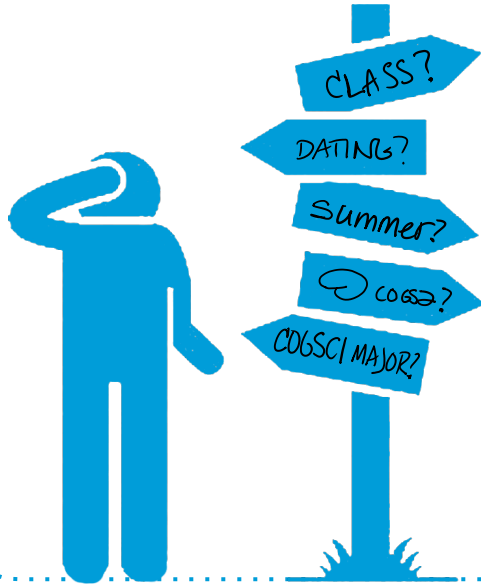




risky business dopamine and rewards

Mary ET Boyle, Department of Cognitive Science, UCSD

We face risk everyday.

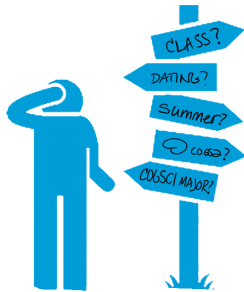


- Which class to take?
- Who to date?
- What's my major?
- What to do this summer?

We rarely know *in advance* and with certainty what **the outcome** of our decision will be.



We are forced to make tradeoffs between the pros and cons of the potential outcomes and their probability of happening.



- Which class to take?
- Who to date?
- What's my major?
- What to do this summer?

The *many* definitions of **risk**



**Lay person associates
risk with
hazards and lack of
familiarity.**

The *many* definitions of **risk**

**Business person
associates *risk*
as a challenge to
overcome.**



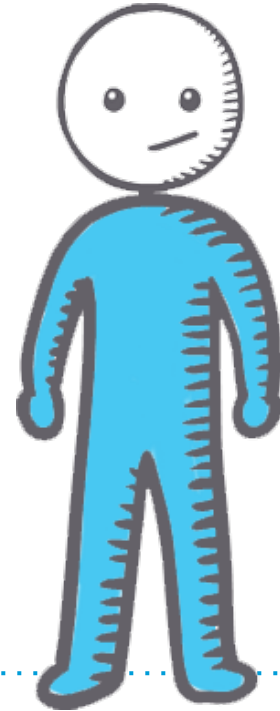
The *many* definitions of **risk**



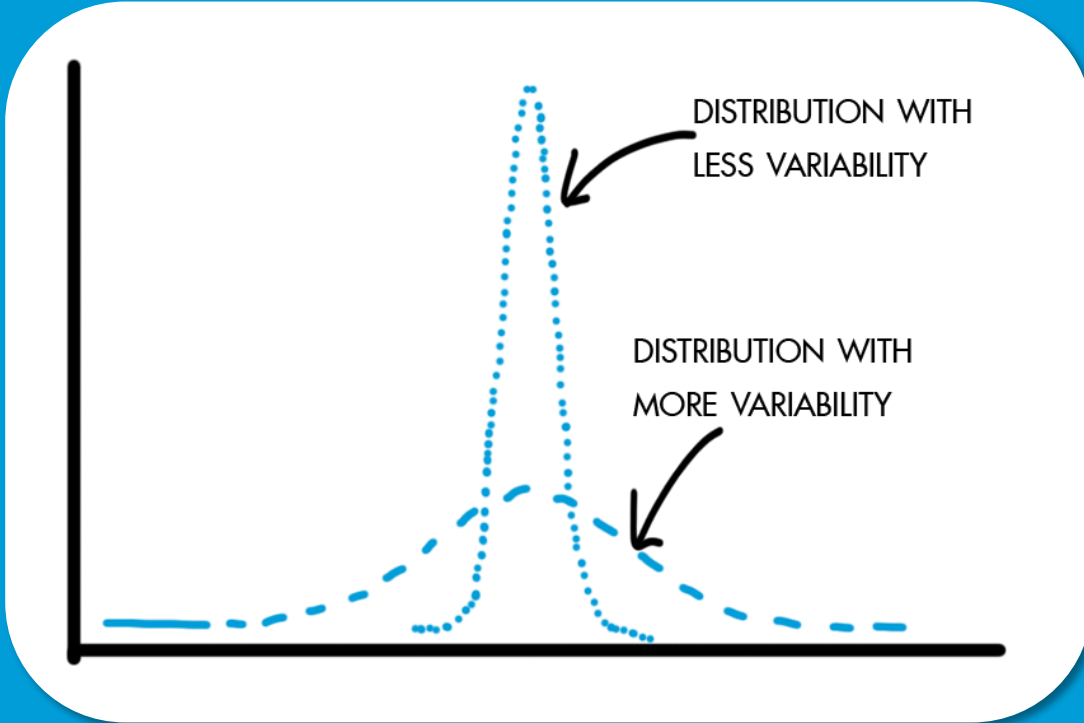
**Medical clinicians
associates *risk*
as exposure to loss or
harm.**

The *many* definitions of **risk**

**Decision economists
associate *risk* as
increasing with variance
in the probability
distribution.**



Decision economists
associate *risk* as
increasing with variance
in the probability
distribution.



Regardless of
whether a
potential loss is
involved.

Which is considered more risky?



Heads:
\$100



Tails:
\$0

\$50

Decisions under risk



Decision maker
knows with
precision the
probability
distribution of
possible outcomes.

Decisions under uncertainty

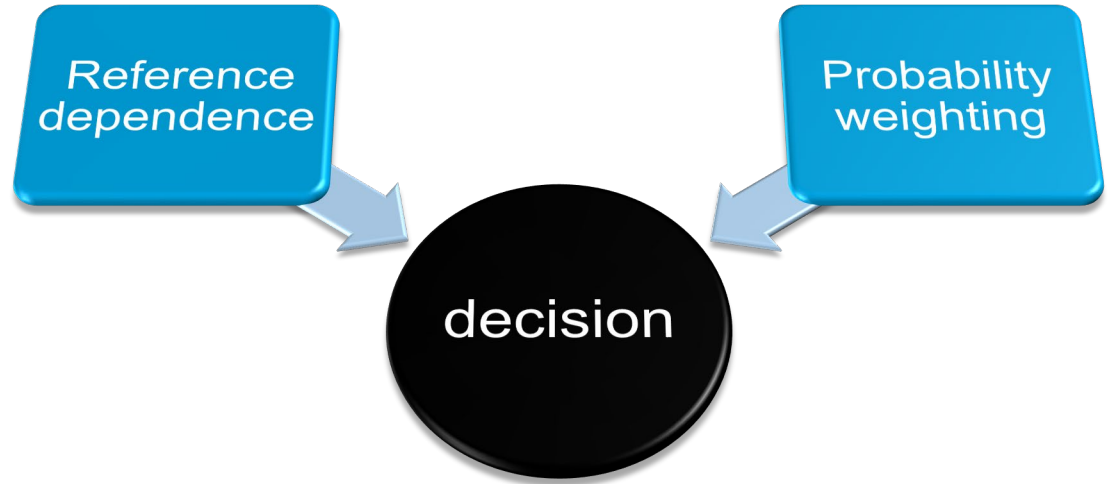


Decision maker
must assess the
probabilities of
potential outcomes
that are vague.

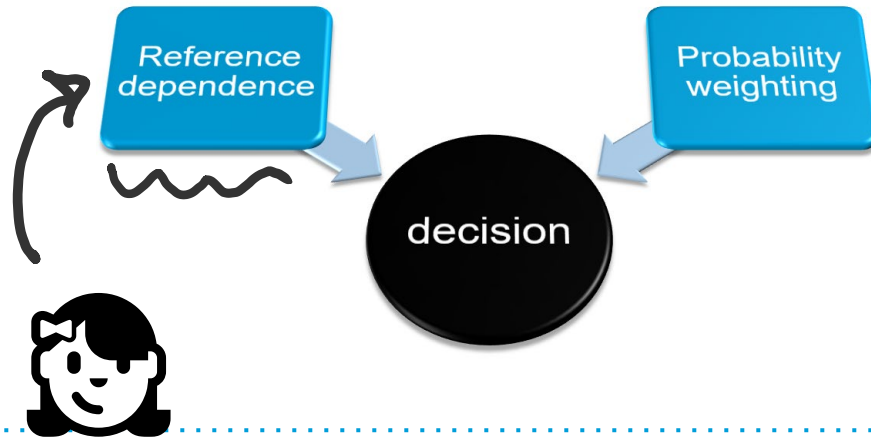
prospect theory



Models
what people
actually
choose
versus what
they
should
choose



reference dependence

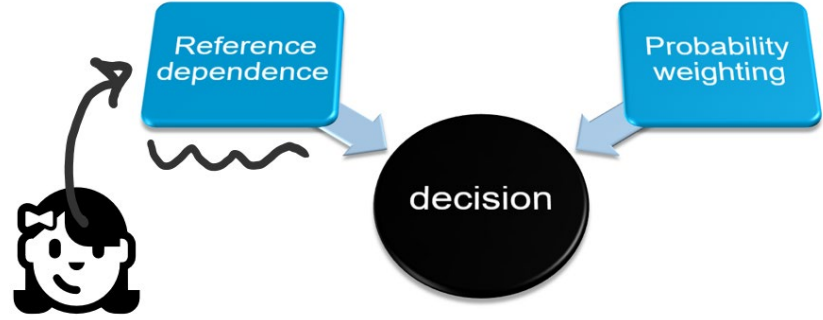


1. WHAT DOES IT MEAN?

2. WHY IS IT IMPORTANT?

3. HOW DOES IT INFLUENCE D-M?

SHAPES HOW WE THINK!

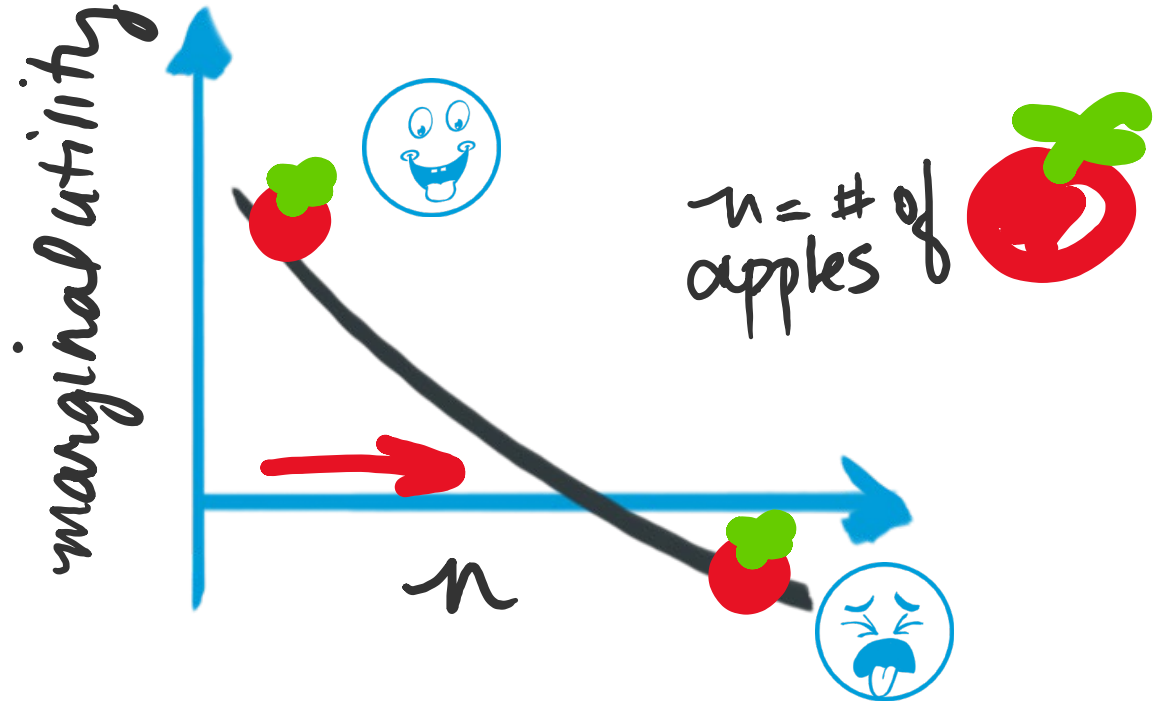


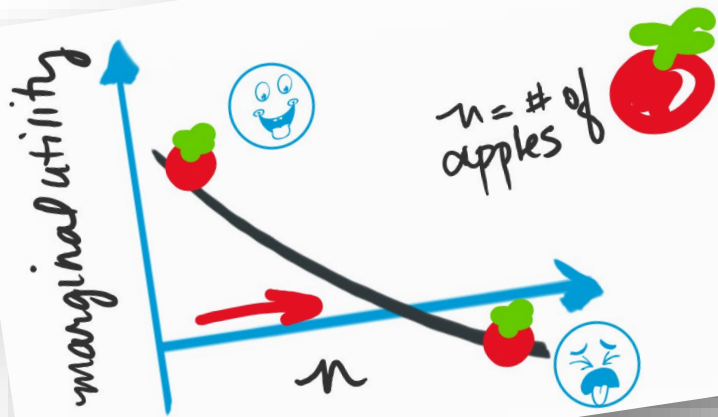
← BIG DECISIONS

bias
decisions

Law of Diminishing Marginal Utility

traditional
economics





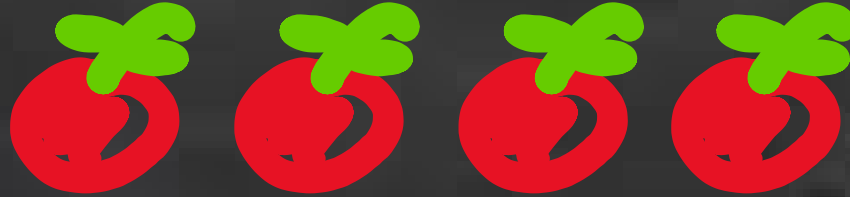
“ The **perceived value** of, or satisfaction gained from, a good to a consumer declines **with each additional** unit acquired or consumed.

....
if consumption continues, sickness (disutility) will result. ”

LAW HOLDS ONLY UNDER THE FOLLOWING CONDITIONS:

- (1) HOMOGENEOUS UNITS
- (2) NO CHANGE IN TASTES
- (3) CONTINUITY
- (4) SUITABLE SIZE UNITS
- (5) CONSTANT PRICES
- (6) INDIVISIBLE GOODS
- (7) RATIONAL CONSUMERS
- (8) ORDINARY GOODS
- (9) MARGINAL UTILITY OF MONEY NOT CONSTANT

(1) HOMOGENEOUS UNITS



All units of the commodity should be of the same weight and quality.

(2) NO CHANGE IN TASTES



- ☞ There should be no change in the tastes, habits, customs, fashions and income of the consumer.
- ☞ A change in any one of them will increase rather than diminish utility.

(3) CONTINUITY



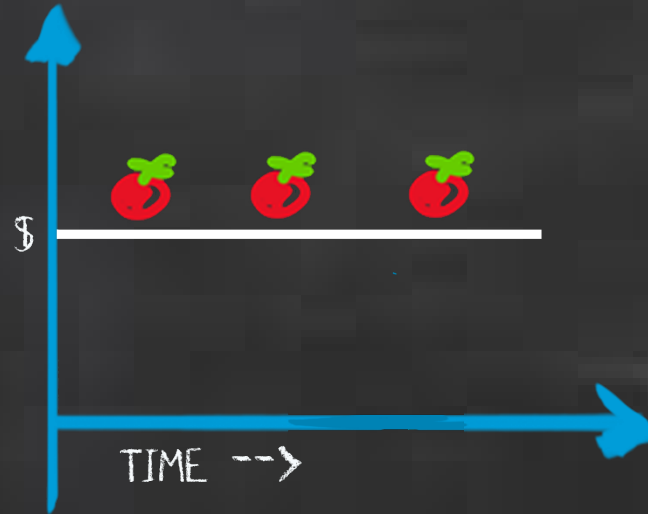
- ☞ There should be continuity in the consumption of the commodity.
- ☞ Units of the commodity should be consumed in succession at one particular time.

(4) SUITABLE SIZE UNITS



- 👉 Units of the commodity should be of a suitable size.
- 👉 Giving tiny apples to a hungry person would increase the utility of the subsequent apple!

(5) CONSTANT PRICES



- ☞ Prices of the different units and of the substitutes of the commodity should remain the same.

(6) INDIVISIBLE GOODS



☞ The commodity should not be indivisible.

(7) RATIONAL CONSUMERS



- ☞ The consumer should be one who acts rationally.
Not intoxicated or under the influence of a drug.

(8) ORDINARY GOODS

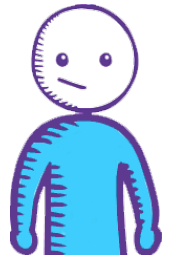
- ➔ Goods should be of an ordinary type.
- ➔ If they are commodities, like diamonds and jewels, or hobby goods like stamps, coins or paintings, the law does not apply.



(9) MARGINAL UTILITY OF MONEY NOT CONSTANT



➔ Marginal utility of money changes as a person acquires more and more money.



\$0
↓
\$ 1,000



\$100,000
↓
\$ 101,000

\$1,000

**traditional
economics
value of
money**

Which one feels **subjectively** greater?

1

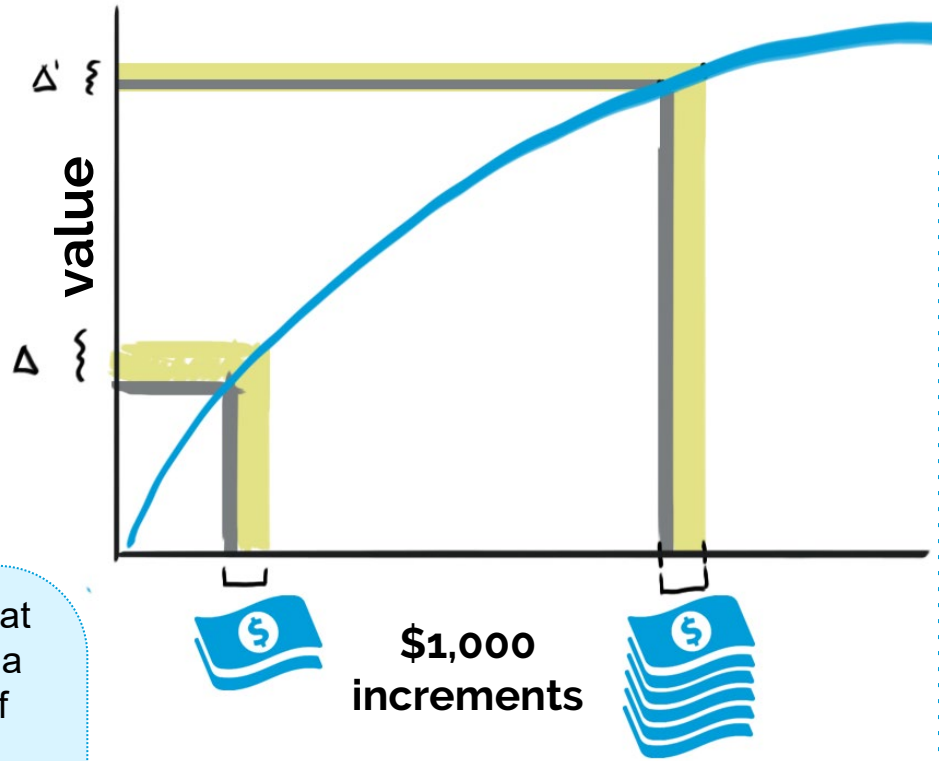
The “value” of an additional \$1,000 increment is influenced both the intrinsic value of the extra \$1,000 and by how many \$1,000’s of dollars the decision-maker has.

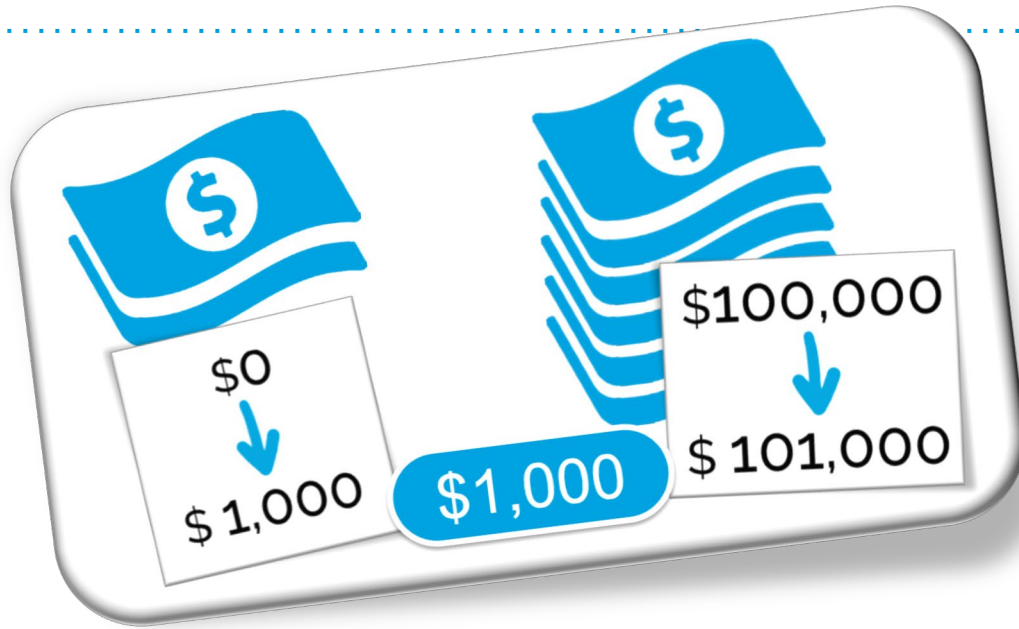
2

The graph shows the value of any given number of \$1,000. Note, that as the total number of \$1,000 dollars possessed increases, the value of an additional \$1,000 diminishes.

3

Thus if a person possesses no money at all, a \$1000 is of tremendous value. If a person possesses tens of thousands of dollars, then the value to them, of an additional \$1,000 would be low.





We don't process information
in **absolute** terms.