



ON CULTURES AND ARTSCIENCE

Interdisciplinarity and discourses of 'twos' and 'threes' after Snow's Two Cultures

by Nora Sørensen Vaage

*At least since C.P. Snow's seminal Rede lecture *The Two Cultures*, the idea of a significant difference in kind between the natural sciences and the arts and humanities has been prevalent in Western culture. A gap has been perceived to exist not only in methodology and theory, but more fundamentally, in understandings and worldviews. This has resulted in a dichotomous debate both in academic and media discourses. As a reaction to this, and parallel in time, some actors have strived to achieve a 'third culture'. This is a common attitude in the still emerging field of 'artscience', whose actors seek to combine the advantages and knowledges of the sciences with those of the arts and humanities. Researchers from every concerned field have contributed to the exploration of the interface between 'art' and 'science'. However, I argue in this article that the very term artscience, in simply joining together the words 'art' and 'science', is reenforcing an old notion of a binary opposition between these two fields. The idea of 'two cultures', still implied within the image of a 'third culture', disguises the plurality of perceptions and approaches within and across fields. While useful in pointing out lack of communication between fields, it tends to overemphasize divisions, ignore complexities, and, in some cases, leave out important parts of the picture. I suggest that the discourse of the 'third culture' and the term 'artscience' may jointly occlude the multiple possible constellations of practitioners, roles and approaches, and may be a potential limitation to interdisciplinary collaborations.*

Keywords: artscience, two cultures, third culture, interdisciplinarity

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Introduction

In 1959, C.P. Snow's seminal Rede lecture *The Two Cultures* reframed and repositioned the conception of the relationship between the natural sciences and the arts and humanities in Western culture. Since then, a gap has been perceived to exist not only in methodology and theory, but more fundamentally, in understandings and worldviews (Collini 1998, Ede 2008, Snow 1998 [1959]). Snow's framing of what he saw as a problem of his time, and the resulting discussion, contributed to a dichotomous debate both in academic and media discourses. As a reaction to this, and parallel in time, some actors have strived to achieve a 'third culture', as suggested by Snow (1998) in his 1963 follow-up essay "The Two Cultures: A Second Look".

Snow's account was deeply rooted in the British and international context of the 1950s. However, the 'two cultures' idiom has later been applied in multiple ways, causing conceptual confusion. In the half a century since Snow's description of the two cultures, the term has become 'a pair of empty bushels', seemingly ready to be filled with whatever is required. Science and engineering, science and social science, and art and science, have all been described as two cultures – mostly without clear definitions being provided in the description. It is, at this point in time, an easy way of saying that something is so different as to make communication between the domains difficult (Kimball 1994, Porter 2005). People cited in this paper seem to have diverging opinions as to what the two cultures actually are, but do not, for the most part, deem it necessary to present a definition.

'Artscience' has in recent years been used as an umbrella term to describe endeavours to combine artistic and scientific approaches (Born & Barry 2010, Edwards 2008). It is mostly seen in the context of art projects utilizing scientific technology, but also has the connotation of using artistic creativity to further scientific innovation (see for instance Edwards 2008, Gewin 2013).¹ An increasing number of museums and galleries such as ArtScience Museum in Singapore, Science Gallery Dublin, Arts Catalyst, UK, institutions such as Waag Society in Amsterdam, Le Laboratoire in Paris, Art and Science Collaborations, Inc. (ASCI) in New York, and international events such as Ars Electronica, ISEA, and Transmediale Berlin define themselves as doing some form of artsience.

In the Nordic countries, there is no equivalent to the Anglophone term artsience in use. However, numerous actors practice what has, in English, been called artsience: the Finnish Bioart Society, founded in Kilpisjärvi in 2008, has established itself as a frontrunner

within hybrid arts. Biofilia – Base for Biological Arts, a centre at Aalto University in Helsinki, was launched in 2012 with facilities including a fully equipped wet biology laboratory, and offers students, artists, and other interested parties the opportunity to perform trans-disciplinary research on biological processes. The biennials Metamorf Trondheim and Article Stavanger in Norway are by now well established, and the Pixel festival in Bergen offers a wide range of workshops for technologically oriented artists. Center for Kunst og Videnskab (Centre for Art and Science) at the University of Southern Denmark was founded in 2004 as a platform where artists, researchers and communication workers could "create inspiring research communication and new artworks" (CKV 2012).²

Some actors have described such approaches as constituting a 'third culture' somewhere between the arts and sciences. The third culture tends to be presented in positive, normative terms, as a goal to strive towards (Ozog 2009, Vesna 2001). In 2011, an international conference in Gdansk was entitled "Towards the Third Culture – The Co-Existence of Art, Science and Technology". The two cultures are often evoked in artsience literature, and in oral accounts, to explain difficulties in communication and collaboration between 'art' and 'science'. When describing why they feel, despite such difficulties, that artsience projects have a valuable part to play, practitioners often stress the aspect of contributing something to society that may supplement what the disciplines have to offer, as well as the idea of 'going between' or 'bridging' the two cultures – thus creating a 'third' culture (Vesna 2001). Concurrently, many actors in the field point out the similarities between art and science (Dijkgraaf 2012, Malina 2006). Stephen Wilson (2010: 6) described the two fields as "the twin engines of creativity in any dynamic culture". However, I will argue in this paper that far more than two approaches are often represented in artsience projects: technicians, engineers, designers, and a whole range of other professional and amateur actors may be involved. I therefore find it fruitful to discuss the continued appeal of the dichotomous representation of 'two cultures' in this field.

The paper sets out to, firstly, give a short account of how the 'two cultures' have been used since Snow's lecture, with a particular focus on the artsience context. Secondly, I will argue that the neologism 'artsience',³ by simply putting together 'art' and 'science' in the singular, is reinforcing some dichotomous mechanisms pointed out by Snow. Thirdly, I maintain that the idea of 'two cultures',

¹ My empirical research focuses on a sub-group within artsience (artists and other laypeople engaging with wet biotechnology), and has led to the reflections on the discourse of artsience as a whole, discussed in this paper.

² In Danish: "skabe inspirerende forskningskommunikation og nye kunstværker" (my translation). Center for Kunst og Videnskab is perhaps best known for developing the concept for the PhD research communication competition "Forsker Grand Prix".

³ The term is sometimes spelled 'art-science', 'science-art' (Born & Barry 2010) or art/science (Vesna 2011), or shortened Sci-Art – the spelling does not change its semantic denotations. For the most part, artsience is taken to mean the visual/plastic arts engaging with the natural sciences.



still implied within the image of a 'third culture', disguises the plurality of perceptions and approaches within and across fields. While useful in pointing out the lack of communication between fields, it tends to overemphasize divisions, ignore complexities, and, in some cases, leave out important parts of the picture. The discourse of the 'third culture', I suggest, is a reductive approach that occludes the multiple possible constellations of practitioners,

roles and approaches, and may be a potential limitation to interdisciplinary and transdisciplinary collaborations.⁴

4 Interdisciplinarity is defined, here, as the investigation of areas of overlap between disciplines, by actors from two or more disciplines. This contrasts multidisciplinary, in which specialists from different disciplines work together, but maintaining their distinct disciplinary perspectives, and transdisciplinarity, "a practice that transgresses and transcends disciplinary boundaries" (Russell, Wickson & Carew 2008, see also Nowotny, Scott & Gibbons 2001).

Background

More than half a century before Snow gave his Rede lecture, Thomas Henry Huxley had treated a similar topic in his 1880 opening lecture for Mason College, "Science and Culture", to which Matthew Arnold presented a response in the 1882 Rede lecture, "Literature and Science".⁵ In discussing that debate, Collini (1998: xvi) observes:

Not for the last time in British cultural history, questions about the proper place of the sciences and the humanities in the nation's educational system appeared to be inextricably entangled with elusive but highly-charged matters of institutional status and social class.

The disciplinary foundation of these domains, it may be recalled, was laid as late as in the nineteenth century, when the institutionalization of the universities caused multiple changes within the natural sciences, and consequently the humanities and social sciences. The natural sciences took over the claim of philosophy (from which they stemmed) of advancing man's understanding of the (natural) world (Strauss 1965 [1953]).

However, throughout these processes, voices calling for continued close relationships between different fields made themselves heard within both the arts and the sciences. An early example can be found in the Arts and Crafts Movement in England around 1880-1910, which also had as an important tenet the return to the craftsman's workshop, disregarding existing hierarchies that deemed crafts practice less elevated than both art and the natural sciences (see e.g. Popper 1993). In this context, recent tendencies of the arts using or taking cues from the sciences and technologies are 'nothing new'.

What can help explain the increased interest in interdisciplinary projects between the arts and the sciences in the last two decades? As Nowotny, Scott and Gibbons identified in *Rethinking Science* (2001), the demarcation between science and society has become increasingly unclear in the last few decades, a tendency

intensified by the increased education level worldwide: there are many more individuals out there who are competent in science, so one cannot assume that the 'masses' are unknowledgeable and incompetent. They argued that, throughout "modern times, science has always 'spoken' to society; indeed science's penetration of society is close to being a defining characteristic of modernity. But society now 'speaks back' to science" (Nowotny et al. 2001: 50). This 'two-way communication' between science and society is far from fluent, however, and in their view, most scientists, although generally recognizing that scientific knowledge today has to be communicated to the public in such a way as to include context, "are convinced that it is possible to regard science as a separate sub-system of society in which its normative values, epistemologies, methodologies and its social and scientific practices continue to be distinctive" (2001: 57-58). But whether all scientists are comfortable with it or not, through the transdisciplinarity and contextualization that occurs within what Nowotny et al. call Mode-2 knowledge production, the number of research, or knowledge, actors, is currently being expanded: "Shifting the focus from Mode-2 science to Mode-2 society, the emergence of a Knowledge society means that a much wider range of social, economic and even cultural activities may now have 'research' components" (2001: 89).⁶

One of those activities is art, and artistic endeavours to engage with science are particularly suited to claim research status. As Born and Barry point out in the article "Art-Science" (2010: 104), "It is tempting to view art-science as a good example of the kinds of practices associated with Nowotny et al.'s mode-2 knowledge production." They view the field of artscience as one avenue for growing interaction between the institutions of scientific knowledge and the public. But how do discourses about artscience relate to current practice in hybrid projects? And why are the two cultures so often invoked to explain difficulties in collaboration? Before going further with these questions, we will address the context of Snow's definition of the two cultures, as well as some of the ensuing responses.

5 This earlier exchange proceeded far more amicably than the Snow-Leavis controversy.

6 Silvio Funtowitz and Jerome Ravetz (1994) have taken this observation in the direction of governance, in developing the framework of post-normal science.



The two cultures debate

In C.P. Snow's 1959 Rede Lecture *The Two Cultures and the Scientific Revolution*, he observed that there is a cultural gap between 'literary intellectuals' and natural scientists: they know very little about each other's fields of expertise, but share a mutual suspicion of each other.⁷ As a result of this gap, Snow argued, it was increasingly difficult for them to communicate fruitfully with each other. Snow saw this as a severe limiting factor in the total knowledge pool of humanity (Snow 1998).⁸ The suggested remedy was that scientists should acquaint themselves more with literature, and literary intellectuals be more versed in science. Snow's representation of the situation was hardly impartial, as he had personal relationships with many of the scientists and literates of his time, and himself was both a man of science⁹ and a novelist. He gave numerous examples where the literary 'Luddites' were shown to be more illiterate in science, and more comfortable with their illiteracy, than the other way around. As a result, he got some incensed responses, most famously from English professor F.R. Leavis (1962), who delivered a scathing and personal retort. This, perhaps, contributed to the ensuing discussion being dominated by biased accounts from each side, which served to further polarize the respective parties (Waugh 2009).

One of the criticisms to Snow's account concerned the lack of clarity as to what he meant by 'culture' (Leavis 1962, Yudkin 1962). Snow therefore explained in the 1963 follow-up essay 'The Two Cultures: A Second Look' that the term culture in his view had two meanings: that of 'development of the mind', and the anthropological definition of "a group of persons living in the same environment, linked by common habits, common assumptions, a common way of life" (Snow 1998: 62-64). His use of the term included both of these, although it seems to me that his emphasis is more in line with the second definition. This paper assumes that both of his definitions, and likely others, as well, are connotations within the current discourses of 'two cultures'. In different disciplines and domains, in the course of someone's education and professional life, they will be socialized into a culture, with specialized discourse and taken-for-granted assumptions. As already mentioned, the two cultures idiom is not enveloped by one clear conceptual framework. These muddled conceptual waters ensure that the term 'culture' in 'two cultures' will carry different meaning, for instance, to an ethnographer and a biologist.¹⁰

Mieke Bal, in discussing why she thinks a concept-based methodology is crucial, describes a situation where a philosopher, a psychoanalytic critic, a narratologist, an architectural historian, and an art historian are discussing signs and ideologies. When the word 'subject' comes up, confusion sets in, as "the first participant assumes the topic is the rise of individualism; the second sees it as the unconscious; the third, the narrator's voice; the fourth, the human confronted with space; and the fifth, the subject matter of (...) the depicted figure" (2002: 5). Their disciplinary training, she suggests, has never given them reason to reflect upon whether the word subject is, in fact, a concept, and might be utilized as different, exclusionary methods within diverse disciplines. This tale is illustrative of how specialized interpretations of the same words or phrases may present barriers in trying to discuss topics across disciplines, fields and social groups. As Snow's contemporary, Michael Yudkin (1962: 34) pointed out, the simple binary division of two cultures implied

...though one supposes not intentionally, that communication within each separated part is on a satisfactorily high level. In other words, by concentrating attention on the gap between scientific and non-scientific intellectual effort, he bypasses the many gaps within each 'culture'.

Yudkin argued that there were, "regrettably, dozens of cultures, in sir Charles's use of the term" (1962: 35), pointing to graduates of law or economics as probably having just as little knowledge of Dickens as did scientists.

Snow, in his "Second Look" (1998: 70), did suggest that a 'third culture' might be emerging, concerned with "how human beings are living or have lived" on a factual level. In his view, this was the contribution of the social sciences (in which he included medicine and architecture). His idea of the third culture has been discussed by a number of people, some of whom have gone on to use the term in other ways (for instance about literates writing about science, as in Shaffer 1998). A quite different concept was proposed in the 1995 book *Third Culture: Beyond the Scientific Revolution*, edited by John Brockman. Brockman's third culture consisted of intellectual scientists, endeavouring to communicate their ideas directly to the public, and thus avoiding what he refers to as 'the middleman'.¹¹

An alternative to the term 'third culture', with similar aims in mind, was proposed in the 1987 book *One Culture: Essays in Science and Literature*. In his introduction, editor George Levine stressed that

7 The side of the 'literary intellectuals' has later been widened to include, in different contexts, art, the humanities and the social sciences. The historiography of the 'two cultures' controversy has been expertly treated in a number of articles (see for instance Collini 1998, Ortolano 2008), and the following is a short account intended only to give the necessary background for the treatment of the idiom in the context of arts and science.

8 Snow's lecture, which discussed issues in education and the gap between industrialized and non-industrialized countries as major challenges of his time, was initially hailed by many as a pertinent warning against increased specialization and lack of communication across disciplines.

9 He had a PhD in physics, had been Civil Service Commissioner since the end of the war, and for a while was director at the English Electric Company.

10 The same will hold true for other terms used across multiple fields (and gaining specialized meaning in some), such as 'creativity', 'rigor', or even 'research'.

11 An important point in Brockman's argument was that many scientists, engineers and technicians are eminently qualified to reflect upon philosophical, ethical, social and cultural issues inherent in the technologies they work with. However, many of these professionals, due to the specialized nature of scientific research and the time restrictions requiring people to work long hours to fulfil the promises made in their last grant proposal, have little or no time to perform such reflections, much less communicate them to a general public. That, perhaps, is part of the opportunity perceived by ethicists, journalists and other writers about new technology – and could be seen as part of the explanation, as well, for material engagements in these technologies by artists and other laypeople.



their use of the term 'one culture' aims to look for ways in which "science and literature might indeed be embraced in the same discourse" (Levine 1987: 4), but that it is important to discuss points of convergence precisely because of the strong feeling that the domains are very different. However, the 'one culture' idiom has not proceeded to become the same kind of catchphrase as has the idea of the 'third culture'.¹²

Since Snow's time, the 'two cultures' has become an idiom used in multiple settings, and neither the 'science' nor the 'literary intellectuals' side has remained stable. Perhaps the greater change has happened in the realm of the 'literary intellectuals', now being replaced by settings as diverse as social sciences, art, the humanities, or even engineering (as an opposing culture to 'science' – in the singular). Uses of the idiom ranging from describing differences between problem-solvers and theory-builders within mathematics (Gowers) to contrasts between qualitative and quantitative research in the social sciences (Goertz & Mahoney 2006) appears to be a ratification of Yudkin's 'dozens of cultures' argument.

¹² Although the 2001 book *The One Culture? A Conversation About Science* (eds. Labinger & Collins) discussed the potential end of the 'science wars' using perspectives from the sociology of scientific knowledge and referring to Snow's two cultures in finding common ground between scientists and observers, no mention was made of Levine.

The debate in artsience

The two cultures is a recurring idiom in discussions about specific projects involving some combination of the arts and sciences. In November 2013 author Ian McEwan observed, in discussion with theoretical physicist Nima Arkani-Hamed, that the "old, two-culture matter is still with us" (McEwan & Arkani-Hamed 2013).

As mentioned in the introduction, a 'third culture' has repeatedly been described as an ideal to work towards in artsience (Schaffer 1998), combining the advantages and knowledges of the sciences with those of the fine arts (Edwards 2008, Lowe 2008, Wilson 2010). The goal is to reach new levels both in scientific and artistic projects and, not least, in hybrid endeavours. Judging from the increase in programs and funding for projects combining scientific and artistic goals, there is a wish to establish new relationships between the arts and the sciences (Malina 2006, Zwijnenberg 2009). In the Nordic scene, Hybrid Matters: Digital 2015-16, a collaborative project between The Finnish Society of Bioart, IT University Copenhagen, artists and scientists Å+K, Kunsthall Grenland, Forum Box, and Nikolaj Kunsthall, which seeks to explore "current and future digital developments" through network meetings, laboratories, artistic research and exhibitions, was chosen for the Nordic Culture Fund's Nordic Culture Event of the Year award in 2014 (Nordisk kulturfond 2014), showcasing the current appreciation for such hybrid endeavours.

Researchers from every concerned field have contributed to the exploration of the interface between 'art' and 'science' (Johnson 1997, Slater 2007), transforming different forms of knowledge according

Stefan Collini, in his introductory essay to the 1998 edition of Snow's *The Two Cultures*, points out that, from Snow's days up to our current time, the trend has been twofold: both towards "more specialised sub-disciplines and the growth of various forms of inter-disciplinary endeavour" (1998: xliv). And "in place of the old apparently confident empires, the map [of the disciplines] shows many more smaller states with networks of alliance and communication between them criss-crossing in complex and sometimes surprising ways" (ibid.). As Collini observes, it is a matter of opinion whether this makes it more pertinent to talk about one single culture, or hundreds of different ones. He points out that, while it is still convenient to use overarching categories such as 'the sciences' and 'the humanities', "this conventional usage is not now underpinned by any agreed definitional criteria" (1998: xlv). Collini concludes that we need to encourage the intellectual equivalent of bilingualism. Bi- or multilingualism presupposes a capacity to attend to, and eventually learn from, other fields, and contribute to wider, cultural conversations. This is frequently described as one of the strengths of artsience, providing a pathway to further understanding for all interested parties.

to their separate frames of understanding. Many practitioners are concurrently active as researchers, artists and technicians. An idiom often used by practitioners to describe their different roles is 'wearing several hats' (Interviewee 42, 45, 56;¹³ Tremmel 2014). They rarely say 'wearing two hats', but that is how the relationship between art and science has often been framed: as a 'binary economy' (Jones & Galison 1998: 5). Editors Jones and Galison, in their introduction to *Picturing Science, Producing Art*, identify a number of scholars after Snow, from philosopher of science Thomas Kuhn to art historian Martin Kemp, who have in a sympathetic spirit sought to explore similarities and differences between the arts and the sciences, without being able to overcome this binary economy.

The ability to pose new questions is often presented as a strength in collaborations across the arts, science and technology (Malina 2006, Moura 2009), and the shared interests of artists and scientists have been stressed by several actors (Byatt 2000, Edwards 2008). Roger Malina (2006: 16), long-time editor of *LEONARDO*, the journal of the International Society for the Arts, Sciences, and Technology, argues:

In my experience of interacting with artists, scientists and engineers, I have been more impressed by the shared traits of

¹³ Semi-structured research interviews with artists, scientists and administrators at the SymbioticA Centre for Excellence in Biological Arts, University of Western Australia, April-May 2013. In total, 12 interviews were performed. In this article, seven interviewees are cited: 27; 28; 42; 44; 45; 49; 56.



personality and cognitive strategy than by their differences. I suspect that many of the dissimilarities we often attribute to differences between scientific and artistic cultures arise from the processes of our educational systems, rather than innate proclivities or capacities.

In this, he seems to be voicing his normative engagement in the field, but also an interesting opinion as to the similarities of artists, scientists, and engineers - the inclusion of the latter is notable in Malina's comparison.¹⁴ Similar statements about the commonalities between different actors have been made by numerous other practitioners, from Snow's time (Oppenheimer 1954) to today (Wilson 2010). Snow, like Malina, in part blamed the British educational system for the gap between the two cultures.

Artist and researcher Jill Scott claims that, although the disciplines of artists and scientists are very different, "some sharing of ideologies could become a solid base for valuable innovation, production, distribution and socio-cultural consumption potentials" (2006: 24).

However, this hypothetically fruitful exchange is not always seen in actual collaborative efforts. Ex-mediator of the AiR-program at Xerox Park, Rich Gold, according to Jill Scott "concluded that the problem of collaboration lay not in the fact that these disciplines were different, but that there was a basic lack of respect for each other's accumulated knowledge and the associated means of expressing it" (2006: 26). Perhaps some of this perceived lack of respect stems from a sense of being threatened by the other party's impingement on 'their territory'? As Latour and Woolgar observed in *Laboratory Life* (1986), it is hard for professionals to accept laypeople within their professional spheres.

Some practitioners, both from the sciences and the humanities, have stated that the arts and the sciences are simply incompatible, not just speaking different languages, but representing radically different worldviews, and that true collaboration is impossible (Interviewee 56, Garneau 2008). These actors' collaborations with practitioners from other fields have left them with a sense of disillusionment, as the outcome is, in their view, tilted towards the 'other field' involved.

In February-May 2013, this author performed a case study at the SymbioticA Centre for Excellence in Biological Arts at the University of Western Australia.¹⁵ SymbioticA is the only permanent artistic centre based within a biology department, and offers residencies, B.Sc., M.Sc., and PhD degrees, seminars, and workshops.

Among my informants from SymbioticA, there is a tendency to present equal collaboration between fields as the ideal, while cases where either the artistic or the scientific took a leading role are rarely held forth as examples of methodological excellence. However, this kind of equal collaboration is rarely felt to be occurring, and the model there is to have one or more scientists in a mentoring relationship to a non-scientist (Interviewee 33, 42, 44, 53). This non-scientist is often an artist, but among the 70+ residents who have visited SymbioticA since its founding in 2000 have been many designers, scholars, and also scientists from other fields interested in using biological techniques for explorative or otherwise unusual purposes.

One of the artworks created by the SymbioticA Research Group, *Silent Barrage*, is described on the project's website as "One of the very few real art and science works - in that it is both artistically meaningful and scientifically valid" (Silent Barrage 2013). This statement implicitly contains the idea that many artworks that are framed as 'artsience' don't really fit their definition of being 'both artistically meaningful and scientifically valid'. It is also notable that listed collaborators on the *Silent Barrage* project included a software engineer, a mechanical engineer and a composer and programmer, as well as people rooted in various kinds of art and in neurobiology. Still, this piece is presented as an 'art and science work', leaving the other contributions to 'play second fiddle'.

This is just one example of how, perhaps influenced by the very name of 'artsience', art and science are seen as the two cultures involved, and the other actors on the scene, such as engineers, technicians, designers and scholars, are rarely mentioned in discussions of collaboration, whether difficult or successful (Interviewee 56). Interestingly, whereas you would expect that diverging understandings of language would be a major reason for difficulties of collaboration (as indeed it is often given to be in discourses of the two cultures), an artist with a background in science was not seen as easier to work with by one of my scientist interviewees (Interviewee 56). Even people with double degrees, in his view, tended to work mainly on either 'art' or 'science' angles, and defining themselves, correspondingly, as either artists or scientists.

Most of the practitioners at SymbioticA have more than a passing familiarity with the other fields involved. As may be recalled, according to Snow, such familiarity should in itself be a remedy, a bridge between the cultures. Although this is not sufficient evidence to form a theory, difficulties in collaboration where knowledge is not lacking suggests other possible reasons for discontent in the wake of collaborative projects, in particular the amount of recognition given to each participant in the project.

¹⁴ This observation, coming from an actor experienced in interdisciplinary collaborations, should not be taken lightly. However, we should also consider that the artists, scientists and engineers who choose to participate in collaborative work do tend to have a proclivity for a broader approach to knowledge, as exemplified by their very unwillingness to stay inside what is defined as their professional fields.

¹⁵ As part of the case study, I interviewed 13 practitioners currently at SymbioticA. These were current short- and long-term residents and the permanent artistic, scientific and administrative staff.



The complexity of cultures

Although references to different cultures often occur as explanation for difficulties in collaboration, some proponents of 'art-science' suggest that this 'third culture' might be the solution. Ian Lowe, in the book chapter "Bringing Art and Science Together," goes as far as to say that a "creative synthesis of the arts and sciences is critical to the future of civilisation", and that "Solving the problems before us will require a melding of scientific knowledge, technological capacity, craft skills and artistic creativity" (2008: 21). The attributes described in the latter statement are not discipline specific, and the usefulness for instance of artists for science, through their specialized knowledge about creativity, is one of the points Lowe and others make about the advantages of artscience. However, their insistence of the binary relationship between 'arts' and 'sciences' may itself be a limiting factor. Born and Barry (2010: 104), pointing to the diversity of interdisciplinary endeavours, have suggested that "art-science should be understood as a multiplicity". They acknowledge the problem of 'artscience' as "a practical, intentional category for artists and scientists, cultural institutions and funding bodies", which "forms part of a larger, heterogeneous space of overlapping interdisciplinary practices at the intersection of the arts, sciences and technologies" (ibid.). Oron Catts, in the discussion *A Future for Art & Science Interactions?* (2013), pointed out that "Most of what we see as art and science collaboration is not that at all. More in the realm of technology and engineering".

Why are artists and scientists singled out as the only relevant parties in this context? Designers are often enlisted to partake in scientific projects, but the same two cultures discourse is, as far as I have been able to ascertain, not prominent there. And yet, the transition from art to design is as fluid as that from design to engineering. 'Two cultures' has also been used in the comparison of science and engineering (see for instance Bensaude-Vincent 2004, Drexler 2013, Griffin 2007), in which 'science' is seen as a pure 'quest for knowledge', and 'engineering' is focused on the practical aspects of making. In this perspective, design could arguably be seen as a moderator between science and engineering approaches – although it clearly has a different approach than both.

Similarly, in the preface to *Interface Culture*, Stephen Johnson comments on the cultural division between engineers and artists, our habit of seeing them respectively as "those that dwell on the shores of technology and those that dwell on the shores of culture" (1997: 1). Johnson argues that this opposition "is as false as the genetic separation between human and ape" (ibid.). In this, he was inspired, perhaps, by Lewis Mumford, who in *Art and Technics* referred to the symphonic orchestra as 'a triumph of engineering', which "will probably outlast all our steel bridges and automatic machines" (1952: 8).

The exchange of opinions and ideas between representatives of different fields is frequently touted as important. However, communication is seen to be difficult because the same words often carry different meanings and connotations within different

disciplines, environments and languages. This is far from exclusive to the art/science dichotomy. The notion of the 'two cultures' has, as we have seen, been applied on multiple perceived 'cultures', with the common denominator that the goal is to differentiate something fundamentally from something else.¹⁶

The idea of a 'third' culture, and 'bridging' (implying a connection between two separate sides), taken simplistically, presupposes that there are only two, clearly defined territories involved in the interdisciplinary endeavour. As mentioned, this is rarely the case in artscience projects, in which lab technicians, designers, computer scientists, physicists, or others, depending on the project, may bring their different cultures to the table. The projects mentioned here are only a few examples of a very heterogeneous, complex field of hybrid interactions, involving a considerable range of motivations, technologies, aesthetic visions, and outlooks. Instead of a binary model, these interdisciplinary projects may more realistically be described as being enacted by a network of actors from different fields. In different constellations, similarities and differences can be found between any two of them – but a more comprehensive picture may be gained from studying the totality of interactions. The close interaction between engineering and design, and the fluid transitions between experimental design and art, underline this point.¹⁷ Replacing a discourse of 'artscience' as a bridge between 'art' and 'science' in the singular, broader terms such as 'hybridity' or 'integrated collaborations' may be better equipped to contain the multifaceted reality of these interactions.

Like them or not, dichotomies are effective. Communicating differences in a clear-cut, reductive way makes them easy to grasp, and placing one concept up against another provides easy grounds for contrast and comparison. This, perhaps, explains why so many writers resort to discourses of 'twosomeness' or 'threefoldness'. The latter, as in the synthesis of the Hegelian dialectic, often involves the idea of bridging a divide. This gives the impression of a person being 'at the frontiers', although the frontiers being breached are those in between contrasting concepts.

Snow, in "A Second Look", mentioned the dangers of dividing things into two, but argued that discussing "a hundred and two, or a thousand and two" cultures was "meaningless". Of course, subdivisions exist, but the two cultures he put up were the main, important ones, in his opinion. In our time, however, perceiving 'art' and 'science' as the two cultures important enough to mention leaves out important parts of the picture. The other dichotomies mentioned here, not least science and engineering,

¹⁶ Another example of a proposed cross-over between the two cultures, which in his context are the sciences and the humanities, can be found in the writing of Van Rensselaer Potter, who in the preface to his *Bioethics: Bridge to the Future* suggested that "we might build a 'bridge to the future' by building the discipline of Bioethics as a bridge between the two cultures" (1971:vii).

¹⁷ Concurrently, several of the artists discussed within the scope of my research are explicitly opposed to what they call 'the engineering mindset' (Catts & Zurr 2010).



also represent extremely different mind-sets that make understanding between the domains difficult. At least in our current situation, talking about two cultures has less meaning than referring to many. Although the ideal of a third culture is voiced by some actors within artsience, it is clear that it comes in different shapes, and that there are disagreements within the field as to what are the appropriate aims, motivations and means for artsience projects.

As observed by Cecil Balmond in *60. innovators shaping our creative future*, "The simplistic world of the past, divided into separate classifications by compartment thinking, has begun to dissolve as more fluid concepts gain ground" (Balmond 2009: 83). Fields, or disciplines, are increasingly seen, by some, as artificial constructions, an attempt to create firm boundaries in an environment of frequent overlapping, where the differences are often smaller than the similarities, and the transitions between them ephemerally mobile. Perhaps, in this very phenomenon, and in the effort to make sense of it, lies a key to understanding the popularity of the 'two cultures' discourse.

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One can, in a sense, perceive the discourses of two and three cultures as ways of justifying institutional divisions between disciplines and departments. These disciplinary boundaries still have their uses. However, developments within, and interactions across, such divisions make these discourses seem somewhat out-dated. In 1954, Robert Oppenheimer (1961) suggested that there was a need to find common understandings across disciplines by translating, finding analogies and correspondences, between different disciplinary 'languages'. This is no less valid sixty years on. However, there seems to be a tendency that the very process of trying to form 'bridges', by defining the 'other' as fundamentally different from one's own approach, contributes to the construction of dichotomous relationships. By using the simplistic term artsience, practitioners and scholars may paradoxically be reinforcing the very binaries they seek to overcome through their practice.

Acknowledgements

A number of people read drafts of this article and contributed valuable feedback. Particular thanks go to Ragnar Fjelland, Torjus Midtgarden, Helga Mannsåker, and the members of the research group Images of Knowledge, for their perceptive comments.

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