Preferences and Indifference Curves

You are going to discover a very cool idea: that of drawing a map of a person's preferences. A preference map is based on the intuitively appealing idea that people can sort all the possible combinations of goods into three groups: preferred, not preferred, and indifferent. To make this idea more concrete, let's ask Lisa to tell us how she ranks various combinations of movies and soda.

Figure 9.3 shows part of Lisa's answer. She tells us that she currently sees 2 movies and buys 6 cases of soda a month at point *C*. She then lists all the combinations of movies and soda that she says are just as acceptable to her as her current situation. When we plot these combinations of movies and soda, we get the green curve in Fig. 9.3(a). This curve is the key element in a preference map and is called an indifference curve.

An **indifference curve** is a line that shows combinations of goods among which a consumer is *indifferent*. The indifference curve in Fig. 9.3(a) tells us that Lisa is just as happy to see 2 movies and buy 6 cases of soda a month at point *C* as she is to have the combination of movies and soda at point *G* or at any other point along the curve.

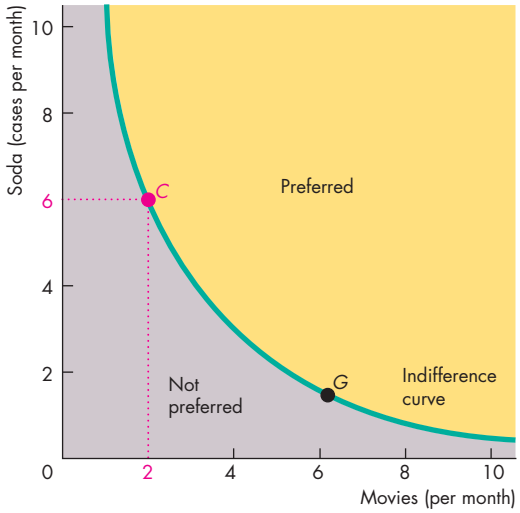
Lisa also says that she prefers all the combinations of movies and soda above the indifference curve in Fig. 9.3(a)—the yellow area—to those on the indifference curve. And she prefers any combination on the indifference curve to any combination in the gray area below the indifference curve.

The indifference curve in Fig. 9.3(a) is just one of a whole family of such curves. This indifference curve appears again in Fig. 9.3(b), labeled I_1. The curves labeled I_0 and I_2 are two other indifference curves. Lisa prefers any point on indifference curve I_2 to any point on indifference curve I_1, and she prefers any point on I_1 to any point on I_0. We refer to I_2 as being a higher indifference curve than I_1 and I_1 as being higher than I_0.

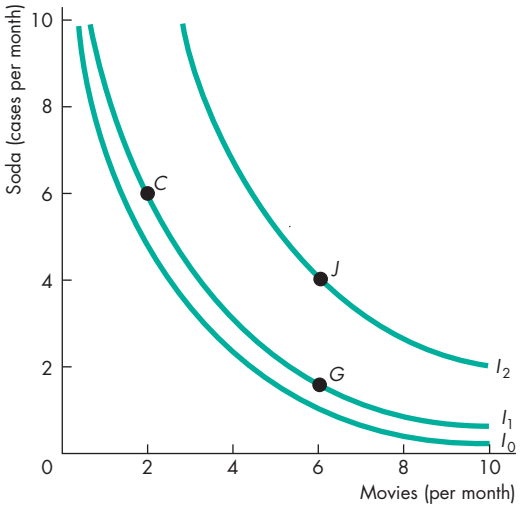
A preference map is a series of indifference curves that resemble the contour lines on a map. By looking at the shape of the contour lines on a map, we can draw conclusions about the terrain. Similarly, by looking at the shape of the indifference curves, we can draw conclusions about a person's preferences.

Let's learn how to "read" a preference map.

FIGURE 9.3 A Preference Map



(a) An indifference curve



(b) Lisa's preference map

Part (a) shows one of Lisa's indifference curves. She is indifferent between point *C* (with 2 movies and 6 cases of soda) and all other points on the green indifference curve, such as *G*. She prefers points above the indifference curve (in the yellow area) to points on it, and she prefers points on the indifference curve to points below it (in the gray area). Part (b) shows three of the indifference curves—I_0, I_1, and I_2—in Lisa's preference map. She prefers point *J* to point *C* or *G*, and she prefers all the points on I_2 to those on I_1.

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Marginal Rate of Substitution

The **marginal rate of substitution** (*MRS*) is the rate at which a person will give up good *y* (the good measured on the *y*-axis) to get an additional unit of good *x* (the good measured on the *x*-axis) while remaining indifferent (remaining on the same indifference curve). The magnitude of the slope of an indifference curve measures the marginal rate of substitution.

- If the indifference curve is *steep*, the marginal rate of substitution is *high*. The person is willing to give up a large quantity of good *y* to get an additional unit of good *x* while remaining indifferent.
- If the indifference curve is *flat*, the marginal rate of substitution is *low*. The person is willing to give up a small amount of good *y* to get an additional unit of good *x* while remaining indifferent.

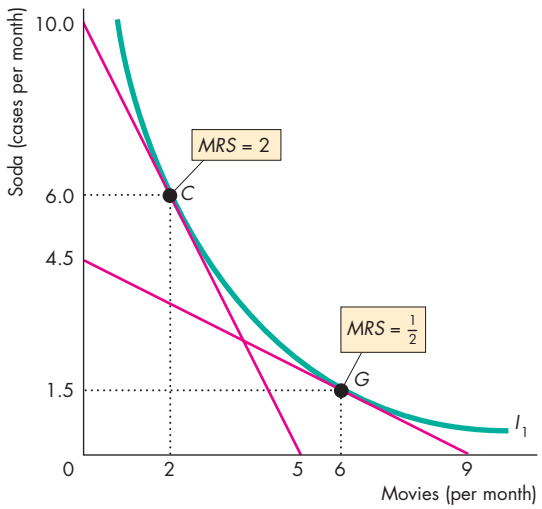
Figure 9.4 shows you how to calculate the marginal rate of substitution.

At point *C* on indifference curve I_1, Lisa buys 6 cases of soda and sees 2 movies. Her marginal rate of substitution is the magnitude of the slope of the indifference curve at point *C*. To measure this magnitude, place a straight line against, or tangent to, the indifference curve at point *C*. Along that line, as the quantity of soda decreases by 10 cases, the number of movies increases by 5—or 2 cases per movie. At point *C*, Lisa is willing to give up soda for movies at the rate of 2 cases per movie—a marginal rate of substitution of 2.

At point *G* on indifference curve I_1, Lisa buys 1.5 cases of soda and sees 6 movies. Her marginal rate of substitution is measured by the slope of the indifference curve at point *G*. That slope is the same as the slope of the tangent to the indifference curve at point *G*. Now, as the quantity of soda decreases by 4.5 cases, the number of movies increases by 9—or 1/2 case per movie. At point *G*, Lisa is willing to give up soda for movies at the rate of 1/2 case per movie—a marginal rate of substitution of 1/2.

As Lisa sees more movies and buys less soda, her marginal rate of substitution diminishes. Diminishing marginal rate of substitution is the key assumption about preferences. A **diminishing marginal rate of substitution** is a general tendency for a person to be willing to give up less of good *y* to get one more unit of good *x*, while at the same time remaining indifferent as the quantity of *x* increases. In Lisa's case, she is less willing to give up soda to see one more movie as the number of movies she sees increases.

FIGURE 9.4 The Marginal Rate of Substitution



The magnitude of the slope of an indifference curve is called the marginal rate of substitution (*MRS*). The red line at point *C* tells us that Lisa is willing to give up 10 cases of soda to see 5 movies. Her marginal rate of substitution at point *C* is 10 divided by 5, which equals 2. The red line at point *G* tells us that Lisa is willing to give up 4.5 cases of soda to see 9 movies. Her marginal rate of substitution at point *G* is 4.5 divided by 9, which equals 1/2.

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Your Diminishing Marginal Rate of Substitution

Think about your own diminishing marginal rate of substitution. Imagine that in a week, you drink 10 cases of soda and see no movies. Most likely, you are willing to give up a lot of soda so that you can see just 1 movie. But now imagine that in a week, you buy 1 case of soda and see 6 movies. Most likely, you will now not be willing to give up much soda to see a seventh movie. As a general rule, the greater the number of movies you see, the smaller is the quantity of soda you are willing to give up to see one additional movie.

The shape of a person's indifference curves incorporates the principle of the diminishing marginal rate of substitution because the curves are bowed toward the origin. The tightness of the bend of an indifference curve tells us how willing a person is to substitute one good for another while remaining indifferent. Let's look at some examples that make this point clear.

Degree of Substitutability

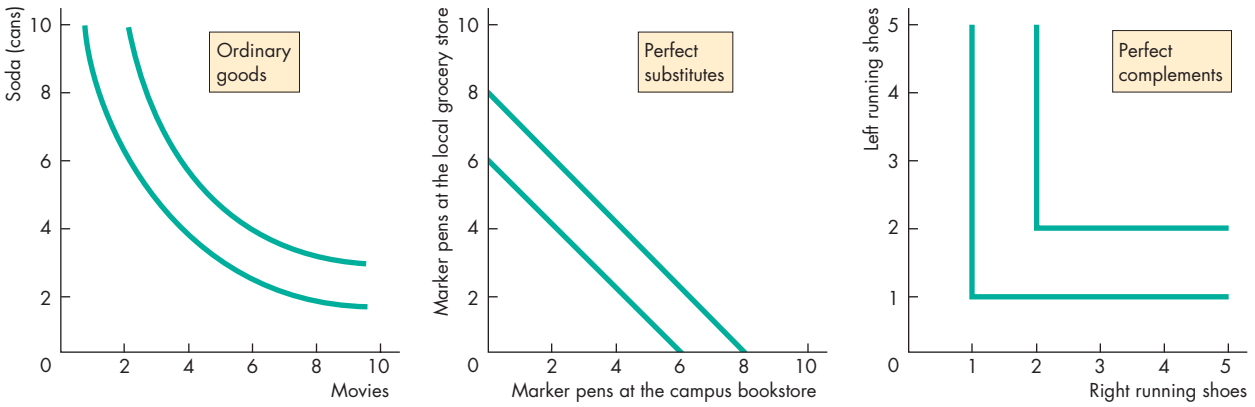
Most of us would not regard movies and soda as being *close* substitutes, but they are substitutes. No matter how much you love soda, some increase in the number of movies you see will compensate you for being deprived of a can of soda. Similarly, no matter how much you love going to the movies, some number of cans of soda will compensate you for being deprived of seeing one movie. A person's indifference curves for movies and soda might look something like those for most ordinary goods and services shown in Fig. 9.5(a).

Close Substitutes Some goods substitute so easily for each other that most of us do not even notice which we are consuming. The different brands of marker pens and pencils are examples. Most people don't care which brand of these items they use or where they buy them. A marker pen from the campus bookstore is just as good as one from the local grocery store. You would be willing to forgo a pen from the campus store if you could get one more pen from the local grocery store. When two goods are perfect substitutes, their indifference curves are straight lines that slope downward, as Fig. 9.5(b) illustrates. The marginal rate of substitution is constant.

Complements Some goods do not substitute for each other at all. Instead, they are complements. The complements in Fig. 9.5(c) are left and right running shoes. Indifference curves of perfect complements are L-shaped. One left running shoe and one right running shoe are as good as one left shoe and two right shoes. Having two of each is preferred to having one of each, but having two of one and one of the other is no better than having one of each.

The extreme cases of perfect substitutes and perfect complements shown here don't often happen in reality, but they do illustrate that the shape of the indifference curve shows the degree of substitutability between two goods. The closer the two goods are to perfect substitutes, the closer the marginal rate of substitution is to being constant (a straight line), rather than diminishing (a curved line). Indifference

FIGURE 9.5 The Degree of Substitutability



(a) Ordinary goods **(b) Perfect substitutes** **(c) Perfect complements**

The shape of the indifference curves reveals the degree of substitutability between two goods. Part (a) shows the indifference curves for two ordinary goods: movies and soda. To drink less soda and remain indifferent, one must see more movies. The number of movies that compensates for a reduction in soda increases as less soda is consumed. Part (b) shows the indifference curves for two perfect substitutes. For the consumer to remain indifferent, one fewer marker pen from the local grocery store must be replaced by one extra marker pen from the campus bookstore. Part (c) shows two perfect complements—goods that cannot be substituted for each other at all. Having two left running shoes with one right running shoe is no better than having one of each. But having two of each is preferred to having one of each.

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"With the pork I'd recommend an Alsatian white or a Coke."

curves for poor substitutes are tightly curved and lie between the shapes of those shown in Figs. 9.5(a) and 9.5(c).

As you can see in the cartoon, according to the waiter's preferences, Coke and Alsatian white wine are perfect substitutes and each is a complement of pork. We hope the customers agree with him.

REVIEW QUIZ

1. What is an indifference curve and how does a preference map show preferences?
2. Why does an indifference curve slope downward and why is it bowed toward the origin?
3. What do we call the magnitude of the slope of an indifference curve?
4. What is the key assumption about a consumer's marginal rate of substitution?

You can work these questions in Study Plan 9.2 and get instant feedback. myeconlab

The two components of the model of household choice are now in place: the budget line and the preference map. We will now use these components to work out a household's choice and to predict how choices change when prices and income change.

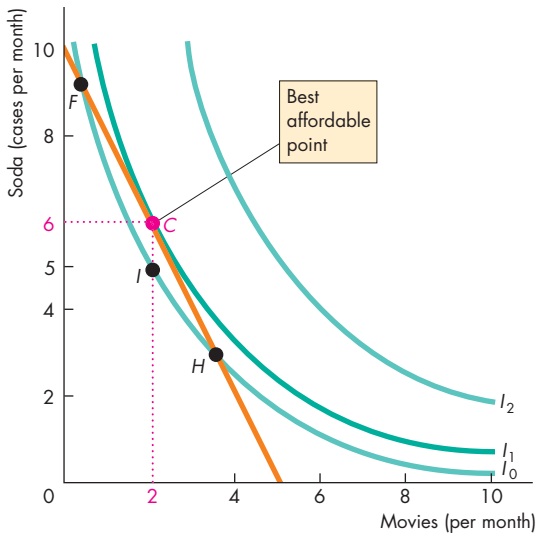
Predicting Consumer Choices

We are now going to predict the quantities of movies and soda that Lisa chooses to buy. We're also going to see how these quantities change when a price changes or when Lisa's income changes. Finally, we're going to see how the *substitution effect* and the *income effect*, two ideas that you met in Chapter 3 (see p. 57), guarantee that for a normal good, the demand curve slopes downward.

Best Affordable Choice

When Lisa makes her best affordable choice of movies and soda, she spends all her income and is on her highest attainable indifference curve. Figure 9.6 illustrates this choice: The budget line is from Fig. 9.1 and the indifference curves are from Fig. 9.3(b). Lisa's best affordable choice is 2 movies and 6 cases of soda at point *C*—the *best affordable point*.

FIGURE 9.6 The Best Affordable Choice



Lisa's best affordable choice is at point *C*, the point on her budget line and on her highest attainable indifference curve. At point *C*, Lisa's marginal rate of substitution between movies and soda (the magnitude of the slope of the indifference curve I_1) equals the relative price of movies and soda (the slope of the budget line).

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