VISITING FOREIGN SCIENTISTS IN THE UNITED STATES: THE IMPACT OF SYSTEMIC AND ROLE CIRCUMSCRIPTION AND DISSOCIATIVE EXPERIENCES ON THE HOMOGENIETY OF THE INTERNATIONAL SCIENTIFIC COMMUNITY

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ABSTRACT

VISITING FOREIGN SCIENTISTS IN THE UNITED STATES: THE IMPACT OF SYSTEMIC AND ROLE CIRCUMSCRIPTION AND DISSOCIATIVE EXPERIENCES ON THE HOMOGENEITY OF THE INTERNATIONAL SCIENTIFIC COMMUNITY

By

Christopher K. Vanderpool

Prior studies in the sociology of science have focused on the internal structure of the scientific community and have only briefly touched upon the societal and transcultural dimensions of science. Moreover, these research endeavors have stressed that science is essentially a homogeneous social structure in which there is a uniformity of behavioral and attitudinal patterns practiced by scientists throughout the world. This dissertation, incontradistinction, attempts to locate variations in the behavior and attitudes of scientists. It examines: 1)the impact of systemic circumscription, as evidenced in the level of development of educational and scientific institutions in a series of nations, and role circumscription, as evidenced in the types of work roles previously performed by scientists, and 2)the exposure of scientists to dissociative experiences, the movement of scientists from one social system to another or their contact with the members of an exogenous social system. These three are related to the homogeneity of the international scientific community

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as evidenced in this sample of a population of foreign scientists in one part of the United States.

Visiting foreign scientists in the United States compose the population in this study. Using the C.I.C. (Committee on Institutional Cooperation) universities* as a site for the research, eighty-two interviews were conducted using an open-ended interview schedule. A questionnaire was constructed composed of fixed alternative questions and sent to scientists in several universities in the Midwestern region. One hundred and forty questionnaires were returned. The total N of the study, then,is two hundred and twenty-two. Because a random sampling technique was not employed, Yule's Q, contigency coefficients, and a comparison of percentage differences are used in analyzing the results.

The data gathered indicate that systemic and role circumscription are related to each other and to exposure to dissociative experiences, societal social responsibility, to professional participation, and to seeing differences between the social systems of work in the United States and the home country. Their relationship to scientific social responsibility and nonprofessional participation are, however, either inconclusive or weak. It is also shown that the greater the

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* The C.I.C. universities are the Universities of Wisconsin, Illinois, Indiana, Minnesota, Michigan, Chicago, Iowa, and Michigan State, Ohio State, Purdue, and Northwestern universities.

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degree of role circumscription, the greater the degree of exposure to dissociative experiences. This result suggests that scientists from developing nations typically go out of their home country to make themselves visible to their colleagues abroad, to get information on current developments in their fields, and to establish interpersonal colleagial relationships with other scientists in their field of work.

Scientists from developing nations and those scientists who perform teaching, administrative, or consulting roles in their countries of origin are more likely to view the work situation in the United States as different from the social system of work in their home countries than scientists from developed nations and those who perform research, teaching-research, professional, or publication roles. As a consequence, the former scientists have to redefine their roles and social identities in the social system of work in the United States. Such a role redefinition and a transformation of social identities is less likely to occur amongst the latter scientists.

Furthermore, scientists from developing nations usually rank their home countries as a peripheral area of scientific activity in a ranking of nations in their fields. Scientists from developed nations, on the other hand, view their home countries as a center or leader in their fields. Data are presented which indicate that

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those scientists from the periphery are more likely to hold non-mainline positions (research assistant or associate) than mainline positions (instructor to full professor) in the United States. The opposite is true for scientists from developed nations in the centers of their fields. Moreover, the scientists from developing nations are more likely to consider the systemic linkage networks of exchanges of students, resources, and information between their home countries and one of the centers in their fields, the United States, as being non-reciprocal than scientists from developed nations who view these networks as reciprocal.

The results also show that exposure to dissociative experiences fosters post-modernity, worldmindedness, and a universalistic orientation to social interaction and, to some degree, to future work location. But its effect on third cultural network involvement and a universalistic orientation to living location is mixed. Educational and prior work experiences abroad are negatively correlated with third cultural network involvement. Making trips to foreign countries in the status of a professional scientists, however, stimulates such contact. Exposure to dissociative experiences is related to a particularistic, rather than universalistic, orientation to living location. This finding suggests an evaluative ability. By becoming aware of alternatives to their society and culture, the majority of scientists make a prefere

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preference for their home country or another country, rather than having no preference.

Finally, the findings reveal that the majority in this study share the same beliefs, perspectives and orientations and behave in a similar fashion both in and outside of the scientific community. This homogeneity of responses give credence to the idea of an international scientific community, at least with regard to these scientists. Science, therefore, is not a heterogeneous collectivity. Such a uniformity of behavior and attitudes could only emerge out of a common social structure and normative structure that transcends traditional societal and cultural differences. Science can be considered, then, as a third culture.

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By

Christopher K. Vanderpool

A THESIS

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Department of Sociology

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A dissertation marks not only the culmination of a research project which is hopefully a contribution to an academic discipline, but also signifies the end of a graduate education and the beginning of a professional career. Several individuals have contributed greatly to my fulfillment of these tasks: 1)the members of my committee--Professors William Form, Charles Loomis, Frederick Waisanen, and John Useem; 2)a silent member of my committee--Professor Ruth Hill Useem; 3)my colleague and co-researcher--Sal P. Restivo; 4)several fellow graduate students at Michigan State University--Florence McCarthy, Arnold Holden, Susan Asch, Shelby Stweman, Robert Shelly, Anne McMahon, and Michael Loukinen; and 5)my wife and son--Lorraine and Aaron Vanderpool.

William Form has been throughout my sociological career a friend, a teacher, and a colleague. He awakened in me and encouraged a strong appreciation of the various facets of social structure and macrosociology and their ramifications on society and sociology. In many ways, Professor Form is a "sociological father" to a whole cohort of graduate students in sociology and I hope he will be proud of his "sons and

daughters" achievements.

Charles Loomis first acquainted me with the concept of systemic linkage and this dissertation relies heavily on this important concept both explicitly and implicitly. In several reading courses, Professor Loomis allowed me to open up "Pandora's Box" in sociological theory stimulating and encouraging my interest in political sociology and classical and contemporary theory.

Frederick Waisanen, as this dissertation indicates, has had an important affect on my appreciation of comparative sociology and social psychology. He was always willing to sit down with me to pound out ideas and to criticize my fledgling knowledge of social psychology and social change. As a result of his seminars, his colleagueship and friendship, Professor Waisanen has been a "Dissociative experience" in my graduate training.

John Useem, chairman of my doctoral committee, has provided the guidance, understanding, and criticism which is necessary in making a graduate education an intellectual and human experience. Always encouraging a full exploration of a problem, a search of the literature of sociology and allied areas of inquiry, and a macroscopic analysis, Professor Useem was stim

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has stimulated what was once a dormant sociological imagination. He was the first to acquaint me with the areas of the sociology of science and comparative sociology and the ways in which cross-societal and cultural contact give rise to "third cultures." The untold hours he has spent with me on this research project and others have extended far beyond the usual teacher-student relationship.

Professor Ruth Hill Useem sat in on many of these after hours seminars. Many of the points she raised in these discussions have been incorporated in this dissertation. Her criticisms and assistance have in many ways made this research endeavor possible.

Sal P. Restivo has been my collaborator on this study and a prior one. Through our many intellectual battles and cooperative activities, we have established a collegial and friendship relationship which will continue in our future professional careers.

My fellow graduate students at Michigan State have also been a great assistance in the completion of my doctorate education. Susan Asch and Florence McCarthy tempered many of my crude ideas in the seminars held at the home of the Useems. Arnold Holden explored with me the issues raised by Professor Waisanen's model of modernization and several times provided help in the st

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I would like to also thank the National Science Foundation, the National Institute of Mental Health and the Hazen Foundation which has supported this study financially. NSF provided a dissertation research grant to cover expenses occured in the completion of this research project. NIMH awarded a fellowship which allowed me freedom from other tasks while completing this study. The Hazen Foundation provided support for many of secretarial expenses entailed in this report and enabled comparative studies directly related to this dissertation to be undertaken.

Finally, but not least, I am very grateful to my wife and son for their understanding, patience and love. Lorraine sacrificed much of her little spare time to type and criticize numerous drafts of research proposals and reports. We have traveled many social miles together from the streets of the inner city of Chicago to our current milieu. My family and I have found sustenance and consciousness in this journey.

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Chapter 1

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One of the present general goals of investigations in the area of the sociology of science is the development of concepts, propositions, and models sufficiently abstract to permit the comparison of different cultures and societies in terms of an analysis of their social institutions (De Gre, 1955: 6). This process of conceptualization and model-building must, however, remain sufficiently concrete to enable an exploration of the historical and ecological dimensions of the emergence of science as a social institution and of the systemic linkages between science and the other social institutions of a society. Since science is by nature international (Einstein, 1950; Gilpin, 1968; Parthasarathi, 1967), research and theorizing in the sociology of science provides an adequate context for analyzing the normative and behavioral patterns which emerge in the process of scientists interacting with one another across national, societal, and cultural boundaries (Useem and Useem, 1968). Hence, the study of the institution of science and its members can yield information about such general social phenomena as the process of institutionalization and institution-building in varying societal settings, the growth of a rational ethos throughout the world, and the structure and development of international

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communities. Substantively, such studies can also be useful in explorations of the structure of science, the interrelationship of science and society, and the values and activities shared by scientists from a variety of societies and cultures.

This ideal goal of the sociology of science, however, has not been accomplished. Theoretical and research literature in this area of sociological inquiry has primarily focused on the internal structure of the scientific community and has only briefly touched upon the societal and transcultural dimensions of science. The "autonomous" normative structure has been rigorously defined, elaborated upon, and reformulated in light of existing social theory and research by Merton (1938 and 1957), Parsons (1951), Barber (1952) and Storer (1966). But the delimitation of the systemic linkages between science and society and the effects of these relations on the structure of the scientific institution, its members, and societies have not been theoretically or substantively articulated in a comparative perspective.

Studies in the United States on the effect of scientific breakthroughs on society (Price, 1963) and the accommodation of scientists to industrial and governmental bureaucracies (Corwin, 1966; Kornhauser, 1962; Pelz and Andrews, 1967; Strauss and Rainwater, 1962) have been the primary research

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themes which have touched upon this domain of inquiry. In addition, the impact of governmental policies and priorities on science in the United States and other countries have been explored extensively by Dupree (1957), Brooks (1968), Price (1967) and Shils (1968). There also have been studies of scientific manpower in other nations and the migration of scientists from peripheral sectors of the international scientific community to the centers of the scientific enterprise (Beijer, 1969; Committee on International Migration, 1970; Harbison and Myers, 1964). Finally, the adjustment of foreign students and scholars in the sciences to the West and back home and to idea systems generated in the West has been extensively explored by Useem and Useem (1955), Kroche (1958) and Swisher (1958). But the values, behavior, and roles which link them to segments of their society and to a series of international communities have yet to be sociologically studied.[1]

This study of visiting foreign scientists in the United States attempts to partially fill this

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1 Hagstrom's study of the values and roles of 76 scientists did touch upon this area in an examination of the extent and operation of social control within the scientific community (1965). However, his analysis of the social influences in the scientific community which produce conformity to scientific values and norms emphasizes the internal dimensions of the beliefs and behavior of scientists. This study is concerned not only with this aspect of the social life of scientists, but also with cognitive and behavioral dimensions of scientific behavior in areas external to science.

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void by focusing its attention on three interrelated phenomena: 1)the perspectives shared by foreign scientists of their function in segments of their society, in their national scientific communities and in the world community of scientists; 2)their actual experiences in the performance of scientific work roles both here in the United States and abroad and the impact of these experiences on their values and behavior; and 3)the significance of their participation in the creation of new social patterns in developed and developing nations. This investigation will hopefully provide a springboard for the development of concepts and propositions which will allow future comparisons of the behavior and values of scientists in varying societal contexts.

General Statement of the Problem. Current research and theorizing in the sociology of science is stimulated and guided by an underlying proposition: science, considered as an institution, estate, or community is homogeneous in nature. Homogeneity is seen as existing on two interdependent levels, structural and normative.

Structural uniformity in science can be characterized as a set of patterns of interaction, roles and status positions centrally organized about the maintenance, transmission, extension, or application

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of knowledge (Storer, 1966: 17; 75). This social system[2] manifests itself primarily in the following settings: 1)workshops, laboratories, and field stations where knowledge is produced; 2)professional organizations and their various organs (e.g., journals, associational meetings, committees, international conferences, etc.) through which knowledge is shared, exchanged, and evaluated; 3)small networks of scientists in subdisciplines of scientific fields (e.g., ring theorists in mathematics) where, as in professional organizations, knowledge is transmitted and evaluated; 4)national and international governmental agencies (e.g., National Science Foundation, National Institute of Health, UNESCO, etc.) from which financial support for the creation and application of knowledge is disseminated to future generations of knowledge creators; 6)advisory groups which provide scientific information to decision makers in the political, economic, military and numerous other social sectors of society; and 7)universities, industries and other organizations where men perform research tasks as well as other activities.

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[2]Social system can be defined as the patterned interaction of social actors "...whose relations to each other are mutually oriented through the definition and mediation of a pattern of structured and shared symbols and expectations." (Loomis and Loomis, 1965: 2).

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*Storer, 196

In each of these loci of activities relevant to the functioning of science as an ongoing social process, the role behavior of scientists in a series of interactional networks and statuses is governed by the "autonomous" normative structure of science. This system of norms delimits the boundaries of appropriate behavior with regard to knowledge cultivation (Merton, 1965: 113-114). Moreover, these norms specify the proper orientation and action of scientists to the body of scientific knowledge, interaction patterns among scientists, and their personal pyschological state (see Figure 1). If deviations from these norms occur, the integrity of science's native commodity, objective information, is endangered (Storer, 1966: 39). According to this perspective,

Figure 1: The Points of Reference and Foci of the Normative Structure of Science*

Point of Reference:

Focus of Norm:	The Body of Scientific Knowledge	Interaction Among Scientists	The Scientists Psychological State
Orientation	Objectivity	Organized Scepticism	Emotional Neutrality
Action	Generalization	Communality	Disinterestedness

*Storer, 1966: 81.

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scientists must conform to these norms, for if there are extensive violations of them the scientific enterprise is destroyed. Thus, normative homogeneity of science manifests itself in the conformity of scientists to a set of norms controlling their participation in the scientific community and, in response to this conformity, specifying the nature of the social system of science.

Several disturbing consequences have followed from assuming structural and normative homogeneity in science. First, relatively little attention is paid to the external linkages of science and an overemphasis is placed on the internal structure of science. Analyses of the systemic linkages of science to other sectors of society have focused on those interrelationships which contribute to the maintenance of science as an "autonomous" social structure. Policy studies by sociologists, political scientists and others have examined the resource linkages between science and government, specifying what impact, if any, these relations will have on the interacting parties. Some strides in explicating these reciprocal effects have been made by Shils (1968), Brooks (1968), Price (1967), Greenberg (1967), and others. Their efforts, however, for the most part have been speculative, sensitizing sociologists to the types of variations systemic linkages may produce in science, without verifying these effects empir

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Secondly, the behavioral patterns enacted by scientists within and outside of the scientific community, their function in varying societal contexts, and values held by them are assumed to be similar. If variations in the behavioral and attitudinal dimensions of scientists do occur, these variations are seen as a result of nonconformity to the normative system of science. Pressures to deviate from these norms arise from either the contradictory demands made on scientists by these norms or the accommodation of scientists to extra-scientific organizations.

In the case of the former, for example, the norm of communality specifies that scientists must freely share under all circumstances the results of their research (Glass, 1965: 97-8; Storer, 1966: 79). Yet the striving for recognition given by the reward system of science in terms of honors, scholarly prizes, and promotion in Western based institutions often forces scientists to be secretive of their work until the moment of publication. These scientists may cover their research in a cloak of secrecy to prevent other scientists from "scooping" the results of their experiments and reaping the scientific rewards to which they are entitled (Merton, 1965; Reif, 1965: 142; Vanderpool, 1966: 23).

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The latter case of the "conflict and accommodation" of scientists to extra-scientific organizations (e.g., industrial and governmental laboratories) is the most documented source of variations in scientific behavior. The norms of science which stress the creativity, and autonomy of scientists clash with the goals of product-oriented organizations (Glaser, 1963; Kornhauser, 1962; Marcson, 1960; Pelz and Andrews, 1967). To reduce these strains, organizational management has introduced a set of practices, such as cooptation and the assignment of scientists to administrative positions, which have "professionalized" the developmental and bureaucratic tasks performed by scientists.

From the perspective of this study, however, the accommodations scientists have made to industrial and governmental research enterprises are more important. The price scientists have had to pay for their participation in these organizations in general has been a lessening of their identification with a discipline as a profession and a strengthening of their psychological and social ties to organizational roles. They have, in the words of Glaser, become more "localite" and less "cosmopolitan" in orientation (1963: 259). For example, of all the scientific disciplines, chemistry has the longest history of research employment by industry and labor. The result of this heritage

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of exposure to developmental research organizations on chemists has been a shifting of their reference groups. Rather than identifying solely with professional chemical organizations and chemists, chemists now identify with industry and government "...in their most professionalized moments" (Strauss and Rainwater, 1962: 171). No longer do chemists see their prestige as resting entirely on their contributions to the knowledge of the discipline of chemistry and the rewards for their work as professional recognition. The recognition most appreciated by them is based on their contribution to the company or agency, a contribution which is rewarded by better salaries, improved working conditions and more decision-making participation in the organization. These changes of professional priorities by some chemists violate the norms of emotional neutrality and disinterestedness and have usurped the reward system of science. Adaptation to organizational milieu is not limited to chemistry, varying kinds of accommodations have been made by other disciplines.

In summary, the literature of the sociology of science has proposed that science is structurally and normatively homogeneous. Rather than viewing homogeneity as a problem, sociologists of science have assumed it to be universal. As a result scant attention is paid to the internal and external sources of heterogene

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of heterogeneity and/or homogeneity in the scientific community. In short, structural and normative homogeneity in science has become a self-fulfilling prophecy in the research and theorizing in the sociology of science.

The assumed structural and normative homogeneity of science is the focal point of this research endeavor. Its main thesis proposes that science is a heterogeneous rather than a homogeneous collectivity characterized by varying sets of roles, statuses, and networks; and its members maintain divergent patterns of values and lifestyles. Given the overemphasis placed on similarities in the behavior and attitudes of scientists and their sources in the literature of the sociology of science, this study will attempt to delimit the nature and sources of dissimilarities in the structure of science and the behavioral and value patterns of scientists. By stressing the variant aspects of science, the areas of homogeneity or heterogeneity in science will be demarcated. In so doing, the outcome of this exploration in the area of the sociology of science will be the specification of some of the parameters of the international scientific community. In short, this dissertation will hopefully answer the following fundamental questions: is there any empirical evidence of an international scientific community as manifested in the selected population and, if so, w

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<u>Specification of Variables.</u> In an attempt to specify the degree of homogeneity or heterogeneity in science from a comparative perspective, this study will examine the following dimensions of the behavior of scientists: 1)similarities and dissimilarities in background, e.g., level of development of the home country, educational history, type of marriage, etc.; 2)variations in cross-cultural and societal experiences, e.g., the nature and types of extra-systemic contacts of scientists; 3)divergent or convergent patterns in the performance of scientific work roles and social roles, e.g., the social functions of scientists with regard to social change in their home country; and 4)similarities and dissimilarities in the scientific and social values held by these foreign scientists, e.g., conformity to the norms of science, attitudes toward social change, etc. Two major sources of variations in these behavioral and attitudinal dimensions will form the crucial variables of this study. The first, the level of development of a scientists country of origin, is the major independent variable of this exploration. The second source, the type of work role performed by scientists, is the major intervening variable.

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The literature on the structure of science and the behavior of scientists in developing countries suggests that there are major differences in the performance of science's central task, the cultivation of knowledge, in developing and developed countries. In the majority of developing and non-Western countries, the emergence of science as an institution occurs under the impact of either a colonial experience, as in the case of Latin American and sub-Saharan nations, or from extensive non-colonial contact with Western civilizations, as in the case of Japan. Only in India, China, and a few of the Middle Eastern countries was science an indigeneous, early development (Needham, 1949). However, modern science in even these instances stem predominantly from sources other than their historical legacy.

In all of these societies, with the exception of Japan, the growth of science has not coincided with the development of their industrial and political sectors. Science as it exists in developed nations has been grafted into societies which do not have the comparable supportive institutions manifest in the developed nations. As a result, the scientific enterprise in developing areas does not function at the level it does in developed nations. Moreover, a high proportion of scientists in many developing countries have received their major professional

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socialization to science in the developed world during their graduate training and/or their post-doctorate internship. Expecting to begin performing or continuing to enact the roles in science they have been prepared to play or have played, most scientists have had to confront the low level of development of the science in their home country. In short, science in developing nations does not interact interdependently with other institutional sectors of society, but remains in a marginal and oftentimes unstable position. Even though science is recognized by the leaders and representatives of these countries as important for the furtherance of modernization, science remains relatively impoverished in comparison with science in developed nations (de Solla Price, 1963: 101; Dedijer, 1962: 783; Institute of Political and Social Studies, 1967: 399-400; United Nations, 1963a: 5 and 28; United Nations, 1963b: 17 and 31).

The general malaise of science in the developing world has been characterized by a lower rate of development of science in terms of the amount of resources given to science in the forms of facilities, financial support, and integration into the general developmental planning of the nation, the number of scientists available to support research activities, and viable organizations representing the scientific enterprise (Merton, 1965: 496). Moreover, the economic environment of resource scar

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resource scarcity and limited job opportunities have generated behavioral patterns among scientists which conflict with the normative structure of science. Scientists from developing nations lack the opportunity to share the information they have gathered in their research. If they express independent opinions in a hierarchical work situation which is characteristic of work relationships in laboratories and universities in some developing nations or in an authoritarian society, they possibly encounter difficulties in their future scientific work. Such a work situation, fosters the growth of alliances based on sponsorship or nepotism rather than purely individual achievement in science (Sinha, 1970; 178-9). In these "pre-research" societies, then, the demands for scientific output, both pure and applied, are high yet the inputs to science from society are modest (Dedijer, 1962: 787).

Beyond their struggle to build the scientific enterprise without substantial societal support, scientists in developing nations may find that scientific research is hampered by the traditional system of values and networks of social relationships (Dedijer, 1962: 787; Sinha, 1970: 210). Autonomy in the selection of problems and techniques is sometimes restricted by definitions of what is sacred

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and beyond human understanding. In addition, the lack of integration into the social networks of traditional society where most of the social influence in these societies is embedded, combined with the absence of an effective delivery system for these groups, fail to provide scientists the leverage needed to have much of an impact among these groupings.

Without material and social support for their work, lacking freedom in problem selection, and with limited employment opportunities, the main consideration for many of these scientists are basic economic security and the search for prestige or status. Such security, prestige, and status are sought by obtaining work in other sectors of the society, e.g., governmental laboratories, civil bureaucracies, state-controlled institutions of higher education, etc. The type of positions open to scientists in these sectors are usually limited to administrative and/or teaching roles. Basic and even applied research often is subordinated to the other roles because relatively little support is given for research and there is relatively little utilization of results. The desire for social change by developing nations leads them to reward those work roles which have immediate significance for development and modernization of the other institutional sectors. For example, in Latin

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American universities, teaching becomes the predominant work role and research is shelved for the duration of the scientists professional career (Ribeiro, 1967: 349, 365). In short, in their search for job security and status, many of the scientists in developing nations have sacrificed not only research autonomy, but also the ability to perform tasks which are central to the production of new knowledge (Jayasuriya, n.d.: 266).

Those scientists who wish to avoid these difficulties in the pursuit of research activities often move across societal boundaries to societies in which research roles are rewarded. Thus, the phenomenon of the "brain drain" is related to the malaise of science in the developing world (Beijer, 1969: 6; committee on International Migration of Talent, 1970: 40).

Given these characteristics and consequences of the systemic relationships of science to the developing societies of the world we can expect, therefore, that many of the values and behavior of scientists from developing countries will differ from the social patterns of scientists from developed countries.

The second major source of variations in the behavior and attitudes of scientists are the types of work roles performed by scientists. The performance by scientists of a set of work roles is only part of the total con

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the total constellation of roles and behavioral patterns appropriate to their occupation, scientists, as defined by them and the institutional locus of the work situation. These work roles are conditioned by and have influence on the values, behavior and other roles performed by the scientist in his life-cycle. In addition, work roles are affected by the dynamic state of the larger society which modifies to a certain degree man's capabilities, goals, and performance within and outside of the organization of work.

Six ideal types of scientific work roles can be enacted within the variety of institutional sectors where scientists are employed:

1) Research Role: a creative role aimed at producing new knowledge, reformulating existing knowledge, solving scientific problems, and providing knowledge for solving social and technical problems;
2) Teaching-research Role: a creative of new knowledge and instructing role that is performed within a research activity which is carried on with one or more undergraduate, graduate or post-graduate students for whom this research involvement is part of their formal educational program (Henle, 1965: 14);
3) Teaching Role: a disseminating role which

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includes all activities related to instructing students in formal and informal classes, both undergraduate and graduate within a university system;

4) Administrative Role: an organization role which includes all activities related to the administration of a university, industrial or governmental organization, or research institutions and centers;

5) Consulting: an externally oriented role that includes those activities which disseminate knowledge to the civic culture and groups holding social power; for example, consulting, delivering public lectures, etc.;

6) Professional Role: a role whose performance includes such activities as editing of journals, membership in scientific associations and organizations, etc.;

7) Scientific Publication Role:[3] a role which includes all those activities related to the writing of professional articles, books, reports of research results, etc.

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[3]Even though all of the other work roles may involve writing and/or publication, the scientific publication role has been separated from the other roles because many of the respondents considered writing and publication of professional articles and books as the only work role they have or are currently performing.

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From the perspective of the traditional normative structure of science on a world-wide scale, the roles of research, teaching-research, professional, and publication are central to science and are normatively valued. The other work roles are central to the respective institutional sector and peripheral to science. Moreover, scientists perform one or more of these work roles to varying degree, i.e., some scientists are only researchers, others are researchers, teachers, and administrators at the same time. Accordingly, one can posit a series of hypotheses relating the degree to which these types of work roles are performed by scientists and the behavior they enact, functions they fulfill, and values they share.

In addition, these types of work roles are important because of the variations which they produce on such phenomena as interaction patterns in the world community of science, the international movements of scientists, and the location of scientists in the process of modernization in their respective home countries. With reference to the world community of scientists, formal and informal interaction patterns are established and maintained by scientists according to the type of work roles they perform. Researchers tend to interact with other researchers and support organizations which act as a focal point and context of scientific communication of research

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of research information (Kaplan and Storer, 1968). Moreover, as was stated previously, one of the main stimuli to the movement of scientists across societal boundaries and the recurrent phenomenon of the "brain drain" is the failure of many societies in providing a fruitful context in which to pursue these work roles (Porter, 1968: 7; de Solla Price, 1963: 101). Finally, the manner in which scientists contribute to the development of their specific society is structured along work role line. Hence, this investigation of the performance of types of scientific work roles provides a useful base for viewing the global dimensions of the behavior and orientations of scientists.

Dissociative Experiences.[4] The model of the development of "third cultural" networks and groupings as formulated by Useem, Useem and Donoghue (1963) and the model of modernization constructed by Waisanen (1969) provide a useful scheme for explicating the effect of level of development of a scientist's home country and the

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[4] The term "dissociative experience" has been used extensively in the field of psychiatry. I am not using it in a psychological manner here, but I am refering to the sociological and social psychological aspects of dissociative experiences. Thusly, on the next page I will define dissociative experiences as movement from one social system to another or contact with the members of an exogeneous social system by a social actor.

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work roles performed by him on the dependent variables to be discussed below. Both of these models emphasize the importance of dissociative experiences (Waisanen, 1969) either in the formation of "...cultural patterns which are created, learned, and shared by the members of different societies who are personally involved in relating their societies, or sections thereof, to each other" (Useem and Useem, 1967: 130) or in the development of modernization at an individual level characterized by innovativeness, knowledgeability and evaluation, future time orientation, commitment to planning, and a belief in the calculability of events and their control through science and technology (Waisanen and Kumata, 1969: 2).

Dissociative experiences can be specified as the actual movement of a social actor from one social system to another social system or series of social systems and as exposure to the ideas, technology, and social norms and cultural values of a "foreign" social system or systems through contact with actors from other societies and cultures, with the media of other systems, or with the material culture of adjacent or distant nations. Hence, dissociative experiences are the avenues through which the elements of two or more social systems become articulated (Loomis and Loomis, 1965: 16). Through physical and/or psychic mobility not only can social actors gain access to exogeneous social and cultural milieu, they can also act as representati

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In their encounters with members of other social systems, these individuals act as mediators between the social systems. As "men-in-the-middle," they share in their binational and multinational interactions some of the values and life-styles, roles and statuses, and technology of their society. It is in this process of extra-systemic contact and sharing that a set of third cultural social structures developed. In short, dissociative experiences are not only composed of inputs from one system to another. Physical and psychic mobility also involve an exchange of inputs and outputs. Dissociative experiences, then, can be a reciprocal process of systemic interaction.

Whether a social actor is exposed to dissociative experiences or not depends upon the nature of the social system he is in and the degree to which the actor is embedded in that system, that is, circumscribed by the system (Waisanen, 1969: 3-7). The social normative structure of the social system can either place constraints on the degree to which social actors can participate in systems exogeneous to itself or it may act as a mobilizing agent pushing the actor into contact with outside systems. Embeddedness in the social system can be defined as the relationship of an actor to the social system (Waisanen, 1969: 7). If the actors participation in the social system encapsulates

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the actor totally in that social system, the actor's access to other systems will be curtailed. If, on the other hand, his relationship to the social system is flexible and not fixed, his ability to encounter other social systems in interpersonal relations, media use, and actual physical movement is enhanced. The first variable, the nature of the social system, delimits the systemic boundaries of possible inter-systemic experience and the second variable defines the role boundaries of possible systemic linkage. The former can be called systemic circumscription and the latter, role circumscription.

In terms of the problem at hand, dissociative experiences are the first dependent variable of the study and an intervening variable. Using level of development of a scientist's home country as a index of systemic circumscription, and the type of scientific work role performed by the scientist as an index of role circumscription, the degree of a scientist's exposure to social systems outside of his home country will vary with these variables.

Following the literature in the sociology of science as discussed in the prior section, scientists who perform research, teaching-research, and professional and publication roles will be more physically and psychically mobile than scientists who perform teaching, administrative, and public roles. In other words, the former a

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the former are less role circumscribed than the latter. In addition, performance of these roles depends upon the level of development of the home country, systemic circumscription. Therefore, the following propositions are proposed:

Proposition 1: The greater the systemic circumscription as evidenced by the level of development of the home country, then, the greater the role circumscription, as exemplified in performance of teaching, administrative, and public roles.

Proposition 2: The greater the role circumscription, the lesser the exposure to dissociative experiences.

Systemic circumscription, as evidenced in level of development of home country, will be measured by Harbison's and Myers' (1964) classification of nations by levels of human resource development. Using a composite index of human resource development, Harbison and Myer ranked 75 nations (1964: 26-34). The index is composed of nine measures: 1)number of teachers per 10,000 population; 2)engineers and scientists per 10,000 population; 3)physicians and dentists per 10,000 population; 4)pupils enrolled at first level (primary) education as percentage of the estimated population aged 5 to 14 inclusive; 5)adjusted school enrollment for first and second level (secondary) education combined; 6)pupils enrolled at second level education as a percentage of the estimated population aged 15 to 19 inclusive, adjusted for length of schooling;

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7)enrollment in third level (higher) education as a percentage of age group 20 to 24; 8)percentage of students enrolled in scientific and technical faculties in a recent year; and 9)percentage of students enrolled in faculties of humanities, fine arts, and law in the same year.

Harbison and Myers formulated four levels of development upon the basis of the scores of the nations. Level 1 is composed of those nations they consider as "underdeveloped" in human resource development. The range of scores in level 1 is from .3 for Niger to 7.55 for Sudan with countries such as the Ivory Coast, Congo, Haiti and Senegal falling between these scores. Level 2, "partially developed" nations range from Guatemala and Indonesia at 10.7 to Iraq at 31.2. Between these extremes lie such nations as Mainland China, Turkey, Paraquay, and Pakistan. In level 3, "semi-advanced" countries, nations such as Czechoslovakia, Poland, India, South Korea, Cuba, etc. fall between the scores of 33.0 for Mexico to 73.8 for Norway. Sixteen nations are classified in level 4, "developed", with Denmark with a score of 77.1 at one extreme with the United States with a score of 261.3 at the other. The country whose score is closest to the United States is New Zealand at 147.3.

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Since the range of scores between level 1 and level 3 is not as great as the range of scores in level 4 and since most of the scientists who come to this nation on visits are from levels 3 and 4 (see International Institute of Education, 1968), countries in level 1, 2, and 3 will be classified as developing and countries in level 4 will be considered developed. Hence, foreign scientists from the sixteen nations Harbison and Myers classified as advanced will be considered in this investigation as being from developed nations (low systemic circumscription). Foreign scientists from the 59 other nations will be considered as coming from developing nations (high systemic circumscription). The sixteen developed nations, in descending rank order, are United States, New Zealand, Australia, Netherlands, Belgium, United Kingdom, Japan, France, Canada, U.S.S.R., Finland, West Germany, Israel, Argentina, Sweden and Denmark. Since no scientists from the United States are part of the population of this study, there are only fifteen nations from the developed level.

Role circumscription will be measured by the time and effort scientists estimate they spend in teaching, basic research, applied research, teaching-research, administration, consulting, organizational activities, and writing and publication while in their home country (see questions 17 on the Questionnaire and 28 and 2

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and 28 and 29 on the Interview Schedule in Appendix A). Those scientists who spend most of their time and effort teaching, consulting, and in administration will be considered as high role circumscribed. Scientists who spend their time and effort in basic and applied research, teaching-research, organizational activities in science (professional role), and writing and publication are considered as low role circumscribed.

Dissociative experiences will be divided into physical and psychic mobility. Physical mobility will be measured by the following items:

1. Country or countries where socialization to science has been received (question 9, questionnaire and interview schedule);

2. Trips to developed and developing countries (question 11, questionnaire; 14, interview schedule);

3. Cross-societal experience in work (question 10, questionnaire and interview schedule).

Psychic mobility, on the other hand, will be measured by these items:

1. Interaction with foreigners in the home country (question 12, questionnaire and 17, interview schedule);

2. Country of memberships in scientific associations (question 46, questionnaire, 81 interview schedule).

Interacting with foreigners in the home country and memberships in scientific associations in countries other than the home country are regarded as indices of psychic mobility because ideas, values, and behavioral p

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As stated previously, dissociative experiences are crucial to the development of third cultural social structures networks and the formation of attitudes which reflect individual modernity. Since this study is concerned with both of these issues, dissociative experiences will be considered not only as a dependent variable, but also as an intervening variable.

With regards to involvement in third cultural social structures and networks, the following proposition is suggested:

Proposition 3: The greater the exposure to dissociative experiences, the greater the involvement in third cultural social structure and networks.

That is, scientists who have been physically and psychically mobile are expected to have participated in social structures and networks which transcend social and cultural boundaries and through they have been relating segments of their society to members of other societies.

Several items are selected as measures of involvement in third cultural networks and social structures. The first measure is the nature of arrival of these foreign scientists in the United States, that is, wha

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that is, what corridors between the scientists' home country and the United States were used as avenues of access (question 14, questionnaire and 23, interview schedule). Reliance on personal initiative rather than contacts in the United States, in the home country, or other countries will be considered as a lack of involvement in third cultural networks. Similarly, if these scientists' networks in and outside of the work situation in the United States are characterized by exclusive interaction with individuals from their home country rather than with individuals from the United States and other countries (questions 23 and 24, questionnaire, and 46 and 47 interview schedule), they are not participating in a binational,multinational, or possibly a cultural setting. Moreover, if their attendance at scientific associational meetings in other countries has not led to the establishment of communication ties with scientists from other nations (question 101, interview schedule), they will be considered as low on third cultural involvement.

Before considering the relationship of dissociative experiences to individual modernity, the concept of post-modernity must be discussed. Apter (1965), Bell (1968), Boulding (1964), Etzioni (1968) and Miller and Form (1964), each suggest in different ways that science and scientists will be important for the emer

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for the emergence of a post-modern society and possibly a post-modern world. By straddling societal and cultural differences through the universalistic aspects of their knowledge and its application, scientists are seen as the precursors and one of the main change agents of the push from modern to post-modern societies. What they are suggesting is that the usual societal continuum of tradition vs. modern needs to be expanded to include the emerging post-modern society.

Many of the writers have been concerned with the value basis which predominates in the post-modern society. The normative system is seen as being grounded either in aesthetics and humanistic ethics or in the growth of a technocratic ethos. Its cultural values are for the most part boundless, that is, they are expansive to the inclusion of new values and beliefs and are open to probing and questioning. The only boundaries that may possibly exist are the extent of man's rationality and his imagination. The basic goal of the belief system of the post-modern society is the conquering of the physical and social environment of the nation state and the world through a visualization that the fate of both are interwined. Hence, international tampering with both of these milieu is dominant and directed change occurs at an international level. The basic result of the post -modern society, then, is the transformat

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transformation of society and the world. The direction of this transformation for some authors is towards the creation of a world community of man. For others, the post-modern world entails the proliferation of "garrison states" or technocratic societies. In either case, the post-modern society is end fixated, the end being either the liberation of mankind and the realization of all human capabilities or the growth of technocracy and bureaucracy in a "military-industrial" state.

The modern society, on the other hand, has the conquering of its national physical environment as one of its major objective. Instrumental values are dominant and national utilization of the physical environment occurs. Those social problems which impede physical progress in terms of economic and technological development are tackled and toyed with while others such as nationalism, prejudice, pollution are not. Essentially, the modern society works on a trial and error basis and is means fixated. Social ends are interpreted in physical terms and society and technical knowledge are looked upon as means.

According to this perspective, traditional society is seen as a social structure where relatively little conscious controlling of the physical and social environment occurs. The value basis of the society

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the society is predominant and stresses stability and ritualism. Here the physical and social environment are accepted as given and there is a relative absence of directed change. When change does occur its source is either external or, if internal, it occurs through an accidental trial and error procedure. In short, folk knowledge is dominant and the means-ends schema of the society is for the most part at a non-rational level.

Whether or not scientists express attitudes similar to what has been briefly sketched as post-modern, modern, and traditional values is determined by asking them questions about the future of their societies (question 49, questionnaire). Their responses to these questions are be coded as either post-modern or non post-modern, in orientation. The following proposition is suggested:

Proposition 4: The greater the exposure to dissociative experiences, the greater the post-modernity.

If dissociative experiences lead to involvement in third cultural networks and a fostering of a post-modern orientation, physical and psychic mobility should also be related to a universalistic orientation to work, social interaction, and living location and to world-mindedness therefore, the following propositions are forwarded:

Proposition 5: The greater the exposure to dissociative experiences, the

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greater the universalistic orientation to work.

Proposition 6: The greater the exposure to dissociative experiences, the greater the universalistic orientation to social interaction.

Proposition 7: The greater the exposure to dissociative experience, the greater the universalistic orientation to living location.

Proposition 8: The greater the exposure to dissociative experiences, the greater the world-mindedness.

Universalistic orientation to work, social interaction and living location acknowledges that social actors are not bounded in any one system in terms of where they would prefer to work, or with whom they would like to interact with, or where they would prefer to live. World-mindedness is a world view in which the social actor defines his relationship to the world to be characterized by a spirit of cooperation and brotherhood where in national differences disappear and the world community of man emerges and where the actor stresses international cooperation among nations in solving national and/or international problems.

The following items are selected as measures of these variables:

A. World-mindedness:
   1. World view change (question 50, questionnaire, and 234 interview schedule).

B. Universalistic orientation to work:
   1. Acceptance of work in other countries (question 159 interview schedule, and 40 questionnaire).

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C. Universalistic orientation to social interaction:
   1. Preference of persons in social interaction (question 147, interview schedule).

D. Universalistic orientation to living location:
   1. Variables affecting living location (question 161 interview schedule).

<u>Additional areas of investigation.</u> As stated previously, this study is concerned not only with the impact of dissociative experiences on the behavior and attitudes of scientists. It also seeks to discover major variations and the sources of these variations in the behavior of scientists with regard to professional productivity, social responsibility, conformity to the norms of science, and their participation in extra-scientific affairs and organizations.

In the discussion of level of development as a crucial independent variable and performance of scientific work roles and an intervening variable, it was noted that scientists in developing nations are expected by their leaders to play a viable role in the development of their country and that the jobs scientists perform in these nations are usually limited to roles related to the economic and social development of their nation or to roles other than research. Moreover, it is often assumed that the major reason scientists from developing nations come to developed nations for advanced training is to learn techniques and paradigms of knowledge which will be instrumental in aiding their nations in their push towards development. What these viewpoints suggest is that scientists from developing nations should manifest in their behavior and attitudes a greater sense of social responsibility and more involvement in extra-scientific organizations than their counterparts in the developed world.

Social responsibility involves an awareness and an acknowledgment by scientists of the interdependent relationship of science and society, i.e., that the scientist be concerned with the possible consequences of his work on society and should acknowledge as one of the criteria used for the selection of research problems, the "relevancy" of his work for his nation and possibly the world. Moreover, social responsibility has a second dimension other than this societal dimension. Scientists should also be concerned with the training and development of new generations of scientists who also will be involved in the production, cultivation and utilization of knowledge. This is the scientific dimension of social responsibility. Since the number of generations in the scientific communities of developing nations is limited and often there may exist only one generation, the current one, scientists from developing nations should also exhibit a greater responsibility in terms of this scientific dimension than scientists from developed nations. The following proposition, then, is suggested:

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Proposition 9: The greater the systemic circumscription and role circumscription, the greater the social responsibility at the societal and scientific levels.

Social responsibility will be measured by the following items:

A. Societal social responsibility:
   1. Perceived social responsibility (question 29, questionnaire, and 76, interview schedule);

   2. Attitudes towards scientists in national decision-making (question 31, questionnaire);

   3. Variables affecting choice of research problems (question 27, questionnaire).

B. Scientific social responsibility:
   1. Obligation to next generation of scientists (question 19, questionnaire, and 195 interview schedule).

As mentioned in the preceding passages, those scientists who are systemically and role circumscribed are expected to be involved in extra-scientific affairs and organizations. That is, they participate in community organizations, political parties, voluntary associations. Formally stated,

Proposition 10: The greater the systemic and role circumscription, the greater the involvement in extra-scientific affairs and associations.

The appropriate measure of this dependent variable is non-professional participation (question 48, questionnaire and 205, interview schedule).

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If scientists who are circumscribed in terms of their social system and roles are engaged in these activities outside of science, one would expect that those who are less circumscribed should be more involved in activities within science. These ideas suggest the following proposition:

Proposition 11: The lesser the systemic and role circumscription, the greater the professional productivity and participation.

The items selected as measure of professional productivity and participation are:

1. Paper publication rate (question 42, questionnaire and 90, interview schedule);
2. Book publication rate (question 43, questionnaire and 98, interview schedule);
3. Attendance at national scientific association meetings (question 47, questionnaire and 85, interview schedule).

In summary, in the presentation of findings relevant to the proposition relating systemic and role circumscription to the behavior and attitudes of scientists, it is hoped that important areas of homogeneity and/or heterogeneity in science will be isolated. In this way, this dissertation aims at specifying the parameters of an international scientific community and the sources of variations within it.

Research Design. The universe of this study is composed of foreign scholars in the United States who hold the doctorate or its equivalent in the 1)physical, 2)biological and 3)social sciences and who are at an .

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are at an American university. Following the National Science Foundation classification of disciplines, physical sciences include astronomy, physics, chemistry, mathematics, atmopheric sciences, earth sciences, and physical geography; biological sciences are composed of such disciplines as cellular biology, environmental and systematic biology, psychobiology, physiological processes, and biological oceanography; social sciences include anthropology, economics, economic and social geography, history and philosophy of science, political science, psychology, education, social psychology and sociology. During the pilot reconnaisance, a decision was made to include engineering under the category of physical sciences and medicine under biological sciences. These disciplines are classified in this fashion because significant numbers of foreign scientists in the United States were in these fields and many of these visiting scholars were engaged in work which could not be distinguished from the work being done by physical or biological scientists.

The universe excludes all those foreign-born scientists who have declared citizenship in the United States and those who are in the process of so doing.[5] It is restricted, then, to only those foreign scientists who are here on a temporary basis as visitors rather than permanent residents.

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5 A legal definition of citizenship is being used.

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In the planning stages of this research endeavor, the initial plan was to draw a random sample of foreign scientists in the C.I.C. (Committee on Institutional Cooperation) Area, the Universities of Wisconsin, Illinois, Indiana, Minnesota, Michigan, Chicago, Iowa, and Michigan State, Ohio State, Purdue, and Northwestern Universities, stratified by level of development of their home countries and by type of science (physical, biological, or social) from a list of visiting foreign scholars in the United States provided by a national organization which compiles such yearly data. The C.I.C. area was selected as a sampling site because one-third of all visiting foreign scientists in the United States are in residence in C.I.C. universities. An interview schedule was constructed (see Appendix A) and three universities were selcted for interviewing sites. These three universities were selected because they had a large number of foreign scholars visiting their institutions and they formed a meaningful continuum of the type of institutions in the Midwest. On the one end, a pure research oriented private university; a public pure research oriented university as median point; and at the other end, a public service research oriented university.

At each of these universities, an attempt was made to rely on the figures provided by the national organization to draw a random sample of visiting foreign scnolars

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scholars stratified along the two dimensions mentioned above. The figures showed that social scientists were a rarity at not only these universities but also nationally, so a decision was made to try to get the entire population of social scientists at these universities. The size of the total sample was to be 150 stratified in the following fashion:

Table 1: Initial Sampling Design: Level of Development and Type of Science att three Midwestern Universities

	Type of Science		
Level of Development	Physical	Biological	Social
Developed	25	25	25
Developing	25	25	25

After arriving on these campuses and drawing the sample, a high degree of unreliability in the lists of foreign scientists on these campuses provided to us was encountered. Only 25 per cent of the total population listed at these universities were still on campus, 75 of the 303 scholars on the list. Two reasons can be cited for this unreliability. First, the list was compiled in terms of those scientists who had been on their campus during one year period, 1968-1969. Many of the scientists had returned home during this time period and this information was not part of the data compiled by the organization. Secondly, some of the visiting scientists had become either permanent residents of the United States or citizens.

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These difficulties forced a different and more flexible approach upon the research design. In every department on these campuses, an inquiry was made into those scientists who are currently in residence and the total number of scientists at the three universities was 100. Eighty-two of these scientists were interviewed using an interview schedule composed of both fixed alternative and open-ended questions (see Appendix A). The questions were constructed on the basis of the theoretical considerations mentioned previously, prior studies in the sociology of science, and suggestions which emerged in the pretesting of the schedule. Three scientists refused to be interviewed and four respondents failed to show up at interviews after repeated assurances from them that they were willing to be interviewed. Eleven respondents could not be located.

This study of the international scientific community was conducted by two researchers, the author of this dissertation and Sal P. Restivo, a fellow graduate student. The cooperative experience of working together stimulated an exchange of ideas, a tempering of crude thoughts, and enabled each of us to extend the study beyond the scope which would have been possible has we worked alone. Since two of us interviewed the scientists, during the course of the interviewing stage of the study a comparison of the responses

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responses to the questions was made to insure comparability of interviewing techniques.

To increase the generalizing ability of the study, a questionnaire was constructed after we had completed the interviews composed of the most sensitive measures of our variables and new questions generated from the responses gathered in the interview process (see Appendix A). The questionnaire contains fifty questions; forty-two fixed alternative questions and eight open-ended and projective questions. In the pretest of the questionnaire, it was estimated that it would take approximately thirty to forty-five minutes to complete the questionnaire.

In addition to the three universities at which interviews were conducted, all departments in the physical, biological, and social sciences in the C.I.C. universities who had reported a considerable number of visiting foreign scientists in these fields on their campus were selected for the mailed out questionnaires. Four universities were excluded from this list because they had reported very few scientists in our categories on their campus.

Letters were sent to the department chairmen of 162 departments requesting the names of visiting foreign scientists currently in residence. Sixty departments sent the requested lists, one department chairman refused to give us the necessary information and, 101 department

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departments had no visiting foreign scholars present, From these departments the names of 278 scientists were obtained and questionnaires were sent to all of them.

We received 140 completed questionnaires for a return rate of 53%. Of the non-respondents,[6] six were found to be citizens of this country, nine moved to addresses unknown, eight returned their questionnaires without completing them, and 115 never responded. Since we had experienced considerable rapport and cooperation with our respondents when we worked together on our M.A. research, this relatively high return rate could have been increased had we extended our deadline for completing the questionnaires from three to five weeks possibly securing those who may not have been on campus at the moment because of semester vacations and/or associational meetings and by sending out a second mail out or contacting non-respondents by phone. Both time and money factors prevented us from pursuing this approach.

The total number of respondents to both the questionnaire and the interview schedule, then, is 222. The characteristics of these foreign scientists with regards to the type of sciences with which they are identified and the level of development of their

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[6] Non-respondents were equally distributed by scientific disciplines and by institution (see Table 1, Appendix B).

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home country are summarized in Table 2. In all sciences, there are more scientists from developed countries than developing countries in our sample. As in our experience in the interviewing process, the social sciences are again under-represented as compared to the representation of the physical and biological sciences. The degree of this under-representativeness is only slightly higher than in the national figures. Open Doors' (International Institute of Education; 1968) data revealed that 87 per cent of the visiting foreign scientists in the United States are in the physical and biological sciences (including engineering and medical research) and 13 per cent in the social sciences. Our figures, on the other hand, show that 95 per cent of our respondents are in the physical and biological sciences and 6 per cent in the social sciences.[7]

With regard to the major countries of origin of visiting foreign scientists in the United States, Open Doors' data reveal that 13.8 per cent are from the United Kingdom, 11.3 per cent from Japan and 11 per cent from India. All other nations are represented by considerably smaller numbers of scientists, each accounting for a half to one per cent of the national total. In our study, 14 per cent of the scientists are

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[7] The under-representation of the social sciences in this study may be due in part to the fact that many of the centers of social science research are located on the East and West coast at such institutions as Harvard, Princeton, Stanford, The University of California etc.

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Table 2: Characteristics of Respondents: Type of Science and Level of Development of Home Country

Level of Development of Home Country	Type of Science: Physical	Biological	Social	Total
Developed	52%	55%	58%	54%
Developing	45	44	42	44
Indeterminate*	3	1	--	2
Total	100% (N=95)	100% (N=115)	100% (N=12)	100% (N=222)

*Indeterminate refers to scientists from countries which were not classified by Harbison and Myers, e.g., Burundi, Switzerland, etc.

In comparison to these aggregate national data on visiting foreign scholars in the United States, then, the characteristics of the respondents of this study are fairly representative. As a result, even though this study is restricted in its generalizing ability because of the sample the conclusions drawn from this study will have some relevancy to issues raised at the national level.

By extending the study with data from questionnaires and adding these data to those which were gathered in the interviews, as increase in the size of the sample ani, as a

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and, as a consequence, the generalizability of the results to the population of visiting foreign scientists in the United States occurred. But there were some disadvantages in this extention of the study. Even though the questionnaire is composed of items we selected as the most significant for our study, we did not ask probes on these questions. In addition, we could not ask a full range of questions on some dimensions because their inclusion would have increased the size of the questionnaire to such a point that it might have presented difficulties for the respondents in answering the questions. Finally, questionnaires prevent the researcher from asking exploratory questions which may come to mind in the interviewing process as a result of the responses given by the scientist. For example, if in asking a question in prior interviews most of the respondents replied in a similar fashion, but the current respondent replied with an anomalous answer, one can ask the respondent for the factors which lie behind his response. But with questionnaire data one may lose the ability to probe into such a deviant case.

There were advantages gained by using a questionnaire beyond those cited already. In constructing the questionnaire, we were able to reformulate questions which we felt were not giving the information we desired in the interviews. Similarly, the questionnaire enabled us to focus more directly on those

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questions which were having the highest profit in yielding information. In short the questionnaire gave us the opportunity to evaluate the interview schedule and to proceed with a refined instrument for data collection.

Because of the limitations of the data gathering techniques in terms of the lack of random sampling from the universe and since most of the data obtained is nominal rather than ordinal, measures of association such as the phi-coefficient, product-moment correlation, and chi-square cannot be legitimately employed in testing the propositions outlined in the previous selection. The analysis of the data will therefore be limited to those statistical techniques which can be appropriately used, e.g., Yule's Q and contingency tables.

A Yule's Q correlation of .15 will be considered as supportive of the relationships indicated in the propositions. A correlation at this level is significant using "t" as measure of significance. Since the N of the tables on which the correlations are based varies because some questions were asked of the interview respondents which were not asked of the questionnaire respondents and vice versa or the same question was asked of both groups, a "t" significance test for each of these possible Ns was computed.[8]

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computed.[8] Using the following formula (Hays, 1963: 529):

$$t = \frac{r_{xy}\sqrt{N-2}}{1-r_{xy}^{2}}$$

a .15 correlation is significant at .10 (t=1.37), when N=82, the size of the interview group; at .05 (t=1.82), when N=140, the size of the questionnaire group; and at .025 (t=2.17), when N=222, the composite size of both groups.

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8 The "t" test for significance does not make the same assumptions about a sample as chi-square. It assumes a normal distribution, but this assumption can be circumvented with a large N (Hays, 1963: 308). Ns of 82, 140, 222 which are the basis of correlations on this study are large enough to allow a circumvention of the normal distribution assumption.

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Chapter 2

General Characteristics of the Respondents and the Impact of Systemic and Role Circumscription on Dissociative Experiences

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In this section, the characteristics of the three major variables of the study, systemic circumscription, role circumscription, and dissociative experience, with regard to the population of visiting foreign scientists will be discussed. Moreover, it will explore the results of the correlations of the variables in the first two propositions of the study which relate systemic circumscription and both of these variables to exposure to dissociative experiences. Finally, additional characteristics of the respondents in this study will be presented.

Systemic Circumscription. As mentioned previously in Chapter 1, the Harbison and Myers classifications of nations by levels of human resource development has been used to measure systemic circumscription. The following table (3) reveals the breakdown of

Table 3: Systemic Circumscription: Level of Development of Nations

Level of Systemic Circumscription		Number
High	Developing	98
Low	Developed	119
	Indeterminate	5
	Total:	222

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the categories of developed, developing, and indeterminate.[9] Visiting foreign scientists from developed nations account for more than half of the respondents in the study (53.6%), and scientists from developing nations (44.1%).

Only five scientists had countries of origin which could not be classified into the categories of developed and developing two from Switzerland, one from Guyana, one from Nepal, and one from Okinawa. An attempt was made to locate statistics on these nations identical to those employed by Harbison and Myers. Data on the five countries in the sources they relied upon to produce their classification could not be located. As a result, Gross National Product per Capita is used as an index of their level of development, since GNP per capita is highly correlated with the indices which Harbison and Myers used. Accordingly, Switzerland is classified as a developed nation and the other three as developing. Therefore, 54.5% (121) of the scientists in this study will be considered as coming from nations with low systemic circumscription, i.e., developed countries, and 45.5% (101) from nations with high systemic circumscription, i.e., developing countries.

[9] For a breakdown of the percentage of respondents by country see Table 2 in Appendix B.

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<u>Role Circumscription.</u> The visiting foreign scientists were asked to estimate the amount of time and effort they spent in performing seven work roles in their home country by ranking the work roles. This ranking was to be used as a measure of the degree to which they are role circumscribed within the scientific community of the home country. As Table 4, shows, only 1 rank proved to be a meaningful measure of role circumscription due to the large number of non-response rates for ranks 2, 3 and 4.

Table 4: Percentage Distribution of Degree of Role Circumscription: Rank Order of the Performance of Scientific Work Roles in the Home Country

Degree of Role Circumscription in Home Country:	Rank 1	Rank 2	Rank 3	Rank 4
High: (teaching, consulting, administration)	27.5%	28.8%	20.7%	14.9%
Low: (research, teaching-research, publication, and professional)	60.8	45.1	37.4	26.5
Non-Response:	11.7	26.1	41.9	58.6
Total:	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)

Additional support is given to the importance of rank 1 as a measure of role circumscription in Table 5. The contigency coefficients reveal that there is a high degree of consistency across each rank. In other words, scientist

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scientists usually maintain the same degree of role circumscription across all four ranks. For example, a scientist who says he spends most of his time in teaching, will also say he considers his next major effort to be spent in administration or consulting. Or in the opposite case, a scientist who say basic research is his primary activity in rank 1, will probably say that professional activities, teaching-research, or publication in science take up his next greatest amount of time and effort. Because of the non-response rates for the other ranks and the high consistency between rank orders, rank 1 will be considered as the measure of role circumscription.

Table 5: Role Circumscription in the Home Country: Contigency Coefficient Analysis of Rank Orders of the Performance of Scientific Work Roles

Rank:	1	2	3	4
1	----	.733	.681	.614
2	----	----	.739	.721
3	----	----	----	.731
4	----	----	----	----

The finding of both of these tables reveal that the majority of the visiting foreign scientists in the study have a low degree of role circumscription. There seems to be at work, then, a selection process of scientists who come to this country for further training, research collaboration, teaching and any of the other major rea

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major reasons for visitation in the United States. The results possibly indicate that scientists with low role circumscription are more likely to enter this country than scientists with high role circumscription. Hence, this finding gives preliminary support to the relationship between role circumscription and dissociative experiences as stated in proposition 2.

In proposition 1, role circumscription is seen as varying with the degree of systemic circumscription. This relationship between the manner in which scientists are bounded within a social system because of the roles they perform within the scientific community is supported in Table 6. The positive correlation supports proposition 1, the greater the systemic circumscription, the greater the role circumscription.

Table 6: Percentage Distribution and Correlation of the Degree of Role Circumscription of the Respondents in their Country of Origin by their Degree of Systemic Circumscription

	Degree of Systemic Circumscription	
Degree of Role Circumscription in the Country of Origin	High (Developing)	Low (Developed)
High: (teaching, administration, consulting)	34.7%	21.5%
Low: (research, teaching-research, professional, publication)	50.5	71.1
Non-response	14.8	7.4
Total	100.0% (N=101)	100.0% (N=121)

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In other words, scientists from developed nations are more likely to participate in the performance of work roles such as basic and applied research, teaching-research, professional activities, and in scientific writing and publication than scientists from developing countries; whereas scientists from developing countries participate to a greater degree in such roles as teaching, administration, and consulting than their colleagues from developed countries.

Dissociative Experiences. In Chapter 1, the function of systemic and role circumscription in acting as a stimulus to exposure to dissociative experiences was analyzed at a theoretical level. Proposition 2 was offered as a point of departure. In that proposition, exposure to dissociative experiences was related to role circumscription, i.e., the greater the role circumscription, the lesser the exposure to dissociative experiences. In this section, the empirical findings probing into this proposed relationship between performance of varying work roles in the scientific community and psychic and physical mobility will be presented. Before an analysis of these results, however, the relationship among the dissociative experience variables will be explored.

The physical mobility indices are composed of the following elements: 1)Foreign Ph.D. Educational Experience, 2)Trips to Developed Countries,[10] 3)Trips to Developing

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[10] The trips to developed and developing countries where usually made by the respondents in a professional capacity.

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Countries, and 4)Foreign Work Experience. Foreign Ph.D. Educational Experience refers to the location of the school in which the scientists received their doctorate or its equivalent. If the doctorate was received in a nation which is different from the home country of the scientists, the scientists are considered as having a dissociative experience.

Trips to Developed Countries and Trips to Developing Countries were used to ascertain whether the scientists were in other countries besides their possible experiences abroad in graduate education and their current trip to the United States. Since most of the scientists in the study have made such trips only once or twice, number of trips to a developed or developing country proved to be a meaningless measure. Travelling to countries abroad, irrespective of the number of times such trips have been made, is a measure of physical mobility. The lack of movement to developed or developing nations is accordingly the absence of a dissociative experience.

Foreign Work Experience, the final measure of physical mobility, refers to the cross-societal work experiences the scientists have had. If they have worked in countries other than their home country, their work experiences are regarded as a case of physical mobility. Those scientists who have worked only in their home country will be considered as having no cross-societal work experience.

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Interaction with Foreigners in the home country and Memberships in Foreign Scientific Associations, are the two indices of psychic mobility. The former is used to determine whether or not the respondents have had contact with foreigners while they were in their home countries. The participation in this form of a cross-cultural social relationship will be regarded as a dissociative experience, whereas the non-participation will be viewed as a lack of psychic mobility. Interaction with individuals from a country other than one's own is considered to be psychic mobility variable, because through such contact knowledge of social structures and normative patterns of other societies and cultures is acquired and also third cultural experiences. This information may be supportive of one's socio-cultural mileu or in opposition to it. In either case, one has gained knowledge of a non-indigeneous system.

For identical reasons, the latter variable, Memberships in Foreign Scientific Associations, is seen as an index of psychic mobility. Belonging to scientific associations in countries other than a scientist's home country is dissociative because through such memberships scientists become aware of current scientific and social activities of scientists in other nations, and the problems and issues confronting science and its relationship to other institutions in varying societies. Such information is gained through the publications and meetings of these

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of these associations. For example, any foreign scientist who belongs to the American Association for the Advancement of Science would have become aware of the current employment crisis of scientists in the United States, the debate occurring in the scientific community on such issues as biological and chemical warfare, technological development and pollution of the environment, and the growing strain between the current administration of this country and large segments of the American scientific establishment. Accordingly, memberships in scientific associations in other nations will be considered a dissociative experience and a lack of such memberships as an absence of a dissociative experience.

A large percentage of respondents have a low level of exposure to dissociative experiences. As Table 7 indicates, more than half of the visiting foreign scholars did not receive their doctorate in a foreign country, were employed only in organizations located in their home country, made no trips to developed or developing countries, had no contact with individuals from other countries, and belonged to scientific associations only in their home country. Table 7 also shows that more scientists have been exposed to psychically mobile events than physical mobility situations. This result occurs because it is only in the psychic mobility category of Interaction with Foreigners in the home

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the home country that a majority of respondents 53.2 per cent had a high level of exposure to dissociative experience. The only physical mobility index which come near to this percentage is Trips to Developed Countries, where 43.2 per cent of the respondents have made such trips and 46.8 per cent did not.

Table 7 also indicates that only in the categories of Trips to Developing Countries and Memberships in Foreign Scientific Associations, the percentage of respondents with a high level of exposure drops below 30.0 per cent. Only 17.1 per cent of the scientists report that they have made trips to developing countries and 22.9 per cent belong to scientific associations in countries other than their home country organizations.

In summary, the visiting foreign scientists do not have professional histories of considerable physical mobility. Their educational and work experiences, along with their physical movement and participation in scientific organizations, are embedded in the social structure of their home country. It is only in their contact with individuals from other nations in their home country that the scientists exhibit a high degree of exposure to dissociative experience. These scientists are, in terms of the indices of dissociative experience, one nation social actors, i.e., they do not have extensive experience in other nations.

Table 8, which presents a Yule's Q correlational

Table 7: Percentage Distribution of Level Exposure to Varying Types of Dissociative Experience

Type of Dissociative Experience:

Level of	Foreign Ph.D.	Foreign	Trips to	Trips to	Interaction With Foreigners	Memberships in Foreign Scien-

Table 7: Percentage Distribution of Level Exposure to Varying Types of Dissociative Experience

Level of Dissociative Experience:	Type of Dissociative Experience: Foreign Ph.D. Educational Experience	Foreign Work Experience	Trips to Developed Countries	Trips to Developing Countries	Interaction With Foreigners in the Home Country	Memberships in Foreign Scientific Associations
High	37.4%	30.2%	43.2%	17.1%	53.2%	23.0%
Low	46.4	66.2	46.8	75.3	43.2	60.4
Non-Response	14.9	3.6	10.0	7.6	3.6	2.6
No Ph.D./no memberships	1.3	----	----	----	----	14.0
Total:	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)

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matrix of the relationships among the psychic and physical mobility variables and their connection to systemic and role circumscription, discloses that the dissociative experience variables are for the most part correlated with one another in a positive direction. Obtaining a doctorate in a foreign country is positively correlated with Foreign Work Experience, Trips to Developing Country, Interaction with Foreigners, and Memberships in Foreign Scientific Associations, and weakly associated with Trips to Developed Countries. Making trips to developed countries is positively associated with Trips to Developing Countries, Interaction with Foreigners, and Memberships Country. Similarly, making trips to developing countries is positively correlated with interaction in the home country with individuals from other nations, and belonging to scientific associations in other nations. Only in two sets of correlations do negative associations appear.

Working in a foreign country is negatively correlated with belonging to foreign scientific associations, negatively associated in weak manner with Trips to Developing Countries, and unrelated to Trips to Developed Countries and Interaction with Foreigners. In other words, those scientists who have worked abroad before the present period tend to belong only to their home country scientific associations and have made no prior trips to developed countries.

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One possible explanation for this occurrence may lie in the fact that the scientists in the sample are quite young, mean age of 32, and the most frequent reason given for the cross-national work experience by the respondents is that they were employed immediately after obtaining the doctorate by the institution granting the degree. The latter is supported by the correlation of .618 between receiving a Ph.D. or its equivalent in a foreign country and foreign work experience. After working for a year or two abroad, they return home for a brief period and are again physically mobile, as evidenced by their current stay in the United States. During their short stay at home and given their very brief professional career, they have had neither the time nor experience to develop those networks which would stimulate both physical and psychic mobility. One would expect, however, that upon their return to the home country after this trip to the United States and after they have established a professional career in their nation, their experiences abroad would stimulate their capacity to be exposed to other types of dissociative experiences.

The second set of variables which reveal a negative relationship with one another are the two psychic mobility indices. Interacting with foreigners in the home country coincides with belonging to scientific associations only in the home country. Again this

Table 8: Correlational Matrix of Systemic and Role Circumscription and Dissociative Experiences *

Systemic	Role Circum-	Foreign Ph.D.	Foreign	Trips to	Trips to	Interaction	Memberships

Table 8: Correlational Matrix of Systemic and Role Circumscription and Dissociative Experiences *

	Systemic Circumscription	Role Circumscription	Foreign Ph.D. Educational Experience	Foreign Work Experience	Trips to Developed Countries	Trips to Developing Countries	Interaction with Foreigners	Memberships in Foreign Scientific Associations
Systemic Circumscription	-----	.388	.309	.163	-.055	.451	.032	.903
Role Circumscription	-----	-----	-.022	-.084	.140	.396	-.131	.189
Foreign Ph.D. Educational Experience	-----	-----	-----	.618	.102	.570	.180	.319
Foreign Work Experience	-----	-----	-----	-----	.071	-.124	-.036	-.305
Trips to Developed Countries	-----	-----	-----	-----	-----	.242	.167	.278
Trips to Developing Countries	-----	-----	-----	-----	-----	-----	.625	.285
Interaction with Foreigners	-----	-----	-----	-----	-----	-----	-----	-.235
Memberships in Foreign Scientific Associations	-----	-----	-----	-----	-----	-----	-----	------

* The N for this table is 222, except for the correlations of role circumscription. The N for role circumscription is 198, because of non-responses to the question on role circumscription.

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empirical relationship is opposite of the expectations of the researcher. A tentative explanation of this negative relationship can be offered through an interpretation of the very strong association of .903 between systemic circumscription and Memberships in Foreign Scientific Associations in Table 8. Scientists from developing countries often belong to scientific associations outside of their home country. This relationship implies that, given a low level of development of the scientific and educational institutions of the home country, scientists must go out of their home country to participate in scientific associations which may or may not exist in their own country. The scientist from a developed nation does not need to do this. He can remain in the home country to receive and contribute information about current developments in the field. Moreover, he does not need to establish interaction patterns with foreigners. The scientist from a developed nation can rely upon his own countrymen for the information he desires and for colleagues. In short, scientists from developing nations must go out of their home country to keep up with current developments in the field and to make themselves known to and come to know the larger scientific community. The scientists from developed nations, on the other hand, can rely on their home country's scientific and educational assets.

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Systemic and Role Circumscription vs. Dissociative Experience. Table 8 also presents the correlations among systemic and role circumscription and the dissociative experience variables. In examining the results presented in the table, one finds that systemic circumscription and role circumscription is related to the dissociative experience variables in a reverse direction than expected, i.e., the higher the systemic and role circumscription, the higher the level of exposure to dissociative experiences. In addition, the correlations between systemic circumscription and the dissociative experience indices are greater than the relationship of role circumscription to dissociative experiences. Systemic circumscription is related to Foreign Ph.D. Educational Experience, Foreign Work Experience, Trips to Developing Countries, and Memberships in Foreign Scientific Associations and unrelated to Trips to Developed Countries and Interaction with Foreigners. Role circumscription is related to Trips to Developing Countries and Memberships in Foreign Scientific Associations, slightly associated with Trips to Developed Countries and Interaction with Foreigners, and unrelated to Foreign Ph.D. Educational Experience and Foreign Work Experience. In other words scientists from developing nations have cross-societal educational and work experiences, make trips to other developing nations and belong to associations in other countries (a point which has been discusse

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discussed previously). Moreover, those scientists who teach, administrate, or consult in their home country have made trips to developing countries and belong to scienfitic organizations in other countries. They also possibly make trips to developed countries and do not necessarily interact with foreigners in their home countries. No relationship exists between their performance of these work roles and corss-societal educational and work experiences.

Given these findings, Proposition 2: The greater the role circumscription, the lesser the exposure to dissociative experience cannot be accepted nor rejected and in fact leans towards rejection. However, the association between systemic circumscription and role circumscription may be confounding these results. In order to show if in fact this is the case, Table 9 was constructed in which level of systemic circumscription is controlled.

Controlling for a high level of systemic circumscription, the relationship between role circumscription and exposure to dissociative experiences is strengthened. Scientists from developing nations who perform teaching, administrative or consulting roles are more likely to be physically and psychically mobile than those who perform research, teaching-research, organization and publication roles. This result is the reverse of the relationship implied in proposition 2.

Table 9: Correlations Between Role Circumscription and Dissociative Experience: Controlling for Systemic Circumscription

Systemic Circumscription
High (Developing Countries)

Table 9: Correlations Between Role Circumscription and Dissociative Experience: Controlling for Systemic Circumscription

Systemic Circumscription
High (Developing Countries)
Dissociative Experiences
(N=101)

	Foreign Ph.D. Educational Experience	Foreign Work Experience	Trips to Developed Countries	Trips to Developing Countries	Interaction With Foreigners	Memberships in Foreign Scientific Associations
Role Circumscription*	.183	-.415	.452	.185	.244	.430

Low (Developed Countries)
(N=121)

	Foreign Ph.D. Educational Experience	Foreign Work Experience	Trips to Developed Countries	Trips to Developing Countries	Interaction With Foreigners	Memberships in Foreign Scientific Associations
Role Circumscription*	-.643	.112	.276	-.854	.485	.236

*High role circumscription includes those who teach, administrate, or consult. Low role circumscription includes research, teaching-research, professional activities, and scientific publication and writing.

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Only with reference to work experience abroad, Foreign Work Experience, is the association supportive of the proposition, i.e., those scientists with a high level of role circumscription are less likely to have cross-societal work experiences.

The relationship between role circumscription and exposure to dissociative experience is again strengthened for low systemic circumscription. Scientists from developed nations who perform teaching, administrative or consulting roles usually make trips to developed countries, interact with foreigners, and belong to scientific associations in other nations. In opposition to the finding that scientists from developing nations who have a high level of role circum-- scription have less cross-societal work experiences, Table 9 shows that Foreign Work Experience is slightly associated with role circumscription for those scientists from developed nations. Moreover the correlations between role circumscription and Foreign Ph.D. Educational Experience and Trips to Developing Countries are in the reverse direction for low systemically circumscribed scientists. Scientists who are from developed nations and who perform teaching, administrative, or consulting roles are less likely to go abroad for their doctorate or its equivalent and are less likely to make trips to developing countries. Both of these findings are supportive of proposition 2. However, caution is needed in interpreting the corr

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the correlation between Trips to Developing Countries and role circumscription because of the relationship of systemic circumscription to this variable. Since scientists from a developing nation are more likely to make trips to other developing nations than scientists from developed nations (only thirteen scientists from developed nations made such trips), the correlation may be meaningless for scientists from developed nations.

These results along with the finding presented in Table 8 indicate that proposition 2 needs to be recast to imply a reverse direction of the relationship between role circumscription and dissociative experiences. Reformulated proposition 2 states, the higher the level of role circumscription, the higher the level of exposure to dissociative experiences.

This reformulation of proposition 2 when viewed in conjunction with proposition 1 implies that scientists from developing countries who perform teaching, administrative, or consulting roles are more likely to be exposed to dissociative experiences than their colleagues who perform research, teaching-research, professional, and publication roles. Moreover, in a similar fashion, scientists from developed nations with a high level of role circumscription are more physically and psychically mobile than their colleagues who perform roles which have been categorized as low level role circums

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The confirmation of proposition 1 supports the argument made in the theoretical section of the study that scientists from developing countries perform teaching, administrative, or consulting roles, in part, because of the lack of available resources to support the other scientific work roles. Given the low level of development of educational and scientific institutions, many of these scientists must go out of their countries to make themselves visible to their field, to get information on current developments, and to establish colleagial relationships with other scientists.

It may also be possible that the performance of teaching, administrative, or consulting roles opens avenues through which experiences in other societies and with members of these societies can be gained. Since these roles are organizationally embedded, the scientist can rely upon the functional position he occupies in the organization to give him access to cross-societal experiences or he can use his position to obtain such access. Such a scientist is more "visible" than the research scientist whose visibility is determined by his periodic publications in his home country journals and the recognition accorded to them. For example, when visitors from other nations arrive at a research or educational institution for a tour of its facilities, they will most likely meet in extensive contact administrators or teac

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or teachers rather than the researchers in the laboratory. Or the administrator or consultant may make trips to other nations to observe other organizations perform their tasks, whereas the researcher may rely more heavily on written communication to obtain information about work being done elsewhere. Whether this explanation is tenable or not can only be proved in future research in which a stress is placed on the visibility of the performance of varying types of scientific work roles.

In summary, these findings indicate that there are differences in the behavioral patterns of scientists. Some of them have had more exposure to dissociative experiences than others. The differences in exposure to varying types of experiences in other societies and with their members is related to the level of development of the respondents home countries (systemic circumscription) and the type of work roles they have performed in their countries of origin (role circumscription). Moreover, scientists from developing countries perform roles in the work situation which are different from those played by scientists from developed nations. These results support the ideas that level of development of the scientists' home country and the types of work roles performed by them are important sources of variations in the behavior of scientists in the international scientific community.

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<u>Additional Characteristics and Backgrounds of the Respondents.</u> In this chapter, we have already analyzed portions of the background and characteristics of the visiting foreign scientists in this study. It has been shown that they have not been, as a whole, physically and psychically mobile and that they usually perform in their home countries roles which have been defined as low role circumscribing. This section explores additional attributes of the respondents with reference to their marital and familial backgrounds, their educational experiences, and their employment histories.

The first major characteristic of the respondents in the study is their age. As Table 10 shows, 40.1 per cent of the scientists are between twenty-six and thirty years of age and 29.8 per cent between thirty-one and thirty-five. Only 6.7 per cent are over forty. With

Table 10: Age Distribution of the Respondents

Age Grouping of the Respondents	Per Cent
Under 25	5.8%
26-30	40.1
31-35	29.8
36-40	16.7
41 and Over	6.7
Non-Response	.9
Total	100.0% (N=222)

Mean age = 32.0

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a mean age of 32, then, we are dealing with a younger generation of scientists. There are no significant differences between scientists from developed and developing nations in terms of age. Our study has tapped a generational segment in the international scientific community which is post-war and, in many cases, post-independence in terms of the scientists from former colonial nations.

In addition, given their youth, these scientists have been involved in the scientific and professional activities of their fields for only a short period. Most of the respondents received their doctorate after the 1955, as Table 11 indicates. Only 3.7 per cent of the respondents obtained their Ph.D. before 1956. Since this study was conducted in 1969, the maximum number of

Table 11: Percentage Distribution of Years in Which the Doctorate was Received by the Respondents

Years in which Doctorate was Received by the Respondents:	Per Cent
Prior 1950	1.4%
1950-1955	2.3
1956-1960	7.2
1961-1965	24.3
1966 and Over	40.5
Doctorate in Progress	5.4
No Doctorate	2.3
Non-Response	16.6
Total	100.0% (N=222)

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years most respondents could have been active in a professional life after their emergence from a student status is twelve years. As a result, the respondents in this study are not only young in age, but also they are professionally young.[11]

The visiting foreign scholars usually complete their highest degree within a relatively short period of time after receiving their bachelor's degree. Four-tenths obtained their highest degree one to five years after they obtained their first degree, as Table 12 discloses. Only 10.0 per cent take longer than ten years to finish the educational process. These results indicate that the majority of the respondents do not experience any breaks between their undergraduate and graduate education. Those scientists who do take longer to complete their highest degree generally cite such factors as military service and lack of financial assets as the major reasons why they did not go directly on into graduate school. Others pointed to another reason, they were unsure of their career goals and vocations after they received their bachelor's degree and, as a consequence, delayed going into graduate school until they had arrived at what they considered to be an appropriate decision. For these scientists, the gap between graduate and undergraduate education is a trial and error period in which they are employed in a variety of tasks in and outside of the scientific

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11 The respondents are also almost all males. Only twelve of the scientists are females.

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Table 12: Percentage Distribution of Length of Years Between Bachelor's Degree and the Highest Degree Received by the Respondents

Length of Years Between Bachelor's Degree and Highest Degree Received by the Respondents:	Per Cent
1-5 Years	43.7%
6-10 Years	34.2
11-15 Years	7.7
16Years and Over	2.3
Non-Response	12.1
Total:	100.0% (N=222)

In the section on dissociative experiences, foreign educational experience at the doctoral level was examined. No reference was made, however, to the level of development of the countries in which the scientists received their Ph.D. Here we will explore not only the level of development of the country in which the doctorate was obtained, but also of those countries in which the bachelor's and master's degrees were received.

Table 13 examines the relationship of the respondents' systemic circumscription, i.e., the level of development of the country of origin, and the level of development of the country in which they received their undergraduate degree. Almost all of the scientists receive their undergraduate training in their home c

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home countries. In addition, only eleven of the respondents took their bachelor's degree in countries other than their home countries. In thier undergraduate training the scientists in this study do not cross national boundaries.

Table 13: Systemic Circumscription and the Level of Development of the Country in Which the Bachelor's Degree was Received by the Respondents

Level of Development of the Country in Which the Bachelor's Degree was Received by the Respondents	Systemic Circumscription High (Developing)	Systemic Circumscription Low (Developed)
Developing	82.2%	4.1%
Developed	5.9	78.5
Non-Response	11.9	17.4
Total:	100.0% (N=101)	100.0% (N=121)

At the master's level, the scientists again usually receive their degree in countries having a similar level of development as their home country. But as Table 14 shows, none of the scientists from developed countries have completed their master's in developing countries. 23.1 per cent of the respondents from developing countries, on the ohter hand, went to developed countries for their initial graduate training. In probes on the question of the country in which the master's degree was received, thirteen of the scientists from developed countries obtained their M.A.'s or M.S.'s in developed countries different from their home countries. None of the scientists from developing nations received their master's degrees in foreign developing nations. These probes reveal that scientists from developing countries are less likely to go to nations with a similar level of development for their initial graduate training than scientists from developed nations. Scientists from developing nations, however, are more cross-development mobile than scientists from developed nations.

At the doctoral level, we find in Table 15 that scientists from developing nations go to developed nations for their Ph.D.'s, but none of the scientists from developed countries receive their doctorate in developing nations. The probes to the question revealed that only one scientist from a developing country went to another developing country for his doctorate. In contradistinction, thirty scientists from developed nations travelled to other developed countries for their Ph.D. Therefore, if scientists from developing countries go abroad for their graduate training at both the master's and doctoral level, they usually go to a developed country and not to a developing country. Scientists from developed countries avoid any of the developing countries for a graduate educational experience. If they go abroad, they will go to a country having a similar level of development as their own. At the bachelor's level, both the scientists from developed and developing nations do not generally have foreign educational experience.

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Table 14: Systemic Circumscription and the Level of Development of the Country in Which the Master's Degree was Received by the Respondents

Level of Development of Country in Which the Master's Degree was Received by the Respondnets	Systemic Circumscription	
	High (Developing)	Low (Developed)
Developing	49.0%	- - -
Developed	23.1	42.1
No Degree	4.8	17.1
Non-Response	23.1	40.8
Total:	100.0% (N=101)	100.0% (N=121)

Table 15: Systemic Circumscription and the Level of Development of the Country in Which the Doctorate was Received by the Respondents

Level of Development of Country in Which the Doctorate was Received by the Respondents	Systemic Circumscription	
	High (Developing)	Low (Developed)
Developing	39.3%	----
Developed	33.6	91.6
No Degree	1.9	.8
Non-Response	25.2	7.6
Total:	100.0% (N=101)	100.0% (N=121)

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Besides being young in age and professionally youthful with varying educational experiences abroad, the respondents in the study generally are married with no children. Only 27.5 per cent of the respondents are single and .9 per cent are divorced. Of those 71.2 per cent of the respondents who are married, 15.3 per cent have one to two children in their families and 6.8 per cent have three or more children. Three-quarters of the respondents, then, are childless.

In the interview schedule, the respondents were asked if their spouses and children accompanied them on their current trip to the United States. Almost all of them replied in the affirmative. When the scientists were asked why their families made the journey with them, the most frequent response was that they wanted their families to have an experience in a foreign country and to see the splendor of, as one Indian biologist related, "super rich America." Only a few scientists' spouses travelled with them for professional purposes. In general, then, for the families of these scientists the current stay in the United States is a vacation, visit, or sightseeing tour.

Given this purpose, many of the scientists mentioned, in passing comments, that they felt obligated to their spouse and children to show them the varying aspects of American culture and life. As one Australian mathematical biologist said, "on weekends, my wife and two sons t

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sons take off in our microbus and tour the city and the suburbs. Often we take trips to Indiana, Wisconsin, and other neighboring states. When I have to work the weekends, I feel I have disappointed my family. All week their cooped up in the apartment. This is the only time they get to see the country and its people. We're planing to delay our return home for several weeks so that we can make up for lost sightseeing." This scientist and several others discussed the tension of their conflict with work and family. But the general pattern seems to be an absence of conflict between the world of work and family in the current stay in the United States.

On the interview schedule, the scientists were also asked to give background information on their spouses, and parents (questions 11, 12, 13, interview schedule). The first item of information deals with the citizenship of these individuals. Only two scientists from developed countries married spouses from foreign developed nations and none of the scientists from developing countries married a spouse from a foreign country. With regard to their parents, only five of the eighty-two respondents to this interview schedule have mothers whose citizenship differs from theirs. Of these five scientists, four are from developed countries and one from a developing country. Similarly, only four of the respondents' fathers are

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from countries different from theirs. Three of the scientists are from developed countries and one from a developing country. In general, the respondents in the study, do not have cross-cultural marriages or parentage, although 11 per cent have cross-cultural marriages.

The second type of data on spouse and familial background probes into their birthplace. Here the point of interest is whether or not their parents or spouses were cross-societally mobile. Only six of the respondents' spouses had citizenships which were different then their birthplace. Seven of the respondents' mothers and nine of the respondents' fathers were born in countries different from the nations in which they currently hold citizenships. There are no differences between the scientists from developed and developing nations on the mobility of their parents or spouses. In general, then, they do not marry cross-culturally and their family backgrounds are usually limited to one society, their home country.

The third item of information on the familial and spouse characteristics is their occupational backgrounds. Table 16 presents the occupations of the fathers, mothers, and spouses of the respondents. Since an important aspect of the occupational backgrounds of these individuals is whether or not they are in scientific fields identical or different from the respondents or in other academic, non-scientific fields, the occupational categories have been divided into two

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into two categories: a)science and other academic fields, and b)non-scientific and non-academic occupations.

As Table 16, shows, 7.3 per cent of the respondents have fathers and spouses in the same field of science as they are in. Only 1.2 per cent have mothers in a field identical to their own. In terms of fields in science different from the respondents, 9.8 per cent of the fathers, and 13.4 per cent of their spouses fall into this category. In non-scientific academic positons, e.g., in the humanities, history, etc., only 1.2 per cent of the fathers and mothers and 6.1 per cent of the spouses are in such fields. These results indicate that the majority of scientists in this study have parents or spouses who are not in scientific and academic occupations.

In the non-scientific and non-academic category, the major occupations of the scientists' fathers are business, government service, e.g., federal officer, government bureaucrat, etc., and labor (worker). Most of their mothers and spouses are unemployed. Of those who are employed, the major categories of employment are laborer, and school teacher for mothers and school teacher for spouses. Using the data on fathers' occupation as a crude index of class background of the respondents, one can conclude the majority of respondents come from a white-collar and a professional class. There were no discernible differences between scientists from

Table 16: Occupations of the Fathers, Mothers, and Spouses of the Respondents in Science and Other Academic Fields and in Non-Scientific and Non-Academic Occupations

Occupation:	Father	Mother	Spouse
a) Science and other Academic Fields			
Scientists in the same field as the Respondent	7.3%	1.2%	7.3%
Scientist in Different Field from the Respondent	9.8	----	13.4
Academician in Other scholarly Field	1.2	1.2	6.1
b) Non-Scientific and Non-Academic Occupations			
Businessman	14.6	----	----
Clerk	4.9	2.4	1.2
Government Service	20.7	----	----
Laborer	15.9	7.3	----
Lawyer	3.7	----	----
Librarian	----	----	2.4
Physician	6.1	----	----
School Teacher (primary or secondary)	3.7	6.1	6.1
Other	12.1	7.3	----
c) Unemployed	----	63.5	74.5
Total:	100.0% (N=82)	100.0% (N=82)	100.0% (N=82)

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developing and developed nations with regard to the occupational backgrounds of their parents and spouses.

Turning now to the employment histories of the respondents, the section on dissociative experience discussed briefly foreign work experience. The majority of respondents did not have corss-societal employment. What is of interest here is the type of organization which employed the respondents in their home countries.

Table 17: Percentage Distribution of the Type of Organizations Which Employed the Respondents in Thier Home Countries

Type of Organization Which Employed the Respondents	Per Cent
Industry	4.5%
Government	11.7
University	78.8
Other	1.4
Unemployed	3.6
Total:	100.0% (N=222)

As Table 17 shows, eigth-tenths of the respondents worked in a university before their arrival to the United States. Governmental organizations employed one-tenth of the scientists and 4.5 per cent had jobs in industry. There were no major differences between scientists from developed and developing countries.

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circumscription, the majority of scientists were performing research, teaching-research, professional, and publication roles in these organizations. Those scientists who were employed in industry and government usually stated in response to probes on the interview schedule that the nature of their research involvement was primarily in R & D or applied research. On the other hand, those employed by universities usually identified basic research.

In summing the characteristics of the respondents, this study is looking at the behavior, values, and orientations of a younger generation of scientists from developed and developing nations who have limited experiences abroad, who are primarily employed by universities, where they enact primarily low circumscribing roles and who do not have a cross-cultural familial and spouse backgrounds.

One further take-off point of inquiry into the characteristics of the respondents are the positions they occupy in the work situation in the United States, the type of exchange networks that existed between their national scientific community and the United States, and their experiences in the social system of work in this country. In Chapter 3 the respondents' positions in this country and the exchange networks will be related to a ranking of nations in terms of scientific output and prestige. A discussion of the social system of work in this cou

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in this country as compared to the visiting foreign scientists' home countries will be presented in Chapter 5.

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Chapter 3

Center and Periphery in Science

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Throughout the world, one can identify centers of scientific activity in a variety of disciplines where research at the forefront of knowledge is transforming existing paradigms or, in some cases, overthrowing them in a process of scientific revolution. Usually these centers are also the major locations of prestigious scientific journals and associations which attract articles from scientists in other countries or their presence in national scientific associational meetings. In addition, scientists outside of the centers send their students to them for socialization under those scientists conducting strategic research in a field. In this way, the centers of scientific activity exert a "pull " towards its vortex of scientific prestigious endeavors.

Outside of these centers lie the peripheral areas of science. When major work in a field is being carried on here and, if such work is successful, the periphery can possibly change its position to a focal point of scientific research. But the likelihood of this occurrence is low because the prestige of the centers begets power and resources in the forms of financial and social support and in terms of a flow of highly trained manpower to it. Thus, the peripheral regions of science are often impoverished and this poverty limits its possible upward mobility in the ranking of nations as centers of scientific activity in a field.

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To find out whether or not the scientists in the study were conscious of a distinction between centers and peripheries of research in their field, the respondents were asked to identify the nations in which research at the forefront of their fields is being accomplished and to discern the position of their home country relative to the leaders in their area of scientific inquiry(questions 34, 35, 36, questionnaire and 125, 126, 127, 130 interview schedule).

The scientists identify most frequently as centers of research the United States, the Soviet Union, France, Great Britain, and Japan. Furthermore, the United States is, in general, acknowledged as the leader of their fields. The positions of the other four nations usually are seen as being interchangeable in position. As one Canadian scientist pointed out, "except for the United States which is the highest country, there isn't much difference in the nations which are near her."

In terms of locating the position of their home countries in relationship to the ranking they presented, the respondents either see their home country as being among or close behind the leading nations or they view it as lagging behind the leading countries in their fields. As Table 18 reveals, scientists from developing nations (high systemic circumscription) usually identify their nations as a peripheral area of scientific activity, i.e., lagging behind the leaders. Scientists

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Table 18: Systemic and Role Circumscription and Perceived Position of the Home Country in Relationship to the Leading Countries in the Respondents Fields

	Systemic Circumscription		Role Circumscription*	
Perceived Position of the Home Country	High (Developing)	Low (Developed)	High (teaching, administration, consulting)	Low (research, teaching-research, Publication, etc.)
Among or close Behind the Leading Nations	36.1%	82.5%	44.3%	72.6%
Lagging Behind the Leading Nations	63.9	17.5	55.7	27.4
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q=-.786		Q= -.540	

*The total N for Role Circumscription equals 198 and not 222 because of 24 non-responses to the question on role circumscription.

from developed nations (low systemic circumscription), on the other hand, rank their home countries as among or close behind the leading nations. Similarly, scientists who perform teaching, administrative, or consulting roles usually discern the rank of their home country to be lagging behind, whereas, those scientists who perform research, teaching-research, publication, or professional roles locate the position of their country of origin as among or close behind the top countries in their field.

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In general, therefore, the greater the systemic and role circumscription, the lower the perceived position of the home country in relationship to the leading countries in a field.

The respondents were also asked if they thought their national scientific community will be upwardly mobile in the future in terms of their ranking of top countries in their fields. The majority of scientists as Table 19 indicates, express confidence in the future mobility of their home country. What is interesting, however, is that scientists from developing nations are more likely to acknowledge the possibility of future mobility than scientists from developed nations. There is no relationship between role circumscription (type of work role performed in the home country) and a perception of the future mobility of the home country.

Several reasons can be given for the relationship of systemic circumscription (level of development) and perceived future mobility of the home country. Many scientists from developing countries, are conscious of the overall "lowness" of the position of their home country, i.e., they see their country as so far behind the top nations in their fields that downward mobility is an impossibility. As a microbiologist from Greece noted, "my country is so distant from the leaders and so are other nations similar to mine, we can only move up. Down is where we are at." For others, there is an inherent

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Table 19: Systemic and Role Circumscription and Perceived Future Mobility of the Home Country in Relationship to the Leading Countries in the Respondents Fields

	Systemic Circumscription		Role Circumscription*	
Future Mobility of Home Country	High (Developing)	Low (Developed)	High (teaching, administration, consulting)	Low (research, teaching-research, Publication, etc.)
Yes	72.6%	50.5%	60.3%	62.2%
No	27.4	49.5	39.7	37.8
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .445		Q= -.039	

*The total N for role circumscription equals 198 and not 222 because of 24 non-responses to the question on role circumscription.

optimism based on the types of advancement in the development of an adequate scientific community they see occuring in the home country. These scientists point out that tremendous strides in self-improvement are underway and a better quality of scientist is becoming predominant in their fields in the home country. Moreover, they often cite increased financial and social support being given to their fields by the public and power centers of their society. It is only a matter of time and the building of a critical mass of scientists for these scientists before their nations narrow the gap between the leading countries and them.

Some scientists share this optimism, but temper it with a c

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it with a cognizance of the possibilities of future mobility on the part of the top nations. They believe in the ability of their countries to climb the ladder of prestige and power in the scientific community, but also discern the failure of their nations to achieve a position of equal rank with the current leaders in their fields because of the advancements in their fields taking place amongst the top nations. They feel that they will narrow somewhat the gap between the leaders and them, but at the same time acknowledge that the distance will never be fully closed.

Those scientists from developing nations who do not see any future mobility of their home countries usually cite the lack of dedicated scientists and students in their fields in the home country, the absence of adequate equipment and facilities, low level of financial and social support given to their work, and the disinterest in creativity in the work situation in the home country as the sources of immobility. For these scientists, the improvement of these conditions is not likely to occur. Rather the "malaise" of their scientific community will remain and,hence, increase the disparity between their nations and the top countries in their field.

Scientists from developed nations, on the other hand, have a lower rate of perceiving future mobility on the part of their home countries than scientists from develo

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from developing countries because they usually see their home country as among or close behind the leaders. For some of them, they cannot visualize any circumstances in which their country could experience downward mobility. Rather, they see their countries as "permanent" centers of scientific activities in their fields. Others made reference to the inability of nations behind them to catch up with their nations in the ranking system, because those nations who are not of an equivalent or better rank lack "quality" scientists, equipment, and support necessary to surpass their home countries. Finally, some of the scientists from developed nations acknowledge that even though their countries are high in the ranking system they outlined, the position of the home country will remain stable because of no competitors from periphery and because of the further advancement of those nations above them. As one British chemist stated, "Britain will always be number two. The United States and Russia will always be ahead of us, but no nation can take second place from us in the forseeable future."

The scientists from developing nations who see their countries as being mobile in the future usually identify the strengths of their national scientific community as the sources of their mobility. Given their strength, they visualize that many of the major breakthroughs in their fields will occur in their home country. These successes will enhance the leadership position of

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their nations and increase their "centrality" in their areas of scientific inquiry. Those nations below them, as a result, will not be able to move close to or above their home countries.

A critical issue to raise in terms of this difference between scientists in developing and developed nations is the impact of the ranking system of nations on the scientists in this study. As has already pointed out, the scientists in the study usually regard the United States as the center or a center of scientific activity in their fields. Given that scientists from developing countries see their national scientific community in their fields as far behind the leading nations and that scientists from developed nations cast their national scientific community among or close behind the leaders, how does this perspective of the home country's place relative to the United States, affect the scientists in this study? Two areas of possible impact are the positions held by the scientists in the social system of work in the United States and the type of exchange networks which exist between their home country and the United States.

Concerning the former, the scientists were asked to identify the type of position they are occupying in the universities during their current stay (questions 6, questionnaire and 7, interview schedule). The positions they hold vary from research assistant to full professor.

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Generally the rank of instructor[12] and assistant to full professor can be regarded as "mainline" positions. Research assistant and associate, on the other hand, usually are considered to be "non-mainline". This distinction has been retained in the analysis and the respondents have been classified into mainline and non-mainline positions.

Table 20: Systemic and Role Circumscription and the Position of the Respondnets in the Social System of Work in the United States: Mainline vs. Non-Mainline Positions

Position of the Respondents in the Social System of work in the United States	Systemic Circumscription High (Developing)	Systemic Circumscription Low (Developed)	Role Circumscription High (Teaching, administration, consulting)	Role Circumscription Low (research, teaching-research, professional, publications)
Mainline (Instructor, Assistant, Associate or Full Professor)	13.8%	30.6%	28.1%	18.3%
Non-Mainline (Research Assistant, Research Associate)	79.2	69.4	71.9	80.3
Non-Response	7.0	----	----	----
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= -.4313		Q= +.2651	

Furthermore, mainline positions often are regarded as more prestigious than the non-mainline

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[12] Sometimes the position of instructor is regarded in some departments as a non-mainline position. Unfortunately data was not obtained which could determine the rank of instructor in the departments studied.

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category. In addition to the prestige factor, is the monetary reimbursement differences between these positions. Usually, the financial rewards are higher for those scientists in instructor to professional rank than for scientists in the research assistant or associate position.[13] Moreover, the mainline positions entail greater involvement in the decision-making structures of the department and greater access to individuals in authority positions in the departments than non-mainline positions. Finally, the difference in positions may also involve varying definitions of roles and social identities on the part of the scientists in terms of their interaction with students and colleagues.

Table 20 relates systemic and role circumscription to the positions of the respondents in the social system of work in the United States. Here one finds that scientists from developing countries are more likely to hold non-mainline positions than scientists from developed countries. In addition, scientists who perform teaching, administrative, or consulting role hold more mainline positions than scientists who perform research, teaching-research, professional, or publication roles in their home countries. Therefore, the greater the systemic circumscription, the greater the tendency to occupy non-mainline positions in the United States. However, the greater the role circumscription, the greater the tendency to occupy mainline positions.

[13]In some universities, the position of reserach associate can be quite prestigeful and financially rewarding. Data on such university differences were not gathered.

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In terms of the ranking of nations presented previously, these results imply that scientists from the peripheral ranking countries will occupy positions of a low status in one of the high ranking centers of scientific endeavor in their field, the United States. Scientists from nations which are close behind or among the leaders in their field when travelling to another center will hold positions which are of a high status. This implies that many of the scientists from developing nations do not receive the same level of reward, prestige, and role involvement as many of the scientists from developed nations receive. Language proficiency may also be a factor. The ranking of the home country, therefore, has an effect on the scientist in the study.

Role circumscription has an impact on the position occupied by the scientists in the social system of work in the United States because of the similarity of tasks involved in mainline and non-mainline positions to the roles eancted in the social system of work in the home country. Mainline positions often entail the performance of teaching and administrative roles. The non-mainline positions, on the other hand, are directly related to research, teaching-research, and to some degree publication roles. In other words, there is a continuity of positions for those scientists who perform teaching, administrative, or consulting roles in their home country and in the United States and also for those scientists who enact research, teaching-research, publication, and profession

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professional roles. This point will be supported with more evidence in Chapter 5 where it will be shown that the work roles performed in the United States correspond highly with the types of work roles performed in the home country.

The second area of interest related to the center-periphery ranking of nations is what type of exchanges do the scientists see as existing between their home country and one of the centers of scientific activity the United States.[14] The respondents were asked to identify if there are any networks of exchanges between their home country and the United States in terms of communication of information in journals and exchanges of journals, transference of financial and other forms of resources, sponsorhip of students, work contacts with scientists, notification of current news and gossip and of the availiability of positions in the United States and the home country (question 39, interview schedule). The major types of exchanges the scientists acknowledge as existing between the two countries are exchanges of resources, students, and journals. What is of interest to this discussion is the direction of these exchanges,

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[14] An attempt was made also to identify the roles scientists enacted in the exchanges between their home country and the United States (question 40, interview schedule). four-tenths of the eighty-two scientists gave non-responses to the question and 1.5 per cent said they didn't know if they played any role. As a result, this question did not yield any results which could have given insight into differences between scientists in systemic linkage roles.

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i.e., are the exchanges reciprocal or non-reciprocal and does perception of reciprocity vary with the systemic and role circumscription of the scientists? Non-reciprocal exchanges have been divided into two types: a)one way exchanges from the United States to the home country and b)one way exchanges from the home country to the United States.

Table 21 indicates that scientists from developing nations are more likely to view the network of exchanges to be non-reciprocal than scientists from developed nations. The latter scientists regard the exchanges as being reciprocal. In addition, more scientists from developing nations see the direction of exchanges of a non-reciprocal nature to be flowing out of the home country to the United States rather than from this country to their nation. For those scientists from developed nations who see non-reciprocity of exchanges, the one way exchange is initiated by the United States towards the home country rather than in the opposite direction.

Scientists who perform teaching, administrative, or consulting roles also identify non-reciprocal forms of exchanges. Their low role circumscribed counterparts, on the other hand, see reciprocal exchanges existing between the home country and the United States. Of the high role circumscribed scientists, 28.6 per cent see direction of the non-reciprocal networks to be from the

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Table 21: Systemic and Role Circumscription and the Type of Exchanges Between the United States and the Home Countries of the Respondents: Reciprocal and Non-Reciprocal Exchanges

Types of Exchanges Between the United States and the Home Country	Systemic Circumscription		Role Circumscription*	
	High (Developing)	Low (Developed)	High (teaching, Administration, Consulting)	Low (Research, teaching-research, Publication, Professional)
Reciprocal	50.0%	67.3%	47.6%	73.7%
Non-Reciprocal a) One way Exchanges From U.S. to the Home Country	23.5	15.4	28.6	17.5
b) One way Exchanges from Home Country to the U.S.	26.5	11.5	23.8	7.0
Non-Response	----	3.8	----	1.8
Total	100.0% (N=30)	100.0% (N=52)	100.0% (N=21)	100.0% (N=57)

*The N does not equal 82 because of non-responses to question of work roles.

United States towards the home country and 23.8 per cent say the exchanges are directed out of their country of origin to the United States. Similarly, 19.7 per cent of these scientists who perform research, teaching-research, publication and professional roles specify one way exchanges from this country to theirs as the

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direction of the non-reciprocal network, whereas only 8.2 per cent identify an opposite directional flow, from the home country to the United States.

Cautiously interpreting these findings because of the small number of scientists involved in this analysis, one can conclude that the systemic linkages between the peripheral nations and the centers of scientific activity in a field are of a non-reciprocal nature and the direction of the exchange is from the center to the periphery or vise versa. Between equal ranked nations, in the leader or close behind the leader, ranks the exchanges are reciprocal, i.e., both nations share in the initiating and receiving of resources, information and students. Two statements made by scientists yield an adequate description of this difference between center and periphery in exchange networks.

Describing the reciprocity of the systemic linkage exchanges between his country and the United States, a scientist from West Germany said: "every week scientists in my department receive letters from Americans. Sometimes they even call each other on the phone for critical discussions on a research problem. We often tell them of promising students who are interested in their areas and we arrange for these students to work in the United States. The Americans also send students to us. We also receive journals from your country and we send ours to yours. So I must say in answer to your question on direction, it occurs both ways."

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AChilean cardiologist described the non-reciprocity of exchanges in the following manner: "to Americans, we are a scientific backwater region. No one bothers with us and no one knows that we even exist in the United States. Sure we get journals from the U.S., but Americans don't read ours. I'm not even sure if they receive them. When my colleagues and I write letters to Americans telling them of our interest in areas that they are working in, some never receive replies. If they do, as I did, the Americans always say 'what the hell are you doing in Chile.' Relatively few of our students go abroad to this country and, many do not return. We never had any American students, even though our work is quite good. Sometimes American cardiologists visit Chile for a vacation and, if they run into one of us, they are quite surprised at the dynamic research we are doing. My colleagues here don't want me to return home. But I will. I like the backwater region."

In summary, scientists from developing nations and those who are highly role circumscribed (teacher, administrators, or consultants) in their home country identify the positions of their home countries in a ranking of nations as low or peripheral to the centers of research in their fields. Scientists from developed countries and those who are low role cricumscribed (researchers, teaching-researchers, publishers and professional scientists), on the other hand, see their nations as centers or leaders in their fields. The peripheral or center rank of their home country affects the type of positions they occupy when they are employed in one of the centers of activity in their field and the type of exchanges they see as existing between their home countries and the United States. These findings imply that scientists from the periphery do not receive the same level of support as do scientists from the center in the United States and in the systemic linkages between their nations and the United States. The consequences of the stratification of nations in fields of science then, are quite broad.

The evidence presented here suggests that future research in the sociology of science must take into account the differential status of nations in science and the functions of rank for the center and periphery. Such a line of inquiry may clearly demarcate zones of power and influence between national scientific communities, differential reward structures, and the processes which lead to the maintenance of a status position in the international scientific community. It also raises the question of how can peripheral nations become upwardly mobile in a system where existing power,privilege and prestige, generates future power, privilege and prestige. Can peripheral nations be individually upwardly mobile or must they use a process similar to "sanskritization" to change their posi

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position to that of a center? The latter avenue to mobility is suggested implicitly in the advocacy of the development of regional centers of research in critical areas of the field by scientists, politicians, and change of agents in the developing world.

Another critical question is the following: If mobility is no longer possible in some fields because of the strength of the leading nations, might not an avenue of mobility for a peripheral nation be investment of financial and social support in another field in which there are no leaders? For example, in one of the interviews, a biologist stated that Red China is now giving enormous support to the biological sciences in the hope of becoming the center of the biological revolution in the next century. In this way, China moves ahead of the Western nations who have been in the past the center of research for the physical science revolution. Since both the physical and biological sciences require enormous expenditures from the gross national products of nations to support adequate research and educational institutions in these fields, the majority of developing nations can never compete head on with the developed nations in these areas. The only hope for these nations is either the formation of coalitions in the form of regional science institutions, as has already been suggested, or investment in the social sciences or other fields in the physical and biological sciences untouched by the centers, where the level of sup

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support needed to give birth to and sustain such institutions is still relatively small.

Research aimed at explorations in this domain of inquiry in the sociology of science could yield, not only critical information on variations in the international scientific community, but also knowledge of international stratification systems and of such stratification phenomena as mobility patterns, caste and class formation, and status crystallization among nations.

Chapter 4

Homogeneity and Heterogeneity in the Scientific Community

In Chapter 2, a considerable degree of homogeneity was seen as existing in this group of visiting foreign scientists with reference to their exposure to dissociative experiences and role circumscription. This section of the dissertation will probe into the degree of homogeneity of the respondents in terms of their involvement in third cultural networks, their orientation to work, social interaction and living location, their post-modern perspectives, their worldmindedness, their societal and scientific responsibility, and their professional and non-professional behavior. Variations in the behavior and attitudes of scientists with regard to these variables will be explained by either the scientists' degree of exposure to dissociative experiences or by their systemic and role circumscription in the home country, as proposed in propositions 4 through 11.

<u>Third Cultural Networks.</u> Proposition 3 relates the level of exposure to dissociative experiences to involvement in third cultural networks in the following fashion: the greater the level of exposure to dissociative experiences, the greater the involvement in third cultural networks. The point of emphasis in this proposition is that physical mobility and psychic mobility act as stimuli to the establishment of social relationships which transcend the cultures of the actors involved. While participating in such relationships, the various actors perform roles as cross-cultural mediators. In this section of Chapter 4

the degree of third cultural involvement of the visiting foreign scientists will be explored.

Table 22 indicates that the respondents in this study participated in situations previously described as third cultural. The visiting foreign scientists have through their participation in meetings of scientific associations established collegial and friendship ties with scientists in other nations, and their networks in their work situations in the United States characterized by interaction with scientists from countries other than their own. With regard to their networks outside of the work situation in the United States, their social relationships have been divided into four categories: 1)interaction with people who work at the same place, 2)interaction with people who work elsewhere, 3)interaction with people in the same field as the respondents', and 4)interaction with people outside of the respondents' fields. This categorization was made to find out whether or not the third cultural networks outside of the work setting were composed primarily of individuals who work with the scientists in the same laboratory or office and to determine whether or not they were limited to individuals in the same field. The results indicate that across all four of these categories, the scientists have established social relationships with individuals from other countries. The high non-response

rate in the category of interaction with people who work elsewhere indicates that it is with these individuals that the respondnets tend to have the weakest contact.

Table 22 also shows that the respondents split almost evenly on the variable Nature of Arrival in the United States. Nearly one-half of the scientists had their current trip to this country sponsored and 47.8 per cent relied on personal resources. Hence, it is only on this index of third cultural involvement that there is a marked degree of variation. The other indices again reveal the homogeneity of the behavior of the scientists.

The relationship of the various indices of level of exposure to dissociative experiences and the indices of third cultural network involvement is explored in Table 23. The results presented in this table are quite mixed in terms of their support of proposition 3.

Looking at all of the correlations of dissociative experiences to involvement in third cultural networks as a whole, one can only say that it appears that the two are unrelated to one another. In spite of the fact that a definite statement cannot be made concerning the status of proposition 3, some conclusions concerning the relationship of dissociative experiences to involvement in third cultural networks can be made.

Table 22: Percentage Distribution of Involvement in Third Cultural Networks by the Respondents

		Indices of Third Cultural Networks:	Networks Outside of Work				
Type of Involvement	Attendance at Meetings	Networks in Work	a) with people who work at same place	b) with people who work elsewhere	c) with people in field	d) with people out-side Field	Nature of Arrival in U.S.
Third Cultural Involvement	62.2%	71.4%	67.9%	45.7%	72.3%	56.9%	48.7%
Non-Third Cultural Involvement	23.2	25.7	13.6	20.0	10.8	33.1	47.8
Non-Response	14.6	2.9	18.5	34.3	16.9	10,0	3.5
Total	100.0% (N=82)	100.0% (N=140)	100.0% (N=140)	100.0% (N=140)	100.0% (N=140)	100.0% (N=140)	100.0% (N=222)

Table 23: Correlations of Dissociative Experiences to Involvement in Third Cultural Networks

	Involvement in Third Cultural Networks:						
			Networks Outside of Work				
Dissociative Experiences:	Attendance at Meetings (N=82)	Networks in Work (N=140)	a)with people who work at same place (N=140)	b)with people who work elsewhere (N=140)	c)with people in field (N=140)	d)with people outside field (N=140)	Nature of Arrival in U.S. (N=222)
Foreign Ph.D. Educational Experience	.396	-.209	-.414	-.545	-.409	-.665	-.080
Foreign Work Experience	-.337	.036	-.367	-.266	-.499	-.172	-.007
Trips to Developed Countries	.316	-.124	.691	.160	.379	.410	.269
Trips to Developing Countries	.569	-.025	.286	-.042	.150	.117	-.014
Interaction with Foreigners	.326	.100	.067	.043	.039	.080	.008
Memberships in Foreign Scientific Associations	.412	.013	.277	-.288	-.256	.007	.004

First of all, those scientists who have had cross-societal educational and work experiences commonly interact with people from their home country in and outside of the work situation in the United States. Hence, prior work and educational experiences abroad have not stimulated the growth of third cultural networks in the respondents' current trip to the United States. Moreover, cross-societal work experiences have not been of assistance to the respondents in the establishment of communication and friendship ties with scientists from other nations at meetings. In contradistinction, educational experiences abroad, along with making trips to developed and developing countries, interacting with foreigners in the home country and belonging to scientific associations in other nations have enabled these scientists to use scientific associations as a setting for the development of third cultural social relationships.

Secondly, making trips to developed countries appears to be the most functional of the dissociative experiences for the development of third cultural networks in and out of the work situation and for obtaining sponsorship for the current stay in the United States. This finding indicates that the making of trips to countries has most likely given scientists who have been abroad appropriate experience in establishing social ties with nationals from other countries in the United States. Relying on their cross-societal background, these scientists seek out individuals not from their home country for interaction. The same conclusion can be drawn for those scientists who have been abroad to developing countries with reference to interaction patterns outside of the work situation with people who work at the same place as the respondents and who are in the same field as they are.

Additional support is given to this conclusion in the findings presented in Table 8 in Chapter 1. There, educational and work experiences abroad were unrelated to making trips to developed and developing nations. These results indicate that possibly foreign educational and work experience does not give the experiental base for participation in third cultural networks as does the foreign experience abroad apart from educational and work purposes. Educational and work experience abroad may in fact not be a stimuli for participation in third cultures at least with reference to third cultural network involvement. Since these experiences were only temporary and time consuming, the respondents may not have been involved with members from other countries and may not have absorbed the cultural patterns which were divergent from their home countries while obtaining their doctorate or its equivalent or working. Even though the trips scientists made to developed and developing countries were also temporary (usually less than a month), the respondents were heavily involved in cross-cultural interaction. The majority of the respondents who made such trips stated the purpose of their journey abroad to be contacting scientists from other nations who were engaged in similar work as theirs. They saw them at conferences or in the scientists' laboratories. In addition, they used such periods to vacation and to see another country.

An additional variable of importance is status. During the foreign educationaland work experiences, the scientists are students and do not have established professional identities in the social system of work. However, during their trips to developed and developing countries, they are interacting as colleagues with the scientists they visited, rather than as students with their professors. Hence, the making of trips abroad may be more dissociative than foreign educational and work experiences because of the divergent status positions held by the scientists in each of these experiences.

Finally, the relationship among the psychic mobility indices of dissociative experiences and the involvement of the visiting foreign scientists in third cultural networks is quite mixed. Interacting with foreigners in the home country is not related to sponsorship of the current trip to the United States nor to participation in third cultural networks in and outside of the work situation. Yet, it is functional for the establishment of third cultural networks at scientific association meetings. Similarly, membership in associations in other countries besides the home country is functional for third cultural involvement at meetings and also for such involvement with people who work at the same place but outside of the work situation. Respondents who hold such memberships, on the other hand, tend to interact only with people from their home country when their interaction partners work elsewhere or are in their field. Language facility in English may be a factor here. A lack of facility in English may account for participation with individuals from the home country rather than with a binational and multinational groups. Upon this evidence, one can conclude that only in certain situations does psychic mobility in the home country stimulate involvement in third cultural networks.

Post-Modern Orientation. As previously noted, Waisanen has proposed that exposure to dissociative experiences enables a social actor to transcend his social-cultural milieu and through this process develop attitudes which can be called trans-national. Following this thesis, the first chapter proposed that for the population in this study such dissociative experiences would foster the growth of a "post-modern" orientation. Accordingly, proposition 4 was developed to explore this relationship: the greater the exposure to dissociative experiences, the greater the post-modern orientation.

Questions 67 and 69 in the interview schedule were used to develop a set of fixed alternative questions which could measure post-modern orientations. These questions were incorporated in question 49 on the questionnaire (see Appendix A). Agreement or Disagreement with the items in the question were scored as post-modern or non-post-modern in the following manner:

Statement	Agreement	Disagreement
"My country should stay as it is, ie., it should not change."	Non-Post Modern	Post-Modern
"What my country needs most is greater economic development."	Post-Modern[15]	Non-Post-Modern
"A greater effort in my home country must be placed on a rediscovery of its past."	Non-Post-Modern	Post-Modern
"The values of science should influence the values and ways of life of the people and leaders of my country."	Post-Modern	Non-Post-Modern
"The problems of confronting my country must be seen as international in nature."	Post-Modern	Non-Post-Modern
"My country should follow and develop its own course thru history and not copy other nations."	Non-Post-Modern	Post-Modern
"There should be more international cooperation between my country and other nations."	Post-Modern	Non-Post Modern

[15] Agreement on this item is essentially indicative of a transitional stage prior to the emergence of a post-modern orientation.

Following this scoring scheme, Table 24 reveals that the majority of scientists have a post-modern orientation. They view the future of their home country in dynamic terms rather than static and reject a nostalgic perspective for their home country. They also see the future of their home country from an international viewpoint stressing that the problems facing their home country are international in nature. Accordingly, their nation along with other countries cannot develop their own course in history but must work together with a spirit of international cooperation. These visiting foreign, scientists also emphasize a need for a proliferation of the values of science, rationality and experimentation through the general masses and leadership of their home countries. This type of future orientation is, as described earlier, post-modern.

The relationship of post-modern orientation to dissociative experience as formulated in proposition 4 is supported in Table 25. Four of the six indices of level of exposure to dissociative experiences are in the main positively correlated with post-modern orientation items. Work experience abroad, making trips to developed countries, and the two psychic mobility indices (interacting with foreigners in the home country and memberships in scientific associations in other countries) have fostered the growth of post-modern

Table 24: Percentage Distribution of Type of Future Orientation of the Respondents: Post-Modern and Non-Post-Modern Orientations (N=140)

	Indices of Post-Modern Orientation:						
Type of Orientation	Stable Home Country	Greater Economic Devel-opment	Greater Rediscovery of Past	Value of Science	Problems are Interna-tional	Develop own Course in History	More In-ternational Cooperation
Post-Modern	85.7%	67.1%	47.9%	68.6%	67.1%	54.3%	82.9%
Non-Post-Modern	4.3	20.7	22.1	10.0	10.7	25.0	3.6
Undecided	2.9	7.9	25.7	16.4	17.1	15.0	10.6
Non-Response	7.1	4.3	4.3	5.0	5.1	5.7	2.9
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 25: Dissociative Experiences vs. Indices of Post-Modern Orientation (N=140)

Dissociative Experiences	Indices of Post-Modern Orientation: Stable Home Country	Greater Economic Devel- opment	Greater Redisco- very of Past	Value of Science	Problems are In- ternational	Develop own Course in History	More In- ternational Cooperation
Foreign Ph.D. Educational Experience	-.305	.546	-.038	-.085	-.310	-.268	.015
Foreign Work Experience	.418	-.104	.560	.293	.395	.317	.206
Trips to Devel- oped Coun- tries	.280	-.161	.206	-.095	-.291	.448	.514
Trips to Devel- oping Coun- tries	-.380	-.048	.101	-.333	-.666	.340	-.061
Interaction with Foreigners	.039	.516	.221	.167	-.404	-.280	.150
Memberships in Foreign Scien- tific Asso- ciations	.233	.801	.099	.579	-.250	.253	.200

orientation. Obtaining a doctorate and its equivalent in another country and making trips to a developing country are in general negatively correlated with this type of perspective on the future. Educational experience abroad is related to a post-modern orientation only with reference to greater economic development. The only index of such a perspective which is related to making trips to developing countries is a rejection of an isolationist view of the historical development of the home country.

Table 25 also reveals that those scientists who have been physically and psychically mobile commonly reject the viewpoint that the problems confronting their home country are international in origin. Rather, they usually view the problems of their nation as being indigeneous to it. This result indicates that exposure to socio-cultural patterns of other nations makes individuals more conscious of the divergence of their own social system from others. Instead of identifying the similarities amongst their system and others, these respondents emphasize the uniqueness of their society relative to others. Such an emphasis implies that these individuals have used other nations as yardsticks of comparison with their home country. This comparative perspective can be characterized as an evaluative ability. Evaluation of one's own system and others is an outcome of dissociative experience and is in keeping with the model that Waisanen has proposed (1969: 7). Since evaluation is a result of exposure to other systems and because only 10.7 per cent of the respondents had non-post-modern orientation on this item, these negative correlations will be considered as supportive of the proposed relationship.

In summary, proposition 4, the greater the exposure to dissociative experiences, the greater the post-modernity, has been supported. Those scientists who have been physically and psychically mobile view the future of their home country in a post-modern manner i.e., the physical and social environment of the home country and the world are conquered through the application of science at an international level or the application of international science at the national level.

Universalistic Orientations to Work, Social Interaction and Living Location. Earlier it was suggested that scientists who were physically and psychically mobile would be more universalistically oriented than scientists who did not have such an exposure to dissociative experiences. Accordingly, it was proposed the following propositions:

Proposition 5: The greater the dissociative experiences, the greater the universalistic orientation to work.

Proposition 6: The greater the dissociative experiences, the greater the universalistic orientation to social interaction.

Proposition 7: The greater the dissociative experiences, the greater the universalistic orientation to living location.

Universalistic orientation to work, social interaction, and living location has been defined previously as a lack of boundedness in one social system in terms of where a social actor would work, who he would associate with, or where he would prefer to live. To measure the first item of a universalistic orientation, we selected questions 159 on the interview schedule and 40 on the questionnaire. Both of these questions ask the respondent if he has a preference to where he works. Similarly, with reference to a universalistic orientation to social interaction and living location, the visiting foreign scientists where asked if they had a preference of persons with whom they would interact with (question 147, interview schedule) and a preference on which country or countries they would possibly live in (question 161).

Table 26 reveals that the majority of scientists are universalistically oriented with reference to work and social interaction, but particularistically oriened to living location. The 74.4 per cent of the respondents on the interview who are particularistically oriented made a preference for either their home country or the United States. These respondents selected their home country for several reasons. First and primarily, they had identified their nation as their home society. Moving to another country would entail for them a loss of familial and friendship ties which they valued highly.

Table 26: Percentage Distribution of Respondents Type of Orientation to Work, Social Interaction, and Living Location: Universalism and Particularism

Type of Orientation	Work	Social Interaction	Living Location
Universal-istic	66.7%	54.9%	18.3%
Particular-istic	29.3	30.5	74.4
Non-Response	4.0	14.6	7.3
Total	100.0% (N=222)	100.0% (N=82)	100.0% (N=82)

Table 27: Dissociative Experiences vs. Universalistic Orientation to Work, Social Interaction, and Living Location

	Type of Universalistic Orientation		
Dissociative Experiences	Work (N=222)	Social Interaction (N=82)	Living Location (N=82)
Foreign Ph.D. Educational Experience	-.390	.260	-.356
Foreign Work Experience	.307	.030	-.465
Trips to Developed Countries	.031	.301	.216
Trips to Developing Countries	.091	.359	.247
Interaction with Foreigners	.153	-.488	-.383
Memberships in Foreign Scientific Associations	.024	.525	-.469

Secondly, some respondents felt that they would have difficulty in adjusting to cultural patterns in another country. Moreover, some of these respondents cherished their cultural heritage over the culture of others. They believed their society had something to offer which others did not. Along thse lines, some respondents felt other cultures, specifically the United States, over stressed the Protestant Ethic of work over enjoyment with an overemphasis on work. As one scientist from Australia said, "I'd rather have a beer with friends and play the horses, than work all the time like these Americans." Others saw their home country as being more rewarding for raising children because from their perspective their culture stressed healthier attitudes toward life, e.g., a lack of stress on violence; or occupational success is not the only important thing in life.

Those foreign scientists who made a preference for a nation other than their home country picked some highly developed nation such as the United States, England, or West Germany as their choice of a living location. The major factor at work in this selection was a desire to partake of the riches and comforts of a technological society. Their vision of these countries were similar to the images held by early immigrants to the United States, namely, the highly developed nation is a "land of opportunity," where material and social success is readily possible in one's life time. Some of these respondents united their work location choice with this selection of a residential site. In these more developed countries, they felt they could achieve the best of both worlds: they could find funds and colleagues for work and, at the same time, enjoy the comforts of life. The preference of a highly developed nation for a living location, as can be expected, was usually made by those scientists who came from developing nations.

These particularistic orientations to living location are in general associated with an exposure to dissociative experience, as Table 27 reveals. Two of the physical mobility indices, educational and work experience abroad, and both of the psychic mobility indices (interacting with foreigners in the home country and memberships in foreign scientific associations) are negatively correlated with a universalistic orientation to living location. Only the making of trips to developed and developing countries in a professional status seem to foster a universalistic orientation, ie., having no preference for a residential site. These results indicate that exposure to dissociative experiences, save for journeys to other nations apart from working and receiving an education, foster an awareness of specific choices of a living location. As in the prior section on post-modernity, this finding suggests an evaluative ability. By becoming conscious of alternatives to the socio-cultural patterns, those scientists who have been exposed to dissociative experiences are selective in identifying the place where they would like to live. Accordingly, proposition 6 should be reformulated in light of this evaluative component: the greater the dissociative experiences, the lesser the universalistic orientation to living location.

The relationship of exposure to dissociative experiences and a universalistic orientation to social interaction, on the other hand, is supported in Table 27. Scientists who have had physically and psychically mobile experiences commonly make no preferences by general categories of human identity in their choices of interaction partners in their social life. Most of the respondents felt that cultural differences, political background, race or any other similar categories did not affect their decision as to whom they prefer to or actually interact with.

In contrast, proposition 5 is only weakly supported in Table 27. Accepting employment in another country or countries is positively associated with work experiences abroad and interacting with foreigners, not associated with making trips to developed and developing countries and memberships in foreign associations, and negatively correlated with obtaining a doctorate or its equivalent in another country. This weak association of dissociative experience and universalistic orientation to work can be clarified through an examination of Table 28.

The respondents were asked on the questionnaire to identify how important or unimportant the following items were in their decisions on where they would work: country, salary, quality of scientists, quality of research facilities, and preferences of their wives and/or children (question 41, questionnaire). As Table 28 discloses, the majority regard each of these factors to be important in their initial choice. The quality of scientists and research facilities are the most important and familial desires the least important.

Interview respondents were asked a similar question (question 160, interview schedule) and again a similar distribution emerges. The majority of respondents, 70.6 per cent identified professional factors, such as available funding for research projects, the quality of scientists, students, and research facilities, etc. as important in their preference of a country to work in. The next major factor was the country, 18.9 per cent of the interview respondents. Idiosyncratic desires, e.g., ability to make friends, personal likes and dislikes, accounted for 5.2 per cent. Familial reasons were given by 3.3 per cent and 2.0 per cent of the responses were uncodable. These results convey that there are definite factors which are incorporated in the decision of a location for employment. The uniformity of selections of these factors by the scientists accounts for the low association between dissociative experience and a universalistic orientation

Table 28: Percentage Distribution of the Variables Affecting the Choice of a Work Location and Their Level of Importance (N=140)

Variables Affecting Choice of Work Location:

Level of Importance	Country	Salary	Quality of Scientists	Quality of Research Facilities	Family
Important	77.9%	76.4%	82.9%	86.4%	57.9%
Unimportant	18.6	19.3	12.1	10.7	28.6
Non-Response	3.5	4.3	5.0	2.9	13.5
Total	100.0%	100.0%	100.0%	100.0%	100.0%

to work.

In summary, exposure to dissociative experiences is related to a universalistic orientation to social interaction and to a particularistic orientation to living location. Its relation to a universalistic orientation to work, however, is weak and is in part attributable to the factors the visiting foreign scientists have identified as important in their selection of a locus of employment.

Worldmindedness. The relationship of dissociative experiences to this orientation was supported in the section on the post-modern orientation of scientists. In addition, the visiting foreing scientists, in general, stressed an international perspective on the future i.e., international cooperation in solving problems is stressed. This section explores a related issue: the degree of worldmindedness of the respondents and the relationship of worldmindedness to exposure to dissociative experiences as forwarded in proposition 8. As previosuly stated, worldmindedness is condiered to be a "world view" in which the social actor defines his relationship to the world to be characterized by a spirit of cooperation where national differences disappear and the world community of man emerges and where cooperation between nations in the solution of common problems takes precedence over an isolationist and nationalistic perspective.

The respondents were asked in the interview and the questionnaire the open-ended question: "What affect have your experiences here and in other countries had on the way you view people, societies, and the world?" (Qustion 50, questionnaire, and question 234, interview schedule). Several items of information derived from responses to this question are relevant to a consideration of worldmindedness. First of all, did this trip to the United States and prior journeys to other countries have an effect on the world view of the visiting foreign scientists? This portion of the data is called "world view change: effect". In this category, responses to the question are coded: 1)a world view change did occur and it was described; 2)a world view change occurred, but no description of the change was given; and 3)no change in the world view was reported.

The second item of information concerned the referent of the world view change, i.e., was the world view change either country or transnationally oriented? This information is called "world view change: referent". Responses which were similar to the following were coded as a trans-national orientation: "I have become conscious of the similarities amongst people throughout the world." "The globe seems smaller to me." "I have found a common humanity to exist and I know we will be able to solve the problems facing us." This referent to the world view change is a country orientation when the scientists made statements similar to these: "I know how far behind our country is from other countries in terms of its progress." "I have become conscious of the grandeur of the history and culture of my nation." "After being in the United States, I have seen what the difference is between the 'haves' and the 'have nots'."

The final piece of data is most relevant to worldmindedness and is entitled "world view change: direction." Here responses to the question were coded with reference to whether or not the change in the world view led to an increase of worldmindedness or nationalsim. If the respondent said that as a result of his trips to another nation, he has become knowledgeable of the common humanity of man, or that he now feels that the similarities amongst men are more important than the differences, or that his political, religious, and racial backgrounds no longer interfere from his standpoint in his interaction with people from other nations, I have coded his response as worldmindedness. If on the other hand, his responses were similar to the following I have coded his reply as nationalism: "My nation is more important than others." "Only people in my home country know how to live."

As Tables 29, 30, 31 show, the majority of respondents have recorded changes in their world views as a result of cross-societal movement. Only 7.2 per cent of these scientists could not and did not depict the nature of the change. In describing the referent of the change, 73.5 per cent of the respondents used the world rather than a country as the main point of their discussion. Finally, the impact of cross-societal journeys on the direction of the world view change is reported as being towards worldmindedness rather than nationalism.

World view change is, in general, negatively correlated with exposure to dissociative experiences, i.e., the lesser the exposure to dissociative experiences, the greater the world view change as Table 32 indicates. The implications of this finding is that the current trip to the United States for those scientists who have not been exposed to the various types of dissociative experience has had a greater effect upon them than those who have had such experiences. For these scientists, then, their stay has been quite dissociative. This finding implies that the first trip results in greater change than subsequent trips. Future trips, therefore, become routinized.

The second implication of the results is that scientists who have made trips to developing countries and who have interacted with foreigners in the home country have had changes occur in their world views as a result of this trip to the United States and other trips they made abroad prior to their current journay. Changes did not occur in those scientists who have educational and work experiences abroad, made journey to developed countries, and belong to associations in other countries. Concerning "world view change: effect," one must be cautious in arriving at a conclusion with reference to

Table 29: Percentage Distribution of World View Change: Effect

World View Change: Effect	Per Cent
Change Described	69.8%
Change not Described	7.2
No Change	8.1
Non-Response	14.9
Total	100.0% (N=222)

Table 30: Percentage Distribution of World View Change: Referent

World View Change: Referent	Per Cent
Trans-national Orientation	73.5%
Country Orientation	25.8
Non-Response	.7
Total	100.0% (N=155)*

*The N does not equal 222 because of the respondents who did not describe the change in their world views --16, who did not have any change --18, and the 33 who did not respond to the question.

Table 31: Percentage Distribution of World View Change: Direction

World View Change: Direction	Per Cent
Worldmindedness	67.7%
Nationalism	25.8
Non-Response	7.1
Total	100.0% (N=155)*

*The N does not equal 222 because of the respondents who did not describe the change in their world views--16, who did not have any change--18, and the 33 who did not respond to the question.

the relationship of dissociative experience to it because only 8.1 per cent of the respondents identified no change as occuring.

A transnational referent, however, is also associated with exposure to dissociative experiences. Those scientists who have not had these experiences cast their description of the type of effect trips to other nations have on them in terms of a country referent, i.e., their orientation identifies a change in attitude toward a particular country, its people, and its culture. Those scientists who have been exposed to dissociative experiences, on the other hand, use a trans-national orientation to describe the changes in their world view, i.e., they have become conscious of the similarities of people throughout the world.

In addition, exposure to dissociative experiences is weakly correlated in a positive direction with a growth of worldmindedness rather than nationalism. Those scientists who have such experiences say that they have become more conscious of the international and transcultural nature of the world and their place in it. Scientists who have not had dissociative experiences, on the other hand, see the world in an opposite manner.

Considering the positive correlations between dissociative experience and world view change referent and direction together, one can conclude that proposition 8 has been substantiated: the greater the dissociative

Table 32: Dissociative Experiences vs. Worldmindedness: World View Change Effect, Referent and Direction

Dissociative Experiences	World View Change: Effect (N=222)	Referent (N=155)	Direction (N=155)
Foreign Ph.D. Educational Experience	-.277	.230	.099
Foreign Work Experience	-.292	-.120	-.300
Trips to Developed Countries	-.233	.355	.249
Trips to Developing Countries	.260	.177	.091
Interaction With Foreigners	.212	.362	-.080
Memberships in Foreign Scientific Associations	-.448	.364	.504

experience, the greater the worldmindedness.

<u>Social and Scientific Responsibility.</u> In Chapter 1, several repercussions of systemic and role circumscription were analyzed at a theoretical level. One of the effects of being system and role bounded was identified as a greater commitment to social responsibility, i.e., an awareness and acknowledgment of the interdependent relationship of science and society. Two dimensions to social responsibility were indicated. The first is a societal dimension in which the scientist

is concerned with the possible consequences of his work on his society and the world. The second dimension is a scientific responsibility towards the scientific community in terms of a commitment to the training of future generations of scientists. In light of this discussion, the following proposition was outlined: The greater the systemic and role circumscription, the greater the social responsibility at the societal and scientific levels.

To measure the first dimension of social responsibility, scientists were asked: 1)if they felt a sense of responsibility for the possible social consequences of their research (questions 29, questionnaire and 76, interview schedule), 2)if they approved of the involvement of scientists in national decision making (question 31, questionnaire), and 3)if they determined their choice of a research topic on the basis of problems facing mankind, or facing their home country, or scientific problems (question 27, questionnaire). The scientific dimension of social responsibility is measured by the questions which asked if the scientists felt they had an obligation to the training of future generations of scientists (questions 19, questionnaire and 195, interview schedule) and why they felt obligated (question 196, interview schedule). In addition, if the scientists chose research topics as the basis of scientific problems rather than problems facing mankind or their home country, this choice will be considered as a measure of scientific social responsibility.

Table 33: Percentage Distribution of the Indices of Social Responsibility at the Societal Level and Type of Responsibility

Indices of Societal Social Responsibility:

Type of Responsibility:	Perceived Soc. Responsibility	Attitude Toward Scientists in Decision Making	Choosing Problems Relevant to Mankind	Choosing Problems Relevant to Home Country
Social Responsibility	85.6%	53.6%	70.0%	67.9%
No Responsibility	10.8	24.3	25.0	26.4
Undecided	----	22.1	----	----
No Response	3.6	1.0	5.0	5.7
Total	100.0% (N=222)	100.0% (N=140)	100.0% (N=140)	100.0% (N=140)

The majority of scientists, as Table 33 reveals, feel socially responsible at the societal level: 85.6 per cent feel a sense of responsibility for the possible social consequences of their work, 53.6 per cent approve of the involvement of scientists in national decision-making structures, and 70 per cent and 67.9 per cent respectively say that the problems facing mankind and their home country are important in their selection of a research topic. Again there is a striking uniformity of attitudes shared by these scientists. Even though there is this uniformity of a belief in social responsibility, these scientists do not act out this belief except with reference to factors influencing a choice of research problems.[16] When they were asked if they belong to any organizations which promote an awareness amongst scientists of their possible social responsibility, e.g., the Bulletin of Atomic Scientists, only seven of them hold such memberships. Moreover, the scientists were asked if they were involved in any way in changing their home country. Only eight said they had acted as change agents. When asked why they were not involved in changing their society, the replied were either "I'm too involved in my work to bother with it," or "It's outside my role as a scientist." In short, social responsibility at the societal level is an attitudinal rather than a behavioral norm for these scientists, except with reference to factors affecting the choice of research topics.

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[16] In the next section the non-professional participation of these scientists will be examined and the results will show that the majority of scientists do not participate in extra-scientific affairs. This non-participation and the lack of a behavioral dimension to social responsibility indicate that the visiting foreign scientists can be considered "social celibates." All of their activities are oriented around the scientific community and this orientation requires a large investment of time and energy. Involvement in extra-scientific affairs at the community and national level would detract from their investment capabilities in the scientific community in
(continued on next page)

Table 34: Percentage Distribution of Social Responsibility at the Scientific Level: Obligation to Next Generation of Scientists

Obligation to Next Generation of Scientists	Per Cent
Yes	85.2%
No	7.2
Non-Response	7.6
Total	100.0% (N=222)

Table 35: Percentage Distribution of Social Responsibility at the Scientific Level: National and International Obligation to Next Generation of Scientists

Type of Obligation to Next Generation of Scientists	Per Cent
National	23.2%
International	52.4
Don't Know	4.9
Non-Response	19.5
Total	100.0% (N=82)

16 ~~(continued from previous page)~~ terms of research productivity as probes on these questions indicated. By restricting their activities to science, they feel they increase their productivity level. Moreover, as the above section reported, many scientists feel extra-scientific involvement is outside of their role as a scientist. In this way, the lack of participation in activities outside of the scientific community resembles the function of celibacy in the Catholic Church at an "ideal" level where priests restrict their duties to their roles as a priest by avoiding participation in outside organizations and marriage, having more time to devote to their priestly functions.

Table 36: Percentage Distribution of Social Responsibility at the Scientific Level: Level of Importance of Scientific Problems as a Factor in Influencing Choice of Research Topics

Level of Importance of Scientific Problems as a Factor Influencing Choice of Research Problems:	Per Cent
Important	91.5%
Unimportant	7.3
Undecided	----
Non-Response	1.2
Total	100.0% (N=140)

On the scientific dimension to social responsibility, Tables 34, 35, and 36 indicate that most of the scientists used scientific problems as a criterion for the selection of a research topic and expressed an obligation to the next generation of scientists. When asked why they had this obligation, two major types of responses emerged. The majority said they are engaged in or would engage in training a future generation of scientists because of a commitment to the growth of the international community of scientists. A minority said that they were obligated because they needed to build up science in their home country. The former is called in Table 35, an international obligation and the latter a national obligation.

Table 37: Systemic and Role Circumscription vs. Societal and Scientific Social Responsibility

Type of Responsibility	Type of Circumscription: Systemic	Role
a) Societal		
Perceived Social Responsibility (N=222)	.492	.150
Attitude Toward Scientists in Decision Making (N=140)	.265	.137
Choosing Problems Relevant to Mankind (N=140)	-.090	-.300
Choosing Problems Relevant to Home Country (N=140)	.404	.137
b) Scientific		
Obligation to Next Generation (N=222)	-.136	.187
Type of Obligation to Next Generation (N=82)	.258	-.015
Choosing Problems Relevant to Scientific Problems (N=140)	.450	-.675

The national obligation to the next generation of scientists from developing nations adds further insight into the differences between the peripheral ranking of their home countries and those nations who are ranked as centers of scientific activity presented in Chapter 3. An emphasis on building the national scientific community in one's field, rather than the international scientific community, is one way of achieving mobility in the stratification system. A stress on strengthening of science throughout the world by scientists from developed nations may be considered as a new form of colonialism. Because those outside of the center have relatively little chance to improve their position, the growth of viable research institutes in the peripheral nations will provide more scientists for the centers and thus increase the dominance of the centers over the periphery.

The low correlation of role circumscription to type of obligation to the next generation indicates that the performance of varying types of high and low role circumscribing activities to an international or national commitment is unrelated. It is the level of educational and scientific development of the country of origin, then, which is crucial in determining the form of an obligation to the next generation.

Because of the very small number of scientists who were uncommitted to future generations, and who did not select scientific problems as a criteria for a choice of research problems, only an implication of the direction of the relationships amongst systemic and role circumscription and scientific social responsibility can be given. The slight negative correlation of systemic circumscription to obligation to the next generation indicated that scientists from developed nations may be more socially responsible than scientists from developing nations on this index. The latter, however, are more likely to use scientific problems as a criteria for problem selection. Concerning role circumscription, scientists who perform teaching, administrative or consulting roles are more obligated to the future generation, but less prone to use scientific problems for selecting a research topic than scientists who perform research, teaching-research, professional, or publication roles. The results, therefore, are inconclusive concerning the proposed relationship of systemic and role circumscription to the scientific level of social responsibility as stated in proposition 9.

Proposition 9, however, is supported in reference to societal social responsibility. Systemic and role circumscription is positively correlated with all the indices, except for the use of problems facing mankind. Here the slight negative correlation of systemic circumscription and the negative correlation of role circumscription to this index reveal that scientists from developed nations and scientists who perform low circumscribing roles claim more global ramifications for their research than scientists from developing nations and scientists who perform high circumscribing roles. The latter, on the other hand, are more conscious of problems facing their home country as previously noted. Proposition 9, then, can be accepted with reference to societal social responsibility and is inconclusive with reference to scientific social responsibility.

<u>Professional and Non-Professional Participation.</u> Propositions 10 and 11 explore issues related to societal and scientific social responsibility. The first attempts to find out whether or not scientists who are systemically and role circumscribed in their systems participated more in extra-scientific activities and affairs than those scientists who are not bounded. The second implies a reverse relationship, i.e., those scientists who are not circumscribed in their system and the roles they perform have higher rates of participation in scientific activities than scientists who are systemically and role bounded. To measure participation in non-professional activities, the visiting foreign scientists were asked if they are or have been members of any civic, charitable, religious, political, and non-professional organizations in their country (question 48, questionnaire and 205, interview schedule). As Table 38 indicates, the majority are not and/or were not involved in such activities and only a few are participating in and/or were participating in non-professional organizations. Most scientists in the study, therefore, are not in non-professional organizations in their own country. This finding implies that the scientists restrict their organized social life to the scientific community.

Table 38 also includes the correlations of non-professional participation to systemic and role circumscription. Systemic circumscription is weakly positively

correlated with it. This result reveals that the development of the home country educational and scientific institutions and the types of roles performed by scientists do not influence their non-professional participation. Rather lack of participation in these activities appears to be a characteristic of the general behavior of scientists in the scientific community. Hence, proposition 10 has not been supported by the data.

The extent of professional participation of these scientists was determined by asking the respondents the following: how frequently they attended national scientific meetings, how many books they have published, and how many papers and articles they have published. With regard to the attendance at scientific associational meetings, scientists were asked if they attended every meeting, most meetings, some meetings, and none of the meetings. Attendance at every meeting was given a score of 3, most meetings 2, some meetings 1, no meetings 0. The mean score of the scientists in the study, 1.67, is used to determine level of professional participation on this measure. Those who scored above the mean are considered as having a high professional participation; those below the mean, low professional participation.

The mean rate of paper and book publication is also used to categorize sciantists as high or low.

Table 38: Percentage Distribution and Correlations of Non-Professional Participation to Systemic and Role Circumscription

Non-Professional Participation	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Role Circumscription*: High (Teaching, Administration, Consulting)	Role Circumscription*: Low (Research, Teaching-Research, Professional, Publication)
Yes	31.7%	33.9%	37.7%	33.6%
No	61.4	64.5	59.0	63.5
Non-Response	6.9	1.6	3.3	2.9
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)

*The total N for Role Circumscription equals 198 because of 24 non-responses to the question on role circumscription.

Publication of eleven or more papers and articles was given a score of 3, six to ten 2, one to five 1, no articles or papers 0. The publication of seven or more books was scored as 3, four to six books 2, one to three books 1, and no books as 0. Scientists are considered as being high in professional participation if they published one or more books (mean is .28 for book publication in sample) or two or more papers or articles (mean is 1.44 for paper and article publication).

Table 39: Percentage Distribution of Level of Professional Participation Indices: Attendance at Meetings, Book Publication, and Paper Publication

Level of Professional Participation	Indices of Professional Participation: Attendance at Meetings	Book Publication	Paper Publication
High	40.7%	17.6%	41.0%
Low	39.2	82.4	46.4
Non-Response	20.1	----	12.6
Total	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)
Mean:	1.67	.28	1.44

As Table 39 records, the majority of scientists have a high level of professional participation in attendance at scientific meetings. Most of them, 82.4 per cent, however, have not published any books. In terms of paper publication, 41.0 per cent of the visiting foreign scientists have published six or more articles. Therefore, the scientists in this study are not high producers.

Systemic and role circumscription are in general negatively correlated with professional participation. Table 40 reveals that scientists from developed natinns have higher level of attendance at meetings and paper publication and a greater book publication rate than scientists from developing nations. Similarly, scientists who perform roles which have been described as low circumscribing role have higher rates of attendance at meetings and paper and article publication than scientists who perform high circumscribing roles. The latter, however, tend to have a higher rate of book publication. These findings support the relationship of systemic and role circumscription as described in proposition 11: The lesser the systemic and role circumscription, the greater the professional productivity and participation.

Table 40: Systemic and Role Circumscription vs. Professional Participation

	Type of Circumscription	
Type of Professional Participation	Systemic (N=222)	Role (N=198)
Attendance at Meetings	-.286	-.337
Book Publication	-.075	.161
Paper Publication	-.142	-.218

In summary, proposition 10 has not been substantiated. Systemic and role circumscription are not related to participation in activities and organizations outside of the scientific community. They are, however, correlated with the indices of professional participation, affirming the hypothesis that the higher the systemic and role circumscription, the lower the professional participation. Level of development of the home country and the types of work roles performed in home country, then, affect the respondents' participation in the international scientific community, but do not affect their participation in social activities outside of science.

Chapter 5

Further Exploration: Differences Between Social Systems of Work in the United States and the Home Country

Dissociative Experiences has been defined previously in Chapter 1 as the movement from one social system to another and as exposure to the ideas, values, and members from another social system. In this section, the point of departure rests on the following question: Is the current stay of these visiting foreign scientists a movement from one social system of work to another or is the current cross-societal work experiences identical to the work experiences of these scientists in their current country? The emphasis here is on whether or not the current stay in the United States is a dissociative experience. In order to answer this query, respondents were asked to compare their work experiences in the United States to those they had in their home country along several dimensions: 1)differences between American and home country students (Questions 20, questionnaire and 42, 43, interview schedule), 2)differences in the relations they had with persons in authority positions in the work situation (questions 21, questionnaire and 44, 45, interview schedule), 3)differences between their American and home country colleagues (question 25, questionnaire), 4)differences in their work involvement in the United States and the home country (question 22, questionnaire and 52, interview schedule), and 5)differences in the type of work roles they performed in the United States and the home country (question 17, questionnaire and

30 and 31 interview schedule).

Differences Between Students. Comparing students in the home country to those in the United States, the majority of visiting foreign scientists see a difference between the students as Table 41 shows. This table also discloses the relationship of systemic circumscription (level of development) and role circumscription (type of work role performed in the home country) to acknowledgement of a difference between students. The results imply that scientists from developed countries are more likely to identify a difference between American and their home country students than scientists from developing countries. Type of work role performed in the home country (role circumscription) is unrelated to perceiving such a difference.

The respondents were also asked to specify what type or types of differences there were between their home country and American students. Three major types emerged from the analysis of responses. First of all, American students and home country students differ in terms of the type of professor-student relationships in the work situation. For some scientists, the interaction patterns between student and professor were more collegial in the United States than in the home country, i.e., professors and students treat each other as colleagues rather than in terms of a superordinate-subordinate authority relationship. For

Table 41: Systemic and Role Circumscription and Differences Between the Social Systems of Work in the Home Country and the United States: Differences in Students

Differences Between Social Systems of Work: Student Differences	Systemic Circumscription		Role Circumscription*	
	High (Developing)	Low (Developed)	High (Teaching, Administration, Consulting)	Low (Research, Teaching-Research, Publication, etc.)
Yes	65.3%	63.6%	60.7%	65.0%
No	22.8	16.5	21.3	19.7
Non-Response	11.9	19.9	18.0	15.3
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= -.438		Q= -.0732	

*The total N for Role Circumscription equals 198 and not 222 because of 24 non-responses to the question on role circumscription.

other respondents, the opposite is true. Secondly other scientists mention that the students differ in the breadth of knowledge they have of the field, i.e., the extent of their knowledge of the theory and techniques of their respective fields. Some scientists said their home country students had a broader knowledge of their fields than did American students. Incontradistinction, other scientists indicated that American students had a better grasp of the theoretical and methodological issues of their fields than their home country students. This point will be elaborated later in this chapter.

The third type of difference between students identified by a portion of the respondents is based on the divergent work habits of American and Home country students. Either American students were seen as working harder than their counterparts in the home country or home country students were viewed as expending more effort in their work than American students.

The N's in Tables 42, 43, and 44 show that more scientists compared the students in terms of the type of professor-student relationship (N=64) than with reference to the breadth of knowledge of the field possessed by students (N=49) and the work habits of the students (N=45). The interaction patterns between students and professors are generally more salient to the scientists than the "quality" of the student in comparing students in the home country to students in the United States. With reference to students, then, the differences between the social systems of work is primarily structural.

Tables 42, 43, and 44 also portray the relationship of systemic and role circumscription to these three types. Scientists from developing nations are more likely to view the professor-student relationship in the home country as being collegial in comparison to such relationships in the United States than scientists from developed nations. Moreover, for scientists from developing

Table 42: Systemic and Role Circumscription and Differences Between American and Home Country Students: Differences Based on Collegial Professor-Student Relationships (N=64)

Differences Between Students Based on Collegial Professor-student Relationships in the U.S. and Home Country	Systemic Circumscription		Role Circumscription	
	High (Developing)	Low (Developed)	High (Teaching, Administration, Consulting)	Low (Research, Teaching-Research, Publication, etc.)
Collegial Professor-Student Relationships in the U.S.	29.0%	42.4%	38.1%	35.1%
Collegial Professor-Student Relationships in the Home Country	71.0	57.6	61.9	64.9
Total	100.0% (N=31)	100.0% (N=33)	100.0% (N=21)	100.0% (N=37)
	Q= -.286		Q= .064	

Table 43: Systemic and Role Circumscription and Differences Between American and Home Country Students: Differences Based on Breadth of Students Knowledge of Field (N=49)

Differences Between American and Home Country Students Based on Breadth of Knowledge of Field	Systemic Circumscription High (Developing)	Systemic Circumscription Low (Developed)	Role Circumscription High (Teaching, Administration, Consulting)	Role Circumscription Low (Research, Teaching-Research, Publication, etc.)
American Students have a Broader knowledge of field than Home Country Students	71.4%	39.3%	60.0%	46.9%
Home Country Students Have a Broader Knowledge of Field than Home Country Students	28.6	60.7	40.0	53.1
Total	100.0% (N=21)	100.0% (N=28)	100.0% (N=10)	100.0% (N=32)
	Q= .589		Q= .081	

Table 44: Systemic and Role Circumscription and Differences Between American and Home Country Students: Differences Based on Work Habits of Students (N=45)

Differences Between American and Home Country Students Based on Work Habits	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Role Circumscription: High (Teaching, Administration Consulting)	Role Circumscription: Low (Research, Teaching-Research, Publication, etc.)
American Students Work Harder than Home Country Students	59.1%	65.2%	54.5%	67.9%
Home Country Students Work Harder than American Students	40.9	34.8	45.5	32.1
Total	100.0% (N=22)	100.0% (N=23)	100.0% (N=11)	100.0% (N=28)
	Q= -.129		Q= -.357	

nations, American students have a broader knowledge of the field than the students in their home country. Scientists from developed nations, on the other hand, believe that their home country students' knowledge of the theoretical and methodological issues confronting the field is greater than students in the United States. Systemic circumscription (level of development) is unrelated to perceived differences between students based on work habits.

Role circumscription is unrelated to perceived differences between students based on collegial professor-student relationships and breadth of knowledge. Type of work role performed in the home country is, however, related to differences based on the work habits of students. Those scientists who perform teaching, administrative, or consulting roles (high role circumscription) see their home country students expending more effort in their work than students in the United States. Scientists who perform research, teaching-research, scientific publication writing, or participate in the professional activities in science (low role circumscription) view the American student as working harder than the home country student.

The general implications of these findings is that the scientist from developing countries has a greater adjustment to make in moving to the social system of work in the United States, with reference to the students he works with. From this perspective, the students he interacts with in this country have a broader knowledge of the field he is in and, as a result, they may be more challenging to him. Moreover, he has to confront a new set of interaction patterns between student and professor. In the United States, these patterns are for him less collegial than in his home country. As a result, he has to redefine his role in relationship to the students he works with. In his home country, his role is that of a senior colleague and his students are junior colleagues. But in the United States, this relationship is of a superordinate-subordinate form and requires a transformation of the definition of his role and that of his students. For the scientists from developed nations such role redefinitions and possible challenges from students are less likely to occur.

Similarly, teachers, administrators, or consultants may find the increased work effort of students in the United States demanding and/or rewarding. American students by working harder possibly complete projects assigned to them quicker than these scientists have been used to in their home countries. As a result, the scientists are required to find additional work for the students who work under them. The search for the projects may place a strain on the scientist toward more output than he has experienced with home country students. But the work habits of the American student may also be rewarding to the scientists in the sense that his work assigned to students arrives at completion faster than in the home country. Therefore, he can be more flexible in the directions his research takes him. In either case, the increased work effort of American students may also entail a redefinition of the roles of the scholar and his student as mentioned above with reference to the professor-student relationship.

Such a role redefinition on the part of teachers, administrators, and consultants could occur for another reason. The roles they performed in the home country were not of the research type, as we shall see later in this chapter. In the United States, they are performing, for the most part, research roles. Their patterns of interaction in the home country with students would be in terms of the roles they had performed. But in the United States, the roles they are enacting are of a different type and, hence, require a different definition of their role and the role of the student. Thus, the transition in the type of roles they perform may be an additional source of accommodation to the social system of work.

Beyond the question of the adjustment of scientists to the students in the United States, one has to ask why did these scientists regard collegial relationships between student and professor to be more prevalent in their home country than in the United States? In probing on the differences between students, several scientists from developed and developing countries outlined the structure of interaction patterns between students and faculty in the United States in terms of a hierarchy of quality of these patterns. They stated that undergraduate students working in the laboratories are viewed by the faculty as embryonic technicians who are assigned menial research tasks. The role of the faculty member with relationship to the undergraduate student is that of a manager of research technicians. Most of the interaction which occurs between the two is limited to suggestions on how to improve a particular laboratory process or technique. Only the brightest of these students are welcomed to explore theoretical issues with the faculty member.

Graduate students are above the undergraduates in the hierarchy. They are assigned tasks more central to the research endeavor in terms of theory and less in terms of technique. The faculty member here is again viewed as the manager of the research enterprise and his graduate students his employees. As with the undergraduate students, only the brightest of the graduate students are allowed to have more intimate and frequent contact with the faculty member in discussions of the theoretical issues of the research project.

Above these students are the post-doctorates who are in collegial relationships with the permanent members of the faculty. The post-doctorates are usually the scientists who have most contact with the graduate and undergraduate students. They oversee the research project and guide the students in their work. The permanent faculty members manage the financial sides of the project and have frequent conversations with the post-doctorates on the theoretical and methodological problems and successes of the research project. It is only in the interaction relationships between permanent faculty and the post-doctorates that collegial relationships are dominant.

In their home countries, these scientists stated that both undergraduate and graduate students are treated more as junior colleagues and less as technicians. More frequent discussions and debates over the theoretical implications of research occur between them than between students and faculty in the United States. This relationship is viewed by many of the scientists as a master-apprentice relationship. For them, the social system of work in the United States resembles, as one scientist stated, a "factory" which stresses efficiency and effectiveness of a research project over the benefits students can derive from participation in the project. However,as we shall see shortly, the relationships of faculty members to each other in the home country are less likely to be collegial as they are in the United States and more likely to be of a superordinate-subordinate type.

The system of professor-student relationships in the United States may explain why these scientists identified

American students as working harder than their home country counterparts. In a rigid hierarchical system where there seems to be a pecking order of students, undergraduate and graduate students are driven to increase their work effort in order that they may enter into a more meaningful set of relationships with faculty members. For example, one scientist from Australia mentioned that there are frequent colloquia in which famous scholars are invited to discuss problems at the threshold of a field. After the scholar makes his presentation, informal conversations are held. All students receive invitations to hear the speaker, but only those who are acknowledged as being "good" and "bright" students are allowed to partake in these informal discussions. Hence a student must work hard to surpass his colleagues to receive such a reward.

Several scientists from developing nations offered another reason why collegial professor-student relationships are more prevalent in the home country than in the United States. For many of them, the only colleagues they have are their students. The absence of other faculty members to discuss issues central to their fields requires a greater reliance upon students. They are, in some cases, the only audience the scholar has to discuss with, criticize, and evaluate his ideas. In the United States, faculty members provide this functbn for the scientists and the result is a decrease, from their perspective, in frequency of communication with students and a change in the quality of interaction patterns between students and professors.

Some scientists from developing nations also explained why they regarded their students as working harder than American students on the basis of the facilities available to the student. In the home country, equipment and technology available for carrying on research is limited. In addition, the libraries students have access to are inadequate. As a result, their students must work harder to fulfill the same task that American students may be doing. The level of development of the scientific community in the home country, therefore, is critical in understanding the differences between students in the United States and the home country.

In summary, for the majority in this study there is a difference between the social systems of work in the home country and the United States with reference to students. The scientists are not moving across societal boundaries into a system identical to their own, but are moving into a work situation which is divergent from their own. The difference between the systems is greater for scientists from developing nations (high systemic circumscription) and less for scientists from developed nations (low systemic circumscription). Role circumscription (type of work role performed in the home country) is important for the differences between social systems only in terms of differences in the work habits of students.

<u>Differences in Authority Relations.</u> Another important aspect of the movement of scientists from one social system of work to another is the type of relationships the scientists have to persons in positions of authority in the work situation, e.g., department chairmen, deans, administrators, etc. To determine whether or not the interaction patterns scientists had with such individuals is different in the United States as compared to the home country, respondents were asked the following question: "Do you find that there is a difference in the way you interact with persons in authority here (e.g., department chairmen, deans, etc.) as compared with the way you interacted with similar individuals back home?" (question 21, questionnaire and 44 and 45 interview schedule). Table 45 presents the results and the relationship of the perception of differences to systemic and role circumscription.

The majority of scientists in the study acknowledge a difference in the way they interact with persons in authority positions in the work situation in the United States and in the home country. Both systemic and role circumscription are related to the perception of differences in the social system of work. Scientists from developing countries perceive a difference to a slightly

Table 45: Systemic and Role Circumscription and the Perception of Differences Between the Social Systems of Work in the Home Country and the United States: Differences in Relations with Persons in Authority Positions in the Work Situation

Perception of Differences Between Social Systems: Authority Relation Differences	Systemic Circumscription High (Developing)	Systemic Circumscription Low (Developed)	Role Circumscription* High (Teaching, Administration, Consulting)	Role Circumscription* Low (Research, Teaching-Research, Publication, etc.)
Yes	58.4%	50.4%	55.7%	51.1%
No	32.7	38.8	29.5	40.9
Non-Response	8.9	10.8	14.8	8.0
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .155		Q= .204	

*The total N for Role Circumscription equals 198 and not 222 because of 24 non-responses to the question on role circumscription.

greater degree than scientists from developed countries. Similarly, scientists who have performed teaching, administrative, or consulting roles also have a greater frequency of noting differing authority relations in the United States than scientists who enact research, teaching-research, and other low circumscribing roles.

When asked to identify the nature of the difference in interaction patterns with persons in the authority positions, the respondents noted only one type of difference: either the authority relations in the home country are less collegial than in the United States or the authority relations in the home country are more collegial than in the United States. No reference to the quality or characteristics of the persons occupying positions of authority in the work situation was made by the scientists. The major difference between the United States and the home country in terms of the relationship of the scientists to persons in authority positions is, then, structural.

As Table 46 shows, systemic circumscription is related to the viewing the nature of the difference between authority relations in terms of the degree of collegiality of interaction patterns with persons in authority position in the work situations of the United States and the home country, but role circumscription is unrelated to it. That is, scientists from developing countries see the authority relations in the home country as less collegial than in the United States, whereas scientists from developed countries are more likely to view them as more collegial in the home country than in the United States. Table 46 also reveals that the majority of scientists regard their interaction patterns with department chairmen, deans, etc. to be less collegial in the home country than in the United States.

In the interviews, scientists were asked why the degree of collegiality varied in both societies. Most

Table 46: Systemic and Role Circumscription and Differences of Authority Relations in the United States and the Home Country: Degree of Collegiality of Relationships with Persons in Authority Positions in the Work Situation.*

Differences of Authority Relationships in the U.S. and Home Country	Systemic Circumscription		Role Circumscription	
	High (Developing	Low (Developed)	High (Teaching, Administration, Consulting)	Low (Research, Teaching-Research, Publication, etc.)
Authority Relations in the Home Country are less Collegial than in the United States	67.0%	51.1%	53.1%	56.8%
Authority Relations in the Home Country are more Collegial than in the United States	33.0	49.9	46.9	43.2
Total	100.0% (N=78)	100.0% (N=90)	100.0% (N=49)	100.0% (N=102)
	Q= .351		Q= .077	

*The N's do not equal 222 because of non-responses and those respondents who did not see a difference in the authority relations in the United States and the Home Country were included in the analysis.

scientists state that the hierarchy of authority in the social system of work in the home country is based on seniority and age rather than accomplishments in the field. In the United States, seniority and age are seen by them as relatively unimportant in comparison to the creativity and productivity of the scientists. As a consequence, the scientists feel that in the home country they are required to show deference to department chairmen, deans, administrators because they have been employed longer than they have or because of their senior age. Defference is expressed by maintaining a strictly formal relationship with the person in the authority position. In the United States, on the other hand, many of the people for whom they work are near the same age as the respondents and their relationships are quite informal. For example, one scientist from Germany said, "I call my 'boss' here, Bob, and we go out for a beer now and then. In Germany, I call my department chairman, Dr. 'so and so' and we restrict our talk to departmental matters." For these scientists, the social system of work in the home country resembles a formal gerontocracy.

Scientists from developing nations frequently cite an additional reason for the lack of collegiality in the home country. Most of their deans, department chairmen and administrators received their education many years ago and they have not kept up with the current developments in the field. The persons in authority positions maintain paradigms of their field which are outmoded. When the young faculty approaches them with a new idea, it is rejected outright because it does not fit into the conception of the field they possess.

Moreover, for many of these scientists, traditional cultural variables entered into these relationships with reference to age. As one Indian biologists said, "In my country, one has to pay homage to the aged, no matter if they are wrong or right." The quality of a scientists' project is not evaluated according to its scientific merits, but are viewed with suspicion because they came from a "youngster." These factors may account for the higher percentage of scientists from developing countries, as compared to scientists from developed countries, who point out that the authority relations in the home country are less collegial than in the United States.

Those scientists who viewed their interaction with persons in authority positions as being more collegial in the home country than in the United States usually make reference to the inaccessibility of contact with department chairmen, deans, and administrators. The only time they meet with these people are when they arrive and when they leave. Many felt that their leaders didn't even know of their presence. For example, one scientist related the following experience: "I made an appointment to see the department chairman last week because I am leaving in three weeks. I wanted to thank him for giving me the opportunity to work here. When I went into his office, he said to me, I'd like to welcome you to our staff and I hope you enjoy your stay with us." Moreover, what contact they have had with American's authority positions is limited to discussions of their work and never goes beyond a strictly formal interaction. The important variable in the work situation for these scientists is the size of the department they are in as compared to the size of the staff in their home country. All of them believe that the presence of so many faculty members and students in the department in the United States prevent the emergence of meaningful formal and informal contacts with people in authority relations.

In both cases, where scientists view their relations with persons in authority as being more collegial in the United States than in the home country or vise versa, an adjustment in the social identity of the scientists is likely to occur. In the former, the sciantists must redefine their role as one of a colleague with the department chairmen, deans, etc. In the latter, the scientist must regard himself as one of the many members on a large staff. In short, these scientists are moving from one social system of work to another with reference to authority relations and must accommodate themselves to the differences in these systems.

Differences Between Colleagues. In the preceding sections, the differences between the social systems of work in the home country and the United States perceived by the respondents with reference to those below them in rank (students) and those above them (department chairmen, deans, etc.) were analyzed. In this part, the analysis focuses on the variations scientists view as existing between scientists who are of an equivalent rank to them in the work situation in the home country and the United States, their colleagues.

On the interview schedule, the visiting foreign scholars were asked if they saw any differences in the work habits of their American counterparts as compared to their colleagues back home (question 55, interview schedule) and what was the nature of these differences (question 56, interview schedule). Fifty-three scientists saw such a difference, twenty-two did not, and seven did not respond.

Those scientists who said their colleagues differed, outlined several dimensions of variations. Some regarded their American colleagues as working harder than their fellow scientists in the home country. For example, one Australian scientist said, "My colleagues in Australia like to play the "hoofies" (horses), but all these Americans can do is work hard. They don't know how to enjoy life." Others felt that their home country colleagues worked longer hours than American scientists because of the low level of research technology available in the home country. Some felt that Americans were not as dedicated to their work as their home country colleagues. Their home country colleagues consider their work as central to their life, whereas for Americans work is, as one Japanese meteorologist related, "a nine to five job." Other respondents mentioned that Americans had less of an understanding of the problems confronting their field than their home country scientists because Americans were more interested in the technical aspects of a research project and less concerned with the theoretical and philosophical issues involved in a problem. Finally, some of the visiting foreign scientists believed that Americans were more organized in their work than their home country colleagues due to the varying levels of technology and the financial support available for research in the United States as compared to the home country.

On the basis of these responses, question 25 on the questionnaire was developed. Respondents were asked to determine the degree of their agreement or disagreement with the following statements: 1)"Americans in my field work harder than my colleagues back home"; 2)"My colleagues back home work longer hours than their American counterparts"; 3)"Americans are not as dedicated to their work as my home country colleagues"; 4)"The degree of understanding that Americans have of the problems confronting my field is less than that of my colleagues back home"; 5)"Americans are more organized in their work than my colleagues back home". The fequency distribution of the type of agreement with these selected differences of American and home country colleagues is presented in Table 47.

The majority agree that their American colleagues work harder and are more organized in their work than their home country colleagues. But they disagree with the statements that their home country colleagues work longer than Americans, that Americans are not as dedicated in their work as their home country counterparts, and that Americans have less of an understanding of the problems confronting their field than their home country scientists. Hence, it is only with reference to the work efforts of scientists and organization in their work that these scientists regard their colleagues in the United States and the home country as differing.

Systemic and role circumscription are related to agreement and disagreement on these items as Table 48 indicates. Scientists from developing nations agree that Americans work harder than their home country colleagues, that their home country colleagues work longer hours than their American counterparts and that Americans are more organized in their work than their country colleagues. Scientists from developed nations usually disagree with these statements. Scientists who performed teaching, administrative, or consulting roles also see Americans as working harder and being more organized in their work efforts than their home country colleagues. Those

Table 47: Percentage Distribution of Type of Agreement with Selected Differences of American and Home Country Colleagues (N=140)

	Type of Difference Between Colleagues				
Type of Agreement:	Americans Work Harder Than Home Country Colleagues	Home Country Colleagues Work Longer Hours Than Americans	Americans are Not as Dedicated To Their Work As Home Country Colleagues	Americans Have less of an Understanding of Problems Confronting My Field Than My Home Country Colleagues	Americans are More Organized in Their Work Than My Home Country Colleagues
Agree	40.0%	19.3%	5.0%	7.1%	51.4%
Disagree	32.1	50.7	74.3	67.9	22.2
Undecided	25.7	25.7	16.4	19.3	22.9
Non-Response	2.2	4.3	4.3	5.7	3.5
Total	100.0%	100.0%	100.0%	100.0%	100.0%

respondents who perform research, teaching-research, and other low circumscribing roles, on the other hand, generally disagree with these statements, but believe that their home country colleagues work longer hours than Americans.

Only tentative conclusions can be drawn concerning the degree of dedication in work and the understanding of problems confronting a field of scientists in the United States and the home country because of the one-sided distribution of responses to these items. Scientists from developing nations and those scientists who perform high circumscribing roles, (teaching, administration, or consulting) view Americans as more dedicated in their work and as having less of an understanding of problems confronting a field than their home country colleagues. Scientists from developed nations and those who perform low circumscribing roles disagree with these statements.

The relationship of level of development (systemic circumscription) to the acknowledgement of differences between colleagues can be explained by the differences in the conditions of work in the countries where the educational and scientific development is low compared to high. In the developed nations, rewards are given for high levels of output in terms of completion of research projects and for publication of the results. In comparison, many of the developing nations such rewards

Table 48: Correlations Between Systemic and Role Circumscription and Selected Differences of American and Home Country Colleagues*

Selected Differences of American and Home Country Colleagues	Systemic Circumscription (Level of Development)	Role Circumscription (Type of Work Role)
Americans Work Harder than Home Country Colleagues	.555 (N=98)	.207 (N=85)
Home Country Colleagues Work Longer Hours than Americans	.155 (N=94)	-.285 (N=84)
Americans are not as Dedicated to Their Work as Home Country Colleagues	.404 (N=108)	.494 (N-74)
Americans have Less of an Understanding of Problems Confronting my Field Than my Home Country Colleagues	.200 (N=102)	.294 (N=88)
Americans are More Organized in Their Work Than My Home Country Colleagues	.626 (N=100)	.189 (N=87)

*The total N for each correlation does not equal 140 because undecided responses and non-responses which where dropped from this analysis. The N for role circumscription correlations are lower than those for systemic circumscription because of non-responses to the work role question.

are absent. Secondly, in the United States, as in other similarly developed countries, there are more scientists competing for the same set of rewards, than in the developing nations. Hence, there are pressures placed on the scientist in developed nations to be productive which may be absent in the developing nations. These factors, account in part, for the reason why scientists from developing nations are more likely to see American scientists in their field as working harder than their home country scientists.

Scientists from developing nations see their home country colleagues working longer hours and as less organized than Americans primarily because of the technological and financial supports available for completing research tasks germane to a field. Without these forms of support, scientists from developing nations spend more time trying to complete the same jobs that scientists from developed nations are working on. In addition, the lack of technology and finances often make for a "patch-work" performance of work roles because the scientist pulls together from disparate sources support for his projects and spends time in maintaining any support he receives. Moreover, the lack of colleagues who can assist in the research endeavor critically affects the organization of the research enterprise. The scientists have relatively few people to whom they can turn for critiques and evaluations of their work.

As a result, many of the weaknesses and the strengths of the design of a research problem may be undetected. Such problems are less likely to occur in countries where there are such supports and colleagues.

The relationship of type of work role performed in the home country (role circumscription) to the perception of differences between colleagues reflect the changes in the type of work role performed in the United States as compared to the home country. As will be shown shortly, those scientists who performed teaching, administrative, or consulting roles are more likely to experience a change in the type of roles they perform in the United States than scientists who have performed research, teaching-research, and other low circumscribing roles. Scientists who are highly role circumscribed may be comparing scientists in their home country who perform similar roles, i.e., teaching, administrative or consulting roles, to scientists in the United States who are performing low circumscribing roles, i.e., researchers, teaching-researchers, professional role players, and publication scientists. In so doing, the scientists are comparing across types of roles rather than within one form of role. So the differences they are viewing may be actually comparisons of types of roles and not general characteristics of American and home country scientists in their field.

Unfortunately questions were not asked of these scientists to compare their colleagues in the United

States and their home country in terms of comparable roles. Some support of this argument can be given indirectly, however, if we examine the following data.

On the interview schedule, the scientists were asked to identify those types of work roles which they regarded as being most central to their field in the home country and in the United States (questions 33 and 34). As tables 49 and 50 reveal, scientists identify the type of work role they perform in the home country to be the same as the type they regard as most central to their field in the home country.[17] That is, teachers, administrators, or consultants say their roles are most central to their field in the home country and those scientists who enact work roles such as basic and applied research, teaching-research, professional and publication roles in science see their roles as most central in the home country. However, the former and the latter both agree that low circumscribing roles (research, teaching-research, etc.) are most central to their field in the United States. This difference in the centrality of work roles in the United States as compared to the home country provides tentative support to my argument that scientists who perform teaching,

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[17] These results must be cautiously interpreted because of the high rate of non-responses to the questions. The discussion which follows, as a consequence, deals with trends.

administrative, or consulting roles may be comparing differences in colleagues on the basis of types of roles they perform rather than in terms of general characteristics of American and home country scientists in their field.

Tables 49 and 50 also indicate that for scientists from developing nations, teaching, administrative, or consulting roles are central to their field in the home country. Scientists from developed nations, on the other hand, acknowledge research, teaching-research, organizational roles and activities in science, and scientific publication writing, as most central. Level of development of the home country is unrelated to type of work role centrality seen in the United States.

Given these results on the centrality of work roles in the United States as compared to the home country and the differences of colleagues in these societies, one can conclude, that scientists from developing nations and those who perform teaching, administrative, or consulting roles are moving from one social system of work to another and that scientists from developed countries and those who perform low circumscribing roles may not necessarily be moving into a social system of work which is divergent from their home country work situation.

<u>Differences in the Type of Work Role Performed.</u> In the prior sections of this chapter, the focus has been on the type of differences the visiting foreign scientists

Table 49: Systemic and Role Circumscription and Type of Work Role Which is Central to the Scientists' Fields in the Home Country

Type of Work Role Central to Field in Home Country	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Role Circumscription*: High (Teaching, Administration, Consulting)	Role Circumscription*: Low (Research, Teaching-Research, Publication etc.)
High Role Circumscribing (Teaching, administration, Consulting)	40.0%	25.0%	38.1%	35.1%
Low Role Circumscribing (Research, Teaching-Research, Publication, etc.)	23.3	34.6	14.3	31.6
Non-Response	36.7	40.4	47.7	33.3
Total	100.0% (N=30)	100.0% (N=52)	100.0% (N=21)	100.0% (N=57)
	Q= .407		Q= .412	

*The N for role circumscription does not equal 82 because of 4 non-responses to question on work role.

Table 50: Systemic and Role Circumscription and Type of Work Role Which is Central to the Scientists' Fields in the United States

Type of Work Role Central to Field in the United States	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Role Circumscription*: High (Teaching, Administration, Consulting)	Role Circumscription*: Low (Research, Teaching-Research, Publication, etc.)
High Role Circumscribing (teaching, Administration, Consulting)	13.3%	9.6%	4.8%	14.0%
Low Role Circumscribing (Research, Teaching-Research, Publication, etc.)	53.3	50.0	52.4	52.7
Non-Response	33.4	40.4	47.8	33.3
Total	100.0% (N=30)	100.0% (N=52)	100.0% (N=21)	100.0% (N=57)

*The N for role circumscription does not equal 82 because of four non-responses to the question on work roles.

seen as existing between the social systems of work in the home country and the United States. This part analyzes the transitions in the types or work roles performed in the United States as compared to the home country.

Respondents were asked to identify the type of work role they performed in this country (question 17, questionnaire and 30 and 31, interview schedule). These work roles were classified according as either high role circumscribing or low role circumscribing. These two types were subsequently analyzed with reference to level of development (systemic circumscription) and type of work role performed in the home country (role circumscription). Table 51 summarizes the results of this analysis.

Almost all of the scientists are performing low circumscribing roles in the United States. Scientists from developing nations have a slightly greater tendency to perform teaching, administrative, or consulting roles in the United States, than scientists from developed nations. Unfortunately, a control table could not be constructed which would control for systemic circumscription (level of development) in order to establish whether scientists from developed or developing nations have greater transitions in the roles they play when they moved from the social system of work in the home country to that in the United States because of empty cells. However, since

Table 51: Systemic and Role Circumscription and Type of Work Role Performed in the United States

Type of Work Role Performed in the United States	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Role Circumscription: High (Teaching,) Administration Consulting)	Role Circumscription: Low (Research, Teaching-Research, Publication, etc.)
High Role Circumscription (Teaching, Administration, Consulting)	9.9%	6.6%	26.2%	7.3%
Low Role Circumscription (Research, Teaching-Research, Publication in science, etc.)	79.2	86.0	70.5	86.9
Non-Response	10.9	7.4	3.3	5.8
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .238		Q= .632	

we have already shown that systemic circumscription is related to the types of work roles performed in the home country (role circumscription), we can tentatively conclude that scientists from developing nations are more likely to experience a change in the type of work role they perform when they begin their work in the United States than the scientists from developed nations.

Table 52: Role Circumscription and Presence or Absence of Changes in the Type of Work Roles Performed in the United States as Compared to Those Performed in the Home Country

Presence or Absence of Changes in Types of Work Roles Performed in the United States as Compared to Those Performed in the Home Country	Role Circumscription	
	High (Teaching, Administration, Consulting)	Low (Research, Teaching-Research, Publication, etc.)
Change in Type of Work Role Performed	70.5%	7.3%
No Change in Type of Work Role Performed	26.2	86.9
Non-Response	3.3	5.8
Total	100.0% (N=61)	100.0% (N=137)

Q= .969

Type of work role performed in the home country is also positively related to the type of work role performed in the United States, that is, those scientists who perform high or low circumscribing roles in the home country to some degree enact similar roles in the United States. This relationship which expresses a continuity in the roles played here and at home obscures the fact that scientists who perform teaching, administrative, or consulting roles usually enact research, teaching-research, professional activities, and roles in science, or scientific publication writing in the United States. Over seventy per cent of these scientists experience a transition of roles whereas only seven per cent of those scientists who were researchers, teaching-researchers, scientific publication writing and those who emphasized professional activities in science experience such a change in roles.

To indicate this absence or presence of changes in roles in the United States as compared to the home country, Table 52 was developed. The relationship of role circumscription to transitions in the type of work roles performed in the United States clearly shows that scientists who perform high circumscribing roles in the home country generally experience a change in roles in the work situation in the United States and those who are low on role circumscription usually do not experience such a transition.

These results indicate, therefore, that scientists who are low on role circumscription are moving, not only between societies, when they enter the social system of work in the United States during their current stay, but also they are being placed into roles which they have not been performing in the home country. Given the difference these scientists observe as existing between students, and colleagues, the variations in their interactions patterns with individuals in authority positions, and the transitions they make in work roles , the experiences these scientists have in the social system of work are considerably divergent from those they are likely to have in their home countries. On the other hand, those scientists who are performing roles similar or identical to those which they have enacted in their home country will have experiences in this country comparable to those in their home country. Support or nonsupport for this argument will rest on the results presented in the next section of this chapter.

Differences in Work Involvement. A useful index of the changes which occur in the behavior of scientists as a result of participation in a social system of work that has characteristics which are divergent from the social system of work they have prior experience in are the changes in the degree of work involvement the scientists have in the United States as compared to the home country. The respondents were asked if they worked longer hours, if they worked less, and if they were more dedicated to their work in the United States or in their countries of origin (questions 22 questionnaire and 52, interview schedule). Affirmative responses to these questions can be regarded as a change in the behavior of the scientists and negative responses as no change in behavior in the work situation in the United States.

Table 53: Percentage Distribution of Types of Differences in Work Involvement in the United States as Compared to the Home Country and the Acknowledgement of Differences in Work Involvement

Acknowledgement Differences in Work Involvement	a) Working Longer Hours in the U.S. than in the Home Country	b) Working Less in the U.S. than in the Home Country	c) More Dedication to Work in the U.S. than in the Home Country
Yes	41.4%	9.0%	35.6%
No	46.0	67.1	43.2
Non-Response	12.6	23.9	21.2
Total	100.0% (N=222)	100.0% (N=222)	100.0% (N=222)

The frequency distribution of responses to these questions which appear in Table 53 indicated that the majority of scientists in this study did not experience any changes in their work involvement during their stay in the United States. Generally, they said they were not working longer hours, working less, or had no more dedication to their work in this country than in their home country. However, systemic and role circumscription both affect the changes in work involvement.

Table 54: Systemic and Role Circumscription and Differences in Work Involvement in the United States as Compared to the Home Country

Differences in Work Involvement	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Low Circumscription: High (Teaching, Administration, Consulting)	Low Circumscription: Low (Research, Teaching=Research, Publication, etc.)
a) Working Longer hrs. in the U.S. than in the Home Country				
Yes	52.5%	30.6%	44.3%	38.0%
No	29.7	58.6	41.0	51.8
Non-Response	17.8	12.8	14.7	10.2
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .544		Q= .192	
b) Working less in the U.S. than in the Home Country				
Yes	4.0%	13.2%	8.2%	9.5%
No	62.4	70.2	65.6	71.5
Non-Response	33.6	16.6	26.2	19.0
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .496		Q= -.030	

Table 54: (cont.) Systemic and Role Circumscription and Differences in Work Involvement in the United States as Compared to the Home Country

Differences in Work Involvement	Systemic Circumscription: High (Developing)	Systemic Circumscription: Low (Developed)	Low Circumscription: High (Teaching, Administration, Consulting)	Low Circumscription: Low (Research, Teaching-Research, Publication, etc.)
c) More Dedication to Work in the U.S. than in the Home Country				
Yes	45.5%	27.3%	37.7%	34.3%
No	30.7	52.9	34.4	49.6
Non-Response	23.8	19.8	27.9	16.1
Total	100.0% (N=101)	100.0% (N=121)	100.0% (N=61)	100.0% (N=137)
	Q= .484		Q= .226	

As Table 54 shows, scientists from developing nations and those who performed teaching, administrative, or consulting roles in the home country see themselves as working longer hours in the United States as compared to the time they spent working in their home country. In addition, they express a greater dedication to work here than they did back home. Scientists from developed nations and those who enact research, teaching-research, and other low circumscribing roles do not experience such transitions in work involvement.

The high degree of homogeneity of responses on the item "working less in the United States than in the home country" prevents the formation of any conclusions concerning the relationship of responses to the item and systemic and role circumscription. The Ns in the yes category cells are too small, for example, only one person from a developing nation said he was working less in the United States as compared to his home country. Moreover, the non-responses affect the direction of the relationship. As a consequence,there is no basis for interpretation of results on this item.

On the basis of the other findings in this table, however, we can conclude that those scientists who are systemically circumscribed and role circumscribed will experience a change in the level of their work involvement in the United States. As has been suggested previously, such transitions occur because these scientists are in the process of redefining their role identities in relationship to the students and colleagues they work with and to department chairmen, deans, and other persons in authority positions in the work situation in the United States. Since their interaction patterns with these groups and because their group attributes differ from their counterparts in the home country, these scientists increase their work efforts and dedication. Such a response is also due to the transitions in the types of work roles they perform as a result of moving from one social system of work to another.

<u>Further Exploration in Differences Between Social Systems of Work.</u> Exposure to dissociative experience may have important consequences for the acknowledgement of variations in the work situation in the United States as compared to the home country. To explore this possible relationship, correlations of the perception of differences between students and in relations with persons in authority positions to the varying types of dissociative experiences were computed and the results are presented in Table 55.

In general, the acknowledgement of differences in relations with persons in authority positions and type of dissociative experience is unrelated. Only those scientists who have made trips to developing nations have a greater rate of seeing such a difference than scientists who have not made such journeys. Since it has already been shows that scientists from developing nations are more likely to make trips to ohter developing nations than scientists from developed nations, the correlation of trips to developing nations and differences in authority relations is supportive of the argument made previously that scientists from developing nations are moving into a divergent social system of work in the United States than scientists from developed nations.

Except for this relationship, then, we can conclude that prior physical and psychic mobility has no effect on the perception of differences in the work situations in the United States and the home country with reference to authority relations. This finding implies that the system of authority relations in the United States is unique to this country and that prior experiences in other countries or with their members does not necessarily prepare the respondents for the type of experiences with persons in authority positions they encounter in the United States.

The perception of differences between students in the United States and the home country, in comparison, is related to types of dissociative experiences but in varying directions. Those scientists who have had foreign educational experiences, contact with foreigners in the home country, belong to foreign scientific associations, or who have made journeys to developed countries usually see no difference between students here and at home. The respondents who have worked abroad before or who have taken trips to developing countries, on the other hand, generally say that students in the United States are different than their counterparts in the home country. This finding indicates that certain forms of prior physical and psychic mobility acquaint scientists with a range of divergent patterns of student-professor relationships and varying characteristics of students in other countries similar to those which exist

Table 55: Correlations of Differences Between Social Systems of Work in the United States and the Home Country and Type of Dissociative Experience: Differences Between Students and in Relations with Persons in Authority Positions

Types of Dissociative Experiences	Differences Between Social Systems of Work in the United States and the Home Country: Differences Between Students (N=186)*	Differences in Authority Relations (N=200)*
Foreign Ph.D. Educational Experience	-.365	.126
Foreign Work Experience	.199	-.041
Trips to Developed Countries	-.277	-.041
Trips to Developing Countries	.263	.159
Interaction with Foreigners	-.173	-.078
Memberships in Foreign Scientific Associations	-.298	-.017

* The Ns do not equal 222 because of non-responses to the questions dealing with differences between students and authority relations.

in the United States. Foreign work experience and making trips to developing countries does not seem to yield such information.

Previously, it has been shown that systemic and role circumscription are related to dissociative experience, that is, scientists from developing countries and those who perform teaching, administrative, or consulting roles in the home country are more likely to be physically and psychically mobile than scientists from developed countries and those who enact research, teaching-research, professional, or publication roles. In this chapter, we have also seen that these scientists usually acknowledge a difference between students in the home country and the United States. These findings and the results presented above indicate that prior educational experience abroad, interaction with foreigners in the home country, memberships in foreign scientific associations, and trips to developed countries by scientists from developing countries and those who perform teaching, administrative, or consulting roles prepare these scientists for the type of experiences they encounter in the social system of work with reference to students. Accordingly, these scientists have less of an adjustment to make to the work situation in the United States than scientists who have not had these forms of prior psychic and physical mobility.

Such an occurrence was related in the interviews by a scientist from India who had been to Great Britain for his doctorate and who had made several trips to the United States, France, and England. On a probe to the question on differences between students, he said the following: "Every time I've been abroad I have met students in the countries I visited. Overall, they are the same in every country. They treat their professors in a similar manner and are very similar in the way they work in the laboratory. Indian students do the same work as British, French, and American students in my field. There is no difference between them. I don't have any problems at all with students."

Those scientists who have had some forms of dissociative experience, then, are less likely to see a difference between students in the home country as compared to American students than scientists who have not had these experiences. Prior experience in foreign countries and with their members, on the other hand, have no effect on differences scientists see in their relations with persons in authority positions.

In summary, this chapter has shown that many scientists regard the work situation in the United States as being considerably different than the work milieu in the home country. It differs in terms of the types of relationships they establish with students, colleagues and those persons who occupy authority positions in the social system of work. The work situation also varies with reference to the work habits and dedication of the people they encounter in these settings. We have also seen that the work roles they perform in one system may not necessarily be the same they perform in another. In short, for many of the respondents the current stay in the United States is a movement from one social system of work to another which is unlike the social system of origin. They are not moving into an identical system. On this basis, we can conclude that for many of the respondents the current stay in the United States is a dissociative experience.

Scientists from developing nations and those scientists who perform administrative, teaching, or consulting roles usually view the work situation in the United States as divergent from the social system of work in the home country, experience a change in the type of work roles they perform in the United States, and increase their involvement in work in the United States. For scientists from developed countries and those who perform research, teaching-research, professional, and publication roles, on the other hand, the work situation in the United States, the type of work roles they enact, and the degree of their work involvement are, in general, comparable to the home country. Therefore, the following proposition holds for this group of visiting foreign scientists: The greater the systemic and role circumscription, the greater the difference of the social system of work in the United States as compared to the home country. This proposition implies that the social system of work in the United States is more likely to be dissociative for scientists from developing countries and those who perform teaching, administrative, or consulting roles in the home country than for scientists who are from developed nations and those who enact research, teaching-research, publication, or professional roles in the home country.

Chapter 6

Summary of Results and Conclusions

This study attempted to locate variations in the behavior and attitudes of a sample of visiting foreign scientists from developed and developing countries. In addition, several variables were suggested as some of the sources of these divergent interaction patterns and orientations. Three major conclusions can be drawn from the results presented in preceding chapters: 1) systemic circumscription (level of development of the educational and scientific institutions of the home country) and role circumscription (type of work role performed in the home country) have an impact on the social relationships, prior experience, and current behavior and perspectives of the visiting foreign scientists; 2) exposure to dissociative experiences (movement from one social system to another social system and exposure to the ideas, technology, or cultural values of a "foreign" social system or systems through contact with the actors of another system) fosters post-modernity, worldmindedness, and a universalistic orientation to social interaction, and, to some degree, work location, but its effect on third cultural network involvement and a universalistic orientation to living location is mixed; and 3) the remarkable degree of uniformity in the behavior and attitudes of these scientists gives some evidence of a trans-societal and cultural scientific community.

Systemic and Role Circumscription. Systemic and role circumscription, as evidenced in the level of development of the home country and the type of work roles performed respectively, are related to each other and to exposure to dissociative experiences, societal social responsibility, professional participation, perspectives on a stratification of nations in scientific fields, and the differences between the social systems of work in the United States as compared to the home countries of the respondents. Their relationship to scientific social responsibility and non-professional responsibility are, however, either inconclusive or unrelated.

The relationship of systemic circumscription to role circumscription implies that scientists from developing nations are more likely to perform teaching, administrative, or consulting roles than their colleagues in the developed world. In those countries with a low level of development of educational and scientific institutions, there is inadequate support given for those roles which are most central to the creation and utilization of scientific knowledge. Basic and even applied research often take a back seat to teaching, administration, or consulting. As Dedijer has pointed out (1962) and as these results confirm, many scientists are from segments of "pre-research"cultures or societies.

Given the conditions of the home country combined with the lack of availability of research and professional roles in science, and the relatively little support given to research productivity and publication and the utilization of these results, visiting foreign scientists from developing nations who are highly role circumscribed have experiences in other societies and with their members. That is, the greater the role circumscription, the greater the exposure to dissociative experiences. They have been abroad for educational reasons, have made journeys to other nations, interact with foreigners in the home country, and belong to scientific associations in nations other than their home country organizations. Through such activities, they keep up with the current developments in their field, make themselves visible to scientists in other nations, and establish collegial relationships with them. Their performance of teaching, administrative or consulting roles, however, hinders their chances of employment in other nations as the negative correlation of the performance of these types of highly circumscribing roles to cross-societal work experiences, controlling for systemic circumscription,has shown.

Similarly, scientists from developed nations who perform teaching, administrative, or consulting roles make trips to developed countries, interact with foreigners and belong to scientific associations in other nations. But their colleagues in developed nations who enact research, teaching-research, professional, or publication roles have been abroad for their doctorate and have made trips to developing nations.

Systemic and role circumscription are also related to social responsibility at a societal level. Scientists from developing nations and scientists who perform teaching, administrative, or consulting roles are concerned with the possible implications of their work on their society and others. In addition, they often use the current problems facing their home country as a criterion for the selection of a research problem were feasible. Moreover, they give approval to the involvement of scientists in national decision-making. Incontradistinction, scientists from developed nations and those who perform research, teaching-research, professional, or publication roles in their home countries are commonly low on societal social responsibility.

Concerning the second level of social responsibility, the scientific, the results are inconclusive. Most of the scientists in the study express an obligation to the next generation of scientists. They also choose problems relevant to science for research topics. Because of the low rate of disagreement to these indices of scientific social responsibility, a generalization concerning their relationship to systemic and role circumscription cannot be made. The results show, however, that the type of obligation to the next generation is correlated in a positive direction to systemic circumscription. That is, scientists from developing nations are committed to the growth of science in their own nations, whereas scientists from developed nations state that their obligation to the next generation is in reference to the international scientific community. The scientific social responsibility of scientists, then, is particularistic for scientists from developing nations, but universalistic for scientists from developed nations.

This obligation by scientists from developing countries to build the national scientific community in their field rather than the international scientific community is one way of achieving mobility in the stratification system of science described by the respondents. Scientists from developed nations and those who perform teaching-research, research, professional, or publishing roles in their home countries see their nations as centers or leaders in their fields. Scientists from developing countries and those who perform teaching, administrative, or consulting roles identify the positions of their home country in a ranking of nations as low or peripheral to the centers of research in their fields. The peripheral or center rank of the respondents' home countries affects the type of positions they occupy when they are employed in one of the centers in their fields, the United States, and the type of exchanges they see existing between their home countries and the United States. As a consequence, scientists from the periphery do not receive the same level of support as do scientists from the center in the United States and in the systemic linkages between their nations and the United States. To compete as equals with the centers, those scientists from the periphery must support the growth of viable research institutes in their countries. Thus scientists from developing countries are committed to the next generation of scientists in their country and not throughout the world.

A strengthening of science internationally desired by scientists from developed nations may be considered as a form of neo-colonialism. Because those outside of the centers of science in their fields have relatively little chance to improve their position, the growth of viable research institutes in the peripheral nations will provide more scientists for the centers and thus increase the dominance of the centers over the periphery.

Furthermore, those scientists from the periphery,i.e., the developing nations, are more likely to hold non-mainline positions (research assistant and associate) than mainline positions (instructor to full professor) in the United States. The opposite is true for scientists from the center, i.e., developed nations. Moreover, scientists from developing nations are more likely to consider the systemic linkage networks of exchanges of students, resources, and information between their home countries and one of the centers in their fields, the United States, as being non-reciprocal than scientists from developed nations whoview these networks as reciprocal.

The stress placed on problems facing the home country as a criterion for a choice of research problems and the emphasis on training future generations to create and further the national scientific institutions by systemically and/or role circumscribed scientists would lead one to expect that this societal and social responsibility would foster participation in extra-scientific affairs and activities. It does not.Scientists from developing nations or those who perform teaching, administrative, orconsulting roles do not participate in civic, political, religious, etc. groups more than scientists from developed nations and those who perform research, teaching-research, professional, or publication roles. The lack of participation of scientists in these organizations and activities and in any form of social action which would lead to change in their society implies that these visiting foreign scientists restrict most of their activities to the scientific community. Any involvement in social change and in activities outside of science by these scientists, if it occurs at all, is possible only as a direct or indirect outcome of the research they are engaged in or some activity within the social system of science. This group of visiting foreign scientists in the United States are, in short, one system actors.

Systemic and role circumscription are, however, correlated in a reverse direction to participation in scientific activities as proposed in Proposition 11. Scientists from developed nations and those who are teachers, administrators, or consultants have higher rates of attendance at national scientific meetings and of paper and article publication than scientists from developing nations and those who enact research, teaching-research, professional, or publication roles. Of the few scientists who have published books, most are teachers, administrators, or consultants.

These results support the analysis of the impact of systemic and role circumscription on the behavior of scientists in the first chapter. In developing nations, little support is given to research output in terms of inputs from society to science, yet such an output is demanded. Moreover, most of the available roles in science that scientists from these nations can perform are those which do not lead to research productivity in terms of scientific publications. In addition, the positive correlations of systemic and role circumscription to memberships in scientific associatons in other nations and their negative correlation to attendance at national scientific meetings implies that scientists from developing nations consider scientific associations in other countries as more important to their career than the associations in their home country in terms of accessibility to information concerning current developments in their fields and to meet colleagues. Without viable or highly developed scientific associations in their home country these scientists use memberships in associations in other nations as a systemic linkage to the larger scientific community. Scientists from developing nation and those scientists who perform teaching, administrative, or consulting roles view the work situation in the United States as different from the social system of work in their home countries. The social systems of work varies in the interaction patterns these scientists have with students, colleagues, and persons in authority positions (e.g., department chairmen, deans, supervisors) and in terms of the characteristics students and colleagues in their home countries and the United States. In addition, these scientists experience a change in the type of work roles they perform in the United States as compared to those they enacted in the home country. In this country, they usually perform research, teaching-research, professional, or publication roles. In their countries of origin they generally enact teaching, administrative or consulting roles. Moreover, in response to the differences in the social systems of work, these scientists increase their work involvement in the United States and, as has been suggested, must redefine their roles and social identities with their American colleagues, students, and supervisors.

For scientists from developed nations and those who perform research, teaching-research, professional, or publication roles, the work situation in the United States is quite similar to the social system of work in their home countries in terms of students, colleagues, persons in authority positions and relation with them, the type of work roles they enact here, as compared to their home country, and the degree of their work involvement. On the basis of these findings, the following propostion is formulated: the greater the systemic and role circumscription, the greater the difference of the social system of work in the United States as compared to the home country. Hence, the social system of work in the United States is now likely to be dissociative for scientists from developing countries and those who perform teaching, administrative, or consulting roles in their home country than for scientists who are from developed nations and those who enact research, teaching-research, publication, or pfoessional roles in the home country.

In conclusion, the level of development of the educational and scientific institutions in the home country and the type of role performed by scientists are important variables determining the possibilities of exposure to dissociative experiences, social responsibility at the societal level, the type of obligation to future generations of scientists, and experiences in the social system of work in the United States.

Dissociative Experiences. Exposure to dissociative experiences, i.e., foreign educational and work experience and trips to developed and developing countries (physical mobility) and interaction with foreigners in the home country and memberships in foreign scientific associations (psychic mobility), is also a significant source for explaining variations in the perspectives and orientations of the scientists in this study. Psychic mobility and physical mobility contributes to the growth of a post-modern perspective on the future of the home country, fosters internationality, and a universalistic orientation to social interaction, and to work.

The relationship of dissociative experience to third cultural network involvement is, however, mixed. Only two of the four physical mobility indices, trips to developed and developing nations, are strongly related to such involvement. The data suggests that these journeys given an experiential base for interaction with members from other societies that educational and work experience do not give. This explanation is feasible in one considers the purpose of the trips to these nations and the nature of the educational and work experiences and the status-roles of the persons making these trips. The scientists who made trips to other countries did so as peers for the purpose of directly contacting scientists from other nations or to become acquainted with a socio-cultural milieu different from their own. Either purpose implies co-equal participation of the respondents with selective members from another society. Educational and work experiences abroad would seem to involve such participaton. However, getting a higher degree in a foreign insititution or working in a foreign nation is seemingly quite restricting. Working towards a degree or being employed for a certain period of time may require a total commitment to these tasks obliterating the chance to participate in social and professional relationships with members of the host and other societies and to absorb social and cultural patterns of the profession in the host society. Therefore, when these scientists went abroad for advanced educational and work purposes, their most significant and enduring contacts with people from societies other than their own are limited to the classroom or the laboratory or the equivalent and does not extend outside of these settings. During these experiences, the nature of interaction is restricted to scientific matters and does not run over into social areas. This is especially true if there are linguistic problems.

The two psychic mobility indices are also ambivalently related to third cultural network participation. Interacting with foreigners in the home country is functional for using scientific meetings and conferences as a setting for personal social relationships with people from other societies, but not for establishing networks at work or outside of work in the United States. Belonging to associations in other nations, on the other hand, does lead to third cultural social relationships outside of the work situation with people who work at the same place of work and for interaction with people from other nations at scientific meetings. It leads to non-third cultural relationships outside of work with people who work elsewhere or who are in the same field as the respondent.[18]

Given these results, proposition 3, the greater the exposure to dissociative experiences, the greater the involvement in third cultural networks, can be accepted only with reservations. That is, only in specific situations and only with some types of dissociative experiences does third cultural network involvement follow from exposure to dissociative experiences.

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[18] Interaction with members from the home country in a different society acting only with each other can be part of a third culture insofar as they are mediating the two cultures and are sharing norms which transcend both societies.

Exposure to dissociative experiences is also related to a particularistic orientation to living location, i.e., scientists are selective in choosing residential site. Only trips to other nations apart from educational and work experiences has led to such a universalistic orientation, i.e., no preference for a living location. This finding suggests an evaluative ability on the part of those actors who have had these experiences. By becoming more fully aware of alternatives to their society and culture in their status as professional scholar, the majority make a preference for their home country or another country.

Exposure to dissociative experiences, in summary, has had an effect on the way these scientists view the world and their relationship to it, their perspective on the future of their home country, and their orientation to where they would like to live or work and who they would interact with. In general, this effect has been in the direction of increasing the post-modernity, worldmindedness, and universalistic orientation of the visiting foreign scientists.

Homogeneity in Science. In Chapter 1, the main point of emphasis was an exploration of the variations in the behavior and attitudes of the scientists and the sources of this heterogeneity. The variations that have been found to exist on the selected behavioral and attitudinal dimensions has been related to systemic and role circumscription and exposure to dissociative experiences. Yet, there is one finding as consistent as the others: the majority shared the same beliefs, perspectives, and orientations and tended to behave in a similar fashion both in and outside of the scientific community.

These visiting foreign scientists have, for the most part, experiences in other societies or with people from them. They are involved in thrid cultural networks and their world views have changed in the direction of increasing worldmindedness as a result of these contacts. Moreover, they visualize the future of their home country in dynamic post-modern terms wherein their nation acts in cooperation with other nations to shape the future of the world. They believe that they are socially responsible to their society and the world and to the international and their national scientific communities. In addition, they use the same criteria for selecting a location for work, yet they are universalistically oriented to a locus of work. They share a particularistic orientation to a living location, but express a universalism with regard to whom they are willing to associate with. They participate readily in their national scientific associations, and have similar publication rates. Finally, they tend to be non-participants in extra-scientific organizations and activities.

This homogeneity of responses gives credence to the idea that there is an international scientific community, at least with regards to these scientists. Such a uniformity in behavior and attitudes could only emerge out of a common social and normative structure. The main thesis of this study, therefore, must be revised. Science is not a heterogeneous collectivity. It is a homogeneous collectivity characterized by varying levels of systemic and role circumscription, in which scientists share the same beliefs, perspective, and life styles, the world, their societies, and their place in them. The scientific community, therefore transcends societal and cultural differences resulting in, what one may call, a third culture of science.

Appendix A

Interview Schedule and

Questionnaire

A STUDY IN THE SOCIOLOGY OF SCIENCE

INTERVIEW SCHEDULE

Sal P. Restivo
C.K. VanderPool
Dept. of Sociology
Michigan State University
East Lansing, Michigan

FACE SHEET

1. Sex: M____ F____

2. Age: ____

3. Marital Status: S____ M____ D____ W____

4. Number of children:____

5. Birthplace:______________________________

6. Citizenship:______________________________

7. Current Position: Visiting____ Nonvisiting____

____ Instructor ____ Professor

____ Ass't. Professor ____ Research Assoc.

____ Assoc. Professor ____ Other (specify)____________

8. Field: ______________________________

9. Educational Background:

	Country	Field	Degree& Year
A. UNDERGRADUATE:	________	________	________
B. GRADUATE:	________	________	________
	________	________	________
C. POST-GRADUATE:	________	________	________

10. Career History for LAST FIVE YEARS:

A. Organization: _____ Industry

_____ Government

_____ University

_____ Other (specify)____________________

B. Countries: ______________ ___________ __________

C. Positions: ______________ ___________ __________

11. IF MARRIED: Background of Spouse:

A. CITIZENSHIP: ______________________________

B. BIRTHPLACE: ______________________________

C. OCCUPATION: ______________________________

12. Background of Mother:

A. CITIZENSHIP: ______________________________

B. BIRTHPLACE: ______________________________

C. OCCUPATION:

13. Background of Father:

A. CITIZENSHIP: ______________________________

B. BIRTHPLACE: ______________________________

C. OCCUPATION: ______________________________

14. Not counting this trip, what foreign countries have you visited in the last five years for reasons related to your work?

COUNTRY	LENGTH OF STAY
____________________	____________________
____________________	____________________
____________________	____________________

15. IF MARRIED: Is your wife with you? YES ____ NO ____

16. IF MARRIED: Are your children with you? YES ____ NO____

17. Do you interact regularly with foreigners in your home country?

YES____ NO ____ IF NO, GO TO 21

18. WHAT COUNTRIES WERE THEY FROM?

19. WHAT WERE THEIR OCCUPATIONS?

20. WHY DID YOU INTERACT WITH THEM?

21. IF RESPONDENT HAS CONTACTED SCIENTISTS; WHAT WERE YOUR OBLIGATIONS AND RESPONSIBILITIES TO THEM?

22. How did you happen to come to this country?

A. To do research with colleagues ____
B. To learn about new techniques ____
C. To see America ____
D. To communicate results with colleagues ____
E. To do research which could not be done at home ____
F. To teach ____
G. Other (specify) ____________________

23. How did you happen to come to this university?

A. I was invited by colleagues ____
B. Invitation by university ____
C. University provided funds to do what I want to do ____
D. A friend of mine was here before ____
E. Exchange program ____
F. Other (specify) ____________________

24. What do you plan to do after your stay here?

25. WHY?

TEACHING WORK ROLE

IF THE RESPONDENT HAS TAUGHT BEFORE
AND IS CURRENTLY TEACHING, ADMINISTER
THE FOLLOWING QUESTIONS

1. What level courses are you teaching?

2. What are the differences you have experienced in teaching here as compared to teaching in your home country?

3. What do you like most about teaching here?

4. What do you like least?

5. In your field, when does a man reach his peak as a teacher?

6. What impact does teaching have on your professional career, e.g. is it detrimental to your status in the field, etc.?

7. DOES THIS VARY IF YOU TEACH IN YOUR HOME COUNTRY AS COMPARED TO TEACHING IN THE UNITED STATES?

IF YES:
8. IN WHAT WAYS:

9. Is there a difference in the way you teach ______________
(field)
here as compared to your home country?

(Probe for materials added to a course which are not part of the general subject matter of the course.)

WORK ROLE UNITED STATES

1. Teaching formal courses and seminars (Including preparation time) ______
2. Basic research ______
3. Applied research ______
4. Research and development ______
5. Teaching-Research (that kind of research carried on with one or more apprentice researchers for whom this research involvement is part of their formal training) ______
6. Administration within an organization ______
7. Public service activities (speaches to general public, appearances on T.V. and radio, popularization of science representing your field at civil functions, etc.) ______
8. Consultant to public organizations ______
9. Consultant to private organizations ______
10. Organizational activities in science (editing, membership participation, committee participation in scientific organizations, etc.) ______
11. Writing and publication ______
12. Other (specify)______________________________

WORK ROLE HOME COUNTRY

1. Teaching formal courses and seminars (Including preparation time) ______
2. Basic research ______
3. Applied research ______
4. Research and development ______
5. Teaching-Research (that kind of research carried on with one or more apprentice researchers for whom this research involvement is part of their formal training. ______
6. Administration within an organization ______
7. Public service activities (speaches to general public, appearances on T.V. and radio, popularization of science, representing your field at civil functions, etc.) ______
8. Consultant to public organizations ______
9. Consultant to private organizations ______
10. Organizational activities in science (editing, membership participation, committee participation in scientific organizations etc.) ______
11. Writing and publication ______
12. Other (specify) ______________________________

26. Who provided the financial support for your trip here at this time?

	Home country	U.S.	Other
A. Government:	____	____	____
B. Industry:	____	____	____
C. Foundation:	____	____	____
D. University:	____	____	____
E. U.N. Agencies:	____	____	
F. Personal resources:	____		
G. Other (specify):			

____

27. Who supports your work here?

WORK ROLE

28. On this sheet are a list of activities scientists sometimes perform. CHECK THOSE ACTIVITIES YOU PERFORM BACK HOME. (GET RANK ORDER)

29. WHICH ACTIVITIES TOOK UP MOST OF YOUR TIME? (GET RANK ORDER)

30. Here is a sheet identical to the one I just gave you. CHECK THOSE ACTIVITIES WHICH YOU PERFORM HERE. (GET RANK ORDER)

31. WHICH <u>ACTIVITIES</u> TAKE UP MOST OF YOUR TIME HERE? (GET RANK ORDER)

32. Which of the above activites, do you regard as most central to your role as a <u>FIELD</u>?

____

33. Which of the above activities are most central to <u>FIELD</u> in your home country?

____

34. Which of the above activities are most central to <u>FIELD</u> in the United states?

____

35. What types of activities will you perform when you go back home?

A. The same as before _____
B. The same as here _____
C. Different (specify

____

36. As a result of this trip to the United States, do you plan to change the way you perform your activities?
_____ YES _____NO <u>IF NO, GO TO 39</u>.

37. IN WHAT WAYS WILL YOU CHANGE YOUR ACTIVITIES?

38. DO YOU PLAN TO CONTINUE TO WORK IN THE SAME FIELD?

39. What are the networks of exchanges between American and H.C. Field?

A. Jobs ______

B. Money ______

C. Resources ______

D. Journals ______

E. Equipment ______

F. Students ______

G. News and gossip ______

H. Work contacts with other scientists ______

(PROBE FOR DIRECTION OF EXCHANGES)

40. WHAT IS YOUR ROLE IN THESE NETWORKS?

(PROBE FOR OBLIGATIONS IN PROFESSIONAL COMMUNITY)

41. Have you interacted with students in your home country?
YES____ NO____ IF NO: GO TO 44

42. DO YOU FIND THAT THERE IS A DIFFERENCE IN THE WAY YOU INTERACT WITH STUDENTS HERE AS COMPARED TO YOUR INTERACTION WITH STUDENTS BACK HOME?
YES______ NO______ IF NO: GO TO 44

43. WHAT IS THE NATURE OF THE DIFFERENCE?

44. Do you find that there is a difference in the way you interact with persons in authority positions here (e.g. Dept. chairman, Deans, etc.) as compared with the way you interact with similar individuals back home?
YES_______ NO______ IF NO: GO TO 46

45. WHAT IS THE NATURE OF THE DIFFERENCE?

46. In your current stay here who are the nationals you most frequently interact with?

47. WHAT DO YOU USUALLY TALK ABOUT?

a. work (research) ________
b. social matters ________
c. other (specify) ________________________

48. Did you know these scientists personally before you came to this country? YES______ NO ______
IF NO: GO TO 51

49. HOW DID YOU GET TO KNOW THEM?

50. HOW WELL DO YOU KNOW THEM?

51. Some individuals are completely involved in their research --- absorbed by it night and day. For others their work is simply one of several interests. IN YOUR HOME COUNTRY, HOW INVOLVED WERE YOU IN RESEARCH?

Completely involved_____ Somewhat involved_____
Not much invloved ______

52. Has the level of your work involvement changed since you've been here?

53. Is there anything about your work experiences here which you did not expect before coming here?
YES______ NO______ IF NO: GO TO 55

54. WHAT DIDN'T YOU EXPECT?

55. Are the work habits of your American colleagues different from the work habits of your colleagues back home?
YES______ NO______ IF NO: GO TO 57

56. IN WHAT WAYS ARE THEY DIFFERENT?

57. What do you like most about working with Americans?

58. What do you like least about working with Americans?

COMMITTMENT TO SOCIAL CHANGE

59. Are you involved in bringing about change in your country?
YES______ NO______ IF NO: GO TO 65

60. What type of change are you working for?

61. Why are you involved?
   a. It is my duty to my country ____
   b. Every scientist must ____
   c. To better mankind ____
   d. My work role necessitates it ____
   e. It's an opportunity for advancement ____
   f. Other (specify)
   ____

62. What is the nature of your involvement?
   a. Membership in political groups ____
   b. Applied research ____
   c. Planning groups ____
   d. Basic research ____
   e. Teaching ____
   f. Consulting ____
   g. Kinship and friendship groups ____
   h. Other (specify) ____

63. Are there any constraints placed on your involvement?
   YES ____ NO____ <u>IF NO: GO TO 66</u>

64. WHAT ARE THESE CONSTRAINTS AND WHO IMPOSES THEM?

   A. <u>Constraints</u>:
      a. Social values cannot be investigated ____
      b. Cannot attack groups in power ____
      c. Cannot criticise ideology ____
      d. Cannot invistigate certain physical problems ____
      e. Illegal to pursue these activities ____
      f. Other (specify)
      ____

B. Imposers:
   a. Public in general ____
   b. Government and other authorities ____
   c. Religious groups ____
   d. Traditional leaders ____
   e. Other (specify) ____

GO TO 66

65. Why aren't you involved?
   a. Outside the role of a scientist ____
   b. Too involved in my work to bother with it ____
   c. Fear the reprisals of such involvement ____
   d. Cannot because others prevent me ____
   e. Other (specify) ____

IF RESPONDENT ANSWERS WITH STATEMENTS SIMILAR TO c&d, PROBE THE CONSTRAINTS AND THE IMPOSERS OF CONSTRAINTS.

66. How do you feel about scientists who are directly involved in bringing about change in your society?

IMAGES OF THE FUTURE

67. If you could picture your country in the best possible form, how would things look about ten Years from now?

68. What models do you use to construct this ideal picture of your country?

69. What segments of your society share such models?

70. Are the scientists in your country important for achieving this future?

71. Do you think this ideal future will be achieved by your country? YES _____ NO _____

72. IF NO: WHY NOT?

73. IF YES: WHY?

74. Are you pessimistic or optimistic about the future of the world? PESSIMISTIC_____ OPTIMISTIC _____

75. WHAT IS THE BASIS OF YOUR PESSIMISM OR OPTIMISM?

SOCIAL RESPONSIBILITY

76. Some scientists are concerned about the effects of their work on society (e.g., the atomic scientists who expressed concern about the use of atomic weapons, biologists who are concerned about indiscriminate crop spraying). Other scientists are not concerned (e.g., mathematicians working on theoretical problems which have no applied aspects). Are you concerned about the effects of your work on society?

YES _____ In what way?

No _____ Why not?

IF YES,GO TO PROBE 77. IF NO, GO TO 78.

78. Are you a member of any associations or group of scientists interested in the effects of scientific research on society?

YES _____ (names of organizations)

NO _____

IF NO, GO TO 79.

79. Would you be interested in joining such an organization? WHY OR WHY NOT?

KINSHIP

80. How have your family and relatives influenced your professional career?

ORGANIZATIONAL PARTICIPATION

81. What scientific organization do you belong to?

82. Is there a viable scientific association in your field in your home country?

83. What are the goals of the scientific organizations you belong to?

84. WHAT ARE THEIR SOCIETAL FUNCTIONS?

85. How often do you attend meetings at the

	very often	often	seldom	never
a. Regional level	_____	_____	_____	_____
b. National level	_____	_____	_____	_____
c. International level	_____	_____	_____	_____

86. What meetings have you attended in the U.S.?

87. WHY DO YOU ATTEND THESE MEETINGS?

a. To meet old friends _____
b. To establish new relations _____
c. To advance my career _____
d. To meet with other people doing the same research _____
e. To advance the career of students _____
f. To keep up with developments of the field _____
g. Other (specify) ______________________________

88. WHAT LANGUAGES ARE USED AT THE INTERNATIONAL MEETINGS YOU HAVE ATTENDED?

89. How would your colleagues describe your role in the profession?

90. How many papers have you published in journals?
1-10 _____ 11-20_____ Over 20_____ None_____

91. Where do you usually publish?

92. WHY DO YOU PUBLISH IN THESE PLACES?

93. In what languages do you write for publication?

94. HAS YOUR WORK BEEN TRANSLATED INTO OTHER LANGUAGES?

95. DO YOU TRANSLATE PUBLISHED WORKS?

96. Who reads what you publish?

97. To whom would you send preprints and reprints of your articles? PROBE FOR COUNTRY.

98. How many books have you published?
1-5_____ 6-10_____ Over 10_____ None_____

99. Have you published papers and books in subjects other than your own? YES_____ NO_____ IF NO: GO TO 101.

100. IN WHAT AREAS?

THIRD CULTURAL RELATIONS

101. Have scientific gatherings in nations other than your home country enabled you to establish personal and communication ties wiht scientists from other nations? YES_____ NO_____ IF NO: GO TO 108.

102. WHERE WERE THEY HELD?

103. WHAT LANGUAGES WERE SPOKEN?

104. WHAT NATIONS DID THE SCIENTISTS COME FROM?

105. HOW DO YOU KEEP IN TOUCH?
a. Letters _____
b. Visits _____
c. Other meetings _____
d. Other (specify)________________________________

106. WHAT DO YOU USUALLY TALK ABOUT?

107. HOW WELL DO YOU KNOW THEM?

GO TO 109.

108. How do you establish such relationships?

109. Do you ever visit a country specifically to meet with scientists in your field?

110. When visiting another country, do you look up scientists? YES_____ NO_____ IF NO GO TO 112.

111. WHY?

112. Have any of the scientists you met abroad visited you here in the U.S.? YES_____ NO_____ IF NO: GO TO 116.

113. WHY?

114. WHAT WERE YOUR OBLIGATIONS AND RESPONSIBILITIES TO THEM?

115. WHICH COUNTRIES WERE THEY FROM?

116. In your relations with foreign scientists, is your national identity a liability or an asset?
   a. Liability ____
   b. Asset ____
   c. Both ____
   d. Doesn't make a difference ____
   e. Don't know ____ IF e: GO TO 124.

117. WHY?

118. DOES THIS PROBLEM ARISE WITH SCIENTISTS FROM CERTAIN NATIONS? YES____ NO____ IF NO: GO TO 122.

119. WHICH NATIONS?

121. WHY?

122. DOES THIS HAVE ANY AFFECT ON YOUR CAREER PLANS? YES____ NO____ IF NO: GO TO 124.

123. WHAT AFFECT?

COGNATIVE MAP

124. What are the essential characteristics of a science? ALTERNATE: WHAT DISTINGUISHES THE SCIENCES FROM OTHER SUBJECTS, FOR EXAMPLE, FROM LITERATURE, OR ART, OR PHILOSOPHY?

125. Which are the leading countries in your field?

126. HOW WOULD YOU RANK THESE COUNTRIES?

IF HOME COUNTRY IS NOT MENTIONED IN 125, PROBE 127--OTHERWISE GO TO 128.

127. WHAT ABOUT YOUR HOME COUNTRY? IS IT AMONG THE LEADERS, CLOSE BEHIND, LAGGING FAR BEHIND, OR NOT IN THE PICTURE AT ALL?

128. Has there been any change in the position of your home country during the past decade? YES _____ NO_____
IF YES, PROBE 129. IF NO GO TO 130.

129. HOW HAS IT CHANGED?

130. Do you anticipate any change in the position of your home country in the forseeable future? YES_____ NO_____

131. WHY OR WHY NOT?

132. If you had an outstanding student which country would you send him to for the best possible professional training in your field?

133. Which are the leading journals in your field?

134. WHICH COUNTRIES ARE THEY PUBLISHED IN?

135. Is there any country-or are there any countries-which makes it difficult or impossible for you to learn what its scientists in your field are doing?
YES_____ NO_____ IF YES, PROBE 136, 137. IF NO, GO TO 138.

136. WHICH COUNTRY(IES)?

137. WHY IS IT DIFFICULT OR IMPOSSIBLE TO LEARN WHAT SCIENTISTS IN THIS COUNTRY(IES) ARE DOING?

138. Is there any country(ies) whose scientists you would not share your work with? IF YES, PROBE 139, 140. IF NO, GO TO 141.

139. WHICH COUNTRY(IES)?

140. WHY WOULDN'T YOU SHARE YOUR WORK?

141. Are there any conditions under which you would not share your work with scientists in another country(ies)? YES_____ NO_____ IF YES, PROBE 142. IF NO, GO TO 143.

142. WHAT CONDITIONS?

143. In evaluating a scientific statement, journal article, etc., by a scientist in your field do you ever take into account the fact that he is from a particular country--does his nationality affect your evaluation in any way? YES_____ NO_____ IF YES, PROBE 144. IF NO, GO TO 145.

144. HOW DOES THIS ENTER INTO YOUR EVALUATION?

145. Think of all the countries you have worked in and all the scientists you have worked with. which country's scientists would you most prefer to work with? IF PREFERENCE EXPRESSED, PROBE 146. IF NO PREFERENCE, GO TO 147.

146. WHY?

147. Which country's scientists would you most prefer to socialize with? IF PREFERENCE EXPRESSED, PROBE 148. IF NO PREFERENCE, GO TO 149.

148. WHY?

149. Which persons outside of your field do you consider to be part of your audience--persons you want to share your knowledge with in one way or another? IF NONE, GO TO 153. OTHERWISE, PROBE 150, 151, 152.

150. PROBE NATIONAL, BI-NATIONAL, MULTI-NATIONAL, INTERNATIONAL.

151. WHICH SEGMENTS IN SOCIETY DO THEY REPRESENT?

152. WHY DO YOU WANT TO INCLUDE THEM IN YOUR AUDIENCE?

153. Which persons outside of your field would you explicitly exclude from your audience? IF NONE, GO TO 151. OTHERWISE, PROBE 154, 155, 156.

154. PROBE NATIONAL, BI-NATIONAL, MULTI-NATIONAL, INTERNATIONAL

155. WHICH SEGMENTS IN SOCIETY DO THEY REPRESENT?

156. WHY DO YOU WANT TO EXCLUDE THEM FROM YOUR AUDIENCE?

157. How many persons in your field are there in your home country?

158. HOW MANY DO YOU KNOW PERSONALLY?

159. Does it make any difference to you what country you work in? YES_____ NO_____

160. WHY OR WHY NOT?

161. Does it make any difference to you what country you live in? YES _____ NO _____

162. WHY OR WHY NOT?

163. Think of the best possible conditions for carrying out the work you are interested in. Is there any one country (or countries) in which you would be able to work under approximately such conditions?

164. Are there any limits placed on the kind of work you can do in your home country? IF YES, PROBE 165. IF NO, GO TO 166.

165. WHAT KINDS OF LIMITS?

166. Are there any limits placed on the kind of work you can do here? IF YES, PROBE 167. IF NO, GO TO 168.

167. WHAT KINDS OF LIMITS?

168. Are there any other persons from your home country in this department? YES _____ NO_____ DON'T KNOW _____ IF YES, PROBE 169. IF NO OR DON'T KNOW, GO TO 173.

170. DO YOU KNOW THEM PERSONALLY? YES_____ NO_____ KNOW SOME_____ IF YES, OR KNOW SOME, PROBE 171. IF NO, GO TO 172.

171. WHAT DID YOU TALK ABOUT THE LAST TIME YOU GOT TOGETHER WITH SOME OR ALL OF THEM?

172. Are there any other persons from your home country at this university? YES_____ NO_____ DON'T KNOW_____ IF YES, PROBE 173. IF NO, OR DON'T KNOW, GO TO 175.

173. DO YOU KNOW THEM PERSONALLY? YES _____ NO_____ KNOW SOME_____ IF YES, OR KNOW SOME, PROBE 174. IF NO GO TO 175.

174. WHAT DID YOU TALK ABOUT THE LAST TIME YOU GOT TOGETHER?

175. Are there any other persons form your home country in your field visiting in the United States? YES_____ NO _____ KON'T KNOW _____

176. When you retire, or nearing the end of your career, what would you like people in general to remember you for?

177. WHICH PERSONS WOULD YOU LIKE TO BE REMEMBERED BY IN PARTICULAR?

178. Some scientists believe that the criteria for truth and verification in science will never change. Do you agree with them? YES_____ NO _____

179. WHY OR WHY NOT?

180. What would you say are the most productive years for a scientist in your field?

181. If you could change your profession today, would you? IF YES, PROBE 182. IF NO, PROBE 183.

182. WHAT WOULD YOU CHANGE TO, AND WHY?

183. WHY NOT?

IF RESPONDENT HAS BEEN ABROAD BEFORE ASK QUESTIONS 184, 185, 186. IF THIS IS HIS FIRST TRIP ABROAD GO TO 187.

184. Upon returning to your home country did you (or do you usually) discuss your visit with people in your field? YES_____ NO_____ IF YES, PROBE 185. IF NO, PROBE 186.

185. WHY?

186. WHY NOT?

187. Have you tried to arrange for one or more of your colleagues and/or students to visit abroad? YES_____ NO _____

188. Have you tried to arrange visits to your home country for scientists you met abroad? YES _____ NO_____

189. For each of the following types of scientists indicate the extent to which you feel you have something in common with them by virtue of being a scientist.

Physical scientists

GREAT DEAL IN COMMON_____ SOMETHINGS IN COMMON _____
A FEW THINGS IN COMMON, BUT NOT MANY _____ NOTHING AT ALL IN COMMON _____

Biological scientists

GREAT DEAL IN COMMON _____ SOME THINGS IN COMMON _____
A FEW THINGS IN COMMON, BUT NOT MANY _____ NOTHING AT ALL IN COMMON _____

Social scientists

GREAT DEAL IN COMMON _____ SOME THINGS IN COMMON _____
A FEW THINGS IN COMMON, BUT NOT MANY _____ NOTHING AT ALL IN COMMON_____

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190. Of the following, which best characterizes your present work?

a. Specifically related to physical and/or biological problems indigenous to my home country _____

b. Specifically related to economic, social, and/or political problems of my home country _____

c. Specifically related to physical and/or biological problems indigenous to a specific region (e.g., Southeast Asia) _____

d. Specifically related to economic, social, and/or political problems of a specific region (e.g., Southeast Asia) _____

e. Specifically related to physical and/or biological problems affecting the world as a whole_____

f. Specifically related to economic, social and/or political problems which involve all nations _____

g. Has no relationship to national or geographic boundaries _____

191. On the basis of your response to the last question, what effect does the character of your work have on the nature of your career, if any? Is it an asset, a liability, or irrelevant to getting ahead in your field, making a name or reputation, etc?

PROBE FOR CAREER REFERENT - HOME COUNTRY, UNITED STATES, INTERNATIONAL SCIENTIFIC COMMUNITY...

GENERATIONS

192. How many generations can you identify in your field in your home country? PROBE FOR REFERENT: IS IT SOCIETAL, OR SCIENTIFIC?

193. Which generation do you belong to?

194. Are there any significant differences between the generations you have identified?

PROBE FOR COMMITMENT TO BUILDING A SCIENTIFIC COMMUNITY (NATIONAL, BI-NATIONAL, MULTINATIONAL OR INTERNATIONAL) AND CONCERN FOR PROBLEMS OF DEVELOPMENT, MODERNIZATION, AND POST-MODERNIZATION.

195. Do you feel any obligations to the next generation of scientists in your home country? YES_____ NO_____

196. WHY OR WHY NOT?

CONDITIONS OF WORK

197. During the last five years where have you spent most of your working hours?

a. Laboratory_____

b. Firld_____(social surveys, geological or geographic surveys, etc.)

c. Clinic_____

d. Library _____

e. Office _____

f. Other _____

IF MORE THAN ONE OF THE ABOVE IS RELEVANT, RANK ORDER YOUR RESPONSES

198. Indicate the extent to which each of the following has characterized your work over the last five years.

a. Theoretical: Definitely characteristic_____ Somewhat characteristic_____ Not characteristic_____

b. Methodological: Definitely characteristic_____ Somewhat characteristic_____ Not characteristic_____

C. Experimental: Definitely characteristic_____ Somewhat characteristic_____ Not characteristic_____

d. Technological (including applied work, research and development, etc.): Derinitely characteristic_____ Somewhat characteristic_____ Not Characteristic_____

e. Clinical: Definitely characteristic_____ Somewhat characteristic_____ Not characterisitc_____

f. Empirical: Definitely characteristic_____ Somewhat chaacterist_____ Not characteristic_____

199. During the last five years, how many people have you usually worked with on wach of your studies? IF RESPONDENT HAS WORKED ALONE, GO TO 201. OTHERWISE, PROBE 200.

200. WHAT KIND OF RELATIONSHIP DID YOU HAVE WITH THE PERSON(S) YOU WORKED WITH - WERE THEY COLLEAGUES, TECHNICIANS, SUPERVISORS...?

201. What would you say are the most important tools and resources in your work - things you must have in order to carry out your research?

202. How well organized is your field in terms of a body of empirically corroborated hypotheses, systematic theories, etc.?

203. Some scientists are working on the forefronts of knowledge, in fields or subfields that are just beginning to receive attention; others are involved in research that is peripheral to the main concerns of men in their field; still other scientists may fit somewhere between these two extremes. How would you characterize your work with reference to your field in general?

204. To what extent does your work entail financial costs requiring large-scale funding (e.g., government funding)?

COMMUNITY AND PUBLIC ACTIVITIES (REFERENT IS HOME COUNTRY UNLESS OTHERWISE SPECIFIED)

205. Have you been involved in any non-scientific organizations or activities (for example, as an elected public official, a public lecturer, a civic leader, etc.) at the local level (e.g., in your community) during the last five years? IF YES, PROBE 206-216. IF NO, PROBE 217.

> 206. WHAT ACTIVITIES AND ORGANIZATIONS, AND IN WHAT CAPACITY?

> 207. ARE YOU STILL INVOLVED IN THESE ACTIVITIES AND ORGANIZATIONS?

208. DO YOU INTEND TO REMAIN INVOLVED?

209. WHEN YOU ARE ENGAGED IN THESE ACTIVITIES DO YOU THINK OF YOURSELF PROMARILY AS A /respondent's field/, A SCIENTIST, A CITIZEN...?

210. DO OTHERS THINK OF YOU IN THE SAME WAY?

211. WHAT DO COLLEAGUES IN YOUR FIELD THINK ABOUT YOUR PARTICIPATION IN THESE ACTIVITIES?

212. WHY DO YOU ENGAGE IN THESE ACTIVITIES?

213. BY VIRTUE OF BEING A SCIENTIST, IS THERE ANYTHING THAT ESPECIALLY QUALIFIES YOU TO ENGAGE IN THESE ACTIVITIES? YES_____ NO_____ IF YES, PROBE 214. IF NO, GO TO 215.

214. WHAT IN PARTICULAR?

215. WHEN PARTICIPATING IN THESE ACTIVITIES DO YOU THINK OF YOURSELF AS A REPRESENTATIVE OF A SPECIFIC GROUP OR ORGANIZATION, FOR EXAMPLE THE SCIENTIFIC COMMUNITY, YOUR HOME COUNTRY...?

216. WHAT IMPACT, IF ANY, HAS YOUR PARTICIPATION IN THESE ACTIVITIES HAD ON YOUR PROFESSIONAL CAREER?

GO TO 218.

217. WHY AREN'T YOU ENGAGED IN SUCH ACTIVITIES?

218. Do you think scientists in general should become involved in the kinds of activities we have been discussing?
YES_____ NO_____

219. WHY OR WHY NOT?

220. Have you participated in decision-making at the national level during the last five years? YES_____ NO_____
IF YES, PROBE 221-231. IF NO, PROBE 232.

221. WHAT ACTIVITIES IN PARTICULAR, AND IN WHAT CAPACITIES?

222. ARE YOU STILL INVOLVED IN THESE ACTIVITIES?

223. DO YOU INTEND TO REMAIN INVOLVED?

224. WHEN YOU ARE ENGAGED IN THESE ACTIVITIES DO YOU THINK OF YOURSELF PRIMARILY AS A /respondent's field/, A SCIENTIST, A CITIZEN...?

225. DO OTHERS THINK OF YOU IN THE SAME WAY?

226. WHAT DO COLLEAGUES IN YOUR FIELD THINK ABOUT YOUR PARTICIPATION IN THESE ACTIVITIES?

227. WHY DO YOU ENGAGE IN THESE ACTIVITIES?

228. BY VIRTUE OF BEING A SCIENTIST, IS THERE ANYTHING THAT ESPECIALLY QUALIFIES YOU TO ENGAGE IN THESE ACTIVITIES? YES_____ NO_____ IF YES, PROBE 229. IF NO, GO TO 230.

229. WHAT IN PARTICULAR?

230. WHEN PARTICIPATING IN THESE ACTIVITIES DO YOU THINK OF YOURSELF AS A REPRESENTATIVE OF A SPECIFIC GROUP OR ORGANIZATION, FOR EXAMPLE, THE SCIENTIFIC COMMUNITY, YOUR HOME COUNTRY...?

231. WHAT IMPACT, IF ANY HAS YOUR PARTICIPATION IN THESE ACTIVITIES HAD ON YOUR CAREER?

GO TO 233.

232. WHY AREN'T YOU ENGAGED IN SUCH ACTIVITIES?

233. Do you think scientists in general should become involved in the kinds of activities we have been discussing?
YES_____ NO_____

234. Looking over all your experiences here, in other countries and back home, what affect have they had on the way you view man, society and the world?

235. Are there any questions I did not ask which I should have asked?

VISITING FOREIGN SCIENTISTS AND SCHOLARS:

A STUDY IN THE SOCIOLOGY OF SCIENCE

QUESTIONNAIRE

Sal P. Restivo
C.K. Vanderpool
Department of Sociology
Michigan State University
Summer 1969

1. Sex: Male_____ Female_____

2. Age: __________

3. Marital Status: Single_____ Married_____
   Divorced___ Widowed_____

4. Birthplace: ______________________________

5. Citizenship: ______________________________

6. Current Position: Visiting Instructor _______
   Visiting Assistant Professor _______
   Visiting Associate Professor _______
   Visiting Research Associate _______
   Other (specify)_______________

7. What is your field?______________________________

8. What are your areas of specialization?_______________
   ____

9. Indicate the academic degrees you have earned.

   Bachelors Degree (or equivalent): Year __________
   Country __________
   Subject __________

   Masters Degree (or equivalent): Year __________
   Country __________
   Subject __________

   Ph.D. (or equivalent) Year __________
   Country __________
   Subject __________

10. In the last five years, where have you been employed?

   a. Organization: Industry _____
   Government_____
   University_____
   Other (specify)_______________

   b. Country(s) ______________________________

   c. Position(s)______________________________

11. Not counting this trip to the U.S., what foreign countries have you visited in the last five years for reasons related to your work?

Countries	Length of Stays
___________	___________
___________	___________
___________	___________

12. Did you interact regularly with foreigners in your home country?
Yes_____ No_____

13. Why did you come to this country? (Check as many as applicable).

a. To do research with colleagues _______
b. To learn about new techniques _______
c. To do research which could not be done at home _______
d. To teach _______
e. Other (specify)_______________________

14. How did you happen to come to this university? (Check as many as applicable).

a. I was invited by American colleagues I met in my home country. _______
b. I was invited by a colleague in the U.S. who knew of my work in my field. _______
c. A former teacher recommended me for a position. _______
d. Personal initiative.
e. A friend of mine was here before_______

f. Other (specify):_______________________

____

15. What do you plan to do after your stay here?

a. Stay in the U.S.
b. Return home
c. Not certain
d. Other (specify): _______________________

16. What types of activities will you perform after your stay here?

    a. The same as before I left my home country ________
    b. The same as I perform here in the U.S. ________

    c. Other (specify)________________________________

17. The following list is composed of activities scientists sometimes perform. Please rank each activity in terms of the amount of time and effort you expend in them while in your home country and now in the U.S. (For example, teaching_2__, Basic research __1__, Organizational activities_3__, etc.). If you haven't performed the activity please leave the space blank.

	Home Country	U.S.
a. Teaching formal courses and seminars (including preparation time)	________	____
b. Basic research	________	____
c. Applied research	________	____
d. Teaching-Research (that kind of research carried on with one or more apprentice researchers for whom this research involvement is part of their formal training).	________	____
e. Administration within an organization	________	____
f. Consultant to public and/or private organizations	________	____
g. Organizational activities in science (editing, membership participation, committee participation, in science organization, etc.)	________	____
h. Writing and publication	________	____

    i. Other (specify)________________________________

18. Which of the following statements concerning teaching and a career in your field do you agree or disagree with?

    Use the following rating: 1=Strongly Agree; 2=Agree; 3=Neither agree, nor disagree; 4=disagree; 5=Strongly disagree.

    a. A combination of teaching and research helps a person in my field to be successful. ____
    b. Teaching without an emphasis on research is detrimental to a career in my field. ____
    c. Teaching detracts from time and effort that should be spent in research. ____

(4)

19. In terms of your ability to teach science, do you feel any obligation to or responsibility for the next generation of scientists in your home country?

Definitely _____ Somewhat _____ None _____

20. Comparing your experience here in the U.S. and back home, do you find that there is a difference between American students and students from your home country? Yes _____ No _____

If Yes: What is the difference? ____________________

____

____

21. Do you find that there is a difference in the way you interact with persons in authority here (e.g. Department Chairmen, Deans, etc.) as compared with the way you interacted with similar individuals back home? Yes _____ No _____

If Yes: What is the difference? ____________________

____

____

22. Has the level of your involvement in work changed since you've been here in the following ways?

a. Working longer hours Yes _____ No_____
b. Working less that before Yes _____ No_____
c. More dedication to work Yes _____ No_____

d. Other (specify): ____________________

23. Please indicate which of the groups below include most of the persons you work with.

a. Americans 1) in my field_______
2) not in my field____
b. Persons from my home country
1) in my field_______
2) not in my field____
c. Persons from other countries
L) in my field_______
2) not in my field____

24. Please indicate which one of the groups below includes most of the friends you see socially, i.e., away from work.

a. People in my field who work where I do and are from
1) the United States_____
2) my home country_______
3) other countries_______

b. People in my field who work elsewhere and are from
1) the United States_____
2) my home country_______
3) other countries_______

c. People not in my field who work where I do and are from
1) the United States_____
2) my home country_______
3) other countries_______

d. People not in my field who work elsewhere and are from
1) the United States_____
2) my home country_______
3) other countries_______

25. Indicate the extent of your agreement or disagreement with the following statements. Use the following rating: 1=Strongly agree; 2=Agree; 3=Neither Agree nor disagree; 4=Disagree; 5=Strongly Disagree.

a. Americans in my field work harder than my colleagues back home. ______
b. My colleagues back home work longer hours than their American counterparts. ______
c. Americans are not as dedicated to their work as my home country colleagues. ______
d. The degree of understanding that Americans have of the problems confronting my field is less than that of my colleagues back home.______
e. Americans are more organized in their work than my colleagues back home. ______

26. Please indicate the extent to which each of the following has been a part of your scientific work over the past five years.

a. Theory construction: great part__some part__no part_
b. Mathematics and Statistics: great part__some part__no part_
c. Methodology: great part__some part__no part_
d. Experimentation: great part__some part__no part_
e. Clinical work: great part__some part__no part_
f. Engineering: great part__some part__no part_

27. How important is each of the following in determining your choice of a research problem to work on?

    a. Problems facing Mankind(e.g, world population crisis, international conflicts)
    very important__somewhat important__not at all important__
    b. problems facing my home country(e.g. economic development, problems in education)
    very important__somewhat important__not at all important__
    c. scientific problems(e.g.theory, methodology)
    very important__somewhat important__not at all important__

28. What do you consider as the single most important factor affecting your choice of a research problem?

____

29. Do you feel a sense of responsibility for the possible social consequences of your research?
Definitely_____ Somewhat_____ Not at all _____

30. How do you think the research you are doing will affect mankind?
    a. will definitely be of great benifit _____
    b. will definitely have adverse affects_____
    c. will definitely have no effect on society in the forseeable future _____

31. Some scientists and scholars maintain that every scientist and scholar should be directly involved in the decision-making process of their country. Do you agree or disagree with them?
Strongly agree___ Agree_____ Neither Agree nor disagree_____ Disagree_____ Strongly Disagree_____

32. To what extent does your work entail financial costs requiring large-scale funding by major foundations or government agencies?

to a great extent___ to some extent___ not at all___

33. During the last five years where have you spent most of your working hours? If more than one of the following categories is relevant, please clarify by rank ordering them in terms of the amount of time and effort you spent in each setting.

a. Laboratory ___ b. Field(social surveys, geological surveys)___ c. Clinic___ d. Library___
e. Office___ f. Home___ g. Other(specify)__________

____

34. Please list the leading countries in your field, in rank order if possible.

Leading Country(s)________________ ________________
2nd ________________ ________________
3rd ________________ ________________
4th ________________ ________________
5th ________________ ________________

35. If your home country is NOT mentioned in question 34, please answer this question: Where does your home country fit into the picture?
a. Among the leaders___ B. Close behind the leaders__
c. Lagging behind the leaders___ d. Not at all in the picture____

36. Do you anticipate any improvement in the position of your home country in the forseeable future? Yes___No___

37. What country or countries are the scientists you most frequently communicate with from?

________________ ________________ ________________

________________ ________________ ________________

38. How do you communicate with them? Rank order the following in terms of their importance as a means of communication.
a. Letters___ b. Telephone___ c.Associational meetings___ d. Pre-prints/reprints___ e. Personal visits___ f. Other(specify)____________________

39. Is there any country (or countries) whose scientists and scholars it is difficult or impossible for you to communicate regularly and freely with? Yes____ No_____

If yes: List the countries:____________________

What prevents regular and free communication?
1) Language_____
2) Politics_____
3) Other (specify)____________________

40. Would you accept a permanent job outside of your home country? Yes_____ No_____ Maybe_____

41. Rate the importance of each of the following items as they would affect your decisions about where you work in terms of the following scale: 1=very important; 2=somewhat important; 3=hardly important; 4=not important.
a. Country___ b. Salary___ c. Quality of scientists___
d. Quality of research facilities___ e. Likes and dislikes of my wife and/or children___ f. Other (specify)____________________

(8)

42. How many papers have you published in your field?

1-5____ 6-10_____ 11 or more_____ none_____

43. How many books or monographs have you published in your field?

1-3_____ 4-6______ 7 or more______ none_____

44. What countries do you usually publish your works in?

____

45. In evaluating a scientific statement, journal article, etc. by a person in your field, do you ever take into account the fact that he is from a particular country? Yes_____ No_____

If yes: In what way:_____________________________

____

46. Please list the names of the scientific and scholarly societies you belong to and the countries they are located in.

Name of Country	Name of Society
________________	________________________
________________	________________________
________________	________________________
________________	________________________

47. How often do you attend the meetings of these societies?

Name of Society

________________ every meeting___ most meetings_____
some meetings___ no meetings______

________________ every meeting___ most meetings_____
some meetings___ no meetings______

________________ every meeting___ most meetings_____
some meetings___ no meetings______

________________ every meeting___ most meetings_____
some meetings___ no meetings______

48. Are you, or have you been a member of any non-professional organization (civic, charitable, religious, political, etc.) in your home country? Yes_____ No_______

49. To what extent do you support the following statements? Use the following rating: 1=Strongly agree; 2=Agree; 3=Neither agree nor disagree; 4=Disagree; 5=Strongly disagree.

a. My country should stay as it is, i.e. it should not change. ________
b. What my country needs most is greater economic development. ________
c. A greater effort in my home country must be placed on a rediscovery of its past. ________
d. The values of science should influence the values and ways of life of the people and leaders of my home country. ________
e. The problems confronting my country must be seen as international in nature. ________
f. My country should follow and develop its own course thru history and not copy other nations. ________
g. There should be more international cooperation between my country and other nations. ________

50. What affect have your experiences here and in other countries had on the way you view people, societies, and the world?

____

____

____

____

____

Appendix B

Supplementary Tables

Table 1: Number of non-respondents to the Questionnaire: Type of Science and Institution.

	Type of Science			
Institution	Physical	Biological	Social	Total
Wisconsin	22	29	1	52
Purdue	27	13	1	41
Minnesota*	13	4	2	19
Illinois*	7	14	5	26
Total	69	60	9	138

*Minnesota and Illinois have less foreign scientists on their campuses than Wisconsin and Purdue (see International Institute of Education; 1968).

Table 2: Percentage Distribution of Respondents by Their Country of Origin

Countries	Percentage Distribution	Countries	Percentage Distribution
England	15.3%	Norway	.9
India	13.9	Spain	.9
Japan	12.1	Burma	.5
Germany	7.6	Costa Rica	.5
China*	6.5	Guyana	.5
Australia	4.6	Indonesia	.5
Canada	3.7	Iran	.5
Israel	3.7	Ireland	.5
Czechoslovakia	2.8	Jordan	.5
Korea	2.3	Malaysia	.5
Switzerland	2.3	Nepal	.5
Italy	2.3	New Zealand	.5
Chile	1.9	Okinawa	.5
France	1.9	Peru	.5
Egypt	1.9	Philippines	.5
Pakistan	1.4	South Africa	.5
Poland	1.4	Sweden	.5
Turkey	1.4	Syria	.5
Brazil	.9	Thailand	.5
Colombia	.9	Venezuela	.5
Greece	.9	Yugoslavia	.5
Hong Kong	.9		
Netherlands	.9	Total	100.0% (N=222)

*The figures are for China unspecified and the Republic of China. Our figures include both categories. Only two respondents were classified as China unspecified.

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