

# FROM SCIENTIFIC SPECIALIZATION TO THE DIALOGUE BETWEEN THE DISCIPLINES

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## ABSTRACT

The enormous increase of the objects of inquiry since the seventeenth century has led to an increasing specialization in the individual scholarly and scientific disciplines and in their research. Today, despite the immense gain in knowledge tied to this development, an increasing number of people believe that cooperation between the disciplines is urgently necessary, because it can lead to creative ways of approaching problems and, therefore, to productive solutions. This is especially true for such socially relevant problems as research on peace or the environment. But considerable barriers hinder this cooperation. The conventional organizational forms of the scholarly and scientific enterprise, for example, promote further specialization rather than cooperation. So, too, the research undertaken by different disciplines often proceeds on vastly different basic assumptions. And, of course, one discipline often lacks knowledge about a neighboring discipline. But these difficulties might well be overcome if scholars and scientists are willing to adapt themselves, quickly and unconventionally, to new and surprising research constellations.



Since the early 1960's, "interdisciplinarity" has been one of the important concepts in the debate about Wissenschaft.<sup>1</sup> English in origin, the term is used in a German-speaking context chiefly in the discussions about university reform. The debate about establishing a "studium generale" in the 1950's (as a reaction to the necessary renewing of the German educational system after 1945) is replaced in the 1960's by a debate about possibilities and forms of interdisciplinary cooperation. Whereas the politically based discussion about the "studium generale" was still conducted wholly under the banner of the resurrection of humanistic traditions (cf. Ruegg, 1954, p. 24ff.), (the conception

of interdisciplinarity is markedly pragmatic as regards the organizational forms of Wissenschaft and research. The main concerns of interdisciplinary research are interdisciplinary cooperation, teamwork or research in groups, and the founding of reformed universities with interdisciplinary emphases. The debate about interdisciplinarity concerns itself specifically with the problems of the current research and university situation.

The hopes of the 1960's have been only partially fulfilled. For the German-speaking area, an independent "Center for Interdisciplinary Research" (ZiF) has been founded in Bielefeld only; at this center, the discussions about interdisciplinarity have become institutionalized. On the whole, the UNESCO conference in Bucharest in 1981, on "Interdisciplinarity in Higher Education," reflected the disillusionment that has set in since the 1960's. The reasons for this disillusionment can be found both inside and outside the "system" of Wissenschaft. Internally, the main problems are that of the "unity" of Wissenschaft and (especially) of interdisciplinary Wissenschaft and that of possible structural parallels between individual disciplines. In other words, the main internal problem is the question of what connects the Wissenschaften, of what they have in common.

The main difficulties external to the "system" of Wissenschaft are to be found in the current research and university situation. Faced with ever shrinking financial allocations, the forces promoting research appear to be less interested in innovative projects and goals than in the preservation of existing, traditional structures, i.e. those oriented around individual disciplines. But this scarcity of funds could also trigger the opposite (positive) effect if the scarce financial allocations were primarily used to solve individual central (interdisciplinary) problems, to address questions that involve more than one discipline.

Clearly, the concept of "interdisciplinarity" (Holzhey, 1976; Gusdorf, 1978) has to do with questions "between" the disciplines; interdisciplinarity therefore always implies the problem of disciplinarity. Both problems are aspects of the "system" of Wissenschaft. Thus, interdisciplinarity is concerned with principal wissenschafts-theoretical and wissenschafts-historical questions. Like disciplinarity, interdisciplinarity is a part of the reflexion of Wissenschaft: the immense growth of science and scholarship, problems of the theoretical grounding of Wissenschaft, and its public exploitation and application are all questions that involve both discipline-specific research and research that encompasses more than one discipline.

But interdisciplinarity is also especially dependent on disciplinarity. Since interdisciplinarity requires a high degree of differentiation among the disciplines and a high degree of specialized research, disciplinarity and

interdisciplinarity have an exactly reciprocal relationship. The dialogue or cooperation between the disciplines assumes the separation and the independence of the individual disciplines. Interdisciplinarity and disciplinarity are, therefore, on the one hand, individual problems in the larger complex of Wissenschaft: on the other, they are necessarily interrelated.

### HISTORICAL PREREQUISITES FOR INTERDISCIPLINARITY

To be possible, interdisciplinary research requires the loss of the unity of Wissenschaft. Interdisciplinarity is therefore a relatively modern problem. Only at that moment in history when the autonomy of the individual disciplines and the lack of unity are perceived as problems is the hour of interdisciplinary research and debate at hand. Hence, interdisciplinarity is a problem of the history of Wissenschaft.

For the Greeks, Wissenschaft was – as a "methodized means to knowledge" – the one form of knowing that was held separate from other forms (cf. von Hentig, 1971). In addition to philosophia (critique of cognition), Wissenschaft was composed of two other parts: historia (the ascertaining and ordering of experience) and techné (the applying of the ordered knowledge of experience). These three levels of knowledge are bound up in the concept of philosophia as the unity of all knowledge, whereby philosophy is seen, not as a theory or system, but as the form of reflexion of the unity of all Wissenschaften.

The idea of the unity of Wissenschaft remains alive well into the early modern period. In the Middle Ages, the sense that cognition is divine plays a decisive role; in Humanism, the unity is considered as it pertains to human talent or human consciousness. Even René Descartes still clings to the ideal of unity: "all philosophy is like a tree; the roots are metaphysics, the trunk is physics, and the branches that have grown out of this trunk are the other Wissenschaften. These latter can be traced to three main disciplines, namely medicine, mechanics, and morals" (Descartes, 1647; quoted by Luyten, 1974, p. 135).

But in the seventeenth and especially in the eighteenth century, it becomes clear that the immense increase of the objects of knowledge is leading to an increasing specialization in the individual scholarly and scientific subjects. More and more, the problem of the unity of Wissenschaft is perceived as a problem that is -- both theoretically and practically -- no longer readily solvable. This is reflected in these words of Francis Bacon: "all the classifications of the Wissenschaften are to be understood and employed in such a way that they name and distinguish the different fields but do not separate or

dismember them, because it is important that the dissolution of the connections in the Wissenschaften be everywhere avoided. The opposite effect has made the individual Wissenschaften empty and unfruitful and has led them into error, since they are no longer nourished, preserved, and refined by a common source and a common fire" (Bacon, 1623; quoted by Funke, 1974, p. 175). Here, Bacon, at the beginning of the seventeenth century, invokes a unity of knowledge and of Wissenschaft that is already in danger of disintegrating.

Since the unity found in the classical and humanistic tradition can no longer simply be assumed, the question of a "new" unity, one yet to be achieved, must become a theoretical and practical problem. From this point on, the once assumed unity (as a part of a philosophically grounded cosmology) finds an analogue in a unity that must first be produced or brought about. Such attempts at unification can be found in the history of the modern period, undertaken in different philosophical ways and on various theoretical levels, in the works of Comenius, Leibnitz, d'Alembert, Kant, Wilhelm von Humboldt, or Hegel. Ontological foundations of unity are, more and more often, replaced by those grounded in the theories of cognitive science. The most pointed expression of the wish for a new unity can be found in the early romantic notion of "Symphilosophie," in which the production of unity is attempted by means of a reduction in mythos.

These philosophical and mythological conceptions are not yet phrased in terms of "interdisciplinarity." Implicitly or explicitly, however, they have as their subject a theory that would unify all Wissenschaft and all Wissenschaften.

#### THE INSTITUTIONALIZATION OF INTERDISCIPLINARY COOPERATION

Two tendencies correspond to the philosophical-theoretical answer to the modern process of differentiation in the Wissenschaften: there is, on the one hand, a pragmatic attitude toward the reciprocal "lending" between neighboring disciplines (with its possible forms of graduated systematization) and, on the other, an increasing institutionalization of interdisciplinary cooperation. It is generally true, of course, that there was a general "social stabilization of Wissenschaft" (cf. Kahn, 1976, p. 19) after the phase of "intellectual independence" in the second half of the seventeenth century. Wissenschaft becomes generally institutionalized, a process that cannot simply be explained as an internal development. It also has external, broadly historical causes: a new urban culture, the new means of production in manufacturing, and the organizational form of the absolutistic state make possible the acceptance of the process of scientific progress. And for a time, this process is considered irreversible.

The process of institutionalization at the beginning of the history of modern Wissenschaft encompasses the institutionalization of the individual Wissenschaften as well as of the cooperation between those individual disciplines. Here, the founding of academies is the decisive historical event. In the academies of the seventeenth century, to be sure, no formal, internal differentiation between fields is undertaken at first: but such a differentiation does begin quite early on, even though it does not immediately conform to our modern scheme (cf. Weingart, 1976, p. 53). An examination of these scholarly societies makes clear that the process has three steps: whereas initially, individual disciplines are not distinguished, the second step is marked by a differentiation made for the sake of discussion and research in the individual fields. In the third step, groups begin to form, signifying, "basically, a retraction of the differentiation" (p. 54). Of great importance also is the question as to how "pure" Wissenschaft and "applied" Wissenschaft can be brought together or connected. Progress by means of cooperation is considered equal to the application of Wissenschaft and technology; divisions between the disciplines are seen as obstructions to such progress.

In terms of the history of Wissenschaft, then, the beginning of the modern period is marked by three important points: the institutional (and therefore political) establishment of the disciplines as a "system" of Wissenschaft; the differentiation in scholarly and scientific institutions (as in the academies) for the sake of progress in individual disciplines; and the cooperation between individual disciplines, especially of the sort that intends to solve the problem of applying Wissenschaft and technology and to attain thereby at least a partial unity of Wissenschaft. Interdisciplinarity is thus practiced in the scientific academies for the sake of progress. In these institutions, the question of the philosophical unity of the Wissenschaften plays a subordinate role.

A combination of the philosophical discussion about the unity of Wissenschaft and the institutional solution to the problem of unity does occur – at that moment in history when, at the beginning of the nineteenth century, the Berliner university is founded under the auspices of Humboldt's concept of education [Bildungsidee]. By virtue of its connection to the founding of a university, an act of much consequence for the subsequent history of universities in Europe and elsewhere, Wilhelm von Humboldt's concept of "universal education" [allgemeine Menschenbildung] became the standard and the goal for movements and educational endeavors of various colors that can be traced through the course of the eighteenth century. Up to this time (as revealed by the example of the great French encyclopedia compiled by d'Alembert and Diderot), the attempt to combine the philosophical with the institutional unity of Wissenschaft had been only partially successful. By founding the Berliner university, von Humboldt is the first to find a

replacement for the "encyclopedic" solution in his practical application of the idealistic notion of a "conceptual overview through education" [Idee durch Bildung]. This notion attempts to create the unity of Wissenschaft institutionally, under new historical conditions. "This concept implied the rejection of the specialized and praxis-oriented individual Wissenschaften as well as the rejection of their empirical methods, inasmuch as the scientific or scholarly character [Wissenschaftlichkeit] of these disciplines and methods could be seen as part of the process of philosophical reflexion" (Weingart, 1976, p. 119).

Humboldt finds a unifying agreement of all Wissenschaften, not by invoking structural parallels between, or technical subject matter shared by, the individual disciplines, but by employing a concept of education centered on the human subject, a subject capable of being perfected and, indeed, already in the process of perfecting itself. The difficulties of practically applying this concept are obvious: problems of university organization and of the politics of Wissenschaft, and the primary questions of whether (interdisciplinary) connections can be made between individual disciplines in the sciences and the humanities, and whether any concept of education can be made so general as to include all the disciplines (cf. Hohendahl, 1982). The ideal of the educated person [des Gebildeten], in contrast to one who is merely learned [der Gelehrte], must remain an ideal of the hermeneutically based historical-philological disciplines. That the discipline of history could (had to) assume the role of guiding discipline of Wissenschaft in the nineteenth century (as opposed to philosophy in the eighteenth) clearly reveals the gap in Wissenschaft, a gap that is no longer bridgeable by interdisciplinary methods: there is a deep division between the humanities and the natural sciences.

Von Humboldt's (utopian) attempt and its history reveal just how difficult it was to unify all Wissenschaften -- theoretically and institutionally -- under the banner of a universal concept of education. "Unity" was (and will continue to be) most easily attained in its practical application, as a "unity of research and teaching." But here, as well, and especially in the twentieth century, there are difficulties that cannot be overlooked. Knowledge has continued to increase, as have the problems of a sensible and necessary reduction in complexity in research and in teaching. Implementing von Humboldt's idea will therefore become more and more difficult.

#### CURRENT FORMS OF INTERDISCIPLINARITY

The history of Wissenschaft shows that interdisciplinary research may assume various forms. We can speak of a scale of the sorts of possible cooperation between disciplines. This scale ranges from forms designed to

further progress in individual disciplines to concepts that strive for a universal unity of Wissenschaft.

Current discussions also emphasize the variety of forms and goals in interdisciplinary research. They distinguish pluridisciplinarity and multidisciplinarity from interdisciplinarity and transdisciplinarity. Pluridisciplinarity and multidisciplinarity denote cooperation or coordinated work between more or less neighboring disciplines; interdisciplinarity concerns itself much more with the unity or structural parallels of individual disciplines or with specific problem-areas in such disciplines. Here, emphasis is placed on the practical execution of research in scholarly interaction, preferably in an interdisciplinary group: "an interdisciplinary group is composed of people from various disciplines, each with his different concepts, methods, and data; such a group is organized to solve or work on a shared problem by means of a continuous exchange between the participants from the various disciplines" (Mayville, 1978, p. 9; cf. also Jantsch, 1980).

"Transdisciplinarity" is reminiscent of the older concepts that suggest or promise a unifying theory of Wissenschaft, one in which a higher "level of integration" is sought. "Transdisciplinarity embraces several levels of integration, each of which has interdisciplinary and multidisciplinary elements, and then raises them to a higher level of integration. The comprehensive theory of the evolution of the universe, for example, consists in ... the theories of the evolution of matter, of life, and of the human being, and it may therefore lay claim to transdisciplinary breadth. This theory transcends individual disciplines and first-level integrations, encompasses several such levels, and is sustained by many related methodologies and conceptual systems" (Nevo, 1981, p. 10).

Forms of interdisciplinarity may, however, be distinguished according to criteria other than the degrees of possible cooperation or of attained integration. In the praxis of institutional interdisciplinary research, four different "criteria of interdisciplinarity" have been developed: "border-interdisciplinarity," "problem-interdisciplinarity," "method-interdisciplinarity," and "concept-interdisciplinarity" (Huerkamp et al., 1979, pp. 24-26).

We speak of "border-interdisciplinarity" when two disciplines have approached each other to the extent that "an overlapping area is created between them in which both disciplines, each with its own methods and concepts, can make a (productive) contribution to the solution of a problem, because each has already worked in the area." Comparative behavioral ontogenesis in humans and animals -- a problem now being researched by psychologists and biologists -- provides a good example of

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border-interdisciplinarity. Of course, each group approaches the problem in a different way, "since the psychologists concern themselves with the development of the individual and with the character traits and illnesses that arise during such development, and the biologists examine the principal species-specific processes of normal development" (p. 24). But in the bordering or overlapping areas of the two disciplines, productive questions are posed and new solutions found. Such questions and solutions can also lead to new branches of Wissenschaft, if neither "mother discipline" can offer the required methods. This has happened in the field of behavioral ontogenesis, as can be seen in the creation of a division for "developmental psychobiology" at the Max Planck Institute for Psychiatry or in the publishing of the new American journal Developmental Psycho-Biology. Another example of such a new Wissenschaft is bio-physics, a field on the border between biology and physics.

In contrast to "border-interdisciplinarity," which has its beginnings in individual disciplines, "problem-interdisciplinarity" can be characterized as a research procedure centered on a complex and problematic question. As a rule, this problem cannot be assigned to a given discipline, nor can its solution be approached in a border area between two fields. Usually, therefore, several disciplines take part in the research. The difficulties with this sort of interdisciplinary work (if Utopieforschung is taken as an example; see below) are the problems of exactly defining the object of research and choosing the methods to be used. Since a simple collecting of viewpoints does not make for interdisciplinary research, the object of study must be carefully selected and limited, and the methodology must be standardized at the beginning of the undertaking. Before mutual interdisciplinary research can occur, all conflicting, discipline-specific methods and handicaps must be critically discussed, corrected, or modified. Here, a certain "maturity" (both internal and external to Wissenschaft) is just as important as the question as to whether such an interdisciplinary analysis might turn out to be useful in addressing the individual problems of the disciplines participating.

"Method-interdisciplinarity" is understood as a form in which "new methods, developed in various disciplines, can be used in others" (Huerkamp et al., 1979, p. 25). The problem of transferability is all important for this kind of cooperation. Only in rare cases can methods be simply transferred to another discipline and applied unchanged to a different problem; such cooperation is often made more difficult, and such transferability often impossible, by the fact that the disciplines often develop separately, at different times and rates. A related question: should the use of one discipline (or of a method developed by that discipline) as an auxiliary or "helping" Wissenschaft (statistics, for example) be seen as a sort of interdisciplinary cooperation? If we cling to the principle of cooperative interdisciplinarity in which at least two disciplines learn and profit from each other, then this question highlights the limitations of the

concept of interdisciplinary.

Under the term "concept-interdisciplinarity," then, we can combine those cases "in which models or concepts developed by one branch of the Wissenschaften can be used to supplement or even to replace the models or concepts of another discipline" (p. 25). The main task here, analogous to the above mentioned problem of transferability and to the question of the processes of exchange between disciplines, is to find points of contact within the often varying scientific and scholarly contexts, and to make these productive for interdisciplinary cooperation. The dominance of one discipline's concepts or models over those of another always reveals the limits of reciprocal interdisciplinarity. The primary role of linguistics or of the social sciences in certain areas of literary scholarship may be seen as examples of such dominance.

Whether interdisciplinarity is concerned primarily with a research subject (border-interdisciplinarity, problem-interdisciplinarity), or with aspects of methodology (method-interdisciplinarity, concept-interdisciplinarity), the practice of research proves that the forms of interdisciplinary cooperation required are chiefly determined by the choice of the research topic, and that these forms must be discovered and created during the course of the research itself. Thus it is the specific practice of research that determines the degree of attainable interdisciplinarity. Such research is "expensive, time-consuming, full of surprises, often laced with conflicts, and it makes great demands on those involved: they must be open, flexible, and willing to communicate. Not every scientist or scholar is suited to such work. And the abilities required have nothing to do with the abilities that usually determine the reputation of a scientist or scholar" (Kaufmann, 1983).

If we examine all branches of Wissenschaft to determine their potential for interdisciplinary cooperation and their potential difficulties with such cooperation, we can distinguish five principal topological categories:

(1) Interdisciplinary work in the natural sciences and in mathematics. Cooperation appears comparatively "simple" here, since a common code (the formalized language of mathematics) facilitates communication.

(2) The connection between the natural sciences and practical technology. The application of the results of scientific research in the area of practical technology necessarily demands forms of interdisciplinary cooperation. Without such forms, the practical appropriation of theoretical knowledge would be impossible.

3) Interdisciplinary cooperation in the humanities and social sciences. This can be described as the effort to establish connections (unification); here, the goal must be to achieve a consensus within a research group (as in an interdisciplinary research team). Therefore, interdisciplinary cooperation in the humanities can be characterized as the participants' attempt to achieve consensus, as a hermeneutic process that leads, ideally, to a synthesis.

(4) Dissemination of the results of humanities and social science research in public and in the classroom. This also requires interdisciplinary cooperation. The main problems here are those of the selection and reduction of the material (complexity should be preserved, not eliminated), and the question of communication (language).

(5) The most difficult sort of interdisciplinary cooperation is that between the nomological natural sciences and the humanities and social sciences. This difficulty has an historical explanation, as was shown above. The loss of the assumed unity of Wissenschaft makes the division between the two major discipline groups a major problem and a continuing challenge. This division is deepened by the different methods and codes (languages) used by the two groups. But there is another reason: problems of cooperation and communication are also caused by the differences between the objects treated by each group.

The incompatibility of methods reminds us that the subjects of the individual Wissenschaften are also incompatible. Thus, the question of theories or models that might guarantee unity must remain open.

#### POSSIBLE UNIFYING CONCEPTS OF INTERDISCIPLINARITY: INTEGRATION OR COMMUNICATION?

Can productive models or concepts of unification be developed -- given the differentiation found even in the sphere of interdisciplinary cooperation? Three main suggestions for such models are being considered today: that of structuralism (cf. G. Schiwy...), that of functionalism, and that offered by the general theory of systems.

It was Jean Piaget who, first and foremost, made the idea of common structures the starting point for a theory of interdisciplinarity (Piaget, 1973). According to his theory, one must not only establish structural parallels between various disciplines and in various problem-areas, but also concentrate on the question of comparability. But structuralism is ineffective if it remains (as in Piaget's work) severed from a general theory of evolution and learning. Here, the question of new guiding sciences must be raised: is the role of philosophy

and social philosophy now being taken over by psychology and anthropology? Can a structuralist concept of evolution be arranged so that it conforms to a social theory, to "general assumptions about the structures and the development of the social totality?" (Bonss, Schindler, 1982, p. 53).

Today, in contrast to the ideas of interdisciplinary structuralism, the aspect of function is receiving emphasis. Along with the aspect of application, those of communication between discipline groups and of exchange between neighboring disciplines receive special stress. The exchanges in question are those undertaken to seek interdisciplinary solutions and limited syntheses that may have retroactive benefits for the participating Wissenschaften. This sort of (functional) pragmatism reveals itself in programmatic statements about interdisciplinary research: the demand for a re-integration of the specialized disciplines by means of cooperation intends, not a philosophically grounded universal synthesis of the Wissenschaften or their knowledge, but rather a cooperation of specialized disciplines for the purpose of developing and researching specialized questions; that is, this demand for re-integration intends to develop a partial unity of Wissenschaft centered on, and created during the work on, each given object of empirical study. The foundations of such interdisciplinary research are a mutual conceptual understanding and the development of common theoretical concepts. And in those fields in which research is less often governed by "theories" (as in the historical and philosophical disciplines), it is important to unify the specialized aspects of a given subject by centering them on universal objects of research, without considering the concrete nature of a team-research project, which would necessarily be much more limited.

The most far-reaching, although still very formalized, theory of interdisciplinarity is offered by the general theory of systems with its many models for possible (combinatory) connections. Niklas Luhmann has proposed that systems be seen as entities that "separate themselves out of an environment by means of differentiation and that contain, within themselves, a description of the differences between the system and its environment. The element of "reflexion" becomes, so to speak, transferred from the subject to the object" (Luhmann, 1981, p. 156).

If the element of reflexion, however, is no longer tied to the subject (as in the hermeneutic tradition), then other methods from the area of cognitive theory are required, methods that can approach the object of analysis in an "objectivistic" manner. This means that the theory of systems attempts to transcend the "subjective factor" and to establish interdisciplinary connections by beginning with the "objects" themselves. Especially interesting in this context are those entities of knowledge and ideals that contain points of contact which make the systems themselves dynamic (cf. problems of "dynamic

stability" and of evolution).

Whether or not this theory can close the gap between "theoretical interest groups in science and scholarship or in technology and the humanities" remains to be seen. And yet, disciplines such as cybernetics or bio-chemistry (which were created, and can be practiced only, by interdisciplinary cooperation) reveal tendencies that point in this direction. In the meantime, the individual will probably find himself confronted more and more often by the realization that the complexity of such Wissenschaften places too many demands on his abilities.

#### INTERDISCIPLINARITY IN THE HUMANITIES: THE EXAMPLE OF UTOPIEFORSCHUNG<sup>2</sup>

The problem of interdisciplinary research in the humanities can be illustrated with the help of a short example: a project of the "History of the Function of Literary Utopias in the Early Modern Period," conducted from 1980 to 1981 by an international research group at the Center for Interdisciplinary Research at the University of Bielefeld. Those participating were scholars and historians of literature from ancient and modern philologies, philosophers, historians, and sociologists, all of whom had had experience with interdisciplinary cooperation.

After a preliminary briefing phase in which the selection of the subject area was discussed, the group concentrated on three steps (Voskamp, 1982, p. 2). First, concepts and definitions of Utopia from various theoretical contexts and from different disciplines were compared, critically discussed, modified, supplemented, or expanded. The group discovered that Utopieforschung is especially suited to illustrate the problems of interdisciplinary cooperation in the humanities, because the conflicting concepts and definitions of Utopia actually mirror the existing conflicts of theories and methods in the humanities themselves. A consensus was achieved insofar as the research was limited to texts that have been characterized as "Utopian" because of their specific structures and functions and their historical assignment to a certain kind of discourse. The group's point of departure was therefore not a theory of "The Utopian" or of "utopian intention" following Ernst Bloch. Rather, one of the main areas of concentration turned out to be this: to determine more exactly the relation of ("Utopian") texts and ("Utopian") structure of consciousness ("intention," "method"), and to analyze the meaning of collective ("Utopian") fantasies: the ideal city, the Garden of Eden, the Golden Age, the Land of Milk and Honey (cf. F. Seibt...). Here, the individual group members introduced their respective research projects. It became possible to replace the theoretical discussion of Utopia with the work of historical reconstruction. And although

the group did not achieve a unified and complete picture of the early modern "utopia," the members did quickly discover that a "history of Utopia" was the only meaningful and adequate way to discuss and "solve" the related theoretical problems. The third and final step in the group's work was a discussion of the method of historical reconstruction and the idea of interdisciplinary cooperation itself. The group found that a central problem of interdisciplinary research in the humanities and social science, once a research topic has been selected, is the finding of a common language. Interdisciplinary discourse is made possible only by a process of ever-increasing communication.

Overall, the group tried to avoid approaches of the sorts grounded in the history of philosophy or the history of ideas, or those based on analyses of features or motifs, by analyzing the texts assigned to the discourse "utopia" in their historical and social contexts, that is, according to their conditions of origin and their subsequent influences. The fundamental contribution of Utopias must be sought in their function. And since this function must be established for various historical situations, this means analyzing, on the one hand, the historical context (the expectations and behavior patterns of historically varying readers) and, on the other, the audience-specific structures of communication in the texts themselves. Both aspects aim at analyzing forms of consciousness and patterns of behavior, something usually performed today under the auspices of a "histoire de mentalites" or "history of ideas." Here, however, the "history of the dissemination and transformation of social knowledge" (Vosskamp, 1982, p. 7f) is just as important as the discovery of long-term conceptual systems and their fluctuations and changes over time.

In the context of such questions, the interdisciplinary work of the Bielefeld group centered on three main problems: first, the transition from the classical "Utopias of space" in the Renaissance (cf. Thomas More's Utopia) to the modern "Utopias of time" in the eighteenth century (cf. the Enlightenment philosophy of progress, and Louis-Sebastien Mercier's The Year 2440); second, the "dialectics of Utopia" (utopias are praiseworthy ideals and horrible nightmares; cf. the problem of totalitarianism); third, the processes of Utopian self-reflexion, as a "critique of Utopian reason." These three aspects formed basic questions around which it was possible, at least partially, to group or synthesize the various arguments from the participating disciplines.

The group achieved interdisciplinary agreement especially in the mutual reconstruction of the history of Utopia since the eighteenth century as both a history of Utopias and a history of Utopian self-reflexion. On the level of aesthetic processes, this can be observed as early as the works of Wieland, in which a Utopian narrative becomes a narrative about the possibility of (Utopian) narration itself. The semantics of Utopia and of its potential for images are seen as historical and can therefore be tested for their "Utopian" utility or

become the material for aesthetic experimentation or play. Philosophically, the increasing tendency of Utopias toward self-reflexion begins a process of subjectification and aesthetification. This begins the process of highly complex steps in the reduction of the concept "Utopia" that marks our modern period as well, either as "work of art Utopias" or as critical "subject Utopias" or "momentary Utopias," that is, Utopias of individual happiness or sudden insight and knowledge. Historically, this means that such reduced concepts of Utopia cannot admit generalizations or models that would apply to all of society. Today, this means that other, historically older concepts of Utopia, such as those of the Enlightenment, are gaining new relevance (cf. Rousseau's concept of nature or Kant's idea of "eternal peace"; cf. Vosskamp, 1982, p. 7f).

### INTERDISCIPLINARITY AND LANGUAGE

As shown by the experience of Utopieforschung: along with the choice of the "correct" moment for interdisciplinary research (which depends on the maturity of the problem in the Wissenschaften and on external societal needs) and along with the consideration of the factors of group psychology (composition of the research group, dynamics of the group "learning process"), the problem of language plays a central role in interdisciplinary cooperation.

Initially, each researcher enters the discussion with the technical terminology of his own discipline at his disposal; attempts by one discipline or another to ensure the dominance of its own terminology occur quite often. But a language mixture can develop only during the work of the research group. This mixture is created in the course of the learning process, and is composed of elements from the various technical languages participating in the given discourse. Transcending all competition and rivalry, it can then assume a communicative function. But such a common meta-language can build only partially on the available colloquial language; the latter can have the first word, but not the last (John L. Austin).

Whether an interdisciplinary meta-language could be scientifically produced remains a hotly-debated question. Attempts to construct a base language (for example, from a set of 400 to 500 terms; see Lorenzen, 1974; Luhmann, 1981) seem problematic, since it is clear that the meta-language must develop during the work on the specific problem-nexus. In each interdisciplinary research project, the problem of language will pose itself and have to be solved anew.

This presents a difficulty, certainly, but also an opportunity: only in the process of searching for and gradually finding a common meta-language can an interdisciplinary discourse develop. Thus, the emergence of a new discourse

called Utopieforschung is the result of original (discipline-specific) language problems. This new discourse can be considered a discourse between the disciplines, and one that has, at the same time, retroactive effects on those disciplines participating in the research process. But this new discourse can also continue to work as an independent discourse (according to the degree of institutionalization involved), and can thereby assume the function of a new branch of Wissenschaft. Therefore, the emergence and crystallizing of a new field or area of Wissenschaft can also be seen as an institutionalization of speech forms that have relatively common semantics. Interdisciplinary cooperation not only makes possible a mutual enriching of the participating disciplines; it also can produce new discourses.

### INTERDISCIPLINARITY AND TEACHING

Interdisciplinary teaching depends on whether the complexity of a given problem can be reduced to its essentials and whether a language of communication can be found. The most important prerequisites for interdisciplinary teaching are:

- A high degree of openness and curiosity on the part of teachers and students, and an attitude of readiness to adapt, quickly and unconventionally, to new and surprising constellations.

- At the university, departments are needed that, together with interdisciplinary research institutes, could develop programs for interdisciplinary teaching. This would require cooperation between those engaged in theory and those engaged in practical application and implementation.

- Interdisciplinary teaching can take place in a team-teaching environment among representatives from several disciplines. For students, interdisciplinary studying or learning would require a solid knowledge of the basics of the field in question. It seems, therefore, that interdisciplinary teaching would be effective only among advanced students.

- In the future, interdisciplinary teaching could be implemented more often in advanced or continuing education and training programs. On-the-job experience often allows one to recognize possible connections between disciplines and opportunities for interdisciplinary exchange. A less problematical situation would be one in which one discipline is under primary consideration and others assume the role of secondary or auxiliary disciplines. This could be a first step towards interdisciplinarity.

### THE MEANING AND THE GOAL OF INTERDISCIPLINARITY

The question of the meaning and the goal of interdisciplinarity is today just as open as the question of the possible unity of all Wissenschaften. At a point in history where the degree of differentiation in the disciplines is higher than ever before, the question of connections between the disciplines must be raised more frequently and more pointedly. In summary, five main aspects must be mentioned:

(1) The historically explicable loss of the unity of all Wissenschaften creates (paradoxically) the prerequisites for all forms of interdisciplinary cooperation. At the same time, the disintegration of this unity offers opportunities for new combinations that are unusually rich in variations and potentially very productive. Being "productive," here, means gaining knowledge by promoting and increasing internal scholarly or scientific progress. This holds for the development of individual disciplines and for those more or less contiguous or more or less separate. Today, for many scholarly and scientific problems, solutions cannot be found without the use of interdisciplinary cooperation.

The lost unity of the Wissenschaften -- and this is only a slight exaggeration -- challenges us to undertake interdisciplinary work. In the humanities, for example, interdisciplinarity offers an alternative to the historical evaluation and interpretation of history, a method still frequently used. In the natural sciences, the occasionally rigid and closed borders of disciplinary research can be replaced by an interdisciplinary openness toward other disciplines that is founded on praxis. As regards the two main discipline groups (natural sciences and the humanities), interdisciplinary research, in psychology or human medicine, for example, could help to bridge the gap between them or even help to (partially) close that gap.

(2) Aside from the issue of cooperation between disciplines and groups of disciplines, interdisciplinary work has special significance for the research on certain larger problems. These "problem complexes" (cf. the discussions on peace and the environment) frequently reveal "an identity that is more stable than that of a given individual discipline" (Lepenes, 1978). Such problems are often of socially and politically central importance, and are given to the "system of Wissenschaft" by the public, in the hope that a solution can be found. In this way, interdisciplinary research is often more directly connected to the "outside world" than is disciplinary research. Of course, hopes for quick practical solutions to such problems must often be disappointed.

(3) Such connections between interdisciplinarity and the "outside world" are always present in the technological application of scientific results and in

the dissemination of new knowledge. Today, interdisciplinary cooperation is used perhaps most intensely in the area of applied technology. Future planning in the economic and social sectors, for example, is unthinkable without interdisciplinary cooperation.

The problematics of interdisciplinary teaching refer back to questions of the agreement between and the unity of the disciplines. Examples include the debate about concepts of education [Bildung] or the question of the principle of selection (canon). Here, the role of the disciplines could also lead to the question of how much interdisciplinarity contributes to "making scholarly and scientific work understandable as regards its general social meaning" (Holzhey, 1974, p. 121).

(4) In the aftermath of the historical disintegration of the originally "given" and philosophically grounded unity of all Wissenschaften, interdisciplinarity can help us to remain conscious of the fact that unity and (partial) unification are henceforth unattainable. The search for interdisciplinary unity in the Wissenschaften can be seen as an always limited, always necessary endeavor. Today, this unity reveals itself as a process of the self-reflexion of Wissenschaft: the "Wissenschaftswissenschaft" (Hartmut von Hentig) clearly marks a historical situation in which the question of the unity of Wissenschaft is kept alive, not in the spirit of philosophy, but through the medium of self-reflexion.

(5) Disciplinary and interdisciplinary research are central factors in the production of knowledge. If we assume that the development of Wissenschaft is marked, on the one hand, by rational argumentation and admiration for a scholarly or scientific theory and, on the other, by the strategies necessary for the survival and the success of Wissenschaft, then we must conclude that the same assumptions also apply to interdisciplinary research. For interdisciplinary research, however, rational argumentation and the establishment of the necessity of such research appear to be more important than the strategies for survival or success. The "power" and prestige of disciplinary research are, now as then, very great; interdisciplinary research must still legitimize itself in the eyes of disciplinary research.

The production of knowledge is the production of socially relevant meaning. In the future, interdisciplinary research could assume functions that disciplinary research is unable, or no longer able, to perform.

NOTES

1 Translator's note: in many contexts, Wissenschaft and its derivatives (pl. Wissenschaften, adj. or adv. wissenschaftlich, comb. wissenschafts-) can be rendered as "science," "scholarship," "discipline," "field," etc. Where, however, Wissenschaft refers to the totality of institutionalized scholarly and scientific pursuits, I have retained the German word, with some regret.

2 Translator's note: Utopieforschung denotes research on, or studies in, the problem of Utopias.

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