Rising Analytics and Resilient Intelligence:

5 Lessons for Business Analytics Students to Chart a Path to the Next Normal

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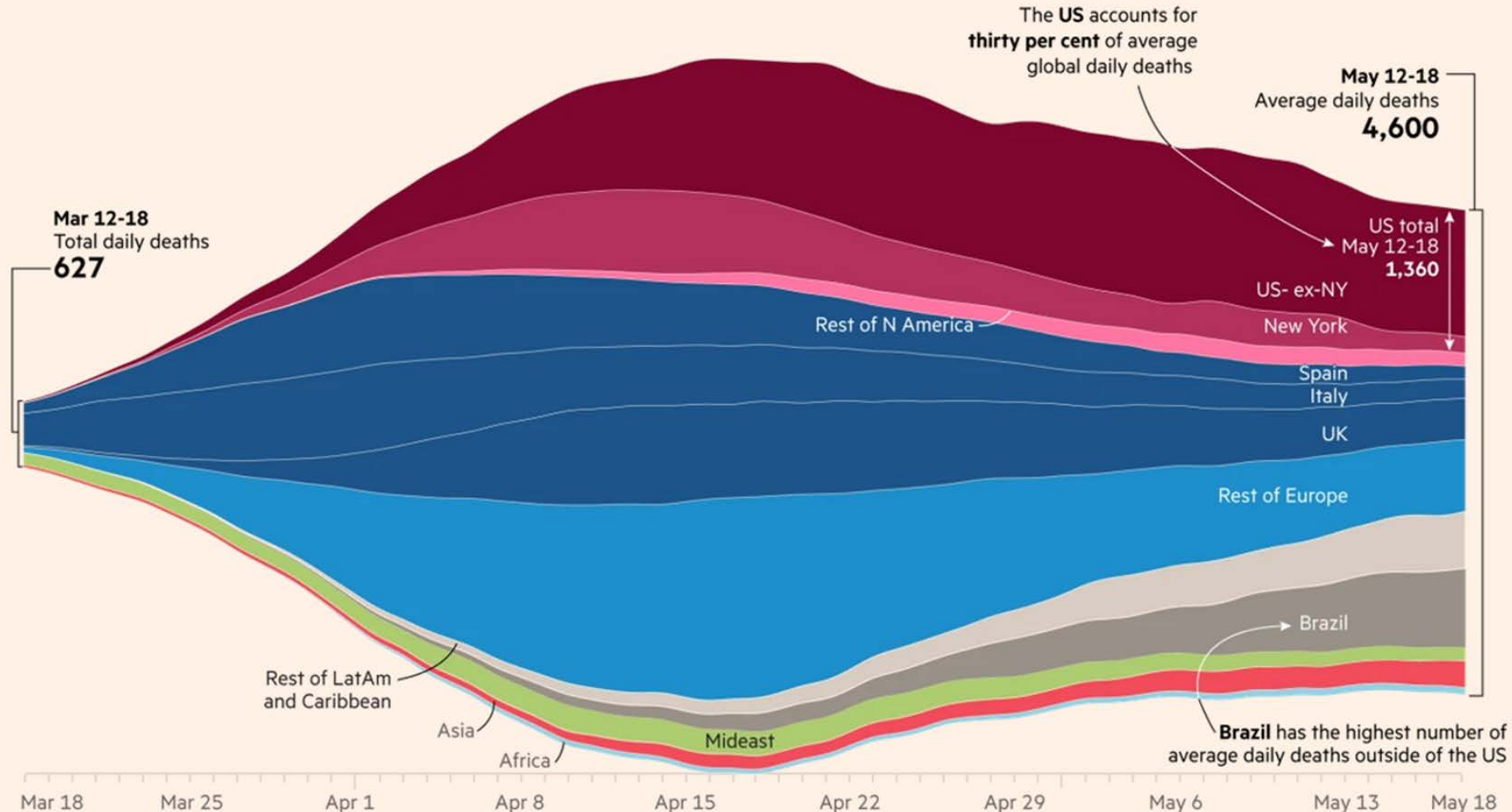
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Covid-19 & Analytics on the Rise

The global Covid-19 death toll is continuing to ease slowly

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)

The **US** accounts for **thirty per cent** of average global daily deaths

May 12-18 Average daily deaths **4,600**

Mar 12-18 Total daily deaths **627**

US total May 12-18 **1,360**

US- ex-NY

New York

Rest of N America

Spain
Italy
UK

Rest of Europe

Brazil

Rest of LatAm and Caribbean

Asia

Africa

Mideast

Brazil has the highest number of average daily deaths outside of the US

Mar 18 · Mar 25 · Apr 1 · Apr 8 · Apr 15 · Apr 22 · Apr 29 · May 6 · May 13 · May 18

Daily confirmed deaths (%, by region)

Need for Resilient Intelligence to Navigate Disruption

What we are doing at Weatherhead…

- *Adding Flexibility for Students in the Application Process*

- *Deploying "High-touch," Hybrid Teaching Models*

- *Analyze Trends for Agile Adaptation*

- *Transforming Industry Partner Relationships for New Modes*

- *Seeding Analytics Communities of Practice*

Lessons for Resilient Intelligence: Analytics Perspective

- **Focus on the Curve. Linearity is Dead.**

- **Focus on the Flatten. Language Matters**

- **Rare events happen.**

- **Redundancy & Flexibility are keys for Resilience in Rare events.**

- **Science Matters. Agility Wins, Not Speed.**

WHAT DOES "FLATTENING THE CURVE" MEAN?

We heard this term again and again by public health officials, state governors, and others as justification for stay at home orders or other advisories

https://coronavirus.ohio.gov/wps/portal/gov/covid-19/dashboards/forecast-model

S – I – R model and its derivatives were the basis for some of these projections:

- S: Number of susceptible people
- I: Number of infected people
- R: Number of removed people (due to death or immunity)

All predictions are wrong; prediction models are always right

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FLATTENING THE CURVE

Predictions are done in support of decisions, in order to achieve certain goals. The goals themselves might come from various places – including cultural and political considerations in the Covid 19 case.

The S – I – R model was supplemented by **Reproduction number**, **mortality rate**, **average days of hospitalization**, **hospital capacity** for various things, to help decision-making about actions the government took to keep the situation under check.

Many recommendations of closing/curtailing certain activities and businesses, face covering, limits on number of people, came out of an attempt to meet the goals, assuming predictions were true.

1. FOCUS ON THE CURVE. LINEARITY IS DEAD.

Slopes – simple, linear, one-cause – one effect

Curves – complex, non-linear, multiple causes for an outcome that interact

Marketing example – increase revenue may be the goal (desired outcome). It, however, gets affected by:

- What you can control (price, promotion, advertising, etc.)
- What your competitors might do
- What is happening in the environment

Models need to account for <u>important</u> and <u>relevant</u> factors

2. FOCUS ON "FLATTEN." LANGUAGE MATTERS.

Models may be built by experts in model building, but they are (should) always be in the interest of improving a (set of) decision(s)

Language of decision-makers always needs to be kept in mind

Modelers often need to educate decision makers, so a two-way learning is essential for a successful use of analytics

How to flatten the curve – provides points of action based on model specification

Marketing example may be – how to make some campaign "viral?" Opposite of flattening but model can identify possible points of interventions.

"Rare Events" happen!

"Rare events" are low-probability/low frequency, high-severity problems that can have far-reaching consequences.

Rare Event Analytics (REA) has not attracted much attention as it is limited in scope due to lack of data and the thinking that they will never occur!

Predicting events like COVID is more difficult due to

- The lack of historic data
- Lack of understanding of their characteristics.

We cannot predict rare events but due to their sever consequences, organizations need to plan for how to mitigate the disruptions.

"Rare Events" happen!

We cannot predict rare events but due to their sever consequences, organizations need to plan for how to mitigate the disruptions.

To achieve this, organizations need to be "resilient"

Redundancy and Flexibility are Keys for Resilience

Resilience refers to the ability of a company to bounce back from a large disruption.

Resiliency comes from Redundancy.

Redundancy – "have a backup" throughout the system

Color Key:
Blue: Transmission
Green: Distribution
Black: Generation

Transmission Lines
765, 500, 345, 230, and 138 kV

Generating Station

Generator Step Up Transformer

Transmission Customer 138kV or 230kV

Substation Step-Down Transformer

Subtransmission Customer 26kV and 69kV

Primary Customer 13kV and 4kV

Secondary Customer 120V and 240V
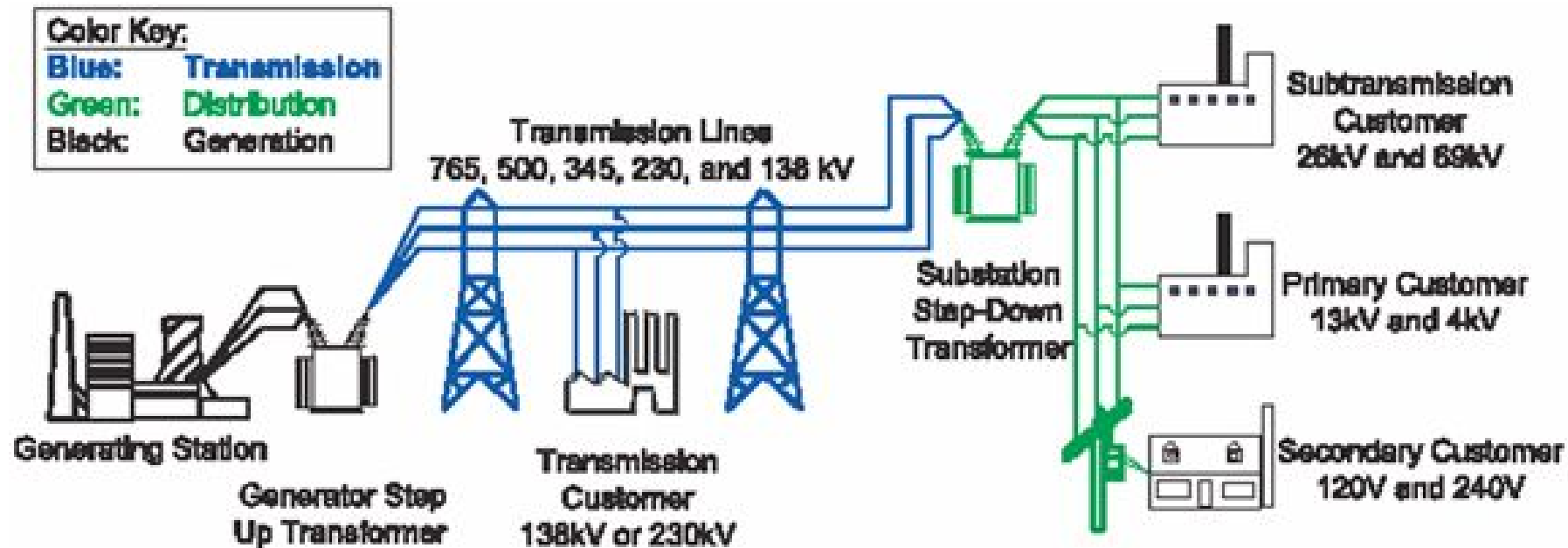
Redundancy and Flexibility are Keys for Resilience

Redundancy

- Auxiliary power plant
- Buffer (more inventory)
- Excess Capacity
- Multiple suppliers

Analytical tools focus on efficiency and cost optimization — Redundancy is expensive and in short run "wasteful".

Analytics tools need to take a long term view in planning for redundancies.

Redundancy and Flexibility are Keys for Resilience

Flexibility

- Flexibility in Production
    - Switch from one product to other

- Flexibility among suppliers
    - Multiple suppliers for an item
    - Multiple items from a supplier

- Flexibility in workforce
    - Cross Training

Science Matters. Agility Wins, Not Speed

- *Science Matters: Story of Covid-19 Spread in 2 Graphs*

Number of Deaths with Time (Raw, Log Scale)
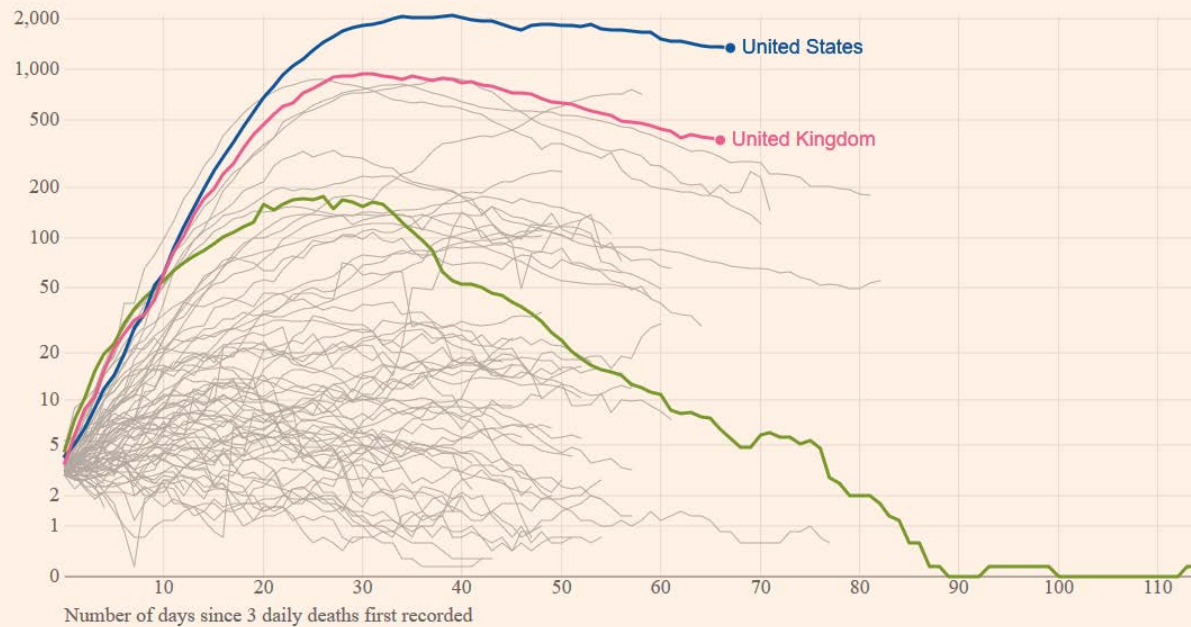
Number of Deaths with Time (Adjusted for Pop , Log Scale)

What went wrong in UK?
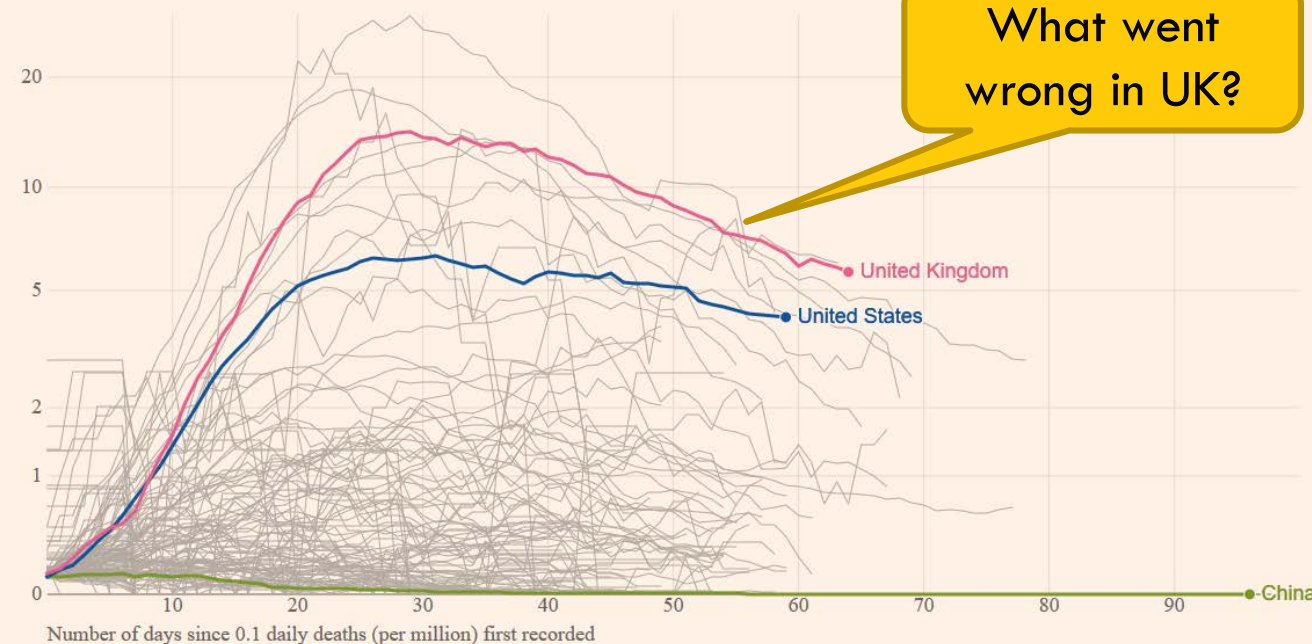
Science Matters: The UK Experiment

CORONAVIRUS PANDEMIC

'Biggest failure in a generation': Where did Britain go wrong?

Unlike Italy, the United Kingdom had time to prepare for the coronavirus tsunami. But as the death toll climbs, critics say Britain's response has suffered from a series of deadly mistakes and miscalculations.

By Bevan Shields
MAY 3, 2020

The Guardian

This article is more than 2 months old

Britain goes it alone over coronavirus. We can only hope the gamble pays off

Devi Sridhar

Ignoring advice and lessons from Europe and Asia on mass testing and isolation, health experts insist that our approach is the answer

Sun 15 Mar 2020 05.00 EDT

- *UK had access to basic scientific knowledge (mutated SARS, 5-7 day gestation, 2-3% mortality*

- *UK has access to epidemiological knowledge (test, isolate, contact tracing, & social distancing)*

- *UK differed in how it weighed and used science (preferred "herd immunity" approach)*

Agility Matters: Implementation, not just Knowledge

Excess Death Rate (adjusted) and Response Time
PITTSBURGH, PA

Excess Death Rate (adjusted) and Response Time
St. Louis, MO
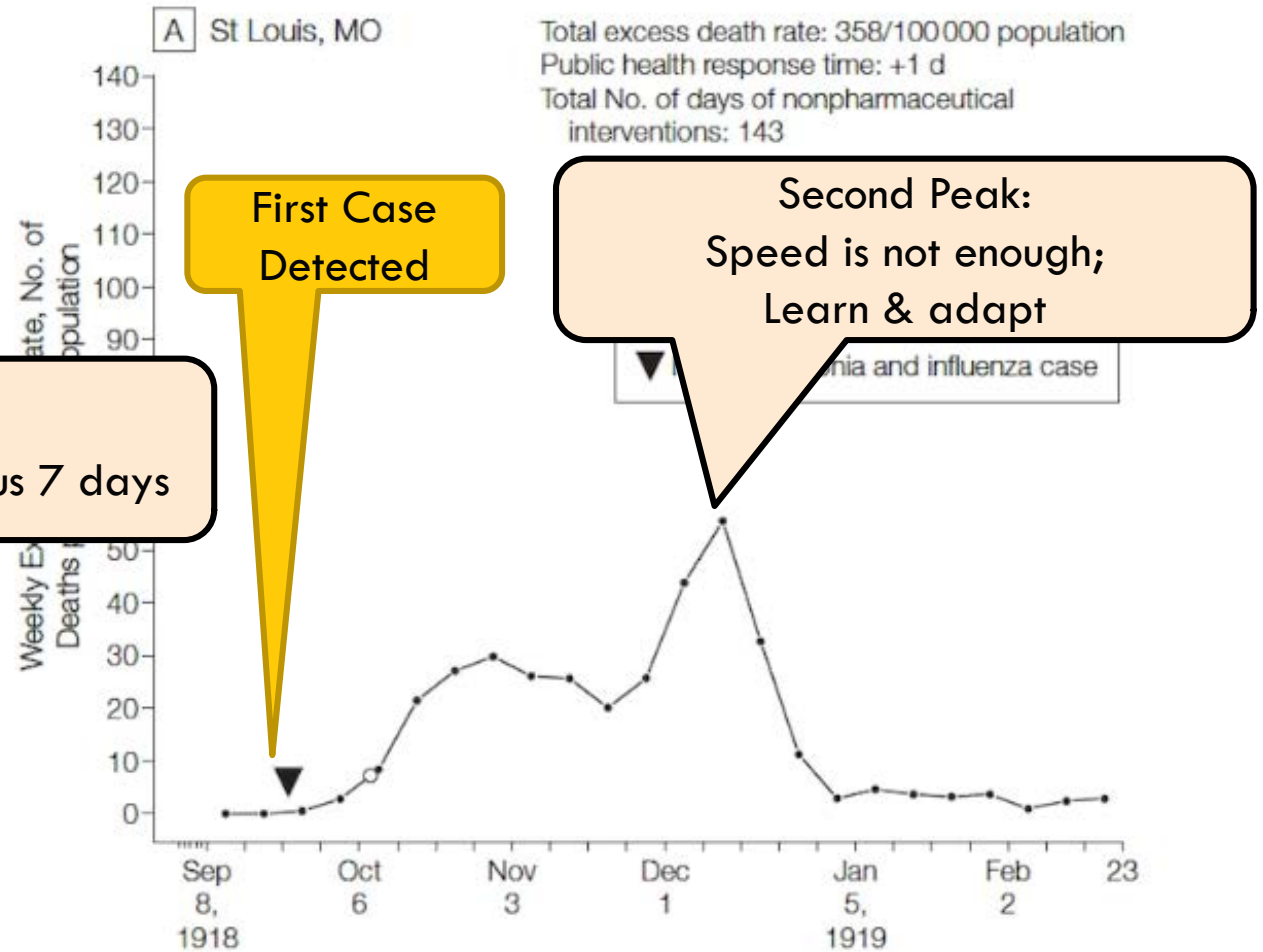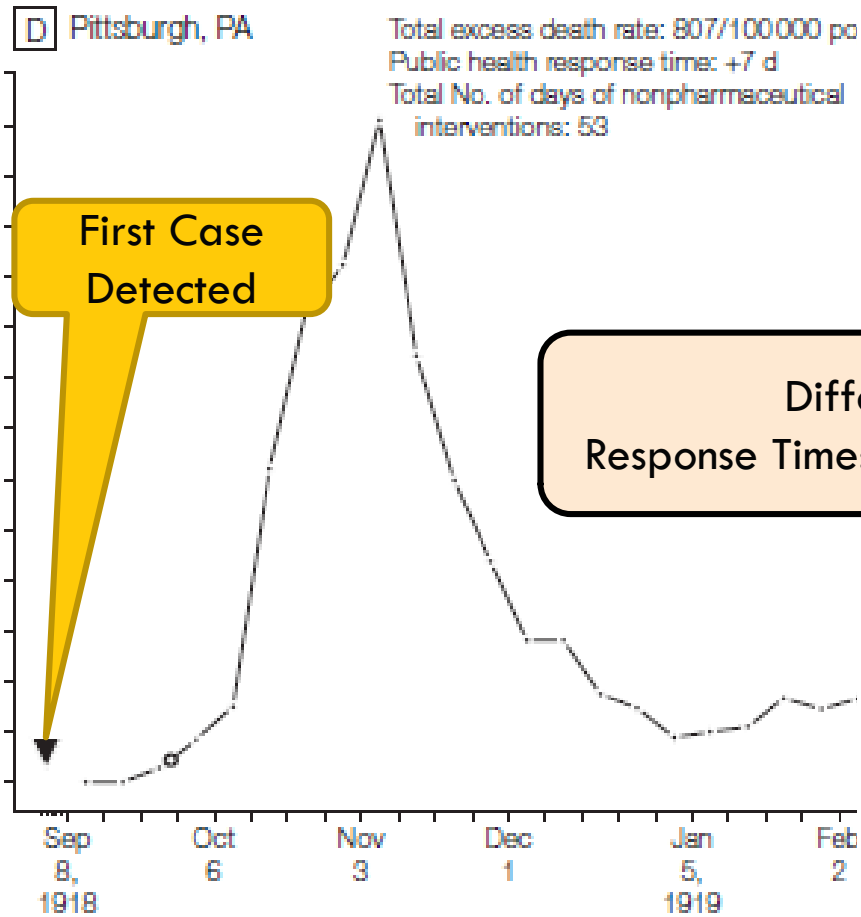
This chart shows the double-humped peaks of deaths during the 1918 flu in St. Louis. The city imposed strict restrictions early on but loosened them under pressure from its citizens, only to see deaths jump again. (Courtesy of JAMA and Howard Markel)

Lesson: Science Matters. Agility Wins, Not Speed

- Without Science, you are "dead."

- Implementation can "kill" the Science advantage.

- Speed helps, but *not* enough to prevent "death."

- Agility—learning and adapting—makes a "winner."

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Thanks

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