

Perception — Translation — Transformation*

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Abstract

As a research initiative of the School of Art and Design Zurich (HGKZ) and co-financed by the Swiss Innovation Promotion Agency KTI/CTI, the Swiss Artists-in-Labs (AIL)-Project (2004) intended to encourage education, interdisciplinary research and innovative processes, and new methods of production at the interface between science and art. The KTI/CTI's creed is "science to market". Involving tertiary level institutions such as the HGKZ, it backs joint research and development projects aiming at the strengthening of market-oriented innovation processes, establishing practice-oriented qualifications for academic researchers, and improving cooperation between educational institutions and the industry. The promotion follows the bottom-up principle: projects are defined by the participating partners themselves, with the business side covering at least half the costs.

The paper elucidates the *processes* of perception, translation, and the role of the experiential and transformative potential of art in the AIL-Project. It argues that there exists in fact an underestimated and strong communicative potential for art in a scientific context. In my analysis and final conclusions I will refer, on a more general level, to the empirical evidence of the asymmetries between the arts and the sciences as witnessed during the AIL-residencies. My final suggestions regarding the necessity to fundamentally change the project conditions of interdisciplinary projects will be concerned with claims of how to subsequently include and systemically implement these new insights into future research perspectives.

If we are to find a reliable way of integrating knowledge between science
and art then the intellectual traffic must pass in more than one direction.

Robert Pepperell

As a research initiative of the School of Art and Design Zurich and co-financed by the Swiss Innovation Promotion Agency KTI/CTI,¹ the Artists-in-Labs (AIL)-Project

¹ The Swiss Innovation Promotion Agency's creed is "science to market". Involving tertiary level institutions such as the Hochschule für Gestaltung und Kunst Zürich (HGKZ), it backs joint research and development projects aiming at the strengthening of market-oriented innovation processes, establishing practice-oriented qualifications for academic researchers, and improving cooperation between educational institutions and the industry. The promotion follows the bottom-up principle: projects are defined by the participating partners themselves, with the business side covering at least half the costs. The new Swiss Universities of Applied Sciences (like the HGKZ), launched in 1998, represent a new type of academic institution in Switzerland. Whereas the two Federal Institutes of Technology (Lausanne and Zurich) and the traditional universities work on long-term research projects, the Universities of Applied Sciences focus on immediate applications, and on working with

intended to encourage education, interdisciplinary research and innovative processes, and new methods of production at the interface between science and art. Over the past years, I have become aware that the evaluation and the reports on art-sci-projects essentially lack a basic and critical self-reflection. There is on the other hand, the problematic issue of the overall absence of a critical eye from the organizers' perspective – organizers who often sell art-sci-projects as a successful form of a kind of 'new style art' the assessment of which is biased towards getting a creative output. On the other hand, artists aim at gaining impact – with an unreflected fascination of the 'sound' of scientific terms more often whereas problematic features like unshared epistemological motivations of both the artists and the scientists, for example, are not addressed, or simply being overlooked.

By elucidating the *processes* of perception, translation, and the role of the experiential and transformative potential of art in the AIL-Project, I will argue that there exists in fact an underestimated and strong communicative potential for art in a scientific context considering the translatory and transformative potential and proceedings underlying our perception. In my analysis and final conclusions of the AIL-process, I will refer, on a more general level, to the empirical evidence of the asymmetries between the arts and the sciences as witnessed during the AIL-residencies. My final suggestions regarding the necessity to fundamentally change the project conditions of interdisciplinary projects will be concerned with claims of how to subsequently include and systemically implement these new insights into future research perspectives.

A More Open Concept of Mutual and Shared Perception

There is a necessity for a kind of creative and conceptual innovation, a radical new way of thinking about science and art in terms of the interrelatedness of their codes or constituent parts. It is from this perspective that I consider Michael Century's proposal which focuses on a 'multi-perspective framework from which to view the rising density of communication between the worlds of art, technology, and science'²

companies to transform basic research results into marketable products and services. The AIL-Project involved nine industrial partners and was certainly a very good move. Although many of the commercial benefits and application-oriented goals were not realized, there seemed to be a common agreement among our partners that the project had greatly stimulated science and should be repeated.

² Century's analysis focuses on an "apparently rising density of communication which suggests the need to begin rethinking some aspects of the relationship between cultural support policy, innovation and research policy, and the still nascent but interconnected set of concerns about the requirements for widespread creative participation in a 'techno-sphere' increasingly shaped by fast-changing digital media technologies". Century, M. (1999). *Transdisciplinary Knowledge Production and the Arts*. Studio Labs since 1960. Sussex University, and McGill University's: Graduate Program in Communication. Report. Redefining a new support policy linking culture, innovation and research may be an important step in Switzerland where the level of access to information concerning interdisciplinary practice of science and art is underdeveloped compared to other countries. This is surprising, considering that Switzerland possesses world class science laboratories. This fact also surprises since both – artists (especially media artists) and scientists increasingly share similar computer-supported working tools which they use for their theoretical discourses and practical research. Moreover, it has been a major challenge time and again to convince cultural institutions and Swiss research councils of the meaningfulness and necessity to *sustainably* support e.g. the Swiss Biennial on Science, Technics and Aesthetics which I founded in 1994. The Biennial is a very untypical Swiss institution whose uncommon aim is to foster and facilitate the exchange and collaboration among academic disciplines such as quantum physics and consciousness research, as well as philosophy and art, in order to break down the conceptual and institutional barriers to interdisciplinary research.

as supportive for the AIL-Project's basic intentions of breaching artistic, scientific and disciplinary boundaries in the process of common knowledge production. The idea of a more open concept of mutual and shared *perception* and its translatory and transformative potential is thereby central.

The AIL-study revealed very personal attitudes and assumptions on the part of both the scientists and the artists – some are included here –, as well as new ideas of how an understanding of the potential of interdisciplinary collaboration and exchange can help to 'bridge the gap' between the various disciplines. My critical observations of the AIL-research process are based on the Bakhtinian concept of responsibility understood as answering to and for the other – keeping in mind that the value of the other and not of the I is aesthetically productive.³ The development of mutual awareness – if made abundantly available – could thereby play a special dialogic role. It supports the development of collaborative values which take place in productive contexts and social environments such as the AIL-Project.

The Challenge of Orientation and Collaboration

Fourteen artists from eight countries with different cultural backgrounds and artistic disciplines were exposed to the experience of highly complex working conditions in nine Swiss science laboratories. The artists came from Australia (1), Germany (2), India (1), Austria (2), Singapore (2), UK (1), USA (2) and Switzerland (3). Their experiences and professional working fields included conceptual art, computer animation, documentary film, human computer interface (HCI) research, living sculpture, mediated bot intelligence, performance art, robotic theatre, sound and video art, and wearable computing.

A major challenge for this multi-cultural and multi-disciplinary group was being surrounded by the atmosphere of constant, dynamic data production in scientific laboratories, and developing new communicative skills and methods of collaboration. The group had to learn how to orient itself in the immense piles of specialized knowledge in the disciplines of AI-research, astronomy, the computer- and life sciences, electron microscopy, energy engineering, microelectronics and the nanosciences as well as particle physics. The residencies started and ended with twelve different project proposals resulting in varied types of art-sci-prototypes. The production of these prototypes (some of them resulted in works of progress) took place between April 2004 and January 2005. During this period the artists spent a total amount of 65 months (the average duration of each residency was 4.6 months) in the laboratories. When the AIL-Research-Team⁴ started to observe, investigate and analyse the processes of social interaction and knowledge production, it soon realized that the creative processes underlying each project were based on heterogeneous methods of observation, analysis, experimentation and visualization, which were difficult to compare.

³ See Ponzio, A., Petrilli, S. (2000). *Philosophy of Language Art and Answerability in Mikhail Bakhtin*. 1st Edition New York Ottawa Toronto: LEGAS. p8.

⁴ The AIL-Research-Group consisted of Jill Scott, project leader, Priska Gisler, Marille Hahne and myself as team members.

The Challenge of Communication

In the beginning of the residencies, a majority of the artists faced severe challenges resulting in a complicated founding process of defining and finding the appropriate project-partners in the laboratories.⁵ It was the first great obstacle for each resident to overcome. As a consequence, in order to start communication with the scientists on a very basic level of exchange the artists had to become quite inventive. The first contact should not only include the presentation of the artist's working perspective and the purpose of the research in the laboratory, but it should also serve to get the artist linked as fast as possible to the formal and informal communication channels in the science contexts.⁶ It became obvious that if the artists wanted to become respected members of the science community they had to both get acquainted with and linked to the 'established' culture of scientific communication.⁷ Not all projects managed to do so, however – a majority of the artists faced a sheer unsolvable situation regarding the expectation of efficient communication and fruitful exchange. It didn't come to us as surprise, after all. Reaching out *together* where one would be able to experience the limitations of 'cherished' boundaries as Heinz von Foerster might have ironically called them,⁸ and even going *together* beyond these boundaries

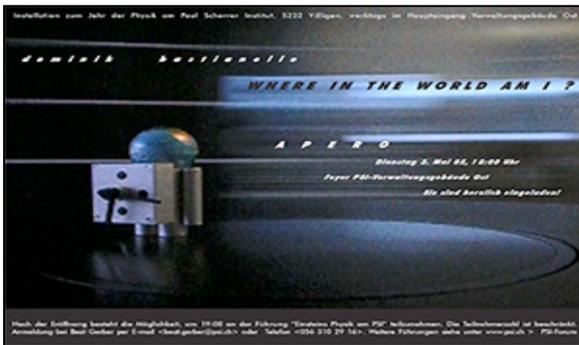
⁵ Tiffany Holmes, AIL-resident in the Computational Laboratory of the Swiss Federal Institute of Technology outlines the problem in her report: "I discovered that the researchers would lend a friendly ear to my questions during the lunch hour or a coffee break. (...) However, no one I spoke with had time for discussion or project building outside of the appointed lunch or coffee breaks, or biweekly lectures or seminars". Axel Vogelsang, AIL-resident at the Institute of Information Systems of the same institution made a quite different experience: "During the collaboration a great team spirit evolved. It was a real collaboration in a sense that my requirements triggered ideas for new solutions as well as that the lab collaborators [scientific partners] constantly produced ideas that I could use for my work".

⁶ I refer hereby to the specific forms of formal and informal communication, discussion, and presentation in science laboratories as they are described by Bruno Latour and Steve Woolgar. They write: "Every presentation and discussion of results [in the science lab] entailed the manipulation either of slides, protocol sheets, papers, preprints, labels, or articles. Even the most informal exchanges constantly focused either directly or indirectly on documents". Latour, B., Woolgar, S. (1986). *An Anthropologist visits the Laboratory. In: Laboratory Life. The Construction of Scientific Facts.* Chichester, West Sussex: Princeton University Press. p53.

⁷ Dominik Bastianello, AIL-resident at the Paul Scherrer Institute (PSI) reported about his attempts to establish initial communication with scientists: "One of the main tasks in my project was to find appropriate persons for my project who were willing to match their dense time schedules with it. (...) So my initial strategy was to win potential partners to collaborate with. I designed my first communicative steps carefully. When I made my first phone call, I indicated briefly what the content of my project and the aim of my work was, and then asked the scientist to basically inform me at our first meeting about his or her own work and on-going research". Nigel Helyer, Bastianello's fellow artist at PSI, was intimidated when he realized the extremely complex structure of the PSI which occupies over 1000 international researchers: "The relative physical isolation of PSI coupled with its apparently impenetrable organisational structure caught me somewhat off-guard. That the other AIL-artist at PSI, Dominik Bastianello, confirmed that even as a Swiss national, making forays into the PSI hierarchy was a daunting and often times unproductive experience in some ways, made me feel less incompetent in my attempts to navigate the industrial scale and rigidly organised PSI machine".

⁸ Coming from the discourses of cybernetics it was the late Heinz von Foerster who frequently insisted that 'useful' boundaries have their own 'limitations'. See Glanville, R. (2003). *Understanding Systems: Conversations on Epistemology and Ethics.* A Review of the book by Heinz von Foerster and Bernhard Pörksen. *Cybernetics & Human Knowing. A Journal of Second-Order Cybernetics, Autopoiesis and Cyber-Semiotics.* 10 (1), p185.

would presuppose, naturally, a very different and *commonly* shared communicative process and research perspective which the ALL-pilot wasn't providing. Interestingly, thanks to the boldness and the perseverance of the residents a majority of the projects started to become linked to their scientific contexts almost automatically during the initial processes of inquiry. In fact, it was a major surprise. A key factor in this may have been an unshared willingness of the artists to conquer and understand scientific frontiers however complex they were. And it had a lot to do – I suggest – with the artists' intrinsic curiosity and eagerness to conquer these new horizons of knowledge – new yet unexplored worlds. In other words: Perception was identified as being a key factor in the process of translation and transformation of scientific artifacts into experiential realities.



Perception as a Subjective Process

[Fig. 1]. When I use the word 'perception', I refer to a phenomenon which – albeit its measurability in specific domains – remains ultimately *subjective* and cannot be fixed and generalized by law. Art can be understood as a facilitator to experience and can help to consciously become aware of science in multiple

ways. In my view it was a major overall effect of the ALL-Project that art as a medium of non-theoretical epistemological reflection and supported by the very nature of its non-discursive methodology turned into a facilitator for the perception, translation, and the transformation of our picture of the exact and objective sciences. One example is the case of the Swiss resident Dominik Bastianello who spent time in the Paul Scherrer Institute (PSI). Bastianello originally planned to discover and compare similarities between image patterns on video clips, resulting from rotating or swinging cameras and those images known from the particle detector chamber of quantum physics showing traces of high velocity particles. Bastianello works as an architect and has a conceptual interest in the creation of visual spaces. In his final exhibition *Where in the World am I?* he metaphorically questions the complex relation of the observer and the observed – still a problematic philosophical issue in physics today. Bastianello's apparatus refers to a multiple layer of theoretical issues in quantum physics including e.g., the Copenhagen Interpretation of quantum mechanics, the Heisenberg Uncertainty Principle, and Bell Inequalities. I do assume that Bastianello subjectively tells us something about what John Bell called the 'problem' of quantum mechanics and its relation to observation. Hence, his installation may be summarized as a *poetic revelation* based on a subjective point of view of unsolvable observer-centered issues that have been bothering quantum physicists for a long time. There's a persuading link in his prototype to relativity and John Bell's wonderfully formulated question *Is the world more intelligible when we don't imagine ourselves to be at the center of it?*⁹.

As perception differs from the so-called exact sciences it may become the topic of experience and less a theory in the natural scientific sense. By inventing modalities

⁹ Bell, J. S. (2004). *Speakable and Unsayable in Quantummechanics*. 2nd Edition Cambridge: University Press. p170.

of experience art may offer different and multiple ways of perceiving the world. Art can even be capable of demonstrating how the natural sciences perceive and depict our world and where precisely their strengths and limits lie. Today, scientific laboratories serve as a space for the theoretical and speculative development of ideas; as condensed and enhanced environments in which reconfigurations of the natural and social order and its relations to each other take place.¹⁰ Shirley Soh, AIL-resident from Singapore at the Centre for Biosafety and Sustainability (BATS), focused on the ecological impact of GM (genetically modified) agriculture in developing countries with the adjacent issues of sustainability, biodiversity, market needs, and distribution. The focus of her study was on soil and bacteria. In her final exhibition *The Writing is on the soil*, she posed key questions regarding sustainability



in theory and practice, the availability of finite natural resources, and ethics. Visitors could hesitantly walk on cracking eggshells with sprouting grass seeds inside symbolizing the fragility of nature. Soh had scattered them about the floor at the Pharmazentrum's foyer – in a sort of sheltered room to which she referred to as 'safe space'.

Metaphorical language, words, pictures, sounds and many other material representations play an essential role in perception. Art is capable of giving us a *translation* of what is known scientifically and transform it into imminent experience. Under certain circumstances, art may act in terms of exaggeration as well. It then distorts scientific positions and procedures or just acts as a simple warning. [Fig. 2].

If we consider the artists' and the scientists' *processes* rather than their products, science and art share many ways of proceeding: observation, structured speculation, visualization, exploitation of analogy and metaphor, experimental testing. Among these shared features the visual, in particular, can play a key role in the representation of a remade experience in particular styles.¹¹ In fact, the language of images possesses an endless vocabulary which has been deconstructed and reinvented throughout centuries according to an exciting process generated by its own creative needs.

Visualization or Interpretation or Illustration?

[Fig. 3]. On various occasions we invited the residents and the scientists involved to mostly public meetings (among them 'Fusion 04' and 'Fusion 05') where they could present and exchange a number of topics of



¹⁰ Knorr Cetina, K. (2002). *Wissenskulturen. Ein Vergleich naturwissenschaftlicher Wissensformen*. 1st Edition Frankfurt a. M.: Suhrkamp Verlag. p45.

¹¹ Kemp, M. (2000). *Visualizations. The Nature Book of Art and Science*. 1st Edition Oxford New York: Oxford University Press. p4.

general research, or discuss specific problems which occurred in the research process during the residency. The artists welcomed these gatherings which were socially meaningful to them. One meeting specifically aimed at framing visual, interpretative and illustrative processes as they are generated in science and art or in other interdisciplinary research contexts. Although there was more of a common disagreement in the definition of these rather elusive terms on both sides, neither the artists nor the scientists argued against the increasing importance of the role of visual imagery at the interface between science and the public. Despite the fact that a majority of the artists was inclined to strictly refuse being 'reduced' to play the role of someone who 'only' visualizes, interpretes, or illustrates science! In fact, the question should be faced whether Bastianello's prototype represents a kind of 'visualization' or rather an 'interpretation' of the laws of quantum mechanics, for example. As much as the famous Richard Feynman aphorism that 'nobody understands quantum mechanics' should not be taken at face value, Bastianello's *Where in the World am I?* contains analogous intuitive elements about which Feynman spoke in his diagrams by saying 'I do know it's a crazy mixture of partially solved equations and some kind of visual picture of what the equation is saying is happening, but not as well separated as the words I'm using'.¹² Or else, does Shirley Soh's installation 'illustrate' the increasing impact of the life sciences on nature, society and our individual lives? Does it 'visualize' certain aspects of the life sciences? It may do so, but the term seems to be somehow too 'short' and its descriptive potential fails. Such questions seem to point to a dead end. We may also look at Nigel Helyer's *Theorem*, Margaret

Tan's *Smart Apron*, or Axel Vogelsang's *Lost Cosmonaut* the same way. The latter according to the artist is a work in progress to be understood as 'an experiment in interactive story telling and writing with digitally enhanced paper'. Tiffany Holmes' project *Floating Point* which conceptualized water quality in sound and image, came probably closest to what can be labelled a 'visualization'. 'Visualization', 'interpretation', and 'illustration' seem to be inappropriate terms here. They don't really

FLOATING POINT

Conceptualizing Water Quality in Sound and Image

Work in Progress • Tiffany Holmes • www.tiffanyholmes.com

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Figure 1. Water with unhealthy nitrate ions.



Figure 2. Water with average amounts of oxygen.

Please join us for a drink and a look at the prototype.
Wednesday, the 15th of December 2004, 17:30-18:30 pm
ETHZ Computational Laboratory – HRS Building, Viewing in Room F 05.

deal sufficiently with the profoundness and complexity of the translatory and transformative *processes* that inherently belong to our apparatus of perception. 'Visualization', 'interpretation', and 'illustration' much better apply to *techniques* of creation, presentations or portrayals of information, or they may serve as a redirection to what we call an ordinary 'drawing' in the case of an illustration. [Fig. 4].

Returning to my proposal on perception, I would thereby generally differentiate between methods of 'translation', 'completion', or even 'exaggeration' ect. It is within the experiential and perceptive 'dimension' that we can identify something conceptually as an autonomous *translation*, *completion* or *exaggeration* of the (natural) sciences. Moreover, it is a central issue to place a *model* of experience besides the apparently objective and rule based grasp of the (natural) sciences. Martin Kemp insists on yet another point: Our final full comprehension of visual and interpretative *processes* and *methodologies*. They provide, he argues, 'an ideal weapon in the fight to break down the barriers of communication that modern

¹² Kemp, M. *Visualizations. The Nature Book of Art and Science*. pp100-101.

specialization has erected between the arts and sciences'. Shouldn't then artists – as one artist stated – stop strictly refusing to systematize their methodologies? Indeed, the theoretical experience of these processes based on analysis, observation, and understanding should be made accessible. Methodologies do not only provide evidence but they also point toward aesthetic dimensions.

Regarding the impact of the life sciences on society and economy, and the controversy caused by ethical issues, more and more artists like Shirley Soh are concerned with ethical contents. Over the past years, the relation between art and the (natural) sciences has become a topic of investigative studies by art scientists. It is necessary that more studies about the workings of scientific methods from the perspective of contemporary art practices should be undertaken. We should be urged to study the transformation of the natural sciences into the techno sciences including the role of (media) art.¹³ This all reflects the fact that to the extent that these issues constitute a new 'field' of research themselves, it is still a field without a core knowledge base, a core set of constructs, and a core set of methodologies in science and art.

Yet, although there are no definite conclusions at this point, there is a tacit expectation. There will certainly be more insights into today's asymmetries between the arts and the sciences. In Michael Punt's view, the arts need to attend much more to methodology if they are to escape from the redundancy of simply inventing the familiar and avoid confusing insight with idiosyncrasy. He is pointing at yet another phenomenon which has to do with an obsession of scientific epistemological approaches: "In a reverse angle, the unsustainable obsession with science as an uninflected epistemology validated by method needs more scientists who are prepared to be amazed and to take risks with their public credibility by acknowledging the inexplicable anomalies that they discover in the laboratories".¹⁴ It is my conviction that only when the aforementioned general attitudes and assumptions will change in both science and art, we may be able to achieve a more complex understanding of the real potentials of interdisciplinary collaboration and exchange. The objectivist program of the sciences which does not necessarily provide a satisfactory account of human understanding nor the issues requiring such an account like human language and communication, the human sciences, moral and aesthetic values, should grasp the great opportunity for a change. This is the chance to accept the challenge of alternative epistemological programs like art which can circumvent certain problematic ways of thinking such as *fragmentation* breaking things up into bits, as if they were independent.¹⁵

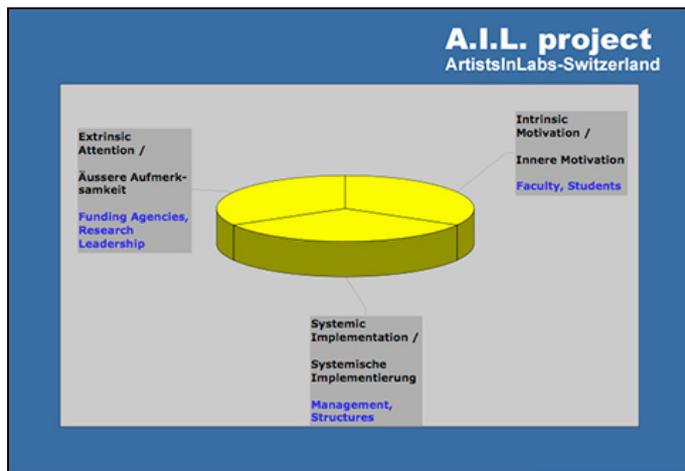
Conclusions: Interdisciplinary Research at the Interface between Science and Art

The AIL-Project represents a new development for Switzerland. It opened up the horizon for new creative strategies, observations and the analysis of the changes of novel fields of activity, working and reflection between science and art. Substantial shifts and incongruities of the boundaries between these disciplines have been detected and turned into pragmatic experiential perspectives defining future common interests and goals for researchers in science and art. The central component of this

¹³ Reichle, I. (2005). *Kunst aus dem Labor*. 1st Edition Wien New York: Springer-Verlag. p5.

¹⁴ Punt, M. (2005). *The 6th Swiss Biennial on Science, Technics and Aesthetics*. Available: http://mitpress2.mit.edu/e-journals/Leonardo/reviews/feb2005/swiss_punt.html. Last accessed 20 July 2005.

¹⁵ Bohm, D. (1996). *On Dialogue*. 1st Edition London and New York: Routledge Classics. p56.

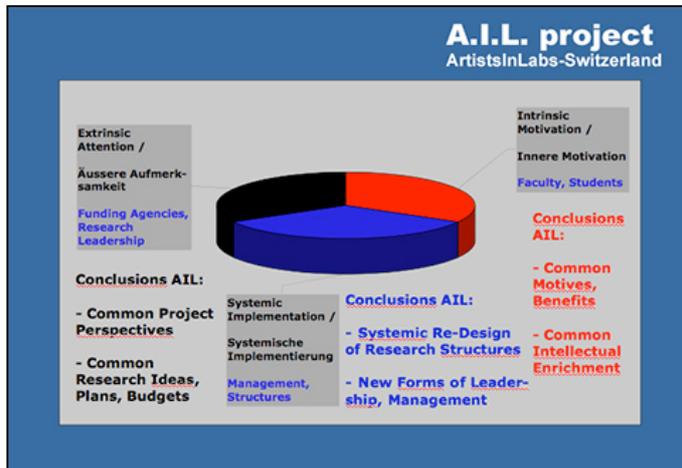


exchange and collaboration between science and art incorporated perception, communication, and imagination as well as special aesthetic experience. However, in a future project the issue of *common* benefits and *common* intellectual enrichment should be conceptualized more thoroughly so that they can contribute to the reorganization of new fruitful research perspectives. The main goal is to improve communication

and exchange between scientists and artists.

[Fig. 5]. In the AIL-Project there was an unpronounced agreement among its participants that the knowledge coming from either science or art, would – epistemologically speaking – not represent entities which are completely segregated from each other. I am persuaded that such an a priori assumption would, in the end, have led to complete non-communication. It had neither corresponded with our initial intentions to pave the way for a new dialogue between science and art, nor with the basic interdisciplinary character of the project. The concrete experiences demonstrate clearly what kind of structural and conceptual prerequisites may be necessary for a second round of AIL in order to sustainably foster the fruitfulness of future collaborative strategies. Today, new studies claim that the academic sciences are on the move away from traditional forms of homogeneous, hierarchical and discipline-oriented research – to new heterogeneous, inter-disciplinary, horizontal forms of collaboration. In a recent American NSF-study, Diana Rhoten uses interdisciplinarity to refer to the integration of different methods and concepts through a cooperative effort by a team of investigators. She introduces three major factors – ‘extrinsic attention’ (funding, agencies, research leadership), ‘intrinsic motivation’ (faculty, students) and ‘systemic implementation’ (management, structures) as being supportive for academic interdisciplinary approaches in research projects. Rhoten’s fundamental criticism of the status quo at universities addresses the problem very directly: “ (...) they have tended to approach interdisciplinarity as a trend rather than a real transition and thus undertake their interdisciplinary efforts in a piecemeal, incoherent, catch-as-catch-can fashion rather than approaching them as comprehensive, root-and-branch reforms”. And she adds: “As a result, the ample monies devoted to the cause of interdisciplinarity, and the ample energies of scientists directed toward its goals, have accomplished far less than they could, or should have”.¹⁶ I am persuaded that if science is to continue to maintain its authoritarian position in a responsible manner with a sincere interest in interdisciplinary research, it must widen its horizon to include open-ended analyses of experience. To include such experiences in relation to the world of art helps to envision new modes of knowledge production with a much wider scope that can go beyond the conventional frameworks of scientific and artistic exploration.

¹⁶ Rhoten, D. (2004). Interdisciplinary Research: Trend or Transition? *Items and Issues*. 5 (1), p6.



[Fig. 6]. Therefore, my key research conclusions suggest that *common* project perspectives between science and art are of high relevance. How can they be achieved? In the past thirty years many research programs have proclaimed aspects of interdisciplinarity, but, at the same time specialization in the scientific disciplines has increased dramatically. Scientists often complain of being tied too strongly

to their specialized thinking fields, but it is often difficult to motivate them to be included in collaborative working perspectives in which they must leave their own epistemological territories. Though, to aim at *common* benefits and perspectives means to define research interests together and to include science as much as possible as a partner with its disciplinary, methodologically oriented research goals. Common needs for research ideas, research plans and budgets, however, should be based on mutual partnership in order to fully integrate research interests of all partners.

To Rhoten 'intrinsic motivation' understood as an incentive or motivation for the project partners is a vital factor. The promise of common intellectual enrichment may become a convincing factor for a group of partners to engage in participation. An authentic collaboration based on collegial cooperation can only be created under thus clearly formulated expectations, actions and interactions. Furthermore, it is necessary – besides the integration of 'intrinsic' and 'extrinsic' factors (common financing, research perspective, goals) and motivation – to re-design the research structures systemically. Definitions of problems and project directions should be analyzed, discussed and transferred together. Only under such new conditions will it be possible to practice new forms of common knowledge production. By citing 'organizational errors that have resulted from the lack of vigorous thinking around interdisciplinarity' Rhoten warns: "Instead of implementing interdisciplinary approaches from the perspective of a thorough-going reform, many universities are simply adopting the interdisciplinary labels without adapting their disciplinary artifacts".¹⁷ It is therefore of utmost importance that the traditional forms of leadership and management methods be subordinated to the challenges and necessities of interdisciplinary research!

Jean-Christophe Ammann proclaimed that Western art has reached the *qualitative* rock bottom. Foreseeing immense novel chances and freedoms for art, Ammann argues that an extensive exploration of the 'psycho-mental inner space' still lies

¹⁷ Rhoten, D. Interdisciplinary Research: Trend or Transition? p9.

ahead of us.¹⁸ Novel, still unexplored contexts of dynamic and specialized knowledge production sites in scientific disciplines and laboratories may indeed represent a kind of physical and mental space where science and art could develop new abilities to grasp these chances and freedoms and define common research horizons for their aesthetic experiences. Thus, deep epistemological and ontological questions could be shared and discussed from various perspectives. William Irving Thompson calls these perspectives ‘presentations of time’: “The ephemeral quark and ephemeral performance of a work of art will be categorically different, for the machines of science, the instruments of AI, will be instruments of a Keatsian unheard music. The ultimate description of nature will have become the latest performance of culture, and we shall travel in endless loops of a mirroring Moebius strip in which our ideas of nature reflect our culture of ideas”.¹⁹ The philosophical issues of the observer and the observed as pronounced in physics, or the quest for mind and matter, for example, can be researched and reflected together, and this newly gained knowledge can then be transformed by avoiding the trap of a too narrow reductionist and disciplinary view. Luis Eduardo Luna, a South-American anthropologist refers to the issue of the various ways of knowing – I permit myself to introduce this trans-cultural link here – by relating it to another intriguing thought. Referring to the topic of knowledge in the culture of the Amazonian Indians he states: “For our western world to learn something means to be completely objective by attempting to ‘eliminate’ the subject as much as possible. (...) It is my impression that for a shaman or an Amazonian Indian to ‘know’ something may mean ‘transforming’ oneself into ‘that which one is observing’. One learns by transformation or by ‘approaching the two ends’ – the observer and the observed. The shaman becomes an animal or the animal becomes a human being”.²⁰ This kind of shamanistic iconography exists all over the world and it may tell us something that we could understand in a profound way. When the AIL-artists entered the science laboratories they started to transform and mediate the picture of the exact and objective sciences. With a kind of ‘shamanistic unsharpness’ they turned scientific artifacts into experiential realities to represent science differently. ‘Representation’ is in fact the most appropriate term here. Because it says – as David Bohm taught us – to ‘re-present’ – to present again.²¹

It is my conviction that interdisciplinary dialogues require today a new basis for profound reflection. We should take the risk and ask these important questions that reach beyond boundaries – beyond scientific objectivism. It is Vilém Flusser’s suggestion that our very subjective epistemological horizons like experiences, desires, or even dreams etc. play a very significant role in these contexts. One of the consequences of being able to communicate and exchange about this urgent demand is the common realization of new alternative forms of knowing, experience and analysis. Or in the words of Vilém Flusser: “To design new worlds which we haven’t explored yet”. It could be the starting point for a new way of making science and art a common enterprise – at the interface between the sciences and the arts.

¹⁸ Ammann, J. C. (2005). Identität und Authentizität. Das Ästhetische, das Dokumentarische - und das Ideologische in der Kunst. *Neue Zürcher Zeitung*. 111, p69.

¹⁹ Thompson, W. I. (1992). An introduction to “What Am I Doing in Östfärnebo?” by Cornelia Hesse-Honegger. In: Bundesamt für Kultur, Switzerland *Cornelia Hesse-Honegger. After Chernobyl*. Bern: Verlag Lars Müller. pp16-17.

²⁰ Luis Eduardo Luna, personal e-mail to author, July 14, 2005.

²¹ Bohm, D. *On Dialogue*. p63.

Let us remember that the value of the other and not of the I is aesthetically productive. Science and art share many ways of proceeding. They just have to start sharing them.

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Illustrations

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