Cheat Sheet: *A Course in Behavioral Economics*, 3rd Ed.

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Chapter 2

Axiom 2.5 (Transitivity of weak preference) If $x \succcurlyeq y$ and $y \succcurlyeq z$, then $x \succcurlyeq z$ (for all x, y, z).

Axiom 2.6 (Completeness of weak preference) Either $x \succcurlyeq y$ or $y \succcurlyeq x$ (or both) (for all x, y).

Definition 2.11 (Indifference) $x \sim y$ if and only if $x \succcurlyeq y$ and $y \succcurlyeq x$.

Definition 2.16 (Strict preference) $x \succ y$ if and only if $x \succcurlyeq y$ and it is not the case that $y \succcurlyeq x$.

Definition 2.32 (Utility function) A function $u(\cdot)$ from the set of alternatives into the set of real numbers is a utility function representing preference relation $\succcurlyeq$ just in case $x \succcurlyeq y \Leftrightarrow u(x) \geqslant u(y)$ (for all x, y).

How to do proofs

Hint one: To establish a proposition of the form $x \rightarrow y$, assume what is to the left of the arrow (x)and derive what is to the right (y). If you want to establish a proposition of the form $x \leftrightarrow y$, do it both ways.

Hint two: If you want to establish a proposition of the form $\neg p$, assume the opposite of what you want to prove (p) and derive a contradiction.

Chapter 3

Definition 3.2 (Opportunity cost) $c(a_i) = \max\{u(a_1), u(a_2), \ldots, u(a_{i-1}), u(a_{i+1}), \ldots, u(a_n)\}$.

Proposition 3.25 (Expansion condition) If x is chosen from the menu $\{x, y\}$, assuming that you are not indifferent between x and y, you must not choose y from the menu $\{x, y, z\}$.

Chapter 4

Axiom 4.6 (Range of probabilities) $0 \leqslant \Pr(A) \leqslant 1$.

Axiom 4.7 (The EQUIPROBABILITY rule) If the outcome space $\{A_1, A_2, \ldots, A_n\}$ consists of n equally probable individual outcomes, then $\Pr(A_i) = 1/n$ (for all i).

Axiom 4.15 (The OR rule) If A and B are mutually exclusive, then $\Pr(A \vee B) = \Pr(A) + \Pr(B)$.

Axiom 4.18 (The EVERYTHING rule) The probability of the entire outcome space is equal to one.

Axiom 4.19 (The NOT rule) $\Pr(\neg A) = 1 - \Pr(A)$.

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Axiom 4.19 (The AND rule) If A and B are independent, then $\Pr(A\&B) = \Pr(A) * \Pr(B)$.

Definition 4.32 (Conditional probability) $\Pr(A \mid B) = \Pr(A\&B) / \Pr(B)$.

Proposition 4.34 (The general AND rule) $\Pr(A\&B) = \Pr(A \mid B) * \Pr(B)$.

Proposition 4.39 (The rule of total probability) $\Pr(D) = \Pr(D \mid B) * \Pr(B) + \Pr(D \mid \neg B) * \Pr(\neg B)$.

Proposition 4.42 (Bayes's rule)

$$\Pr(B \mid D) = \frac{\Pr(D \mid B) * \Pr(B)}{\Pr(D)} = \frac{\Pr(D \mid B) * \Pr(B)}{\Pr(D \mid B) * \Pr(B) + \Pr(D \mid \neg B) * \Pr(\neg B)}.$$

The heuristics-and-biases program

Heuristics are functional but imperfect rules of thumb that can be used when forming judgments:

- The **anchoring-and-adjustment** heuristic instructs you to pick an initial estimate (anchor) and adjust the initial estimate up or down (as you see fit) in order to come up with a final answer.
- The **representativeness** heuristic tells you to estimate the probability that some outcome was the result of a given process by reference to the degree to which the outcome is representative of that process.
- The **availability heuristic** makes you assess the probability that some event will occur based on the ease with which the event comes to mind.
- The **affect heuristic** gets you to assign probabilities to consequences based on how you feel about the thing they would be consequences of: the better you feel about it, the higher the probability of good consequences and the lower the probability of bad.

Because the heuristics are imperfect, they can lead to bias: systematic and predictable error.

Chapter 6

Definition 6.9 (Expected value)

$$EV(A_i) = \Pr(S_1) * C_{i1} + \Pr(S_2) * C_{i2} + \ldots + \Pr(S_n) * C_{in} = \sum_{j=1}^{n} \Pr(S_j)\, C_{ij}.$$

Definition 6.21 (Expected utility)

$$EU(A_i) = \Pr(S_1) * u(C_{i1}) + \Pr(S_2) * u(C_{i2}) + \ldots + \Pr(S_n) * u(C_{in}) = \sum_{j=1}^{n} \Pr(S_j)\, u(C_{ij}).$$

Chapter 7

Definition 7.30 (Value)

$$V(A_i) = \pi[\Pr(S_1)] * v(C_{i1}) + \pi[\Pr(S_2)] * v(C_{i2}) + \ldots + \pi[\Pr(S_n)] * v(C_{in}) = \sum_{j=1}^{n} \pi[\Pr(S_j)]\, v(C_{ij}).$$

Prospect theory

The central components of prospect theory are the value function (Figure 7.2) and the probability weighting function (Figure 7.6).

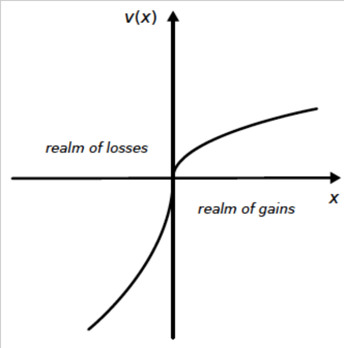

Figure 7.2: The value function

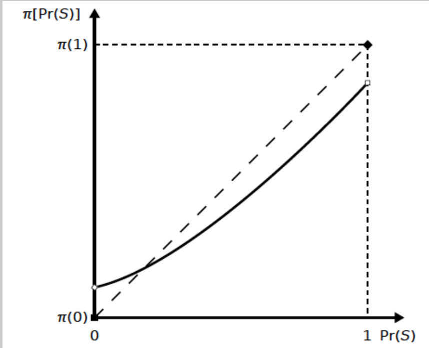

Figure 7.6: The probability-weighting function $\pi(\cdot)$

Chapter 8

Definition 8.10 (The delta function)

$$U^0(\mathbf{u}) = u_0 + \delta u_1 + \delta^2 u_2 + \delta^3 u_3 + \ldots = u_0 + \sum_{i=1}^{\infty} \delta^i u_i.$$

Discount factors vs. discount rates

To convert a discount factor δ into a discount rate r, or *vice versa*, apply one of the following formulas:

$$r = \frac{1-\delta}{\delta} \qquad \delta = \frac{1}{1+r}$$

Chapter 9

Definition 9.1 (The beta–delta function)

$$U^0(\mathbf{u}) = u_0 + \beta\delta u_1 + \beta\delta^2 u_2 + \beta\delta^3 u_3 + \ldots = u_o + \sum_{i=1}^{\infty} \beta\delta^i u_i.$$

Chapter 11

Social preferences

Preferences	Example functional form
Altruistic	$u(x,y) = 3/5\sqrt{x} + 2/5\sqrt{y}$
Envious	$u(x,y) = \sqrt{x} - \sqrt{y}$
Rawlsian	$u(x,y) = \min\left(\sqrt{x}, \sqrt{y}\right)$
Inequality-averse	$u(x,y) = -\left\lvert\sqrt{x} - \sqrt{y}\right\rvert$
Utilitarian	$u(x,y) = \sqrt{x} + \sqrt{y}$