Another Example

- Pew Research Center, Aug. 11-19, 2009. Asked a random sample of 2,010 adults nationwide:
- “Do you strongly favor, favor, oppose, or strongly oppose allowing gay and lesbian couples to marry legally?”

Another Example

n=2,010 randomly selected adults views on allowing gay and lesbian couples to legally marry.

```
<table>
<thead>
<tr>
<th>Strongly Favor/Favor</th>
<th>Strongly Oppose/Oppose</th>
<th>Unsure</th>
</tr>
</thead>
<tbody>
<tr>
<td>39%</td>
<td>53%</td>
<td>8%</td>
</tr>
</tbody>
</table>
```

Another Example

- 90% confidence interval for $p$, the population proportion who strongly oppose/oppose.
- 90% confidence $z^* = 1.645$
Another Example

\[ \hat{p} = 0.53 \quad \text{SE}(\hat{p}) = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.0111 \]

90% confidence \[ z^* = 1.645 \]

\[ 0.53 - 1.645(0.0111) \text{ to } 0.53 + 1.645(0.0111) \]

0.53 - 0.018 to 0.53 + 0.018

0.512 to 0.548

Another Example

• Note that according to this confidence interval, a majority of all adults (i.e. more than 50% of all adults) in the U.S. strongly oppose or oppose allowing gay and lesbian couples to marry legally.

What Sample Size?

• Conservative Formula

– The sample size to be 95% confident that \( \hat{p} \), the sample proportion, will be within ME of the population proportion, \( p \).

\[ n = \frac{1}{ME^2} \]
Example
• Suppose we want to be 95% confident that our sample proportion will be within 0.01 of the population proportion.

\[ n = \frac{1}{ME^2} \Rightarrow n = \frac{1}{(0.01)^2} = 10,000 \]

Sample Size
• More general formula for sample size.

\[ n = \frac{(z*)^2 \hat{p}(1 - \hat{p})}{ME^2} \]

Sample Size
• Gay and lesbian marriage example. ME = 0.01 with 95% confidence.

\[ n = \frac{(z*)^2 \hat{p}(1 - \hat{p})}{ME^2} = \frac{(1.96)^2(0.53)(0.47)}{(0.01)^2} \]
\[ n = 9,570 \]