

## Lesson 37: Conditional Probability

### Conditional Probability

The probability we assign to an event can change if we know that some other even has occurred. This idea is the key to many applications of probability. Conditional probability is generally solved intuitively – a two way table is an easy way to solve conditional probability questions.

Notation: The probability of B given that A occurred is  $P(B | A)$  .

### Daily Data Collection

Each student will describe their gender and whether they have ever had any piercing.

	Pierced – Yes	Pierced - No	Total
Boys			
Girls			
Total			

Find the following:

$P(\text{pierced} | \text{female})$

$P(\text{female} | \text{pierced})$

### Daily Data Collection

Each student will describe their gender and what hand they use to write.

	Right	Left	Total
Boys			
Girls			
Total			

Find the following:

$P(\text{left} | \text{female})$

$P(\text{male} | \text{right})$

## CHECK YOUR UNDERSTANDING

Students at the University of New Harmony received 10,000 course grades last semester. The two-way table below breaks down these grades by which school of the university taught the course. The schools are Liberal Arts, Engineering and Physical Sciences, and Health and Human Services.

School	Grade Level		
	A	B	Below B
Liberal Arts	2,142	1,890	2,268
Engineering and Physical Sciences	368	432	800
Health and Human Services	882	630	588

(This table is based closely on grade distributions at an actual university, simplified a bit for clarity.)<sup>10</sup>

College grades tend to be lower in engineering and the physical sciences (EPS) than in liberal arts and social sciences (which includes Health and Human Services). Consider the two events  $E$ : the grade comes from an EPS course, and  $L$ : the grade is lower than a B.

1. Find  $P(L)$ . Interpret this probability in context.
2. Find  $P(E | L)$  and  $P(L | E)$ . Which of these conditional probabilities tells you whether this college's EPS students tend to earn lower grades than students in liberal arts and social sciences? Explain.