an initial vaccine will grant immunity for at least one to two years, but should that immunity wane, a longer lasting vaccine may have to be deployed. Historically, so-called live attenuated vaccines that contain a weakened virus tend to perform most reliably over extended periods of time, Andino-Pavlovsky said.

"That may be what we need in the long run," he said. And research into coronavirus immunity should continue, regardless, "not only for COVID-19, but for the next coronavirus that comes.

Closing in on a Vaccine: The Not-so-simple Mechanics

Tel Aviv University Professor Jonathan Gershoni claims his lab is "two-thirds of the way" to creating a COVID-19 vaccine, according to a report in today's Jerusalem Post, by Tamar Beeri.

Gershoni, who holds USPTO vaccine patents, is very good at explaining how his vaccine will work. Probably other vaccines against COVID-19 will adopt similar strategies. So, here is his not-so-simple explanation, according to Beeri:

"[Gershoni] explained that the vaccine intends to target the virus's Receptor Binding Motif (RBM), a critical weak point which allows the virus to attach itself and infect a target cell. The RBM is a small feature of the virus's "spike" protein, meaning that the virus uses many different proteins to replicate and invade cells, but the "spike" protein is the "major surface protein that it uses to bind to a receptor – another protein that acts like a doorway into a human cell." [Those spikes you see on cartoon drawings of the novel coronavirus are how it pokes into a human cell and uses the cell's DNA to replicate itself].

"Once this protein binds to the cell receptor of a human cell, the viral membrane fuses with that of the human cell, which allows the genome, or genetic blueprint of the virus to enter human cells and begin infection. "The idea is to recreate, to reconstitute, to construct an RBM of COVID-19 virus and use it as the vaccine," he told the Post. "That is to say, you would inject a small 50 amino-acid sequence and it would allow our immune system to focus on it and create antibodies that would directly target the virus at its weak spot."

"Due to the size of the RBM, which is a highly complex three-dimensional structure and only 50 amino acids long, it will be very challenging for it to be functionally reconstituted. It would, however, be extremely effective as a basis for a possible vaccine

"The smaller the target and the focus of the attack, the greater the effectiveness of the vaccine," Gershoni said. "The virus takes far reaching measures to hide its RBM from the human immune system, but the best way to 'win the war' is to develop a vaccine that specifically targets the virus's RBM."

"Gershoni originally developed the design of the vaccine which targets the RBM in response to SARS CoV, which broke out in 2004, and later for MERS CoV. "What we found was that we were able to reconstitute, to create a functional Receptor Binding Motif, and that's when we filed for patent in 2015," he explained to the Jerusalem Post.

"We are now currently working on implementing the design of the vaccine that we were able to construct for SARS and MERS and to apply it to the current virus, the SARS coronavirus 2," he continued. "This is a multi-step process. We've completed, I would say, about two-thirds of the way."

A Vaccine Is On The Way – Soon?

Today's Jerusalem Post daily paper, published in Jerusalem, brings some much-needed good news about progress in creating a vaccine against COVID-19.

The report notes:

"A team of Israeli researchers says that they are days away from completing the production of the active component of a coronavirus vaccine that could be tested on humans as early as June 1. "We are in the final stages and within a few days we will hold the proteins – the active component of the vaccine," Dr. Chen Katz, group leader of MIGAL's biotechnology group, told The Jerusalem Post. In late February, MIGAL [The Galilee Research Institute] committed to completing production of its vaccine within three weeks and having it on the market in 90 days. Katz said they were slightly delayed because it took longer than expected to receive the genetic construct that they ordered from China due to the airways being closed and it having to be rerouted."

(Note: the 'genetic construct' from China, is simply the RNA ribonucleic acid that defines COVID-19 -- shame that cancellation of flights from China to Israel caused the delay – every day counts!).

"As a reminder, for the past four years, researchers at MIGAL scientists have been developing a vaccine against infectious bronchitis virus (IBV), which causes a bronchial disease affecting poultry. The effectiveness of the vaccine has been proven in preclinical trials carried out at the Veterinary Institute."

Amazing that chickens, maybe, and their vaccine can help save human lives?

The report continues: "Our basic concept was to develop the technology and not specifically a vaccine for this kind or that kind of virus," said Katz. "The scientific framework for the vaccine is based on a new protein expression vector, which forms and secretes a chimeric soluble protein that delivers the viral antigen into mucosal tissues by self-activated endocytosis, causing the body to form antibodies against the virus."

What does this mean? Basically: The vaccine helps the body produce a key protein able to penetrate the cells infected by COVID-19 in the throat and lung mucous. How does it penetrate? Endocytosis is "the process of actively transporting molecules into the cell by engulfing it with its membrane." This helps the cell produce antibodies that kill the virus, before it can kill the cell and reproduce, creating millions of new viruses that spread through the lungs.

"In preclinical trials, the team demonstrated that the oral vaccination induces high levels of specific anti-IBV antibodies, " a MAGAL expert said.

A worldwide race is on, to develop an effective safe COVID-19 vaccine. Whoever wins, humanity will be the big winner. This is one race that can benefit everyone, even the spectators.

The Coronavirus Vaccine Will Be French:

Meet Prof. Frederick Tanji

“Louis Pasteur was born on December 27, 1822 –and died on September 28, 1895. He was a French biologist, microbiologist and chemist renowned for his discoveries of the principles of vaccination, microbial fermentation and pasteurization. He made remarkable breakthroughs in the causes and prevention of diseases, and his discoveries have saved many lives ever since. He reduced mortality from puerperal fever and created the first vaccines for rabies and anthrax.” The Pasteur Institute in Paris, named after him, is a world leader in this field.

Fast forward. Prof. Frederick Tanji is a senior professor at the Pasteur Institute in France and the head of the Department of Virology at the National Institute of Scientific Research (CNRS). He works day and night on developing a vaccine against a corona virus, and is one of the top candidates to get to the finish line first.

According to press accounts, “Tanji’s development team received € 4.3 million in funding to start clinical trials for the corona vaccine he developed, which, like others developed at the institute, *is based on measles vaccine*. “I developed a measles vaccine given to every baby born, which is effective and safe,” Tanji explains. “All the vaccine makers in the world know how to produce this vaccine in large quantities – which is very important. It’s also very cheap. This vaccine can be used as a (vector) basis for the Corona vaccine. I have engineered the measles virus genome so pathogenic sequences can be added to it. Like other viruses. That’s what we’re doing now with the Corona virus. “

“Tanji’s method – based on measles vaccine – has already been applied to other vaccines that have undergone clinical trials and some are already in production, and are designed to prevent Zika’s disease, Lassa fever, 1SARS, and MERS, “so we already have experience developing corona vaccine vaccines “, Says Tanji.

If Tanji succeeds, we need to thank the Chinese. “The speed at which vaccine development researchers came to be due in part to the early and rapid Chinese effort to sequence the genome of the new virus. China shared the genetic information in early January, allowing distance groups around the world to grow and investigate a live virus.”

Tanji wants the vaccine to be produced and sold at cost.

Tanji thinks human behavior will have to change radically post-COVID-19. “Social behavior will have to change, and we will have to significantly reduce travel. 4 billion people are flying every month – half the world’s population, that’s crazy. It transmits diseases. The economy needs to change.”

The Race to a COVID-19 Vaccine: Q&A

Where do we stand in the quest for a safe effective COVID-19 vaccine?

More than 2.2 million persons worldwide have contracted the virus and of those, 154,783 have died. That is a 6.8% death rate. But wait – there are far more cases worldwide than those we know about. Deaths are certain; cases are a guess. If we use

a 1% to 1.5% death rate, we can guess that between 10 million and 15 million persons worldwide have contracted the illness. Only an effective vaccine will put a clear end to this crisis, in which COVID-19 is already the #1 cause of death in the US.

This Q&A is based on an informative survey published in a reputable website, [livescience.com](https://www.livescience.com), by staff writer By Nicoletta Lanese, two days ago:

* <https://www.livescience.com/coronavirus-covid-19-vaccine-timeline.html>

When will a vaccine be ready?

"Here's why it probably can't be developed any sooner than 12 to 18 months.

"More than 60 candidate vaccines are now in development, worldwide, and several have entered early clinical trials in human volunteers, according to the Some groups aim to provoke an immune response in vaccinated people by introducing a weakened or dead SARS-CoV-2 virus, or pieces of the virus, into their bodies. The vaccines for measles, influenza, hepatitis B and the vaccinia virus, which causes smallpox, use these approaches, according to the U.S. Department of Health & Human Services. Although tried-and-tested, using this approach to develop these conventional vaccines was labor-intensive, requiring scientists to isolate, culture and modify live viruses in the lab.

That initial process of just creating a vaccine can take 3 to 6 months, "if you have a good animal model to test your product," Raul Andino-Pavlovsky, a professor in the Department of Microbiology and Immunology at the University of California, San Francisco, told Live Science. "

Are there short cuts? How fast is the US working on a vaccine?

"The first COVID-19 vaccine to enter clinical trials in the United States, for example, uses a genetic molecule called mRNA as its base. Scientists generate the mRNA in the lab and, rather than directly injecting SARS-CoV-2 into patients, instead introduce this mRNA. By design, the vaccine should prompt human cells to build proteins found on the virus' surface and thus trigger a protective immune response against the coronavirus. Other groups aim to use related genetic material, including RNA and DNA, to build similar vaccines that would interfere with an earlier step in the protein construction process. *But there's one big hurdle for mRNA vaccines. We can't be sure they will work.* As of yet, *no vaccine built from a germs' genetic material has ever earned approval*, Bert Jacobs, a professor of virology at Arizona State University and member of the ASU Biodesign Institute's Center for Immunotherapy, Vaccines and Virotherapy, told Live Science. Despite the technology having existed for almost 30 years, RNA and DNA vaccines have not yet matched the protective power of existing vaccines, National Geographic reported.

In this high-stakes competition, is there also collaboration?

"Assuming these unconventional COVID-19 vaccines pass initial safety tests, "will there be efficacy?" Jacobs said. "The animal models suggest it, but we'll have to wait and see." "Because of the emergency here, people are going to try many different solutions in parallel," Andino-Pavlovsky said. The key to trialing many vaccine candidates at once will be *to share data openly between research groups, in order to identify promising products as soon as possible*, he said.

Could a COVID-19 vaccine be potentially dangerous and do damage?

For sure.

“Designing a vaccine that grants immunity and causes minimal side effects is no simple task. A coronavirus vaccine, in particular, poses its own unique challenges. Although scientists did create candidate vaccines for the coronaviruses SARS-CoV and MERS-CoV, these did not exit clinical trials or enter public use, partly because of lack of resources, Live Science previously reported. “One of the things you have to be careful of when you’re dealing with a coronavirus is the possibility of enhancement,” Fauci said in an interview with the journal JAMA on April 8. Some vaccines cause a dangerous phenomenon known as antibody dependent enhancement (AED), which paradoxically leaves the body more vulnerable to severe illness after inoculation. *Candidate vaccines for dengue virus, for example, have generated low levels of antibodies that guide the virus to vulnerable cells, rather than destroying the pathogen on sight*, Stat News reported. Coronavirus vaccines for animal diseases and the human illness SARS triggered similar effects in animals, so there’s some concern that a candidate vaccine for SARS-CoV-2 might do the same, according to an opinion piece published March 16 in the journal Nature. Scientists should watch for signs of AED in all upcoming COVID-19 vaccine trials, Fauci said. Determining whether enhancement is occurring could happen during initial animal studies, but “it is still unclear how we will look for AED,” Jacobs said.

Are there specific dangers in developing a COVID-19 vaccine?

A successful coronavirus vaccine will snuff the spread of SARS-CoV-2 by reducing the number of new people infected, Andino-Pavlovsky said. COVID-19 infections typically take hold in so-called mucosal tissues that line the upper respiratory tract, and to effectively prevent viral spread, “you need to have immunity at the site of infection, in the nose, in the upper respiratory tract,” he said. These initial hotspots of infection are easily permeated by infectious pathogens. *A specialized fleet of immune cells, separate from those that patrol tissues throughout the body, are responsible for protecting these vulnerable tissues*. The immune cells that protect mucosal tissue are generated by cells called lymphocytes that remain nearby, according to the textbook “Immunobiology: The Immune System in Health and Disease” (Garland Science, 2001).

“It’s like your local police department,” Andino-Pavlovsky told Live Science. But not all vaccines prompt a strong response from the mucosal immune system, he said. The seasonal influenza vaccine, for example, does not reliably trigger a mucosal immune response in all patients, which partly explains why some people still catch the respiratory disease after being vaccinated, he said.

“Even if a COVID-19 vaccine can jumpstart the necessary immune response, researchers aren’t sure how long that immunity might last, Jacobs added. While research suggests that the coronavirus doesn’t mutate quickly, “we have seasonal coronaviruses that come, year in [and] year out, and they don’t change much year to year,” he said. *Despite hardly changing form, the four coronaviruses that cause the common cold keep infecting people — so why haven’t we built up immunity?*

Could the COVID-19 virus pose special problems?

“Perhaps, there’s something odd about the virus itself, specifically in its antigens, viral proteins that can be recognized by the immune system, and that causes immunity to wear off. Alternatively, coronaviruses may somehow fiddle with the immune system itself, and that could explain the drop-off in immunity over time. Andino-Pavlovsky said. To ensure a vaccine can grant long-term immunity against SARS-CoV-2, scientists will have to address these questions. In the short term, they’ll have to design experiments to challenge the immune system after vaccination and test its resilience through time, Jacobs said. In a mouse model, such studies could take “at least a couple of months,” he said. Scientists cannot conduct an equivalent experiment in humans, but can instead compare natural infection rates in vaccinated people to those of unvaccinated people in a long-term study. “When you have the luxury, you look at this for five years, 10 years to see what happens,” Andino-Pavlovsky added.

How will they ensure that a COVID-19 vaccine is safe?

“Unlike an antiviral treatment for COVID-19 that can be given to patients already infected with the virus, a vaccine must be tested in diverse populations of healthy people. “Because you give it to healthy people, there’s an enormous pressure to make sure it’s absolutely safe,” Andino-Pavlovsky said. What’s more, the vaccine must work well for people of many ages, including the elderly, whose weakened immune systems place them at heightened risk of serious COVID-19 infection. “Initially, safety studies will be done in small numbers of people,” likely fewer than 100, Jacobs said. A vaccine may be approved based on these small studies, which can take place over a few months, and then continually monitored as larger populations become vaccinated, he added. “That’s just my guess.”

[Note: The high and growing death toll from COVID-19 may justify some speed-up and short-cuts].

So what are the various stages that a vaccine must undergo, before it can be mass produced?

“Any potential vaccine will need to pass a safety trial, known as a Phase 1 trial, which also helps determine the needed dose. The next step is a larger trial in 100 to 300 people, called a Phase 2, which looks for some biological activity, but can’t say for sure if the drug is effective. If a vaccine candidate prompts a promising immune response in Phase 2 clinical trials, after passing safety tests in Phase 1, it’s possible that the FDA could approve such a vaccine for emergency use “before the 18-month period that I said,” Fauci said in the JAMA interview. “If you get neutralizing antibodies,” which latch onto specific structures on the virus and neutralize it, “I think you can keep moving forward on it,” Jacobs said. Normally, a vaccine would then enter Phase 3 clinical trials, which include hundreds to thousands of people.

“So adding up these steps, each of which will likely take 3 to 6 months, it’s very unlikely we would be able to find a vaccine that is safe and effective in less than 12 months — even if many of these steps could be done in parallel.

Can it be mass-produced? How?

“Then comes the issue of manufacturing billions and billions of doses of a new vaccine whose ingredients we don’t yet know. Bill Gates has said that the *Gates Foundation will fund the construction of factories for seven coronavirus vaccine candidates,*

equipping the sites to produce a wide variety of vaccine types, Business Insider reported.

[Neanderthal Conservative groups have attacked Gates, making false and inflammatory claims about him].

"Even though we'll end up picking at most two of them, we're going to fund factories for all seven, just so that we don't waste time in serially saying, 'OK, which vaccine works?' and then building the factory," Gates said. Even if a fairly promising vaccine surfaces by 2021, and can be mass-produced, the search won't end there. "Especially with trying to get something out this quickly, we may not get the best vaccine out there right away," Jacobs said. Ideally, an initial vaccine will grant immunity for at least one to two years, but should that immunity wane, a longer lasting vaccine may have to be deployed. Historically, so-called live attenuated vaccines that contain a weakened virus tend to perform most reliably over extended periods of time, Andino-Pavlovsky said.

"That may be what we need in the long run," he said. And research into coronavirus immunity should continue, regardless, "not only for COVID-19, but for the next coronavirus that comes.

In the Eye of the Corona Storm: A Drug That Works

My good friend Dr. G. N. Rao, founder of the L V Prasad Eye Institute in Hyderabad, India, drew my attention to this: A coronavirus drug that works.

According to Maayan Jaffe-Hoffman, writing in the Jerusalem Post:

"Israeli-based Pluristem has treated its first American patient suffering from COVID-19 complications under the country's compassionate use program.

The news comes days after a report by the company showed that six critically ill coronavirus patients in Israel who are considered high-risk for mortality were treated with Pluristem's placenta-based cell-therapy product and survived, according to preliminary data provided by the Haifa-based company.

Let me provide some background.

Researchers report: "When it comes to COVID-19, recent research has suggested about 20% of people get the severe form of the disease. Many in this group become critically ill because of their advanced age or underlying health conditions. But those who were previously healthy and are in their 30s, 40s, 50s are very likely experiencing a cytokine storm."

A small but significant fraction of COVID-19 patients, mainly younger ones, die not from the ravages of the virus on their lungs, but because their body over-reacts, as their immune system kicks in violently and creates this "cytokine storm". It turns out that an overly strong immune reaction is just as bad, or worse, than a weak reaction.

How does Pluristem's drug work? Here is how CEO Yaky Yanay explains it:

"Patients who are in severe condition and dying are actually dying from a severe respiratory condition. What is actually happening is -- there is a very high level of inflammation and at a certain point the immune system of the patient will attack [the patient], mostly in the lungs. Until now, Pluristem's technology has been largely used

to treat people suffering from poor blood flow to the legs, but the company's scientists were able to quickly repurpose the cells to treat coronavirus patients. "We take cells from the placenta after full-term delivery and we have developed technology to expand the cells to very large numbers, in an environment that mimics the human body," Yanay said. "The technology allows us to treat more than 20,000 people from a single placenta."

His team "programs" the cells, which then have a wide range of proteins they can secrete. The cells don't just deliver the proteins but also "adjust the level of secretion based on signals they receive from the body."

The US FDA allows using the drug on compassionate grounds for very seriously ill patients. But for widespread use, full-scale three-phase clinical trials are necessary, and are already well underway.

Chapter Five. Asia Shows the Way

COVID-19: Lessons from Three Smart Small Asian Nations

Part 1. Singapore

We can learn a great deal from three small Asian nations or semi-autonomous areas (Hong Kong, Singapore, Taiwan) about how to deal with COVID-19. These lessons are summed up in today's New York Times, by Hannah Beech:*

Here, Part 1, is how Singapore acted.

I taught MBA students in Singapore, at Nanyang Technological Institute, for many years, and came to know Singapore and its people well.

I can sum up Singapore's cultural DNA, in place from Day One, in large part thanks to its brilliant founding leader Lee Kwan Yew: We are a small nation, disliked by our huge neighbors. To survive, we must be the very best at everything, and accept no excuses for incompetence.

"Singapore's strategy of moving rapidly to track down and test suspected cases, provides a model for keeping the epidemic at bay, even if it can't completely be stamped out completely.

"With detailed detective work, the government's contact tracers found, among others, a group of avid singers who warbled and expelled respiratory droplets together, spreading the virus.... If you chase the virus, a Ministry of Health official said, you will always be behind the curve."

Singapore has had a relatively few cases and few deaths, even though the Chinese New Year brought a lot of arrivals from China initially.

The author writes: "Early intervention is the key. So are painstaking tracking, enforced quarantines and meticulous social distancing – all coordinated by a leadership willing to act fast and be transparent."

Singapore's key benchmark: To trackers seeking where the COVID-19 was contracted, for those testing positive -- you have two hours to bring us concrete answers. Two hours. No excuses.

In Singapore, "details of where patients live, work and play are released quickly online, allowing others to protect themselves."

Violation of privacy? Embarrassing? Of course. But public health comes first. And a disciplined population accepts this.

Western nations seem to be chasing the virus, after it has arrived, rather than acting pre-emptively well before it unpacks its bags and settles in.

Perhaps next time, we will follow Singapore's lead?

"Asian hubs offer model for tackling an epidemic". New York Times March 19/2020

Part 2. Hong Kong

Hong Kong is officially known as "the Hong Kong Special Administrative Region of the People's Republic of China". It has 7.4 million people and GDP per capita of some \$46,000 – higher than that of Israel.

Here, according to the New York Times, is how Hong Kong dealt with the COVID-19 crisis, influenced strongly from its traumatic experience with SARS in 2003:

"Hong Kong's heavy death toll from SARS, nearly 300 people, has spurred residents in the semiautonomous Chinese territory to exercise vestigial muscles of disease prevention this time around, even as the local authorities initially dithered on whether to close the border with mainland China. *Nearly everyone, it seemed, began squirting hand sanitizer. Malls and offices set up thermal scanners.*"

“The most important thing is that Hong Kong people have deep memories of the SARS outbreak,” said Kwok Ka-ki, a lawmaker in Hong Kong who is also a doctor. “Every citizen did their part, including wearing masks and washing their hands and taking necessary precautions, such as avoiding crowded places and gatherings.”

“The Hong Kong government eventually caught up to the public’s caution. Borders were tightened. Civil servants were ordered to work from home, prompting more companies to follow suit. Schools were closed in January, until at least the end of April.”

“On Tuesday, the government of Hong Kong, where only 157 cases have been confirmed, announced a mandatory 14-day quarantine for all travelers from abroad beginning later this week.”

SARS outbreak occurred nearly 17 years ago, in 2003. Despite this, the memory of SARS and the measures adopted at that time are fresh in the minds of Hong Kong citizens. It was the people of Hong Kong who acted, even before the government and administrative officials took action, in the COVID-19 outbreak.

I am certain the same will be true of COVID-19. We will remain this for generations. And hopefully, in the next pandemic, we will act promptly, as Hong Kong did.

Part 3. Taiwan

Taiwan, officially calling itself the Republic of China, is an island nation of some 23.7 million people, with GDP per capita of some \$55,000 (using the adjusted exchange rate, known as Purchasing Power Parity), which reflects Taiwan’s undervalued currency.

Taiwan responded very quickly to the COVID-19 threat, perhaps faster than anywhere:

“Taiwan acted even faster. Like Hong Kong and Singapore, Taiwan was linked by direct flights to Wuhan, the Chinese city where the virus is believed to have originated. *Taiwan’s national health command center, which was set up after SARS killed 37 people, began ordering screenings of passengers from Wuhan in late December even before Beijing admitted that the coronavirus was spreading between humans.*”

“Having learned our lesson before from SARS, as soon as the outbreak began, we adopted a whole-of-government approach,” said Joseph Wu, Taiwan’s foreign minister. *By the end of January, Taiwan had suspended flights from China, despite the World Health Organization’s advising against it.* The government also embraced big data, *integrating its national health insurance database with its immigration and customs information to trace potential cases,* said Jason Wang, the director of the Center for Policy, Outcomes and Prevention at Stanford University. *When coronavirus cases were discovered on the Diamond Princess cruise ship after a stop in Taiwan, text messages were sent to every mobile phone on the island, listing each restaurant, tourist site and destination that the ship’s passengers had visited during their shore leave.*”

As of Tuesday, Taiwan had recorded 77 cases of the coronavirus, although critics worry that testing is not widespread enough. *Students returned to school in late February.*

Speed. Agility. Discipline among the population. Preparedness. Anticipation. “Reading the world map correctly”.

This is what we learn from smart, rich, agile, disciplined small Asian nations.

Learning From Taiwan: A Deeper Look

[Clue: Democracy & Transparency]

In a previous blog, I wrote tersely about how Taiwan, Singapore and Hong Kong have excelled in handling the COVID-19 pandemic.

An article in Wired.com gives more details about Taiwan’s success. A brief summary: Democracy and Transparency.

Andrew Leonard writes: “Taiwan Is Beating the Coronavirus. Can the US Do the Same? The island nation’s government is staying ahead of the virus, but don’t ascribe it to “Confucian values.” Credit democracy and transparency.

“AS OF WEDNESDAY, the nation of Taiwan had recorded 100 cases of Covid-19, a remarkably low number given the island’s proximity to China. Some 2.71 million mainland Chinese visited Taiwan in 2019, and as recently as January there were a dozen round trip flights between Wuhan and Taipei every week. But despite its obvious vulnerabilities, Taiwan has managed, so far, to keep well ahead of the infectious curve through a combination of early response, pervasive screening, contact tracing, comprehensive testing, and the adroit use of technology.”

“Taiwan’s self-confidence and collective solidarity trace back to its triumphal self-liberation from its own authoritarian past, its ability to thrive in the shadow of a massive, hostile neighbor that refuses to recognize its right to chart its own path, and its track record of learning from existential threats.”

A BBC report this morning recounts that Taiwan was hit hard by SARS in 2003. In its wake, Taiwan set up stockpiles of medical equipment and detailed contingency plans. The moment China announced the case of a strange type of pneumonia, Taiwan was ready. Incoming flights had passengers tested for fever before they left the plane.

For political reasons, mainland China has vetoed Taiwan’s membership in the World Health Organization. As a result Taiwan has had to prepare for pandemics on its own, without WHO help. That has proved a major boon.

Andrew Leonard continues: “The threat of SARS put Taiwan on high alert for future outbreaks, while the past record of success at meeting such challenges seems to have encouraged the public to accept socially intrusive technological interventions. (Jason Wang, a Stanford clinician who coauthored a report on Taiwan’s containment strategy, also told me via email that the government’s “special powers to integrate data and track people were only allowed during a crisis,” under the provisions of the Communicable Disease Control Act.)”

Leonard continues to describe Taiwan’s transparency: “Taiwan’s commitment to transparency has also been critical. In the United States, the Trump administration ordered federal health authorities to treat high-level discussions on the coronavirus as classified material. In Taiwan, the government has gone to great lengths to keep

citizens well informed on every aspect of the outbreak, including daily press conferences and an active presence on social media. Just one example: On March 15, Vice President Chen posted a lengthy analysis of international coronavirus “incidence and mortality rates” on Facebook that racked up 19,000 likes and 3,000 shares in just two days.”

Taiwan, Singapore and Hong Kong are now battling the ‘second wave’ – COVID-19 cases of citizens who contracted it abroad and are now returning home. (Of course nations have to allow their own citizens to re-enter the country). If only Europe and the US would open their windows, much can be learned from how Taiwan handles this ‘second wave’...because, chances are, there will also be a second wave in Europe and the US.

Chapter Six. Teaching Online

On-Line Learning

(with Maya Taya Arie)

As millions of children and college students are learning on-line, as schools and universities close, this blog will address key issues related to online education.

Our first key point: This is not about online teaching, it is about online learning. That is, a client-centered approach that focuses on the learning and the learner, not on the teacher. With wide access to search technology, children and students are increasingly able to learn and discover facts on their own. The role of educators has changed greatly – from teaching, to facilitating learning. That should be the focus of online education.

Shlomo Maital is a retired Technion professor, specializing in innovation and creativity; Maya Taya Arie is his grand-daughter and a student studying social studies with a focus on management, sociology and political science at Bar Ilan University.

Maya asks: How can a teacher teach an entire class online, and still retain the students' attention?

Response (Maital): I taught my first distance-learning class at MIT in 1995. My students were Argentinean engineers, in three cities, La Plata, Buenos Ares and Mendoza.

The technology was: a broadcast studio at MIT, with video signal sent by Internet to Argentina. The connection was often broken, restored, broken again – but the Argentinean engineers were very patient, and the session was quite interactive, with students raising their hand, acknowledged by the lecturer, asked a question, and received an answer.

I had a wonderful producer named Elizabeth Derienzo. This is very important – MIT realized from the earliest days of distance teaching that this was a production, not a lecture. Elizabeth stood behind the TV camera, and constantly motioned to me, “high energy, high energy”. Because – when you teach in a classroom, you have at least some of the students who are ‘with you’, who respond with facial expressions, who interrupt, ask questions, engage..and this brings energy to the classroom. In a sterile studio, there is none of that. So -- I constantly raised my own energy level, in my voice and body language, at Elizabeth’s request, because if the lecturer is bored and asleep, the students will be, too. And let’s face it, many lecturers, sitting in front of a boring screen, think to themselves that they would rather be doing something else – and lack the enormous nuclear energy that a classroom can provide.

Conclusion: Online instructors -- remind yourself constantly, high energy. Modulate your voice, dynamics, up, down, project interest and passion. Passion! And above all, even when (especially when) you do not feel much like teaching online -- Act! Pretend. Put on a show. Because online education is indeed a show, and like actors who perform even when ill, or tired, at a high level, so must we educators.

This is Rule #1. High Energy. Passion. And convey it to your students. Genuine, great. If not – Pretend.

On-Line Learning (2)

(with Maya Taya Arie)

Maya asks: Is there significance to using a white board or Power Point in an on-line presentation.

My (Shlomo) answer: Let's assume that you, online learning facilitator, are using Zoom. There is a free version that is very useful. It is widely used. ZOOM has zoomed in value – and it is now a unicorn, with market value of its shares exceeding \$1 billion. And they deserve it.

Zoom was founded in 2011 by Eric Yuan, a lead engineer from Cisco Systems and its collaboration business unit WebEx.[1] Yuan graduated from the Stanford University executive program and was previously vice president of engineering at Cisco for collaboration software development. David Berman, from WebEx and Ring Central, became president in November 2015. The service started in January 2013 and by May 2013, it claimed one million participants.

If you can give a talk (note: try to keep it short!) without white board or Power Point – great! But generally there are data and facts and key points we need to put on the screen. Power Point can be used as a virtual white board – open it, and you can type on the slide as you speak.... Sometimes this is better than showing a pre-prepared slide, as it unfolds and evolves as the learner watches. (On Zoom: click on 'share' to open Power Point and share it with viewers).

If you have bandwidth problem (low capacity WiFi), you can just use "audio" on Zoom, and speak without video. This is not a bad option.

For Power Point: use 28 point or 32 point fonts. No smaller! Do not put too much stuff on the slide. Be ready to make your slides available to your viewers, if they request them by email.

Find ways to make your talk interactive, even if you have many viewers. There is a 'chat' button on Zoom. You can have your viewers ask questions by writing text through the "Chat" button, to avoid the chaos of many viewers asking questions at once.

Make time for this. After say 10 minutes, pause, and ask for chat questions....

In our next blog, we'll talk about other ways to make online learning interactive.

Online Education Blog #3

Become Whom You Teach

Nietzsche once wrote, insightfully, "Become who you are". I'd like to adapt that slightly: For online educators – Become whom you teach.

My granddaughter Maya asks: "Try to imagine that you are a student, what tools would you find most effective when learning virtually?"

Maya, that is a super question. Perhaps the most basic of all.

As a management educator, one of the hardest things I teach is to become customer-centric. I used to do an exercise with my managers: Please, stand up and speak about your product, as if you were a customer. Your product disappears, your business is broke. What do your customers miss most?

Sounds simple? But most managers had a very hard time, especially senior ones, who had not seen or heard a customer in years.

Same goes for us educators, especially at the college level. Take me, for instance. I've been teaching in college for well over 50 years. There are two generations between me and my students. Do I really understand them, their needs, their thinking, their preferences? And do I really try to?

Some 23 years ago, Harvard Business School Professor Dorothy Leonard, along with Jeffrey Rayport, wrote a fine article, "Spark Innovation Through Empathic Design".* Her main point: You can ask customers what they want. Mostly they do not know. Or, you can observe them and empathize with them, BECOME them. And then when you are in their shoes and skin, figure out their needs.

So, Maya -- Online education is triply quadruply hard, because I do not have students in front of me, face to face. But I do have them on screen, with 'chat'... So, I can think hard, who ARE these people, what do they want and need, what interests them, what do they want to learn? NOT – what do I know and have to teach them? And how are they responding?

And I do know this – After years of teaching economics and crunching numbers, the most effective teaching tool is – stories. Stories! Real people, real events, real conflict, real decisions. So this will be the subject of my next blog – Teaching online, by the effective use of stories.

Harvard Business Review, Nov.-Dec. 1997.

Online Education Blog #4

5 Tips from Harvard Business School

Tips from Harvard Business School for online educators:

5 Essentials Tips for Teaching Online

For educators who have never taught online before—and for those brushing up on the basics—online teaching expert Bill Schiano shares his top five tips for creating a successful virtual classroom experience.

1. Make eye contact.

If you want to engage students, you've got to be looking at that camera. Make your notes easy to see. If I'm looking down at my notes, you'll see my bald spot, but you won't see my eyes. You're not engaged with me. Try posting a photo of your students near your webcam—remember that you're talking to people, not a machine.

2. Involve your students as much as possible.

Make your class session as interactive as you can. If you're planning to just lecture, then record the lecture and make the recording available asynchronously instead. In a live session, remind yourself at least every 15 minutes to intersperse some form of interaction—be it taking questions, running polls, or calling on students to share examples, so it's not just you speaking.

3. Bring your best self.

As much as you can, engage yourself and show your passion. Maybe it's with your hand gestures and vocal intonation, or maybe it's with the conviction of your words. Remember why you became a teacher and use that energy, that sense of purpose, and convey that passion to your students. It's even more essential online because you need to be bigger when you're online—you're often competing with more distractions and students who feel like they can go on mute and tune out.

4. Remember that online connections are real connections.

Decide what the tone of your class is going to be—casual, formal, or somewhere in between. That's going to help you decide what your assignments will look like, how you're going to introduce your students to one another, and what it'll feel like to be part of the community you're building. The more you can build that community, the more your students are going to feel invested in the course, and the more likely they are to engage in the work. You want everyone in the class to want everyone else to be better. Many of your students will want that strong sense of connection, too, because they'll miss being able to physically go to campus and talk to people.

5. Embrace the opportunity.

You now have the opportunity to work with students online, which means they have an opportunity to learn online—this is going to help them develop skills that will be extremely useful to them in their careers. As more and more work gets done virtually, being comfortable interacting virtually and getting acclimated to the tools they'll use in online courses will be helpful to them long term. Keep that big picture in mind whenever you're struggling—and know that, with practice, you can absolutely translate your physical classroom skills to an online environment.

Excerpted from “Adapting Quickly to Teaching Online,” a webinar by Bill Schiano, Professor of Computer Information Systems at Bentley University.

Chapter Seven. Failures

European (Dis)Union:

Shame on Them!

Italy is desperate. With more COVID-19 cases and deaths than China, it is now 'triaging' (selecting) those who get medical care and not treating those 60 years old and over. Don't blame them – they have to, they lack medical equipment and doctors and hospital beds and ventilators.

Wait. Italy is part of the "European Union", a union of 27 nations banding together to help one another and support one another.

Right?

Apparently, wrong. The nation coming to Italy's rescue is not the other 26 EU nations, but Russia, which has sent medical supplies and personnel.

(And by the way, United States? Which used to help other nations? Not in the age of Trump... America First!)

Slovakia's leader noted that his desperate requests for help from the EU were turned down cold. But China did come to the rescue, and it is China which is now sending medical aid to other nations. The press claims it is done to restore China's image, badly damaged by the fact that COVID-19 originated in China. Maybe, too, it is done because China simply gets it.

European Union? It was not Brexit and Britain that has damaged European union, but the Europeans themselves. Whatever happens in this crisis, Europe will not be the same. If nations in a union do not help one another in time of need, then there is no union.

Shame on you, Europe.

How the US Screwed Up:

A Litany of Fumbles

The United States, led by the Trump administration, has fumbled the ball in dealing efficaciously with the COVID-19 pandemic. Here is the terrible litany of fumbles, mistakes and bad decisions, which in the end cause the deaths of many people. Needlessly.

April 2018. Some nine or ten months before the crisis arose, Trump and his National Security Council advisor John Bolton (later fired himself...justice?) fire the NSC team charged with pandemic preparation; on April 8 Tim Bossert is fired, as Home Secretary Advisor, in charge of "comprehensive defensive strategy against pandemics". Bye bye strategy and plans. In May Rear Admiral Tim Ziemer, who headed a 'health security team' was fired and not replaced.

Fast forward: China experiences early COVID-19, and, rather late, in late December, informs the world of it, and warns. On Jan. 20 the Center for Disease Control, in the US, announces the first case, a traveler from Wuhan, China. “We shut it down”, Trump says on Feb. 2. In February the CDC sends out its COVID-19 test, to public health testing labs in the US states; it doesn’t work. The US, (pride? Ego?) fails to purchase tests that are proven to work, from South Korea and other countries. The test is fixed, finally – but valuable weeks are lost. The public health labs work at developing their own test, something that has never before happened.

“When the CDC rolled out its tests, a component in them turned out to be faulty. That was unfortunate, but it put a big spotlight on the CDC’s decision to use its own test kit instead of test kits other countries have used, reportedly in an effort to create a more accurate test.”

As of March 9, well into the US pandemic, only 4,300 COVID-19 tests had been carried out.

Press reports: “Testing is crucial to slowing epidemics. First, it lets public health officials identify sick people and subsequently isolate them. Second, they can trace that sick person’s recent contacts to make sure those people aren’t sick and to get them into quarantine as well. It’s one of the best tools we have for an outbreak like this. It’s also something that the federal government has done well before — recently, with H1N1 and Zika. “It’s been surprising to me that the administration’s had a hard time executing on some of these things,” Ashish Jha, director of the Harvard Global Health Institute, said. “

America dropped the ball on testing. Press reports: “In the months before the coronavirus outbreak, the administration cut a public health position that was meant to help detect disease outbreaks in China, where the pandemic began, Even without such cuts, experts and advocates argue the US generally underfunds disease outbreak preparedness and public health programs more broadly. Further cuts just deepen the risks of pandemics. The common refrain among experts is that other countries’ actions, such as China’s draconian measures, gave the US a bit of time to do something, but the federal government has failed to get even the basics right in that time.”

What was President Trump’s role in this? “Trump “did not push to do aggressive additional testing in recent weeks, and that’s partly because more testing might have led to more cases being discovered of coronavirus outbreak, and the president had made clear — the lower the numbers on coronavirus, the better for the president, the better for his potential re-election this fall.”

Hospitals, especially in New York City, complain they lack equipment. Why? There is a large US strategic stockpile of lots of useful things. However, “While the administration has said it’s using federal authorities and tapping into its stockpiles to get more of this gear to the places that need it, health care workers on the ground complain that they still don’t have enough — forcing them to reuse possibly contaminated equipment and choose between working in unsafe conditions or not show up to work at all. All of this at a time when the country needs to, according to experts, boost health care capacity.” There are rumors, Trump dislikes Washington state and New York State and that this is impacting federal shipments.

In a pandemic, preparedness is crucial. The US Defense Department has contingency plans for a huge variety of threats. What about the health area? “..... this reflects on the lack of preparedness: A shortage of medical equipment is one of the many problems government simulations and exercises warned about before the current outbreak. But Trump simply didn’t prioritize pandemic preparedness beforehand. The US ... was not prepared ... A good preparedness plan would have helped address this and had things in place to allow for that increased need to be met.”

US health care system is inadequate, even with Obamacare (imagine if Trump had succeeded in annulling it!). “With the outbreak growing, the US’s lack of universal health care has become an even more obvious problem: If people can’t get testing, they’re less likely to find out they have Covid-19 and take precautions to avoid spreading the virus. If they can’t get treatment in case of complications, they’re more likely to suffer, potentially spread the disease, and die.”

Fighting the poor, rather than the virus: “The administration has pushed forward on measures that will kick people off food stamps. This will not only lead people to suffer if they lose their jobs as a result of a coronavirus-caused recession, but it could lead to sick people going to work and spreading the disease, because they won’t have a safety net if they don’t bring in a paycheck.”

Chasing immigrants, instead of virus: “Experts also pointed to the “public charge” rule, which effectively discourages immigrants from seeking public services, including health care, by threatening their immigration status if they are “likely to be a public charge” by relying on those services.”

Yes, the United States has dropped the ball – fumbled it. And this litany is very partial – it’s only 1,000 words, it could fill a book.

And the sad part, again, is that when a halfback fumbles in football, worst case, his team loses the game. In the US, when the administration fumbles, people die. Many people. And then ? Excuses. Boy, are we going to hear excuses, all the way to November and beyond.

Dr. Anthony Fauci predicts, as many as 200,000 Americans could die in this pandemic. Many of these deaths could have been prevented, if the Administration had simply held onto the ball.

There has to be accountability. At the very least, at the ballot box in November

Save the Theodore Roosevelt!

Many years ago, my son Ronen, then an officer and chief engineer on an Israeli missile boat, and I boarded an American Sea Stallion helicopter at Ben Gurion Airport, Tel Aviv, and were ferried to the enormous American nuclear aircraft carrier Theodore Roosevelt, anchored a few miles offshore. (The ship was far too big to enter Haifa Port).

This was made possible by my cousin Malcolm, a nuclear sub commander. Thanks again, Mal!

Ronen and I were astounded. Eleven decks, 5,000 sailors, nuclear engines meant it could stay on duty for many months, 80 jet aircraft launched from the upper deck, and

the ability to launch and receive planes at the same time – and the capability, practiced frequently, of launching and recovering in the dark of night (not done by other nations).

Wow.

Fast forward. COVID-19. A New York Times article reports: Captain of Aircraft Carrier Pleads for Help as Virus Cases Increase Onboard. “We are not at war,” the captain of the carrier Theodore Roosevelt wrote. “Sailors do not need to die. If we do not act now, we are failing to properly take care of our most trusted asset — our sailors.”

Captain of Aircraft Carrier Pleads for Help as Virus Cases Increase Onboard

“We are not at war,” the captain of the carrier Theodore Roosevelt Brett E. Crozier wrote. “Sailors do not need to die. If we do not act now, we are failing to properly take care of our most trusted asset — our sailors.” The ship is now in Guam.

In a four-page letter dated Monday, first reported by The San Francisco Chronicle on Tuesday, Capt. Crozier laid out the dire situation unfolding aboard the warship, the Theodore Roosevelt, which has more than 4,000 crew members. He described what he said were the Navy’s failures to provide him with *the proper resources to combat the virus by moving sailors off the vessel*. “We are not at war,” Captain Crozier wrote. “Sailors do not need to die. If we do not act now, we are failing to properly take care of our most trusted asset — our sailors.”

(The Acting Secretary of the Navy has responded that, well, nobody on the ship is really THAT ill... so --- suck it up, guys!)

“Thomas B. Modly, the acting Navy secretary, told CNN in an interview that the Navy was working to move sailors off the ship — but that there were not enough beds in Guam to accommodate the entire crew.”

“We’re having to talk to the government there to see if we can get some hotel space, create some tent-type facilities there,” Mr. Modly said. “We’re doing it in a very methodical way because it’s not the same as a cruise ship.”

Speaking to reporters Tuesday night, the commander of the Pacific Fleet, Adm. John C. Aquilino, said that “we’re welcoming feedback” regarding the requests outlined by Captain Crozier. Admiral Aquilino said that crew members would be rotated off the carrier for testing and quarantine before returning aboard. The intent, he said, was to keep the ship ready to carry out its missions. He said that no crew members had been hospitalized thus far, but he declined to specify the number of infections.

“The problem aboard the Roosevelt highlights a central dilemma facing the military: Top officials, who have spent years placing readiness to fight the next war as a top priority, are now finding that maintaining that readiness during a pandemic can endanger the health, and even the lives, of service members. At the same time that Americans are being told to stay at home and practice “social distancing” in public, many service members are instead being told to continue doing their jobs.”

I find this episode infuriating! I’ve served in military reserves and trained hard. Be ready to fight, is the credo. True. But in times of pandemic plague? Save lives. And soldiers’ lives matter too.

Anyone want to start a Twitter account, Soldiers’ Lives Matter? Because they do.

Wake up, Defense Secretary Mark Ester. You can save the lives of the sailors on the Theodore Roosevelt. These young men and women, some only 19 years old, spend long months at sea, away from their families. In normal times they defend America, all over the world. But now? It is urgent, top priority, to save their lives.

So – do something! DO SOMETHING! If you do not, their lives are your responsibility. And there will be no forgiveness.

COVID-19 & Culture

All over the world, nations are undergoing lockdown – or versions of it, “shelter at home” (a term used in the US for what you do when a possible tornado or hurricane threatens), quarantine (a French word for ‘40’, based on the 40 days people were closed off during plague), or even curfew.

It does seem that nations where quarantine was earliest, and most heeded, did the best. Places or countries that heeded quarantine the least and latest did worst.

In Israel, COVID-19 afflicts heavily the ultra-Orthodox, partly because in early March Purim celebrations brought masses of them together and spread the plague.

In Wuhan a 70-day lockdown, rigidly enforced, seems to have done the trick.

In Michele Gelfand’s new book (she is a professor at U. of Maryland), the difference between countries with rule breakers and rule makers is explored. This is highly relevant for our coronavirus dilemma.

Brazilians are rule breakers. Society is “loose” and relaxed. So is Israel. Try driving on our roads and highways. Rules here are made to be broken.

Singapore is a rule maker. Don’t bring 200 packages of gum into the country. Don’t toss your old gum onto the street. You get fined. Singapore has handled the plague very well. So has South Korea, a rule maker society. Brazil’s new President seems to ignore it.

In Israel, the virus is reaching its apex, roughly around today. A severe police-enforced lockdown was declared just before Passover, because families in Israel always get together to observe and celebrate it. So police set up roadblocks and levied heavy fines, for those trying to travel. In rule breaking nations, to enforce a rule you really do need the police and fines, and even the Army (used in ultra-orthodox areas in Israel).

Is your country a rule maker or a rule breaker? And how is it dealing with the lockdown? Will it change the culture of your country? Will it become more submissive – or return to its old loose ways soon after?

Remdesivir: Grasping at Straws!

There is a massive amount of fake news circulating now about COVID-19, some of it racist, pernicious and dangerous. There is also well-meaning news, reports that want to bring hope but in fact are simply grasping at straws.

A report now viral, emanating from the University of Chicago, is about how an anti-viral drug developed by a pharma company, Gilead, has helped seriously ill COVID-19 patients.

Remdesivir is an antiviral medication; a nucleotide analog, specifically an adenosine analogue, which inserts into viral RNA chains, causing their premature termination. It is being studied during 2020 as a possible post-infection treatment for COVID-19 illness.

A U of Chicago doctor participated in an *internal hospital video* in which she reported that when seriously ill patients administered remdesivir, many recovered.

The video reached some hospital employees, who leaked it to journalists. That led to a highly optimistic report.

This is not a clinical test. There is no protocol, and no placebo (sugar pill given to some patients).

The drug, made by Gilead Sciences, was tested against Ebola with little success, but multiple studies in animals showed the drug could both prevent and treat coronaviruses related to Covid-19, including SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome).

We are all desperate for some good news. But grasping at straws is not going to help. The journalists who reported this “scoop” should have told us exactly what the source was, an internal chatty ‘gossip’ video of the kind that circulates in most hospitals.

The journalist who DID inform us was the CNN medical correspondent, is Elizabeth Cohen, who has serious training and deep scientific knowledge. She has a Master’s degree in public health. Her colleague is Dr. Sanjay Gupta, a neurosurgeon; together they comprise “the horse’s mouth” and to mix a metaphor, a horse’s mouth that does NOT grasp at straws.

How Israel Is Handling the Nursing Home Crisis

In the novel coronavirus pandemic, nursing homes have been a disaster, with many tragedies. This is just one terrible example, in New Jersey:

“29 Dead at One Nursing Home From the Virus. Or More. No One Will Say.] By Monday, the police in a small New Jersey town had gotten an anonymous tip about a body being stored in a shed outside one of the state’s largest nursing homes. When the police arrived, the corpse had been removed from the shed, but they discovered 17 bodies piled inside the nursing home in a small morgue intended to hold no more than four people. “They were just overwhelmed by the amount of people who were expiring,” said Eric C. Danielson, the police chief in Andover, a small township in Sussex County, the state’s northernmost county.

In Israel, too there have been nursing home tragedies. Family are banned from visits; and caregivers bring in the virus and the elderly are afflicted.

After several such scandals, Israel has taken action. A former Director-General of the Ministry of Health, Dr. Ronnie Gamzu, now head of a large Israeli hospital, was asked by the Ministry of Health to shape a comprehensive plan for protecting Israel’s nursing home residents. His 100 page document is revealing.

It calls for 600 Home Front soldiers to monitor entry to the homes. Notice that a former Health Ministry senior official does not trust the Ministry itself to handle the problem,

but instead appeals to the Army. And those 600 can be increased to 1,000, if needed. Many in Israel believe that the overall management of the pandemic should have been placed in the hands of an interdisciplinary team led and run by the Israel Defense Forces.

Nursing homes are vulnerable. The elderly in them need caregivers. And the caregivers need the work, because they are poorly paid. So, you cannot quarantine or exclude the caregivers, despite the risk. Testing every single one is a possible answer, but you would need to do this very often – Caregiver A could be 'clean' today, but infected tomorrow.

Better late than never? Hard to say that, when it comes to the elderly, many of whom survived the Holocaust. Let us protect and care for them properly, and not make excuses.

Chapter Eight. Measuring the Plague

Unpacking the COVID-19 Stats:

Four Measures

The COVID-19 statistics can be very confusing, and the press has not been great at dispelling the fog. Here is how the New York Times explains the four key measures:

By Nate Cohn, Josh Katz, Margot Sanger-Katz and Kevin Quealy March 27, 2020

Each measure answers a different question.

HOW WIDESPREAD IS THE CORONAVIRUS IN THE COMMUNITY OR CITY?

1. Cases per 1,000 people. *This is a measure of the prevalence of coronavirus in the community.*

New York City, at 2.15, is just below #1, Wuhan, China, 4.59, and Lombardy Region, Italy, 3.48, but Albany Ga. And New Orleans are surprisingly high, too, as 'hot spots', at 1.35, and 1.32, respectively.

Confirmed Cases per 1,000 residents. An imperfect measure, because of spotty testing – are there few cases because of limited testing, or few cases because testing has shown this to be true? Hard to know.

Confirmed cases per 1,000 by metro area

METRO AREA	POPULATION	CASES	PER THOUSAND
Wuhan, China	11.1 mil.	50,821	4.59
Lombardy region, Italy	10 mil.	34,889	3.48
New York	20 mil.	43,016	2.15

HOW DEADLY IS THE VIRUS? WHAT IS THE DEATH RATE?

2. Deaths per 1,000 people. This measure is likely to be more accurate, alas, than other measures. But this measure lags the number of infections by several weeks...

Deaths per capita are currently higher in the New York City area than in most other places.

METRO AREA	POPULATION	DEATHS	PER THOUSAND
Lombardy region, Italy	10 mil.	4,861	0.48
Wuhan, China	11.1 mil.	2,535	0.23
Albany, Ga.	153,000	10	0.07
New Orleans	1.3 mil.	65	0.05
Seattle	3.9 mil.	133	0.03
Burlington, Vt.	221,000	6	0.03
New York	20 mil.	500	0.03

HOW FAST IS THE CORONAVIRUS SPREADING?

3. Growth Rates Over Time.

Measure: the rate of cumulative cases over time, averaged over the previous week. This helps us learn, is the epidemic getting better or worse? Are we at the 'apex' (worst is behind us) or before it?

A growth rate of 40 percent on this chart means the cumulative number of cases is growing by 40 percent every day. A rate of 100 percent would mean that the number of cases was doubling daily.

HOW WELL HAS THE COMMUNITY OR CITY DONE, IN SLOWING DOWN THE RATE AT WHICH THE CORONAVIRUS IS GROWING?

4. Growth Rates by Case Count.

This measure is the rate of growth of the number of cases in a given place – it measures whether a community has slowed the rate of growth, before there is many cases. I.e., is the community flattening the curve?

Seattle and San Francisco succeeded in flattening the curve. How come? These measures help us ask the right questions

We need to be cautious when interpreting coronavirus statistics. And a wide variety of stats are being tossed at us, often by those who do not fully understand them.

COVID-19: Logarithms Hold the Key

Warning: This blog could be harmful to your health...because it's about... logarithms. (Logs). And plague. What in the world?

Well, let's give it a shot. Nothing to lose.

A logarithm is a number, such that when its 'base' (usually, the number ten, or the number 'e', 2.71828 (we do NOT have to go into the black depths of THAT number), is raised to the value of the log, you get the value of your starting number, x.

For instance, $10^2 = 100$. So the logarithm of 100 (using the 'base' of 10) is 2.

Clear?

Why are logarithms useful? Well, they have fallen into massive disuse lately, because of computers and calculators. But once they were crucial. Because, suppose you need to multiply two big numbers. On paper. Ouch! But wait! If you knew the logarithms of the two numbers? Add them! Because? The value of b^y times b^z equals b^{z+y} -- so, we have converted multiplying (hard!) to addition (easy!).

Logarithms was publicly proposed by John Napier in 1614, an English mathematician. Generations of school children (like my mother) had to learn the secrets of logs.

But what has this to do with COVID-19. So – there is a wonderful magical property of logs. Suppose there is a key number that you are tracking. E.g., the number of people in your country or your city or community, who have COVID-19. You can graph it, look at it, inspect the curve, it is rising, OK, but – what does it mean?

So here is what John Napier would recommend, 400 years ago. Take the logarithm of the number. Graph THAT, not the number itself.

Why? Because – trust me on this -- the gradient, (steepness, or slope) of the logarithm graph tells everything. If the slope of the log is RISING, then the RATE of increase is increasing. If the slope is getting less steep, FALLING, the rate of increase of COVID-19 is declining. And this is crucial, to know how we're doing. And you CANNOT tell this is you graph the number itself.

So, here in Israel, the slope of the logarithm of the number infected with COVID-19 has been declining. Yay! The rate of increase is declining. We're getting toward the apex. It's a ways off...but once we reach the top of THAT hill, the slope of the log will turn from positive to negative...and that's a KEY point. Because that's when the number infected begins to fall....cause of celebration.

Clear? Clear as mud? So here is a sample graph. This is the total number of cases outside China. On a log scale. You can see a constant slope – constant rate of growth, as the virus spreads. Reflecting, maybe, a very slow response in Europe and the US.

So – in your country or city, track the logarithm of the number of cases, and measure the slope. That tells you whether it is speeding up or slowing down. I don't think our political leaders are quite up to that difficult mental exercise.

COVID-19: The Rule of 72 Rules

Albert Einstein once said famously, that compound interest is the “most powerful force in the universe.” It is indeed, especially when compound interest is at work, in transmitting virus from one person to another, at varying rates.

So, here is the Rule of 72, and some optimistic news from my country Israel.

How fast is the number of infected persons doubling? How often? Are we succeeding in slowing it? The graph above shows the number seriously ill, or who have died, from COVID-19, dated from when schools closed – and the dotted line shows the future projection. The data are by the National Security Council.

Initially, it was assumed that the daily growth in COVID-19 seriously ill and deaths was growing at a compounded interest rate of 25% daily !! (why compound: because 25% more people, infect 25% more people, infect 25% more people..and so on...like bank compound interest).

Here is the Rule of 72: The Rule of 72 shows you how quickly you'll double your money. All you have to do is divide 72 by the interest rate it's earning. This is the number of years it will take for your money to double.

Translate that to virus: Divide 72 by the daily rate of increase at which people fall seriously ill or die – that tells how rapidly the number of victims doubles – in how many days. 25% daily growth? $72/25 =$ about 3. Every 3 days. So in one month, 30 days, we have 10 doublings. 2 raised to the 10th power is 1,024. A thousand times more ill and dead, in one month. Simply not a situation hospitals can handle.

And that was the initial doubling rate in Israel, in the early days of school closure. Then people got the message and sheltered at home.

The daily infection rate then declined, to 15%. According to the National Security experts.

What does that mean? Rule of 72: $72/15$ or about 5. Doubling every five days. How many doublings in 30 days? $30/5$ equals 6. Two to the 6th power equals 64.

Sixty-four times more victims.

Something we can handle. Difficult, tragic – but – do-able.

Sixty-four times more victims is hugely better than 1,024 times more victims.

This is the Rule of 72. And the key point is – the Rule of 72 is in OUR hands. As my cell phone tells me each time I open it: Stay Home.

Now – next step, how do we figure out who can emerge from home to run the factories and farms? And when? But so far, the Rule of 72 Rules.

Media: It's Not That Hard. Do the Numbers!

The print and TV media are letting us down. CNN publishes daily counts of COVID-19 cases, worldwide and in New York and other states.

So?

What do the numbers mean?

OK – here are the numbers for Israel, total cases, every two days...and the daily rate of change. The start date is March 24, the final date is April 9. Today.

2690	19.7 %
3619	17.3
4695	14.9
6092	14.9
7428	11.0
8430	6.7
9248	4.9
9755	2.7

Remember my blog, Rule of 72? Divide 72 by the daily % change, you get the number of days it takes for COVID-19 cases to double. On March 24, doubling every 3.5 days. Ouch. By April 9, doubling every 24 days, roughly.

Why? Pretty severe police-enforced lockdown, including the night of Passover. It works.

CNN, media: Show us the % change, daily. Show us the rule of 72 – days to double. And show us the trend.

It's not rocket science! It's just percentages and compound interest.

Rule of 72: One More Time

Sorry, but – one more time for the Rule of 72. Many print and cable journalists are rather innumerate – they took Philosophy 1 instead of Calculus 1 in college. So it is no wonder they struggle to interpret the COVID-19 numbers for us, and simply throw totals at us, without really explaining what they mean. So, it's left to us citizens to “do the math”. And, alas, that math could involve logarithms.

(Someone I know well, recently asked me, is a logarithm the same as an algorithm? Because, high school teachers themselves don't seem to know what log(arithms) are).

So, first, a quibble. CNN, when you show your COVID-19 graphs, daily numbers, can you please do it on a logarithmic scale, not absolute numbers? (in Excel, you can use

the $\log(\)$ function or the $\ln(\)$ function, where \ln is the log to base 'e' 2.71828 and \log is the log to the base 10... ok, never mind about all that! But the reason for logs is, the steepness of the logarithmic curve shows the rate of change, and you can easily tell if the curve is getting steeper (rate of change is rising) or less steep (rate of change is slowing), and this is of course CRUCIAL!).

So, some of you, maybe very few, maybe VERY few, want to know, where does this Rule of 72 come from? (Divide 72 by the daily rate of change of COVID-19 patients, and you get the number of days it takes for the number of those infected to double). If it's 10%, it doubles every week – disaster. If it's 2%, it doubles every 36 days, about monthly – phew...we made it.

So here is the basic equation:

$$(1+R/100)^T = 2$$

Where R is the rate of (daily) change, in %, T is the number of days it takes to double, and 2, well, that's the doubling, e.g. a 10% daily spread rate will double in 7 days: $(1+0.1)^7 = 2$

If you take the logarithm of each side of the equation, you get this:

$$T \ln(1+R/100) = \ln 2 \text{ (trust me!)}$$

So T, the number of days it takes for the virus to double the number infected, if the rate of spread growth is R, is equal to

$$T = \ln 2 / \ln(1+R/100)$$

Now, mathematicians pull a neat trick out of their bag of tricks, and find a way to simplify this equation, so we don't need calculators or log tables:

$$T = 72/R$$

Hence Rule of 72: divide 72 by the rate of spread, you get 'days to double'. (One last word, skip this if you wish -- you can do this approximation using a neat way to find approximations called a Taylor Function, neatly tailored by mathematicians to simplify our lives...).

Normally, we use Rule of 72 to see how many years it will take for our money to double. Well-heeled people get 8% interest on their money, or more, usually through the stock market, so their millions double on their own every $72/8 = 9$ years.

Initially the virus was spreading at 25% growth rates daily, in many places, meaning the numbers infected were doubling every $72/25 = 3$ days! Roughly. Yikes. Say 100 people were infected initially. At this rate, in 30 days, there will be 10 doublings. 10 doublings is 2 times 2 times 2, ten times, or 1,024. So those 100 infected become 100 x 1,000 or 100,000! THIS is why it was so absolutely crucial to jump on things early and lock everyone down. Alas, the US failed to do this. So did other nations.

So if TV and media fail to use Rule of 72 – do it yourself. Figure out the daily % rate of change of those infected with virus (come on, you can do it.... Today's number / Yesterday's number, minus 1 and then times 100. Then divide 72 by this number. Presto: Days to double. Big number? Worry. Small number? Yeah!

Viral Shedding Peaks – BEFORE Symptoms

A very large number of research papers are now emerging from China, by Chinese scientists and scholars, related to biology, medicine, education, and other areas. China is sharing with the world what it has learned.

Yesterday's Nature Medicine features a very important article by a large group of Chinese researchers, which shows this:

“We report temporal patterns of viral shedding in 94 patients with laboratory-confirmed COVID-19 and modeled COVID-19 infectiousness profiles from a separate sample of 77 infector–infectee transmission pairs.

We observed the highest viral load in throat swabs at the time of symptom onset, and inferred that *infectiousness peaked on or before symptom onset*. We estimated that 44% (95% confidence interval, 25–69%) of secondary cases were infected during the index cases' presymptomatic stage, in settings with substantial household clustering, active case finding and quarantine outside the home. Disease control measures should be adjusted to account for probable *substantial presymptomatic transmission*.”

Meaning? Three rather scary words: substantial pre-symptomatic transmission. We spread the coronavirus even before we feel symptoms.

This is why social distancing will need to be enforced for quite some time, until tests are widely available and can provide results within hours. If you have no symptoms, then anybody can be a carrier and spreader. Anybody.

Finally, we are learning about this insidious enemy – is anyone expressing some gratitude to the Chinese for sharing?

Well, a small gesture – here are the names of the researchers who co-authored this paper: Xi He, Eric H. Y. Lau, Peng Wu, Xilong Deng, Jian Wang, Xinxin Hao, Yiu Chung Lau, Jessica Y. Wong, Yujuan Guan, Xinghua Tan, Xiaoneng Mo, Yanqing Chen, Baolin Liao, Weilie Chen, Fengyu Hu, Qing Zhang, Mingqiu Zhong, Yanrong Wu, Lingzhai Zhao, Fuchun Zhang, Benjamin J. Cowling, Fang Li & Gabriel M. Leung

Does the Novel Coronavirus Mutate?

Writing in today's New York Times, Nathaniel Lash and Tala Schlossberg try to answer the key question, does the novel coronavirus mutate? If so, how and when?

Here is why it is important for us to know this. The pandemic crisis will end only when we have a vaccine, produced in billions of doses. The vaccine will work by stimulating the body to produce antibodies that neutralize the virus by binding to it in a very specific way. If the virus can mutate to defeat the vaccine, then the vaccine will not stop working. The key is the “spike protein” – the protein the virus makes that penetrates the cell walls and lets the virus invade (and kill) it. Those are the spikes you see in the graphic illustrations of corona. Vaccines can defeat the spike.

Here is what the authors of the article have found:

“Among the thousands of samples of the long strand of RNA that makes up the coronavirus, 11 mutations have become fairly common. But *as far as we know, it's the same virus infecting people all over the world*, meaning that only one “strain” of the

virus exists, said Peter Thielen, a molecular biologist with the Johns Hopkins Applied Physics Laboratory. Only one of those common mutations affects the “spike protein,” which enables the virus to infect cells in the throat and lungs. Efforts to produce antibodies that block the spike protein are central to many efforts to develop a vaccine. *Since the spike protein has changed little so far, some scientists believe that’s a sign that it can’t alter itself very much and remain infectious.”*

So – we have a small piece of good news. The measles vaccine, for instance, was developed in 1950. And it is still effective. Measles hasn’t mutated in a manner that neutralizes the vaccine. Evolution is powerful – but apparently it cannot surmount EVERY obstacle. So hopefully the same will apply to the COVID-19 vaccine – and we will bid this insidious deadly enemy good-bye, with an effective vaccine... until the next one.

Chapter Nine. Leadership

Life Imitates Art: Camus' The Plague

Life imitates Art, so goes the saying. It is true. Novelists often anticipate events and describe them in detail, before they unfold. Take for instance the novel by the French-Algerian author Albert Camus, *The Plague*, published in French in 1947.

Camus began working on the novel in 1941. He did painstaking research, studying plagues and epidemics through history. His novel is set in the Algerian coastal city Oran, where a cholera plague killed a large fraction of the population in 1849.

Camus describes the initial denial, widespread in the early stages of COVID-19. "It's impossible it should be the plague, everyone knows it has vanished from the West", says a Camus character. Camus adds, sardonically, Yes, everyone knew that, except the dead.

When 500 people a day die in the Oran plague, Camus' character, a Catholic priest, explains the plague as God's punishment for sin. The main character, a medical doctor, knows better. He believes suffering is randomly distributed, makes no sense, it is absurd.

Camus concludes his novel, with these words:

"Everyone has it [the plague] inside himself, this plague, because no one in the world, no one, is immune." Dr. Roux says, the plague never dies; it "waits patiently in bedrooms, cellars, trunks, handkerchiefs and old papers" for the day when it will "rouse its rates and send them to die in some well-contented city".

We humans know everything, control everything, decide everything – except when a tiny virus, not even technically a living thing, learns how to insert its RNA inside a cell, hijack the cell's DNA, replicate itself, and kill the human body. And we instantly become much more humble.

Based on: Camus on the coronavirus, Alain de Botton, New York Times, March 22.

Leadership in the Time of Plague

Even though I live in Israel, I find myself glued to the TV nightly, watching New York State Governor Andrew M. Cuomo's addresses and press conferences. This is true of much of America, including President Trump, who schedules his own TV appearances in order not to conflict with Cuomo's.

As I watch Cuomo, I ask myself, what is leadership? What are the key qualities of political leaders, in the time of plague? Why is Cuomo's leadership so effective, in contrast with Trump's and other political leaders, including my own here in Israel?

A few tentative answers. First, blunt honesty. Cuomo tells it like it is. His warnings carry weight and credibility. (Compare with, say, Trump, whose superlatives, great, terrific, perfect, ring hollow – remember, if a leader lies to us once, we will forever doubt ANYthing he or she says in future). Second, command. Cuomo has done his homework and he's smart. He commands the numbers and the complexity of the

situation and explains it clearly to people. Third, compassion. Cuomo is a touch leader, pragmatic, hard-nosed. But when he talks about his mother Matilda, and saving her if needed, and saving all us old people, he shows empathy and sympathy. Leaders have that combination of toughness and soft compassion, used in every case where appropriate. Fourth, pragmatism. Use common sense, figure out what is needed, get it done, no excuses (the Singapore formula). Fifth, Speed. Forget platitudes, we need ventilators now, hospital beds now, masks now. Look, New York State is not Trump's favorite. We suspect he has withheld ventilators from the nation's strategic stockpile. New York State prosecuted Trump's so-called charity foundation. But Cuomo has not libeled or criticized Trump by name – only Federal agencies – and it has paid off. So leaders know how to pick their enemies, with care.

I want to share an approach I've found useful, for myself. I'm 77 years old and made lots of mistakes in my lifetime. So have we all. And it is painful to look back on some of them. So, today, perhaps a bit too late, I use this approach: When I need to make a decision, or decide how to behave, I ask myself: Shlomo, OK, how will you feel about this decision, in 10 years, when you look back on it? Will your chest swell with pride or will your stomach turn over with shame? Use this, and you can't go wrong. This is the time for leadership – not just by our political leaders but by every single one of us, challenged by the situation and faced with choices – to help others effectively or hunker down and care only for ourselves.

And in conclusion, consider these words by Thomas Paine, written during the bitter days of the American Revolution – times that try people's souls.

“THESE are the times that try men's souls. The summer soldier and the sunshine patriot will, in this crisis, shrink from the service of their country; but he that stands by it now, deserves the love and thanks of man and woman. Tyranny, like hell, is not easily conquered; yet we have this consolation with us, that the harder the conflict, the more glorious the triumph. What we obtain too cheap, we esteem too lightly: it is dearness only that gives every thing its value. Heaven knows how to put a proper price upon its goods; and it would be strange indeed if so celestial an article as FREEDOM should not be highly rated” Thomas Paine 1776

Leadership In the Time of Plague:

Learning from Winston Churchill

Erik Larson. The Splendid and the Vile: A Saga of Churchill, Family, and Defiance During the Blitz. Crown, 2020. 546 pages.

In days of crisis, people everywhere look to leadership. Many of our leaders have alas fallen short. Perhaps they each should read Erik Larson's new book, *The Splendid and the Vile*, about the leadership of British Prime Minister Winston Churchill, during the terrifying days of the blitz, when the German Luftwaffe bombed London daily, for 57 days and nights, including a huge daylight raid on Sept. 15, 1940.

The damage was enormous. Historians note: “More than 40,000 civilians were killed by Luftwaffe bombing during the war, almost half of them in the capital [London], where more than a million houses were destroyed or damaged. *A million houses!*”

What did Churchill do to show leadership?

(Luftwaffe head Hermann Goring was ordered by Hitler to begin bombing London, on Sept. 6/7. The goal was to terrify London citizens and draw the sparse Royal Air Force into a battle, where, outnumbered, RAF plans would be destroyed, leaving Britain open for invasion).

First, he was there. He regularly went out to sites that had been bombed, spoke to those who had lost their homes, and showed empathy.

Second, he condensed his message to two simple qualities; Truth. Defiance. Truth, to recognize the desperate situation. He told the people the truth – how the RAF was far outnumbered. Defiance, to spark the British people’s morale and fighting spirit. Churchill regularly watched the bombing at night from the roof of 10 Downing St., exposed and unafraid.

Churchill understood his people. British anti-aircraft guns were silent in early September, because the nighttime raids meant you could not see the Nazi bombers. No point in wasting ammunition. But Churchill understood – he ordered the anti-aircraft guns to fire anyway – and the Londoners cheered and were cheered and buoyed.

Enemy bombers are a different enemy than a silent killer virus. But leadership remains similar. Truth. Defiance. Tell the truth – something some leaders fail to do, such as the criminal behavior of the President of Brazil. Defiance -- Fierce determination to defeat the virus, by telling people what to do and how to do it, even if it means sacrifice. The WHO made an enormous error in the early stages, saying that wearing masks was not needed. This turns out to be wrong – Researchers show that even home-made cloth masks (of the kind my wife zapped together in no time, with a handkerchief and two elastic bands) can do a lot of good, protecting others from infection from those who are asymptomatic. [Great Leader Trump refuses to wear a mask, seeing it as a sign of weakness... I wonder, would Churchill have worn a mask, had he led Britain today?].

Best-Practice Virus Management: Look to Germany

Sometimes, something happens and – we know exactly why we were put on this earth. Take Angela Merkel. Americans would call her a ‘lame duck’ chancellor, as she has indicated she will not run for re-election, and a successor was already chosen (and then, resigned, and a new successor emerged). But meanwhile, she is still Chancellor, leading Germany at a critical time – and guess what – she gets it. [She obtained a doctorate in quantum chemistry in 1986 and worked as a research scientist until 1989]. Listening to an ignorant, spiteful, uneducated draft-dodging American President who does NOT get it is very painful, after hearing Merkel.

In part because of Merkel’s leadership, and in part because German is a very well run organized country strong in science and technology, Germany today is best-practice in emerging from the coronavirus lockdown. New York Times’ Berlin bureau chief Katrin Bennhold explains why:

“...3,000 households [were] chosen at random in Munich for an ambitious study whose central aim is to understand how many people — even those with no symptoms — have already had the virus, a key variable to make decisions about public life in a

pandemic. The study is part of an aggressive approach to combat the virus in a comprehensive way that has made Germany a leader among Western nations figuring out how to control the contagion while returning to something resembling normal life.”

Bennhold continues: “Other nations, including the United States, are still struggling to test for infections. But Germany is doing that and more. *It is aiming to sample the entire population for antibodies in coming months*, hoping to gain valuable insight into how deeply the virus has penetrated the society at large, how deadly it really is, and whether immunity might be developing. The government hopes to use the findings to *unravel a riddle that will allow Germany to move securely into the next phase of the pandemic: Which of the far-reaching social and economic restrictions that have slowed the virus are most effective and which can be safely*. The same questions are being asked around the world. Other countries like Iceland and South Korea have tested broadly for infections, or combined testing with digital tracking to undercut the spread of the virus.

“Germany, which produces most of its own high-quality test kits, is already testing on a greater scale than most — *120,000 a day and growing in a nation of 83 million*. Chancellor Angela Merkel, a trained scientist, said this week that *the aim was nothing less than tracing “every infection chain.”* That high level of testing has helped her country slow the spread of the virus and keep the number of deaths relatively low. More people in Germany now recover from the virus every day than are infected by it. *Every 10 people infected with the virus now pass it to seven others — a sharp decline in the infection rate for a virus that has spread exponentially.*”

“Nationally, the Robert Koch Institute, the government’s central scientific institution in the field of biomedicine, is testing 5,000 samples from blood banks across the country every two weeks and 2,000 people in four hot spots who are farther along in the cycle of the disease. Its most ambitious project, aiming to test a nationwide random sample of 15,000 people across the country, is scheduled to begin next month.”

“In the free world, Germany is the first country looking into the future,” said Prof. Michael Hoelscher, who heads up the Munich study, noting that a number of countries had already asked him for the protocol to be able to replicate it. “We are leading the thinking of what to do next.” Mr. Hoelscher was co-author of what has become a widely influential research paper about how the virus can be transmitted before someone develops symptoms. “There’s no doubt after reading this paper that asymptomatic transmission is occurring,” Dr. Anthony Fauci, director of the National Institute for Allergy and Infectious Diseases in the United States, told CNN on Feb. 1, three days after the paper was published. “This study lays the question to rest. *Asymptomatic transmission is what has made containment so difficult because a large number of infections are not detected.*”

Doctors Share, Globally: So Should We!

Doctors all over the world are using social media to rapidly share information about the coronavirus. And this is saving lives. Here is an example.

An emergency room doctor at Lincoln Hospital, in the Bronx, New York City, reports that some distressed COVID-19 patients are NOT being intubated, with ventilators. And the results are good. Why? What is going on?

An Italian doctor published, on social media, the following insight: There are two types of coronavirus patients: L type and H type. L type have poor oxygenation, 60-70% oxygenation of their blood, or even 50% (normal is 95%). But they show no distress, are hungry and have good clinical presentations. Hmm. The H types have similar lack of oxygen, struggle to breathe – and they definitely need intubation.

Intubating L type patients can be harmful, and actually make them worse. Besides, with ventilators very scarce, misusing them can actually cost lives, by depriving those who need them.

There is a desperate need to learn more about the novel coronavirus, and because this is a pandemic, it is vital to share knowledge rapidly, efficiently, candidly and truthfully, among countries. And doctors are doing this. They are sharing insights on-line and other doctors, despite long desperate work days, are tracking this literature and learning and applying what they learn. As they are in Lincoln Hospital, Bronx.

We can all learn from this. Why just doctors? We all can share ideas, creative solutions, and information. There is a catch. There are evil people out there, spreading rumors, fake news, conspiracy theories...and muddying the water, fogging the insights. And there are miscreants who are inserting pornography into Zoom conferences, some of them important.

Twitter has been effective in preventing and punishing fake news. You get a warning, then removal, and have to meet conditions to get back on. Facebook has been delinquent and unwilling, for the most part. With social media playing a crucial role today, we cannot afford to have them act as delinquents, like Facebook. If needed, regulators should step up and put their feet to the fire.

Corona Capitalism: Sell at Cost

My friend Tran Luong Son, an MIT graduate and entrepreneur/software expert, calls me and asks about how to saving businesses, rapidly going bankrupt.

Here is a small simple suggestion. Amend capitalism. Shift from “produce for profit” (Pharma – take note!) to “produce and sell at cost”. And for governments? For those businesses valiantly applying the new capitalist compassion, producing at cost, to save businesses and keep the economy at float – lend at cost – i.e. zero. (Some countries, including my own, are initiating credit for small businesses, at 0.1% interest, with long repayment periods).

Produce and sell at cost. Why at cost? If at less than cost, you need subsidies, and government budgets are strapped. At cost – you can do this forever. Not quite forever

– profits generate investment. So in the short run investment will dry up (it will anyway). But in the long run, Keynes said, we are all dead... (figuratively...).

So, let's build an emergence strategy, based on asking every business to produce a business plan, for producing X units, employing Y people, paying lower but livable wages, producing at prices that reflect accurately costs..., variable costs, because fixed costs are 'sunk costs'....

Can capitalism reinvent itself as compassionate capitalism? Coronavirus capitalism.

It can. Let's hope it happens. And big companies? You get on board too...

Surprise: Germany Leads!

Quiz: Which country in the world is highly conservative fiscally, avoids deficits like the plague (oops, sorry for that one), hassles spendthrift EU nations (like Greece) for excess debt, and in general has acted like Scrooge?

You got it. Germany.

Part two: Which country has seen the extent of the COVID-19 plague clearest and acted most decisively, including massive emergency spending?

Surprise. Germany. Never would have guessed it.

Lame duck Chancellor Angela Merkel, a trained scientist, trained well in the former East Germany, was among the first to predict massive deaths, and drew scorn at the time – but she is proving right, even though Germany, for many reasons, has the lowest relative death toll (relative to the number of cases).

And now, she has led Germany to implement the most extensive, massive emergency bailout plan including huge spending, covering salaries of employers and guaranteeing emergency loans for businesses. No other country comes close. (Alas, my own country is right there at the bottom – though, of course, we do not have as deep pockets as Germany does).

According to the International Monetary Fund, Germany's bailout package is fully 28% of GDP! And Germany guarantees 90% of emergency loans. All this, to keep businesses afloat, so they can bounce back.

But I have one caveat, or quibble. Germany: all this largesse goes to Germans. How about Italians and Spaniards? Can you spare just a small slice of your luscious pie for fellow EU countries, suffering badly? They're waiting.

Learn from Spain:

We WILL Err – but how?

Spain has suffered terribly from the new coronavirus. The numbers tell the tale:

Cases overview



Spain

Confirmed	Recovered	Deaths
169,496	64,727	17,489

For a nation of 47 million, this is a terrible toll. It is explained in part by Spain's late start in lockdown, and its Mediterranean open lifestyle, in the cafes and markets, during a warm spring.

But it seems to have peaked. The number of new cases peaked in Spain, at 8,000, daily, on April 2, and has now declined to about 4,000. So Spain is gradually beginning to emerge from lockdown, to revive the economy, in a planned careful and staged manner.

I think other countries should watch Spain carefully, talk to Spanish experts, learn about their plan, adapt the plan to their own nations' needs and nature...and in general, we need a global brainstorming conference. An international Zoom of experts.

Take Korea. There has been a resurgence, there, a second wave, but not huge, 100 cases. OK – what happened? Is the immunity conferred by having the COVID-19 and recovering from it sufficient to give permanent immunity? Or can a huge dose of the virus come back and attack you again? Let's find out from Korea.

How is Singapore handling the 'track down those who spread it'? We will need to have a system for that, when we (many of us) return to work.

We should have a website clearing house for things countries have learned, but a credible one, with only vetted proven entries by real experts.

What do we know about this vicious viral enemy? Can we compile a COVID-19 handbook – here is what we know, and how we know it, and what the source of the data is.

And regarding emerging from the 'shelter at home' lockdown -- Trump says this is the most important decision of his life. HIS decision? If I were an American, would I feel reassured in having TRUMP???? make the decision? When his 'base' is calling for the resignation of Fauci, a credible epidemiology expert, who urges caution?

We will make mistakes and already have. Trump's January-February fumbling cost many lives. Maybe, it is best to err on the side of caution, as we emerge from lockdown. Let's study Spain carefully.

Political Leaders: Step Back! Let the Pros Do It!

Ladies and gentlemen, golf fans! Here we are, on the 18th green, at the legendary Master's tournament. Byron Putput has a 30-foot put for birdie, to win the Green Jacket and the championship. He's thinking. He's looking. He's planning... all his 24 years of golfing are going into this crucial put! The fans are silent. The tension is palpable.

But wait. Here comes... Donald Trump. Yes, Donald Trump. POTUS, he's called, President of the United States. Yes, fans, he is shoving aside Byron. Executive privilege, he says. Trump himself will take the put. He pulls a putter out of the golf bag – but wait, it is not a putter, but an iron. He's going to do the put with an iron!

Oh my gosh. Is this really happening?

..... No, it's not. Or is it? Reopening the US economy is, "I would say, without a doubt, that it is the most important decision I have ever had to make," Trump said three days ago. First person singular. I. Not 'we'. And he doesn't even have the authority to decide, it is really up to the governors.

Let's make some sense out of this. Giora Eiland is Major General (ret.) Israel Defense Forces. Eiland is a former head of the Israeli National Security Council. Speaking on Israeli Radio, he made this point:

In the pandemic, Israel (and every country) is at war. This requires mobilization of all our energy, skills, wisdom and resources. Israel has done this, alas, numerous times in the past. But how? As we do in wartime, as US and UK did in wartime. Set up a panel of experts. NOT politicians! In health, economy, education, psychology, science, medicine. Put them in a room. Let them define the issues, then divide up according to "comparative advantage" and work out alternatives and plans. Nonstop. Round the clock. Sleep on cots in the room or nearby.

Israel's Ministry of Health has disastrously mismanaged the issue of performing COVID-19 testing. And testing, by all experts, is key to emerging from quarantine. The IDF (army) could have done it faster, better, more professionally. But internal political squabbles between Israel's Prime Minister and the Defense Minister (whom the PM hates), Netanyahu's nemesis, prevented this. Too bad. We are paying the price today.

Trump will not take the final put at the Master's golf tournament. A pro golfer will do that. Why are we letting him, or Netanyahu, or Macron, or Johnson, take the lead in managing the epidemic? Step back politicians. Step aside. Let the professionals manage this war. Because you politicians do not have a clue.

One possible exception: NY State Governor Andrew Cuomo. In his amazing daily briefings, he shows a wonderful grasp of data, curves, expert opinion, trends, and illustrates his talks with informative slides and graphs. But this exception proves the rule.

Chapter Ten. Emerging from Plague

Getting Back to Work – But How?

So far, this tiny virus, COVID-19, has caught us napping. We are all playing catch-up, making policy moves (like “shelter at home”) just a trifle too late, or a lot too late, as in unfortunate Italy. And we are making huge mistakes. Italy drafted its aging pensioner doctors and medical staff – the most vulnerable group of all – and many have sadly died. This should not have happened.

So, can we for a change think ahead a bit? With people at home, rather than at work – how can we get them back to work? Economists are pretty quiet these days (except, loud mouths, like Arthur Laffer or Larry Kudlow) but maybe we do have something sensible to contribute?

Tom Friedman, NYT Op-Ed columnist, wisest of persons, says: “can we more surgically minimize the threat of this virus to those most vulnerable while we maximize the chances for as many Americans as possible to safely go back to work as soon as possible?” He has a solution, based on the experts with whom he consulted.

Economists crunch numbers. We have far too few good numbers on COVID-19. Dr. John Ioannides, Stanford U., mentioned by Friedman, writes:

“The current coronavirus disease, Covid-19, has been called a once-in-a-century pandemic. But it may also be a once-in-a-century evidence fiasco. At a time when everyone needs better information, from disease modelers and governments to people quarantined or just social distancing, we lack reliable evidence on how many people have been infected with SARS-CoV-2 or who continue to become infected. Better information is needed to guide decisions and actions of monumental significance and to monitor their impact. Draconian countermeasures have been adopted in many countries. If the pandemic dissipates — either on its own or because of these measures — short-term extreme social distancing and lockdowns may be bearable. How long, though, should measures like these be continued if the pandemic churns across the globe unabated? How can policymakers tell if they are doing more good than harm”.

And in a NYT Op-Ed, “Is Our Fight Against Coronavirus Worse Than the Disease?”, Dr. David Katz, Yale University, writes that “as the work force is laid off en masse (our family has one adult child home for that reason already), and colleges close (we have another two young adults back home for this reason), young people of indeterminate infectious status are being sent home to huddle with their families nationwide. And because we lack widespread testing, they may be carrying the virus and transmitting it to their 50-something parents, and 70- or 80-something grandparents. If there are any clear guidelines for behavior within families — what I call “vertical interdiction” — I have not seen them”.

Katz asks, “When would it be safe to visit loved ones in nursing homes or hospitals? When once again might grandparents pick up their grandchildren?”

Here is his proposal: In short, focus on the most vulnerable, protect them – and get others back to work:

If we were to focus on the especially vulnerable, there would be resources to keep them at home, provide them with needed services and coronavirus testing, and direct our medical system to their early care. I would favor proactive rather than reactive testing in this group, and early use of the most promising anti-viral drugs. This cannot be done under current policies, as we spread our relatively few test kits across the expanse of a whole population, made all the more anxious because society has shut down. This focus on a much smaller portion of the population would allow most of society to return to life as usual and perhaps prevent vast segments of the economy from collapsing. Healthy children could return to school and healthy adults go back to their jobs. Theaters and restaurants could reopen, though we might be wise to avoid very large social gatherings like stadium sporting events and concerts. So long as we were protecting the truly vulnerable, a sense of calm could be restored to society. Just as important, society as a whole could develop natural herd immunity to the virus. The vast majority of people would develop mild coronavirus infections, while medical resources could focus on those who fell critically ill. Once the wider population had been exposed and, if infected, had recovered and gained natural immunity, the risk to the most vulnerable would fall dramatically. A pivot right now from trying to protect all people to focusing on the most vulnerable remains entirely plausible. With each passing day, however, it becomes more difficult. The path we are on may well lead to uncontained viral contagion and monumental collateral damage to our society and economy. A more surgical approach is what we need.”

Can we rethink our policies and strategy? Can we add some thought about economics to the public health/medical policy mix? Can we think ahead of the virus, instead of chasing it and falling behind? Can we truly think cost-benefit, systemically, holistically?

The World After COVID-19

What happens after the COVID-19 pandemic subsides? Two McKinsey (global consulting company) experts Kevin Sneader and Shubham Singhal provide some insights. This blog is rather long – warning!

They describe a five-stage process we need to manage: In order: the five R’s -- Resolve, Resilience, Return, Reimagine, Reform.

First point: Everything, *everything* will change.

“It is increasingly clear our era will be defined by a fundamental schism: the period before COVID-19 and the new normal that will emerge in the post-viral era: the “next normal.” In this unprecedented new reality, we will witness a dramatic restructuring of the economic and social order in which business and society have traditionally operated. And in the near future, we will see the beginning of discussion and debate about what the next normal could entail and how sharply its contours will diverge from those that previously shaped our lives. Collectively, these five stages represent the imperative of our time: the battle against COVID-19 is one that leaders today must win if we are to find an economically and socially viable path to the next normal.”

The authors then note a five-stage process for moving forward:

Step One. Resolve “...a toxic combination of inaction and paralysis remains, stymying choices that must be made: lockdown or not; isolation or quarantine; shut down the

factory now or wait for an order from above. That is why we have called this first stage Resolve: the need to determine the scale, pace, and depth of action required at the state and business levels. As one CEO told us: “I know what to do. I just need to decide whether those who need to act share my resolve to do so.”

Step Two. Resilience. “A McKinsey Global Institute analysis, based on multiple sources, indicates that the shock to our livelihoods from the economic impact of virus-suppression efforts could be the biggest in nearly a century. In Europe and the United States, this is likely to lead to a decline in economic activity in a single quarter that proves far greater than the loss of income experienced during the Great Depression. In the face of these challenges, resilience is a vital necessity. Near-term issues of cash management for liquidity and solvency are clearly paramount. But soon afterward, businesses will need to act on broader resilience plans as the shock begins to upturn established industry structures, resetting competitive positions forever. Much of the population will experience uncertainty and personal financial stress. Public-, private-, and social-sector leaders will need to make difficult “through cycle” decisions that balance economic and social sustainability, given that social cohesion is already under severe pressure from populism and other challenges that existed pre-coronavirus.”

Step Three. Return. “Returning businesses to operational health after a severe shutdown is extremely challenging, as China is finding even as it slowly returns to work. Most industries will need to reactivate their entire supply chain, even as the differential scale and timing of the impact of coronavirus mean that global supply chains face disruption in multiple geographies. The weakest point in the chain will determine the success or otherwise of a return to rehiring, training, and attaining previous levels of workforce productivity. Leaders must therefore reassess their entire business system and plan for contingent actions in order to return their business to effective production at pace and at scale. Government leaders may face an acutely painful “Sophie’s choice”: mitigating the resurgent risk to lives versus the risk to the population’s health that could follow another sharp economic pullback. Compounding the challenge, winter will bring renewed crisis for many countries. Without a vaccine or effective prophylactic treatment, a rapid return to a rising spread of the virus is a genuine threat. In such a situation, government leaders may face an acutely painful “Sophie’s choice”: mitigating the resurgent risk to lives versus the risk to the population’s health that could follow another sharp economic pullback. Return may therefore require using the hoped-for—but by no means certain—temporary virus “cease-fire” over the Northern Hemisphere’s summer months to expand testing and surveillance capabilities, health-system capacity, and vaccine and treatment development to deal with a second surge. See “Bubbles pop, downturns stop” for more.”

Step Four. Reimagination. “A shock of this scale will create a discontinuous shift in the preferences and expectations of individuals as citizens, as employees, and as consumers. These shifts and their impact on how we live, how we work, and how we use technology will emerge more clearly over the coming weeks and months. Institutions that reinvent themselves to make the most of better insight and foresight, as preferences evolve, will disproportionately succeed. Clearly, the online world of contactless commerce could be bolstered in ways that reshape consumer behavior forever. But other effects could prove even more significant as the pursuit of efficiency gives way to the requirement of resilience—the end of supply-chain globalization, for

example, if production and sourcing move closer to the end user. The crisis will reveal not just vulnerabilities but opportunities to improve the performance of businesses. Leaders will need to reconsider which costs are truly fixed versus variable, as the shutting down of huge swaths of production sheds light on what is ultimately required versus nice to have. Decisions about how far to flex operations without loss of efficiency will likewise be informed by the experience of closing down much of global production. Opportunities to push the envelope of technology adoption will be accelerated by rapid learning about what it takes to drive productivity when labor is unavailable. The result: a stronger sense of what makes business more resilient to shocks, more productive, and better able to deliver to customers.

Step Five. Reform. *“The world now has a much sharper definition of what constitutes a black-swan event. This shock will likely give way to a desire to restrict some factors that helped make the coronavirus a global challenge, rather than a local issue to be managed. Governments are likely to feel emboldened and supported by their citizens to take a more active role in shaping economic activity. Business leaders need to anticipate popularly supported changes to policies and regulations as society seeks to avoid, mitigate, and preempt a future health crisis of the kind we are experiencing today.*

“In most economies, a healthcare system little changed since its creation post–World War II will need to determine how to meet such a rapid surge in patient volume, managing seamlessly across in-person and virtual care. Public-health approaches, in an interconnected and highly mobile world, must rethink the speed and global coordination with which they need to react. Policies on critical healthcare infrastructure, strategic reserves of key supplies, and contingency production facilities for critical medical equipment will all need to be addressed. Managers of the financial system and the economy, having learned from the economically induced failures of the last global financial crisis, must now contend with strengthening the system to withstand acute and global exogenous shocks, such as this pandemic’s impact. Educational institutions will need to consider modernizing to integrate classroom and distance learning. The list goes on.

“The aftermath of the pandemic will also provide an opportunity to learn from a plethora of social innovations and experiments, ranging from working from home to large-scale surveillance. With this will come an understanding of which innovations, if adopted permanently, might provide substantial uplift to economic and social welfare—and which would ultimately inhibit the broader betterment of society, even if helpful in halting or limiting the spread of the virus.”

Unemployment Insurance? Or Guaranteed Wages?

The Cost of Wrong Choices

US politicians, led by POTUS (President of the United States) are congratulating themselves for the \$2.2 trillion bailout (Care Act), bringing relief to Americans out of work.

But let’s look at this more closely. US unemployment has leaped from a 40 year low, to what the St. Louis Federal Reserve believes could be as high as 32% (higher than

the 24% unemployment rate in the Great Depression of the 1930's). So the right approach is: Extend unemployment benefits. Right?

Wrong!

A New York Times article by leading economics Emmanuel Saez and Gabriel Zucman makes this case:

“Instead of safeguarding employment, America is relying on beefed-up unemployment benefits to shield laid-off workers from economic hardship. To give just one example, in both the United States and Britain, the government is asking restaurant workers to stay home. But in Britain, workers are receiving 80 percent of their pay (up to £2,500 a month, or \$3,125) and are guaranteed to get their job back once the shutdown is over. In America, the workers are laid off; they must then file for unemployment insurance and wait for the economy to start up again before they can apply for a new job, and if all goes well, sign a new contract and resume working.”

So clearly – the ‘extend unemployment insurance’ approach is NOT a solution. In the US, the right policy is to protect jobs. The wrong policy, the one adopted, is to pay pittance to those thrown out of work, in large part owing to government ‘shelter at home’ policy. The NYT continues:

“This dramatic spike in jobless claims [in the US] is an American peculiarity. In almost no other country are jobs being destroyed so fast. Why? Because throughout the world, governments are protecting employment. Workers keep their jobs, even in industries that are shut down. The government covers most of their wage through direct payments to employers. Wages are, in effect, socialized for the duration of the crisis.”

Socialized? SOCIALIZED!!!!???? Oh my, there's that word, socialism. Yikes.

The US has a huge problem with semantics. Let's be clear. *Socialism is an economic and social and political system, in which the means of production, distribution, and exchange are owned by the government.* By paying wages to employers, governments are NOT implementing socialism, but preserving capitalism, by keeping employers and their companies alive, for a few months. That's it!

America, open your windows (how often have I said that!). Check out Europe, “Old Europe”, as US Presidents like to say.

“Some countries — like Germany, with its Kurzarbeit system, a policy aimed at job retention in times of crisis — already had the government infrastructure in place to send workers home while the state replaced most of their lost earnings. [Kurzarbeit, ‘short work’, shortens the work week for all to distribute the hours among more people]. But several nations with no experience in that area — like Britain, Ireland and Denmark — were able to introduce brand-new employment guarantee programs on the fly during the epidemic.

There is a fundamental problem with using unemployment insurance as the main bailout tool:

“Even if unemployment is generously compensated — as it is in the \$2.2 trillion bill Congress passed — there is nothing efficient in letting the unemployment rate rise to double digits. Losing one's job is anxiety inducing. Applying for unemployment benefits

is burdensome. The unemployment system risks being swamped soon by tens of millions of claims. *Although some businesses may rehire their workers once the shutdown is over, others will have disappeared.* When social distancing ends, millions of employer-employee relationships will have been destroyed, slowing down the recovery. In Europe, people will be able to return to work, as if they had been on a long, government-paid leave.”

There is a fundamental hidden assumption in the US Care (bailout) Bill. It is based on liquidation – let businesses go broke, they screwed up anyway, we’ll re-establish them when all this blows over. Wrong!!!

A liquidationist ideology seems to have infected minds on both the left and the right. On the right, opposition to government grants to businesses is grounded in the view that markets should be left to sort out the consequences of the pandemic. Let airlines go bankrupt; shareholders and bondholders will lose but the airlines will restructure and re-emerge. The best way government can help is by slashing taxes, according to this view. The relief package includes more than \$200 billion in tax cuts for business profits. *This view is misguided. There is nothing efficient in the destruction of businesses that were viable before the virus outbreak.* The crisis cannot be blamed on poorly managed corporations. Government support, in the case of a pandemic, does not create perverse incentives. Bankruptcies redistribute income, but in a chaotic and opaque way. And while bankruptcy might be a way to deal with the economic fallout of the pandemic for large corporations, it is not well adapted to small businesses. Without strong enough government support, many small businesses will have to liquidate.

Wrong-headed American policy impacts us all. In the good old days of the global economy, from the 1950’s onward, whenever the world economy slowed, America’s economy was the locomotive. Burgeoning spending by eager US consumers created demand that pull other economies out of the mud, worldwide. That was a crucial role America played.

Today? We’re going to need America and China both, as locomotives, to pull us out of the Depression COVID-19 is causing. China seems to be coming out of it. Well done. But the US? Not under current policies. Sooner or later, policymakers will recognize their error. But the US President NEVER admits error and doubles down on wrongheaded statements and policies. So don’t count on the US correcting its fundamental MASSIVE mistake.

World, we’re on our own. America will sink, under a mountain of unemployment applications.

The End of the Beginning

There is evidence that, to quote Winston Churchill, “we are not at the beginning of the end, but..at the end of the beginning.” Here are the daily totals of new cases worldwide, thanks to worldometer.com, and next to them, the % daily change:

3-Apr	101736	
4	84821	-16.6 %
5	71502	-15.7
6	74044	3.6
7	85116	15.0
8	84447	-0.8
9	85638	1.4
10	94629	10.5
11	80963	-14.4
12	72523	-10.4
13	71572	-1.3
14	73969	3.3

What this looks like, is a kind of 'plateau' levelling off -- as the coronavirus spread globally, some countries were afflicted early, others later. So countries will reach their 'apex' at differing times... (the US is still not there yet)... And this will produce a kind of plateau worldwide.

The reason this is important, is this -- countries will begin to emerge from their 'lockdown' at different times, some sooner than others. Denmark is opening its kindergartens, China is sending Wuhan back to work in part.

But in terms of public health, we need to see this as a global system. If there are hot pockets in one country, no country is safe -- because a return to normality will restart flights and travel. And we still do not fully understand the duration or extent of coronavirus immunity for those who had it.

Compassionate Capitalism: Filling in the Details



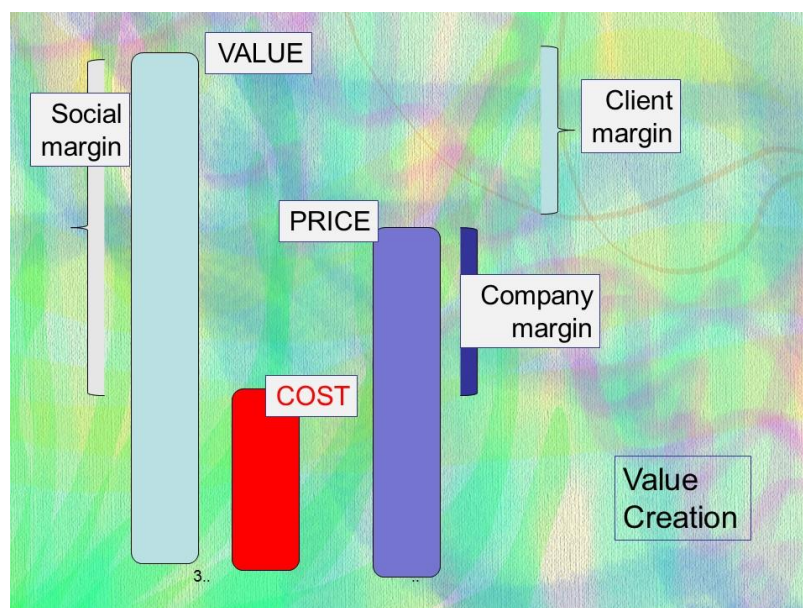
Compassionate capitalism

In an earlier blog, I proposed that businesses adopt a new formula for free-enterprise capitalism: Price at cost. I called this "compassionate capitalism", suitable for this new era of unprecedented unemployment, hardship and economic collapse. The goal: Preserve jobs, keep businesses alive, but help the people stretch their diminishing incomes.

My close friend in Vietnam, Tran Luong Son, reports that the idea is resonating in his country, but there remain many practical questions. Let me try to answer some of them. In general, I propose to launch a voluntary group of visionary business leaders, willing to embrace C (the capital C is for compassion, the small 'c' is for capitalism), and to commit to a small number of Cc principles.

Can you outline a clear simple methodology for applying Cc?

1. Open an Excel sheet for each of your products and services.
2. Begin with variable costs (costs of production and distribution). Wages: lower than pre-plague but reflecting the needs and productivity of workers; senior management take proportionately bigger cuts. Materials: Take into account second sourcing – businesses that used a single source are, in many cases, in trouble.
3. Cost of capital: This is an opportunity cost. The risk-adjusted return on capital has declined, but is recovering. Use again the principle of fairness: Owners of capital need a return on their money, but not as high as pre-plague. They too must take cuts, as do wage-earners.
4. Fixed costs: Governments are part of this. They need to contribute as well, by reducing income and profit taxes and property taxes. Many governments have job-preservation schemes, to replace unemployment insurance with partial wage subsidies.
5. Prioritize: Apply the McCabe principle. Tom McCabe was the legendary CEO of Scott Paper, making it a great global company. He had every senior manager put this plaque on the wall: Whom do we serve? 1. Customers 2. Our community 3. Our country 4. Our employees. 5. Our shareholders. Shareholders last???? McCabe had a simple answer. Of course. If you serve the other four well, you will best serve your shareholders, in the long run. This applies more than ever now. In Cc compassionate capitalism, serve your customers, your community and your country, and your employees. They come first. This is what capitalism should look like, if we are to sustain it.
6. Use the “value sharing” principle. When I taught this to MBA students, there was blood on the floor. They were taught to profit maximize. This is more than obsolete, it is immoral in today’s plague-ridden world.



- a) Estimate the value your product or service creates, by the average amount your clients would be willing to pay for it, if you ‘squeezed’ them at the maximum. (\$). B)

estimate the cost of providing the product or service, taking into account maximum productivity and hidden costs (opportunity cost of capital – see above). C) set the price as close as you can to cost, while sustaining the business and its jobs. To maximize client margin (the net value your clients get from your product). These days, ‘value’ is way down, for most products and services, because our income and disposable income are way down. If you still manage to generate ‘client margin’ (net value for clients), you will have loyal customers for three generations or for a century. We customers will not forget who served us (McCabe principle) and who ripped us off.

Capitalism can no longer afford to maximize ‘company margin’. The game today is to maximize ‘client margin’.

COVID-19: The Economists’ Perspective

As readers know, I am an economist and have been super-critical of my fellow economists; I believe our prescriptions have done massive damage to the world, including the free-market greed-is-good credo that led to 2007/8. But in the current pandemic, I am hearing words of wisdom from brilliant economists like Nobel Laureate Paul Krugman, a New York Times columnist.

In his latest Op-Ed, in the New York Times (April 1) Krugman brings some serious wisdom. Let me summarize what he says.

“To simplify things, think of the economy as consisting of two sectors, nonessential services (N) that we can shut down to limit human interactions and hence the spread of the disease, and essential services (E) that we can’t (or perhaps don’t need to, because they don’t involve personal interaction.) We can and should close down the N sector until some combination of growing immunity, widespread testing to quickly find and isolate cases, and, if we’re very lucky, a vaccine let us return to normal life.

“For those (like me) still receiving their regular paychecks, this period of shutdown — call it the coronacoma — will be annoying but not serious. I miss coffee shops and concerts, but can live without them for however long it takes.

“Things will, however, be very different and dire for those who are deprived of their regular income while the coronacoma lasts. This group includes many workers and small businesses; it also includes state and local governments, which are required to balance their budgets but are seeing revenues collapse and expenses soar.

“How big is the N sector? Miguel Faria-e-Castro of the St. Louis Fed [summarizes estimates](#) that are as good as any: 27 to 67 million people, [for the United States], which he averages to 47 million. That’s a lot; we could be looking at a temporary decline in real GDP of 30 percent or more. But that GDP decline isn’t the problem, since it’s a necessary counterpart of the social distancing we need to be doing. *[The problem instead is how to limit the hardships facing those whose normal income has been cut off.](#)*

“What can be done to help those cut off from their normal incomes during this period of national lockdown? They don’t need jobs — we don’t *want* them working at a time when normal work routines can spread a deadly disease. What they need, instead, is money. That is, what’s needed now is disaster relief, not economic stimulus.”

So many 'experts' who tell us what should be done, are sitting pretty with large bank accounts and salaries that continue to flow. Krugman's empathy for those without income – many millions – is exemplary. THEY are the ones we need to worry about most.

So, as I've written elsewhere: Save Lives, yes... by writing checks. If needed, pay the salaries and wages of workers for businesses, to keep them afloat. Disaster relief...as Krugman says.

Testing holds the key. Why? Using Krugman's terminology: Suppose we had sufficient tests, deployed rapidly, with quick results, to know if EVERY working person had COVID-19. Divide the populace into N (non-essential, or infected) and E (essential and clean). If you shut down N+E together, everyone, you lose output and jobs – you lose E times (average output or income of E), which is huge and unnecessary. If you shut down only N, you get all the jobs and output of E, and income. And you can use it to help pay survival incomes to the N.

This makes sense, right? And we CAN get those quick automated tests out the door if they are given priority.

Emerging from Plague: Thinking Ahead

With many nations still weeks from the 'apex' (the peak number of COVID-19 cases), it seems premature to discuss what the press and experts call 'exit' strategies – the period AFTER the plague. The word itself is wrongheaded. Exit strategies are what startups do, when they succeed in creating value and need to capture the wealth and return it to their investors and founders. Usually, by acquisition or issuing shares and selling them.

We do not seek an 'exit' strategy. We need an 'emergence' strategy, when we come out of our tunnels and rabbit holes and resume our regular lives. Words matter. There is no 'exit' from COVID-19, because it will remain endemic for a long time. There is 'emergence'...with great caution.

How best can this be done? How should our governments be planning emergence?

Here are some wise thoughts by Prof. Ron Balicer, a person with whom I've worked, Chief Innovation Officer at Israel's Clalit Health Services (a large HMO) and a member of the Health Ministry's Epidemic Management Team. His article was published in the daily Haaretz newspaper.

"Mathematical models and past experience show that the spread of infection in communities living in overcrowded conditions can spark a renewed and serious outbreak among all segments of society. From an epidemiological perspective, Israel's population (as well as, to a large extent, that of the Palestinian Authority) constitutes interconnecting "communicating vessels" with immediate collateral impact.

"In the current setting, the most stable and reliable marker of population-based trends in disease dissemination is the trend in the numbers of severely ill and respirator-aided Covid-19 patients. However, this marker lags behind the real-time spread by several weeks. If we continue to see that this marker is stabilizing – a collective sigh of relief

will be heard. In the meantime, we must not wait for absolute certainty before planning the next phase of contending with this crisis and its attendant closure: the exit strategy.

“I propose two preconditions for initiating this strategy: The first is a significant halt in the exponential rate of the disease spread, and the availability of a substantial number of free beds in intensive care units, which will serve as the buffer and allow a margin of error to prevent a collapse should easing of the lockdown spur a sudden increase in infections. Let’s use some numbers as an illustration: In the optimistic scenario in which there are up to 100 seriously ill or respirated people in Israel on the eve of Passover, the distance between where we are now and the point of health system insufficiency is 4-5 doublings of the number of people needing artificial respiration. In recent weeks we’ve seen that the doubling time is three days, with faster rates in some localities.

“The second condition required before embarking on that strategy is to obtain a real-time intelligence assessment, detailed and updated, regarding the rates of infection among different communities. This is a precondition for resorting to a rapid intervention vis-a-vis every new patient, as is happening in countries that have managed to successfully curb the epidemic to date.

“In other words, there needs to be an efficient system of conducting lab tests for Covid-19 among a wide swathe of the population, in order to exercise an effective exit strategy. To that end, Israel is hopefully gaining what will be an exceptional per-capita testing capacity, even in comparison to the advanced countries. The 30.000 daily tests we hope to be able to conduct in a few weeks' time should be conducted dynamically and judiciously in order to facilitate this intelligence assessment.

“An exit strategy requires a change: a transition from social distancing and full lockdown enforced on the entire population in a sweeping and non-selective manner, to a new status quo. This new routine could be based on three components: a fast and focused effort to locate and tackle infected individuals; a differential and dynamic lockdown policy among targeted communities; and designated policies for allowing recovered immune patients to return to normal life and take a continuously increasing role in sustaining the economy.

“All this needs to be done while adapting the economy to working remotely with strong delivery services, to daily conduct based on social distancing and environmental hygiene in every workplace, and to continued construction of medical infrastructure, with maximal protection of medical teams.

“As part of the new status quo, the older population will remain as isolated "islands" within each community for a longer period, having its physical, emotional and social needs met on a daily basis.

[“There are several components --] The first component involves the efficient and determined tracking down of newly infected people and their rapid removal from the infective pool. This demands a rapid “closing of the circle” capacity. The multi-stage process of locating people suspected of being infected and having them tested for Covid-19, the rapid quarantine of sick people removed from home, an epidemiological investigation and a quick isolation of their contacts – all this must be accomplished with speed and precision. Moreover, it must be done in large numbers of cases and contacts.

For this condition to be met, a combination of capabilities – which at present are suboptimal – must be achieved. These include extensive and carefully thought-out testing of all people who have been in contact with the new cases; the ability to obtain results quickly for those who tested positive, and their removal from their families to hotels or other facilities; both manual and electronic epidemiological investigation, contact tracing and their quarantine; and firm enforcement of social-distancing instructions, among all segments of society.

“The second component is a **geographically differential** lockdown/quarantine policy, dynamically updated according to the available data. Communities in which there is persistent transmission of the virus, and those with individuals who are particularly vulnerable, must remain under a stricter lockdown, whereas communities in which transmission has effectively been mitigated can enjoy a continued easing of restrictions.

“The country can be divided into sub-regions. Imagine that one day the radio announces that areas A, B and D can go to work from now on, whereas area C (i.e., Jerusalem or Rahat) is still to be confined to home. On another day, area A might be asked to reinstate a four-week lockdown, in view of ensuing infection. Obviously, such a policy won’t completely prevent “leakage” between areas and communities, but it will significantly head it off, and with the other components in place, this may be sufficient.

“In order to facilitate and supervise such a policy, an ongoing process of real-time intelligence-gathering must be established, including the continual monitoring of self-reported symptoms and continuous screening for infected people, in order to detect potential outbreaks as early as possible.

“The third component: Once serologic blood tests will become largely available, we will be able to conduct mass testing and define a growing number of recovered immune individuals. **This group will assume an increasing role in re-operating businesses with few restrictions. Moreover, older people who got sick and recovered could also return to a “new normal” routine.**

“In my view, easing of the closure will take place as a continuous, **gradual process** of experimentation and re-assessment, in cycles of several weeks each. In each cycle, significant restrictions will be lifted, followed by a tense watchful waiting period of several weeks, required to evaluate its impact on the dissemination rates. *If the doubling time does not accelerate significantly, and the safety margin of available intensive care beds has not been reduced to the danger level, further easing of measures can be then implemented.*”

Emerging from Plague: Thinking Ahead (2)

As the ‘rate of doubling’ (number of days COVID-19 cases double, from every three days to weekly or more) slows, in some countries, even plague-ridden ones like Italy, a new danger emerges: Complacency.

Writing in the New York Times, Nicholas Kristof warns of a second wave.

“...countless thousands will still die because of past mistakes and complacency. A pandemic is like an oil tanker: It continues to move forward long after you hit the brakes.”

In China, deaths didn't fall sharply until a month after controls had been imposed. The benefits from social distancing in the United States will take time to ripple through the system, and there will continue to be new infections — and many more deaths.

Kristof continues: “The Institute for Health Metrics and Evaluation at the University of Washington has a constantly updated model that predicts that the daily death toll across the United States will rise until April 16 and then slowly decline. By the beginning of August, it estimates that more than 93,000 Americans will have died from Covid-19.”

“More bad news: Case fatality rates have been creeping up, and lethality may be greater than many had expected. Germany was hailed for a death rate of only about 0.5 percent, and South Korea was not much higher; now both have case fatality rates well above 1 percent. In models of the virus that my colleague Stuart A. Thompson and I published, we used a death rate of 1 percent. But if the South Korean death rate by age is applied to the demography of the United States, the American case fatality rate is about 2 percent, according to Dr. Christopher Murray, the director of the Institute for Health Metrics and Evaluation.

“A great majority of the deaths in the United States will have been avoidable. South Korea and the United States had their first coronavirus cases on the same day, but Seoul did a far better job managing the response. The upshot: It has suffered only 174 coronavirus deaths, equivalent to 1,100 for a population the size of America's.

“That suggests that we may lose 90,000 Americans in this wave of infections because the United States did not manage the crisis as well as South Korea did. As of Friday night, the U.S. had already had more than 7,000 deaths. while we can bend the curve, it will bend back when we relax our social distancing.

“This is more bad news, for many people seem to believe that once we get through this grim month or two, the nightmare will be over. But the virus is resilient, and health experts warn that this may be just the first wave of what may be many waves of infections until we get a vaccine sometime in 2021.

“We're just looking at this first wave,” noted Dr. Murray. He estimates that in June, some 95 percent of Americans will still be susceptible to the virus. *“The world's on fire with this virus,” said Michael Osterholm, an epidemiologist at the University of Minnesota, and this means that even if one country succeeds in putting out the blaze, sparks will keep arriving from elsewhere to cause new outbreaks. He added: “I think the transmission will continue to occur for some time.”*

Emerging from Virus: Academics Step Up

Public health officials, who are in control in most countries, have their hands full, dealing with the medical crisis. So it is up to us, academics and others, to begin weighing options for emerging from the lockdown.

An interuniversity team led by Tel Aviv U. President Ariel Porat and Weizmann Institute President Alon Chen, have prepared an excellent 27-page plan. Details are reported by Haaretz journalist Meirav Arlosoroff.

(Suggestion to other countries: why not set up a similar team? Include epidemiologists, virologists, economics, psychology, law, computer science, even quantitative physics, and of course public health).

Here are the options the experts present. Option One: Maintain the strict lockdown. Option Two: the opposite, speed up the rate of infection among Israel's non-vulnerable population (is there such a thing?) to achieve 'herd immunity' (VERY bad term – we are NOT a herd... why not population immunity? Or mass immunity?). Under the second option, the elderly would remain in isolation for their protection.

Neither are very attractive, are they? There is a missing link – widespread testing, to provide detailed data. The required number of tests is not available.

So the committee suggests a third option -- a "gradual lifting of the lockdown while officials carefully monitor numbers related to the pandemic. Divide Israel into equally sized 'risk zones' based on how far and wide the coronavirus has spread. Red zones would maintain total lockdown. Yellow zones would be where people are allowed to leave their homes for work, provide they *stay inside the yellow zone!* In Green Zones residents are free to go to their jobs, including jobs outside their zone. Those showing symptoms remain in quarantine in all three zones. Those shown to be immune are free to go wherever they please. (A key here is a serological antibody test, not yet widely available) Places of work would reopen, subject to strict rules on hygiene and social distancing. Workplaces would be graded, according to how risky they are for a 'second wave' outbreak. Workplaces barred from opening would be exempt from rent.

The committee also recommended tax incentives to encourage work from home.

Division in red, orange, green zones is based on sophisticated mathematical models that predict the epidemic's spread – along with high levels of testing. Sampling tests that show less than the 2-3% infection rates would enable ease of the lockdown. Green zones are where the number of serious cases doesn't exceed 100 and the infection rate is less than 8 %. Technologies like location technology and artificial intelligence will be used to predict the possible rate of contagion.

Since test kits are in short supply, a model for sampling should be used, for each zone, including children, so schools can reopen.

The Committee says that a measured exit from the lockdown can and should already begin. It calls for allowing between 900,000 and 1.5 million workers to return to their jobs. This is between one quarter and a third of Israel's work force.

"Data from the math models shows that the virus' high infection rate does not allow for complete release from lockdown, even for Green zones", they note. Social distancing still is the main tool, to reduce infection parameters by a factor of 2 to 3. Areas of especially high infection must receive special treatment, such as the ultra-Orthodox areas.

I believe that each country needs its own inter-University committee of this sort, because each country has its own culture and unique circumstances. It needs to be a non-governmental civilian effort, because governments are simply focused on the day-to-day.

Mukherjee: Worth Reading and Heeding

Who is Dr. Siddhartha Mukherjee? He is a 49-year-old Indian-American, physician, biologist, oncologist, author, TV commentator. His book on cancer won the Pulitzer Prize in 2011. He is an Associate Professor of Medicine in the Division of Hematology and Oncology, Columbia University Medical Center.

The Government of India conferred on him its fourth highest civilian award, the Padma Shri, in 2014.

His article in *The New Yorker* on the pandemic is brilliant and clear. Here is a brief summary of his main points. (800 words...).

* Ancient Chinese and Indians, and Arab doctors, knew long ago, that you could 'vaccinate': e.g. "taking matter from a smallpox patient's pustule and applying it to the pricked skin of an uninfected person, then covering the spot with a linen rag." Healers in China did this as early as 1100 AD.

* Three questions deserve attention: 1) "do people exposed to higher 'doses' of virus have increased risk of infection? (e.g. healthcare workers). 2) Is there a relationship between the 'dose' of virus and the severity of the disease?" 3) "can exact quantitative measures of how the virus behaves in infected patients (peak viral load, patterns of its rise and fall...) predict the severity of the illness, and its infectiousness to others? We need to start measuring the virus WITHIN people!"

The fact that we do not have strong proven answers to these questions, show how little we really know about COVID-19 and how we are fighting in the pitch dark!

For HIV, Mukherjee notes, how much was in a patient's blood produced a distinct pattern; the virus count in the blood rises to a peak "Peak viremia", patients with the highest peak viremia "typically became sick sooner, they were least able to resist the virus." (Same goes for coronavirus? We don't know). The set point too is crucial (the level to which a virus count settles and stabilizes, after its initial peak. People with a high set point move quicker to actual AIDS (autoimmune disease). Same for COVID-19? Also, viral load (quantity of the virus in the body) helped predict (AIDS') nature, course and transmissibility. (Same for COVID-19?)....

For kids – could an initial low-level exposure (as the ancient Chinese Indians and Arabs did) lead to a lower set point, (and hence less COVID-19 danger and risk?)....

Mukherjee cites research showing "the more virus you shed, the more likely you are to infect others" from HIV research. I.e., the R0 number (numbers infected by one infected person) is variable, depending on how much virus the infected person 'sheds'.

"Does a large viral dose result in more severe disease? "For reasons we don't understand front-line healthcare workers are at greater risk for serious illness despite their younger age." Is it because they are exposed to 'higher doses'? (Correlation between dose and severity varies widely from one strain of flu to the next). Corona viruses "seem to follow the pattern seen in influenza". A SARS study showed (in Hong Kong) that "a higher initial load of virus measured in the deep part of your throat above your palate was correlated with more severe respiratory illness". For measles, there is proven links between dose and severity.

Finally, can we track viral load and hence predict the course of the disease? Here's the catch. Tests are done with oral swabs. But viral dose varies immensely with *how the oral swab is administered, and it varies tremendously among doctors and healthcare workers who administer the swab!* A study in the Lancet medical journal does show that "viral loads...from patients with severe COVID-19 were 60 times higher on average than loads among patients with a mild form of the disease"!

Data. Bring me data. We need to know how much virus COVID-19 patients harbor, not just whether they harbor any.

"If we had "dosimetry" (viral dose measures), we can quarantine those who are most infectious."

Let's do a two-step procedure. 1. Identify infected patients. 2. Quantify viral loads in nasal or respiratory secretions. Plan medical care accordingly.

End Lockdown? Mukherjee says, we need two criteria: people have no measured viral shedding, and they have signs of *persistent immunity* in their blood (antibody test). Healthy immune workers are crucial – they can work with no danger to themselves or others, and they can care of other sick people!

Why should we listen to an oncologist? "Measurement and enumeration are the mainstays of medicine for people in my field. We do 'risk stratification'. " This should be the case for treating COVID-19 too.

Mukherjee makes a simple medical point. "To win the (battle) against COVID19, it is essential to trace the course of the virus as it moves through the populations. But it's equally essential to measure its course within a single patient. The one becomes the many. Count both; both count."

Coronavirus Genes Tell the Story!

A saying in the Jewish Talmud: Know where you've come from, know where you are going. Based on a New York Times article on the virus genome:

Where did the novel coronavirus come from in the first place?

From a Chinese horseshoe bat...but "researchers found the virus infecting humans now split off from the bat decades ago and gained some unique mutations". (Maciej Boni, Penn State U, using sophisticated computer programs analyzing genetic structures).

How do viruses mutate?

Sometimes two different coronaviruses enter a single cell, and the resulting copy made by the cell's DNA is a combination of the two...a new mutation.

How different are the various coronaviruses?

In January a team of Chinese and Australian researchers published the first genome of the new virus. (Kudos to them! They distributed it instantly and widely!). Since then researchers worldwide have sequenced the genes of 3,000 coronaviruses. Some are identical, some are distinctive mutations.

Implication: For many years we will need to track this virus, lest it mutate viciously and 'successfully'.

Where can researchers find the data on the virus genomes?

Look up the online database GISAID. Evolution experts are analyzing how the virus evolves, in a project called Nextstrain, and constantly update the virus 'family tree'.

What did genome researchers learn about the spread of coronavirus in the US?

Dr. Trevor Bedford, U. of Washington, and team found that it was not spreading in the US "in December". President Trump poured scorn on those warning about the spreading virus, calling it a 'hoax'. Had quarantines been imposed earlier, many of the deaths could have been prevented. "A virus identified in a patient in late February (in New York) had mutation shared by one identified in Washington (state) on Jan. 20". The current New York pandemic, deadly, could have been stopped if the experts' warnings had been heeded. But "climate denial" and "science expert denial" seem to go together in the US Administration.

How many novel coronavirus versions have been found so far?

Researchers at Mt. Sinai Hospital, New York City, have "identified seven separate lineages of viruses that entered New York and began circulating." They believe that ... "we will probably find more".

Is there any good news in all this research?

Yes! One piece of knowledge that has not been widely reported. "Some viruses evolve so quickly that they require vaccines that can produce several different antibodies". (This makes producing a good vaccine really hard!). "But that's not the case for COVID-19. Like other coronaviruses it has a relatively slow mutation rate compared to some viruses, like influenza. ..its mutation rate reveals, things could be a whole lot worse".

A Vaccine is Coming – from Pittsburgh ***

Before the good news about a COVID-19 vaccine – a piece of history.

In 1947, native New Yorker Jonas Salk accepted an appointment to the University of Pittsburgh School of Medicine. In 1948, he undertook a project funded by the National Foundation for Infantile Paralysis to determine the number of different types of poliovirus. Salk saw this was a golden opportunity to extend this project towards developing a vaccine against polio. He built a research team and devoted himself to this work for the next seven years. The field trial set up to test the Salk vaccine involved 20,000 physicians and public health officers, 64,000 school personnel, and 220,000 volunteers. Over 1.8 million schoolchildren took part in the trial.

On March 26, 1953, Salk announced on a national radio show that he had successfully tested a vaccine against poliomyelitis, the virus that causes the crippling disease of polio. In 1952—an epidemic year for polio—there were 58,000 new cases reported in the United States, and more than 3,000 died from the disease. Dr. Salk was celebrated as the great doctor-benefactor of his time.

Fast forward. A press release from the NIH: <https://www.nih.gov/news-events/nih-research-matters/microneedle-coronavirus-vaccine-triggers-immune-response-mice>

“After the identification of SARS-CoV-2, the genome sequence of the new coronavirus was rapidly released to the public by scientists in China. Several weeks later, National Institute of Health-funded scientists produced a detailed picture of the part of the virus, called the spike protein, that allows it to infect human cells. This spike protein is currently the target of several vaccine development efforts. And we see the graphic version of the corona ‘spikes’ everywhere...

“Researchers led by Drs. Louis Falo, Jr. and Andrea Gambotto from the University of Pittsburgh have been working to develop vaccines for other coronaviruses, including the one that causes Middle East Respiratory System (MERS). They adapted the system they had been developing to produce a candidate MERS vaccine to rapidly produce an experimental vaccine using the SARS-CoV-2 spike protein.

The team developed a method for delivering their MERS vaccine into mice using a microneedle patch. Such patches resemble a piece of Velcro, with hundreds of tiny microneedles made of sugar. The needles prick just into the skin and quickly dissolve, releasing the vaccine. Since the immune system is highly active in the skin, delivering vaccines this way may produce a more rapid and robust immune response than standard injections under the skin.

“When delivered by microneedle patch to mice, three different experimental MERS vaccines induced the production of antibodies against the virus. These responses were stronger than the responses generated by regular injection of one of the vaccines along with a powerful immune stimulant (an adjuvant). Antibody levels continued to increase over time in mice vaccinated by microneedle patch—up to 55 weeks, when the experiments ended.

“Using knowledge gained from development of the MERS vaccine, the team made a similar microneedle vaccine targeting the spike protein of SARS-CoV-2. The vaccine prompted robust antibody production in the mice within two weeks.

“The vaccinated animals haven’t been tracked for enough time to see if the long-term immune response is equivalent to that observed with the MERS vaccines. The mice have also not yet been challenged with SARS-CoV-2 infection. However, the findings are promising in light of results from the similar MERS vaccine.

“The components of the experimental vaccine could be made quickly and at large-scale, the researchers say. The final product also doesn’t require refrigeration, so it could be produced and placed in storage until needed. The team has now begun the process of obtaining approval from the U.S. Food and Drug Administration to launch a phase 1 trial within the next several months.

“Much work still needs to be done to explore the safety and efficacy of this candidate vaccine. “Testing in patients would typically require at least a year and probably longer,” Falo says. “This particular situation is different from anything we’ve ever seen, so we don’t know how long the clinical development process will take.”

OK – it works in mice. Now for humans. A vaccine is on the way – and it may emerge again from Univ. of Pittsburgh.

Remdesivir: Grasping at Straws ***

There is a massive amount of fake news circulating now about COVID-19, some of it racist, pernicious and dangerous. There is also well-meaning news, reports that want to bring hope but in fact are simply grasping at straws.

A report now viral, emanating from the University of Chicago, is about how an anti-viral drug developed by a pharma company, Gilead, has helped seriously ill COVID-19 patients.

Remdesivir is an antiviral medication; a nucleotide analog, specifically an adenosine analogue, which inserts into viral RNA chains, causing their premature termination. It is being studied during 2020 as a possible post-infection treatment for COVID-19 illness.

A U of Chicago doctor participated in an *internal hospital video* in which she reported that when seriously ill patients administered remdesivir, many recovered.

The video reached some hospital employees, who leaked it to journalists. That led to a highly optimistic report.

This is not a clinical test. There is no protocol, and no placebo (sugar pill given to some patients).

The drug, made by Gilead Sciences, was tested against Ebola with little success, but multiple studies in animals showed the drug could both prevent and treat coronaviruses related to Covid-19, including SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome).

We are all desperate for some good news. But grasping at straws is not going to help. The journalists who reported this “scoop” should have told us exactly what the source was, an internal chatty ‘gossip’ video of the kind that circulates in most hospitals.

The journalist who DID inform us was the CNN medical correspondent, is Elizabeth Cohen, who has serious training and deep scientific knowledge. She has a Master’s degree in public health. Her colleague is Dr. Sanjay Gupta, a neurosurgeon; together they comprise “the horse’s mouth” and to mix a metaphor, a horse’s mouth that does NOT grasp at straws.

Conclusion: Save Lives, Save Jobs

[This essay appears originally in the Marketplace column, Jerusalem Report fortnightly,]

Marketplace, before you inevitably flood this space with numbers, can you please lift the fog and simplify?

Sure. The goal of the government, and mainly our stalwart civil servants who are running things, is twofold: Save lives. Save jobs.

In a pandemic you save lives by quarantining people, because the virus spreads rapidly through contact. But when people can't go to work, saving lives destroys jobs, many thousands. So while saving lives, we also have to find creative ways to save jobs. And at the same time begin to prepare for the dawn, when we emerge from our homes and revive the economy.

Lives are foremost. But economic depression also ruins lives. So we have to manage this terrifying lives/jobs tradeoff wisely, learning from other smart nations and from history.

That's it in a nutshell. I believe the key issue is -- how to save lives, while at the same time saving jobs innovatively. I regret that in Israel, this is not how the core policy dilemma has been framed. And I am certain that there is a right answer.

What has the Netanyahu government done so far?

On Monday March 31 an emergency economic bailout program was announced by Prime Minister Netanyahu and Finance Minister Kahlon. Complementing it was a serious stiffening of 'shelter at home'. Netanyahu declared economic activity will be forced to slow even further, from 30% to 15 % of normal.

The total spending on the program is NIS 80 b. (\$22.3 billion). This is massive – 5.7% of GDP and includes the NIS 10 billion program announced early on March 11. The US emergency bailout program was bigger, and totaled 10% of GDP.

Some NIS 11 billion will go to healthcare (belatedly – in flu season Israeli hospitals stack beds in corridors.) Of that NIS 10 billion will go the healthcare system itself, for equipment and hiring, along with housing virus infected persons in hotels. Some NIS 1 billion will go to help at-risk populations, e.g. deliveries to the elderly.

For business sector loans, NIS 19.5 billion is allocated. Most of these loans will be government backed, with credit provided by commercial banks This sum divides up as: up to NIS 8 billion for small and medium-sized businesses, NIS 7 billion for large businesses with NIS 400 million and over in turnover, and the remainder, for loans to non-profits in health, education and welfare.

(Marketplace points out that when small businesses are drowning, it is not helpful to offer to lend them a bathing suit).

Some NIS 12 billion will be allocated to enable businesses to delay payments owed to the government or to receive government payments earlier. This includes NIS 9 billion in taxes owed or National Insurance payments and bills for water and electricity. It includes refunds for tax prepayments in February and March. Makes sense – most businesses could not pay taxes anyway.

Wage-earners will get NIS 17 billion, allocated for a 'social safety net', operated by National Insurance. Of this NIS 14 billion will go to unemployment benefits for those put on unpaid leave. This will cover such benefits for the coming three months. Some NIS 3 billion will go to those over 67 who would not qualify for unemployment benefits.

Infrastructure projects get NIS 7.7 billion, invested in Finance Ministry projects to enable "speedy recovery post-virus". It includes transportation infrastructure (NIS 1.1 billion), especially highway repair, and NIS 1.5 billion for high-tech companies. What a great time to build railway track and fix highways, when roads and trains are empty and we need to save jobs!

Businesses will get NIS 12.6 billion from the government budget. Half of this will be for companies that keep workers on the payroll rather than lay them off. Grants to the self-employed will total NIS 3 billion.

Will this not create a huge hole in the budget?

It will. But so what? Finance Ministry Director-General Shai Babad said earlier that the budget deficit in 2020 will jump to more than NIS 100 billion (\$27.7 billion), compared with NIS 55 billion (\$15.2 billion) in 2019. This is a massive understatement. But let us recall what J.M. Keynes said, during the Great Depression of the 1930's: If nobody is spending, the only source of demand in the economy is the government. When economies crash, deficits do not matter, jobs do. Save them. In the 1930's governments did not listen to Keynes and we had a decade-long Depression, ended only by a disastrous World War.

Babad warned that the economic cost to Israel of a five-week shutdown would amount to some NIS 130 billion (\$36.4 billion) and that a 12-week economic lockdown would cost NIS 280 billion (\$78.5 billion). The cost of the 12-week scenario is rather optimistic and the economic cost will be massive.

Israel is hugely fortunate that its economy entered the COVID-19 crisis with low public debt (60% of GDP), low unemployment, good growth (3% GDP growth) and \$131 billion in foreign exchange reserves. Finance Ministry experts have recently successfully borrowed large sums in global capital markets, anticipating huge demands on the budget. With massive amounts of credit floating around, and with its high credit rating, Israel has borrowed long-term (in some cases, for 100 years) at low rates.

What can we learn from other countries and from experts?

A lot. Marketplace thinks that spending only 21% of the NIS 80 billion, or NIS 17 billion, for workers, as unemployment benefits, is wrong, qualitatively and quantitatively. But don't believe me. Here is the opinion of wiser heads, Emmanuel Saez, a University of California, Berkeley, professor and Gabriel Zucman, a French economist, commenting on a similar US plan to pay unemployment benefits:

“Instead of safeguarding employment, America is relying on beefed-up unemployment benefits to shield laid-off workers from economic hardship. To give just one example, in both the United States and Britain, the government is asking restaurant workers to stay home. *But in Britain, workers are receiving 80 percent of their pay (up to £2,500 a month, or \$3,125) and are guaranteed to get their job back once the shutdown is over.* In America, the workers are laid off; they must then file for unemployment insurance and wait for the economy to start up again before they can apply for a new job, and if all goes well, sign a new contract and resume working.”

It is rather simple. If you let businesses fire everyone, and then keep the unemployed alive with meager unemployment insurance, you will need to rebuild the complex legal fabric of businesses during the recovery. Wrong move. But if you help businesses save jobs by paying part of their payroll, everything is in place for a rapid recovery when people emerge and go back to work. And those employees whose jobs you saved? They will repay their employers with high productivity and hard work.

This is what Israel *should* do. But alas, it is not.

The Jerusalem Post reported, “The number of unemployment benefit claimants exceeded one million for the first time on Wednesday April 2, climbing to 24.4% of Israel's entire workforce. While the unemployment rate stood at just 4% prior to the coronavirus outbreak, over 844,000 individuals applied for unemployment benefits since the start of March.”

We could have used part of the added unemployment insurance spending to save jobs by supporting payrolls. Bailout for wealthy businesses? Not at all. It can be recovered later in taxes; leave it to the tax collectors.

The Center for Industrial Excellence at the S. Neaman Institute Technion, where I work, organized an internet based round-table brain-storming session, on April 2, dealing with exit scenarios from the crisis. Over 40 experts from various disciplines participated. This was the first in a series of discussions aimed at generating actionable recommendations.

What is our strategic plan for the next stage – after putting the economy in intensive care, reviving it and breathing new life into it with cash?

This is what Economics Nobel Laureate Paul Krugman advises, in the New York Times, for the US. It applies to Israel, too:

“To simplify things, think of the economy as consisting of two sectors, nonessential services (N) that we can shut down to limit human interactions and hence the spread of the disease, and essential services (E) that we can't (or perhaps don't need to, because they don't involve personal interaction.) We can and should close down the N sector until some combination of growing immunity, widespread testing to quickly find and isolate cases, and, if we're very lucky, a vaccine let us return to normal life.

“For those (like me) still receiving their regular paychecks, this period of shutdown — call it the coronacoma — will be annoying but not serious. I miss coffee shops and concerts but can live without them for however long it takes.

“Things will, however, be very different and dire for those who are deprived of their regular income while the 'coronacoma' lasts. This group includes many workers and

small businesses; it also includes state and local governments, which are required to balance their budgets but are seeing revenues collapse and expenses soar.

“How big is the N sector? ...The St. Louis Fed estimates that there are 27 to 67 million people, [for the United States], which he averages to 47 million. That’s a lot; *we could be looking at a temporary decline in real GDP of 30 percent or more.* But that GDP decline isn’t the problem, since it’s a necessary counterpart of the social distancing we need to be doing. The problem instead is *how to limit the hardships facing those whose normal income has been cut off.*”

So does Marketplace have something clear and constructive to recommend?

Yes! Suppose we had sufficient tests, deployed rapidly, with quick results, to know if every working person had COVID-19. Divide the populace into N (non-essential, or infected) and E (essential and clean).

If you shut down N+E together, everyone, you lose massive output and jobs – you lose E times (average output or income of E), which is huge and unnecessary.

But if you shut down only N, you get all the jobs and output of E, and income. And you can use it to help pay survival incomes to the N.

This makes sense, right? And we *can* get those quick automated tests out the door if they are given priority.

Asking the right question is the key to getting the right answer. The question now being asked is, how can we save lives? This is understandable, even appropriate. But we should reframe this to ask, how can we save lives, medically, and at the same time save lives, economically, by saving jobs? That’s a harder question and embodies a painful, wrenching tradeoff.

Save jobs AND save lives. We can do it.

Economy



Samuel Neaman Institute
for National Policy Research

Tel. 972-4-8292329 | Fax. 97-4-8231889
Technion City, Haifa 3200003, Israel
www.neaman.org.il