# The Dynamics of Collaborative Resistance Negotiating the methodological incongruities of art, cultural theory, science and design

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**Abstract**

This paper reflectively explores how the collaborative team behind in potēntia critically and creatively embraces the methodological dialectics that occur when trying to accommodate the different disciplinary approaches of art, cultural theory, science and design. Hosted by SymbioticA – The Centre of Excellence in the Biological Arts, The University of Western Australia, in potēntia is an example of multi-disciplinary collaborative art/science practice pioneered by SymbioticA. Negotiating aesthetics versus accuracy, risk versus rigor, experimentation versus speculation, and problematising versus problem solving, this paper reflexively discusses how cross-disciplinary collaboration, although fraught with friction also presents new and unique opportunities - professionally and personally - for unexpected creative discoveries to emerge.

**Key Words:** collaboration, multi-disciplinary, bio-art, life, death, personhood

## Introduction

Starting from the position that the collaborative dynamics of art, cultural theory, science and design offer fertile grounds to both critique and resist the fetishisation of stem cell technologies, this paper explores how the collaborative team behind in potēntia, critically and creatively embrace the methodological dialectics that occur when trying to accommodate the different disciplinary methods and approaches of art, cultural theory, science and design.

Created by artists Guy Ben-Ary and Kirsten Hudson in collaboration with Mark Lawson and Stuart Hodgetts, in potēntia is a liminal, boundary creature created as an artistic and speculative techno-scientific experiment with disembodied human material, diagnostic biomedicine equipment and a stem cell reprogramming technique called induced pluripotent stem cells

**Figure I *in potentia*. Photo ©: Guy Ben-Ary**

(iPS). Beginning with human foreskin cells purchased from an on-line catalogue, we reprogram these cells into stem cells and then differentiate them into neurons. What results is a functioning neural network or "biological brain" created from human foreskin cells. Encased within a purpose built sculptural incubator reminiscent of eighteenth century scientific paraphernalia, in potēntia also includes a custom-made automated feeding and waste retrieval system as well as DIY electrophysiological recording setup that converts neural activity into an unsettling soundscape.

It is important to note, that the collaborative team behind in potēntia, follow the collaborative structure and philosophy fostered by SymbioticA. Rather than seeing art/science collaboration as one in which art is employed by science as a "legitimate tool to aid scientific research" to "communicate big ideas in an engaging and intuitive manner" [1], SymbioticA - under the direction of Oron Catts – instead positions the role of art as that which critically and openly challenges and critiques new scientific knowledge and application. Rather than seeing art as a tool that simply aids in the engaging visualisation of science knowledge, Catts asserts that artistic research should be "valued for its own merits and its contribution to culture rather than be seen for its potential secondary outcomes of aiding or acting as a research and development arms for other disciplines" [2]. In potēntia thus emerges out of a rich, diverse, collaborative research community, which not only encourages a range of cross-disciplinary collaborative approaches that activate new forms of understanding and critical enquiry, but also encourages better understanding and articulation of cultural ideas around scientific knowledge and informed critique of the ethical and cultural issues surrounding life manipulation. [3].

## Cross-disciplinary Negotiation

"Form versus function is the nightmare of my life" – Guy Ben-Ary

Collaboration, states Karen Pearlman in a recent issue of Arts Hub, is hard to define [4]. This is because although the Latin roots 'con' means with and 'laboro' means work infers simply to 'work with', in the creative industries, 'collaboration' connotes more than simply working side by side. Instead, although collaboration within the creative industries often includes individuals working side by side, it also involves times when individuals work on their own, or in a variety of collaborative configurations inside a larger collaborative team, as well as times when all collaborative members come together to debate and negotiate the needs and direction of a project.

Collaborative projects also occasionally draw upon people who are outside the collaborative team if a particular skill-set is required that falls outside the expertise of the collaborative members. When this happens, there is often much discussion within the collaborative team over whether to introduce a new member into the collaboration, or instead to simply outsource the skills required. This decision is often dependent on whether the expertise required is regarded as intrinsic to the development of the project, or is instead a one-off fabrication or consultancy need. Collaboration then is a complex and highly nuanced emergent form of engagement that raises interesting questions about the

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**Figure II *in potentia*. Image ©: Guy Ben-Ary**

nature of negotiating authorship as well as each collaborator's relationship to the work produced.

Although the original concept behind *in potēntia* was initialised by Guy Ben-Ary, over the course of three years, as the needs of the project increased, the project grew to a collaborative team of four – Guy Ben-Ary, Kirsten Hudson, Stuart Hodgetts and Mark Lawson. Over the course of those three years, others were also sought out to contribute – such as glass blowers, glass manufacturers, steel spinners, DIY electrophysiology experts, amongst others – in order to help in the development of the project. However the core collaborative team felt these particular experts had a different level of investment in the project and therefore they were not seen as fundamental to the conceptual and aesthetic artistic integrity of the final piece and as such, were not invited into the collaboration. Instead, they were paid for their time and expertise.

Within the *in potēntia* project, there were five distinct elements that needed to be developed and negotiated:

1. Biologically reprogramming foreskin cells into stem cells and then differentiating them into a neural network using iPS technology.
2. Developing and designing a bio-reactor or life-support system
3. Developing and designing a custom-made electrophysiology system
4. Developing & designing a sculptural object that was also a functioning tissue culture incubator
5. Developing a critical theoretical, conceptual and social context for the project

Working on these elements individually, in pairs, as well as in a group of three or four, we found that we were negotiating not only the limit of what degree of functionality and protocol could be overlooked or bypassed within each of the elements, but also how individually constructed elements could "work" together, whilst still maintaining an overall aesthetic and conceptual integrity. This meant that sometimes we found ourselves working within a strict set of protocols of a specific discipline and other times flying by the seat of our pants as the limits of our knowledge of our disciplines was stretched. Therefore, whilst we found that we were able to make the individual elements "work" on their own, the main challenge was to "glue" these elements together in such a way that they could "hold" – aesthetically, conceptually, and practically.

Not something easily identifiable or immediately accessible, we found this "glue" to be an emergent dynamic element in a collaborative team that developed out of open and honest dialogue with all collaborative members. We use the term "glue" here very specifically, to signal our desire to communicate our acknowledgement of the differences each member of the collaboration brought to the *in potēntia* project, but also how each party came into the collaboration with a sympathy and respect for how each of the collaborative members work . By using the term "glue", what we hope to convey is that rather than seeking, or pretending that, each member is capable of learning the other collaborative member's disciplinary expertise, instead there is both a recognition of difference *and* a desire to come together to create new forms of understanding, language and critique. Therefore, within the *in potēntia* project, as we sought to develop a common language – which we believe is the main ingredient of this "glue" - we found that we became more focused on the needs of the project rather than on the ego of the individuals. By trusting that all of us had the project as our central concern, critical questions and concerns were able to be voiced that were able to enrich the perspectives of the *in potēntia* project, which resulted in a developing self confidence of the partners, which allowed us as individuals and therefore the team, to take more risks.

## Cross-disciplinary Mistakes

"Foam is the best form of disaster prevention" - Mark Lawson

Although artists, scientists, designers and cultural theorists can be regarded as similar in that their work starts with questions about the what, why, and how of the world's phenomena, the methods they use to explore and find answers are poles apart. Therefore, whilst we believe that the advancement of a common language helps to enable successful collaborations between artists, cultural theorists, designers and scientists, we also recognise that there are fundamental differences between these disciplines. Moreover, there is also a divide between individual practitioners (regardless of discipline) who remain secure in the territory of their own expertise and for whom moving outside those boundaries to experiment with ideas from other disciplines is too challenging, and those for whom interdisciplinarity is more natural.

**Figure III in potentia (in progress). Image ©: Kirsten Hudson**

From our experience, we believe successful cross-disciplinary collaboration requires individuals whose enthusiasm is sparked by a process of problem-solving and question asking and whose personalities have a tolerance for risk and time spent in having to incorporate a multiplicity of practical, aesthetic and conceptual requirements. It also needs individuals that can understand that facing a continuing assortment of problems is part of the process, in fact, is essential to the collaborative process, rather than a hindrance to the final outcome. Equally, we have found through our conversations, that any significant development in cross-disciplinary collaboration appears to be led by a desire to create something new [5], and therefore individual reward is not necessarily found in the final project's outcome, inasmuch as in the process of learning, problem solving or learning new skills and ways of thinking outside one's own discipline [6]. Continuity of any collaborative project therefore depends on the ability of the partners to balance these tensions in the relationship. However, difficulties often arise if the tensions grows too much, causing the partners to give up the collaboration.

For example, when developing the prototypes for our bioreactor we tried

out a number of different ideas to simplify the system, as our main focus was trying to simplify and refine the design and aesthetics of a tissue culture and electrophysiology lab so to minimize the lab-based aesthetic, whilst still allowing a functional system that could keep the neural network alive. Our idea was to create an incubator system that would keep the neural network alive for at least 3 weeks without human intervention. To do this, we needed to develop a full functioning tissue culture incubator module that would keep the chamber (where the cells are hosted): heated to 37 degrees Celsius, 5% Co2

80% humidity, as well as various sensors to monitor and control the above conditions.

When we first began designing and developing our bioreactor, we started working with an engineer who brought fresh ideas to the practical design of the bioreactor in ways we hadn't thought of before. However, as we progressed in thinking and designing the bioreactor, he found that he was unable to tolerate the demands of the aesthetic and conceptual requirements of the project, or the excessive time needed to discuss and accommodate these requirements, and therefore he removed himself from the collaboration.

From this experience, we have found that cross-disciplinary collaboration allows four (or however many) people to go faster, work better, and come up with more creative and lateral solutions. However, this can only be achieved if those people work together; that they are able to recognise and respect individual dynamics or need for rest, rhythm and surging. This means that interdisciplinary collaboration always involves looking at others, recognising similarities and differences and thus allocating effort accordingly.

For example: when rowing in a team, it would make sense for each individual rower to paddle as fast as they can. However, if each rower tries to paddle as fast as they can and does not pay attention to the rhythms, dynamics and rests of the others, they do not work together as a team and miss the opportunity to harness the strength gained by all team members working in unison. To work in unison, although each rower may be paddling slower than they could individually, by adapting/changing/accommodating/working with each of their team members, they become part of a whole, and as thus able to go much faster as a team than they ever could as an individual.

## Cross-disciplinary Discovery

"Everyone needs to be a Jack of all trades" – Stuart Hodgetts

The protocols of Induced Pluripotent Stem Cell reprogramming that we employed for *in potentia* are extremely complex and require a lab that is set up for tissue culture, molecular biology, virus work and microscopy. However the biological work in which we were engaged for in potēntia is not "new science". One day when we were having a group conversation, Guy and Kirsten asked Stuart about what he felt he was gaining from the collaboration. They felt that although they were working very closely with Stuart, and were able to learn and to carry out the work in his lab, they recognised that the "science" of what they were doing was not adding anything "new" to Stuart's own research. However, in discussing this with Stuart, and asking his reasons for wanting to be involved in the *in potentia* project and what he was "getting out of it", as a group we realised that when individual's engage in cross-disciplinary collaboration, regardless of whether it contributes new knowledge to an individual's own research project, it enables a new kind of approach to an individual's research - one of lateral improvisation or thinking outside of the box that feeds back into own research.

This methodology of improvisation at the heart of cross-disciplinary collaboration not only enables a re-learning how to "do" your own discipline. It also facilitates the discovery of a new skill-set that feeds back into each individual's own research and discipline, giving rise to a range of possibilities previously unimagined within an individual's disciplinary inquiry. When artists, scientists, designers and cultural theorists work together in a collaborative manner, different perspectives and ways of thinking lead to conclusions that (hopefully) combines the best of all individual's disciplinary thinking; in our case, scientists begin to think like artists, designers begin to think like cultural theorists, artists begin to think like designers and cultural theorists begin to think like scientists. This disrupts typical ways of seeing and not only facilitates creative problem solving, but also opens up the ability to ask unprecedented questions. Not contained by any one discipline or methodological expectations, assumptions and protocols, instead, a methodology of improvisation within the practice of cross-disciplinary collaboration provides new perspectives for engaging in an individual's own research that is often unavailable when you are so embedded and invested in your own disciplinary process, protocols, priorities and expectations.

However, it is always important to be aware of the danger that each individual within a cross-disciplinary collaboration can sometimes start fooling themselves into thinking that they are now capable of being a practitioner/expert in the discipline/field of their fellow collaborators – so it is important to know your limits and trust the knowledge and expertise of the others rather than over-estimate your expertise and no longer need the disciplinary insights of your collaborators.

**Figure IV in potentia (in progress). Image ©: Kirsten Hudson**

## Cross-disciplinary Resistance

"I know this might sound like a dumb question, but..." – Kirsten Hudson

Freedom is often associated with creativity, yet recent writing suggests that too much freedom can be paralysing when it provides too many choices [7]. Therefore, although we tend to think that creativity thrives best when constraints are removed, in-fact the opposite is true; creativity thrives when people are challenged by constraints that inconveniences them and forces individuals to be inventive, innovative and creative. Constraints provide us with the opportunity to get rid of everything that is irrelevant and focus on the matter in hand, and to break things down into their component parts and by doing so concentrate on the things that really matter. Over the three years in which we have been working on *in potēntia*, we have all been involved in long periods of discussion and reflection, during which

time a common language has been negotiated out of creative disciplinary collaborative restriction.

Within this space of cross-disciplinary collaboration (pioneered by the collaborative philosophy of *SymbioticA*), ideas have been productively developed and mutual respect has been fostered by an engagement with creative restriction as we sought to negotiate aesthetics versus accuracy, form versus function, tacit knowledge versus discovered knowledge, risk versus rigor, experimentation versus speculation, appropriation versus expertise, protocol versus intuition, known versus unknown, proof of concept versus creativity, and problematising versus problem solving, due to us all having to creatively accommodate, negotiate, debate and challenge the restrictions inherent of all of our disciplines. Therefore, although there is clearly no single model for a successful cross-disciplinary collaboration, we have found that the more individuals from different disciplines learn to talk to one another and embrace the challenges and possibilities of creative restriction, the more likely we will gain a richer understanding of how one another's practice can creatively open up a broader space where individuals gain new perspectives on their own work. This is not to suggest that artists should necessarily understand scientific terminology, or that the scientist should take on the jargon of the art world, or that a designer should be able to converse in cultural theory rhetoric, but rather that a conceptual understandings developed within cross-disciplinary collaborations, offer a rich and creative method to acquire new tools to reflect on some of the bigger issues that concern us all.

**References and Notes**


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**4.** Karen Pearlman, Understanding Creative Collaboration (May 19 2013), http://au.artshub.com/au/news-article/features/arts/understanding-creative-collaboration-195393

**5.** See Oron Catts, Ionat Zurr, White Paper – Biological Arts, www.seadnetwork.wordpress.com/white-paper-abstracts/abstracts/biological-arts/

**6.** These insights into collaborative experience have been garnered over many years through conversations with art/science practitioners engaged in collaborations. These include conversations with: Guy Ben-Ary, Stuart Hodgetts, Kirsten Hudson, Mark Lawson, Oron Catts, Ionat Zurr, Perdita Phillips, Tarsh Bates, Megan Schlipalius, Stuart Bunt and Chris Cobilis. However, for a more detailed account of an art/science collaboration and the kind of sympathy required from all parties to manage the tensions caused by different disciplinary methods, material and intents see David H. Weinberg "From the Big Bang to Island Universe: Anatomy of a Collaboration" http://www.astronomy.ohio-state.edu/~dhw/McElheny/narrative.pdf

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