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Text

Facing the music … and the science: Expertise opportunities and obligations during interdisciplinary work

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By Professor Roger T. Dean

As a musician and researcher, I recognise interdisciplinarity as virtually ubiquitous amongst creative and research fields, in spite of inevitable resistance from some. Its purpose is generally to foster innovation, which depends on the extension of possibilities beyond the familiar. Hybridisation between disparate sets of ideas is one of the most powerful approaches, and fundamental to Fauconnier and Turner's idea of "conceptual blending". But equally important is the co-harnessing of distinct extra-disciplinary processes and methods. The current huge advances in computational power and analytical approaches are just two of many pointers to the possible benefits of using such techniques. Thus, the discipline of machine learning (ML), far removed from artistic creation, can not only imitate Mozart, but also develop innovative turns in Go, or in visual and sonic arts.

So how does interdisciplinarity generally operate? First, consider that even within science, interdisciplinarity rules: for example, most medical research is published by teams of six to a dozen people, each with their own specialist contribution (molecular biology, cell biology, electron microscopy, mass spectroscopy …). In the arts, there have always been collaborations of visual and sonic artists, but now we commonly seek out mathematicians, biologists, or AI people, to further our imaginative purposes.

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The benefits in terms of diversity of output are obvious. But what new opportunities and obligations for an individual artist or researcher does this bring? I want to argue that these form a continuum down which we need to travel some way to optimise the process. In my own case, with backgrounds in both biochemistry and cognitive science, as well as music composition and improvisation, cultivating and interacting multiple "mind-sets" has been the norm. But for an artist-researcher newly using, for example, quantitative social network analysis, how (far) is it necessary to proceed, having sought out an amenable expert collaborator?

When making art, we may think we can leave the other discipline to our new collaborator, because we and they will make judgements about artistic effect that depend little on their special expertise. But when doing research, that view would be dangerous, as we need to be confident of the quality of the methods used before submitting it to academic review.

As the *Authorship Guide* (NHMRC, ARC, UA 2019) says: "An author is responsible for ensuring the accuracy and integrity of their direct contribution to the research output … Authors are also responsible for taking reasonable steps to ensure the accuracy and integrity of the contributions of all other co-authors. This means that authors should, where feasible, be able to identify which co-authors are responsible for specific … parts of the work and that they should raise any concerns about the accuracy and integrity of the research before submission … This may require consideration of the underlying data and methodology" I would write "must require".

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As a scientist, in the early part of my career I believed that I needed first-hand experience and competence in every method and analysis used in a paper of which I was part. But with teams up to a dozen, and hugely increased methodological diversity, this became impossible and guides such as just quoted had instead to formulate responsible but still practicable paths. My own current version of these obligations is to seek technical awareness of every approach used that is sufficient to allow querying the team expert far enough to be confident of "accuracy and integrity", and still more important for me, also of the aptness of the technology for the intended purpose.

Can we take a similar approach as artist-researchers? I argue we can and should. This does not necessarily mean that each of us learns, for example, how to run machine learning models (as I currently do as a music-making project) before engaging an ML expert, though we can choose to on occasion. It means rather that we grapple with the principles and limitations of ML until able to evaluate how appropriate the approach is for our purpose, and where it may mislead (all ML is biased by the data it uses, unless that data could ever become literally comprehensive). In some artistic circumstances we may want not only new directions, but also even "misleading" interpretations, because of their innovative implications, whereas within research intents this latter might be less likely. It is the possibility of being "mislead" into fundamental new perspectives, to new artistic ideas, that indicates that we should acquire at least technical awareness of the complementary field. Because it is probably only by working towards a significant degree of understanding of the complementary disciplines we are adding to our project, that we and our collaborators will get the most out of them and of each other, including being productively mislead.

References

Authorship: A guide supporting the *Australian Code for the Responsible Conduct of Research*. (2019) pp. 10. National Health and Medical Research Council, Australian Research Council and Universities Australia. Commonwealth of Australia, Canberra.

Roger Dean, FAHA, is a composer/improviser, and since 2007 a research professor in music cognition and computation at the MARCS Institute, Western Sydney University. He founded and directs the ensemble austraLYSIS, which has performed in 30 countries. He has performed as bassist and pianist in contexts from the Academy of Ancient Music and the Australian Chamber Orchestra, to the London Sinfonietta and the Hoarded Dreams Jazz Orchestra. His improvising collaborations range amongst Ted Curson, Derek Bailey, Evan Parker, Sandy Evans and Oren Ambarchi. His creative work is on 50 commercial audio cds, and in many digital intermedia and installation pieces, including as co-author of *novelling*, the international Robert Coover Award winner in 2018. His 400 substantive research publications include 8 humanities books. During 18 years as a CEO, he was foundation director of the Heart Research Institute, Sydney, researching in biochemistry, and then Vice-Chancellor of the University of Canberra.

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