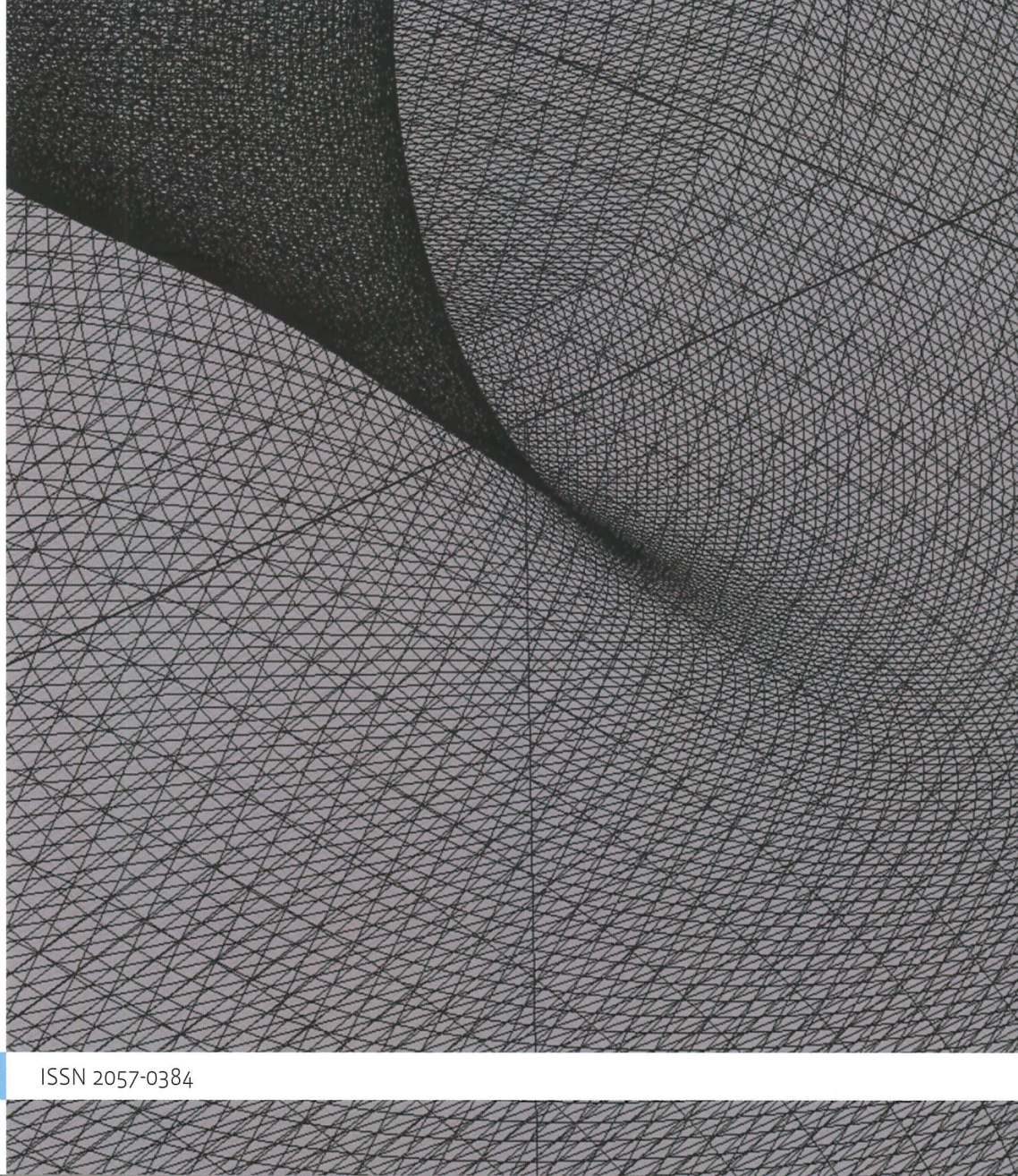
Visual Arts

Drawing

Research, Theory, Practice

Volume 1 Number 1



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Aims and Scope

Drawing: Research, Theory, Practice is dedicated to the promotion and dissemination of drawing practice and research in its current cultural and disciplinary diversity, with a focus on contemporary practice and its theoretical context. Delivered as a printed material, the journal re-establishes the materiality of drawing at a time when virtual, online electronic formats dominate the field of contemporary visual culture.

A peer-reviewed academic publication, the journal encourages pluralist forms of discourse that reflect the evolving relationships between drawing practice and theory and their representation in research. It aims to be a forum for engaging interdisciplinary debates on the ways in which drawing functions in contemporary culture – as experimental practice, process, performance or product; as visual narrative, methodology, cognitive process, representation, documentation, recording or communication tool; as an investigative, descriptive or interpretive pursuit; as a site of conception and production, critical thinking or discursive exploration – addressing current issues of theory and practice, traditional concepts and histories.

The journal content – including articles, critical essays, research projects and reports, artist and practice profiles, original visual material, book, conference, event and exhibition reviews – addresses the roles, functions, values and cultural significance of drawing in a multidisciplinary context. It presents drawing as a discipline in its own right and in a diversity of forms across fine art, architecture, design, craft, animation, media and visual communication, social and cultural practices, psychology, science, and technology. It invites practitioners, researchers, educators, theorists to make contributions that deal with the various knowledges and representations of drawing.

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PROFILES

KENNA HERNLY
Tate St Ives

Drawing the real and the unknown: A look at a project by Gemma Anderson

Keywords
art
science
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collaboration
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Abstract

From March to November 2015, artist Gemma Anderson hosts the Cornwall Morphology and Drawing Centre (CMADC) at the Cornubian Arts and Science Trust (CAST), Helston, Cornwall. The aim of CMADC is to use drawing as the primary mode of investigation to learn about morphology, the study of form in nature. Through a series of drawing workshops, Anderson and her scientific collaborators identify and address questions that concern both scientific and artistic practice. This text focuses on the second workshop, in which mathematician Professor Alessio Corti worked in collaboration with Anderson to explore 'Drawing in the Fourth Spatial Dimension'.

Supplies of microscopes, specimen slides, mineral samples and detailed drawings fill the bright studio in CAST's Victorian building in Helston, Cornwall, where artist Gemma Anderson is hosting a new interdisciplinary drawing project. Between March and November 2015, Anderson's Cornwall Morphology and Drawing Centre (CMADC) is offering a series of workshops that give participants the chance to explore areas of scientific study using innovative drawing and observational methods. Over the course of the project Anderson will present different aspects of her drawing practice in collaboration with a botanist, a mathematician, a mineralogist and a zoologist. Based on 'morphology' – the study of form in nature – these workshops aim to look for forms shared in nature across animals, minerals and vegetables.

While Anderson is introducing the study of morphology through drawing at CMADC, her own research focuses on what she terms 'Isomorphology'. Isomorphology is the subject of Anderson's Ph.D. and is described in her new book as

> a comparative, drawing based method of enquiry into the shared forms of animal, mineral and vegetable morphologies. As a holistic and visual approach to classification, Isomorphology runs parallel to scientific practice while belonging to the domain of artistic creation. It is complementary to science: addressing relationships that are left out of the scientific classification of animal, vegetable and mineral morphologies.
>
> (Anderson 2015)

Using drawing as a way of knowing, Anderson has developed a visual system of Isomorphic classification that is based on a series of abstract symbols. The workshops at CMADC reference this classification system to explore forms usually studied in isolation by different scientific disciplines, resulting in finding ways that art and science can be useful to each other.

In the second of the series of workshops offered at the Cornwall Morphology and Drawing Centre, Anderson presented 'Drawing in the Fourth Spatial Dimension' in collaboration with Professor Alessio Corti from the Imperial College, London, and artist Terry Pope. This workshop on 25 April 2015 offered another dimension of Anderson's practice, and granted a small group the opportunity to conceive forms and patterns in forms that exist in the world beyond human perception.

The workshop started with the story of how Anderson and Professor Corti began collaborating in 2010. While studying at the Royal College of Art, Anderson saw a press release from the Imperial College on new research by Professor Corti and his research partner, Dr Tom Coates. The press release featured a computer-generated visualization of six dimensions. Fascinated by this, Anderson contacted Professor Corti and the two began collaborating, developing ways of visualizing form beyond the third dimension.

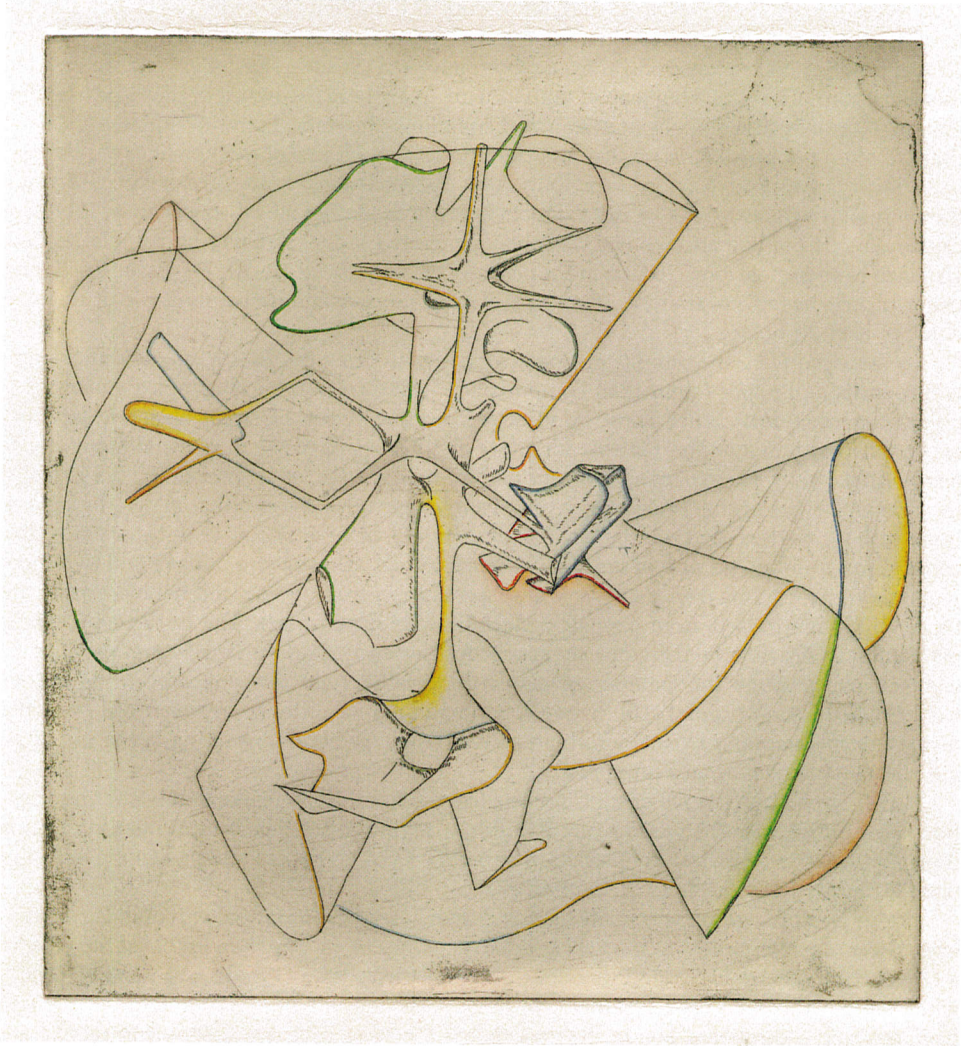

Figure 1: Gemma Anderson, Copper etching of computer-generated models of three-dimensional slices of six dimensional Fano varieties *(2012) © Gemma Anderson.*

Professor Corti then explained that in his work as a mathematician he researches string theory, in which it has now been determined that up to twelve dimensions currently exist in the universe. At this point in his explanation Professor Corti gave the group a sly smile, 'You weren't ready for this were you?' This was a big leap of faith into an area where the best tool seemed to be the imagination. Normally described by mathematical equations, theoretical physics explores areas of nature that are often not possible to observe in experiments. New forms of mathematics are being continually invented to find ways of describing and understanding what cannot be observed. String theory requires the existence of extra dimensions for its mathematical consistency. Professor Corti explained that mathematicians use computer-generated models created by complex equations to visualize extra dimensions. To search for patterns through these models Professor Corti referred to using 'a periodic table of shapes'. This visual classification system uses a similar logic to Anderson's study of Isomorphology.

So, here we were in a studio in Cornwall trying to draw the fourth spatial dimension armed with pencils and paper rather than computer modelling software and complex equations. At this point, constructionist artist Terry Pope brought out a series of small wearable devices. Pope explained that while at the Bath Academy of Art he began to conduct experiments to destabilize normal vision. He explained that our normal patterns for visual processing are established in the first two years of life. Pope has created various wearable devices that allow alternate perceptions to be experienced. Pope began the explanation of how these work by wearing headgear constructed from an old pair of army-issue headphones, two shaving mirrors and two motorcycle rear-view mirrors. This device allows you to see both in front of you and behind you at the same time. Pope then passed around small devices he calls hyperscopes. The hyperscope changes our perception of distance, making objects appear further away than they really are. As Pope talked, I watched him through the hyperscope, observing that his right arm appeared to be further away from his body than normal. The hyperscope increases the distance between the eyes, therefore increasing the amount of visual information available to the brain, resulting in the use of processing capacity that is normally untapped.

Pope's hyperscopes serve as tools to visualize the fourth dimension, demonstrating very clearly how fixed our view of the world really is and how applying imagination can offer interesting solutions. In the same way that scientists use microscopes, Pope's hyperscopes make it possible to study what is not normally visible to the human eye.

At this point the group was ready to start drawing. Anderson started with drawing a cube on the large sheet of paper pinned to the wall at the front of the room. She then unfolded the cube creating a cross-shape (Figure 2), while Professor Corti explained that we would find the fourth dimension when we put the cube back together. We must have looked confused. He told us to imagine we have received a cardboard box in the post that is a perfect cube; we flatten it to recycle and then

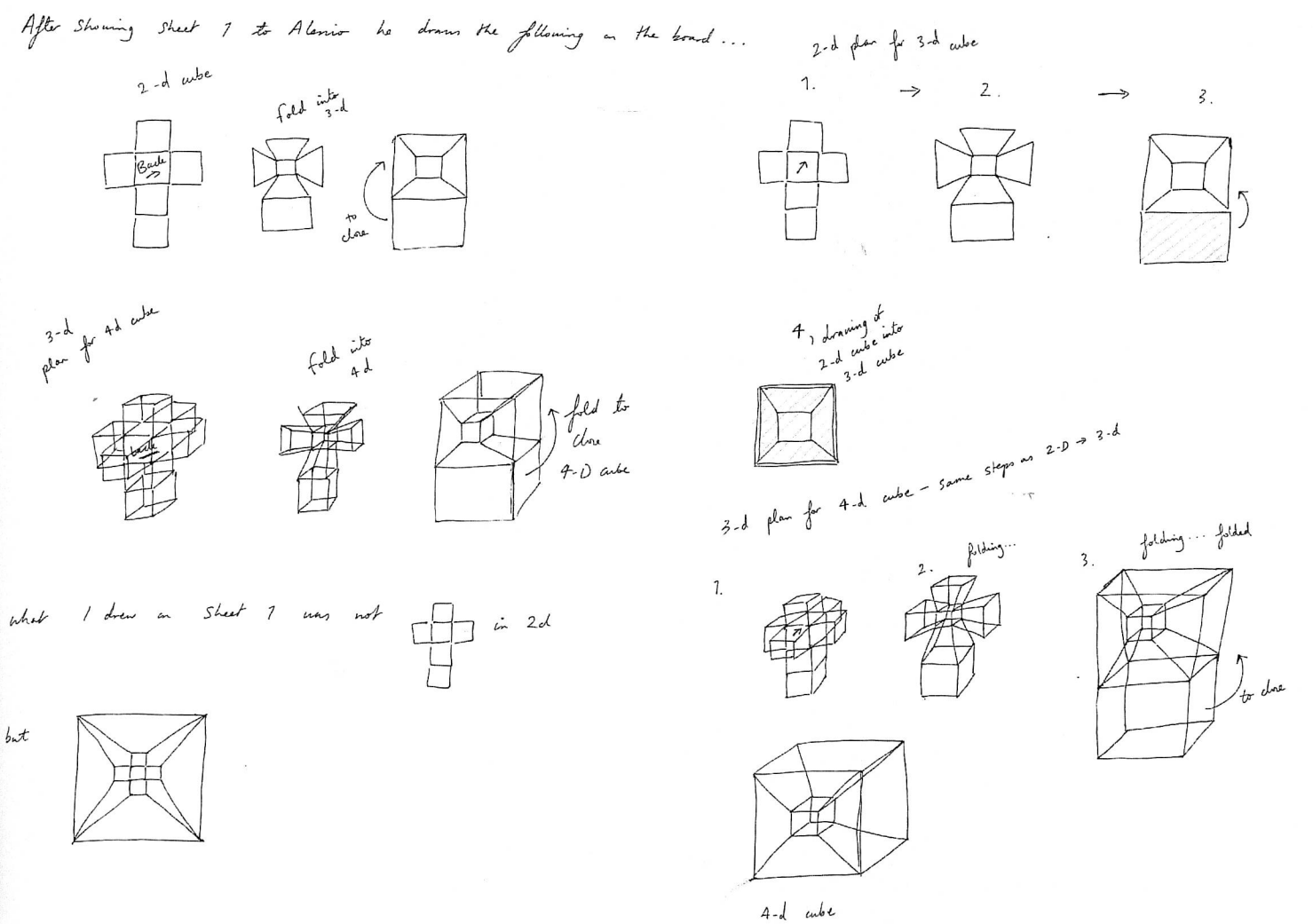

Figure 2: Workshop participant drawing *(2015) © Gemma Anderson. Photographer: Nico Tempini.*

decide we would like it to be a box again. If we lay the flattened box on the floor and then fold the sides to a 45° angle to the bottom of the box, we have achieved the fourth dimension. Folding becomes the key to reaching new dimensions. If you fold a one-dimensional line, the act of folding occurs in the second dimension. If you fold a three-dimensional object, the act of folding occurs in the fourth dimension.

Professor Corti then drew a cube with an additional cube on each side. He then unfolded the sides of all of the surrounding cubes until the edges met to form perfect rectangles. This was now a four-dimensional shape: a hypercube (Figure 2). We continued to experiment with the process more and more, creating hyperprisms out of pentagons, hexagons and heptagons. Next, he taught us a basic equation to allow us to check that our hyperprisms have the right number of sides, faces, facets and vertices. All the elements of a prism in an even dimension will always equal zero and the elements of a prism in an odd dimension will always equal two. After some debate we all get to this point, looking very proud of our hyperpentagons.

Towards the end of the workshop Professor Corti spoke of how most mathematicians only use computer models to visualize equations. He has used drawing since he was a teenager and teaches these techniques to his first-year students. He emphasized that this is an area he would like to develop as he thinks that the act of drawing encourages close observation in a way that is difficult to achieve with computer modelling. Drawing provides a level of interpretation that is distinctly human and encourages understanding. Their collaboration moved Anderson's practice away from naturalistic observational drawing towards drawing from the imagination, demonstrated by her drawings of a tree in the fourth dimension on the wall. Perhaps what is most surprising here is that Professor Corti speaks of his work starting in the imagination and requiring leaps of faith to realize visual models. Many would probably have expected the artist to start from this point and not the scientist; but this area of mathematics is finding descriptions for what lies on the edges of the known world, making the imagination essential.

This was the first time Professor Corti and Anderson have delivered a workshop together, and the first time that Professor Corti has presented to a non-maths audience. They will continue to collaborate and have plans for developing drawing software to use as a mathematical teaching aid. This unique collaboration demonstrates the benefits of interdisciplinary working, and it is genuinely a way of sharing research and understanding – not a way of popularizing science or limiting artistic practice.

Since it opened in March the Cornwall Morphology and Drawing Centre has featured drawing workshops that demonstrate what can be achieved across disciplines by the close observation and imagination required by drawing. From the observed to the unknown, Anderson's drawing practice is forging new knowledge and methods of understanding. I look forward to what her future collaborations bring.

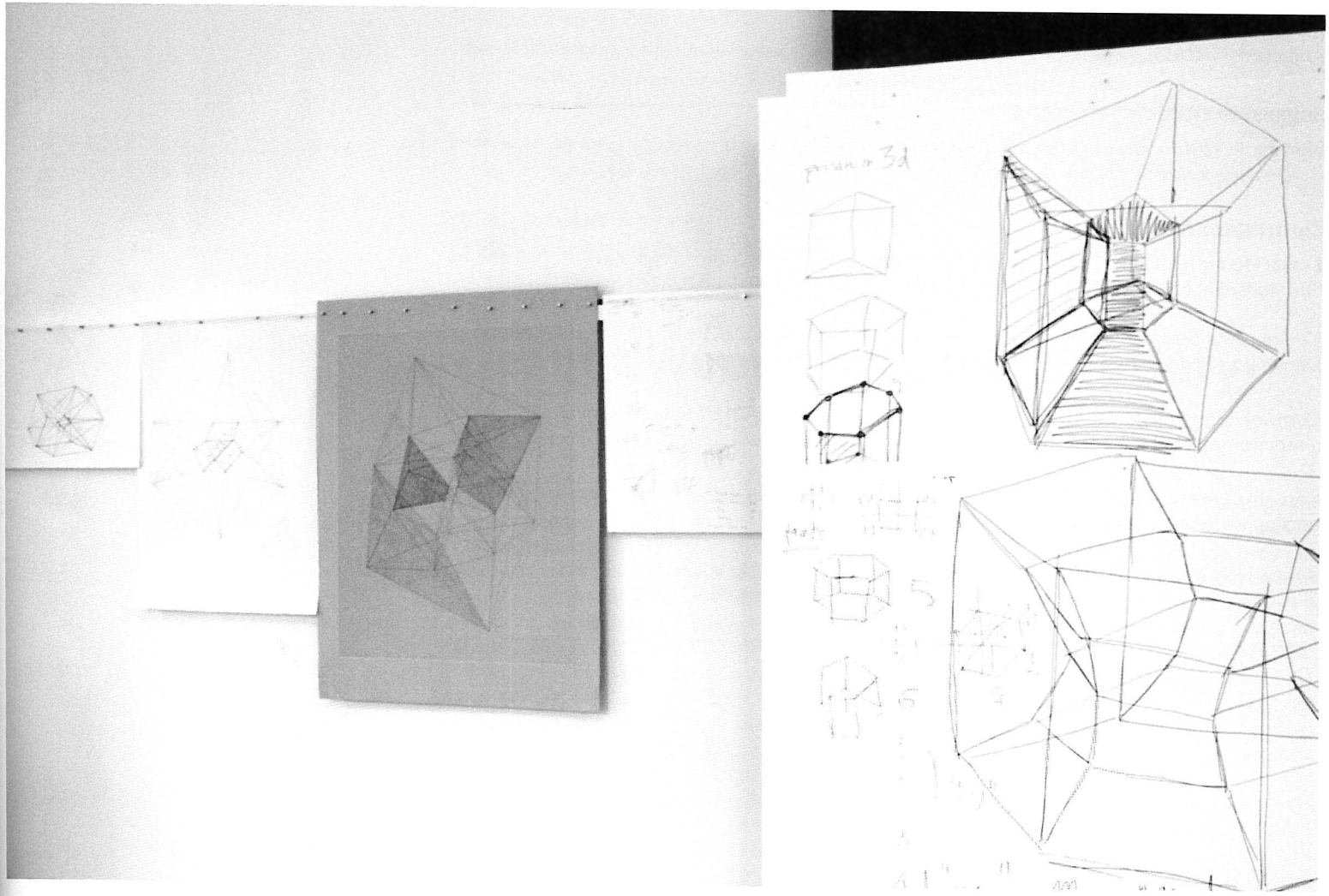

Figure 3: Gemma Anderson and Alessio Corti, Multi-dimensional drawings resulting from Professor Corti and Anderson's collaboration *(2010–15) © Gemma Anderson and Professor Alessio Corti. Photographer: Nico Tempini.*

Reference

Anderson, G. (2015), *Isomorphology*, Penryn: Atlantic Press in association with Falmouth University.

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Contributor details

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Gemma Anderson graduated from the Royal College of Art in 2007. She is currently Lecturer in Drawing and completing a practice-based Ph.D at Falmouth University.

Cornwall Morphology and Drawing Centre (CMADC), based at CAST until November 2015, offers a series of experimental workshops combining artistic and scientific approaches.

Cornubian Arts & Science Trust (CAST), Helston, is an educational charity that promotes participation, appreciation and learning in the visual arts and sciences.

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