

# Explorations

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***Explorations: The UC Davis Undergraduate Research Journal*** accepts contributions from undergraduate students at the University of California, Davis.

Contributors should submit two copies of the double-spaced manuscript, as well as an electronic copy on computer disk or CD-RW. The text of essays should be in MS Word or rtf (rich-text-format); equations or formulae that contain symbols may be included within the text, but must also be submitted in a separate pdf file and clearly labeled for easy identification. Figures, photos, and other graphics may be included, but must also be submitted in separate files in pdf, psd, or MS Word formats and clearly labeled for easy identification. Author's name should appear on the title page only. Name(s) and departmental affiliation(s) of author's faculty sponsor(s) should also be included. Citations and bibliographies should conform to the style appropriate to the academic discipline.

Complete theses may be submitted. The journal publishes essays of no more than 30 pages; upon acceptance, longer essays will be returned to authors for initial editing to conform to the page limit. Authors must be available via phone or email until the end of the calendar year for the purposes of consulting with editors, revising essays under editorial guidance, and double-checking sources.

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## Editor's Preface

No matter what its form or expression, research always involves a powerful and fundamental drive in the human creature: the necessity—and with it, the *excitement*—of exploration. The impulse to explore brings with it a desire that is almost as powerful, to share the news of discovery with others. All of the essays in this volume, like those in previous volumes, have arisen from those same twin drives.

Discoveries carry with them implications—some that can be anticipated, and others that cannot; some that are minor and have only limited effect, others that are more critical and possibly even global in scope. Some discoveries contribute positive and new knowledge, while others show the limitation or the error of previous findings. Some will inspire new research, while others will motivate future researchers to find limitations or errors in our current ways of thinking, methods of investigation, and guiding questions or hypotheses. In one way or another, then, a discovery always constitutes a contribution.

The questions that prompt discovery often cluster around different sets of issues and concerns that extend across disciplines. Whether small or large, discoveries arise within a context that is created by the parameters established by the set of questions being asked. Some findings have a bearing on questions of epistemology, while others deal with issues of methodology that, in turn, inform theoretical developments. If we envision knowledge as arising out of a dialectic between the two poles of discovery and theory, we can see that the issues and questions of one side end up framing the issues and questions for the other. These issues and questions constitute the paradigm within a discipline—and often *across* disciplines.

Paradigms have boundaries that exist because of, and are enforced by, a discipline's accepted practices and ways of thinking. The boundaries, however, are not absolute. Especially in the physical and natural sciences, they shift in response to new questions and new discoveries that cannot be addressed or understood within the confines of the existing paradigm.

Because of the nature of such shifts, the import of a discovery must await its appropriate moment. On occasion the contribution might not be recognized at the time in which the work was conducted. A case in point is the work on plant genetics originally done by Mendel in the late 1850s and the early 1860s. The implications of his findings were only realized in the beginning of the twentieth century, at which time the kinds of paradigmatic questions regarding evolution had shifted from the original Darwinian emphasis on the physical features that orchestrate evolutionary change to the mechanisms through which these features work within populations. It was nearly forty years after Mendel's work—and twenty years after his death—that his discoveries were recognized for the critically important advancement they marked in the discipline of genetics. Only through a series of paradigmatic shifts could the prescient quality of Mendel's work be appreciated.

The creation of generalizations and of different types of comparison constitutes yet another form of discovery. While the construction of theory may be a guiding force in the natural/physical sciences and in some of the social sciences, the practice of comparison and generalization is central to the social sciences and the humanities. Comparing detective stories through time and across national cultures, for example, helps explain why and how certain national traditions produce certain kinds of detectives and detective stories and not others. Generalization and comparison require that we view the discovery either against the backdrop of what is already known (e.g., asking whether a particular discovery is unique) or as the result of broader epistemologies and sociologies of knowledge.

Discovery, generalization, comparison, and theory all relate to another critical issue that transcends the boundaries of what each discipline defines as “knowledge” as well as the ways in which it arrives at and organizes that knowledge. Within each discipline's paradigm is an idea or vision of what constitutes

its subject matter and of the relationship between its subject matter and the empirical evidence. The subject matter of a discipline sets forth its critical conceptual frameworks and theoretical constructs, while the empirical evidence is used to test theories and develop hypotheses. Freud, for example, argued that the mind in all its facets is the subject matter of psychology, while individual behavior constitutes the empirical evidence. At the same time, the understanding of the subject matter at any point in time *defines* what is and is not considered to be “evidence,” as well as dictating the level and nature of the evidence required to either verify or falsify theories. Thus, along with the subject matter, the nature and understanding of the empirical evidence will change over time.

Both poles in the dialectic between theory and discovery thereby define one another, inform the questions needed to validate knowledge, and regulate the kinds of analysis performed in the discipline. The development of an intellectual and epistemological foundation in any discipline, however, depends more on the totality of the formulation of the subject matter than it does on any individual piece or pieces of empirical evidence. In the physical and natural sciences, the distinction between the two might not be much of an issue, although paradigmatic changes will and do bring forth new or different subject matters. But in the social sciences, the distinction is more critical and has greater relevance to the work done by researchers in those areas. More often than not, the contrast is blurred, poorly defined, and misinterpreted. Throughout the social sciences, the conflation of the unit of observation with the object of analysis brings to mind an analogy that Noam Chomsky employed in *Language and Mind* (1968), that calling psychology a behavioral science is akin to calling physics a science of meter reading.

As subject matters change and the empirical evidence becomes richer, the human ability to devise vast and highly complex theories of scientific enquiry, to use metaphor and rhetoric in ways that are both more nuanced and more aware of language’s implications, and to usher in new aesthetic developments and criteria for quality in art, music and literature all attest to the creativity and the richness of the human mind. Developments of this type are the pinnacles of growth, imagination and thought as mapped by a culture’s mental logic. It is this creativity that led James Thurber to utter his famous dictum, “The noblest study of mankind is man—says man.”

It is this creativity also that gives rise to each of the six essays in this volume. Christine Coit examines an iconic figure in American literature and film, Raymond Chandler’s detective Philip Marlowe, tracing his emergence from, and his evolution through, particular cultural ideologies. Nathan W. Bronson’s research on the biochemical mechanisms involved in memory loss in mice has implications for the treatment of Alzheimer’s disease. Alfredo Burlando’s analysis of Colombian monetary policy since 1990 provides new ways of examining and understanding the complex relationships among economic policy, political conditions, interest rates, and the control of inflation. Josephine Yu examines the relationships between different types of graphs and matrix integrals, with implications for the disciplines of mathematics and physics. In her study of ancient Greek temples, Stefanie Norris uncovers an evolution in the ways in which temple builders and artists used pediment space to convey their culture’s cherished myths. Finally, Jaclynn Davis’s in-depth examination of primary historical records from one of California’s earliest reform schools results in a study of how two social issues converge at the turn of the twentieth century, revealing how the less powerful members of society can be caught in paradigmatic shifts in cultural values.

The editors and contributors wish to express special thanks to the faculty mentors from UC Davis who provided invaluable assistance and guidance to the emerging scholars represented in this volume: Max Byrd (Department of English), John Horowitz (Section of Neurobiology, Physiology, and Behavior), Oscar Jorda and Peter Lindert (Department of Economics), Motohico Mulase (Department of Mathematics), Lynn Roller (Departments of Classics and Art History), and Karen Halttunen (Department of History).

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