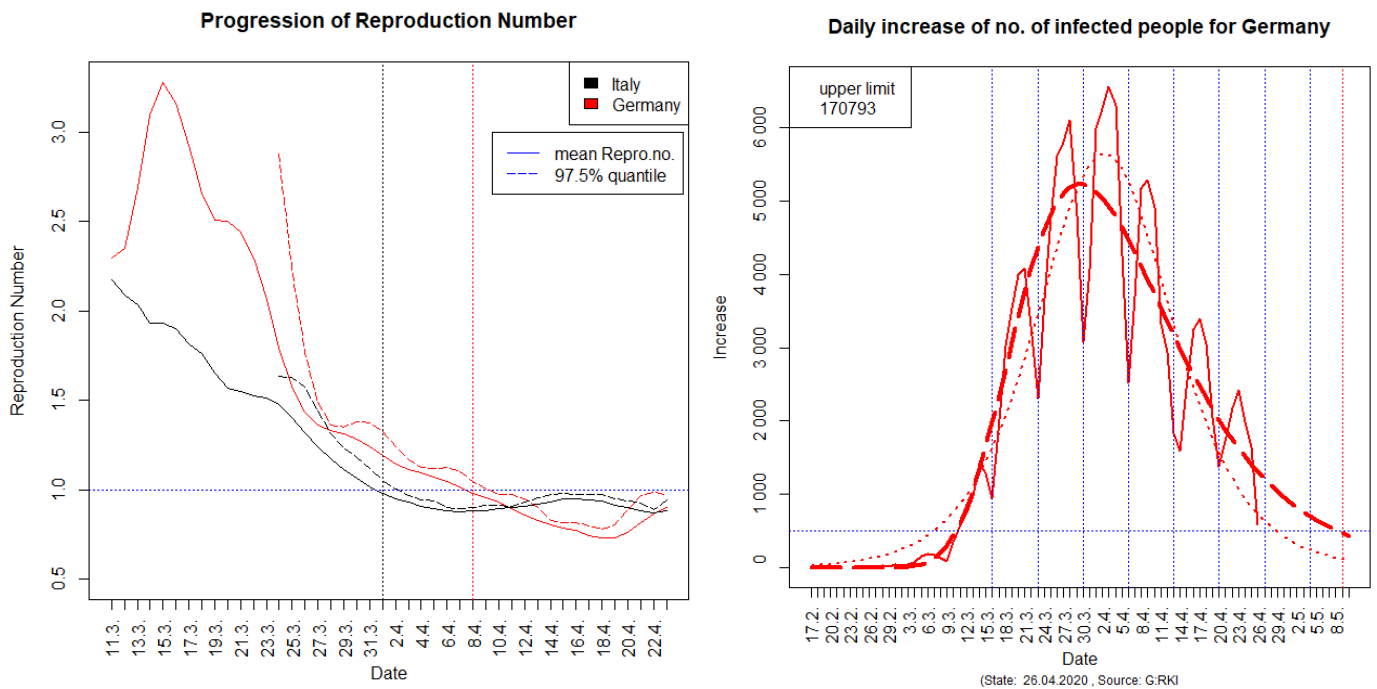


26.04.2020: COVID-19 Pandemic: Germany: By new more realistic model, stagnation predicted only for 9.5., and upper limit estimated around 170 000



The left figure shows the mean reproduction numbers (solid line) and the 97.5% quantile (dotted line) for the COVID-19 pandemic based on new infections reported by the Robert-Koch-Institut (RKI, Berlin) at the 26.4. and by Johns-Hopkins University for Italy. To avoid reporting artefacts, we ignored the last 3 observations (being too preliminary for Germany) and smoothed observations by **moving averages** of order 7. Then, we determined the **reproduction number** at time t by the ratio of the moving averages at times t and $(t-4)$, i.e. by relating means of successive blocks of 4 values each. Vertical lines indicate the predicted intersections with 1, the horizontal line is at 1.

The right figure shows the daily real new infections of COVID-19 (solid line) and two kind of predictions (dotted and dashed lines) for **Germany**. Predictions are generated by an optimally fitted **weighted logistic model** (dotted line) and an optimal (unweighted) **Gompertz model** (bold dashed line), respectively. Vertical blue dotted lines indicate Mondays, the red vertical dotted line the start of **stagnation** of new infections (< 500) as predicted by the Gompertz model. The horizontal dotted line indicates 500 new infections.

Reproduction numbers are estimated to be lower than 1 since 1.4. for Italy and since 8.4. for Germany. The 95% uncertainty region is very narrow and steadily below 1 for Italy since the beginning of April. For Germany, the reproduction number is lower than 1 only since 8.4. and uncertainty is higher. Moreover, since 21.4. the uncertainty region nearly includes 1, again.

The representation of daily new infections shows that the numbers reported by the RKI follow waves related to weekdays with local minima at Mondays (with the exception of the week after Easter where Monday is a public holiday). The **Gompertz model appears to be much more realistic** than the logistic model in all time regions! With the Gompertz model, stagnation (< 500 new infections) we now predict only for the 9.5. for Germany (and for even later for Italy) and the estimated upper limit of the no. of infected people in the first wave of the pandemic is around 170 000 for Germany (and around 220 000 for Italy). Because of the wave structure of the observations it may well be that new infections, nevertheless, preliminarily already fall short of the limit 500 tomorrow (a Monday!) as predicted by the logistic model.