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How to cope with uncertainty in COVID-19 times

In the heat of the coronavirus crisis, in which COVID-19 is shutting down most of the world’s standard behavior, this chapter was written on the first day after Angela Merkel, the German Federal Chancellor, announced a new set of rules that increased regulations after weeks of many public and private institutions and businesses, such as schools, daycares, restaurants, and some shops, already being closed. Until this moment, the 16 states of Germany had been setting their own rules for how strict or loose they wanted to be, with some allowing restaurants to stay open and others closing them. Even within a state, some cities (e.g., Cologne) had stricter rules than others (e.g., Düsseldorf). On March 22, Merkel and all 16 state presidents had a video conference to establish one set of rules for all people in Germany. The decision was made when Germany had 22,672 identified cases and 92 deaths, and the tragedy unfolding in other European countries painted a picture of horror (Fig. 1, right side for worldwide death toll of 14,641 on March 23, 2020). In an effort to slow the spread of the virus, one of the rules meant to reduce contact between people outside their immediate family or household was the banning of gatherings of two or more people.

How do governments decide on the basis of expert opinions and the data provided, also whether the banning of gatherings is enough to reduce the spread of the virus? Would it be better to be strict and ban traveling to and from work for sectors that are less important (as the Italians have done) or movement outside the house entirely other than seeking medical attention or supplies or food (as the Spanish have done), or should we calculate that gathering with two or four people will not make much of a difference to hospitals’ capacity to cope with the virus? How can we measure if a set of rules is effective in the following weeks, given the incubation period of the virus is up to 2 weeks? One rationale behind any of the decisions being made was to slow the rate of new infections to reduce overload on the healthcare system and to gain time to develop treatments and a vaccine. But how do we predict the future growth of a virus when so many factors are influencing the dynamics of such a pandemic crisis?
Fig. 1  Number of infected people in Germany (22,672 across all 16 states) and worldwide (223,029, with a large number in Europe) on March 23, 2020. (Used with permission from Tagesschau).
The growth rate indicates the number of new infections and deaths. It is currently exponential, meaning that, for example, in about a few days the number of infections doubles. Growth rates (i.e., how quickly infections doubled) varied on that day in Europe between 1 and 10 days. Of course, many factors influence this rate and that is why it is hard to compare such numbers between countries without knowing multiple factors, such as concomitant illness of the patients, treatments offered, and what mitigating actions countries have taken (from almost full shut-downs to almost free movement).

The test for the virus can produce so-called false-negatives, that is, a negative result when in fact the tested individual does have the virus. Given that in some countries these tests are self-administered in the current crisis, results may be less reliable. In addition, the infection rate is dependent on the number of tests conducted, which varied on March 20, for example, between more than 300,000 (South Korea, \( N = 316,664 \)) and less than 500 (Ukraine, \( N = 316 \)), but at that moment in time, there was a linear correlation between the number of tests conducted and the number of confirmed cases: the more tests conducted in a country, the more cases found. It is of course also evident that it is not only the total number of infections, deaths, or tests that is important but also these numbers need to be related to the number of inhabitants, and rates may vary dramatically depending on whether you are looking at the data for, say, India or the Faeroe Islands. Averaging numbers, as well, is not always meaningful; for example, COVID-19 is very harmful for elderly people and those with a weak immune system, and the patients who overload the hospital system are those who need intensive care and lung ventilators (the virus affects the lungs and can result in death when the lungs cannot produce enough oxygen).

Around the world, the heated debate over how much action is to be taken is going on, but most agree that long-term predictions are almost impossible to make given the dynamics of the situation we are facing since March 2020. My colleague and former boss Gerd Gigerenzer from the Max Planck Institute of Human Development in Berlin, Germany, suggested that an important lesson to be learned from this outbreak is the need to improve risk literacy [1]. In the same vein, Peter Gøtzsche, director of the Institute for Scientific Freedom in Copenhagen, Denmark, asked what would have happened if the Chinese had not tested their patients for coronavirus: “Would we have carried on with our lives, without restrictions, not worrying about some deaths here and there among old people, which we see every winter? I think so” (p. 1) [2]. What would happen if we did not ignore base rates and
understood that some of the deaths would have occurred with or without the pandemic, as Juan Gervas [3] from Madrid, a quite heavily hit city in Spain, reported on March 14, 2020:

*In these people, elderly, sick men, the mortality is probably not extraordinary, but rather the one that “is expected”, the one that would have occurred anyway, with or without the pandemic. Its impact on mortality is meaningless. It is impossible to notice its impact without the news because the number of cases and deaths are irrelevant in a world in which millions of people die each year (and half of them due to hunger and wars) (p. 1).*

The statistics in March 2020 showing the average mortality of various countries as argued earlier are misleading for many reasons, as neither personal nor contextual factors are considered. An extreme case of this is the Italian data [4]. These data show that actually 99% of the patients who died from COVID-19 had a comorbidity and an average age of 80 years. These national and international examples from reliable scientific data sources (let us not talk about fake news and unreliable data) highlight that it is not easy to make fast choices on the individual or societal level. It is thus not surprising that well-respected statisticians are arguing that we need to prepare not to overreact to multiple developments, as John Ioannidis of Stanford University suggested [5]. What exactly does this mean for the decisions our leaders are making regarding how many people can gather in public or whether it is best to close all or some of the shops in a country? I can only repeat that we need to cope with that uncertainty, increase risk literacy, and make a personal choice depending on our own personal factors and the context in which we all live.

How do we now rate the actions of governments regarding health measures for society and individuals?

The simple answer is to use valid information and make an individual judgment of what risk-group you belong to. Given people cope differently with uncertainty, this is a very personal decision. For society the balance between different interest of a free society and how it functions best as well as the health security of risk-groups is at end a political decision that is informed by science. Currently, most virologists when asked how the virus will develop and when we will have medical countermeasures respond quite carefully and base their answers on knowledge of previous viruses, as they
cannot predict how this new virus will act. Whether governments or individuals are overreacting or underreacting can only be answered in hindsight.

For the government of Italy, this has indeed been a traumatic experience given that the country has been the hardest hit in Europe. As of March 23, 2020, the infections were at a high of 59,138 and 5476 deaths were recorded—about 800 a day over the preceding weekend. Why did Italy have extremely larger numbers than compared with other countries? It has been suggested that country-specific factors have played a role, such as the mean age of the population being older or a lower number of intensive care beds with lung ventilators, among others [6]. As argued earlier, in hindsight it is easy to say we should have prepared better, knowing that the data from China indicated a growing epidemic, but the risk was perceived as low that a similar situation would arise in Europe. Because the virus moved in Europe at different times and speeds, in March 2020 it seems that many countries are prepared for the pandemic to grow but this preparedness will not stop the virus fully. Most likely, as experts predict and the reader will know when reading these lines, we will reach herd immunity, preventing the virus from moving further, when 60%–70% of citizens have been infected, and hopefully less 1% of the population (most likely the very old and those with weakened immune systems) have died.

For the individual, risk taking may depend on one’s age or health conditions and the strength of the immune system. However, on a societal level, even young and healthy people have been asked not to gather in public places in an effort to “flatten the curve,” so as to avoid a peak number of severe infections overwhelming the healthcare system. As the Bavarian state president Markus Söder put it, we may save not only those who follow the rules but also those who did not. In a previous chapter, I also talked not only about underreactions but also about overreactions, as happened after the 9/11 terrorist attacks, when in the United States there were about 1500 more car accident fatalities than in previous years because many people avoided flights and took long road trips instead, putting a much higher number of cars on the streets and highways.

In addition to learning to cope with uncertainty, we should strive to understand the risk of base rate neglect, as explained in previous chapters, to be prepared for similar events in the future. Many decisions must be made for a particular point in time, as the coronavirus crisis demonstrates, and may not even be valid for more than a few days or weeks, so they need to be dynamic. Whether the opportunity costs of banning social contact and shutting down a country, and its economy are acceptable is also a moral question.
With the decisions facing individuals and governments dealing with the coronavirus pandemic, moral decisions as evaluated by thought experiments such as the trolley dilemma discussed in an earlier chapter—in which a person is asked to decide whether the loss of one life is an acceptable price to pay for the good of a larger group, society, or mankind—take on new relevance. Ending on a more positive note, I see an outpouring of social support, positive effects on the environment, and useful changes in the way we work and educate people (remotely) around the world. In my own home city of Cologne, I have never before experienced quite such an atmosphere.

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