

Measuring Preferences & Finding Best
Strategies:
A Game Theoretical Approach
to a Historical Investigation
of an Academic Library

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Research Statement

I am conducting an archive-based historical investigation of one research institution's academic library using a game theoretical approach. The goal is to evaluate past decisions and strategies pertaining to library planning and development and to extrapolate from this evaluation the preferences inherent in them. The research will answer questions about the effective utility of various types of library planning and the outcome is to furnish additional insight for present day management and strategic issues.

Background

Historical scholarship is an investigation of past events in order to elicit the reasons why decisions were made and to explain the causes of certain events. Often these investigations are interpreted within cultural, social, and economic theoretical frameworks, which may be applied within various domains. For instance, we may examine the circulation records of a specific library in order to draw a picture of library book use in order to weed and make space for new acquisitions. We may further examine past studies of circulation records and the written reports by former librarians in order to educate ourselves and provide a historical context for our own current methods. Historical scholarship as narrative may also supply the information, knowledge, and wisdom necessary when we frame such studies and create strategic and tactical plans that seek to implement and transform into concrete and objective actions our visions, missions, and values. A theoretical framework often used or assumed, for example, in circulation studies is one of

classification, where we divide domains of knowledge by what we have decided they are *about*. If we know and understand the historical reasons and contexts for decision-making, this knowledge and understanding may provide us with better guidance and offer more substance in our present day decision-making. One question becomes from what theoretical and evidence-based position do we evaluate such investigations.

While a historical investigation supplies the evidence needed, game theory offers a theoretical position to begin this inquiry. It equips theorists with a relatively simple model for evaluating decisions and strategies as well as describing and predicting best strategies in games with multiple players and commonly known and defined rules. In essence, it works like this. Preferences are assigned based on expected utility payoffs, what may be referred to as the possible outcomes of a game. In mixed strategy games players choose from among a selection of pure strategies based on simple probability of expected utility. When all players have available a set of best strategies they would not deviate from, there is a Nash equilibrium. There may be multiple Nash equilibria in any give game. See Harrington (2008) for an excellent introductory and Ritzberger (2002) for a more mathematical explanation of game theory.

Game theory modeling is most especially applicable in situations where we identify and allocate resources (preference ordering), and make optimal choices among those preferences, or choose best strategies. It is thus a methodology for identifying what is rational, defined here from an economic perspective simply as the *consistent* application of making decisions and selecting strategies to maximize payoffs and minimize losses.

Preferences may be informed by our mission, vision, and values, both of the

library's and of the profession's, but they may also be informed by more specific criteria based on the context we find ourselves when we make decisions and formulate plans and strategies, such as the cost of a book, a database subscription, computers, etc. That context may include the specific community and its needs, the library's budget, its employees as well as other available resources. This historical investigation is an attempt to reveal what some of those preferences might be and how significant they are.

Therefore, the complexity enters the model when we define and quantify our preferences. Preferences are relatively easy to quantify when those preferences equate to units of currency or some other singular data point, but when preferences are based on service, the beliefs of a profession, or the behavioral patterns of decision-makers, a historical evaluation offers a promising qualitative method for determining what those preferences are and how to rank them. Even equating a single preference unit to a single dollar bill becomes a complex matter when that dollar bill may be more useful when applied to one task than it is when applied to another.

Game theory and expected utility probability measures offer an additional context for evaluating our preferences and for choosing the best strategy for any given library plan, especially in conjunction with our profession's statements. In other words, game theory may provide an Archimedean point for evaluating not just our activities but also our stated goals. Essentially, I propose that a library's preferences can be discovered by examining that library's past decisions as well as the profession's and library's stated mission, vision, and values. Hence, historical scholarship and a study of a specific library's narrative may furnish us with a rich source of material and a specific method for uncovering what those prefer-

ences were and are. Once those preferences are named and weighted, game theory supplies the model for calculating whether previous strategic moves were optimal strategic moves.

Methodology

1. Examine the library's historical artifacts, reports, plans, correspondence and other records collected and retained by the University's Archival department.
2. Identify and choose a specific, past library event, such as a building expansion, circulation report, etc. that furnishes extensive enough documentation for this evaluation.
3. Induce from this event, based on stated goals, expenses, desired outcomes, actual outcomes, evaluations and so forth, the preferences inherent in them.
4. Calculate the weight of those preference based on those variables.
5. Using those calculated preferences, identify the strategies that were available, the strategies that were optimal and were Nash equilibria, and the strategies that were chosen.

References

Harrington, J. (2008). *Games, strategies and decision making*. Worth Publishers.

Ritzberger, K. (2002). *Foundations of non-cooperative game theory*. Oxford University Press, USA.