Building on this tradition of research, the talk will cover two further developments:

(3) *Metaphor*. Most of conceptual structure is metaphorical, in that abstract concepts are in general structured in terms of other concepts that are experienced more directly. These include most of our social, interpersonal, and emotional concepts.

The metaphorical structuring of concepts is in general not unique. Abstract concepts are defined by clusters of partly overlapping metaphors. In such cases, the concepts do not have a consistent ontology. Instead, each metaphor brings its own ontology with it. Even the Western concept of a rational argument is defined by three partly overlapping metaphors whose ontologies are not consistent with one another.

Conceptual structure is not universal.

Conceptual metaphors characterize social, interpersonal and personal realities, and therefore serve as a basis for planning and action.

(4) *Mental Imagery*. Each culture consists in part of a large set of mental images which are shared by the members of that culture to a remarkable degree. Such conventional mental images are necessary for the comprehension of much of natural language.

Such mental images are not unstructured (as in Kosslyn's cathode-ray-tube model) nor are they propositionally structured (as claimed by Pylyshyn and others). Instead they are structured by abstract image schemes. Such image schemes play a central role in the semantics of natural language.

Philosophical significance: These results clash with classical ‘objectivist’ views of reality and of cognition. These views are: (1) The world is made up of objects; at any given time, each object has a fixed set of properties and there is a fixed set of relationships among the objects. Classical model theory and most computer data bases reflect such a view of reality. (2) Cognitive categories are set-theoretical, thought is propositional, and logic is a model for ‘correct’ human reason. The results of cognitive semantics suggest that this picture is grossly inadequate.

Social significance: Suppose we are correct that abstract concepts are characterized by very different metaphors in diverse cultures. Then social and economics planning, as well as foreign policy, ought to take relevant conceptual differences into account. At present, they have barely begun to be studied.

**Measuring the Political Consequences of Electoral Laws.** Bernard Grofman.

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In **Baker vs. Carr** (369 U.S. 186 (1962)) the U.S. Supreme Court affirmed that judicial redress could be sought to compel a state to reapportion its legislature in accord with new census data. In a number of subsequent cases, the Court addressed itself to the issue of voter r

various apportionment and explicating the meaning of applied to Congressional, at

‘equal protection’ suggests a scheme to satisfy. At minimum the right to exercise his vote; question of what equal prote
difficult one.

One answer is that each ind

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The principal focus of most 70’s was in specifying sta

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In our talk we shall focus on

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(1) We shall elucidate co

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(2) We shall review statisti

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Abstracts

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'equal representation' with 'equal representation'. Only a little reflection is
required to see the very severe limitations of defining equality of citizen repre-
sentation solely in terms of equally populated districts. As Dixon (1979 : 227) quite
strongly (and we believe quite accurately) put it:

(T)here is no such thing as 'equal representation' in a district system of
electing legislators. There may be 'equal population' districts,
which is an objectively verifiable concept. But with a district basis
there can never by 'equal representation' because all districts
discriminates by discounting utterly the votes of the minority
voters.

In our talk we shall focus on issues arising out of these Supreme Court redistricting
and representation cases.

(1) We shall elucidate competing criteria by which to judge the fairness of
alternative redistricting schemes for single-member-district legislatures.

(2) We shall review statistical models on the nature of seats/votes relationships
for single-member districts.
(3) We shall review the controversy over the use of at large and multimember-district election systems and discuss the impact of such systems on minority representation.

(4) We shall look at the attempt by 'reformers' to take 'politics' out of the redistricting process.

(5) If time permits, we shall look at proposed alternatives and modifications to single-member-district plurality elections, including weighted voting, approval voting, the alternative vote, and various forms of proportional representation.


We present a model of financial markets where the space of statecontingent claims is viewed as a topological vector lattice. The nonlinear operations of meet and join in a vector lattice allow us to formally express elementary options, i.e., calls and puts, as nonlinear functions of the underlying security and riskless asset.

Within this framework, we address the following two questions: First, in what sense can a finite number of marketed securities, e.g., two, span the space of statecontingent claims, when the number of states exceeds the number of marketed securities? Second, given a set of marketed securities and their prices, when can these prices be uniquely extended, by arbitrage, to the space of all state-contingent claims?

Using the Stone–Weierstrass theorem, Stone’s integral representation theorem for Daniell functionals, and Prohorov’s theorem on the existence of the projective limit of a projective system of Radon measures, we give complete answers to these questions for markets with an infinite state space, where there are a finite or continuum of trading dates.

**Extinction and the Coevolution of Competing Species.** Jonathan Roughgarden. Department of Biological Sciences, Stanford University, Stanford, CA 94305, U.S.A.

All the islands of the Eastern Caribbean contain native species of lizards from the genus *Anolis*.

There are 16 islands each of which has one native species. On 15 of these the species have evolved a characteristic body size, called the 'solitary size'. But on the island of Marie Galante there is a species of lizards whose body size is much larger than the solitary size.

On 8 of the islands there is a great difference in size between the smaller member of the two species is much larger than that on 6 of the 8 islands.

When there is a large difference in size between the smaller member of the two species is much larger than that on 6 of the 8 islands.

However, on the island of St. Eustatius is an island of the same body size and does not compete strongly on 6 of the 8 islands.

An explanation for these differences is that there is a turnover of species and coevolution of competitors. The competition occurs. The extinction of the smaller species is a result of competition. The extinction of species is a result of competition. A new species is a result of competition. A new species is a result of competition.

There are several phases in the invasion of Anolis. The larger body size with one species. The larger body size with one species. The larger body size with one species. The larger body size with one species. The larger body size with one species.

Next, the island is invaded by another species. The larger body size with one species. The larger body size with one species. The larger body size with one species. The larger body size with one species.

After the invasion, the two species evolve a smaller body size to compete with each other. The larger body size with one species. The larger body size with one species. The larger body size with one species.

As the resident continues to evolve, the larger body size with one species. The larger body size with one species. The larger body size with one species. The larger body size with one species.

But during this coevolution the size continues to approach the St. Maarten.