## *Sabotage*

Here's a troubling story. A veteran PI related how he once worked in a large laboratory that had an open floor plan (OFP). In other words, multiple labs shared space and equipment with no walls between them. The OFP was primarily in place as an administrative strategy that allowed one lab to absorb another's lab space if the latter got recruited to another university or lost funding.

The PI then described how two labs sharing the common space had become very competitive. These two labs shared a tissue culture storage area, and graduate students from either lab began to suspect sabotage from the other lab when their cell culture experiments yielded unpredictable results. Most researchers label the lid of their cell culture dishes, but when one postdoc began labeling the top and bottom of her dish, she discovered that a switch had indeed occurred. She then accused the personnel of the other lab of intentionally switching the covers of the dishes to mix up the samples. This resulted in a very painful incident with the labs accusing each other of sabotage. Finally the University had to construct walls to separate the labs.

Not terribly ethical, wouldn't you say? Your comments?

## *Expert Opinion*

We will respond to this scenario from two, rather different vantage points or interpretational frameworks. The first one will understand this scenario as originating from nonmaleficent, unintentional, but careless behaviors that result in errors. The second understands this behavior as the deliberate sabotaging of another's work product. Either interpretation looks to an observation by Donald Berwick about human factors and systems design: "Every system is perfectly designed to achieve the results it achieves."[1]

*Interpretation #1: "Never ascribe to malice that which can adequately be explained by incompetence."* This account presupposes that either intentional sabotage of the tissue cultures <u>never</u> occurred or, if it did, was triggered by some researcher's unintentional error of carelessly switching lids of the tissue culture jars.

This understanding would look to what risk management personnel call "system flaws" or weaknesses that heighten an environment's vulnerability to failure.[2] This phenomenon usually results from system operators—in this case, lab personnel—failing to observe customary rules, regulations, policies, protocols or standards pertaining to lab operations, which in this case involve noncontamination protocols. To the extent that researchers in this lab are relatively "unpatrolled," they might be committing any number of noncontamination policy violations, e.g., using suboptimal sterile practices, placing lab specimens on contaminated surfaces, exposing specimens to the open air, or carelessly exposing sensitive materials (including themselves!) to radioactive, neurotoxic, or corrosive materials.

These protocol violations or "technical errors" can be caused by any number of factors like fatigue, poor monitoring, inadequate training, or system operators getting used to cutting corners in attempting to be more efficient. Thus the need exists for some kind of policing of complex environments like large laboratories with open floor plans populated by numerous personnel so that the latter might strictly adhere to the usual and customary standards.

Note, also, that while open floor plans might admit the advantages that are mentioned in the contributor's scenario, their design also admits problems such as: The collegiality, or at least civility, that open floor plans anticipate might not exist; lab groups or their members might change regardless of the vicissitudes of funding; and multiple persons working in complex environments can bring varying (and often inadequate) levels of understanding to their job functions that can degrade the quality of system operations.

These variables only heighten the recommendation that lab personnel be periodically reminded of and trained in noncontamination and tissue sample labeling protocols; that all lab personnel be vigilant in patrolling for such; and that they immediately intercept and correct protocol deviations. Achieving the latter is not easy because it entails the kind of collegial environment wherein system operators feel comfortable in calling attention to system weaknesses and the like. Consequently, leadership must create an organizational atmosphere of safety. Researchers who call attention to one another's deviant behaviors or protocol violations can only do so if they feel confident that they will not suffer recriminations and that leadership will take appropriate steps to insure that deviant behavior ends. Also, some commentators argue that persons who violate protocols should not be blamed or penalized initially, unless their actions are brazen, reckless, or chronic.[3]

This discussion of how to choreograph work environments such that system weaknesses and operator errors are intercepted before harms or perils materialize is too elaborate to be discussed here, so we will alert the reader to some literature that might be helpful.[4] We remind the reader, however, that the discussion so far assumes that the untoward event was most likely the result of careless actions precipitated by a lack of adequate adherence to noncontamination protocols. The next account will not nearly be so optimistic about human motives and professional integrity.

*Interpretation #2: "Always suspect the baser motive."* This account will understand the contamination event as intentionally maleficent. Unfortunately, the history of scientific investigation is replete with examples of misconduct, and it is probably unlikely for an individual who is well along in a scientific career not to have had a personal experience or brush with an incident such as the one above.

In a remarkable article appearing in a 2007 issue of *Science and Engineering Ethics*, Melissa Anderson and her colleagues described the results of a series of focus group meetings they conducted with 51 mid- and early-career scientists.[5] The interest of the focus sessions was to assess the effects of competition among scientists on their work and relationships. The authors' summary statement concluded that:

> [C]ompetition contributes to strategic game-playing in science, a decline in free and open sharing of information and methods, sabotage or others' ability to use one's work, interference with peer-review processes, deformation of relationships, and careless or questionable research conduct (p. 437).

While competition is supposed to promote innovation and productivity by evolving a marketplace of ideas that operates in a fair and just manner, Anderson remarked that:

> None of the focus-group participants made reference to positive effects of competition on their work…the scientists referred to competition as a constant and negative force that interferes with the way science is done …The present analysis suggests that those who fund, manage and regulate the enterprise have underestimated the extent to which competitive pressures on scientists induce behaviors that can only be described as perverse, counter-normative and counter-productive (pp. 458-459).

Other researchers have empirically observed a strong, positive relationship between the perceived level of competition in an environment such as the one described above and the likelihood that associated personnel will observe some kind of misconduct.[6] As one of Anderson's focus group participants put it:

> I think part of the problem today is it's so much more competitive than it used to be. When we were first starting out, it was more collegial. You gave reagents away freely. Now there's more at stake. There's patents at stake. There is getting yourself funded. They make it so difficult to get grant money these days. And all this stuff is coming into play. And people are more secretive. People are doing things like that more, to chop their competitors, to get a leg up on them. And it's, in a way, almost being forced to do it. Because it's just, it's too competitive. Especially if you're in a hot field. It's extremely competitive (p. 443).

One would hate to think that the saboteur in the above scenario simply acted out of malice, thinking that the sabotage was a great idea. But stories of purely malicious or patently unfair behaviors among members of the scientific community are endless, perhaps beginning at the undergraduate level with stories about stealing the "curve-wrecker's" notebook in organic chemistry. Anderson remarks about how scientific competition has come to resemble the "tournament" metaphor, where a win promises to bring great dividends to the victor, even though his or her *margin* of victory might be extremely small. Thus, gold-medal winners in the Olympic games might go on to have multi-million dollar careers even though second-place finishers (whom no one remembers) might have lost by a few hundredths of a second. Thus, whatever results in an even modest advantage might be seriously considered, such that the less scrupulous might cave in to the temptation to augment their chances illicitly.

What we have in the dilemma above is an open floor plan, different personalities with (likely) varying levels of moral integrity, very possibly an intensely competitive environment that puts people on guard and that heightens anxiety and suspicion, the distinct possibility of unintentional errors, and the realization that, ultimately, there aren't enough good jobs in scientific research to go around. Thus, it is small wonder as Anderson remarked—and recalling Berwick's observation on systems delivering products they are perfectly designed to deliver—that "researchers [might] respond with self-protective and self-promoting behaviors."(p. 459)

Could one reduce the cut-throat nature of the open floor plan with coffee hours, opportunities for social interactions, open academic exchanges, and journal clubs"? Might ethics training conducted by authority figures that specifically addresses these kinds of vicious behaviors be helpful? Possibly, although sociopaths or the vengeful will likely not be deterred.

Which brings up the uncomfortable question of how to deal with this situation. Obviously, the University's office of research compliance (or some facsimile) would need to

conduct an investigation and advise the lab on proceeding. The open floor plan might need to be revamped and adequate security and training measures undertaken to prevent future instances of contaminations. Should the culprit(s) ever be identified, they would almost certainly face expulsion from the University. The University might also notify whatever professional organizations to which the culprit(s) belong of their malfeasance.

But if Anderson's 2007 publication has accurately picked up the implications of competition from Berwick's 1996 observation that "Every system is perfectly designed to achieve the results it achieves," then one might contend that the root cause of this dilemma will go unaddressed. Until the hypercompetitive forces of sciences are lessened at least to the point where investigators would not consider this kind of behavior, gross scientific misconduct will probably continue. Let us only hope that it will be relatively rare.

References:


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3. Reason J. *Managing the Risks of Organizational Accidents*. Aldershot, UK: Ashgate, 1997:205-221; also see Green M. Nursing error and human nature. *Journal of Nursing Law*, 2004;9(4):37-44.

4. See, for example, Dwyer, J. Primum non tacere: an ethics of speaking up. *Hastings Center Report*, 1994;24(1):13-18; Maxfield D, Grenny J, Patterson K, et al. Silence kills: The seven crucial conversations for healthcare. *VitalSmarts.* Available at http://www.aacn.org/WD/Practice/Docs/PublicPolicy/SilenceKills.pdf.

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