The social construction of science: a theoretical and empirical investigation of aspects of the institutionalisation of the physical sciences

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THE SOCIAL CONSTRUCTION OF SCIENCE:

A Theoretical and Empirical Investigation of Aspects of the Institutionalisation of the Physical Sciences.

A thesis submitted in fulfilment of the requirements for the award of the degree of

Doctor of Philosophy

from

The University of Wollongong

by

TOM JAGTENBERG, BE N.S.W., MSc Manc.

Department of Sociology,
November, 1980.
This thesis is an original piece of research, the main content of which has not been previously submitted for a University Degree or other similar Award.

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Tom Jagtenberg
Dedicated to
my Mother and Father.
Many people have provided me with encouragement, support and ideas over the four and a half years that I have been working on this thesis. My parents, Pat and Tom Jagtenberg, have given unceasing support and encouragement for an enterprise that has consumed so much of my time. My supervisor, Stephen Hill, has remained closest to the content of the thesis over the years, and I am particularly grateful for the guidance, support and freedom that he has afforded me. My other colleagues and students in the Department of Sociology, University of Wollongong, have also provided me with a general sociological background that has been very important as a point of reflection during the generation of the broad structures of sociological relevance contained in this thesis. Professor Thomas Luckmann, Dr. Richard Whitley and Associate Professor Roger Krohn provided useful criticisms of earlier papers which formed some of the beginning structure of the thesis. Thanks to Myree Mitchell for the quality and efficiency of her typing over the years, and also for her general support and perception.

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To all my friends - Julia, Ian, Stephen, Robin and others, I thank you for your patience and indulgence. To Becky, words are not necessary.
There is at least one problem in which all thinking men are interested. It is the problem of cosmology; the problem of understanding the world including ourselves, and our knowledge, as part of the world. All science is cosmology, I believe . . .

ABSTRACT

This thesis concerns the institutionalisation of the physical sciences.

The thesis breaks with the established traditions in the history, philosophy and sociology of sciences by attempting to capture both the cognitive and social dimensions of institutionalisation in one unified analysis. This unification has been achieved through a treatment of research as goal directed social action. This theme has been developed both theoretically and empirically.

Theoretically, the thesis draws on a range of sources but the main inspiration has been the phenomenologically inspired work of Alfred Schutz - particularly as explicated by Thomas Luckmann and Peter Berger. The theory that has been developed has been supported by two case studies of Australian researchers - a group of physicists involved with the inspiration and development of an economically viable thermally based solar energy array, and a group of neuropharmacologists investigating aspects of chemical transmission systems in the human brain and their relationship to schizophrenia.

The case material involves aspects of both structure and process in the life worlds of physical scientists. These aspects have been explored in considerable detail through the development of a system of eighteen related hypotheses. The overall picture of the physical sciences that is presented though, is one of structured sub-universes of meaning constituted through the actions of professionalised scientific workers.
Scientific research is portrayed as a highly social process with researchers working together as part of research programs. Research programs are defined as the primary locus of productive activity and are constituted through the (typically) collective activities of a group of research workers who share a commitment to particular research practices and techniques, who are directed in their research towards a shared set of goals, and who share, to some extent, a common stock of specialised knowledge.

The sub-universe of the research program is not without its conflicts and discontinuities, however. Researchers were observed to alternate between contexts of research and contexts of legitimation, which in the case of the solar energy researchers was a highly institutionalised separation of structures of relevance. This movement between contexts was in some cases associated with the experience of conflict in which scientists at times, found themselves in double bind situations where the demands of a more inwardly directed professionalism competed with demands of social relevance.

The scientific research described in the case studies was predominantly instrumental by virtue of being more highly directed towards technical goals and the means for their realisation than towards questions about the value of these goals. It is suggested that this instrumentalism is typical of all of the contemporary physical sciences.

The field work conducted in the course of the thesis involved the innovation of a method of "repeated feedback". In this method research accounts were generated through an iterative process which relied on the scientists to check and up-date a series of descriptions of their
research. These descriptions were based on open ended interviews, questionnaire responses and non-formal interaction. Insofar as the method can be used to prevent unintended discrepancies between a sociologist's impressions of scientists' research and scientists' understandings, the method is particularly useful for the generation of accurate research accounts.
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