

Which Scientists Shifted their Research Focus to the COVID-19 Pandemic?

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The COVID-19 pandemic has been one of the largest shocks to the scientific enterprise in the 21st century, both in terms of the disruptions it has caused scientists themselves,^{i,ii} but also in the form of an enormous surge in demand for scientific advances related to the virus and its effects on society. In time, there will surely be a large number of studies that will come to evaluate how scientists responded to this event.

Here, survey data from during the pandemic sheds some initial light on the rate and composition of scientists choosing to shift their research to focus on this pandemic. It is based on an international survey circulated from April to August 2020. The methodology has been described elsewhere,^{i,ii} but part of the survey included three questions related to scientists' decisions to shift the focus of their work towards some aspect of the pandemic. The three questions allowed us to infer: (1) how similar, scientifically speaking, the respondent's prior work was to the pandemic; (2) whether the scientist had shifted any of their research focus towards the pandemic; and (3) approximately how large of a scientific shift towards the pandemic did the scientist undertake.ⁱⁱⁱ

These questions were presented to a random subset of the roughly 8,000 respondents – to minimize average survey length – yielding 1,520 answers used in the summary statistics that follow. Of these 1,520 scientists, 56% were male, 51% were under fifty years old, 63% were based in the U.S. (with the remainder in either Europe, Canada, or Western Asia), and the major fields of study were 41% biology/chemistry, 28% math/engineering/physics/earth science/computer science, and 31% social sciences.

Overall, 41% of respondents reported shifting their focus towards the COVID-19 pandemic to some degree. Of those who did not, 14% reported not doing so because their research was already closely aligned enough that no switch was necessary to study the pandemic. While there was not a substantial difference between U.S. and foreign scientists (diff=4.7%, $p=0.07$), we find that young scientists (under fifty years old; diff=9.1%, $p<0.01$) and female scientists (diff=10%, $p<0.01$) were both more likely to shift some of their focus (See Figure 1a). Looking across the three major discipline groupings, social scientists were the most likely to report a shift (57%), followed by biologists / chemists (41%), and then mathematicians / physicists / engineers / etc. (24%; joint- $p<0.01$).

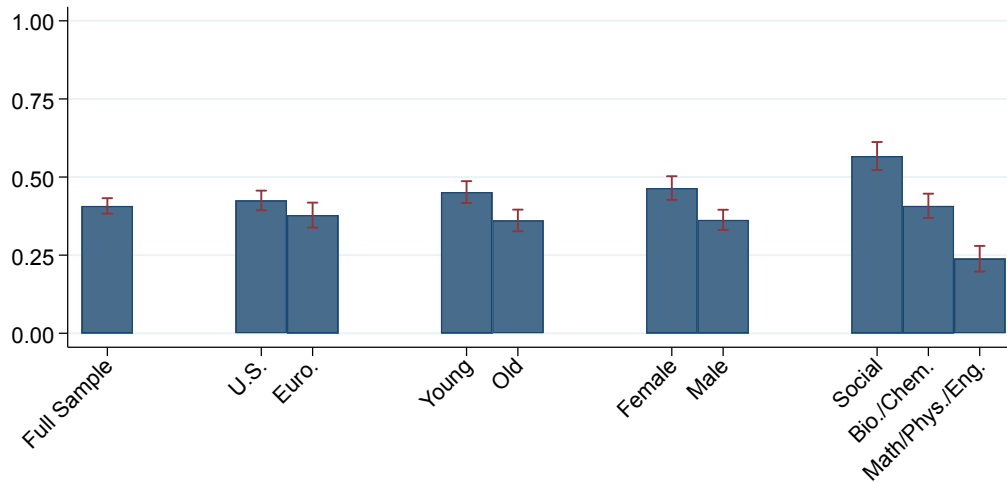
The directional adjustment costs of science, seen relevant outside of times of crises^{iv}, appear relevant here as well. Most scientists' expertise is very unrelated to the pandemic (Figure 1b), and we find that these scientists that are "far" from the pandemic are much less likely to make a switch, along with those who are very "close", who need not make a switch in order to study the pandemic (Figure 1c). If these adjustment costs are indeed an important constraint, we should see larger shifts among those less similar (since these scientists would implicitly face larger costs to turn their focus on the pandemic), and this is precisely what we observe (Figure 1d). Would we call the amount of redirection observed here, or the composition of scientists making these switches, "socially optimal"? It is obviously too early for ex-post evaluations. But initial work to make ex-ante projections using data on COVID-19 pharmaceutical projects suggests that, at least at that specific phase of the innovation pipeline, a social planner would have desired a larger shift towards this pandemic, especially towards novel research lines, than what has been observed.^v

These findings underscore the importance of understanding the allocation of scientists – since the supply of scientists is relatively fixed in the short run, the allocation of expertise will have a strong influence over who is willing and able to contribute to new demands from society as they (unexpectedly) arise.

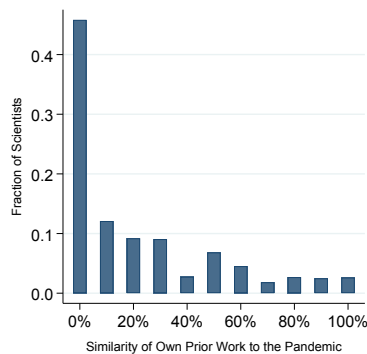
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Figure 1. Composition of Scientists Shifting their Focus to the COVID-19 Pandemic and the Magnitudes of those Shifts

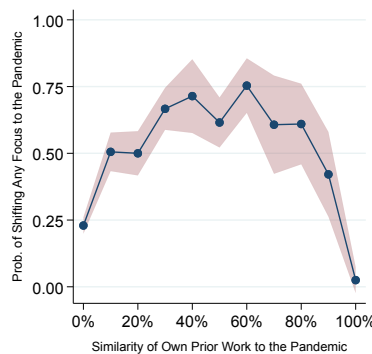
(a) Fraction of Scientists that Shifted Any Research Focus



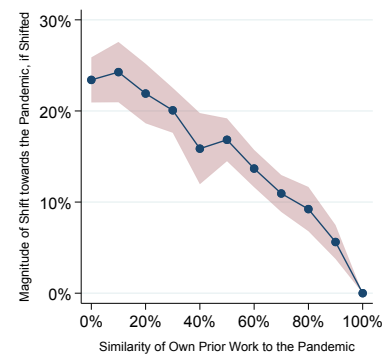
(b) Distribution of Prior Similarity to the Pandemic



(c) Probability of Any Shift per Prior Similarity



(d) Magnitude of Non-zero Shifts per Prior Similarity



Notes: Panel (a) plots the full sample average (leftmost column) alongside mutually exclusive sub-sample averages for four alternative sub-groups (right columns). The distribution of scientists' similarity to the pandemic, the probability of reporting any non-zero shifts, and the magnitude of those non-zero shiftsⁱⁱⁱ are reported in Panels (b-d), respectively. In Panels (c-d), the shaded areas indicate 95% C.I., and there is no uncertainty around shift probabilities or magnitudes at 100% similarity because no shift is possible by construction.

Endnotes & References

- ⁱ Myers, K.R., Tham, W.Y., Yin, Y., Cohodes, N., Thursby, J.G., Thursby, M.C., Schiffer, P., Walsh, J.T., Lakhani, K.R. and Wang, D. (2020). Unequal effects of the COVID-19 pandemic on scientists. *Nature Human Behaviour*, 4(9), 880-883.
- ⁱⁱ Myers, K.R., Lakhani, K.R. and Wang, D. (2020). Towards recovery: Scientists with better ratings of their institution's response to the COVID-19 pandemic have more optimistic forecasts about their future research. *Working Paper*, 1-5.
- ⁱⁱⁱ Questions (1; "%Prior Similarity") and (3; "%Relative Change") solicited answers in the form of percentages from 0% to 100%. We estimate the magnitude of the scientists' shift towards the pandemic as: %Magnitude of Shift = %Relative Change × (100-%Prior Similarity). This accounts for the fact that scientists initially (relatively) less similar to the pandemic have a much larger distance in scientific space to traverse in order to study the pandemic. In other words, this magnitude is an estimate of the fraction of the distance between the scientists' prior work and the pandemic they choose to traverse. Thus, if two scientists both report making shifts of 50%, with one reporting a prior similarity of 10% and the other 90%, then the scientist who was "further" from the pandemic (at 10%) will have been said to make a larger change in their research focus.
- ^{iv} Myers, K.R. (2020). The elasticity of science. *American Economic Journal: Applied Economics*, 12(4), 103-34.
- ^v Bryan, K.A., Lemus, J., Marshall, G. (2020). Crises and the Direction of Innovation. *Working Paper*, 1-34.