Preference relation is how we model a consumer's preferences. "What they like".

$x \succsim y$ "bundle x is at least as good as bundle y".

Once scoop of vanilla $(1, 0)$. Once scoop of chocolate $(0, 1)$.

$(1, 0) \succsim (0, 1)$, $(2, 0) \succsim (0, 2)$, $(2, 0) \succsim (0, 1)$.

$(1, 0) \succsim (0, 2)$.

Suppose finn doesn't care about flavor.

$(1, 0) \succsim (0, 1)$ and $(0, 1) \succsim (1, 0)$. In this case, we write $(1, 0) \sim (0, 1)$

If he is not indifferent:

$(1, 0) \succsim (0, 1)$ and not $(0, 1) \succsim (1, 0)$ then we write $(1, 0) \succ (0, 1)$

"Strictly prefers one scoop of vanilla to one scoop of chocolate".

1 Rational Preferences

Rationality.

A person is called rational if they have a preference relation $\succsim$ that meets three conditions.

Reflexive. For all bundles $\forall x \in X$**,** $x \succsim x$**.**

This is a technical assumption.

Complete. For all pairs of bundles. $\forall x, y \in X$, either $x \succsim y$ or $y \succsim x$ or **both**.

"For all pairs of bundles, the consumer has to be able to say something about their preferences." They can say "I am indifferent" they can't say "I don't know".

Technically completeness implies reflexive (to see this, take x, y to both be equal to x)

Transitive. For all triplets of bundles. $x, y, z \in X$**.**

If $x \succsim y$ and $y \succsim z$ then $x \succsim z$.

This would fail transitivity:

I like apple strictly better than bananas, bananas strictly better than oranges, and oranges strictly better than apples.

$a \succ b$ the same as $a \succsim b$, and not $b \succsim a$.

$b \succ o$ the same as $b \succsim o$ and not $o \succsim b$.

$o \succ a$ the same as $o \succsim a$ and not $a \succsim o$.

From lines 1 and 2: $a \succsim b$ and $b \succsim o$ but from line 3, not $a \succsim o$ which violates transitivity.

Transitivity implies that cycles like this will never happen. If cycles like this do happen, then preferences aren't consistent with the ability to make a choice. *What would this consumer possibly choose from the the set of* $\{a, b, o\}$*? They will never be satisfied .*

I like apple better than bananas, bananas better than oranges, and oranges better than apples.

Whenever we have complete and transitive preferences, we can use those preference to put the object/bundles in an "order". Possibly with ties.

$a \sim a, b \sim b, o \sim o$

$a \succ b, b \sim o$,$a \succ o$

We can turn this preference into an ordering:

1: a

2: b, o

Choice then, simply asks the consumer to choose the bundle in their budget that is also highest on this ranking.

10 a

8 b, o

5 c

3 d

"Preference scores". Pick the object/bundle that gets the highest preference score. This is really just a utility function. The utility "represents" the underlying preference relation.

For any preference relation, there are many utility functions that represent it.

100 a

51 b, o

50 c

30 d

Without any further structure. The preference relation is purely "ordinal" it tells us how things compare (is one better than the other) but "how much" better one thing is than another (it's not a cardinal comparison).

Know the assumptions.

Understand that the utility function is simply a mathematical representation of an underlying preference relation that is used for **our** convenience as economists.

1.1 Choice and Preferences

How do we turn preferences into choices?

Choice is a "selection" from a budget set. It is what the consumer wants from the set B. They can say they want multiple things if they are indifferent between several options, but like all those options better than the rest.

From B, chose an object that is at least as good as everything else in B.

$C(B) = \{x | x \in B \,\&\, \text{for all } y \in B, x \succsim y\}$

If I choose x from B, I have to like x at least as much as everything else in B.

a

b, o

c

d

$C(\{a,b,o,c,d\}) = \{a\}$

$C(\{b,o,c,d\}) = \{b,o\}$

Suppose we had the following non-transitive preference relation:

$a \succ b, b \succ c, c \succ a$

$C(\{a,b,c\}) = \emptyset$

This is why transitivity is so important.

1.2 Indifference Curves and Other Sets

These are sets induced by a preference relation. They can get graphed.

Indifference Curve (Indifference Set)

An indifference set, is a set of bundles in X such that all of those bundles are indifferent to each-other.

All of the bundles indifferent to the bundle x. "Contour set of x".

$\sim (x) = \{y | y \in X \& y \sim x\}$

The slope of an indifference curve is called the "**Marginal Rate of Substitution**" (MRS). It measures how the consumer is willing to trade between the two goods.

"How much of good two would you give up to get one more unit of good one."

The MRS at a bundle **is the slope of the indifference curve at that point.**

1.3 Indifference Curves Cannot Cross

The only thing we can infer about indifference curves under rational preferences is that two distinct indifference curves cannot cross.