Value Functions

- **In General:**

  Preference Measure

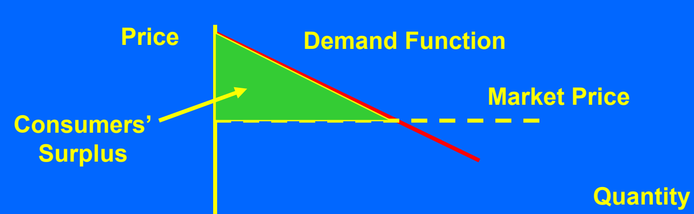
  PM = f($\underline{X}$)

  where $\underline{X}$ = vector of attributes

- **Semantic Caution: Value**
  - Value in Exchange
  - Value in Use
  - “Fair Market Value”

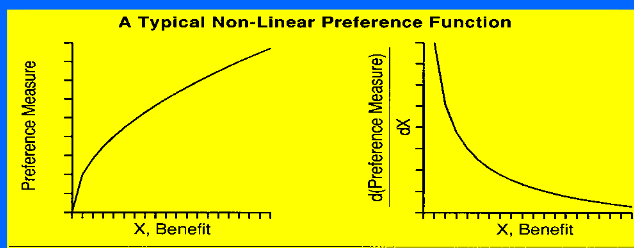
Illustration of Difference in Value

- **Value in Exchange IS NOT Value in Use**
  - Value-In-Use - Like a “shadow price” in optimization
  - What is value of a “key employee”
- **“Fair Market Value”**
  - Market Prices Rarely Reflect Value Consumer Surplus



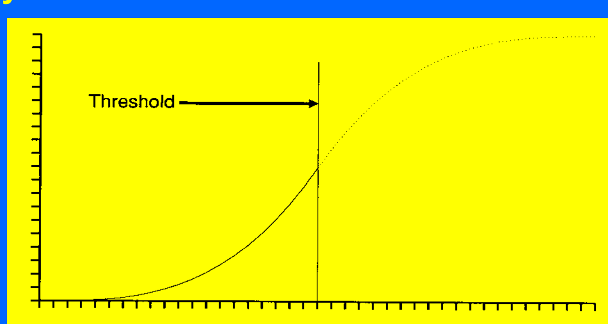
Value Function - V(X)

- **Definition:**
  - V(X) is a means of ranking the relative preference of an individual for a bundle on consequences, X
  - "lunch effect"



Preference Function

- **Risk Preference Also Observed**
  (There is no "Law of Diminishing Marginal Utility")
- **However, May Instead Reflect "Threshold Effect"**
  (Asymmetric Behavior About A Threshold Value)



Basic Axioms (1)

- Completeness or Complete Preorder
  - People have preferences over all $\underline{X}_i$
- Transitivity
  - If X_1 is preferred to X_2; and X_2 is preferred to X_3 ; Then X_1 is preferred to X_3
  - Caution: Assumed True for Individuals; <u>NOT</u> Groups

Example Intransitivity for Groups

Voter	Choice Order for Candidate		
	Left	Center	Right
Tom	1	2	3
Diana	3	1	2
Harriet	2	3	1

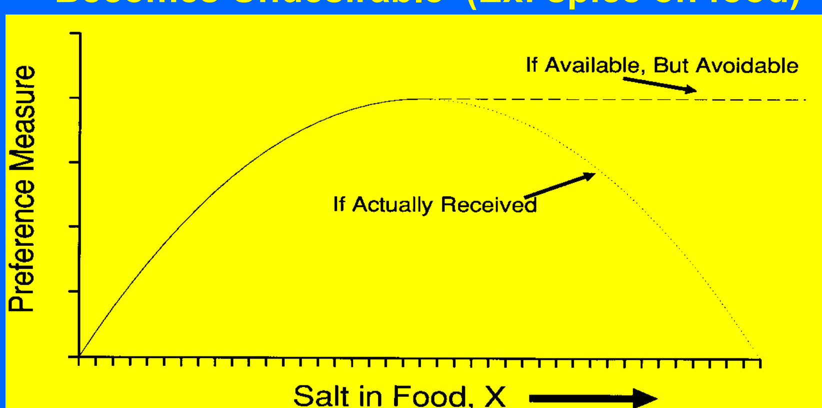
- Left against Center: Left wins 2:1
- Center against Right: Center wins 2:1
- So: Left is preferred to Right? Wrong!!!
- Left against Right: Right wins 2:1 !!!

Basic Axioms (2)

- **Monotonicity or Archimedean Principle**
  - For any $\underline{X}_i$ ($\underline{X}^* \geq \underline{X}_i \geq \underline{X}_*$) there is a w (0 < w < 1) such that $V(\underline{X}_i) = w\,V(\underline{X}^*) + (1 - w)\,V(\underline{X}_*)$
  - That is, More is Better (or Worse)

Another Preference Function

- **Represents a Benefit Which Ultimately Becomes Undesirable (Ex: spice on food)**



Consequence of V(X) Axioms

- Existence of $V(\underline{X})$
- Ranking Only

Strategic Equivalence of Many Forms of $V(\underline{X})$

Any Monotonic Transform of a V(X) is Still an Equivalent $V(\underline{X})$

For example:

$V(X_1, X_2) = X_1^2 X_2 = 2 \log(X_1) + \log(X_2)$

Value Functions