Me on COVID-19 Contact Tracing Apps

I was quoted in BuzzFeed:

> "My problem with contact tracing apps is that they have absolutely no value," Bruce Schneier, a privacy expert and fellow at the Berkman Klein Center for Internet & Society at Harvard University, told BuzzFeed News. "I'm not even talking about the privacy concerns, I mean the efficacy. Does anybody think this will do something useful? ... This is just something governments want to do for the hell of it. To me, it's just techies doing techie things because they don't know what else to do."

I haven't blogged about this because I thought it was obvious. But from the tweets and emails I have received, it seems not.

This is a classic identification problem, and efficacy depends on two things: false positives and false negatives.

- False positives: Any app will have a precise definition of a contact: let's say it's less than six feet for more than ten minutes. The false positive rate is the percentage of contacts that don't result in transmissions. This will be because of several reasons. One, the app's location and proximity systems -- based on GPS and Bluetooth -- just aren't accurate enough to capture every contact. Two, the app won't be aware of any extenuating circumstances, like walls or partitions. And three, not every contact results in transmission; the disease has some transmission rate that's less than 100% (and I don't know what that is).

- False negatives: This is the rate the app fails to register a contact when an infection occurs. This also will be because of several reasons. One, errors in the app's location and proximity systems. Two, transmissions that occur from people who don't have the app (even Singapore didn't get above a 20% adoption rate for the app). And three, not every transmission is a result of that precisely defined contact -- the virus sometimes travels further.

Assume you take the app out grocery shopping with you and it subsequently alerts you of a contact. What should you do? It's not accurate enough for you to quarantine yourself for two weeks. And without ubiquitous, cheap, fast, and accurate testing, you can't confirm the app's diagnosis. So the alert is useless.

Similarly, assume you take the app out grocery shopping and it doesn't alert you of any contact. Are you in the clear? No, you're not. You actually have no idea if you've been infected.

The end result is an app that doesn't work. People will post their bad experiences on social media, and people will read those posts and realize that the app is not to be trusted. That loss of trust is even worse than having no app at all.

It has nothing to do with privacy concerns. The idea that contact tracing can be done with an app, and not human health professionals, is just plain dumb.

EDITED TO ADD: This Brookings essay makes much the same point.

EDITED TO ADD: This post has been translated into Spanish.

Tags: base rate, Bluetooth, COVID-19, false negatives, false positives, GPS, identification, medicine, privacy, surveillance, tracing

Posted on May 1, 2020 at 6:22 AM • 163 Comments

Comments

Grahame Grieve • May 1, 2020 6:47 AM

Also, the biggest false negative: surface transmission. Someone coughs on a surface, and you touch it a minute later. You never went close to the person, and are not registered as a contact. Not that any kind of contact tracing can pick that stuff up.

But not all techies are seduced by this - it got short shrift in this report, for instance: https://healthpolicy.duke.edu/sites/default/files/atoms/files/covid-19_surveillance_roadmap_final.pdf - as well as Scott Gottleib, other authors have serious chops in Healthcare IT (e.g. Farzad)

But a view from a different side: In the end, the only real tool we have is quarantine; the main question facing us is how to use it most efficiently, to maximise the cost/benefit balance. It's possible that the app will play a small role in that, though not in the simple way that you imagine, but more in giving people an estimate of the general viral load around them. It's not substitute for real contact tracing.

Alan • May 1, 2020 6:47 AM

> the virus sometimes travels further

or it can be left behind on a surface and picked up by someone later who was never in direct contact

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Justaguy • May 1, 2020 6:50 AM

Bravo! Spot on Bruce. I don't always agree with you but this time you hit the nail on the head. Good read. By the way, you must be in a hurry today (typo in the title of this article). Thanks for what you do Sir.

Uwe • May 1, 2020 6:52 AM

the contact problem gets even worse if you take different living conditions into account. I'm living in a house with multiple apartments. every morning I go to my workspace and sit there for 8h in front of my PC while working. my downstairs neighbor might do the same but I'm pretty sure Bluetooth can't tell there's a floor between us and might count this as contact. I also have an upstairs neighbor...

Mauro • May 1, 2020 6:56 AM

How is this specific to tracing apps? Or are you criticizing the whole idea of contact tracing to control epidemics?

S • May 1, 2020 7:03 AM

Word!

P.S.: There is a typo in the heading: COVAD-19 should read COVID-19.

Tyler • May 1, 2020 7:17 AM

Unfortunately it appears you haven't looked into this in enough detail, yet you're now being suddenly quoted everywhere (dangerous). Several erroneous assumptions:
- Contact tracing by ONLY bluetooth will be implemented in the next updates of iOS and Android and won't require an app to function (just opt-in). That means the tracking capabilities will be available on about 80% of devices within 4-5 months on iOS. Less so on Android of course, but given the critical nature of this update and with the support of public healthcare systems and proper messaging/marketing, I'd expect this update to be more rapid than usual.
https://developer.apple.com/support/app-store/
- Bluetooth has three levels of proximity sensing, so contact tracing can be done within the critical range of six feet in open spaces and walls do indeed block transmission to some extent, so you should expect very few false positives. Think of bluetooth beacon technology for shoppers – it only works when you're right next to the beacon.
- I'll be clear – location-based contact tracing should have never left the idea board and no one should be taking it seriously.
- Fast, cheap, ubiquitous testing is already on the way. Start thinking in terms of where we'll be in 3-6 months, avoiding a second wave, not tomorrow.
- Your grocery store example is not really relevant. If you spend 5 min within 4-6 feet of someone, the contact tracing will do its job. If you're in any store touching products and then your face, then you're fucked anyway. Stop touching your face. Wear a mask.

At least you didn't rant about the privacy implications because, again, the new Contact Tracing APIs in Android and iOS have taken care of this as well. I would encourage you to review the information about these APIs and reconsider your post here before it's shared further.

RAD • May 1, 2020 7:40 AM

Schneier says:

> "I'm not even talking about the privacy concerns, I mean the efficacy. Does anybody think this will do something useful?

I think it would be useful as the backbone of a subsequent traditional contact tracing investigation. I don't have perfect 14-day recall. I'd prefer to have a 14-day place/contact report generated automatically the moment I contacted health professionals due to symptoms. The efficacy of the

automated notifications is questionable but a "trusted" cross-platform OS level API for device proximity tracking seems reasonable and useful.

Clive Robinson • May 1, 2020 8:03 AM

@ Bruce, ALL,

> the disease has some transmission rate that's less than 100% (and I don't know what that is).

I'mnot surprised, it's like trying to "nail a buggy on a mule in the dark" for several reasons. But two that are easy to see,

1, Even though $\mathbf{R_0}$ is an "average" it's for a moment in time, because it changes all the time, thus we have $\mathbf{R_t}$ when dealing with historic etc data (usually derived from a graph).

2, Like the Case Fataliry Rate (CFR) it's sensitive to it's inputs. Which in the case of asymptomatic and presymptomatic infection is very dificult to find out even remotely close without mass testing.

As noted there are three basic ways out of this,

1, Let everyone get infected with attendant high mortality rates and getting an endemic infection with anything upto 1-6% of the worlds population dead.

2, Vacination, if one that is both safe and effective ever comes about (We still do not have vaccines four the four "Seasonal CoV, or SARS-CoV-1)

3, Eradication, where the virus is robbed of hosts thus dies out and with a little luck becomes extinct. This can only be by effective "Issolation" not social distancing. Social distancing slows the spread it does not stop infections happening.

As the first two are not realy options currently we are going for social distancing in the hope we can slow it enough so that healthcare has a chance to cut the death rate of the spreading infection.

At some point social distancing is going to have to stop, because the economy will change beyond anything that would have been imagined half a year ago except by "scare mongering scientists"... And that sort of "societal change" an absolut anathema to the 1% of the 1% and other vested interests.

So how to deal with the problem?

Well the only proven technique so far is,

> First close the borders.
>
> Track, Trace, Test, Confine

Which has been carried out by several Asian and Antipodean nations...

If anyone has any other ideas --and no I do not meen the idiotic "herd immunity Policy" carried out so disastrously in the UK etc-- then I for one would be delighted to hear about them.

But till then...

Richard • **May 1, 2020 8:11 AM**

I'm not an epidemiologist and may well be an idiot, but isn't this missing the point a bit? It's akin to not recommending that people wear masks on the basis that they only reduce the likelihood of transmission by a modest percentage rather than eliminating it (and yes, I know that there are also other reasons not to recommend wearing masks).

Surely, even if an app correctly encourages only one out of every five or six vulnerable recipients to self-isolate or get tested when they wouldn't otherwise have done so, then the transmission rate is reduced, however minimally. The difference between a reproduction rate of 0.9 and 1.1 is the difference between a virus that eventually disappears in the local population and one that eventually infects almost everybody. This, in addition to other measures, still seems like quite an attractive option to keep that rate below 1, despite the obvious flaws.

Arne • **May 1, 2020 8:42 AM**

Great post Bruce! But please correct the title from "COVAD-19" to "COVID-19" so it passes the most basic filters when sharing

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Bryant • **May 1, 2020 8:44 AM**

Richard is correct. If the contact tracing apps are billed as a complete solution, people will be disappointed. But that’s not the intent; they’re part of a suite of tools. They don’t need to be 100% accurate to have a positive effect.

Manual contract tracing has the exact same problems. You’ll get false positives, because the virus doesn’t pass to everyone you come in contact with. You’ll also get false negatives, because you can’t identify everyone you were close to. But manual contact tracing works, as evidenced by South Korea. There’s no reason to think that good tracing apps can’t be a valuable assist.

Ron • **May 1, 2020 8:51 AM**

The contact apps aren't to alert you when you are in proximity with someone who as COVID.

They are to trace those who have been in proximity with someone who is diagnosed with COVID for sufficient time to have become possibly infected and to get them tested.

If we weren't concerned with privacy, each individual phone user would be identified and would be required to be tested.

But with privacy, and sufficient testing capacity, people can be notified anonymously that they were in proximity of someone positively diagnosed and they can decide whether to get tested.

Depending on how many choose to do that, it will have at minimum, some positive impact in that more people will get tested. There is though, if the proximity detection is even partly useful, the possibility that more positive cases will be detected and people can quarantine and also be treated if needed earlier.

That should reduce the health impact of COVID-19 and treatments are more likely to be useful in the early stages of infection.

Chris • **May 1, 2020 8:52 AM**

Hi, Bruce! I agree with your assessment of false positives/negatives but I disagree with the conclusions you draw.

In a pandemic a single individual is not significant. What does matter, however, is the herd. There is a significant advantage to reducing the number of cases, even if some alerts are false positives or some cases go missing as false negatives.

The alerts/testing does not have to work with 100% precision to be effective. Even with only a 50% success rate this would be a great success. Remember pandemics are all about exponential growth and 1/2^n would help reducing cases tremendously.

Detlef • **May 1, 2020 9:05 AM**

I'm not sure whether the terms of 'false positives' and 'false negatives' apply here.
It is not a test. It is about creating a contact list.
And yes, it will not be perfect.

Gordon • **May 1, 2020 9:24 AM**

I think Richard and Clive hit my main points, but here is another three cents.

I am not an epidemiologist either (IANAE?E?)

The big point is how sensitive R is; already covered.

Some other points I don't think have been covered.

The argument that the bluetooth contact tracing is not reliable enough to influence behaviour. As Richard pointed out, it doesn't have to persuade everyone, just a few percent; *but also* it isn't a binary decision. Maybe someone doesn't go to a big event because he had a couple of alerts recently. Instead of being an asymptomatic mega spreader, he is just a regular spreader.

The other main point I wanted to make is that contact tracing may not be as rigorous as human driven contact tracing, but it has other possibilities. 1. It can handle anonymous contacts (transmission on a bus, anyone? and 2. You can go back in time! Not very far, for privacy reasons, but if you start getting warnings about contacts who weren't infection when you met them, time to test.

Minor points.
20% in Singapore, yes they're law abiding and tend to trust the authorities, but this is a central government database system including location, which is a massive dis-incentive. It also ran as a regular app, so had to be foreground to work, and chewed battery.

Without ubiquitous testing, this is of limited use. However, anything that helps target testing, will make testing so much more effective.

The bluetooth contact information doesn't have to be used in isolation. Ask about symptoms, give it more weight, find downstream contacts getting sick, give it more weight.

One final point.

Absent someone outing themselves as a professional active epidemiologist, we should be very careful about writing this off for reasons we're not sure of. I do know there was a lot of noise about how long the viral RNA can remain viable on a surface in a lab (probably based on test from SARS-1 virus), but I'm hearing a lot now about this not being a proven vector, and that the main transmission vector is probably direct.

+1 for Tyler as well

Stefan • **May 1, 2020 9:25 AM**

I'm not sure you are barking up the right tree here. A contact tracing app is not an infection test and should not be mistaken as replacing one. It can however shorten the reaction time to identify a better subset of high risk individuals in the overall population that at all had the chance of being close enough for a possible infection over the previous 14 days the moment someone testes positive, so they can be tested as well and potential pre- or non-symptomatic infections identified (rinse and repeat at that point). Getting better at tracing reliably and effectively is a direct factor for how many daily infections we can control _without_ imposing restrictions on the other 299 Million people (or whatever your local population count is you are having political debates in).

Senectus • **May 1, 2020 10:09 AM**

Richard and Bryant are correct, This was never meant to be a 100% purposeful solution. it was just yet another prosthetic to help us manage the problem.

The problem is organic, the prophylactic is multilayered.

Jane • **May 1, 2020 10:12 AM**

The validity of input data is also a concern - i.e. questionable due to significant rates of RT-PCR false negatives and false positives. Studies have demonstrated false negative rate of between 10 to 50%, with many experts agreeing on conservative a estimate of 20%. In Australia, TGA admits tests have not been subjected to standard validations due to the fast track approval process. If the testing accuracy is dubious, then this undermines the premise of the app. Australia hasn't even commenced serology studies, which would provide useful comparitive data. This could also be a means to estimate the actual extent of penetration of the virus in the community, and reassess death rate estimates.

C • **May 1, 2020 10:30 AM**

And without ubiquitous, cheap, fast, and accurate testing, you can't confirm the app's diagnosis. So the alert is useless.

We're working on "ubiquitous, cheap, fast, and accurate testing,"; will you revise your post once it's there? It already is there in a bunch of countries; are apps not useful there?

The idea is not to have only apps, but to warn people who are at increased risk to nudge them towards getting tested. Contact tracing by hand worked remarkably well in many places; the apps are supposed to aid with that.

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parabarbarian • **May 1, 2020 10:31 AM**

Will this work if the nearby phone has bluetooth visibility turned off?

Nix • **May 1, 2020 10:33 AM**

@Clive Robinson,

> 2, Vacination, if one that is both safe and effective ever comes about (We still do not have vaccines four the four "Seasonal CoV, or SARS-CoV-1)

Well, no, but as Derek Lowe has pointed out, that's mostly because nobody's bothered. SARS-CoV-1 is extinct, and it's a bit hard to test a vaccine when you have no pathogen to test it against: the SARS-CoV-1 vaccines-under-development appear to have activity against SARS-CoV-2 as well, so that's givign them a head start. As for the other human coronaviruses... all put together, they cause perhaps 15% of human colds. So a vaccine against one would cure about 25% of 15% of colds for a few years, say 5% in round numbers -- so it's fairly unlikely that if you got vaccinated against one of them that it would prevent even *one* cold before it wore off, even if it lasted for a decade or two, even if you didn't already have acquired immunity against it (and such immunity is probably quite likely, since the things have been circulating for who knows how long). A vaccine is simply not worthwhile.

SARS-CoV-2 is not like that. There's only one of it, it's not very diverse (it hasn't had time, even if it didn't also have a proofreader keeping the mutation rate down), and nobody has prior exposure. A vaccine is *definitely* worthwhile.

JanS • **May 1, 2020 10:36 AM**

I think you misunderstood one very important point: If you get a warning from the app that you have been in contact with someone you shouldn’t quarantine for two weeks. You should limit your contacts for the next 72h and behave as „potentially infected“ in a reasonable way and quarantine in case you get the slightest symptoms. So really wear mask, really don’t see others and really be careful with your hand hygiene. The advantage of the app will be the time to know that you are potentially infected to break the chain before it continues with a higher likelihood. Because traditional contact tracing is simply too slow. It should not be a black&white quarantine vs running around freefly and hug people...

Bill • **May 1, 2020 10:40 AM**

The purpose of these contact apps - regardless of design and technique - is to suggest who should be tested next. Your scenario is not in use, these apps won't ever be able to tell you if you are a "positive" or "negative".

So there are no false negatives or positives at all - false positives will disappear when tested, and the only disadvantage they bring is loss of the limited test supply. False negatives should not - if they follow the social distancing rules - infect other people and will show up eventually when feeling sick.

If testing supply is sufficient, you increase the amount of physical tests to minimze the amount of false negatives (if you've ever been in range of an infected person you will be send to a test).

In real world conditions now somewhere between one in a hundred or one per ten thousand persons you meet is infected, depending on location. So an app - even if done badly, distributed only to some people and not working all the time may still help to create a waiting-to-be-tested line that works better than random testing.

In a perfcet world you simply test everyone 4 times in two weeks and you're done.

Mart • **May 1, 2020 10:44 AM**

@Tyler - can you provide any more details on three levels of proximity sensing? AFAIK, South Korea had to run a battery of device calibrations in order to compensate for the different broadcasting power levels of different phones/chips; from this I conclude that Bluetooth is not a good tool to measure distances to other devices. Please explain why that is incorrect.

Also, I would like to comment on the "something is better than nothing" idea: if the app reports contact with someone tested positive for Covid-19, what happens next? With a decentralized, anonymous system, it is all up to the individual. If they all run and ask for a test, the testing system might not be able to cope given too many false positives. Even if they get a test, after a few times of having a negative test despite being alerted by the app, people will stop taking it seriously.

And at this very moment in Europe, people with severe symptoms are still not being admitted to a proper test unless they have been in contact with someone known to be positive - so there seems a very strong need to keep the testing numbers low. Adding millions of app users will not help on that. And the app will NOT help any of the official contact tracing, as officials have not access to any useful data, even if you hand over your phone. All they get are random numbers that need to be matched to the random numbers stored on other mobile phones.

And finally: Once such an app is in place there is a clear danger the app will become "mandatory", e.g. for admission to certain places ("show me your app or I will not let you in").

Andy • **May 1, 2020 10:45 AM**

I think Stefan and Tyler both make good points - this is not a replacement for a medical test, and it isn't for now. It's about identifying higher risk individuals in the future.

Can a phone tell if you've been infected by Covid-19? Of course not. But it can give you some degree of warning if you're at higher risk due to past proximity with someone who has tested positive. Nothing replaces proper testing, though.

You also assert "It's not accurate enough for you to quarantine yourself for two weeks". I'm afraid I take issue with this; that rather depends on your criteria for going into quarantine.

- If you will only quarantine if you are proven sick, then yeah, it does nothing for you - *yet*. Testing is being scaled up in many countries, and in the future (while we're still dealing with this) having a warning might be a prompt to get tested and act based on it's result.

- If you will quarantine if you've had a warning - or perhaps a number of warnings - as you see it as your duty to prevent transmission even though you may or may not be infected, then maybe it's good enough now. Testing can catch up in time.

The problem of false negatives - of contacts not being recorded - is not a problem in itself because that's the world we already live in. My concern, though, would be that people start to rely on the app, rather than continuing to keep their distance, wash their hands, and not touching their face.

Stefan Mangold • **May 1, 2020 10:55 AM**

On problem of contact tracing (regardless of centralized or not) with Bluetooth or similar technology is that a malicious attacker with specialized radio equipment (think 500 meter instead of 5m, and think wardriving with radio signals from outside to inside a building) can make any group of people falsely believe that they are infected.

For example, someone might just drive by a parliament building and send the members of parliament into voluntary home quarantine. This is possible with Bluetooth Beacons.

Is my understanding correct? Let's say I own a restaurant and I want to shut down my competitor's restaurant. Or let's say I am a teenage kid and want to shut down my school. Or, let's say I am a US democrat and want to hurt the political activities of the republican party.

I really don't know since I am not an expert, but I am wondering if such apps should be widely used.

Daniel Hommers • **May 1, 2020 10:56 AM**

There is ways around every problem, i wonder why professionals are so quick to dismiss ideas completely because of minor hurdles..

First of all you can definde logical sectors. You research in what possbile locations infection typically takes place. Then you can give an "ID" to these locations. (I dont want to go into technicals but for example QR Codes at store entrances and busses)

Even if you only trace all public locations somebody has been to you have gained a lot.

Another way to segment the problem is to use different modes, for home, outside, work etc.

The limited testing capatibilities are exactly why an app would be helpful. You would know where to look without "testing around" cases.

Of course there is other problems but there is also other solutions. You could develop cheap blue tooth transponders for rooms and vehicles for example.

Whatever we will come up with lets not resign so readily.

Robert Catesby • **May 1, 2020 10:57 AM**

RE: "My problem with contact tracing apps is that they have absolutely no value."
Not true: they can improve reaction time, assuming the tools are use appropriately.

The principle value is for the State to be able to track everyone's movements.

RE: "To me, it's just techies doing techie things."
Absolutely. This is a common problem: Americans in general, and techies in particular, *love*technical solutions, even if they don't make sense.

RE: false positives and negatives
These are very valid points.

Alternative: If you want to avoid the issues in tracing and stop the spread of the disease, there is a simple, cost effective solution:
1. Assume that everyone outside your home is a potential carrier.
2. Assume that every surface you touch is potentially contaminated. (The only exception is a surface that you cleaned yourself -- recently.)

Keep your distance. Wear a mask. Encourage others to wear one. If you touch an object or surface, wash your hands. You don't wait for an app to tell you that you might have been exposed. You don't rely on the person to self-isolate based on the app.

One of the first rules of gun safety is this: assume that all guns are loaded. The only exception is a gun that you have unloaded yourself. Treat every gun that you handle as if it is loaded -- always. If you treat it with respect, you'll never have to say, "I'm sorry: I didn't know it was loaded."

[My background in college was microbiology and biochemistry. I spent most of my early career working with scientists, where I regularly encountered hazardous materials.]

Peter • **May 1, 2020 11:34 AM**

The money spent on these dragnets for people's relationships (or better fascists' wet dream) should better be spent by minifying surface conterminations and raising the sanitizing in the public space.

Like:
- having soap and sterilium dispensers in each and every public building, schools or toilet FOR FREE, and MQTT-driven "refill needed" and "cleaning needed" foot or ellbow operated buttons. AMZN should have a few from their shelved dash button project.

- using self opening doors

- changing the door opening programs for public means of transportation to open alway all doors to maximize air change and minimize door handle usage.

- maximizing air changes in public buildings

- using bare, polished brass again for door knobs, levers, handles

- add desinfectant sprayers to escalators' rubber handrail gears

- use multilingual speech recognition in elevators (where you could for example say 5th floor, fünfter stock, or the name of any tennant in the 5th floor)

- also rotating heat exchangers with moisture/enthalpy recovery in modern skyscrapers should be a big no-no sanitationwise.

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zonker • **May 1, 2020 11:42 AM**

One further problem I see (which could be included in the "false" positive area) is false assumptions, of where everybody has a smart phone, and where there's a permanent 1:1 relationship between the user and the technology. This is very much in the vein of "you are your phone" that's presumed with things like payment systems.

This is a real blind spot for the people who advocate this kind of application of technology, including the people who are advocating for online voting. For people who live in that kind of environment, where they are never without their phones, and have apps for everything, COVID tracking, voting, purchasing, multi-factor authentication, and nearly anything else is just another app.

However, there are plenty of people out there that don't use their phones that way. There's still lots of feature phones out there, that don't have the capacities of a smart phone, including ones that don't support wi-fi or LTE (or GPS). And there's also plenty of places where people may share phones. Plus, the issues of people who are in areas (often, but not always, ru

For the technically adept who live on their smartphones, it's easy to dismiss the people who don't have similar technology and usage patterns as Luddites that "can't get with the program", but like it or not, that kind of usage is far from universal, and widespread enough that I think the kind of monitoring proposed will have significant (and likely fatal) gaps in coverage.

I'm unconvinced that this is a problem that can be solved with this application of this technology.

Ian Varley • **May 1, 2020 11:59 AM**

> Assume you take the app out grocery shopping with you and it subsequently alerts you of a contact. What should you do? It's not accurate enough for you to quarantine yourself for two weeks. And without ubiquitous, cheap, fast, and accurate testing, you can't confirm the app's diagnosis. So the alert is useless.

If you assume that all the app does is say "you had a contact", then yes, in the absence of easy testing, it'll quickly feel pointless to people.

But what if, on the other hand, the app says something like: "Your phone registered proximity to someone who's known to be infected, at [this time], for [this long]. Please answer a few questions:
- Were you around other people, or by yourself?

- Were you wearing a mask?
- Did you spend time within 6 feet of anyone who was not wearing a mask?"

Etc.

Given this, the app could help the user make a reasonable decision about their risk level; should they seek a test, or isolate at home?

If we're concerned about too many false positives, the multipliers can be brought down, so for example, brief encounters are low risk, and if you say you were wearing a mask, it's listed as very low risk. But there will still be cases where this kind of app gives you value, especially after we've opened up a lot; for example, if you're in a coffee shop without a mask for 2 hours, and then you later get an alert that someone infected was near you for a big chunk of that time, there's a very good chance you might be infected, and an app like this would potentially alert you to this possibility even before (or in the absence of) symptoms on your part.

Lukas • **May 1, 2020 12:00 PM**

There are ongoing studies right now to verify the efficacy of contact tracing apps, and whether the contacts they register are inline with what we would consider "dangerous" contacts with a reasonably high probability of transmission (e.g. by EPFL in Switzerland). Maybe we should all calm down and wait for the results before we start yelling at each other, and making arguments based on on intuition and "common sense."

Lukas • **May 1, 2020 12:02 PM**

(Also, just to point that out as well, these apps don't have to be perfect. It's totally fine for them to have a high percentage of false positives and false negatives, as long as they overall have a measurable positive impact on the reproduction number. And since small changes in the reproduction number can have large effects, even an app that only works somewhat poorly could still make the difference between an infection getting out of hand, and being contained.)

Lukas • **May 1, 2020 12:04 PM**

>The money spent on these dragnets for people's relationships

One final point: many of these apps do not work in the way you think they work, and can not be used to track people's behavior. Might be worth looking into actual proposals for how these apps will work instead of calling people fascists without any evidence.

Don't Post Much • **May 1, 2020 12:07 PM**

My view of these tracking apps seems to be somewhat different than the ones posted above. Even if there are tech problems with the apps; even if a lot of folks will not pay attention to the results; even if there are multitudes of false positive/negative results; if even one human life is saved, then it will benefit the future.

Imagine that if one life saved is the future parent or grand-parent of the next Marie Curie, Albert Einstein, Jonas Salk, or Richard Feynman.

Dave • **May 1, 2020 12:21 PM**

> Assume you take the app out grocery shopping with you and it subsequently alerts you of a contact. What should you do? It's not accurate enough for you to quarantine yourself for two weeks.

Whether or not it's accurate, one might be concerned that the government would find out and order a quarantine. This is one of many reasons why people may avoid using the app (even if they have the technical capability to run it) which could make the false-negatives a self-reinforcing problem.

Dan G • **May 1, 2020 12:27 PM**

If you can get clusters of people to use it, say everyone in a big office building, it's a lot easier to hit that 20-60% number than in the population as a whole.

IMO these apps will be most useful as a tool to assist manual contact tracing teams at first.

Dave • **May 1, 2020 12:35 PM**

"Don't Post Much" wrote:

> if even one human life is saved, then it will benefit the future.

That's an overly simplistic analysis, that among other things only considers gross benefit rather than net benefit. I could just as easily say that the mental effects of pervasive surveillance could make "the next Einstein" turn away from physics. Maybe we'd bring a deadly anti-government revolution into existence. These are all wild-ass guesses. Setting social policy based on evidenceless predictions is a fool's errand.

Jordan Brown • **May 1, 2020 12:38 PM**

> if even one human life is saved, then it will benefit the future.

If even one stalker uses this technology to track down and kill their victim...

If a government uses this technology to track down and imprison even one dissident...

Any "if it only saves one life" argument ignores the fact that there are trade-offs in all things. Everything has a cost and, scaled up to the world, it's not uncommon that that cost is greater than one life.

Ken Hagler • **May 1, 2020 12:42 PM**

Our rulers have been telling us nonstop for weeks that SARS-CoV-2 is so contagious that you can get it just from walking past someone on the sidewalk, and now we're all supposed to use "contact tracing" apps? Just who do they think they're kidding?

This isn't a virus, it's a plot device in a badly written movie that does whatever the writer needs it to from one scene to the next without regard for logic or continuity.

MarkH • **May 1, 2020 12:47 PM**

Something Bruce (and apparently most of us) have perhaps missed, is that

a) contact tracing is a technique of demonstrated effectiveness which

b) is extremely labor intensive and

c) is most usefully done by people who have non-trivial training and experience.

My understanding, is that the concept of "contact tracing apps" is not to **replace** trained contact tracers, but rather to increase the amount of work they can accomplish in each day.

How well this works in practice, I don't know.

Perhaps at least one Asian country has already tried it, and the world can learn from their experience.

I see that while I was editing this, Dan G made the same point more succinctly :)

@Grahame Grieve:

Although there has been very much discussion of the possibility of transmission via surfaces, doctors just aren't seeing it. It appears (from real-life tracing of how people became infected) that almost all transmissions are to people who were within 2 meters of an infected person for more than 10 or 15 minutes.

No technique will catch 100% of anything. That's not necessary, for it to be useful.

@Clive:

I see you still haven't let go of eradication without vaccines.

To accomplish this globally is a practical impossibility.

Some countries may achieve eradication within their borders ... but until vaccine eradication becomes possible, they would have to keep their travel barriers up high, and pay the price for that, permanently.

Even with such barriers in place, these countries will have the reality that leakage can't reliably be forced to zero, and therefore be ready with Test/Trace/Isolate responses whenever a new case appears.

Peter • **May 1, 2020 12:54 PM**

Might be worth looking into actual proposals for how these apps will work instead of calling people fascists without any evidence.
I called nobody a fascist. I called the system a fascist's wet dream.

Somebody creates a system with the best intentions. Governments changes, systems stay, rules change... what do you do, if the next government misuses your system?

And it will be misused at some point in time, because a pile of data invites misuse - just like trash attracts rats and left over french fires attracts raccoons. The best way ist to not collect possibly dangerous data at all.

I showed up ways to lower the reproduction number of COVID-19 (and by the way other viruses and bacteria in the same effort). More sustainable, broader in effect, even accessible to people without smartphones, money, lobby and support (the working poor, and the really poor - these have been the substrate on which COVID19 grew in Singapore).

With each and every such data collection system (and set of laws coming with it), please ask yourself: what could the next (possibly dystropean, stupid, extremist) government or junta do with it, should the country fails, elects an extremist party, breaks apart in a civil war, etc?

If you introduce a situation where somebody can say "the system said so" and confine or even deport you "for medical reasons" *and everybody copes with it*, the temptation to just emulate "is infected"-events to get rid of "the other side" will grow fast. Not even the workers for this system would know that they deport or confine for political reasons, they just do their work.

Maybe you should read up about the first "big data" application (made with punch cards and hollerith machines back in the day): the field "religion" in the dutch census database before 1933. Introduced with the best intentions (to calculate church taxes correctly and fast) the occupying germans said thank you, and used this information to pick up and deport the jews. Greetings from Anne F.

Now sit down and make a list of what can be done under the worst circumstances with your proposed system and all data in it if NOT in the hands of St Lucas and used for the greater good of all human beings, but in the greedy claws of Kim Abu Adolpho Jean-Bedel al-Teherani from Somedistantholestan, if he wishes to divide and opress his subordinates.

MarkH • **May 1, 2020 12:56 PM**

@Detlef:

> I'm not sure whether the terms of 'false positives' and 'false negatives' apply here. It is not a test. It is about creating a contact list. And yes, it will not be perfect

Well said!

Anyone who wants to understand the purpose of such tools, can consider the real-life example of crime investigators looking at the telephone records of a suspect.

Will all of the calls on the phone log be related to the crime? Well duh, no! Of course not.

Could there have been other conversations related to the crime that don't show in the phone log? Well duh, yeah! Of course.

Despite these limitations, review of phone logs has enabled investigators to exclude or confirm suspects. It's a data source, NOT a diagnostic.

Kenny • **May 1, 2020 1:27 PM**

This is a 'dumb' take. The idea that contact tracing can be done with "human health professionals" is "just plain dumb". The performance of human health professionals will also result in false positives and false negatives. What's the evidence that those rates are significantly better than an app?

The smart take would realize that the choice isn't *between* apps and 'professionals' – they could and should be used together. Without an app like what's being discussed, how would any professionals be able to trace a person's contacts, e.g. at a grocery store? Maybe the transmission of some other disease could be traced by, e.g. reviewing security camera videos at a number of stores, but this disease doesn't seem likely to be contained to any real degree in that way.

The better way to interpret *any* contact tracing, either by app or 'professional', is not as a binary 'infected' or 'not infected' judgement but as *evidence* to be weighed by such factors as false positives, false negatives, or other (approximately) measured biases in the different procedures. Yes, there would almost certainly be some threshold that, when exceeded, any contact tracing operation would suggest (or demand) that a person be quarantined, and, if regular testing could be (safely) done for those people, that threshold could be adjusted based on the evidence provided by those tests. But it's still not the case that people could definitely perform better than apps, especially without any app data available at all.

Also, the idea that contact tracing could be performed, 'at scale', by what someone might reasonably consider to be a "human health professional" is also "just plain dumb". The people likely to be involved in any large scale contact tracing effort are almost certainly not going to be doctors or nurses to any significant extent. They might be 'professionals' because they're being paid but they're only 'health professionals' because of the enterprise; not because of any significant health training or education.

Mailman • **May 1, 2020 1:28 PM**

I agree with Bruce on this.
All the arguments that "it doesn't need be perfect", and "contact tracing app is a positive contribution even if only helps track down a small number of cases", miss the point.

The true positive results will be drowned in false positives, which will divert precious resources into conducting useless activities, and creating unneeded stress in people.

It will also lull people into a false sense of safety. "Oh, the techies are looking out for us, we're good". And so there will be false negatives that could have been prevented or detected through more serious means.

Trudi Fenster-Klotz • **May 1, 2020 1:30 PM**

Are tracking apps useful ?

There are some food for thought videos on this site, unpacking “R” into causal factors, discussing transmissibility in terms of a statistical population of values rather than a point value, and referencing realistic models (e.g. modeling portal MIDAS.)

https://www.ams.org/news?news_id=5934

Terry • May 1, 2020 1:32 PM

The idea behind the APP is that you have ubiquitous, cheap, fast, and accurate testing. But App or not, we need massive testing to get back to or near to normal again.
https://paulromer.net/

Trudi Fenster-Klotz • May 1, 2020 1:44 PM

For modeling, a convenient list of links

https://m.youtube.com/playlist?list=PLW-VhlPXy1DXl_BNq39K84BSlWVztDH0n

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La Abeja • May 1, 2020 2:14 PM

@Trudi Fenster-Klotz

> For modeling, a convenient list of links
> https://m.youtube.com/playlist?list=PLW-VhlPXy1DXl_BNq39K84BSlWVztDH0n

1. The numbers don't add up for mathematical modeling on YouTube.
2. AMS is too much the gentleman's club, and there are too many fashion models on the premises.

StephenMelba • May 1, 2020 2:20 PM

@Clive R

"Which has been carried out by several Asian and Antipodean nations"

Do you mean to include Australia? The Commonwealth Government sat on its hands in Jan, Feb and half way through March. It allowed thousands of infected people to come from overseas straight into the community.

The social distancing rules and business closures have been imposed by the State Governments. States have closed their borders to other States. Contact tracing and testing has been done by the States.

The Prime Minister is champing at the bit to get the nation back to work. Hear him extoll the virtues of the new contract tracing app at https://www.abc.net.au/news/2020-05-01/coronavirus-restrictions-advice-relaxed-requirements/12206910.

This seems calculated to convince the community to live with the virus. Lots of copies have been downloaded. It beats me why people have so much faith in computer systems.

My understanding is that the Prime Minister of the other antipodean nation to which you may be referring, New Zealand, did state an intention to eradicate the virus.

I can see your assertion that what is required is tracking, tracing, testing and confining. However in my view a clear aim should also be stated, perhaps:

"To continually reduce the number of infections."

Communities should demand that their Governments ensure that each infected person infect on average less than one other person.

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jones • **May 1, 2020 2:31 PM**

Modern infectious diseases like coronavirus are the consequence of industrial civilization: technical developments enable the high density populations of modern cities and the ability for rapid mass travel.

Social diseases, civilization diseases or lifestyle diseases?
https://www.ncbi.nlm.nih.gov/pubmed/18350729

If we look at the efficiency of modern medicine, it is in rapid decline because many of the innovations that allowed us to get here are over 100 years old: sanitation and hygeine (Ignaz Semmelweiss), painkillers and anesthetics, antibiotics (developed for about $40,000 in basic science research), and the vaccine.

https://telesio.files.wordpress.com/2012/06/modern-medicine-chart-productivity-of-the-us-healthcare-system.png

Modern medicine -- like any industrial enterprise -- is characterized by diminishing returns. In this context, to expect technology to save us from coronavirus is not rational. There are no technical solutions to the problems caused by too much technology.

The solutions here are in the policy realm: a comprehensive system of social insurance so that the sick can get treated and national resources can be rapidly mobilized in an emergency; and, alongside this, a guaranteed minimum income so that those who are ill can stay at home without risking infecting others but can maintain their ability to participate in the economy.

A starting point for the latter policy direction might be John Kenneth Galbraith's "cyclically graduated compensation," which ties unemployment benefits to the unemployment rate. When unemployment is low, benefits are just enough to get by; when unemployment is high, benefits are competitive with wages. This eliminates the incentive to idleness and prevents recessions from driving down wages, all while preserving aggregate demand for business.

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lurker • **May 1, 2020 3:15 PM**

It's voluntary to carry the app, then when it informs of a possible contact it's voluntary to get tested. Excuse me, what's the point? Just so Silicon Valley can be seen to be doing something, anything…

The ugly point hidden so far is the monetization. It's beyond belief this app is given away in altruism.

Dave • **May 1, 2020 3:35 PM**

> then when it informs of a possible contact it's voluntary to get tested.

Maybe voluntary in one direction. If a test is what I wanted, it wouldn't be so easy to volunteer. My city has one testing center, a 4 hour walk from me, and if I thought I could walk or bike that distance

there'd be no reason to. It wouldn't exactly be a great idea to take a bus or taxi there. If I solved that problem, I still wouldn't be able to be tested, because it's only open to critical workers and their families, people who recently traveled internationally, and people who've had close contact with a confirmed COVID infectee (and how are they gonna get the test?).

The tests need to be abundant and *accessible*. These app makers would do more good by making an app that helped get people to tests, or tests to people. Health officials all praise testing, but much of the world seem to be dragging their feet on it. Stories abound of people who maybe once had COVID and don't expect to ever know.

Trudi Fenster-Klotz • **May 1, 2020 4:37 PM**

Are contact tracing apps useful ?

Contact tracking apps can be viewed as crude virus infection proxies. They imitate (with some degree of fidelity) the spreading mechanism of a generic virus.

They proxy only the physical locality aspect of a virus infection opportunity. All other aspects are treated as if they were operating at 100% effectiveness.

If widely enough adopted, they might provide insight into how the population is really interacting with itself. This in turn used with recorded cases and fatalities might help estimate the unknow infection rate.

Otto • **May 1, 2020 5:09 PM**

When infections are on the rise, we currently need to put 100% of the population into lockdown, i.e. a light to moderate quarantine. A widely used contact tracing app would allow us to only put those into quarantine who have had exposure. We might achieve half the efficacy of a total lockdown by merely quarantining 5% of the population. The rate of false positives hardly matters for this use-case, in some situations 99.9% could be acceptable. Being able to divide a population into groups of "more likely exposed" and "less likely exposed" is sufficient to enable a more fine-grained response and possibly avoid another indiscriminate lockdown.

Weather • **May 1, 2020 5:19 PM**

Like brute forcing a password each char is exponential, a computer can do it but manual testing can't, you need 95% accurate tests.

Duncan • **May 1, 2020 5:38 PM**

Probably pointless when you don't give your citizens proper welfare or source of income to be able to hunker down, they are going to revolt, or have to queue for food etc.

The arguments about surface transmission, it's purely how well behaved your population is, social distancing and hand hygiene works. All you are doing with this argument is saying we'll all suffer the lowest common denominator.

"you can't expect people to isolate for 2 weeks if they get a false positive" - social distancing and hygiene applies to households, households with positive cases still have family members living in them that are not catching it with proper protocols.

So yes, it's easily defeated, but where you have a good uptake of proper behavior, where contact tracing and hygiene has already been successful, it makes that process much more thorough and faster if there is any more outbreaks of community transmission. Every contact will be tested.

The wild card at the end of any theory is peoples behavior and the ugly truth is that's why some countries are doing better than others.

Clive Robinson • May 1, 2020 6:00 PM

@ Jane,

> Australia hasn't even commenced serology studies, which would provide useful comparitive data.

Maybe not...

Chinese Researchers fitst pointed out that something like 6% of those infected do not "seroconvert" (produce antibodies).

The WHO later warned of this but frustratingly just said "many" not a range of percentages.

Clive Robinson • May 1, 2020 6:08 PM

@ C,

> We're working on "ubiquitous, cheap, fast, and accurate testing,"

It's not just the tests that are a problem...

See my comment just above to @Jane.

But it's not just the seroconvertion issue, others are starting to say that in some the antibodies die back quickly --as little as two-four weeks, hence they can be reinfected in a very short time.

Others think that the virus might hide in the body out of the circulatory system where our blood tests will not spot it. Thus it can come back with a vengence if those people are subject to stress.

Such issues is confirmed by research could make a nonsense of "back to work testing"...

Clive Robinson • May 1, 2020 6:24 PM

@ NIX,

> SARS-CoV-2 is not like that.

No and COVID-19 is very unlike the symptoms of the common cold.

But there are issues as I've pointed out to @Jane and @C above, but there is more peculiarities being detected.

There is a paper that I've yet to read in depth done in the UK that has a cohort of ~16k patients, that tested positive in the UK, which is about a third of the total recorded cases at the time.

Off the top of my head 14% did not progress to hospital, of those that did something like 30% died.

But more intetestingly of those in hospital who died ~60% were men. But only about half of those in hospital had recognisable comorbidities.

Those that were hospitalised tended to "group" that is they shared symptoms with others but not others.

This suggests there are "types" of infection or patient. Which is which is unclear currently, but this raises the flag that there might not be a "one size fits all" vaccine. Which effects not just efficacy but safety as well. That is a vaccine that is safe for one type might be quite unsafe for another group.

It's for reasons like this we don't generally "rush testing through"...

Bob • May 1, 2020 6:54 PM

I would like to interject a question of practicality into this very interesting discussion of opinion and theory.
Earlier this week, Apple began rolling out a beta of iOS 13.5 that includes the Covid-19 Tracking capability, with the default being "On", located under Settings/Privacy/Health.
Does this mean someones iPhone running iOS 13.5 Beta is now collecting and reporting contact information to Apple, or does this mean the feature is available for app developers to implement?

Clive Robinson • May 1, 2020 7:07 PM

@ Daniel Hommers,

> There is , i wonder why professionals are so quick to dismiss ideas completely because of minor hurdles..

No there are not ways around every problem, you would know that if you have been a practicing professional engineer for any period of time.

Your first limitvand theres nothing you can do about this is "the laws of physics".

This leads into another issue even when the laws of physics do alow it, existing systems may not be designed for such solutions to be possible.

Which leads into another issue "work factor -v- Power Consumption" if the solution cuts battery life down to only an hour or two a day, people are either not going to carry their phone because it's on charge all the time or they are going to turn the phone off.

Which leads into another issue, the application may well be a resource hog this slow other applications on a phone down to a crawl.

But there is another issue are all phones going to be able to run both Bluetooth and WiFi, they do share the frequency spectrum so what was once usable WiFi gets jamed by all those bluetooth emiting phones...

There are a number of other just technical not security issues but the above should make you realise that there is NOT "ways around every problem", and they are NOT "minor hurdles".

As our host @Bruce has quite rightly pointed out,

> *To me, it's just techies doing techie things because they don't know what else to do.*

To which I would add that,

> Like so many other "techies" they have little or no clue what they are doing, because their love of technology and thinking they look clever is a Dunning-Kruger problem. Of which we have hundreds of thousands of examples with the likes of IoT and many "start up gizmos" all going wrong at the simple technical levels, let alone the security levels that very very few have any experience what so ever.

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metaschima • **May 1, 2020 7:10 PM**

I totally agree with you Bruce, contact tracing using an app is totally ridiculous. However, you may have opened up a can of worms. Covid19 is the new ISIS/ Taliban/enemy of Ingsoc. It will always be a looming threat to perfect personal safety and security, which in the US is worth giving up all your freedoms for, whether you like it or not. Of course, I don't believe that giving away your freedoms will stop anything. In fact since 2001, it seems nothing can stop the inevitable.

Mjb • **May 1, 2020 7:14 PM**

We're putting millions of people into effective quarantine today. Even if this app has a rate of 50% false positives and we end up putting hundreds of thousands people into quarantine wrongfully it's a huge win for society overall.

Clive Robinson • **May 1, 2020 7:24 PM**

@ Lucas,

> One final point: many of these apps do not work in the way you think they work, and can not be used to track people's behavior.

You don't get it do you?

The location of your phone is known to many people and both the IC and LEO's can get it either by just "snooping on the backbone" or poping around with an NSL etc.

All these apps realy do is "stand as a witness against others".

I just wish people would take this fact on board because it might tell you why some LEO's are going to have wet dreams over this technology.

But it gets worse your phone has no idea if it's recording another mobile phone or a "fixed position beacon". This alows your phone position to be worked out fairky accurately especially if the accelerometers in the phone are also enabled.

But it gets worse if a Government insists that the DB's are stored centrally (France for instance) or accessable centrally than any anonymity in the system can be fairly easily unrolled...

And these are just one or two of the more easily seen flaws in the system, there are others and no doubt many more will be found with the Standards, Protocols and Implementations.

Wael • **May 1, 2020 9:38 PM**

The proposal is conceptually flawed, full stop, new line :)

Noam • **May 1, 2020 9:55 PM**

Perfection is the enemy of good. The system isn't perfect but it is valuable.

Your phone alerts you that someone you spent 18 minutes with at a coffee shop has tested positive. It recommends that you watch for symptoms and get tested.

What's the risk of a false positive? Not that much.

A false negative is more risky because it may lead to a false sense of security as people go out convinced they don't have coronavirus. But they would do that anyway without the app.

AL • **May 1, 2020 10:55 PM**

Other considerations aside, if this application requires electricity to work, that could be a show-stopper on Iphone, at least my Iphone. 😉

Howard Solomon • **May 1, 2020 11:57 PM**

An official with a Canadian public health authority I questioned said in manual contact tracing they are only interested in people who had CLOSE and PROLONGED contact with an infected person. So, I conclude, there's no need for an app to, say, collect the numbers of people you walk by on the street on in a supermarket. Also remember that manual tracing -- like an app -- only covers who you are in contact with, not what you touch.

Wael • **May 2, 2020 12:19 AM**

I have a better idea: make it a feature of Pokémon. Ten million people will download it the first day, no questions asked.

WhiskerInMenlo • **May 2, 2020 12:38 AM**

Contact tracing has a long history for STDs. STDs also have a medical solution. And for STDs the notion of a contact is nicely bounded.

This bugger virus is not understood. It is interesting for an application to present a spaghetti map for others to map to if and only if the known positive Is in your cached weeks of stranger IDs matches.

A virus transfer would look like any other interaction: hello Bob, drug sale, drug purchase, bum a cigarette, ask for directions, Time and space will have to be fuzzy for surface contact viral transfers.

The numbers of possible contacts boggle the mind.

The obvious is a test me notification icon. The number of triggered contacts is likely to be 20-200 times the number of positive tests. USA new cases yesterday 36,000 so ball park one million tests triggered a day.

Speaking of ball park... model contact dynamics reported by such an application at a baseball or basketball game.

Ivan • **May 2, 2020 2:10 AM**

about your sentence:
"To me, it's just techies doing techie things because they don't know what else to do." I'd have added "to defeat the virus" in the end.
Instead for other purposes at least some governments will enjoy to look into collected data.
https://eprint.iacr.org/2020/493

Alejandro • **May 2, 2020 7:06 AM**

As usual, Bruce gets to the meat of the matter quickly, emphatically and in no uncertain terms:

Good job!

Mikko Särelä • **May 2, 2020 7:27 AM**

The point of contact tracing is not to replace traditional human based tracing. It is to complement it.

The point of tracing is to find large enough portion of contacts early enough so that R stays below 1 - that is so that the average number of people a person infects.

The problem of false positives is that you have more people to test. The question is whether you have enough testing capacity for the number of false positives you get.

the problem of false negatives is that they potetnially create a new netwokr of infected people who have not been noticed. Once they are, the contact tracing (traditional+mobile data assisteed) should be usable to find other people infected and the networks they are connected with.

It's a really good question whether people will use these applications, since they don't provide personal benefit. And for this reason, it should be highlighted that the benefit is for the society and not for the individual so that people are not disappointed, when it's not a device that helps you protect you. .

Natalia • May 2, 2020 8:06 AM

The biggest false belief is that contact tracing apps should substitute manual tracing by health professionals. They don't. Contact tracing apps are there to *complement* manual tracing.

Regarding app notification: the health authorities still need to decide what message they will transmit together with the notification. Moreover, epidemiologists say that this message should not be predetermined, but based on manual and digital contact tracing + other contextual information.

John Kelsey • May 2, 2020 11:42 AM

I think I broadly agree with Bruce's point--I don't expect these to have a large impact on the world. But I'll note a few things:

a. The contact tracing apps are designed not to be very useful for tracking people. In particular, if I seize your phone, I don't learn whom you've been close to from the data stored on the app. (But if someone seizes your phone and mine, they can check whether we've been close--only I think they can get that information from the phone company without our ever knowing.)

b. The basic protocol I've seen does make some kinds of tracking of people easier, in the sense that if you put listening nodes in a lot of public places, you can link the movements of people later on when they announce a positive test result. It's pretty hard to avoid that problem. Also, your random codes (and bluetooth addresses) roll over every so often, but in many cases if I'm listening locally I'll be able to track a device across a rollover, because address X disappears exactly when address Y appears, all at the same distance from my listening node.

c. It's possible for the apps to come up with a score for how much exposure you got. Every time Alice receives a pulse from Bob, she estimates his distance from the power and other data that she receives. She can estimate the amount of time they were within a certain distance, and produce some kind of risk score. You could alert only on a sufficiently high risk score, which might lower false positives quite a bit.

d. The descriptions I've seen allow my app to store metadata with the stored codes I've recorded from other people. That means instead of just getting an alert like "You may have been exposed, best of luck!" I might be able to get an alert like "You may have been exposed between 12:15-3:45PM at the Starbucks on Main Street, when you sat approximately 3 meters from a known infectious case for over three hours." That would be more useful, though it still has the problem that it will have substantial false positives (which will be visible) and false negatives (which won't).

As far as false positives, the (somewhat sketchy) data we have on the virus now suggests that when nobody's taking any precautions and everyone's susceptible (so we're talking about R_0), the average infectious person manages to infect 2-3 other people over the course of about 10 days when they're infectious. That means that there will be dozens of people who were close enough to get infected, but didn't. The app will give those dozens of people all an alert.

The result is that there will visibly be like 20 or so false alarms for every true alarm when the virus isn't very widespread in the community. That's going to give the app a pretty bad reputation with users up front if testing is available, and it probably implies we can't expect everyone with an alert to self-quarantine for 14 days.

John Kelsey • May 2, 2020 11:50 AM

It seems like what's needed here isn't a contact tracing app, it's guidance (maybe just written instructions, maybe an app) to help manual contact tracers do their jobs given cooperation from the patient and short-term access to their phones and tablets and such. For example, if I turn up at the hospital and test positive for COVID-19, it's pretty clear someone should look at the calendar on my phone and determine any meetings or appointments I've had, and should look through my contacts and make sure that (for example) my doctor and dentist know I've tested positive, so they can check their records and figure out if I've been in their office recently. But there's probably a lot that the computer forensics people could propose that's better than this.

Note that the context here is me wanting to help, but also wanting my phone back--I'm not going to be okay with being stranded in the hospital while my phone (my only way to communicate with my family) is shipped off to some lab to extract the data.

Is there useful guidance we can provide? This might be extra important, since there are probably going to be thousands of people employed as contact tracers in the next few months. (If we have any plan other than letting the virus burn through the population and kill lots of people till we reach herd immunity, we will need those folks doing the contact tracing.)

Call Me Late for Supper • May 2, 2020 12:09 PM

"The idea that contact tracing can be done with an app, and not human health professionals, is just plain dumb."

But Bruce ... an app is a seamless solution. As such, it's gotta be good, yes? ;-)

Ryan Baker • May 2, 2020 12:26 PM

I've yet to see anyone credible suggest that apps should be used as a substitute, rather than complement, to tracing professionals. That said, it does appear as if that's creeping into app design, though for other reasons.

App design being proposed currently, tries to minimize privacy concerns. In the process, it cuts tracing professionals off from direct access to much of the data. Individuals have to enable tracing. Individuals have to enter their test status. Individuals are the ones notified of trace based warnings.

To the degree that a tracing professional has reached out to individuals, or that individuals reach out to tracing professionals, that data is still valuable, as it supplements anything that an individual can reconstruct from memory, diary, or historical records. But, and this is a big but, it's a significant shift from privileged access to historical data by tracing professionals.

To the degree that this approach might crowd out those approaches, it could harm the response by tracing professionals. However, there's a very credible belief that that type of response was never going to be accepted, i.e. that tracing professionals in the US were never going to be granted this type of privileged access.

I think it's fair to point out that the community most opposed to tracing apps, is also the same one most opposed to privileged access to data, and as such, it's disingenuous to offer tracing

professionals as the alternative solution while also restricting their access to data. Is there anywhere they have such professionals have successfully carried out their mission without some level or privileged access?

Mikle C • May 2, 2020 1:22 PM

Bruce, you are both absolutely correct, and also absolutely wrong.

Yes, relying on contact events from contact tracing apps alone will provide no value. However, there's also the non-contact location data of the past 14 days that can get correlated against other location data sets.

The contact events are primarily for notification services (that person B aught to get tested), but the non-contact location trace will allow health services to identify potential infection sites. Driving through a drive-thru will not generate a contact event, but the location data could tie an employee's infection to a source, and with that tie new sanitary procedures can be developed.

The app cannot be effective as the sole contact tracing plan, but it can be effective if it is a part of a more comprehensive contact tracing plan including questionnaires, data crunching, and statistical analysis. And contact tracing is just a part of a bigger plan to help isolate only those who need isolation.

https://ethics.harvard.edu/covid-roadmap

The plan here, for stage 1, is TTSI: Testing, Tracing, and Supported Isolation. We need fast, cheap, ubiquitous testing, we need comprehensive contact tracing in several forms (including the app), and we need supports available so that people who are asked to self-isolate have income and job security so that they won't break isolation out of necessity.

Steve • May 2, 2020 2:17 PM

Per Bruce:

> This is just something governments want to do for the hell of it. To me, it's just techies doing techie things because they don't know what else to do.

Absolutely.

"Contact tracing" apps are a perfect example of "*don't just stand there, **do** something*" thinking, an analog to "*security theater*."

In fact, if Bruce hasn't already coined the phrase, I'd call it "***COVID** theater."*

Expect to see a lot of it in the coming months and years.

JonKnowsNothing • May 2, 2020 2:35 PM

> "... a very, very unfortunate circumstance where **somebody who was asymptomatic**, but obviously had a very high viral load, was **in contact with people for six days**, residents and staff, and this is the very, very tragic outcome of that."

Any "contact app" will fail this Real Life test. This condition occurred in a Care Home and 13 people died so far. They didn't need a "contact app" they needed **Regular Fast Testing, Daily**

To properly get a handle on "whys and wherefores" that such a device is being promoted consider:

There are 2 items governments need to accomplish to get "the economy rolling"

1. Get kids back in school.
   In the USA it's generally illegal to leave a young minor at home alone. If parent(s) have to stay home to supervise, they won't go back to work.
   Ergo: Kids back to school ASAP.
2. Convince people it is "safe" by giving them a talisman protector.
   If you believe your talisman will protect YOU from illness you will go out and about. It's important the talisman have "magic aspects" that protect YOU.
   Ergo: Roll out a talisman ASAP.

There is no cure, no treatment, no fix.

If you die you will join the hundreds of thousands that have died. Your kids will join up with all the COVID19-Orphans of parents who thought their talismans would protect them.

If you understand the entire purpose is to separate you from your safety, home, family in order to make Anyzone Muskies more fiat wealth and you select to do this willingly, by all means go ahead and wave your talisman in front of you was you travel and shop.

If you value your own lives, that of your family and neighbors then you will **Stay the FHome** until you get the same 5min Abbott Test, hourly and daily that the heads of Government get. It won't protect you but it might stop you from going home and infecting the rest of the family.

There is the small not often discussed problem of "washing clothes" where your children drag it back to the house after a good fun day of play or you drag it in on your running shoes after stepping in a spit-wad on the running path. There is no test for ambient infection. Not even your talisman will help you here.

of note:

> YOUR life doesn't matter a lot in the terms of the economy but it DOES MATTER in terms of humanity. I have zero to gain by imploring people to use their intelligence and stay home, YOU have everything to gain by doing so.

ht tps://www.theguardian.com/australia-news/2020/may/02/why-is-it-spreading-sydneys-newmarch-house-aged-care-home-becomes-epicentre-of-covid-19-fight

ht tps://en.wikipedia.org/wiki/Talisman

ht tps://en.wikipedia.org/wiki/Fiat_money

ht tps://en.wiktionary.org/wiki/whys_and_wherefores

ht tps://www.theguardian.com/world/2020/apr/27/families-health-staff-die-coronavirus-get-60000-payouts-matt-hancock

> Families of health staff who die of coronavirus to get £60,000 payouts
> ...
> In previous economic models the Value of a Worker Lifetime Labor is pegged at $1Million
> *So, how much is that in BezoDollars?*

(url fractured to prevent autorun)

Ryan Baker • **May 2, 2020 5:50 PM**

@Peter
Tracing is going to be necessary. The list of safeguards you suggest are inadequate, and targeted at transmission vectors that are secondary.

You might want to read up on the latest information on how the virus generally spreads. While surface contact was initially warned off heavily, and is still a possible vector, more recent papers suggest the most common method of infection is airborne droplets that are transmitted during relatively close proximity.

There's the often quoted 6 feet, but like almost all numbers this isn't a rule, more of a probable risk zone. Masks (to lower your risk to others) and personal space seem to be the only measures that have a high degree of relevance.

You can use as much disinfectant as you like, it won't meaningfully change R0. Don't take that the wrong way though, hygiene is worth the effort, but any thoughts that it's sufficient are quite a bit more dangerous than enabling app tracing for the next year.

What's very clear to me is, there's one main scenario for getting out of this. That scenario is that we create a group of tracers who track down potential contacts and people quarantine themselves based on findings. If they don't have access to enough information, this will fail. If we don't have sufficient testing available it will also fail.

There's a few other improbable scenarios that I'd acknowledge. Since not everything is known, these are possible, and if I don't acknowledge them, I'm sure someone will believe I never thought about them.

1. It's possible a vaccine is created and produced at scale in a short time frame. Depending on what time frame you mean, this is either impossible or improbable. If you modify "short" to "longer" (i.e. a year at least) your odds go up, but the consequences aren't acceptable.
2. The virus is at the less deadly end of all analysis, spreads faster, and has more asymptomatic cases and is often reaching herd immunity already. It's "possible".. maybe even more probable than #1. But it's no where probably enough that you should bank on it.

Barring those improbable scenarios, not investing in contact tracing is going to see a force you to accept one of two scenarios, neither of which is good.

1. Using repeated or long term lockdowns. Many people would get infected anyhow. Each time a lockdown is eased, infection rates would spread, and another one would soon be needed to maintain this not good scenario.
2. Giving up on containment entirely or close enough to it that the virus spreads to the level of herd immunity (hoping that isn't short term), and you suffer whatever consequences that brings. I won't put a number on that, many things are unknown there, but it's unless improbable scenario #2 is true, it's enough that any sane person would regret not taking the tracing route.

Emory Merryman • **May 2, 2020 8:30 PM**

This is something I have thought about for a while.

(1) The false positive rate is a non-issue. If I could spend a few hours outside in a park before getting a false positive and returning home for 2 weeks of isolation that would be huge improvement over my current situation (lockdown 24-7).
(2) I think the contact tracing app will not happen because by the time the app is developed, testing will be cheap enough to be ubiquitous - obviating the need for the app.
(3) This shows the need for "basic" research. If academics had already worked out big chunks of the app as a funded academic exercise, then we could think about it. But it is too late to start now.

JonKnowsNothing • **May 2, 2020 9:59 PM**

@Emory Merryman

re:

> (1) The false positive rate is a non-issue. If I could spend a few hours outside in a park before getting a false positive and returning home for 2 weeks of isolation that would be huge improvement over my current situation (lockdown 24-7).

Here is another way to consider this: It is NOT ABOUT YOU :)

A False Positive would give YOU a nice 2 week no pay, no health care vacation with a chance of no job at the end. And to be blunt, not that many care about YOU.

A False Positive sets off an entire chain-reaction of all the people you know or came in contact with. It means Contact Tracers start rummaging through your travel and work and leisure itinerary and immediate jam N+ people into quarantine because of YOU. They get to enjoy the same 2 week no pay, no health care vacation and the identical chance of no job at the end. Since you probably interact with many different types of people with many sorts of jobs during the "trace-back period of 14-21 days" that means a whole pile of folks get hurt because YOU wanted to go for a walkabout.

So, imagine you live in a big urban city and you have a pretty decent paying job such as a Professor at a Major U. You travel via public and private and UBER-LYFT transport during the week, you go to a rock concert on the weekend, a symposium mid-week, you dine out at fashionable restaurants and enjoy a good booze-up on the weekend playing D&D with a group of longtime friends.

Now count up all the people you were near for 14-21 days and all the people they connected with for 14-21 days and all of the people they connect with (3 hops for starters). ALL of those people get

punished because of your walkabout.

Who cares about the economy, which is the reason they are even planning to lift restrictions at this time? Who cares if you put some restaurant out of business because you dined there? Who cares if the bus driver and subway monitors and taxi drivers die because you just had to go to the park?

Well... good question. If you don't care... no one will care about you either.

Because you will certainly be on the receiving end of the same scenario, except you will be the one surprised by the hazmat suits showing up at your place of work and scaring the bejezzus out of your family, friends and children.

Walkabouts are Walk-This-Ways

ht tps://en.wikipedia.org/wiki/Walk_this_way_(humor)

> "Walk this way" is a recurrent pun in a number of comedy films and television shows. It may be derived from an old vaudeville joke. It refers to the double usage of "way" in English as both a direction and a manner.

(url fractured to prevent autorun)

Crush The Curve • **May 2, 2020 10:25 PM**

We took a deeper look at questions around digital contact tracing from an Australian perspective here:

https://blog.crushthecurve.today/why-should-you-install-the-covidsafe-app-part-2/

Brad Templeton • **May 2, 2020 11:32 PM**

Bruce, the digital app is an adjunct to the usual human research. When they contact trace they ask the infected person for names of people they have been in contact with. This can definitely be facilitated if you can show the person a set of faces and names learned from the contact tracing app. They will just quickly discard the faces they don't recognize unless the app was "very sure" and you can then talk to both people. This gets rid of the false positives. You tune the thresholds to match the desired human workload.

The false negatives are there for human tracing, when the person gives you a list of names. But now, that list can be supplementeed with a computer's memory of how long the contact was and at what distance, allowing you to prioritize the order of contacting the other parties (and possibly now having contact info on them which the first person didn't have.)

So, is it good enough on its own? Probably not. Is it a very useful adjunct to improve the existing process? Seems so.

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moti yung • **May 3, 2020 12:22 AM**

My take for a few weeks now:
---Medicine is never an exact science (there are type I and type II errors etc. in every analysis of complex medical diagnosis!
The errors never stopped medical research and new medical technology development!
---Public Health methodologies (the reason to look for them), to begin with, included traditional (manual) contact tracing!
It has been there for many many years, see: https://en.wikipedia.org/wiki/Contact_tracing
-It is just one tool and source of information MDs can use.
---CDC has a balanced view on it (which has evolved in the few weeks but essentially reflects also the traditional contact tracing)-- it is one of many tools for MDs to use ....
See: https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html

---At some point the new technology opens new opportunities to serve people, and why not in public health, should we stop at applications we already have?
Say: If I have two mobile phones, is the only way to use them is to measure the hight of a building?
After all, I can do the following:
*throw one phone down from the rooftop!
*use the watch in the other mobile phone to measure time, and based on the time it takes for the first phone to reach earth I can calculate the height!

Well..... there are new applications possible now, I think it should be tried! If we don't try we will never know!

(This post represents my personal opinion).

Clive Robinson • May 3, 2020 5:42 AM

@ Noam,

> What's the risk of a false positive? Not that much.

That depends on who has the applications on their phone.

As having the app on your phone is voluntary the proportion of "neurotics" and "worried well" will be high compared to the normal demographic.

When some of those get a message, they are likely to panic or worse. The result is that they are going to tie up resources.

This tends to cause a "discounting effect" in peoples minds.

I'm currently quite sick in bed with what may well be bacterial sepsis. As I keep getting bacterial infections that are life threatening because I'm immuno compromised due to surgery, the Drs when they pull up my notes get a big red warning about it.

I detected the first signs Friday morning and went directly onto the bacterial infection protocol that I'm supposed to follow. By mid afternoon I realised it was not working so as I realy do not want to go into hospital right now for obvious reasons I phoned the Drs...

Where due to the current load I was told by the receptionists I could get the Dr to phone me back on Monday. I spent the next few minute or so pursuading the receptionist that sepsis was life threatening thus it was quit urgent, so I was told a Dr would phone me back.

They did a few minutes later three questions were asked and an emergancy electronic prescription was issued. A friend went and got the meds for me.

I think the perscription has just about caught it, but I feel very very unwell chills, feaver, joint and muscle pain and difficulty breathing, as for getting out of bed, I don't have the energy to get across the room as for "natural functions" to say the pain is breath taking is an understatment, having been stabbed by burglars in the past I can tell you it hurt a lot lot less.

The fact I had to be a little bit unkind to the receptionist is most likely down to the "worried well" blocking up the phones.

In the past when I get the first symptoms I've gone direct to the hospital, where they know me[1], but there was no way I could physically have got myself up there, plus being immuno compromised the last place I want to be right now is in a "sealed box" hospital with a load of critical respiratory patients...

As has been pointed out to me on number of occasions being an "Unworried Ill" and trying to put the least burden on the system I can is probably not a good idea...

[1] I used to joke about frequent flyer miles and getting a time share bed with hospital staff, but many know me so well I've met and know the names of their children and even grand children, from saying "Hi" in town. On one occasion I passed out in a hospital corridor whilst trying to get to A&E and the "crash team" called knew my name without having to ask...

MarkH • **May 3, 2020 6:24 AM**

@moti yung:

There are several ways to use a smartphone to measure the height of a tall building.

For example, you can install an app or widget to display the GPS altitude measurement, and compare the values between the ground and the top of the building.

You can also get a long string (perhaps fishing line or kite line), attach one end to the phone, and then go to the top of the building. Paying out the line, lower the phone until it reaches the ground, and then pull the line back just enough for the phone to swing freely above the ground. Make some side-to-side motions with the line, and then hold it steady at rooftop height. Measure the period of the phone's pendulum swing, and then apply the formula for pendulum period to compute the height.

Another technique is to go inside the building, find a superintendent or maintenance person, and say "if you tell me the height of this building, I'll give you a free smartphone."

But I like your suggested method most of all, because it destroys a smartphone.

@Clive:

I'm alarmed, and grieved, to learn of your new health complication. Is the immunodeficiency permanent, or do you anticipate some recovery over time?

Your observation that "being an 'Unworried Ill' and trying to put the least burden on the system I can is probably not a good idea" is spot-on.

By God's special providence to nitwits, I've never had any serious health problems (so far!) ... but I know enough people who have, and sometimes "rattling the cage" can save your life.

A man I know went to an emergency room with heart attack symptoms. Though he described his symptoms when he checked in, reception sent him to the waiting area. As his long wait wore on, he felt progressively worse, and had that feeling that his condition was dire.

Being much smarter than I am, he stood up, and feigned a collapse (being careful not to injure himself in the fall). Well, they rushed him to a bed within not many seconds. When the EKG was hooked up, the physician told him "you're having a heart attack!"

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myliit • **May 3, 2020 7:34 AM**

@Clive Robinson

Regarding health issues, Jeez Clive. Take care.

“... As having the app on your phone is voluntary the proportion of "neurotics" and "worried well" will be high compared to the normal demographic. ...”

https://www.newyorker.com/news/q-and-a/paul-romer-on-how-to-survive-the-chaos-of-the-coronavirus

“ [Nobel prize winning economist Paul Romer] But I will tell you that I’m actually encouraged by the decision by Congress to spend twenty-five billion dollars for testing in the phase-three bill. [This allocation is part of Phase 3.5.] That was not what most people were expecting a few weeks ago, and it happened.

[Isaac Chotiner] What is your biggest fear about the economy right now?

[PR] There was some analysis that was done at the St. Louis Fed, going through job categories and just thinking about the employment consequences of physical lockdown and social distancing. Their conclusion was that we were going to be at an unemployment rate above thirty per cent, so that was the early-warning sign that we’re headed for an economic catastrophe that’s worse than the Great Depression.

[IC] Different people have talked about different ways to get through this. Your plan focusses on testing more than almost anything else, and more than some of the other plans. Everyone acknowledges that testing is important, but why is it so central to every idea that you’ve put forward?

The key to solving the economic crisis is to reduce the fear that someone will get sick if they go to work or go shop. So it’s really about building confidence. The thing about testing is that it’s easy to explain and it doesn’t frighten people the way digital contact tracing does. It’s not subject to technological and social, political uncertainty the way digital contact tracing is. It doesn’t require the

organizational capacity that doing human contact tracing does. It's really just a very simple, easy-to-explain idea—that to control the pandemic, we need to get a reasonable majority of the people who are infectious into a quarantine, and then we're good. That's really all it's about. So I wanted to try and articulate a very simple approach for managing this crisis, because I think that's central to restoring confidence.

For example, think about me going back to my dentist. It doesn't really matter what the law says or the governor says I can do. I don't want to go back to the dentist's office in New York City until I know that he can show me a recent negative test, and he doesn't want me to come into his office until I can show him that I've got a recent negative test. So I think it's easy to explain this idea to people, and I think it's also easy to convince people that this is something we could do for as long as it takes to manage this pandemic. Suppose it takes more than twenty-four months to get to a vaccine. If it takes more than twenty-four months, I could see going and getting tested before I go to the dentist and the dentist could get tested. Neither of us has a problem with that.

I really think that confidence is so central to investment decisions, to planning, to anticipating the future, that we need something so simple that nobody worries if it's going to work, nobody worries if we're going to abandon it because it's too painful. Everybody just says, "O.K., yep, that's the plan. We're going to stick to it." And then we go.

[IC] Some of the other plans that have come out have dealt more with things like contract tracing and digital surveillance. ..."

Givon Zirkind • **May 3, 2020 8:34 AM**

In 100% agreement. contrace.org has started to do tracking by asking infected people who they have come in contact with. But, all-in-all, this is not the best way to deal with disease. It's about health & hygiene. Good nutrition. A strong immune system. Being able to provide care and interventions for those who succumb to the disease. Those who have self-isolated will get the disease sooner or later when they come out of isolation.

Alejandro • **May 3, 2020 9:30 AM**

OK, clearly the proposed app is useless and dumb. However, let's not forget Google's heavily financed influence in this matter. They surely want to glob onto our personal medical data every which way. The point is, don't count them out just yet. Or, ever.

Let people know you think the app cannot be trusted and won't do any good. Over and over again. No time to be silent.

My tin foil hat comment on the app.: I don't see any reason at all there will NOT be some parallel data reporting back to Google/Apple/.govs everywhere to improve the app, for troubleshooting, to comply with laws, and to, well, monetize/politicize it as they see fit.

Who or what can stop them?

Jack S. • **May 3, 2020 12:15 PM**

OK, Mr. Government Health Guy, I'll install and run your app if you promise to provide a minimum of three FREE tests (1 to reveal infection, 2 to ensure I'm recovered) should the app report that I was within contact of someone that turned up testing positive for the virus.

I'm not going to quarantine myself for 14-days just because your app said I was near someone that was infected.

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myliit • May 3, 2020 12:26 PM

https://www.washingtonpost.com/world/cellphone-monitoring-is-spreading-with-the-coronavirus-so-is-an-uneasy-tolerance-of-surveillance/2020/05/02/56f14466-7b55-11ea-a311-adb1344719a9_story.html

“ Cellphone monitoring is spreading with the coronavirus. So is an uneasy tolerance of surveillance.

“... Governments, private companies and researchers observe the health, habits and movements of citizens, often without their consent. It is a massive effort, aimed at enforcing quarantine rules or tracing the spread of the coronavirus, that has sprung up pell-mell in country after country.

This is a Manhattan Project-level problem that is being addressed by people all over the place,” said John Scott-Railton, a senior researcher at Citizen Lab, a research center at the University of Toronto.

He is among a group of researchers and privacy advocates who say there is not enough debate over the consequences and utility of the new surveillance tools, and no indication how long the scrutiny will last — even as the flood of prying apps are becoming a reality for millions of people, like solitude and face masks. ...

At least 27 countries are using data from cellphone companies to track the movements of citizens, according to Edin Omanovic, the advocacy director for Privacy International, which is keeping a record of surveillance programs. At least 30 countries have developed smartphone apps for the public to download, he said.

The monitoring has raised fewer objections in countries that have been more successful at battling the virus, like Singapore, and provoked a much louder debate in Europe and the United States — a difference that is reflected in the numbers of people who voluntarily download tracking applications. ...

[Three] 3 in [Five] 5 Americans say they are unwilling or unable to use an infection-alert system being developed by Google and Apple, a Washington Post-University of Maryland poll has found.

Epidemiologists and government health officials have taken a central role in designing some of the coronavirus tracking programs. Privacy groups have been far more concerned when intelligence agencies have taken the lead, as they have in Pakistan and Israel, or when governments outsource tracing to private companies.

Infection-tracking software by NSO, an Israeli company, has attracted criticism before it has even launched. The company is best known for designing surveillance tools used by authoritarian governments to spy on dissidents, journalists and others. A person close to NSO said its new coronavirus tracking software, called Fleming, was being tested by more than two dozen [24] governments around the world.

The pandemic has all but silenced the debate about encroachments on privacy by corporations, Scott-Railton said. “People are anxious. They are worried. They want to go back to normal, to handle doorknobs, to online date.

“We are looking to anyone who is pitching hope.” ...

The intrusions were easier to accept because Singapore’s government appeared to have citizens’ welfare in mind, and no “ulterior motives,” she said. But the number of intrusions was rising: one government app allowed people to report violations by their neighbors. More recently, some grocery stores had required people to provide their identity numbers to enter.

“It’s worrying once you give up these liberties,” she said. “Is this the way it’s always going to be?” ...

The experience of countries hurriedly deploying apps and similar surveillance software highlights the limits of such technology and the challenge of wide-scale public buy-in even in places that are largely open to being watched.

Experts warn, for example, that apps relying on Bluetooth radios can provide inexact location data and falsely identify people as infected.

Jason Bay, the director of Singapore’s contact-tracing app, called TraceTogether, said in an online post last month, “If you ask me whether any Bluetooth contact tracing system deployed or under development, anywhere in the world, is ready to replace manual contact tracing, I will without qualification say that the answer is no.”

Scott-Railton of Citizen Lab said the effectiveness of such apps was ultimately determined by “human social behavior and racial and age demographics.”

Apps are of limited utility unless a large percentage of a country’s population downloads them, and even then, the reach of the software is limited to people who own smartphones, which often excludes lower-income people, racial minorities and people over 65, he said.

[...]”

JonKnowsNothing • May 3, 2020 1:23 PM

@Jack S.

re:

> I'm not going to quarantine myself for 14-days just because your app said I was near someone that was infected.

iirc a few folks tried this in Wuhan early on and had personal escorts either back to their abodes or to jail.

Depending on where you live and what "emergency powers" are enabled, you might not want to spend the 14 days inside a detention mass incarceration facility. Reports are food is bad, hygiene is worse, health care nil, and the guards are paid "not to give a F" about you.

ymmv

@Clive

I am distressed to hear of your illness and I hope that the meds will patch you up. A voice of reason and knowledge like yours is sorely needed now. I hope that a Clive-Canary system is somehow in place to let us know that things are OK with you even when you are not able to post.

When you are alone, there is no one to know, and when you have no family, there is no one to care. Please know that I admire your knowledge and patience to repeatedly explain all the myriad topics covered here and with some luck, you will be expounding on the more nuanced aspects for a long time yet.

Pete Forman • **May 3, 2020 6:12 PM**

To those who say that no app is required I counter that Bluetooth must be switched on. Mine is disabled. If Android/iOS are overriding my Bluetooth settings in order to enable this tracking then I will shout about privacy.

JonKnowsNothing • **May 3, 2020 9:12 PM**

@Pete Forman

re:

> To those who say that no app is required I counter that Bluetooth must be switched on. Mine is disabled. If Android/iOS are overriding my Bluetooth settings in order to enable this tracking then I will shout about privacy.

disclaimer: I do not know if these particular apps run an override.

Apple, not that long ago, was caught using their UWB (ultrawide band Bluetooth connection) and turning on Location even when people had Location OFF. It ran about every 2 minutes.

Apple plans to use it for a short range auto-connection to any other device with a matching system. The idea is that you want to Group Share/Airdrop your pictures and files with everyone in a nearby area. In order to "find the others" it needs to have Location turned ON, so that's what they did.

After the discovery, Apple turned off the Location LED indicator and the search continues without notifications and of course without you having enabled Location. There is now supposed to be a setting to turn off UWB.

Apple stated that there were many "services" that run without any user notification. LEDs are independent of actual states of hardware and software.

A Game of Connect the COVIDS

ht tps://en.wikipedia.org/wiki/Ultra-wideband

> Ultra-wideband (also known as UWB, ultra-wide band and ultraband) is a radio technology that can use a very low energy level for short-range, high-bandwidth communications over a large portion of the radio spectrum.[1] UWB has traditional applications in non-cooperative radar imaging. Most recent applications target sensor data collection, precision locating [2] and tracking applications.
> ...
> Ultra-wideband is also used in "see-through-the-wall" precision radar-imaging technology,[13][14][15] precision locating and tracking (using distance measurements between radios), and precision time-of-arrival-based localization approaches.
> ...
> Apple launched the first three phones with ultra-wideband capabilities in September 2019, namely, the iPhone 11, iPhone 11 Pro, and iPhone 11 Pro Max

ht tps://krebsonsecurity.com/2019/12/the-iphone-11-pros-location-data-puzzler/

ht tps://krebsonsecurity.com/2019/12/apple-explains-mysterious-iphone-11-location-requests/

ht tps://krebsonsecurity.com/2020/01/apple-addresses-iphone-11-location-privacy-concern/
(url fractured to prevent autorun)

ATN • **May 4, 2020 3:42 AM**

> The ugly point hidden so far is the monetization. It's beyond belief this app is given away in altruism.

It is like pretending a free game app is mainly to play.
Once a company achieved to get its app installed, it can identify reliably the owner of the phone, and follow him/her for at least the next few years with good accuracy. Easy to sell data.
I would buy shares of that company.
Maybe the app could also save few people, maybe a game app could be a good game...

At least that Covid-19 virus is a good training for what will happen with a new virulent computer virus, when people will not be able to connect Internet (or any other computer) at all, even banks or doctors...

Time to see the old Battlestar Galactica DVD (the film from 2003 , DVD 8223041-11, not the series) again.

Cellar • **May 4, 2020 4:30 AM**

To me the ``fun'' thing here is that Bruce Schneier, The Brand™, consists of saying security related things so obvious that it makes my ears bleed, but it gets Bruce-the-person a living, even an Eminence Grise™ image. So when Bruce Schneier™ goes on record saying he thought something so obvious it didn't need saying but it turns out it does need saying... we have a problem.

Even he doesn't always flag the obvious. Bluetooth has completely different propagation properties than air- or snot-borne viruses. GPS is an indirect stopgap: It gives you a location estimate with an error estimate, and you don't care about location, you care about proximity. Measuring a<-gps->b is

not what you need, a<->b distance in the ``virus propagation"-``medium" is what you need, which isn't necessarily the same as distance in space. Think plexiglas screens, or building air condition. And the path can be easily time-distorted, think contaminated surfaces.

After having thought about for less than a minute --and do mind my mobile poison of choice is a 6310, not a smartphone-- the closest thing to a usable technique would be using (ultra)sound beaconing and listening to other phones using said beaconing, since the virus requires air for transport and so does sound, mostly. It'll go haywire as soon as you lay it down on a resonant surface, but hey, those might be contagious too. Certainly, the wrongs will be vaguely plausibly ballpark, and more importantly, moreso than bluetooth.

Which is not to say it's a good idea. But ultrasound is a better idea than bluetooth. And yet, I've so far seen exactly nobody propose any such thing. How come? Is this what we can expect from our best and brightest, government-types and techie-types, the world over? Bruce, say something obivous about this please.

Apropos, the privacy thing enters into it at the second stage. Because you don't need the alert when it's given. You'd need it well before so you can stay out of reach. Once that fails you don't need it, someone else does: The people trying to trace an infection back to where they got it from and forward to whoever else they infected. That's typically government healthcare, and so they'll get nosy.

The best practical advice I've seen is a Belgian minister proposing we keep diaries of where we've been and who we've met. It's certainly not perfect, but it's nicely low tech, proven to work as far as it does, and sheds most of the thorny issues, like with privacy, data lakes on government servers lingering far beyond reason, subsequent malappropriation, and so on.

James Evans • **May 4, 2020 4:49 AM**

@Clive

I have been reading this blog for many years and always look through the comments to see your insightful posts. I hope you will get well soon!

White IT • **May 4, 2020 5:16 AM**

The problem we all have is that will these new powers be taken away after the crisis is over. So much data, so much datamining. At we value cyber security and your freedom of privacy.

White IT • **May 4, 2020 5:17 AM**

The problem we all have is that will these new powers be taken away after the crisis is over. So much data, so much datamining. At White IT we value cyber security and your freedom of privacy.

Alan • **May 4, 2020 5:22 AM**

It is different in Australia. We have a very small number of active cases and now we have plenty of testing kits. The app augments but doesn't replace contact tracing. It doesn't need to be perfect.

False positives - so we've wasted a test. Big deal.
False Negatives - we've still captured some of the interactions, and further investigations can cover the gaps.

The Australian experience is 95 deaths in a country of 25 million - we must be doing something right.

MarkH • **May 4, 2020 6:30 AM**

@Alan:

> The Australian experience is 95 deaths in a country of 25 million - we must be doing something right.

Australia and New Zealand have both suffered about 4 deaths per million of population, and nearly extinguished their epidemics with new cases now at very low levels.

Compare to Sweden, with 265 deaths per million of population and climbing, because new cases are diagnosed and additional people are dying at high rates there.

It would seem that there are different concepts of personal and social responsibility, underlying the diametrically opposed approaches represented in those numbers.

Freezing_in_Brazil • **May 4, 2020 8:44 AM**

@Jon Knows Nothing

Regarding my last post, upon a careful reading of the thread I realize that maybe that’s not what yourself think. Notwithstanding, my point still holds true.

Freezing_in_Brazil • **May 4, 2020 9:14 AM**

@ Clive Robinson

You’re in all my warmest thoughts as you recover. Get well soon!

Clive Robinson • **May 4, 2020 9:59 AM**

@ moti yung,

Nice to see you pop up in the blog.

Oh and my thanks to you and Adam Young for your book, for it's slim size and easy readability it was one of the most thought provoking books I've read.

Paul • **May 4, 2020 11:39 AM**

> It's not accurate enough for you to quarantine yourself for two weeks.

Why so? It doesn't have to be totally accurate. Just like when you travel abroad, you're not *guaranteed* to catch the virus while traveling, but you're still required to self-quarantine. Now I

wouldn't make it a strict rule for this app, but if traveling is enough to warrant a quarantine, so is this. I don't think you fully understand the purpose of this app. It's not meant to diagnose people. It's meant to warn them when there's an increased risk of being infected. If I got such a warning, I would definitely quarantine myself. Not because I would think I'm infected now. But because it shows an increased risk.
It's not that you're not always in risk. It's just that, IMO, being in the area where an infected individual went at the same time, and knowing that, should be enough to make people think about self-quarantine.

Mikle C • May 4, 2020 1:54 PM

As an addendum to my last post, I have been both right and wrong in my comment, as Mr. Schneier has been both right and wrong in his original post.

The app (as deployed in Alberta) does not do any location tracing, and does not use GPS. It only does Bluetooth proximity tracing within 2m, and only registers a contact event if two people have been together for at least 15 minutes over a 24 hour period. The only information the health service has is your phone number and a randomly generated ID token. I presume it's only the ID tokens that get exchanged over Bluetooth.

This app isn't trying to provide perfect virus tracing, that's still left to the humans doing that job at health services. What it's meant to do is speed up the question "If person X gets infected, who should we call in to get tested?"

Yes, it'll miss a lot of people, and yes, it'll get some people tested who haven't been infected. At the end of the day, though, it will catch some of those who have been infected, and it'll test them 10 days sooner than they would have been tested otherwise (using the manual patient interview process), with the intent of eliminating 10 days of virus spread from those people. This is a win.

With fast, cheap, and ubiquitous testing, false positives are not a major concern.

The false negatives are still a concern, but the goal isn't to catch all transmissions, but catch the most likely ones. The manual patient interview might help fill in some of those gaps (such as, "I went to X grocery store on Date").

More clarification details about Alberta contact tracing app from https://www.facebook.com/keltie.duggan/posts/10156966717971502:

Tracing Technology Update:

Many Alberta physicians just had an important web learning session about the ABTraceTogether APP given by Dr. Jia Hu who is the Calgary Zone MOH. The explanation on the app site isn’t great yet, so here is important info on the new APP. Dr. Hu answered many of our questions, and asked us to help share the following:

1. The two most powerful tools to reduce spread in the absence of a vaccine are social distancing and test/trace/isolate. The more uptake we have with the new APP, the less social distancing we will need over time. Instead of it taking up 10 days to contact everyone, the goal is to shorten to this time to a few hours, there by improving efficiency. Accuracy will also be improved, as not everyone recalls all their contacts, or even knows them all.

2. The APP was developed (by Deloitte and IBM) based on existing technology in Singapore. For Apple users, in its present state, the APP has a significant limitation that will be fixed in about two weeks. It works fine in the background on Android phones but it has to be on in the foreground on an iPhone, which isn't practical. Apple will do a patch repair for their iOS in 2 weeks, so it will be able to work in the background for iPhones soon.

3. This APP was designed to be the LEAST invasive of privacy as possible while still being useful. It tracks ONLY 2 things: phone number tokens within 2m of your phone and the duration of that contact. (Edit/updated May 4)

4. The information is encrypted so that no other apps in your phone can access the data, such as Facebook.

5. This is not a quarantine APP, such as is used in South Korea. A quarantine app keeps track of your movement. This AB app does NOT use GPS tracking. It is short wave Bluetooth only.

6. There are only four countries with tracing APPs so far, and more to come. Singapore, Canada, Norway and Australia. We are the first province in Canada to have one. Our APP tracks the least information possible so as to limit privacy concerns. For example, Australia tracks age, postal code and location as well as phone numbers and duration of contact, while our APP tracks phone number tokens and duration of time in contact only.

7. The Alberta government and Ministry of Health does not have access to the stored information, just like they do not have access to Netcare. The information is stored on your phone, and only can be seen by AHS if you give permission for access. The information is then stored in an AHS server and is deleted every 21 days. (Edit/updated May 4)

8. This APP is voluntary. In Singapore, where it is also voluntary, there is only 20 percent of population uptake. Alberta is hoping we can do better than that. Please spread the word, and reassure people re: privacy.

9. If you tested positive, you would be contacted by Public Health as you would in any reportable disease, and for Covid you would be asked to isolate. You would then be asked if you had been using the APP and would you agree to sharing the information for contact tracing. Contacts that you had a minimum of 15 min of contact with would be called, asked to isolate and would be given the least information possible, i.e. the source is not given.

10. If you work in health care settings with Covid, for now they suggest having the APP off, assuming you have full PPE with in 2 m of patients with Covid.

11. Kids in school who many have iPhones have not been considered as yet. They will look into this.

12. They wanted to get this APP out ASAP and improve it over time. They realize it is not perfect yet.

I hope this helps! Familiarize yourself with the use of the APP and you can then help spread the word. This technology will help to remove the infection clusters so we can operate our daily lives more safely. This APP is designed to help protect all of us, and most especially our vulnerable populations.

Clive Robinson • May 4, 2020 6:14 PM

@ myliit,

> Nobel prize winning economist Paul Romer

He might be a Nobel economist, but he does not appear to understand sampling.

He says bi-monthly but lets be generous and say "every two weeks" which is a slightly more fine grained sampling rate.

Such sampling will not in the slightest be "random" just like your city waste pick up they'll be getting to you on a fixed day, two or three streets down it will be the following day and so on. It's not just the most efficient way to do it it's also the least costly.

Now on the assumption you are a strapping young lad with a girlfriend who you go to see or go out with most nights and she lives two days ahead of you in the sampling.

Lets assume as you are both young you don't even get the sniffles that is you are both asymptomatic.

So again lets assume you get infected the day befor your test, well guess what with current tests it's unlikely the test will pick it up.

On the night before your girlfriends test you infect her.

So both of you get a full run at being "infective agents" and as you are both young and healthy you both might do a little fooling around.

If you get a bit of graphpaper and draw things out you will realise that you could have quite an infection wave with a close to two week advantage on the monitoring authorities, thus getting the "trace information" might also be difficult if you are actually both teenagers (yes they really are a spiecies from another planet, that's just the way nature designed them and countless military leaders have exploited for millennium).

To gut a long story short there is a formular going back nearly a century (late 1920's) that says in more modern terminology,

> To reliably pick up a signal in a given baseband signal bandwidth you have to sample at twice the rate of the maximum frequency

You can realise this graphically fairly easily, but the correct way is by fourier analysis.

Asside from that rather awkward impasse that will make Paul Romer's idea fail it's actually little different to one I've discussed on the blog.

Put simply rather than use sampling of the whole population which is unnecessary, you simply test everyone with a fast cheap test strip at a building entrance. As long as it reliably detects actuall infections the number of people it falsely says have the infection, provided it's within sensible limits,does not matter because they can be cleared by a more exacting and thus expensive test in a very short period of time.

Clive Robinson • May 4, 2020 6:37 PM

@ Givon Zirkind,

> Those who have self-isolated will get the disease sooner or later when they come out of isolation.

Maybe maybe not it depends on if there is a vaccine or similar.

But also the longer you can stay in self issolation the more likely it is that increasingly effective therapies are found.

If for argument sake it's found that the leathality or need for an ICU/ITU is reduced by a factor of as little as 1000 we would see little immediate value in a vaccine, which would take the preasure off of those who have to make them to be both safe and efficacious.

Whilst we hear stories about a vaccine will be there "real soon now" my personal advice is treat it like the early days of Microsoft product advertising...

That's not to say their won't be one but most experts in effect say "Speed, efficatious, safe, pick two".

Any way if you are self issolating and have a choice as many knowledge workers do, to work from home as long as you like well I'd go with that as a longterm plan if you are over fourty.

The problem is ~50% of the popularion are considered to be extrovert and as little as ~10% real introverts that can survive a year or five of physical issolation.

I happen to be one of the latter and ended up sitting on an Island in the Mediterranean "watching rocks grow" and listen to the world and being paid by the government to do so.

The thing is when you are sitting behind tripple security fencing some of which could shock the life out of you, you sometimes get the urge, not for human company, but to stretch your legs and see a little nature.

Clive Robinson • May 4, 2020 7:22 PM

@ myliit,

> *"Cellphone monitoring is spreading with the coronavirus. So is an uneasy tolerance of surveillance."*

The three step process,

1, Never let a crisis go to waste.
2, If there is not a risis create one.
3, Use FUD to get people to swallow it.

We see this so many times with both elected and unelected government individuals that now we just say,

> It's "A think of the children" Comment

You would have thought that most citizens in WASP nations would have wised up to it by now...

NotAnExpert • May 5, 2020 1:14 AM

IT Security Professionals are not immune to the Dunning Kruger effect.

I think personally that Bruces argument relies heavily on the assumption of "ubiquitous, cheap, fast, and accurate testing" not being a realistic option. But don't listen to me, listen to public health experts.

I know everyone here including Bruce have nothing but good intentions, but please remember that good intentions make excellent pavement on the road to disaster.

As with anything security related, let the actual experts guide public health policies.

Tom Rowe • May 5, 2020 5:32 AM

I see some significant issues with the bluetooth method for those of us who keep it turned off except when absolutely needed.

Clive Robinson • May 5, 2020 6:08 AM

@ NotAnExpert,

> As with anything security related, let the actual experts guide public health policies.

Not a good idea, experts have a depth but generaly not breadth of knowledge

You actually need experts overseen by the type of generalists that were once called "Renaissance man". One of the major failings of Western Education is the push very early on to hyper-specialization. It's actually a failure in many ways[1]. At the very least it engenders a form of pathological competitiveness, where the real skill is not your hyper-specialization but your ability to be a psychopath and stick the knife in where ever you think you see a potential competitor and use the fallen body as a steping stone. You bring a group of supposed experts together and unless they are in colusion you will fairly soon end up getting a similar result as sticking a bunch of feral cats in a sack.

Which gives rise to the issue of "hidden agendas" I've mentioned that in the past I've been involved with communications standards making. Also that you could with a little scrutiny spot the "Five-Eyes" tag teams ensuring they get what they want usually with a whole bunch of invented "Health and Safety" reasons. The benifit of which being it's easy to make any objectors look at the very least uncaring. It was their version of "Think of the children".

The fundemental problem we have currently is,

> Individual-v-Societal rights and responsabilities

Going to either extream actualy hurts the party concerned if you demand the right to full privacy then what you are asking for is full issolation from society. Likewise if society demands full access rights it means no privacy and as far as we can tell that's when society ceases to be.

The problem is the point we are on the line is variable, to some the right to full access whilst they are exempt is a declared goal in life. It's actually a form of mental illness. To them they will use any excuse any crisis even a change in wind direction to demand more access and they will not stop. They care not how many times they try and fail because they are afterall on you the taxpayers dollar, they know that eventually one way or another they will get one step closer to their goal.

They are not going to change only death will stop them but their memory will live on in those likethemselves they leave behind.

The problem most techies don't realise is that such people see them as "useful idiots", almost like small children anxious to please the teacher.

The result is when it's way to late they realise what they have done and how easily the wool got pulled over their eyes. Techies have a "Can do attitude" the problem is they don't have a "Should not do attitude".

There is nothing wrong with contact tracing in the traditional form, it's limited in what it can be misused for because of the number of people involved as they are on the sharp end actually talking to individuals they quickly get to see what the techies don't which is the power of loss of privacy and generally not having an inbuilt mental health issue they quickly realise what it would be like to lose privacy.

As I've pointed out many times in the past "Technology is agnostic to use" and what you should watch out for is "The directing mind" and the use to which it would be put.

If you have any doubts over this go and look at what France is demanding and how.

[1] I've been lucky I got in as a specialist just when microprocessors became the way of the world, but as the market broadened a lot of specialist got to specialized and became effectively extinc (any one else remember the "Cambridge Ring" and no I do not mean a bunch of spys, how about X25 or more recently Novell networking?). What many saw as my failing of being broad ranging in interests especially the rarely changing fundementals rather than chase the rat pack up the house of cards to more superficial sepecialisation has actually kept me relevant not extinct.

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myliit • **May 5, 2020 8:57 AM**

@Clive Robinson

“It's "A think of the children" Comment

You would have thought that most citizens in WASP nations would have wised up to it by now..”

It’s hard to argue against motherhood and apple pie. [1] Of course, our president, amongst others, probably would gladly use any additional surveillance powers against us.

[1] Perhaps we need to add coronavirus as the fifth horseman of the apocalypse, along with, afaik, money launderers, child pornographers, terrorists, and drug dealers.

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myliit • **May 5, 2020 9:35 AM**

@NotAnExpert

“... don't listen to me, listen to public health experts.”

Please consider posting:

1) experts name and affiliation
2) the exact quote
3) referenced text source, preferably with link, for example the WSJ, preferably not video
4) or the like

Clive Robinson • May 5, 2020 3:43 PM

@ myliit,

> It’s hard to argue against motherhood and apple pie.

Which is even easier than arguing a one in 7billion chance corner case as being totally unimaginably bad (say being patient zero in a pandemic[1]) but then pointing the finger and say "But what if it's you, what are you going to say when some one asks why?..."

It's a variation on the old lawyer trick of asking "Do you still beat your wife?" what ever the case is you've been cast in a guilty light and even some one wise to it is going to look at best evasive.

[1] The US executive is making this argument right now they say some twenty or so of the first cases came from a biological research lab just a short walk from the wet market. Therefore Trump and Pence are basically trying to make people think "it must have come from the lab" the trouble is with two colocated sites like a work place and a food market you would expect a lot of people to go from the work place to the market daily to get fresh food[2]. So that commubications path is definitely two way, but how to decide which way? Well one way is to find out who patient zero is and tace their movments... Guess what patient zero went to the food market but did not go to the lab... Is it proof positive it arose outside the lab no[3] but it does make saying or implying it did come out of the lab way more difficult.

[2] In many Asian countries even though fridges and freezers are available the idea of shopping for fresh food every day is normal, and in the case of seafood fresh means still swiming around (and yes even a dull Western palate like mine can tell the difference in just killed fish and four hour dead fish when eating Sashimi.

[3] The thing is asymptomatic sufferes make the usual "cause and effect" determination much more difficult. It is possiple that patient zero is not the true patient zero but the first symptomatic patient... Thus making the true patient zero in effect "unknowable" by the usual methods. Which unfortunatly alows Trump and Pence who are in many peoples opinions "dead men walking" an opportunity for a five to midnight reprieve if they can just sow enough doubt. I guess the real question is can they hang onto the tail of that tiger long enough to get where they want to go or will it devour them... My guess they are going to not just go for a ride but whip that kitty up a bit.

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myliit • May 6, 2020 8:10 AM

Employer surveillance of workers in the name of coronavirus, Apps for that, or something like that?

https://www.wsj.com/articles/lockdown-reopen-office-coronavirus-privacy-11588689725

“Welcome Back to the Office. Your Every Move Will Be Watched.

Employers plan new tools to measure office interactions and track workers’

Many Americans heading back to the factory and the office as the coronavirus pandemic eases will soon begin to notice that their every move is being watched or recorded.

In Midtown Manhattan, thermal cameras will measure body temperatures as employees file into a 32-story office tower at Rockefeller Center. The building’s owner, RXR Realty, said it is also developing a mobile app for tenants to monitor—and score—how closely their workers are complying with social distancing.

...“

JonKnowsNothing • May 6, 2020 9:47 AM

MSM Intercept interview with two of the creators of Bluetooth, Jaap Haartsen and Sven Mattisson, on its use in contact tracking indicating there are some technical problems that might lead to unreliable results.

The problem is:

> Many (non-radio specialists) are unaware of the large variability in signal strength vs. contact distance and contact tracking is reliant on the "strength of a received signal (Received Signal Strength Indication, or RSSI)" to determine distance. The RSSI value is crude and not well calibrated.

Summary:

- In order for your iPhone to connect to your friend’s Bluetooth speaker, it has to essentially shout its existence into the electromagnetic spectrum, sending repeated radio messages that announce that the device is turned on and willing to pair with another.
- Bluetooth is just radio waves, the same chunk of the electromagnetic spectrum that allows for FM radio, Wi-Fi, and cell phones. And if you’ve ever used of these things, you know that getting a reliable signal can be a challenge
- radio waves don’t just teleport from transmitter to receiver, but get bonked around and absorbed by objects in the way: Trees, houses, dogs and cats, cars, brick walls, and other human beings all absorb or reflect a Bluetooth signal, affecting the strength of that signal
- contact tracing relies on using the strength of a received signal (Received Signal Strength Indication, or RSSI) to determine whether you were within coughing distance of a Covid-19 patient
- Swarun Kumar, a professor of electrical and computer engineering at Carnegie Mellon University, recently estimated that environmental factors could make a Bluetooth device that’s 2 meters away appear to another device as if it’s 20 meters away, or vice versa.

- Sven Mattisson, who has read through the Bluetooth-specific portion of the Apple/Google plan, also pointed out that the “way many BLE devices are built, the RSSI value can be rather crude and not well calibrated.”
- accurate ranging, you need triangularization or timing measurements which is not available with vanilla point-to-point Bluetooth links
- Apple and Google plan on embedding a tiny fragment of data inside each Bluetooth broadcast that states the strength with which the signal was transmitted, allowing the receiving device to better determine how much of that signal was lost in transit, and better estimate its distance. The companies believe this process will be refined as it is used.

> Two smartphones sitting on knees,
> Shouting out signals as you please,
> First comes false, then comes maybes,
> quarantines, lockdowns and no paydays.

ht tps://theintercept.com/2020/05/05/coronavirus-bluetooth-contact-tracing/

ht tps://en.wikipedia.org/wiki/Bluetooth

ht tps://en.wikipedia.org/wiki/Jaap_Haartsen
(url fractured to prevent autorun)

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myliit • **May 6, 2020 3:30 PM**

https://www.nytimes.com/interactive/2020/05/06/opinion/coronavirus-us-reopen.html

“Is It Safer to Visit a Coffee Shop or a Gym?

... Some businesses, like some people, are “super-spreaders.” Through the lens of contagion, a yoga class, a busy corner store or a crowded neighborhood bar may look a lot like a wet market in China.

Cellphone data can’t tell us everything. For example, businesses in low-income neighborhoods with fewer smartphones may appear to have less foot traffic. We looked into this, and to date, we have not found any appreciable bias in the measures we are using.

The anonymized location pings also don’t give us any insight into how customers interacted or how many surfaces they touched. And it’s tricky to determine whether people were inside a building or moving around outdoors, where air can move freely, and infection risk may be lower.

To overcome some of these limitations, we asked people to rate, on a scale of 1 to 10, how often they interacted with people or touched shared surfaces at various businesses, as well as how much activity in different sectors occurs indoors. ...

https://www.nber.org/papers/w27042 Pdf
Which Retail Outlets Generate the Most Physical Interactions?

http://ide.mit.edu/sites/default/files/publications/Full%20paper%204-26.pdf Http pdf
Rationing Social Contact During the COVID-19 Pandemic: Transmission Risk and Social Benefits of US Locations

... Notes

Cellphone location data and geofence files used to calculate establishment sizes were provided by Safegraph and Veraset. ...”

Andy Watt • **May 7, 2020 2:45 AM**

Good arguments.

I'm pretty sure that the UK government, being essentially tech-incompetent (long track record of utter failure in large scale IT projects) was probably approached by several companies (it appears a division of VMWare pitched the best here...?) who then lit up the eyes of junior ministers / ministers with promises of an app to give them the South Korean warm and fuzzies in the shortest time possible.

Those would be tech sales guys. You know, the ones with little knowledge of development, or how long or tricky it is, or how it works, or wether it will work at all.

So it's not just by techies, for techies, IMO. It's private companies again recognising when they can get paid by the UK government for a pile of crap which doesn't do anything, because the UK government doesn't understand tech at all.

I suspect you're bang on about the death of this thing, as well. Social media will kill it with bad reviews.

Andrei K. • **May 7, 2020 7:36 AM**

I think you might be misunderstanding the goal of the app and the implementation details.

From the epidemiological data that has been collected by the standard contact tracing, it seems that the vast majority of transmissions occur in close quarters - work, home, school. Infections in public spaces - such as public transports or grocery stores account for only 10-15% of total volume. even with and R_0 of 5, reducing the transmissions only to those, would bring it well below 1.0.

Similarly, apps based on Bluetooth are able to pick up the duration of interaction with a person who has been diagnosed with COVID19 as well as the distance from them - allowing for a cutoff based on

Finally, even in the absence of tests, self-quarantining for 14 days after a potential exposure, or until symptoms are developed and hence testing is needed is already a big step forwards for prevention of epidemic or even endemic spread without locking everyone down for months on end over and over again.

Beobachter • **May 8, 2020 12:50 AM**

Dang, a government mandated tech solution can lack efficacy? Only our esteemed host could get away with such blasphemy. Others would be accused of being illiterate moonshiners, the type who

might distrust gummint agents and even allege that public health is crap or there ain't no such thing as "computer security".

The devil is in the details, folks - or maybe it's God. You all can spend all day here analyzing - hey most of the West is locked up anyways - but it's all meaningless with inadequate data and inaccurate modeling. There are actual medical professionals all over the world who have taken positions all over the spectrum from house arrest repression to letting nature take its inevitable course. Even if you could impose a combination of East German enthusiasm combined with Chinese tech totalitarianism, you'd never know all of the variables of human interactions, let alone be able to control them. See for example Professor Pants Down...

Now go out and play!

JonKnowsNothing • **May 8, 2020 4:55 PM**

@Beobachter

While you are out and about, or oot n aboot, I suggest you take a crash course in Chaos Theory...

You may not be able to predict the exact location of a molecule of water in a river but you can determine the location of the banks.

You might not be able to determine the pathway of a molecule of water as it flows over a waterfall but you can predict the landing area.

There maybe questions regarding the precision of the mathematics given that we know that the statistical banks are much farther apart than currently described using official statistics and values.

The trajectory over the waterfall may lack rigor even though we know a lot about the spillway and impact zone.

However the precision of death is quite well defined.

> *Chaos Theory as explained by an old horseman's adage:*
>
> > ***There is no need to worry about falling off a horse,***
> > ***the ground will catch you.***

ht tps://en.wikipedia.org/wiki/Chaos_theory

> Chaos theory is a branch of mathematics focusing on the study of chaos—states of dynamical systems whose apparently-random states of disorder and irregularities are often governed by deterministic laws that are highly sensitive to initial conditions.
>
> Chaos theory is an interdisciplinary theory stating that, within the apparent randomness of chaotic complex systems, there are underlying patterns, interconnectedness, constant feedback loops, repetition, self-similarity, fractals, and self-organization

(url fractured to prevent autorun)

tz • May 10, 2020 5:55 PM

It would have to be far more invasive, e.g. record video and audio.

Say I was in the grocery store line between two people, one with the app and one without, but the latter was positive and may have given it to me.

Corona is very complex given the HUGE number of asymptomatic or minimal cases (I have near constant "allergies" or low level respiratory problems). Until we have actual antibody testing, and maybe that factored in (will the app say I'm immune?) most of it is theatre.

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myliit • May 11, 2020 5:31 PM

https://www.washingtonpost.com/health/2020/05/11/this-course-will-train-an-army-contact-tracers-you-can-take-it-too/

“This course will train an army of contact tracers. You can take it, too.

The nation needs a sprawling network of contact tracers to track and halt the spread of covid-19, the disease caused by the novel coronavirus. Public health experts estimate that an effective tracking system will require at least 15 tracers per 100,000 Americans — and, in the hardest-hit regions, a workforce twice that size.

About $3.7 billion will be needed to cover the work of 100,000 tracers, the National Association of County and City Health Officials calculated. Creating this army of contact tracers, bigger than any assembled in U.S. history, will require swift, efficient training.

To that end, on Monday, the Johns Hopkins Bloomberg School of Public Health unveiled a course on the online platform Coursera to teach Americans the fundamentals of contact tracing.“

https://www.coursera.org/learn/covid-19-contact-tracing

P T Withington • May 15, 2020 6:28 AM

This is a disappointing article — not your usual well-reasoned argument. By your analysis we should not bother with developing tests or vaccines either, since they also are subject to false positive/negative, not 100% effective, and some actually pan their use on social media.

Beobachter • May 15, 2020 8:31 AM

@JonKnowsNothing:

I think that most of the world is already on a (required) course in chaos practice, with only half baked theory cherry-picked by voodoo doctors - that crash is the economy.

Predicting the course of the Cower-19 outbreak is a wicked problem. Sweden has taken a reasonable approach.

hxxps://en.wikipedia.org/wiki/Wicked_problem

Clive Robinson • May 15, 2020 9:28 AM

@ Beobachter,

> Sweden has taken a reasonable approach.

I would be laughing myself silly at such a stupid comment if it was not killing innocent people by the dozen...

As of "May 15, 2020, 14:11 GMT"

Infected : 20,590

Of which the 8,617 "Closed Cases" results are,

Survived : 4,971 (58%)
Died : 3,646 (42%)

Which is better than the 75% died of a short while ago but nowhere near what the world figure of 15% is...

I would suggest you stop listening / spreading obviously disprovable propoganda.

MarkH • May 15, 2020 3:44 PM

@Clive:

Let me try for a moment to defend Beobachter. He didn't say that Sweden's approach isn't causing death, suffering and grief ... only that it is reasonable!

Imagine a hypothetical commenter I'll call *Völkischer* Beobachter (not to be confused with our own Beobachter!). VB believes that it's necessary for the benefit of the the People, that the weak, unfit, infirm, deformed and disabled be swept away. VB looks at the pandemic, and says "Almost all of the deaths are very old people, very overweight people, people who are already sick..." In other words, the very dregs of humanity: persons who only burden society, and perhaps pollute our genetic stock!

Given such a predisposition, what is not reasonable about Sweden's approach to Coronavirus?

———————————————

Years ago, I learned not to waste time debating people who don't put forward intellectually serious arguments (including, but not limited to, trolls).

Although you and I often come to different conclusions, we're both doing our best to study and apply facts, and to apply valid reasoning to them, in search of some deeper truth.

For an example of grotesque failure to use facts and reason, see this comment (in reply to something you had written); the following comment is my rebuttal.

Clive Robinson • May 15, 2020 5:11 PM

@ MarkH,

> He didn't say that Sweden's approach isn't causing death, suffering and grief ... only that it is reasonable!

Let's just give a few facts "for the record" just so people do not get the wrong idea.

I do not think that people will find the following public facts[1] as reasonable,

If you look up Sweden's normalized
Per million of population death rate and compare it to others under discussion. Currently according to WorldOmeter,

Sweden = 361
Taiwan = 0.3
S.Korea = 5
Hong Kong = 0.5
Australia = 4
New Zealand = 4

You can see the Swedish policy is effectively killing between a hundred and a thousand times other nations that have been discussed recently...

So considering what is publicly known I realy do not think Sweden's policy is in any way defencible.

As you and other readers will know I think the same for the UK and US policies. And you can see why with their deaths per million figure[1]

UK = 501
US = 267

In the case of Sweden, the UK and US it is fairly obviously a very bad "political" choice made well after the evidence from other countries that such policies are very bad was in the public domain. Which makes it an inexcusable bad political policy.

And in the societal terms of the citizens who are not "mothballed as VIP's with daily tests and the best of medical practitioners on standbyas we can see it's not going well at all. That is needless deaths are stacking corpses in body bags up in mortuaries and chilled meat wagons, much to the hurt pain and suffering of their faimilies, loved ones, friends, and colleagues.

In fact as others have done you could look at these political choices as a form of genocide --as someone has already suggested in the case of the US it being racism in the executive-- but that's a subject for a different time and place.

Whilst I would rather treat such commentors pushing the failed neo-liberal mantra as faux "science" etc with simple disdain, I have to remember that even now very few bother to do as you and I do, which is to go through what is publically available[1]. We might disagree on various things but that is part of the process of trying to sift out via fact based methods what is probably true and backed by evidence and not what is actual pure "grade A bovine scat", stired up for "political mantra" reasons (which a NYT article indicated is not just rife but has all the hallmarks of "fake news" worse than others have been accused of).

Thus I have to challenge with facts as we know them at present, not just for current readers of which I assume there are rather more than posters. But also for the historic record for those looking back and asking "Why was this tragedy alowed to happen?".

I feel I owe the grand children of tomorrow an explanation of why things happened, who the bad players were and how they manipulated things the way they did it for a handfull of lobbyist "brown envelope back handers". All so a self entitled few could kill thousands so they could continue not just continue profiting at the expense of ordinary citizens, but actually profiting more (see where the tax dollars are actually going).

The only thing we can reasonably predict is that this bad situation is here to stay for a while and that society will be forever changed. Hopefully it will be for the better, but currently it looks like the self entitled are doing everything they can to make it worse a lot worse, in effect their greed has to be paid for, and their plan is obviously to mortgage up the futures of not just our grand children but their grand children as well. Thus turning society into an effective feudal nightmare...

[1] One of the things that has come to light via our sifting after evidence is that many Governments are quite deliberately lying about the real COVID-19 figures, even where they actually know them. That is they are nearly all using the "fog of war" argument to rewrite history to hide political failings. However as with the UK deliberately ommitting "care home deaths" --which account for near 40% of deaths in many places-- from the "official figures" the information leaks out in other ways such as via the "excess deaths" recorded from burial/cremation statistics.

MarkH • **May 15, 2020 5:53 PM**

@Clive:

It's worthwhile to remind our readers that some countries have not only done 100 times better at saving life ...

... a breath-taking ratio!

... but also that those life-respecting countries may be on track to fare as well economically as those countries whose de facto policy is "oh what the hell"

JonKnowsNothing • **May 15, 2020 6:35 PM**

@Clive @All @Bruce
re:

> all using the "fog of war" argument to rewrite history to hide political failings. ...
> deliberately ommitting ... deaths

And now we are moving to:

> When in doubt, deny anyone died at all.
> We shall create a "PanCovid-Denial" version of history.
> It never happened.

The death juggernaut continues rolling on.

I have always wondered how and why people behave and act against their own self-interest. There has been much written about this topic and not much illumination.

Trying to "save who you can" and "hope they listen to the off-drum beat"; such calls as can be recognized from all our histories and beckon us to a different intensity of making sure that history "remembers what we did here", for surely history will be written by the governments in the short term.

The survivors, with some archiving and luck, may find the words exchanged here, on this blog, as a microcosm of the great planetary debates.

- On one side: pieces of paper with numbers written on them.
- One the other side: piles of corpses, families, friends, neighbors, children, elderly, and young people.

In ancient Egypt the dead had to balance their heart against the feather of truth and justice.

There are not many who can keep the scales even, but some of them are here, dispensing wisdom in the face of such destruction.

@Bruce
Thank you again, for deciding this was a topic to keep on your blog. I hope you archive it well.

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ht tps://en.wikipedia.org/wiki/Book_of_the_Dead

> The deceased was led by the god Anubis into the presence of Osiris. There, the dead person swore that he had not committed any sin ... the person's heart was weighed on a pair of scales, against an ostrich feather, the symbol of Maat, representing truth and justice... there was a risk that the deceased's heart would bear witness owning up to sins committed in life.

ht tps://www.theguardian.com/world/2020/may/15/coronavirus-death-toll-right-denies-figures
a timeline of denials
(url fractured to prevent autorun)

Clive Robinson • **May 15, 2020 8:27 PM**

@ ALL,

As I've mentioned from "public information" Sweden is actually doing quite badly when it comes to the normalised "deaths per million" and the more than twice as bad world average on the death rate

as a case closed outcome at four tenths dying...

Thus you might ask why Sweden carries on on what is clearly a disasterous course?

If I said "cult of personality" you might think I was nuts...

Well how about hearing it from some one on the ground there?

https://www.theguardian.com/world/commentisfree/2020/may/01/sweden-coronavirus-strategy-nationalists-britain

There is a part that might upset people, about those over sixty being denied ventilators "if they have co-morbidities" or just being "over eighty"...

Such is a clear indication that the much vaunted Swedish Health Care System is not just under stress, it is now incapable of dealing with the sick, thus the death rate is going to be higher than it would be if the disease was kept within the Health Care System capabilities,

Worse is that the fact that the policy is failing is being used not just to falsely blaim "migrants" but actually target them as scape goats...

Thus Sweden has "painted it's self into a corner" how they attempt to get out of it might prove instructive to those studying multiculturalism in a strongly nationalistic populous...

Lest people think I'm being unkind to Sweden, my own country the UK is doing worse a lot worse our normalised death rate is around 25% worse than Sweden, and the worst in Europe, and worse yet we know the UK Government are "fiddling the figures"...

So the view of an Italian in the UK might give you an indication as to how bad things actually are (and unfortunately getting worse by the day),

https://www.theguardian.com/commentisfree/2020/may/10/italians-uk-coronavirus-response-boris-johnson-government-covid-19

Rodney P • May 15, 2020 10:41 PM

I can only speak to the Australian experience, however the logic in this article doesn't hold for us.

Australia is in the process of rolling out use of a smartphone-based contact tracking app "COVIDSafe". It appears that so far around 30% of smartphone users have downloaded the app. For perspective, the government says they need at least 40% take-up to be effective. Most likely, in some areas that target has already been reached. That said, the system is not yet fully functional anyhow.

Yes, there is a very active public debate around privacy concerns. However the government says they are putting in place legislation that will make it a criminal offence to access the data for any reasons other than COVID-19 contact tracing. Law enforcement won't have access - not even with a court order. Irrespective of this, I'm sure the privacy concerns will remain at the forefront.

However, limiting this discussion to the point of the article - that a contact tracing app has no value - there are a number of flaws in the discussion.

Firstly, it says "without ubiquitous, cheap, fast, and accurate testing, [the app] is useless". Absolutely. Our government keeps reinforcing that and is actively ramping up testing as a prerequisite to effective roll-out of the app. I understand we are currently doing about 1.35 tests per 1000 population per day, and rapidly increasing. The intention is that anyone with even the slightest suspicion of symptoms or contacts will be promptly tested.

Secondly, it says "The idea that contact tracing can be done with an app, and not human health professionals, is just plain dumb." Yes that idea would be plain dumb, but that is not the use model. The contact tracing is done by human contact tracers. Here is Australia we are now down to typically less than 20 cases nationally per day. Every single one of those is very aggressively contact traced by health department staff. The app is never intended to replace those humans; its role is to assist them. When someone is identified as positive, the contact tracing team interviews them, works out who they might have been in contact with in the recent past, and then tries to locate those people. Once found those people are strongly encouraged to get tested. The app helps to determine the short-list, and helps to make contact with those on that list.

Thirdly, the argument is based on an operational model that seems to be the reverse of what the Australian app does. The article says "Assume you take the app out grocery shopping with you and it subsequently alerts you of a contact. What should you do?". However to quote the Australian government's description, "If someone you have been near in the past 21 days later tests positive for coronavirus, health workers can contact you quickly and let you know what steps you will need to take to keep yourself, and those around you safe." It isn't up to you to interpret the app and decide what to do ... there is a process that is triggered by someone testing positive; if they have been using the app the contact tracers will access the data to find out who has also been using the app while you have been near; and then try to contact them to advise them what to do. As far as a user of the app is concerned they do nothing unless they either test positive, or they get a phone call from a health worker.

In summary, the contact tracing app is not intended to be a total, foolproof solution. The solution is pervasive testing and contact tracing, with the app being nothing more than an aid to that.

Sancho_P • **May 17, 2020 4:53 PM**

@Rodney P

Thank you for coming back to @Bruce’s topic here.

”I can only speak to the Australian experience, however the logic in this article doesn't hold for us.”

Right, Australia makes a good example for our diverse, colorful world.
One “solution” doesn’t fit all places, races and cultures, and this is why mankind is still alive.
Monopoly is only one step from extinction (Winwoes).

The first line of defense is to avoid contacts, that is travel restrictions and safety distance. Contact tracing, on the other hand, isn’t defense, it is an attempt to mitigate damage, always late in the game.

“Firstly”, to test 20*20=400 contacts/day on a sparsely populated region sounds easy, but maybe difficult because of huge distances in some places (Australia?), together with countries where many people have names but neither a real identity nor an address.

“Secondly”, what about NY, London, Madrid? The app will help to memorise contacts, but there is no way to follow up manually if people do **business as usual**.
Automatic follow up wouldn't help, either.

“Thirdly”, no doubt, the Australian government’s health workers are fit for tracing the 400 contacts per day, even with false positives.
But do they need the app with 20 cases per day?
And what about Rwanda’s health workers, are they fit for this job?

“In summary”, the app may help in somewhat civilized regions of our planet, but if people take out to the streets to protest and party there may not be plenty of them.

Pervasive testing and contact tracing are a solution only after a harsh lockdown, which isn’t realistic in many places, we must live, too.
I think a couple of weeks and we have to let it run, app or not.
Sorry for the bad news.

JonKnowsNothing • **May 17, 2020 9:04 PM**

As the various Herd-Immunity-Policy-Countries attempt to reopen their economies it is pretty much chaos-as-intended.

The contact tracking apps is a talisman of poor protection. Without this the governments really cannot convince that many to "go back into the COVID19-virus-laden" environments that the majority work in.

Examples of the packing and slaughter houses and other close-shouldered workplaces like Musk-Factory. The workers already know they are infected and they know they got it from the person standing next to them or the boss eyeballing whether they are hitting their required time-production-targets.

Contract tracing in person is setup to fail, they are already sending out "no more openings" to applicants when there is need for thousands more people. It would be a fair job for those permanently displaced (I don't know what it pays) but if in-person or digital tracking was really intended to be successful there would be other unwanted by-products these governments wish to avoid.

Making sure things are muddied enough to continue their mantra: "It's Here, Get Used To It", "Get Sick So You Can Get Back To Work", "No One Died". There are plenty of people drinking from the fountain whether they want to or not.

There are still plans on the table to push Herd Immunity Policy to the Ultimate Level and for this they need a LOT MORE FOLKS to be infected.

You cannot get Herd Immunity Policy to reach 60% of the population being infected if the contact tracking actually works. In person or digital, it's all for show.

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myliit • **May 18, 2020 6:13 AM**

OT, afaik, not a contact tracing app, but perhaps more useful for most of us

I found this on Apple.com's homepage and don't know much about it. The "learn more" sections link to reasonable looking checklists or things to consider.
I poked around it with a browser; and I would guess that the webpage works for non Apple users, too.

https://covid19.apple.com/screening/ javacript required

"COVID-19 Screening Tool

This tool can help you understand what to do next about COVID-19.
Let's all look out for each other by knowing our status, trying not to infect others, and reserving care for those in need. ...

State Information
Choose a state to see guidance from the health department.
Choose State

About COVID-19
An up-to-date rundown of the virus and its symptoms. Learn more

What You Can Do
Information about social distancing, isolating from others, and more. Learn more

COVID-19 Testing
Current guidance on who should be tested and what to expect from results.
Learn more

Supporting Yourself
Resources to help you care for yourself during this time. Learn more

Updates from Apple News
Trusted sources on the coronavirus.

Our Commitment to Privacy
Apple is not collecting your answers from the screening tool. To help improve the site, Apple collects some information about how you use it. The information collected will not personally identify you.

Developed With
CDC
The White House
FEMA

This site was developed in partnership with The Centers for Disease Control and Prevention (CDC). It is not meant as an endorsement of any Apple products."

JonKnowsNothing • **May 18, 2020 10:20 AM**

@All

MSM report:
On movement tracking using cellphone location data (not COVID19 specific)

- Anonymized location data was captured from opt-in cellphone apps
- Location data was used to track movements of devices from April to mid-May
- Tracking targeted 5 states:
  Michigan, Wisconsin, Illinois, Colorado and Florida.
- Used public protests during that period as an initial tracking point.
- Created visualizations[1] that tracked the movements of those devices up to 48 hours after the conclusion of protests.
- Using the targeted state and location information, they were able to map the travel behavior showing grouping-up/split-up/regrouping across the states
- They only tracked within the state because they did not originally request the additional location information
- They were able to determine that devices did cross the state boundary by other means

> Lansing, Michigan, after a 30 April (2020) ... devices which had been present at the protest site can be seen returning to all parts of the state, from Detroit to remote towns in the state's north.
>
> One device visible in the data traveled to and from Afton, which is over 180 miles from the capital
>
> 19 April (2020) "Operation Gridlock" protest in Denver, devices reached the borders of neighboring states including Wyoming, Nebraska, Oklahoma, New Mexico and Utah.

There is no direct correlation tracking the above movements to the later COVID19 positive tests because there was no official cross-reference data.

> More than 70 people who tested positive for the coronavirus since an April 24 rally at the Wisconsin State Capitol indicated they had attended a large gathering.

1 Visualizations were prominent features during the Snowden Exposure Years as the graphics were much easier to comprehend than a plan list of "it can do X". There was one tracking graphic of a German MP with simple data from his cell phone provider. This was before the extensive abilities of Apps became the normal pathway to data acquisitions.

ht tps://www.theguardian.com/us-news/2020/may/18/lockdown-protests-spread-coronavirus-cellphone-data
ht tps://www.tmj4.com/news/coronavirus/72-got-covid-19-after-being-at-large-event
(url fractured to prevent autorun)

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myliit • **May 19, 2020 9:32 AM**

https://www.wsj.com/articles/curbing-coronavirus-with-a-contact-tracing-app-its-not-so-simple-11588996809 updated May 9, 2020 5:38 pm ET

"Curbing Coronavirus With a Contact-Tracing App? It's Not So Simple.

Contact-tracing apps aim to help health authorities trace paths of infection, and in many cases, to notify users that they've been near a person infected by Covid-19. Yet while trying to solve one big problem, they create a lot more small ones.

Public health authorities, developers and tech companies are working on apps to help us keep track of who we came in contact with and where we've been to aid in Covid-19 contact-tracing efforts. WSJ's Joanna Stern explains the technologies using an 8-bit video game.

10:28 a.m. - Walgreens on Central Ave.

11:18 a.m. - Claire's on East Broad St.

12:20 p.m. - Mavis Discount Tire on South Ave. ..."

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myliit • May 19, 2020 9:51 AM

https://www.wsj.com/articles/apple-google-start-to-win-over-europe-to-their-virus-tracking-technology-11589716800

"Apple, Google Start to Win Over Europe to Their Virus-Tracking Technology

Continent that upbraided Silicon Valley over privacy concerns now warms up to a decentralized approach to contact-tracing apps

[...]

The continent that helped lead a backlash against Silicon Valley's appetite for personal data is increasingly aligning itself with technology built by Apple Inc. and Alphabet Inc.'s Google to blaze a path out of the coronavirus pandemic.

Countries across Europe, like others in the developed world, are building their own smartphone apps to help conduct contact tracing. The aim of the apps is to help public-health officials identify and test everyone who has spent time near an infected person, to better understand and contain..."

Steve • May 26, 2020 2:39 PM

I am not a super clever person and so I must agree with most of what you are saying. However I still believe that this app can aid in the fight against the current pandemic. The data gathered could be used in a multitude of ways that we may not even understand yet, even if that data may not be perfect. Just my two cents to add to the argument!
Cheers Steve

Clive Robinson • May 26, 2020 3:37 PM

@ Steve,

> However I still believe that this app can aid in the fight against the current pandemic.

We are not the people to judge.

Those who are are the epidemiologists and contact tracers who actually track people down.

Their view point from what I've read is, these RF based contact tracing systems have to many fundemental flaws to be anything more than a hinderance to what they do. Firstly they can not tell the difference between a close no contact and a real contact, secondly they kill a phone battery fast, so the phone will turn off partway through the day thus fail to record the rest of the days contacts etc. Such flaws make the systems at best unreliable time wasters to compleat failurs.

The consensens view is that you get more usefull information from people keeping diaries of their day to day activities. These can be either pen and paper or a computer app.

The other thing that quite a few epidemiologists like, is things like the Kings App, where people record what is in effrct a diary of how they feel day to day. As this gives a way way more accurate indicator of actual infections than anything other than large scale truley random combined Antigen and Antibody (IgM etc) testing. They also have results in near zero time compared to lab test that can take more than a week to arrange, take, and get results back.

---

name.withheld.for.obvious.reasons • **May 27, 2020 2:33 AM**

A simple metaphor and analogous definition that clarifies the issue (as far as I'm concerned) is the following:

Given the lack of testing and availability (multiple tests per individual over a period of time) the fact that a "white list" as used in anti-virus software is not possible...

Given the lack of testing and availability (again, over time is problematic) that fact that a "black list" as used in anti-virus software is not possible...

Without a data set that informs--guess what--you remain uninformed. Contact tracing doesn't work in the U.S., so much is missing.

Telemedicine • **May 27, 2020 9:52 AM**

According to the widespread opinion among experts, such apps begin to really work only if 60% of the sample participants download this program. The problem is that in this case, we are talking about 60 percent of the country's population. Effective tracking of social contacts is possible only when this user ratio is reached. “Therefore, it is all the more important for us to lay a solid legislative foundation for the use of such a tracker because this is the only way to strengthen the general public confidence in such tools,” D. Cottier points out.

Security Sam • **May 27, 2020 10:06 AM**

Proposed high tech contact tracing apps
Result in not so obvious latent mishaps
Akin to the butterfly effect classic swarm
The causes an unpredictable perfect storm.

Beobachter • **May 28, 2020 11:03 AM**

Well I see you all have been having lots of terminal fun here while I've been wasting time (and taking everyone's lives into my hands) by going outside in the sunshine here in one of the seeming last remaining holdouts of that obsolete freedom thing (sooo 20th century!).

This doom thread needs some diversity. Since you all obviously have lots of time on your hands, you might check out a few of these links:

hxxps://hitchensblog.mailonsunday.co.uk/2020/05/a-library-of-useful-links-on-the-virus-panic-for-thinking-people.html

Peter is one of the few Englishmen to have kept his head during the planetary panic.

Fatten the curbs, Comrades. We are all red Chinese now!

Apokrif • **May 28, 2020 12:56 PM**

@Clive Robinson: "First close the borders. Track, Trace, Test, Confine"

Perhaps we could add:
* a few N95 masks in every home (enough for, say, a safe half-time professional and personal life for one month)
* lockdown only for children (if no N95 masks available for small heds) and perhaps old people
* no mass gatherings and as much remote work as possible

Could this help to strongly curb the epidemic without damaging the economy or causing many depressions?

Clive Robinson • **May 28, 2020 3:23 PM**

@ Beobachter,

> Peter is one of the few Englishmen to have kept his head during the planetary panic.

Don't make me laugh, Peter Hitchens is mostly a selfdelusionist of the highest order bordering on being a fraud, which is why he works on the Daily Mail. Who's readership is only slightly less delusional than him.

What you are actually revealing is your poor choice of judgment to anyone who can actually think.

Oh by the way Peter Hitchin's was pro Sweden, untill their death rate per million has exceeded most other countries, he apparently has forgoton that now like many other self delusionists and those only doing 260 of a round trip.

Unlike Peter some of the people of Sweden realise just how foolish the COVID-19 policy of their country is and the fantasy of cult of personality it is based on, and are increasingly saying so. Peter Hitchin's on the other hand will not admit that what Sweden was doing was stupid, nor what the US is doing by coming out of lockdown not just too early but without even a modicum of the requirments in place to keep infection under control is stupid. You only have to look at Alabama where the healthcare is saturated with no ICU beds, thus the Case Fatality Rate will rise to maybe five to seven times what it might be if lockdown remained in place.

The dirty little secret behind the whole US policy is to stop billionairs with their money in the stockmarket getting hurt. Because if they do, they might decide to reinvest what they have left else where. Then the whole fraud that has been pulled on various Western Nations will unravel as not just the stock market but the illusion of a strong US Dollar will get blown away. And with that happening the US currency and the US economy will disapear down the toilet, along with all those life savings, college funds and pensions, and the banks will see debt default that will bring them down and it will not matter how many hundred Dollar bills the Fed prints or how many stimulus checks the Federal Government chucks out because you won't get that mess back in the bottle.

So keep singing your neo-liberal mantra at the foot of the bed every night, because it won't be long before the repo man will be around to pick up what you thought you owned but actually don't.

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myliit • **May 28, 2020 4:22 PM**

KYAG or something

https://www.youtube.com/watch?v=Gdlyi5mckg0

Trust me; believe me

Clive Robinson • **May 28, 2020 4:45 PM**

@ Apokrif,

> Could this help to strongly curb the epidemic without damaging the economy or causing many depressions?

All those the things will help WHEN the lockdown has been effective enough. Which it has not yet been in the US in many places.

I was quite shocked to see video of lots of people in swiming pools and the like, where "social distancing" was down to the thickness of lycra or less. Whilstvthe chlorine in the water will kill any virus that gets in the water, it's going to do nothing against any virus in the air from people breathing, talking, singing, shouting etc as they often do whrn having a good time. All we can do is watch and see what happens to the death rate over the next three to six weeks.

As reported at least two political leaders in Alabama have warned that "if you need an ICU place you are out of luck". The healthcare system is staturated that means even what would normally be survivable minor accidents have become killers due to lack of the necessary healthcare.

But the other issue is that for "Track, Trace, Test, Confine" to work all the parts have to be in place and they need not only to run efficiently and effectively, but also with the authority to make the process work.

We know that most of the "Bluetooth" or other RF beacon systems are not going to work effectively or efficiently. A system that kills your mobile phone battery by first coffee break is going to be neither efficient or effective. Worse the number of false positives will be way way higher than can be handled by "contact tracers" who with the best will in the world are going to end up as disease vectors

themselves even with propper PPE. But realistically just how many "contact tracers" will be required? Well that depends on the background community spread figures, which are currently way to high in most Western Nations.

But I guess we all know that the level of testing currently available in all major Western nations is to be honest woefully inadiquate. But also the tests take to long to produce results and many tests are either not sensitive enough or have unacceptable error rates.

In the Northern Hemisphere Western Nations did not trspond quickly enough in most cases. Italy and Spain were unlucky in that they had community spread befor people realised that COVID-19 had not just arivrd but was running wild. However quite a few nations not just procrastinated but also equivocated. Some such as the UK are still equivocating, and making the issues worse every moment.

Yes we need to get are economies going again but we need to be realistic about what we do, and neither North America or Europe are in anyway ready to come out of lockdown to go into a "Track, Trace, Test, Confine" process, even if it were 100% rather than broken as it currently is.

We need to get ontop of community spread first and we are not even close to doing that yet. Primarily brcause we've no idea what is happening in the community because,

> To fight an enemy, you have to engage them, and you can only do that when you known their strength, disposition and location.

Effectively you have to be able "To see the enemy" and without suitable testing at significant levels you can not do that thus you will not have a clue, thus no idea of where to deploy your resources...

Without adequate and effective testing, our only hope not to have significant fatalities is to stay in lockdown.

And there in lies the second rub, we need to test not just for disease via antigen testing, we also need to test for immunity via antibody testing.

The problem with antibody testing is that those who are actually not immune, can fake they are for a short while. Thus some people desperate or idiotic enough could be marked as OK to return to work, when in fact they could become "asymptomatic super spreaders" due to what they do for a living (hairdressers / barbers being one group, café or food workers being another).

JonKnowsNothing • **May 28, 2020 8:36 PM**

@Clive @All

MSM report on the details and holding period for the UK NHS COVID19 Tracker App:

- Individual information data storage: 20 years
- Full name and date of birth, as well as phone numbers and home and email addresses collected for all identified COVID19 Positive or Suspected Cases
- Incidental data collection on all contacts with which your app has linked, data storage: 5 years

- Information will be held securely by Public Health England; held on PHE’s secure cloud environment
- You can request the data to be removed. Don't hold your breath that they will do so. (a potential COVID19 recovery breathing exercise)

In the USA data retention was a big deal during the Snowden period. Various timeframes were tossed into a salad and picked out like BINGO numbers by different LEOs, of which the USA has a LOT. Each LEO has a data retention date and in theory the data gets scrubbed at that point, but not so. The Next-LEO in the line gets to hold the data until their retention date passes. On down the line the data flows into the final sink hole.

It would appear that the UK has found a new sink hole under the disguise of "COVID19 Helping You to (not) Live Longer".

ht tps://www.theguardian.com/world/2020/may/28/nhs-will-keep-personal-data-of-people-with-coronavirus-for-20-years--uk-test-and-trace-programme

ht tps://en.wikipedia.org/wiki/Utah_Data_Center
(url fractured to prevent autorun)

Beobachter • **May 30, 2020 9:52 AM**

@Clive:

Does Peter have the wrong accent? Sure, the Guardian is so much more reliable - just ask Julian Assange and all the whistle blowers they've stabbed in the back. Since the BBC went to hell soon after Little Bush started the Iraq war, I no longer trust any UK media, but some people who haven't gone completely down the viral rabbit hole, might find some interesting information in those heretical links of Peter's. Hilarious how science - and the lack thereof - means nothing anymore in virus-land - it's all left right politics... and control.

I rather agree with you on the state of Western finances... and indeed most other things you comment on. But not on this insane global voodoo spell.

It's also interesting how this thread, which Bruce started to say that the whole concept of phone app contact tracing is little more than snake oil, has so many commenters with pointers to how it should be done. Maybe it just shouldn't be done.

Martin • **June 3, 2020 3:25 AM**

"My problem with contact tracing apps is that they have absolutely no value," Bruce Schneier.

Bruce Schneier has appeared to have completely the missed the point. Of course there are defects with such apps such as false positive and false negatives. But medical diagnoses by medical professionals are also often wrong. We have one app called StopCovid in France since yesterday and I immediately installed it on my phone and will use it assiduously. Such apps have been shown to be useful in South Korea where a high proposition of the population has used them.

JonKnowsNothing • June 3, 2020 9:36 AM

@Martin
re:

> I immediately installed it [covid19 tracker app] on my phone and will use it assiduously.

1. The app has to actually do what it says
2. Majority of these apps do not do what they say
3. If the app does not do what it says the value is near NIL
4. Installing an app just because it has the word "COVID" in the name is likely to load something that you probably did not expect.

For tracking there are other options that already exist and are in use:

> Researchers hope the addition of Facebook de-identified movement data will give a better overview of people slowly returning to their regular travels as we emerge from the coronavirus lockdown period, and help identify any potential places where physical distancing may be an issue.
>
> Several companies, including Google, Apple and Citymapper, make public de-identified data from their mapping and other location-based apps to track traffic flow across cities, states and countries.
>
> Researchers have been using this data to model the massive traffic reductions seen as public health orders were put in place, businesses closed and some people began working from home.

Location data and geo-tagged images are already in use and do a much better job.
People like using real-time maps, and take a lot of pictures.

ht tps://www.theguardian.com/australia-news/2020/jun/03/facebook-data-to-show-australians-movement-as-they-emerge-from-coronavirus-lockdown
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Mark • June 8, 2020 2:24 PM

MIT Technology Review writes "No, coronavirus apps don’t need 60% adoption to be effective.

"Digital contact tracing may work at much lower levels of usage than most people think, thanks to a misunderstanding of the research."

I'm *re*installing my provincial health department's tracing app!

Clive Robinson • June 8, 2020 5:48 PM

@ Mark,

> "Digital contact tracing may work at much lower levels of usage than most people think, thanks to a misunderstanding of the research."

It is their model thst tells them this...

The problem is that the model probably does not have the right assumptions built in.

The first thing is the contact tracing apps are fair usless on their own. Every where they have been used with success is because the important parts are in place of "real world tracking and tracing to remove the many false positives the apps give" likewise rapid and effective testing, and people actually buying into issolation.

None of those realy apply in the US currently, or the UK or Sweden or many other places. So the apps will fail in those places.

Also I suspect their models do not contain an accurate representation of how an actual phone-2-phone contact will work that is it's oh do many failure modes that out number the "ideal contacts" by a vary large margin. For instance I doubt their model includes the fact it will work for a couple of hours in the morning, and then fail as the phone battery dies, and the fact that people will either put their phones on charge and not carry them for several hours during the day or only put them on charge at the end of the day when they have got home and stopped making contact with people.

Then there is the problem of how many walls and floors away can you be and still have the phone say you had a contact. How about how many cars away you can be in rush hour traffic and still have the phone say you had a contact.

The thing is bluetooth is only "local in free space" and at other times it will not work two feet away and others such as two people standing near a fence more than a hundred feet away.

Also their model almost certainly will not take malicious behaviour into account. For someone with even moderate skills they can take amplifiers and antennas ment for long range WiFi usage and push bluetooth through it instead. Now they are having hundreds of contacts over half a mile away with entire office blocks of people or condo type housing.

And we know they will do this because they are many angry very angry people. Firstly with 25% or more unemployed disproportionately hitting the young and about one third of those who still have some form of employment not making ends meet, disproportionatly hitting those with young and towards the bottom of the socioeconomic ladder there is deep seated embitterment rising. Then there are the self employed who's businesses are dying or dead bringing bankruptcy towards them, they are very angry as earlier protests about "lock down" has shown. There will be a percentage of those who would make the system not work either out of a resentful anger, or because by making it fail it will drag others down or cause a failure such thst in their eyes the "old times will return"...

I could go on... but without a lot more work and a great deal more resources put into it, such applications will fail at the very least for lack of the real world parts of the overal system they form such a very small and actually unnecessary part of.

JonKnowsNothing • June 8, 2020 6:45 PM

@Mark @Clive
re:

> Digital contact tracing may work at much lower levels of usage than most people think, thanks to a misunderstanding of the research.

MSM report:

> People who think they have had coronavirus are less likely to download a contact-tracing app, even if they have no proof that they ever contracted the virus

An issue with "invincibility immunity" belief.

ht tps://www.theguardian.com/world/2020/jun/08/people-who-think-they-have-had-covid-19-less-likely-to-download-contact-tracing-app
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Clive Robinson • **June 9, 2020 5:23 AM**

@ JonKnowsNothing,

> An issue with "invincibility immunity" belief.

And there will be other beliefs, and it will not be in just deities and cults. If we look at the so far brief history of AIDS around the world you will see many. Including "quack medicines" at extraordinarily high prices, even from supposadly legitimate companies and organisations.

As for these apps, for various reasons not least being it's "First time technology" they are going to have failure modes their designers can not predict (we've seen this in South Korea already).

Thus they too are rapidly shaping up to be "leading edge is bleading edge" and like patent medicines do more harm than good as they cut divisively through populations.

As a European leader pointed out carry a diary and fill it out as you go, along with how you feel and other pertinent information. It's the sort of tool epidemiologists know and have considerable experience with. Unkike an app it is "free form" so you can add other information that the app developers never allowed for.

When you assess those who are stridently pushing these apps you find a mess of people all on a land grab or stary eyed mission in a cultish belief that technology is the way to go...

As was once pointed out "The best way to the moon is not by sitting on a 3kT bomb". As an engineering manager at another time pointed out "But it is quick, dirty and above all cheap and unsustainable, two words politicians like and two they mostly don't care about" (which was why the STS was such a mess).

Tony Chamier • **June 14, 2020 10:37 AM**

The problem with any COVID-19 Exposure app is the very great difficulty in using a 2.4 GHz Microwave frequency signal's received power level to provide a measure of range in any restricted

environment where the COVID protection need is greatest.

In my early career I worked on a project developing an aircraft guidance system using microwave frequency signals. I learned that signal magnitude varies widely second by second with small movements due to (a) multipath signals (reflections) which add and subtract and so change the signal power level, and (b) attenuation by solid objects, including human beings. Hence in our aircraft guidance system we only used phase information.

Few software engineers today will have experience with radio signals, which of course operate in the analog world?

This recent report from Trinity College Dublin, Ireland indicates the scale of this problem.
"Evaluating The Potential Of Using Bluetooth Received Signal Strength For Proximity Detection".
https://www.scss.tcd.ie/Doug.Leith/pubs/bluetooth_rssi_study.pdf

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