12

The Voinnet Affair: Testing the Norms of Scientific Image Management

Catherine Guaspare and Emmanuel Didier

In the 1980s, it was already obvious that large companies were using metrics to track numerically the efficacy and efficiency of their employees. Management methods based on quantification gained widespread recognition during this decade (Camp, 1989; Hammer and Champy, 1993). Since the 2000s, these metrics seem to have migrated far beyond the borders of the corporate world, permeating the public bureaucracies of most liberal states, giving rise to what has come to be called the "New Public Management" (Osborne and Gaebler, 1992). Education was one site where these new metrics were first applied. While their success proves that they have been useful to some constituencies, their use has also been accompanied by drawbacks and complaints, which have often focused on the gaming practices that metrics fostered (Bruno and Didier, 2013). There are now suggestions that the problem may be worse than that. As universities and research institutions have adopted metrics of performance evaluation (Lawn, 2014), it has also become clear that the life sciences are plagued with widespread misconduct. Is there a correlation?

The literature offers some explanations for the apparent increase of misconduct cases (Steen, Casadevall, and Fang, 2013). One could argue that the barriers to publication have been lowered in the last twenty years or so, thus letting more scientists publish fraudulent articles. But this argument has limitations. First, it does not explain why the barriers to publications have been lowered. Second, over the same period, we have witnessed a series of public scandals triggered by findings of misconduct. Given that one of the social functions of scandal is precisely to *enforce* norms (Dampierre, 1954; Molotch and Lester, 1973; Boltanski, Claverie, and Offenstadt, 2007; Adut, 2008), we should not expect to find scandals if there was a simple lowering of the quality requirements in science. A different explanation is offered by the scientists themselves who often complain that they are under pressure, which may tempt them to produce

subquality science. But the problem with the word "pressure" (which, by the way, is shared with many other professions from the police to medical doctors [Bruno and Didier, 2013]) is that it is mainly a complaint, a denunciation. It is not analytical.

Our hypothesis is that certain dimensions of the practice of science have experienced important transformations in the last twenty years, caused in part by the performative effects of metrics. These innovations have blurred the previous norms regulating scientific practices. At the same time, a new ecology (Star, 1995) of watchdogs and fraud detection has emerged that gives increased visibility to cases of misconduct, which in turn stir public controversies or "affairs" through which norms are re-instantiated.

Rethinking Misconduct Through High-Visibility Affairs

The practice of science has changed in the last twenty years. The digitalization of scientific images and the accessibility of image-processing software (such as Photoshop) have completely reshaped the way images are used and processed in the laboratory, posing questions about the acceptable limits of image manipulation (Rossner and Yamada, 2004). At the same time, changes to the way laboratories are managed (caused by the increased size of research teams and changes in the funding structure) have deeply transformed the role of Principal Investigators (PIs), who are now managers as much as researchers. In turn, this has changed the distribution of responsibility within the laboratory concerning the handling of the images (Frow, 2012).

Since science is a competitive community where all try to succeed, there are incentives to use new tools up to the limit, which sometimes leads scientists to lose the sense of where those limits are, especially in regard to new practices like digital image processing and use. The main scientific journals are stepping in trying to establish guidelines but, until now, they have not resolved all of the ambiguities that emerge from the use of these new tools (Frow, 2012). Practitioners, therefore, may not know for sure what are the limits that should not be crossed given that the community is still elaborating and stabilizing them.

Controversies and scandals are defining events in making social norms explicit (Boltanski, 1990; Bloor, 1991; Claverie, 1998). They are oppositional moments when ethical and epistemological standards become unstable and have to be newly decided upon, breaking up the scientific community into groups advocating for a certain set of norms against

another set, forcing them to make their conception of the norms explicit. For example, some scientists have recently expressed a sentiment of injustice when witnessing practices that they found shocking but brought success to those who deployed them:

> The climate of distorted incentives has been exploited by some scientists to build very successful careers upon fabricated data, landing great jobs, publishing apparently high-impact research in top journals and obtaining extensive funding.… Honest scientists struggle to compete with cheats in terms of publications, employment, and funding. (PubPeer, 2016)

Some who felt this type of resentment did not simply express it but also helped establish a whole new ecology of watchdogs to scrutinize scientific production. And when they identify something disturbing or puzzling, they find ways to have the scientific community confront these issues. They are social actors that put science to a test.

To analyze the ways in which a specific scandal becomes the moment when norms are expressed, we focus on a recent well-known example. In 2014 and 2015, a set of publications authored or co-authored by a renowned French life scientist, Olivier Voinnet, became the target of a series of public critiques. They were posted on the website PubPeer, one of the main new watchdogs that allows scientists to anonymously discuss and criticize scientific papers (Boris Barbour and Brandon Stell, this volume, chapter 11).

Public Critiques and the Mediatization of the "Voinnet Affair"

In 2014, Voinnet was a forty-three-year-old, high-profile plant molecular biologist widely recognized for his work on RNA interference, a defense mechanism that allows plants, but also invertebrates and mammals, to fight viruses. After a thesis completed under the supervision of David Baulcombe (a major plant scientist and a pioneering researcher in gene silencing), Voinnet was recruited by the French National Center for Scientific Research (CNRS) as a permanent researcher and appointed at the "Institut de Biologie Moléculaire des Plantes" (IBMP) in Strasbourg. He was soon promoted to first-grade senior researcher, the highest position for a CNRS researcher. Since 2010, he has been on secondment at the Swiss Federal Institute of Technology in Zurich (ETHZ), where he has set up a new lab. Practically every year since 2004, he has won prizes (the Academy of Science Prize, the Liliane Bettencourt prize for Life Sciences, the EMBO Gold medal) that recognized his work and helped sustain his

research and his lab. During these years, Voinnet benefited from competitive European and French grants. By 2014, he ran two labs (one in Strasbourg, and one in Zurich, with ten members in the former and thirty members in the latter) (ETHZ, 2015c) and had already published around one hundred papers, some in high-profile journals (including *Nature*, *Cell*, *Science*, *EMBO Journal*, and *PNAS*), and some of them highly cited.

In September 2014, images related to ten papers co-signed by Voinnet were flagged on PubPeer. Anonymous peers suspected that some images had been inappropriately modified. Some appeared too bright or too clean or had been manipulated without providing information about the process that had been used. On January 9, Baulcombe (who was the corresponding author on half of the suspected publications posted since September) left a statement on PubPeer for each of the flagged papers (which had grown to twelve in the meantime), explaining that he had been aware of the problems, had begun an investigation, and would notify the editor. One of those statements was signed jointly by Baulcombe and Voinnet. On the same day, *Retraction Watch* (Ivan Oransky, this volume, chapter 10), another watchdog, informed its readers of the ongoing allegations posted on PubPeer about Voinnet and Baulcombe's work (Oransky, 2015a). By so doing, the blog publicized these concerns to a much broader audience, opening new discussions that quickly spread with the comments following the post.

Voinnet, corresponding author of several of the papers, left a post on PubPeer echoing Baulcombe's earlier statement that he was aware of the problems, was investigating, and would notify the editors. As the discussion on both PubPeer and *Retraction Watch* picked up pace, it amplified the concerns, and the scrutiny. By the end of January, thirty-five papers co-authored by Voinnet from different stages of his career were discussed on PubPeer and 255 comments had been left on this website. *Retraction Watch* recorded about 120 comments under its first post about this case. One month later, on February 18, a first correction occurred for a 2014 paper in *Genes & Development*. The information was immediately relayed and publicized through comments on PubPeer and *Retraction Watch*.

The mediatization of this affair by newsmagazines or newspapers further expanded the audience of the case. At first, two articles by the science freelance journalist Leonid Schneider (who was also active on *Retraction Watch*) were released in January in the *Laborjournal* online (Schneider, 2015a) and, in March, in the *LabTimes* online (Schneider, 2015b). But an article published in *Le Monde* (France's most important newspaper)

at the end of March (Morin and Larousserie, 2015a) brought the affair to a large national public. The article reported the ongoing suspicions concerning figure manipulation that were expressed on PubPeer and *Retraction Watch* about articles co-authored by Voinnet. Also, *Le Monde* highlighted for the first time the existence and role played by the two websites, PubPeer and *Retraction Watch*.

The affair took a new turn on April 1, with a comment left on PubPeer by Vicki Vance, a plant scientist at the University of South Carolina (PubPeer, 2015). She wrote that on three occasions she had been the peer reviewer of one of the papers produced by Voinnet's lab and subsequently flagged it on PubPeer. Based on her repeated experience, she became convinced that the authors had lied about several data presented in the article. This paper had been rejected by the first two journals that had asked her for a review. However, the third journal—*Plant Cell*—decided to publish it in 2004, despite Vance's statement in her report that some part of the text or some figures had been deliberately twisted or improperly manipulated to support the results (Vance, 2015). In comments on the websites, some stated that if the authors were at fault, then the journal shared a responsibility for publishing a dubious article that encouraged to continue these questionable practices. On April 9, *Le Monde* (Morin and Larousserie, 2015b) reported this new development by writing that Voinnet was now being "accused of lying."

The same day, the CNRS (CNRS, 2015a) and ETHZ (ETHZ, 2015a) officially announced that they had already opened an investigation after being aware of the potential image manipulation in a large amount of publications co-signed by Voinnet. Following their procedures, each institution had set up a commission made of experts to investigate the allegations posted on PubPeer that were then broadly disseminated by the media. Four days later, *Retraction Watch* in its third post about the case (Oransky, 2015b) relayed this development. It also reported that Vance had released her original peer review of the *Plant Cell* paper on ResearchGate (Vance, 2015) (which opened up a new controversy because peer review is expected to remain private), and that she had also sent an open letter to the CNRS and the ETHZ.

The first retraction occurred in the midst of these institutional investigations. On June 2, 2015, *Plant Cell* complied with a request for retraction by the authors (Plant Cell, 2015) concerning the paper that had been highlighted by Vance on websites and newspapers.[1] This retraction went against the claim of the CNRS and ETHZ in their press release that the results were not affected by the potential image manipulation. The

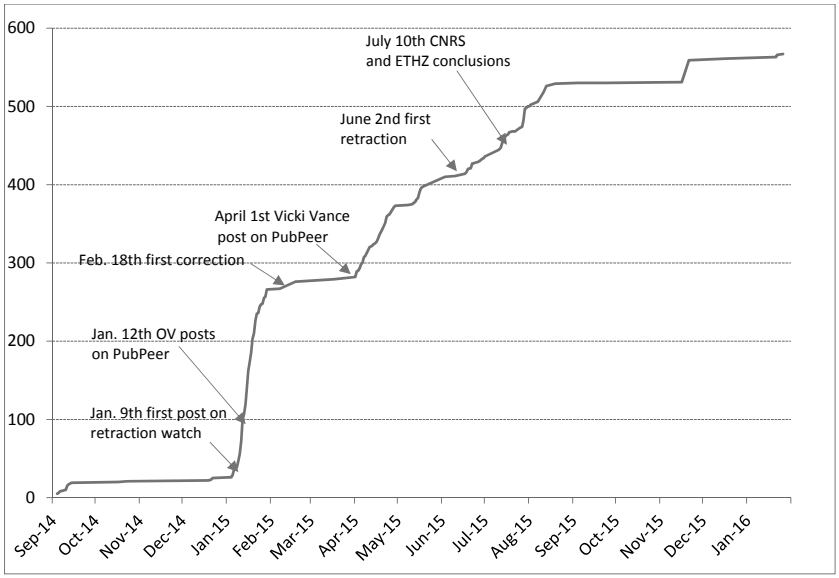

Figure 12.1
Cumulative frequency of posts on PubPeer about Voinnet's publications.

journalist from *Le Monde* underlined this in "A New Step in the Affair" (Morin, 2015). Meanwhile, the affair's visibility continued to grow, as shown by the number of posts on PubPeer.

The Institutions React

On July 10, two separate press releases (CNRS, 2015b; ETHZ, 2015b) published findings of the investigations carried out by the research institutions that employed Voinnet. The ETHZ reported that (ETHZ, 2015c)[2] while the commission did not find evidence of fraudulent fabrication of data in order to alter experimental results (a category 1 offence, the most severe in its own classification of research malpractice established for the case), various errors and manipulations with different levels of seriousness[3] were identified in the figures of about twenty papers. Images had been "beautified" by clearing the "background clouding," some bands were "duplicated," some figures were published without explanation about the processing they received, some papers shared the "same loading control images," and sometimes the same loading control images were used in different figures in the same paper. In other cases, the report pointed out that "mock idealized figures" produced for internal use during lab meetings had

been "mistakenly used" in articles (ETHZ, 2015c). However, based on its assessment of evidence from lab notebooks and the raw images contained in them, the report stated that "the experiments reported in the investigated publications had been conducted and recorded carefully"—a statement that was then mirrored in the title of the ETHZ press release: "Conducted Properly—Published Incorrectly." Unlike the ETHZ, however, the CNRS considered that the errors and manipulations in Voinnet's papers constituted scientific misconduct (CNRS, 2015 b).

Both investigative commissions saw this series of data misrepresentations not as simple successions of random mistakes, but as the consequences of bad practices and bad habits in the presentation of scientific data. As head of the research group, Voinnet was supposed to supervise the treatment and presentation of the scientific results and also to guide his team, especially the junior scientists, to ensure the quality of their work. On this point, the commissions concluded that Voinnet did not meet his ethical and professional obligations. For both institutions, his responsibility was then not only as an author or co-author, but also as a team leader. Additionally, the ETHZ report implicitly pointed out the influence of metrics on these misconducts: "Being at the cutting edge of science, the OV laboratories were exciting, high-pressure, and fast-working, and being fast was part of the problem as OV himself admitted." The metrics might well be an element of this "pressure," leading up to these "speeding offenses," as this commission called them.

The two institutions imposed different sanctions on Voinnet. The president of the CNRS ordered him suspended from the CNRS for two years after his return from Zürich (CNRS, 2015c). The executive board of the ETHZ decided that Voinnet would "receive an admonition from the president of ETHZ" and that measures would be implemented to improve the working practices of the laboratory. Voinnet was also forced to relinquish his leading position at the CNRS laboratory in Strasbourg to focus exclusively on his ETHZ team. The asymmetry between these positions was partly related to the fact that, because Voinnet's employment by the CNRS and the ETH started on different dates, the two institutions did not have to investigate the same sets of papers. There were other sanctions. On January 2016, the Swiss National Science Foundation stopped Voinnet's funding (1.25 million Swiss francs) and banned him from its grants for three years. EMBO revoked his gold medal (Palus, 2016), and the affair led to the retraction of eight and the correction of twenty-four of Voinnet's papers since January 2015.[4]

Conclusion

To conclude, here are two points. First, the early 2010s saw the emergence of a new ecology of watchdogs, fueled by a sense of injustice that some scientists felt when seeing colleagues being rewarded for work they saw as flawed or even fraudulent. Through different means (such as anonymity to protect less established scientists, active online presence, and good connections with the press), they have been able to reach a broad audience when publicizing their serious doubts about the integrity of certain scientific works. They are now able to launch resounding "affairs," in public arenas so wide that government and academic institutions have to react and take a stance.

Second, there were image management practices apparently common (but kept discreet) in some laboratories that were instrumental to building successful careers. When exposed to the general public, however, these practices made those careers tremble. Driven in part by the wide public echo produced by the new watchdogs, institutions find themselves forced to confront these practices. As a result, they produce investigations, tools (such as new classification of misconducts), and organizations (such as the creation of a position of "scientific integrity adviser" by the CNRS)[5] to judge and slowly establish the material foundations of new norms for these practices.

Postscript

This article focuses on the inquiries for scientific misconduct led by the CNRS and the ETHZ in 2015. It is worth mentioning that in 2016 a new commission led by the CNRS assisted by the ETHZ was set up to investigate dubious figures into five publications from Voinnet's former CNRS lab at Strasbourg (ETHZ, 2016). In contrast with the previous findings, this last investigation revealed, alongside simple errors, evidence of intentional fabrication of data. The CNRS and the ETHZ cleared Voinnet of any unethical manipulation of data, but the CNRS holds him responsible for the repeated breach of good scientific practices that occurred under his supervision (CNRS, 2018; ETHZ, 2018).

Notes

1. In *Le Monde*, the journalists specified that Olivier Voinnet requested the retraction of the paper to *Cell* at the end of March (Morin and Larousserie, 2015b).

2. Contrary to the ETHZ, the CNRS did not make public the report of its commission of investigation.

3. Most of them fall into category 3 ("nonannotated processing of images") and some in category 2 (production of idealized figures to make them "more convincing without affecting the overall conclusion of the original experiment"). The report highlighted also that some papers might contain genuine errors (category 4, "unintended publication of erroneous images in place of the correct one").

4. According to the *Retraction Watch* database, consulted October 12, 2018. http://retractiondatabase.org/RetractionSearch.aspx#?auth%3dolivier%2bvoinnet.

5. http://www2.cnrs.fr/presse/communique/5737.htm.

References

Adut, Ari. 2008. *On Scandal: Moral Disturbances in Society, Politics, and Art*. Structural Analysis in the Social Sciences. Cambridge, New York: Cambridge University Press.

Bloor, David. 1991. *Knowledge and Social Imagery*. 2nd ed. Chicago: University of Chicago Press.

Boltanski, Luc. 1990. *L'Amour et la Justice Comme Compétences: Trois Essais de Sociologie de l'Action*. Collection Leçons de Choses. Paris: Métailié.

Boltanski, Luc, Elisabeth Claverie, and Nicolas Offenstadt, eds. 2007. *Affaires, Scandales et Grandes Causes: de Socrate à Pinochet*. 1 vol. Les Essais. Paris: Stock.

Bruno, Isabelle, and Emmanuel Didier. 2013. *Benchmarking: l'État Sous Pression Statistique*. Paris: Zones.

Camp, Robert C. 1989. *Benchmarking: The Search for Industry Best Practices That Lead to Superior Performance*. Milwaukee, White Plains, NY: Quality Press; Quality Resources.

Claverie, Elisabeth. 1998. "La Naissance d'une Forme Politique: L'affaire Du Chevalier de La Barre." In *Critique et Affaires de Blasphème à l'Époque des Lumières*, Philippe Roussin, 185–260. Paris: Honoré Champion.

CNRS. 2015a. "Allegations Concerning Olivier Voinnet's Publications: the CNRS Sets Up a Scientific Commission Of Inquiry." April 7. http://www2.cnrs.fr/en/2549.htm.

CNRS. 2015b. "Completion of the Procedure Against Olivier Voinnet." July 10. http://www2.cnrs.fr/en/2593.htm for the CNRS.

CNRS. 2015c. "Bulletin Officiel du CNRS." June–July, 386. https://www.dgdr.cnrs.fr/bo/2015/juin-juillet-2015.pdf.

CNRS. 2018. "Bulletin Officiel du CNRS." September, 382–383.

Cokol, Murat, Fatih Ozbay, and Raul Rodriguez-Esteban. 2008. "Retraction Rates Are on the Rise." *EMBO Reports* 9(1): 2. doi:10.1038/sj.embor.7401143.

Dampierre, Eric de. 1954. "Thèmes Pour l'Etude du Scandale." *Annale ESC*, IX, 3.

ETHZ. 2015a. "Allegations Under Investigation." April 7. https://www.ethz.ch/en/news-and-events/eth-news/news/2015/04/allegations-under-investigation.html.

ETHZ. 2015b. "Conducted Properly—Published Incorrectly." July 10. https://www.ethz.ch/en/news-and-events/eth-news/news/2015/07/investigation-result-voinnet.html for the ETH Zürich.

ETHZ. 2015c. "Report of the ETH Commission of Inquiry Set Up to Clarify Allegations Against Prof. Olivier Voinnet of ETH Zurich." June 17. https://www.ethz.ch/content/dam/ethz/news/medienmitteilungen/2015/PDF/untersuchungsbericht/Report_of_ETH_Commission_Voinnet.pdf.

ETHZ. 2016. "CNRS and ETH Are Setting Up a Commission of Inquiry." September 8. https://www.ethz.ch/en/news-and-events/eth-news/news/2016/09/commission-of-inquiry.html.

Frow, Emma K. 2012. "Drawing a Line: Setting Guidelines for Digital Image Processing in Scientific Journal Articles." *Social Studies of Science* 42(3):369–92.

Hammer, Michael, and James Champy. 1993. *Reengineering the Corporation: A Manifesto for Business Revolution*. New York: Harper Business.

Lawn, Martin. 2014. *Shaping of European Education: Interdisciplinary Approaches*. Studies in European Education. Florence: Taylor and Francis.

Molotch, Harvey, and Marilyn Lester. 1973. "Accidents, Scandals, and Routines: Resources for Insurgent Methodology." *Critical Sociology* 3(4):1–11. doi:10.1177/089692057300300401.

Morin, Hervé. 2015. "Un Article "Manipulé" d'une Star Française de la Biologie est Retiré." *Le Monde*. June 3. http://abonnes.lemonde.fr/sciences/article/2015/06/03/un-article-manipule-d-une-star-francaise-de-la-biologie-est-retire_4646446_1650684.html.

Morin, Hervé, and David Larousserie. 2015a. "Une Star de la Biologie dans la Tourmente." *Le Monde*. March 31.

Morin, Hervé, and David Larousserie. 2015b. "Olivier Voinnet, Star de la Biologie, Accusé de Mensonge." *Le Monde*. April 4.

Oransky, Ivan. 2015a. "Award-Winning Plant Researcher Correcting Several Papers Critiqued on PubPeer." *Retraction Watch*. January 9. http://retractionwatch.com/2015/01/09/award-winning-plant-researcher-correcting-several-papers-critiqued-pubpeer/.

Oransky, Ivan. 2015b. "Investigations into Voinnet's Work Announced; Critic Publishes Original Peer Review." *Retraction Watch*. April 13. http://retractionwatch.com/2015/04/13/investigations-into-voinnets-work-announced-critic-publishes-original-peer-review/.

Pain, Elisabeth. 2009. "Finding His Voice in Gene Silencing." *Science*. May 29.

Palus, Shannon. 2016. "EMBO Takes Back Voinnet's Award, Investigates Other Awardee Who Just Lost a Nature Genetics Paper." *Retraction Watch*. January 28. http://retractionwatch.com/2016/01/28/embo-takes-back-voinnets-award-investigates-other-awardee-who-just-lost-a-nature-genetics-paper/.

Plant Cell. 2015. Retraction: "Patrice Dunoyer, Charles-Henri Lecellier, Eneida Abreu Parizotto, Christophe Himber, and Olivier Voinnet.(2004). Probing theMicroRNA and Small Interfering RNA Pathways with Virus-Encoded Suppressors of RNA Silencing." *Plant Cell* 16:1235–1250. http://www.plantcell.org/content/early/2015/06/02/tpc.15.00407.full.pdf.

Politix. 2005. "A l'Epreuve du Scandale." n°71.

Osborne, David, and Ted Gaebler. 1992. *Reinventing Government: How the Entrepreneurial Spirit Is Transforming the Public Sector*. Reading, MA: Addison-Wesley.

PubPeer. 2015. "PubPeer > Plant Cell." January 5. https://pubpeer.com/publications/15084715.

PubPeer. 2016. "A Crisis of Trust | PubPeer." March 7. http://blog.pubpeer.com/?p=164.

Rossner, Mike, and KennethYamada. 2004. "What's in a Picture? The Temptation of Image Manipulation." *The Journal of Cell Biology* 166(1):11–15.

Schneider, Leonid. 2015a. "Paper von Olivier Voinnet unter Beschuss." *Laborjournal* online. January 20. http://www.laborjournal.de/editorials/906.lasso.

Schneider, Leonid. 2015b. "Too Much to Be Nothing?" *Lab Times* online. March 24. http://www.labtimes.org/editorial/e_594.lasso.

Star, Susan Leigh (Ed.). 1995. *Ecologies of Knowledge. Work and Politics in Science and Technology*. Albany, NY: State University of New York Press.

Steen, R. Grant, Arturo Casadevall, and Ferric C. Fang. 2013. "Why Has the Number of Scientific Retractions Increased?" *PLoS One* 8(7):e68397. doi:10.1371/journal.pone.0068397.

Stevens, H. 2013. *Life Out of Sequence. A Data-Driven History of Bioinformatics*. Chicago: University of Chicago Press.

Vance, Vicki. 2015. "This Is My Review of the Voinnet 2004 Plant Cell Paper Downloaded from the Journal's Website." April 7. https://www.researchgate.net/publication/274637686_This_is_my_review_of_the_Voinnet_2004_Plant_Cell_paper_downloaded_from_the_journal's_website_The_review_is_from_November_2003.