NISTEP Seminar

Pathogenic Organization in Science: Division of Labor and Retractions

On 26th January 2018, Professor John P. Walsh at Georgia Institute of Technology gave a lecture entitled "Pathogenic Organization in Science: Division of Labor and Retractions" (announced as "Organizational Structure, Institutions and Misconduct: Explaining Retractions in Science") at the National Institute of Science and Technology Policy (NISTEP), Tokyo. In this lecture, he discussed that increasing in division of labor may be a key factor contributing to scientific misconduct and the associated retractions.

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Pathogenic Organization in Science: Division of Labor and Retractions

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Professor John Walsh commenced his presentation by mentioning that misconduct or mistakes in science are a longstanding problem, and lately, there are a lot of concerns about the upward trend of these "pathologies." At the same time, the size of research teams has increased, and there is also some evidence of increases in the division of labor in a research team. Hence, his talk tries to develop an organization theory of scientific pathologies. The idea is to link the structure of the collaboration with the likelihood of the pathology and to look beyond individual fault or intent or the cultural environment often presented as explanations in certain cases.

The division of labor may increase the vulnerability of a project to pathologies. To understand this perspective, Professor Walsh illustrated the famous biology case of David Baltimore who was involved in a high-profile paper. There were questions about whether this was a case of misconduct. After investigation, it was initially determined that misconduct had taken place, the paper was retracted, and David Baltimore lost his position as the President of the Rockefeller University. He was

quoted as saying, ''The study that gave rise to the paper was conducted as a classic collaboration, with each laboratory performing independent research in its particular task.'' In summary, he did not know what happened due to division of labor and different areas of specialization. Later, further investigations suggested that this might have been an honest mistake, or even a disagreement about sound scientific practices. Hence, it is unclear how to interpret intent in this case.

There could be a debate on whether there was some misconduct involved, but the most important thing to focus is the fact that the incident happened, which Professor Walsh termed as ''pathology.'' Pathology is declared by an authority. There is not an absolutist standard, so a particular behavior is not misconduct or pathology because it is inherently antithetical to a normative or moral principle. Rather, it is pathological because it has caught the attention and the approbation of an agent of social control. This labelling theory based concept of pathology is much more operationally tractable, whereas the absolutist one is much harder to measure. Furthermore, this operationalization is more consistent with the organization theory perspective, as the theory does not distinguish the individual-level causes of pathologies, but predicts both deliberate malfeasance and unfortunate errors will be more common as division of labor increases. Hence, pathological science can be defined as papers that got retracted, without recourse to the intent, blame, or the individual causes.

There is a lot of literature looking into the amount of retraction and consequences of it. A key finding is that after a paper gets retracted, people do not cite it as much. This is the normal expectation. The impact of a retraction on future citations and publications also depends on the rank of the researchers involved and maybe the findings on the reasons for the retraction. People also look at the causes and consequences of this, generally at an individual level such as gender, eminence, seniority and country.

There is also some discussion in the literature about the institutional context. One of the possible causes of increased retractions is high stakes incentive systems. In some countries, professors get bonuses for publishing in international journals, and often, the more renowned the journal, the bigger the bonus. A study done by Franzoni and colleagues (2011, *Science* vol.333) ascertained that with the incentive system in place, ritualistic publication practices arise. Professor Walsh extends this finding to hypothesize that such incentive systems might generate more pathologies as well. An additional institutional context is the general prevalence of corrupt behavior in a country. Prior work suggests that some pathologies may be related to country level differences in overall corruption (in business, government, *etc.*). Professor Walsh also tests this hypothesis.

It is well known that pathologies are endemic to science. Merton (1938, *American Sociological Review* vol.3)'s strain theory describes that when faced with an ability to achieve ends through legitimate means, there is a tendency to shift from focusing on the means to focusing on the ends, regardless of means (Merton's strain theory of deviance). In addition, in a collaborative process, some people might know things which the others might not know, which can generate accidents. This specialization can also lead to an environment where if somebody would like to be devious, they can, and it makes it difficult to recognize when it happens due to the lack of knowledge.

Trust can also lead to pathology. In a collaborative work, since all are experts, the general expectation is that they will do their job accurately and there is no need for close inspection. The logic of good faith in a collaboration among professionals is not to watch each other too closely. This makes it more likely for mistakes to happen. This is an organizational level characteristic. Good and bad individuals exist in an organization; however, the organization itself is the driver of this pathogen. Hence, it is argued that the division of labor is one of the predictors of pathogenic science.

Professor Walsh collected data on retractions in biomedical sciences. This field tends to have more retractions compared to other fields, and it is becoming more common to list a division of labor footnote in the paper, called contributorship. All the retracted papers were obtained from PubMed Central, and they then found a comparable paper next to each retracted paper in the same journal issue that was not retracted. Division of labor is defined as the share of tasks done by exactly one author.

The logistic regression model is employed to test whether the division of labor predicts retraction. This model includes not only division of labor but also other potential causes of retraction, such as corruption, incentives, number of authors, interdisciplinarity, competition, university ranking, year, and field. The regression results show that the more division of labor, the more likely the paper is retracted. The division of labor effect is robust and can be measured in a variety of different ways. It is not, however, simply local versus remote collaboration that drives this effect. Note that remote does not necessarily imply division of tasks.

In addition, the more corrupt the country, the more likely the paper will be retracted. The more they give direct incentives, the more likely the paper is retracted. However, when corruption is controlled, this gets weaker. Moreover, interdisciplinarity seems to have a positive effect on retractions.

Professor Walsh then mentioned that training and research ethics have been mandatory in the US. This is likely not unique to the US, but, at least in the US, this training has been mandatory for years now. However, the training involves generally an individual-centered approach to the problem. There is a need for some best practice guidelines and some more sociological training on the shared responsibility for team research findings. Hence, the David Baltimore claim—he is not responsible if his collaborators did something because that was not his part of the project—is not a proper answer. The whole organization is responsible, and there is a need to organize so that these things do not happen.

Cross training, rechecking, and duplicate parallel production are practices that build redundancy into the system to make sure that things do not fall through the cracks. Although putting these recheck processes in place would increase the cost and decrease the productivity of the scientific work, it would increase the reliability. This could be considered as a trade-off problem. Hence, it becomes a policy question as to what extent will one need to emphasize productivity versus to what extent will one need to emphasize reliability.