Questionable Research Practices

Simon Kolstoe

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Defining the spectrum of Questionable Research Practices (QRPs)

Research is a human activity, and as such, researchers will make mistakes when they conduct experiments, analyse data, and report results. As most funding, jobs, and prestige (through publishing research results etc) is based on competition, there is also the chance that researchers may try to cheat the system (or at least not be as thorough as possible) to gain an advantage. Unfortunately, the historical emphasis on the robustness of the "research method", and the objectivity of science in particular, sometimes obscures these very human frailties.

Research misconduct is most commonly defined as manipulating data (falsification), making up data (fabrication), and stealing words/ideas/data (plagiarism). But this narrow definition obscures a far broader range of **Questionable Research Practices (QRPs)** that can just as effectively lead to untrustworthy results and undermine the entire purpose of research.

Rather than distinguish between research misconduct and QRPs, with the implication that QRPs are less serious, it is more helpful to consider QRPs as a **spectrum of behaviours** (see Figure 1), ranging from honest errors and mistakes at one end, through to more serious behaviours at the other. Doing so is helpful as it shows that QRPs are not just about a small number of people behaving dishonestly. Instead, everyone involved in research may at times engage in QRPs, and thus it is up to everyone involved in research to recognise and address the problem in their own, as well as others' research.

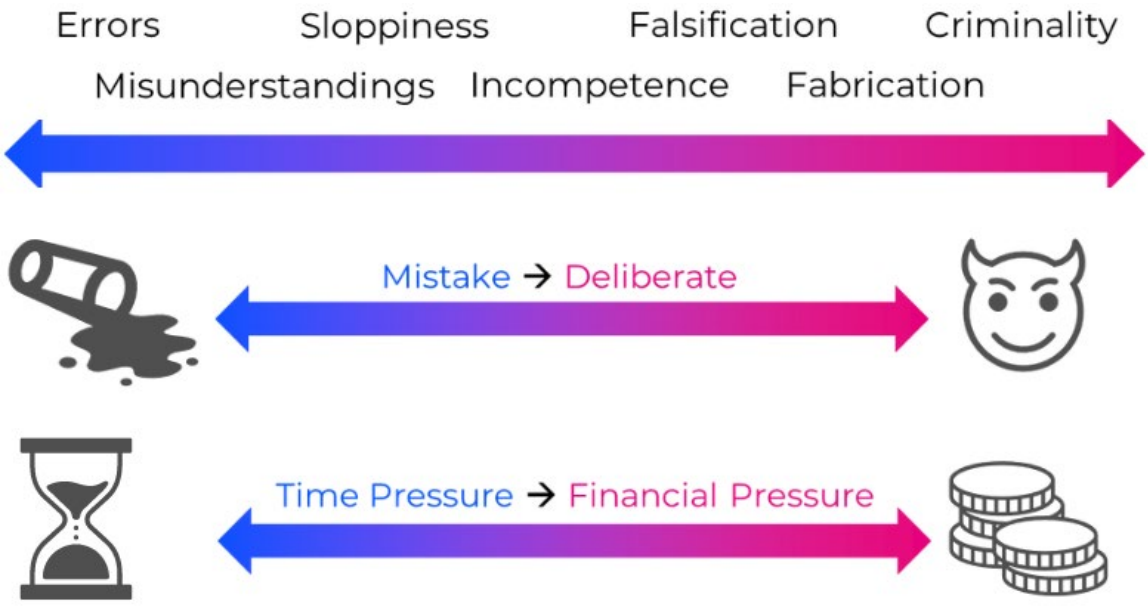

Figure 1: The spectrum of questionable research practices

Viewing QRPs as a spectrum shows how **"innocent" behaviours**, perhaps initially to the left of the spectrum, can lead to the far more serious QRPs on the right of the spectrum. For instance, sometimes the sum of minor infringements can lead to researchers trying to cover up their mistakes and thus moving from the realms of sloppiness into misconduct, fraud, or even criminality.

Viewing QRPs as a spectrum also helps suggest the types of safeguards that can be used to minimise the effects of QRPs on research. For instance, if it is accepted that **errors, misunderstandings, sloppiness**, and even **incompetence** are possible in most research, the importance of taking time to follow strict methodologies, learn how to use accepted statistical tests, or follow reporting guidelines, can be seen more clearly. Likewise, it justifies the effort needed to ensure that data is made open and transparent so that others can try to reproduce (or even replicate) the results. Conversely, if people are intentionally committing QRPs towards the right of the spectrum, the solution is not better methodology, but rather governance processes, laws, and sometimes even strict penalties to discourage such dishonest behaviour.

The spectrum can also be helpful when considering the cause of QRPs. If researchers are rushed for time they may be more likely to make honest errors, and thus need to pay careful attention to their methodology, and record keeping, to ensure mistakes are not made. However, if researchers are under financial pressure there is an increased likelihood that they may conduct more serious QRPs, and thus both they and the people they are working with need to remain more alert to these pressures.

The difference between QRPs and legitimate disagreement

As a very complex activity, it is not uncommon for people to also disagree with each other about research. In fact, the process of working through disagreement is a distinct strength of the wider academic and research process. The importance of legitimate disagreement is even explicitly recognised in historical discussions especially concerning the Philosophy of Science, although disagreement is equally a part of other disciplines as well.

Disagreements about data and its analysis are therefore not only common, but to be expected. The cause is due to different perspectives, contexts or even reagents, and must be worked through as part of a healthy discourse. Part of the reason why *Peer Review* exists is precisely to further this type of discussion at various stages throughout the research cycle. Similarly robust discussions at conferences, in journals, and through correspondence makes up an important part of research culture.

However, such discussions cross over into QRPs when researchers refuse to accept that they can make mistakes and try to cover them up out of fear for their reputation. However, if reputation matters, the opposite is in fact true. Humility is a key virtue for any researcher and the best way to build respect and hence a reputation is to prove that you are open to consider different viewpoints and engage in constructive discussion. As a consequence how we react to our colleagues if they point out errors or mistakes is far more important than the fact that the error occurred in the first place. All of us inevitably inhabit part of the left section of the QRP spectrum, but the key is not to move further to the right by covering up mistakes.

It is also worth mentioning that none of us should be quick to accuse others of QRPs when we do not agree with them. The subjects and topics of research are so complex that legitimate misunderstandings are far more likely than QRPs. Furthermore, some topics may be open to multiple and conflicting positions. The fact that different researchers hold conflicting positions does not mean that one party is necessarily guilty of QRPs. We need to acknowledge differences and deal with them constructively rather than try to bully others into accepting our favoured point of view. Indeed, it should be noted that bullying is definitely further to the right of the QRP spectrum compared to either mistakes or misunderstandings.

Understanding QRPs as a spectrum reminds us that everyone needs to stay alert if we want to ensure we are conducting, and facilitating, the best quality research.

Addressing QRPS is not about policing a minority of researchers behaving badly, but instead is a central part of our identity as a community seeking to create, and promote, a culture of research integrity.

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