CHALLENGES AND BENEFITS OF INTERDISCIPLINARY RESEARCH AND COLLABORATION – A REPORT FROM GERMANY

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Scientific research today is marked by a growing differentiation and specialization in the disciplines. A discipline is characterized by the questions it wants to answer, and the methods it employs to look for such answers. Increased specialization means an inevitable narrowing of focus, which is indeed its main goal. But a narrower focus may also lead to narrow-mindedness. For science, this may have catastrophic effects. In the best case, a slow-down in the advancement of the frontiers of knowledge. In the worst case, a permanent blockage of cures for deadly diseases or better ways for preventing the devastating effects of natural disasters.

When different disciplines look at similar questions, it is often advantageous to learn from answers found in other disciplines by considering their methods, by "looking through their spectacles." With many "spectacles" or perspectives, a more complete picture is obtained through interdisciplinary research and collaboration.

But collaboration takes time and energy. Why would anyone want to complicate things when we already have perfectly-formed departments, each optimized to answer a certain set of questions? In spite of the seemingly well organized chapters of textbooks, reality is complex and intricate and not arranged cleanly along the lines of already established disciplines, most of which have emerged by historical coincidence. Even more importantly, many research problems simply cannot be solved from a single disciplinary perspective, demanding a collaboration between the disciplines: *inter disciplinas*.

How can people be educated for interdisciplinarity? The Center for Interdisciplinary Research – ZiF – is an institute for advanced study which I directed for almost seven years. It was the seed institute for the founding of Bielefeld University in northwest Germany which, due to its historical origins, has a long tradition in interdisciplinary research. ZiF supports and houses interdisciplinary research projects from all fields across the natural and social sciences, engineering and the humanities. Its concept was developed by the German sociologist (and first director of ZiF) Helmut Schelsky who saw interdisciplinary exchange as a key driver of scientific progress. Being the oldest such institute in Germany, ZiF has been a model for numerous other similar centers in Europe.

As evidence for ZiF's attraction as a meeting place for interdisciplinary collaboration, more

than a thousand scholars visit the center every year for colloquia and workshops, summer schools, and research groups with residential fellowships. ZiF research groups are the primary means of supporting long-term interdisciplinary collaboration. For several months, and sometimes for up to a year, the fellows reside at the ZiF and work together on a broader research theme.

One research group run in 2005/06 by my psychologist colleague Günther Knoblich and myself, a computer scientist, focused on 'Embodied communication in humans and machines'. At that time, embodiment had become one of the most promising theoretical perspectives in the cognitive sciences and a challenge to research on intelligent machines. Yet the role of embodiment in communication (e.g., body stance, gesture, facial expression, voice quality) had still been granted comparably little attention, both in communication theories and in applied research on human-machine interaction. In order to look at these questions from the perspective of different disciplines, our group brought together international scholars from communication psychology, linguistics and psycholinguistics, theoretical biology and primatology, philosophy, computer science and robotics. While there was growing excitement for interdisciplinary engagement among the participants from the beginning, we soon realized that this was only a first step toward fruitful collaboration.

Interdisciplinary research and collaboration is not easy in practice – it requires extra steps and must be fostered and nurtured. But our experience shows that nothing else can take its place. Here is what we learned about the challenges and benefits of adopting an interdisciplinary approach.

First of all, interdisciplinary projects need time. The incubation of the theme and its particular questions requires an extended period when, not subject to external influence, participants come to learn about each other's perspectives and insights. Typically, after initial excitement, there is confusion when participants realize that their understandings of terms appear to be different from their peers. Clarification and attempts at definition can encounter resistance and difficulties before change and widening of perspective follow.

Second, there are many benefits, including those which are unexpected. Creativity is not plannable but fosterable by a change in perspective. In the diversity and richness of interdisciplinary exchange, it may happen that attention is drawn to new questions that haven't been asked in one's field, and which henceforth inspire one's own research. Answers may even be found which were not sought after in the first place.

Third, the effects of interdisciplinary research and collaboration are gradual. Progress does not come about casually, and requires continued endeavor. Confusion and temporary disappointment are to be expected, before findings produced through interdisciplinary research are mature enough to be presented to a wider audience and dissemination of results can take place.

What else can be done to foster interdisciplinary research? Another notable and highly successful interdisciplinary activity in Germany is the Interdisciplinary College (Interdisziplinäres Kolleg, IK). Established in 1997 and located in the inspiring surroundings of Lake Möhnesee, the IK is an annual, intense one-week spring school, with a course program comprising science, technology, and humanities and including neurobiology, neural computation, cognitive science, artificial intelligence, robotics, and philosophy. It is aimed at students, postgraduates and researchers from academia and industry. Courses include introductions and methods courses (which allow participants to become familiar with the "spectacles" worn by researchers in other disciplines), as well as the in-depth treatment of a focal theme which changes from year to year. For instance, the theme of IK 2015 was 'From Neuron to Person: Assembling Behavior and Cognition', with a focus on how to analyze or design complete, autonomous agents – animals, humans, robots, and software characters. The benefits for participants of IK are multifaceted, and besides education for interdisciplinarity, it is a unique social event with ample chances for networking between academia and industry and for more continuous interdisciplinary collaboration.

A general observation is that the success of interdisciplinary research and collaboration does not result from individualistic perspectives but rather from interacting with one's peers. It depends – over and above disciplinary qualification – on the willingness of participants to listen to each other, develop true interest in the others' perspectives, and to take on a new perspective to the end of a joint project. Any social or structural support that can be introduced to enhance smooth, appropriate, and enjoyable interaction between individuals and groups will help the research to move forward.

While interdisciplinary research and collaboration presents challenges and calls for extra steps to be taken, the many benefits far outweigh this work, as nothing can really take the place of interdisciplinary research and collaboration for bringing ideas forward. So, get ready to change your perspective, change your concepts, give up positions, learn about the methods and the perspectives of others (to see "through their spectacles"). There is much to be gained. It is worth the effort.

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www.uni-bielefeld.de/ZIF/

www.uni-bielefeld.de/ZIF/FG/2005Communication/

www.interdisciplinary-college.de

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