I. **PARADIGM**

A. **Paradigm**: The prevailing pattern of thought in a discipline or part of a discipline. The paradigm provides rules about the type of problem that faces investigators and the way they should go about solving them.

B. Thomas Kuhn said science goes through five phases
   a. immature science
   b. normal science
   c. crisis
   d. revolution
   e. resolution

C. What we usually observe and practice is “normal science”

D. The Onset of Crisis

E. Competing paradigms are incommensurable—they cannot be compared or evaluated on rational grounds
   a. Because each paradigm will have its own way of reporting observations, advocates of competing paradigms will not characterize what they see in the world in the same way.
   b. Incommensurability means that science can only be settled through extra-rational means—this suggests that science may not be a rational enterprise

F. **STONE VERSUS LAVER**—example of competing paradigms

<table>
<thead>
<tr>
<th>Concept</th>
<th>Laver</th>
<th>Stone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit of analysis</strong></td>
<td>Individual</td>
<td>Community</td>
</tr>
<tr>
<td><strong>Motivations</strong></td>
<td>Self-interest</td>
<td>Public interest and self-interest</td>
</tr>
<tr>
<td><strong>Chief conflict</strong></td>
<td>Self-interest versus self-interest</td>
<td>Self-interest versus public interest</td>
</tr>
<tr>
<td><strong>Source of ideas/preferences</strong></td>
<td>Self-generation</td>
<td>Influences from outside</td>
</tr>
<tr>
<td><strong>Nature of collective activity</strong></td>
<td>Competition</td>
<td>Competition and cooperation</td>
</tr>
<tr>
<td><strong>Criteria for individual d-m</strong></td>
<td>Maximizing self-interest, minimize cost</td>
<td>Loyalty, maximize self-interest, promote public interest</td>
</tr>
<tr>
<td><strong>Building blocks of social action</strong></td>
<td>Individuals</td>
<td>Groups and organizations</td>
</tr>
<tr>
<td><strong>Nature of information</strong></td>
<td>Accurate, complete, available</td>
<td>Ambiguous, interpretative, incomplete, manipulated</td>
</tr>
<tr>
<td><strong>How things work</strong></td>
<td>Laws of matter</td>
<td>Laws of passion</td>
</tr>
<tr>
<td><strong>Sources of change</strong></td>
<td>Material exchange</td>
<td>Ideas, passions, alliances</td>
</tr>
</tbody>
</table>
II. THE RATIONAL CHOICE PARADIGM

A. Alternatives
- Individual knows all the available alternatives
- Doing nothing is always an alternative
- There are always alternatives available

B. Consequences (outcomes)
- Individual knows the consequences associated with each alternative

C. Value
- Individual is able to attach value or worth to each consequence or outcome—value is in terms of intrinsic goals or desires

D. Utility
- To evaluate outcomes it is often necessary to have the outcomes measured on some numerical scale or index
- The scale must be interval or ratio – distance must be meaningful
- One possible scale is utility
  - An overall measure of the happiness or usefulness of an outcome to an individual.
- Importance of utility
  - It allows us to evaluate outcomes that involve non-monetary rewards, e.g., travel by plane versus car
  - It allows us to deal with seemingly paradoxical behavior (more later in lottery example)

E. Uncertainty
- What happens when alternatives have multiple outcomes?
- How do we take this information into account?
- Rational choice assumes that the decision maker knows – or can estimate -- the probability of each outcome given the choice of an alternative

F. Probability
- Probability theory is concerned with the likelihood of future events occurring in certain situations (e.g., coin is flipped, die is rolled)
- While we cannot predict exactly the outcome since it is indeterminate; we can talk about the likelihood of an event.
- We will, for the most part, use the relative frequency interpretation of probability
- Probabilities range from 0 to 1.
G. Expected value

- expected value of some situation is the average pay-off you would receive if you played the game a large number of times.
- Example: a die is rolled; if it comes up with a 5, you win $12; otherwise you get 0. Let’s say you roll the die 600 times—how much can you expect to win?
  - Chances of a 5 are 1 in 6; you would expect to win 100 times
  - 100 times you get $12 and the rest of time you get 0 -- $1200
  - you would expect to get $2 for each throw of the dice

H. Tree Diagram (Decision Tree)

- As situations get more complicated, it useful to represent the decision situation in a graphical manner

III. MICHIGAN LOTTERY

- Alternatives: Buy a Ticket/Not Buy a Ticket
- Outcomes: Win/Lose
- Value: $10,000,000/-$1
- Probability

\[ C_6^{49} = \frac{49!}{43!6!} = 13,983,816 \]

\[ P = \text{Probability of Winning} = .000000072 \]

- Expected Value

\[ \text{EV [Buy Ticket]} = (1-P)*(-$1) + P*($10,000) = .999999928*(-1) + .000000072*(10,000,000) = .99 + .72 = .17 \]

\[ \text{EV [No Ticket]} = 0 \]

- Preference: EV[No Ticket] > EV[Buy Ticket]
- **Gambler’s Paradox**
- **Discount to Present Value**

<table>
<thead>
<tr>
<th>Years From Today</th>
<th>Yearly Payment</th>
<th>Discounted Value</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$500,000</td>
<td>1.000</td>
<td>$500,000</td>
</tr>
<tr>
<td>1</td>
<td>$500,000</td>
<td>0.900</td>
<td>$450,000</td>
</tr>
<tr>
<td>2</td>
<td>$500,000</td>
<td>0.810</td>
<td>$405,000</td>
</tr>
<tr>
<td>3</td>
<td>$500,000</td>
<td>0.729</td>
<td>$364,500</td>
</tr>
<tr>
<td>4</td>
<td>$500,000</td>
<td>0.656</td>
<td>$328,050</td>
</tr>
<tr>
<td>5</td>
<td>$500,000</td>
<td>0.590</td>
<td>$295,245</td>
</tr>
<tr>
<td>6</td>
<td>$500,000</td>
<td>0.531</td>
<td>$265,721</td>
</tr>
<tr>
<td>7</td>
<td>$500,000</td>
<td>0.478</td>
<td>$239,148</td>
</tr>
<tr>
<td>8</td>
<td>$500,000</td>
<td>0.430</td>
<td>$215,234</td>
</tr>
<tr>
<td>9</td>
<td>$500,000</td>
<td>0.387</td>
<td>$193,710</td>
</tr>
<tr>
<td>10</td>
<td>$500,000</td>
<td>0.349</td>
<td>$174,339</td>
</tr>
<tr>
<td>11</td>
<td>$500,000</td>
<td>0.314</td>
<td>$156,905</td>
</tr>
<tr>
<td>12</td>
<td>$500,000</td>
<td>0.282</td>
<td>$141,215</td>
</tr>
<tr>
<td>13</td>
<td>$500,000</td>
<td>0.254</td>
<td>$127,093</td>
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<tr>
<td>14</td>
<td>$500,000</td>
<td>0.229</td>
<td>$114,384</td>
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<tr>
<td>15</td>
<td>$500,000</td>
<td>0.206</td>
<td>$102,946</td>
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<tr>
<td>16</td>
<td>$500,000</td>
<td>0.185</td>
<td>$92,651</td>
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<tr>
<td>17</td>
<td>$500,000</td>
<td>0.167</td>
<td>$83,386</td>
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<tr>
<td>18</td>
<td>$500,000</td>
<td>0.150</td>
<td>$75,047</td>
</tr>
<tr>
<td>19</td>
<td>$500,000</td>
<td>0.135</td>
<td>$67,543</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$10,000,000</strong></td>
<td></td>
<td><strong>$4,392,117</strong></td>
</tr>
</tbody>
</table>
III. THEORY: PUBLIC GOODS / MODEL

A. Social Context of Goods
   1. Common Situation
      a. People Desire Goods
      b. Goods are Scarce
      c. Must be Allocated
      d. Allocation Must be Authoritative
   2. Ability to Allocate Authoritatively
      a. Consumption Characteristics
      b. Production Characteristics
      c.

B. Consumption Characteristics
   1. Excludability
      a. Feasible
      b. Non-Feasible
   2. Supply
      a. Individual
      b. Jointly Supplied

IV. Production Characteristics
   1. Independent Production
   2. Jointness of Production

D. Typology of Goods
   1. Private Consumption/Private Production
   2. Private Consumption/Coop. Production
   3. Public Consumption/Private Production
   4. Public Consumption/Coop. Production

E. Collective Action Problem

DEFINITION: When individuals desire public goods from which they cannot be feasibly excluded and when each individual’s contribution to the production process yields a directly consequential benefit that is less than the cost involved, rational individuals will have a strong incentive to take a free ride.

   1. Public Goods (Jointly Supplied)
   2. Non Feasible Exclusion
   3. Cost of Cooperation > Directly consequential benefit
   4. Free Ride--make full use of the good without paying and/or contributing to its production