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### Citation for published version

Sleigh, Charlotte and Craske, Sarah and Park, Simon (2019) Lowering the tone in Art and Science collaboration: An analysis from Science and Technology Studies. *Journal of Science & Popular Culture*, 2 (1). pp. 37-51. ISSN 2059-9072.

### DOI

[https://doi.org/10.1386/jspc.2.1.37\\_1](https://doi.org/10.1386/jspc.2.1.37_1)

### Link to record in KAR

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# Lowering the tone in art and science collaboration: An analysis from science and technology studies

## ABSTRACT

*This article analyses a collaborative project in art and science (A&S) from a science and technology studies (STS) perspective. In so doing, it reorientates discussion of the affinity between these two disciplines away from abstract epistemology and towards pragmatic questions in the areas of expertise, credit, space, institutions and money.*

## INTRODUCTION

The AHRC-funded project 'Metamorphoses' (Craske et al. 2014–17) consisted of research on two levels. At the first level, an artist (Craske) and scientist (Park) worked together to create a new transdiscipline, 'Biological Hermeneutics', by

## KEYWORDS

SciArt  
art and science  
science and technology  
studies  
expertise  
credit  
space  
institutions  
money

1. A&S was introduced as an alternative to the often-used but problematic 'SciArt' in Sleigh and Craske (2017a).
2. A noteworthy exception to this rule is the collection *Picturing Science, Producing Art*, which, rather than seeking diachronic epistemological characterization of the two fields, asserts that 'art, science, and the hermeneutical concepts that we bring to them are historically and culturally embedded' (Galison and Jones 2014: 3).

collaboratively reading and interpreting the microbiological detritus that had gathered on a 300-year-old copy of Ovid's *Metamorphoses*. At the second level, a science and technology studies (STS) scholar (Sleigh) observed their collaboration. This involvement of an STS scholar as an observer-participant is, to the best of our knowledge, unique; to date there has been little or no scrutiny of the interrelation of art and science (A&S) from the external perspective of this discipline (a 'third culture', perhaps).

This article focuses entirely upon the second of the project's research questions. Instead of analysing questions of epistemology or method, such as the AHRC suggests in the framework under which funding was awarded (2013), it considers the practical, mundane and sometimes fraught or embarrassing interactions between the people and institutions that are involved when art meets science.

Most conversations about A&S<sup>1</sup> are painfully polite. In an earlier article we critically discuss the recent history of A&S, reviewing its place in the literature on art history and theory (Sleigh and Craske 2017a). There, we highlight the political elements of such apparently innocuous terms as 'creativity' and 'curiosity' that are conventionally used to pivot between the two fields, characterizing the discourse of much A&S scholarship as 'epistemology lite'.<sup>2</sup> Here, we venture into practical terrain – an area tacitly seen by scholars not to be a proper subject for research discussion. It is a rarity to have such an honest conversation as we have been able to have, and, by virtue of their frank nature, some of the exchanges that we report in this article are not possible to attribute, even where the sources are known (cf. Callard and Fitzgerald 2015: 23). However, if they are not treated initially in this form, the issues they raise can never move on to more rigorous and formal assessment.

STS routinely asks pragmatic questions of science as a discipline in its own right. Steven Shapin, in the subtitle of his book *Never Pure* (2010), insists on talking about science 'as if it was produced by people with bodies, situated in time, space, culture, and society, and struggling for credibility and authority'. With theatrical chagrin, he regrets that such confronting issues may result in 'lowering the tone' of the history of science (Shapin 2010: 1). What is good for science is good for its entanglements with art; we too 'lower the tone'. The consideration of such issues as Shapin raises is intellectually valid in its own right and of potential practical benefit for future art/science collaborations.

We highlight five themes: expertise, credit, space, institutions and money. In each case, a brief outline of key STS perspectives is given, followed by a discussion of how the issue impacted upon our own collaborative working. Our own experiences are supplemented occasionally by perspectives of other artists working with science, in their responses to a survey about collaboration that was also undertaken as a part of the research (Sleigh and Craske 2017a).

## 1. EXPERTISE

Who has the right to critique science? The generally accepted answer is that it is those who are involved in the same peer-review network as the researcher in question – in a word, experts. STS scholars have studied the social processes of acquiring expertise in many contexts (Arapostathis and Gooday 2013; Gooday 2007; Leggett 2014). Expert participation in science is restricted to those who have passed through obligatory passage points such as completion of a Ph.D., obtaining connection with respected research teams, and so on. In other contexts, there is greater ambiguity: in the public realm, a bachelor's

degree may be enough to qualify somebody as a 'scientist' or at least an expert; additionally, 'citizen science' bequeaths the title to amateurs, whilst biohackers seize it for themselves without permission.<sup>3</sup> Outside of STS, it is commonly understood that expertise is rooted in a historic trajectory possessed by science. Scientists, it is thought, succeed in unravelling some problems and leave others behind for their successors to follow on and resolve.

There is far less public understanding concerning the process of art. For whatever reason, art, at least in its public presentation, does not make explicit (that is, does not make explicit in words)<sup>4</sup> to what past artistic questions it responds. Who has the right to critique art? Apparently, everyone. One reason for this has to do with the profound asymmetry between A&S in public – between the gallery and the science museum. When we see science on display at science museums and expos there is a great deal of explanatory information: panels tell us the principles we see on display. Often, audiences read the panel first, then press the button to see the theory demonstrated. The encounter is highly mediated with the processes and raw results of science rarely shown, such that the learning outcomes are often predetermined (Hein 2002; Hooper-Greenhill 1999). Art is different. The question of how much to label in galleries is often under debate in the art world (Pekarik 2004; Émond 2016), but in general it is fair to say that art in galleries is generally presented with less explanation than science is in museums. The audience meets the art in a raw and mostly unmediated encounter. They are not told the answers, but left to figure them out for themselves; indeed, they are left to figure out the questions, and the research that underpins a work of art.

These asymmetries in expertise as it is enacted in the public eye are perhaps the most contentious point of conflict in A&S. Though politeness reigns in joint presentations at conferences and in A&S research papers, one does not have to go too far to find considerably more suspicious attitudes about the legitimacy of artistic 'expertise' from scientists, or from the other side, about the ability of scientists to understand artistic research programmes.

Collins and Evans (2008: 14) have developed a 'periodic table' of different kinds of expertise, which may help to characterize more precisely the nature of scientists' and artists' participation in their respective complementary spheres. One major set within Collins and Evans' table is specialist expertises: effectively a progression of types from superficial 'beer mat' knowledge of a field to full participation in practice. Crudely, it is the expertise to *do*. The naïve belief is that it is harder for artists to acquire specialist expertise in the field of science than vice versa – that the information required to muster specialist expertise in science is uniquely complex and difficult. However, the surprise according to Collins and Evans is that the second-highest level of specialist expertise – interactional expertise, an ability to pass amongst experts – can, in their view, be acquired by outsiders who undergo 'linguistic' immersion in the field. Understood thus, it is difficult to judge who has the greater chance of passing in their complementary sphere. Neither artists nor scientists are, by training, consciously alert to linguistics, *per se*. What, precisely, is meant by 'linguistic' in each of these fields? Meanwhile, we suspect that a greater proportion of specialist knowledge is tacit in art than it is in science. Additionally, artists' mid to long-term placements in laboratories are becoming commonplace, potentially yielding the acquisition of interactional expertise, whereas the reverse process rarely occurs.

Collins and Evans propose a second major set of expertises: meta-expertises, which are the ways in which we assess experts. Basically, this is the expertise

3. Craske's experience with biohackers has been that they are often trained scientists who reject the institutionalization of their discipline, and that their research can subsequently be subsumed by industry.
4. Writing may be regarded as a third culture, the most familiar medium without which neither visual artists nor scientists could present or even fund their work. Yet neither – with some notable exceptions – is at home in it.

5. Park credited Roger Hiorns' work as inspiration: see <https://www.artangel.org.uk/project/seizure/>.

to *judge*. At the more sophisticated end of this set are 'transmuted expertises', which use social discrimination to produce technical discrimination. If we know that someone's reputation is good we are inclined to trust their results even though knowledge of the actual content of the work is a necessary precondition for this judgement. Artists are arguably even more likely than scientists to object to the notion that reputation colours their view of fellow-practitioners' work. The opportunity for outsiders to exercise meta-expertise comes via what Collins and Evans call 'technical connoisseurship', the recognition and appreciation of skilful practice acquired through interactional expertise. Connoisseurship is a loaded word, suggesting more naturally the judgement of art than of science; there is, moreover, a particular asymmetry in A&S whereby scientists can attempt to exercise this meta-expertise without having first acquired the necessary interactional expertise in an artist's studio.

The following episode from the project highlights how the problem of expertise was made manifest for us when Park attempted full participatory expertise, and Craske resisted acknowledging it as such. Craske decided to subject an item of Park's unrelated artistic output – photographs of bees coated in copper sulphate crystals (Park 2013a, 2013b) – to a research-based critique. She prefaced this by explaining that such critique was an obligatory rite of passage for art students, noting that most of them 'end up crying'. It was notable that the occasion Craske chose for this critique was a moment of high emotion, Park having – as she saw it – 'broken the rules' of the project by unilaterally developing the work without waiting for Craske's disciplinary input. Craske pushed Park on the meaning of the bees piece and how he had arrived at the point of making it. His answers were initially autobiographical,<sup>5</sup> but eventually he constructed a narrative about chemical poisoning and its threat to the bee population. Neither was quite happy with this story (for one thing, copper sulphate is not an insecticide) but, more significantly, Craske wanted the meaning to precede the piece:

If you do something and you present it and you add meaning to it after, that's not good enough. Because you have to check that your audience is going to get the meaning from the work [...] In the same way that you have to justify what you're doing and why you're doing it so that when you publish your paper it's all traceable, it's exactly the same process.

Although he was interested in making art, Park was almost more committed to engage in meta-expertise within the sphere, that is, to have the opportunity to judge it. He became involved in a number of social media exchanges with artists during the course of the project, some of them intense. These revolved around the question of whether a scientist could participate as an equal in the world of art – whether a scientist could call themselves an artist. One artist wrote: 'some scientists create objects and images that they declare to be art, when they are plainly not'. Park posted links to his work on professional artists' Facebook pages and solicited their responses, explicitly probing, in some cases, why his work did not 'count'. A conversation with a different artist yielded the following exchange:

Park: I've seen artists present technical images taken by scientists at a number of venues as art, so how does one image suddenly become art, whilst the other isn't. When does science become art, and when does art become science?

Artist: For that [to be considered an artist] Simon Park you might want to go to art school. I can tell you that in my view art can never become science. The same way that I'll never call myself a scientist, while it seems that some scientists feel that they can call themselves artists.

At one point Park resolved the generally painful ambiguity about his non-admission to the art world by calling himself an 'outsider artist'. Later he came to state: 'I reluctantly call myself an artist, and only began to do so when many of the artists I work with suggested that I am'. Yet reward for this recognition comes from the world of science, not art. Park finds, to his surprise, that his forays into art have been warmly received by his scientific colleagues. In this regard he has become a sought-after speaker and has won a major award.

Clearly there is a lot of personal worth at stake for scientists in aspiring to participation in art, in a way that is not symmetrically thinkable for artists. The exclusion here sometimes comes even at a lower level, preventing learning never mind participation. Thus Craske notes that when she asks for copies of scientific papers from her collaborators, she is rarely sent them and certainly not quickly: 'As if they will not be relevant to my thinking. A kind of edit for me before I have had a chance to make that decision myself'.

The point about the research basis of art, and its lack of comprehension by scientists, was made by one of the respondents to our survey:

What is repeatedly not understood by scientists [...] is that artists have systematic methodologies in the same way that scientists do. [...] Unfortunately we're still coloured by a cultural fantasy that artists are about free-for-all expression that involves the release of personal burdens onto the canvas.

(Sleigh and Craske 2017b: n. pag.)

This comment is also noteworthy in that the artist does take for granted that scientists have a systematic methodology. In our project, it was the artist who had greater excitement, and with it a greater anxiety, at the prospect of being able to pass in the complementary sphere. By contrast, as we have here noted, scientists involved in A&S may hold the prospect of exercising meta-expertise (judgement) more strongly than do artists. The model of Collins and Evans is of great potential to studies in A&S and deserves further investigation to see how well it can capture the dynamics of expertise that are in play in an inter – or transdisciplinary field. What emerges most strongly from this sometimes unpleasant state of affairs vis-à-vis expertise is a lack of explicit discussion about the relationship that critique bears to practice. One point on which Park and Craske as well as others whom we encountered on this project agree is that their professional practice is based on a usually unseen bedrock of critical understanding of their field. Yet their inability to perceive this consciously in relation to the complementary field led to bafflement and even anger when they were excluded from it. In order to have a mutually respectful and collaborative expertise relationship between science and art, both sides need to have a deeper understanding of the role of criticism within each sphere. The current emphasis on research outcomes and impact, without mention of critique, creates an inaccurate view of what is going on in each sphere and how to participate: as though the research-output top of the iceberg were all that existed, without the nine-tenths of critique that lurks below the waterline.

## 2. CREDIT

Sociologist Robert Merton struck a chord with scientists worldwide when he articulated 'communism' as a norm of scientific activity, meaning that no individual owns any given knowledge. This norm is still strongly supported by scientists (Macfarlane and Cheng 2008). Perhaps as a result of this, it is now customary to list everyone who has contributed to the research, in whatever small way, as author of a scientific paper. However, controversy still surrounds the practice of how the hierarchy of authors is established, and what the effects of this are in terms of perpetuating success for the already-successful (Gross et al 2002; King 2012; Plume and van Wiejen 2014).

Since Merton's time, credit has become a topic of extremely well-established importance in STS. STS scholars have pushed the boundaries of the question beyond scientists to include technicians. Shapin's (1989) notion of the 'invisible technician' perfectly captures the issue. In this and other pieces of writing, Shapin explores how the so-called scientific revolution was not the product of only one or two lone 'greats' but depended utterly on the technical contributions of participants who – but for people like Shapin – are now lost to history. Today, technicians are still far more often thanked or acknowledged in published papers than they are included as authors. Nevertheless, Park asserts that 'science is inherently more collaborative than the arts in the sense of credit, and the process of authorship on scientific papers is essentially automatic'.

Art too has its own history and set of current norms regarding credit. The lone genius model, which STS scholars have worked so hard to dispel in public perceptions of science, infects art no less. This is revealed in controversies that periodically erupt, such as the one in 2012 where people, most especially buyers, were 'furious' when they 'discovered' the openly acknowledged fact that Damien Hirst's spot paintings were made by his assistants (Willet 2013). What had seemed to guarantee the value of the art – that it contained the aura of the artist's own touch – had been taken away. For an artist, such stories come as no surprise. Artists, like scientists, have for centuries had assistants and technicians. Craske financially sustains her own practice through fine art fabrication including bronze casting, and project management for better-known artists, almost always without credit. This is completely normal practice. Craske 'know[s] [her] place' in these commissions, respecting the idea or concept is not hers and understanding that her role is merely to help realize it. It may well be easier to maintain this humility in the context of knowing that she has her own conceptual practice whereas a lab technician does not have the same 'other life'. Craske is, however, reluctant to name the artists for whom she has worked, stating instead: 'I respect how they want to portray their practice'. She adds: 'They should have control over their persona'. This statement acknowledges a subtler version of the Hirst-shock perspective: that the made artwork does not have complete autonomy, but always appears in the context of the artist's constructed identity.

Within art colleges, different courses have their own studios with dedicated academic directors. Other studios or workshops are dedicated to technical areas that cut across more than one course, and are run more autonomously by technicians. Historically, art technicians have often been practitioners in their own right, even though they were placed at the lower end of an academic/technician hierarchy within their institutions of employment. Today, there is an increased respect for technical skills although the pay gap with academic



artists still exists. Some independent studios are currently moving towards a more technician-friendly mode of practice, badged as 'transdisciplinary' (Coles 2012). One exemplar is the studio of Danish Icelandic artist Olafur Eliasson whose team of 90 people ranges from craftspeople and specialized technicians to cooks and administrators (n.d.). On the one hand the complete list of people given on his website is impressively full in its attribution of credit – like the endless final-rolling credits on a film; on the other hand, by putting the whole lot under his name it bolsters Eliasson's status still further. There is no winning on the score of artistic humility.

Coming from an art background, Craske found the laboratory a surprising space in that it is not a universal resource like the art workshop. Moreover, she noticed (echoing Shapin), 'the technicians are much more hidden [...] when walking into the equipment areas I didn't meet a technician, just the scientists who ultimately used the equipment'. Not only were technicians not in charge of the space, even their maintenance activities were largely invisible.

In A&S scientists are, potentially, reduced to the role of technicians in the creation of art. The alternatives are apparently two-fold: either that the artist contributes to a scientific outcome, an ideal that is hard to reach, or that the artist becomes a disseminator of the scientific work. Park agrees, stating that the expertise brought to A&S by scientists can be limited to technical knowledge and a familiarity with health and safety or other legal regulations. Scientists can deal with this unexpected demotion either by treating the artist as a client, somewhat in the manner that artists serve as technicians for their famous clients, or by aspiring to full creative partnership – something which we have seen in the previous section to be extremely problematic.

Park states that he has frequently met artists who are concerned about having their 'processes' stolen, but has more often seen the crime go the other way. Giving examples from his own practice he cites a conversation with a colleague in which both noted that they 'meet and spend time with many artists, and for the most part never hear from them again'. In 90 per cent of cases it is felt that the artist's final work is not shown to the scientist, and that in 50 per cent of cases (of four to five e-mails per week) no thanks is forthcoming for help or advice. Park's colleague reports feeling 'bled dry' by these interactions. Such queries are only likely to increase as A&S gains in prominence. From the other side of the fence, it may be that artists are too shy to keep bothering the scientist or too wary of presuming on their time. Nevertheless, the absence of a thank you is difficult to explain or condone.

The question of credit was a fraught issue in the 'Metamorphoses' project. Interim display of work from the project as a part of the exhibition *Unfolding Realities* brought the matter to a head. Having become aware that there were different norms of credit within science, Craske consulted extensively with Sleigh and Park over the text-panels that were a part of the installation to make sure that they were happy with their prominence within them. The inclusion of their names raised eyebrows at the gallery. Worse yet, the media interest generated by the show resulted in an online story that re-excluded them. This generated another social-media storm with Park objecting strongly and the gallery once again indicating its dismay. After the event, the team agreed on three conclusions. First, credit-attribution systems are artificial: there's nothing particularly right or wrong about either art or science's approach, though all of us, even Craske, appreciated the more generous (at least in its theory, if not practice) scientific system. However, Craske was wary lest acknowledging technicians' input 'will increase the potential of the point of art to be



6. Craske held that to use sheep's or horses' blood, as per scientific protocol, would import uncontrollable semiotics to the project. To use her own blood was a way of trying to control the material narrative, though as she discovered, this was the element of the project that was foregrounded in a good deal of its media coverage.

misunderstood'. Moreover, she asserted that the labels were themselves 'part of the artwork'. Second, curators and galleries are actually less attuned to the subtleties of professional politesse in this area than are practitioners in their individual working relationships. And third, as in popular histories of science, media professionals take short cuts and name the 'lone genius' whenever they can. In short word-count pieces, the pressure is entirely understandable.

### 3. SPACE

Since the 1990s, history of science has taken a 'spatial turn' (Agar and Smith 1998; Finnegan 2008). Historians writing in this mode have noted the importance of different spaces in shaping the kind of work that can be done in them. A space is different from a place: a place is a brute geographical location, whereas a space can denote a place or range of places governed by shared norms and behaviours that shape the kinds of knowledge and practice emerging from them. Within the recent history of science, the laboratory has become the single most important space to govern and legitimate science (Gooday and Fox 2005). The hierarchy of seniority is articulated through the positioning, quantity and quality of space owned by different researchers with relationships of seniority and tutelage developed in relation to the division of lab-based labour (Otis 2007). Precision techniques are generated as the guarantor of exact science and recreated in imitative spaces around the world, where the behaviours must be replicated just as much as the equipment (Collins 1992).

In 'Metamorphoses', we discovered that some procedures we had anticipated performing in the lab turned out to be unacceptable activities in that space. Health and safety exerts itself differently in each space, highlighting how science is actually more governed by these considerations than is acknowledged in formal scholarship. As a result of the prohibition on carrying certain items from one space to the other, Craske found that the lab and studio became 'detached'.

One particular example concerned the use of blood. For conceptual reasons, Craske wanted to culture bacteria from the book on human blood.<sup>6</sup> However, human blood is not normally used in laboratory agar. Experiments might inadvertently show up abnormality in the donor's blood, information which might then have to be conveyed to the (unsuspecting) donor. Moreover, human blood can carry viruses that could be transmitted to the experimenter. As a result, these experiments had to be conducted in her studio, an undisciplined space where rules may be broken so long as they are not legal ones. Park perceived that his and Craske's experiments were therefore 'not scientific'. Because human blood is not commonly used in experiments, its quirks are not understood. It would be like using a home-made thermometer; no experiment based upon it can be published. This, of course, is circular: human blood is not scientific because it cannot be used in science. This is an unusually clear instance of social concerns – ethics and safety – being embedded in an apparently epistemological state of affairs. The desire of funding agencies to have 'scientific' outputs from A&S projects swings the default space of such research towards the laboratory.

Interestingly, Craske discovered that in some less-developed countries human blood *is* commonly used as a substrate for bacterial growth (Russell et al. 2006). Presumably this is because the industrialized chains of supply for animal blood are not easily or affordably present. Thus the undisciplined space

of the artist's studio has some unintentional similarity with science outside of the developed world.

7. For one experiment in institutionalizing A&S, see Davies et al. (2015).

#### 4. INSTITUTIONS

Institutions, for STS scholars, are organizations of pivotal importance for science where 'definitions, relationships, values and goals are negotiated' (Gieryn 1988: 588). These negotiated outcomes in turn, and in circular fashion, inflect the science that is made there (Pyenson and Sheets-Pyenson 1999). Given that in the United Kingdom the AHRC and Wellcome Trust have been the primary funders of A&S, universities have generally formed the institutional space where A&S meets, reshaping the enterprise accordingly.<sup>7</sup> Scientists involved in funded A&S are thus more likely than not to be employed in an academic institution, whereas artists very rarely are, being primarily self-employed.

The history of institutionalization is closely connected with the history of professionalization. Historians of science do not, presently, tend to write teleological narratives of movement towards professional status. Nevertheless, the twentieth century reveals a pattern of profession definition at work: first through state sponsorship of science (thanks in large part to the demands of world warfare); and second through its institutionalization in the space of an expanded university system (Leggett and Sleight 2016). These changes brought with them various institutionalizing features to the profession: a defined career path premised upon the acquisition of a Ph.D., salaries, employment rights, and bureaucratized modes of working. Notwithstanding various debates, funding for university research came from government at one remove. Scientists were by and large exempted from having to explain or defend their research to the taxpayers that ultimately paid for it. Twentieth-century scientists were inheritors, ultimately, of a medieval set of cultural norms related to the clerical-university, whilst funded by states preoccupied by international war. It was, to say the least, an unstable set of values, values that are now beginning to unravel in the face of neo-liberal demands for economic 'value' and populist criticism of expertise.

Art is not recognizably a disciplined profession. For one thing, its practitioners do not pursue doctorates as a part of the career path. In applying for funding for 'Metamorphoses' the case had to be made that Craske was of post-doctoral standing although she has only a bachelor's degree. Craske reported that this raised insecurities on her part about being a 'good enough' researcher; this state of affairs might be interpreted as the long shadow of the clerical-university as home of the intelligentsia. Moreover, Craske, as a non-university employee, had to be contractually involved in the project as a research assistant, not as a researcher in her own right. In reality, she took more than her part in leading on intellectual and creative matters and in managing the project. This was even more concerning for Craske who felt 'like she was put in [her] place' by Research Councils UK (RCUK) institutionalization.

Without institutional status, Craske could not fight so effectively to retain resources either within the project's limited funds or from without. In the hierarchy of payment she was at the bottom. Top came those labs whom we paid for analytic work. These relationships began as pro-bono ones in whole or in part, involving scientists external to the funded project but personally enthusiastic to contribute. As the project went on, some of these scientists went on to jobs elsewhere, leaving others to follow up on the work – people who did

not share a personal commitment to the work. These relationships were transformed into more client-based relationships – more expensive transactions.

One of the respondents to our survey told of spending a whole calendar month filling in a 64-page ethics application, as directed by the host institution's research office, only to be told by another administrator that this was wrong and that they needed to fill in a different, two-page form instead. With remarkable restraint, they described this as 'a fascinating learning experience'. Our own project's equivalent was a probation review form which Human Resources kept insisting we fill in for Craske. The questions simply did not fit her work but answering 'no' to any of them would clearly have been a bad idea. Moreover Craske's contract was so short the review was meaningless and would eat up a week's worth of allocated hours just to fill out. Sleight discovered that an unflinching strategy of deleting e-mails eventually paid off and HR gave up asking.

Institutional tensions, via issues of time and money, eventually came to a flashpoint in a discussion about the apparently unrelated issue of credit. As previously described, Park had expressed on Facebook his disappointment that in a press piece about the award of the prize, he had received no mention. This topic now escaped its apparent bounds in the message sent in reply by Craske:

My biggest challenge has been learning to accept the huge differences in time commitment to the work. Some artists as you are well aware rely on the generosity of scientists to donate time. I have always been uncomfortable with that so to try and balance that I spent weeks working on the funding application and then secured funds to cover 4 hours of your time a week for a year. [...] I soon learnt that due to institutional difficulties that to realise that time from you both was impossible. This was no fault of you or Charlotte, but the pressures that are at play in academia. The impact of that however is that I have had to make up that time myself (and more) to deliver what has been required for the grant. So for over 2 years now I have been working on the project for more than 20 hours a week. Ironically I also got paid far less than you both too (although I appreciate that you didn't directly receive any money and the institution pockets it). With no salary as an artist, for 2 years [includes time of application plus project extension due to sick leave of one researcher] I have been paid 5.5k. Despite this, and the 1000s of hours that I have put into the project at every stage I have included you as an equal partner in the investigative process.

In Sleight's view, Craske's previously suppressed frustration about her unpaid hours erupted in a debate that was supposedly about the attribution of credit. Craske maintains, however, that this frustration was about commitment, not money, noting her prior naiveté about the ability of academics to deliver on the hours they were slated for: 'Simply put, I believe there is too much pressure on university staff to deliver the impossible'.

## **5. MONEY**

Money is not so much the elephant in the room as it is the tables, the chairs, the equipment, the labour, the ceiling, floor and walls. Only if the room is in a zoological institution, might it also be, secondarily, an elephant too. Yet,

strangely enough, very few STS studies take money as their principal question even though it features strongly as a co-incident marker of such issues as power, patronage, authority and so on (Galison and Hevly 1992; Shapin 2009: 209–68).

Money creates considerable strain in the relationship between science and art. Science is expensive, art less so (though not, perhaps, as cheap as funding agencies would like to think). The AHRC Innovation Awards in the Science in Culture theme were capped at £80,000 – an extremely challenging amount with which to conduct any serious scientific research, especially once costs for staff time have been stripped out. Science has been an important theme for the AHRC for some years now, but there is a limit to what can be achieved with this level of funding particularly given the clear imperative for there to be outputs which ‘count’ as science. Meanwhile, laboratory directors may have different priorities for, and different ways of thinking about, the small aliquots of cash that enter their budgets from projects such as ours. A serious misunderstanding arose with a university laboratory which promised to pay a scientist to do particular analyses for us. For whatever reason, as we belatedly discovered, this person was re-directed by their line manager to other tasks which had no relevance to the project. Our money for tasks had become money for time.

If ‘Metamorphoses’ is anything to go by, and there is no particular reason to believe otherwise, more time is spent in A&S, and more e-mails exchanged, discussing the question of money than of anything else. We estimate that about 10 or even 20 per cent of Craske’s allocated time was spent navigating the financial complexities of the project, set up as it was through a university. This obligation came as a surprise to her, as she was used to dealing with larger budgets without difficulty. Craske was surprised by the disinterest that Park and Sleigh exhibited in financial issues, perhaps because they were reliant on research office assistance – ‘trusting the system too much’, in her words (another instance of institutionalization). The result of this was that financial management of the project was effectively, and without discussion, passed to Craske.

The asymmetry of this relationship was compounded by the fact that Craske, as an independently employed person, was the only one in the project who was financially disadvantaged by working more than her allotted hours on the project. Sleigh did not work as many hours on the project as she was allocated. She was supposed to abide by a stipulated scheme minimum of four hours per week, a figure that she had felt from the outset was unrealistic. That being said, as Craske pointed out, Sleigh actually racked up a substantial proportion of these, in effect, in the process of *applying* for the grant. Craske estimates that she spent two to three times as much time on the project as she was paid for. She treats this as a normal feature of life as a commissioned artist, but in the nature of this project the pay was problematic both in quantity and administration. Her lower status as research assistant (because of her lack of a Ph.D.) meant that the assigned hourly rate did not meet the budgeted hourly cost for her own studio. The more she worked for the project, the more the studio lost. The complications of pay through the University entailed several exchanges and two meetings with her accountant to resolve (all at cost of time and money). Finally, she was automatically enrolled to a university pension scheme, and when she un-enrolled herself from this, discovered that the excess pay could not be given to her. As a compromise, the team found a way to vire the excess to other expenses, but this was far from ideal. The

8. The project produced well-attended shows at Central Saint Martins and the Warburg Institute, London, and at Chetham's Library in Manchester; it gained positive coverage in both generalist and specialist media; and it won a MullenLowe NOVA Award.

University of Kent's Research Office was very supportive and helpful and the problems were entirely systemic, so far as we could tell.

## CONCLUSION

The project 'Metamorphoses' was ultimately successful, with all three parties – this article's authors – expressing considerable satisfaction with both the process and the outcomes.<sup>8</sup> However, satisfaction in the former was a result of personal relationships successfully negotiated. The project's high-risk enabling of debate and even dispute yielded resolutions that really meant something. Sociologically, things were less satisfactory. Factors made visible here through STS insight at times were not easy dynamics within which to work, and on occasion actively frustrated progress. All these are worth taking into consideration by funding councils that wish to encourage interdisciplinary work between academics and independently employed practitioners of the creative arts.

In regard to A&S, our tentative recommendations are as follows. In terms of expertise, a more explicit public discourse on the critical component of both scientific and artistic practice may yield an easier and more appropriate grasp of expertise on both sides. Thought must be given to the accreditation of contributors to A&S projects, especially by curators and the media. Universities can play their part in creating respectful yet rigorous spaces both for the exhibition and critical appraisal of A&S. Spatially, funders might be more realistic about what kinds of output (scientific or not) can be generated in what space, so as not to make the game one of science-or-bust. Financially, RCUK and its funnelling institutions – universities – might better remunerate artists' time, and institutionally give more consideration to their status as non-employees. Thanks to outstanding practitioners on both sides, A&S continues to demonstrate its creative and critical potential; however, we can safely infer from STS it doesn't succeed any more easily than does science.

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## SUGGESTED CITATION

- Sleigh, C., Craske, S. and Park, S. (2019), 'Lowering the tone in art and science collaboration: An analysis from science and technology studies', *Journal of Science & Popular Culture*, 2:1, pp. 37–51, doi: [10.1386/jspc.2.1.37\\_1](https://doi.org/10.1386/jspc.2.1.37_1)

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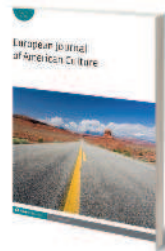
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ISSN 14660407 | Online ISSN 17589118  
3 issues per volume | First published in 2000



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