This presentation shows transformations of slides from the traditional to the assertion-evidence design

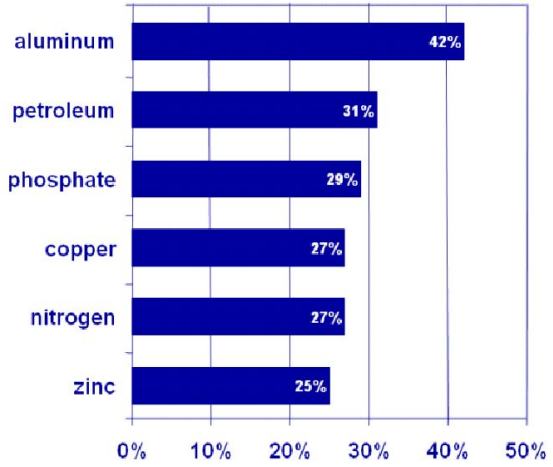
Before

U.S. Resource Use

- The United States uses:
  - 42% of all the aluminum produced worldwide
  - 31% of all the petroleum
  - 29% of all the phosphate
  - 27% of all the copper
  - 27% of the nitrogen
  - 25% of the zinc
- Approximately 30% of all res

After

Although the U.S. has 5% of the world's population, we use an average of 30% of all resources



United States use of specific resources
(percentage of worldwide use)

A First Step Towards Automatic PDE Code Verification

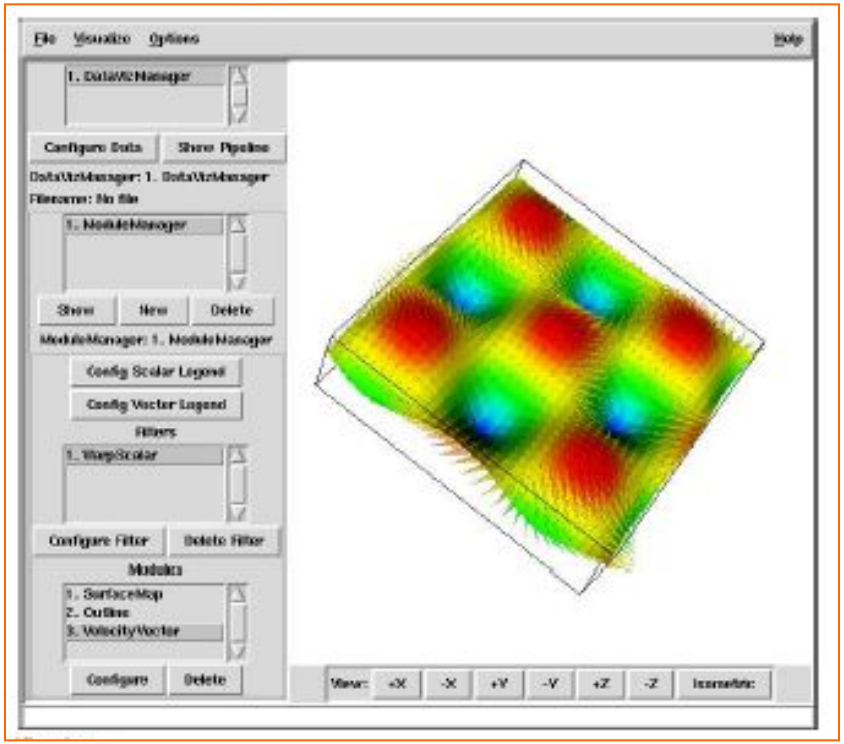
Hans P[illegible]tangen
Ola Skavhaug

Simula Research Laboratory, Norway
University of Oslo, Norway

Before

A First Step Towards Automatic Verification of PDE Code

Hans Petter Langtangen
Ola Skaghaug



Simula Research Laboratory
Oslo, Norway

The Core of This Talk

- Scientists are on the move from programming complied languages (Fortran, C/C++) to environments like Matlab
- Why? Matlab is easier to use and feels more productive
- We can extend the Matlab way of working" far beyond Matlab

Before

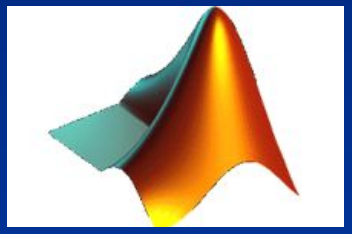
This presentation shows the evolution from a manual environment to one that is automated

Fortran 77

C++

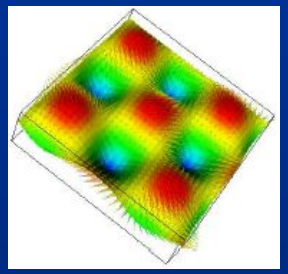
manual

MATLAB



somewhat manual

Python



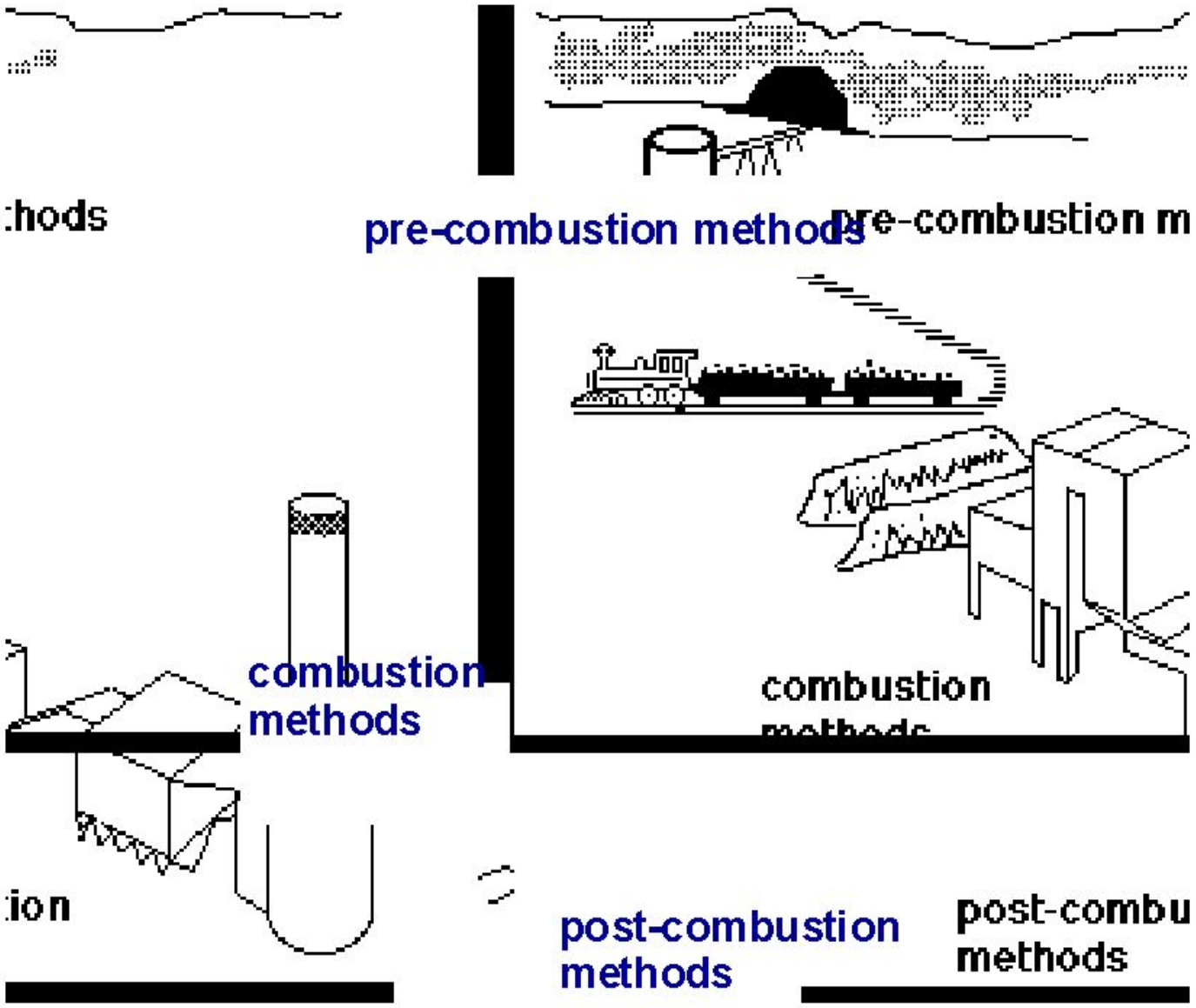
automated

Outline

- Introduction
- Background
- Pre-Combustion methods
  - Coal switching
  - Coal cleaning
- Combustion methods
  - Atmospheric fluidized bed
- Post-Combustion methods
  - Absorption
  - Adsorption
- Conclusions
- Acknowledgments
- Questions

Before

This presentation compares methods for reducing emissions of sulfur dioxide from coal power plants

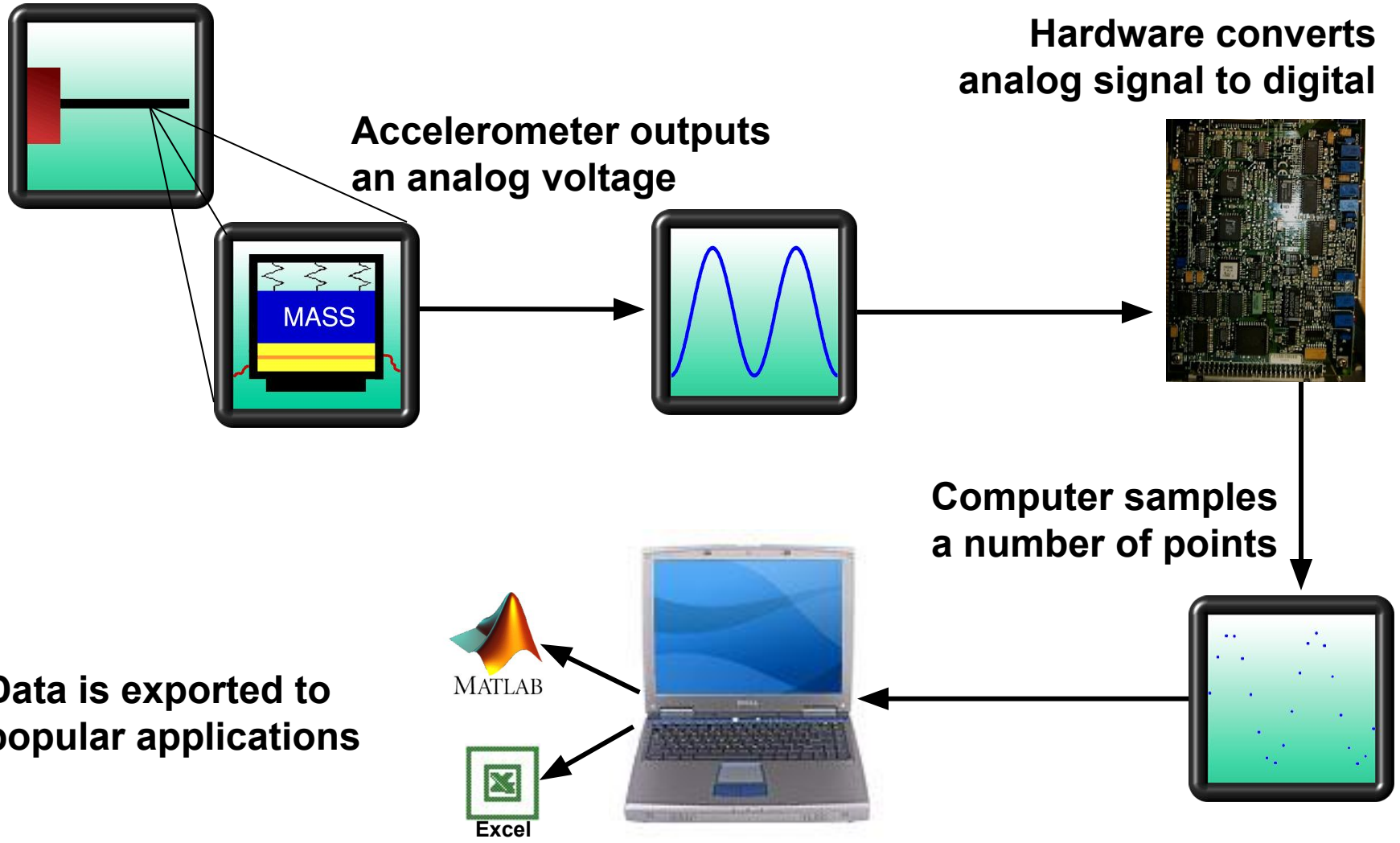


Digital Acquisition System

- Accelerometer outputs an analog voltage
- Hardware converts analog signal to digital
- Computer samples a number of points
- Data is exported to popular applications
  - o Microsoft Excel
  - o Matlab

Before

Converting an analog signal to a digital signal requires a sampling of the signal



Validation and Verification

Validation:

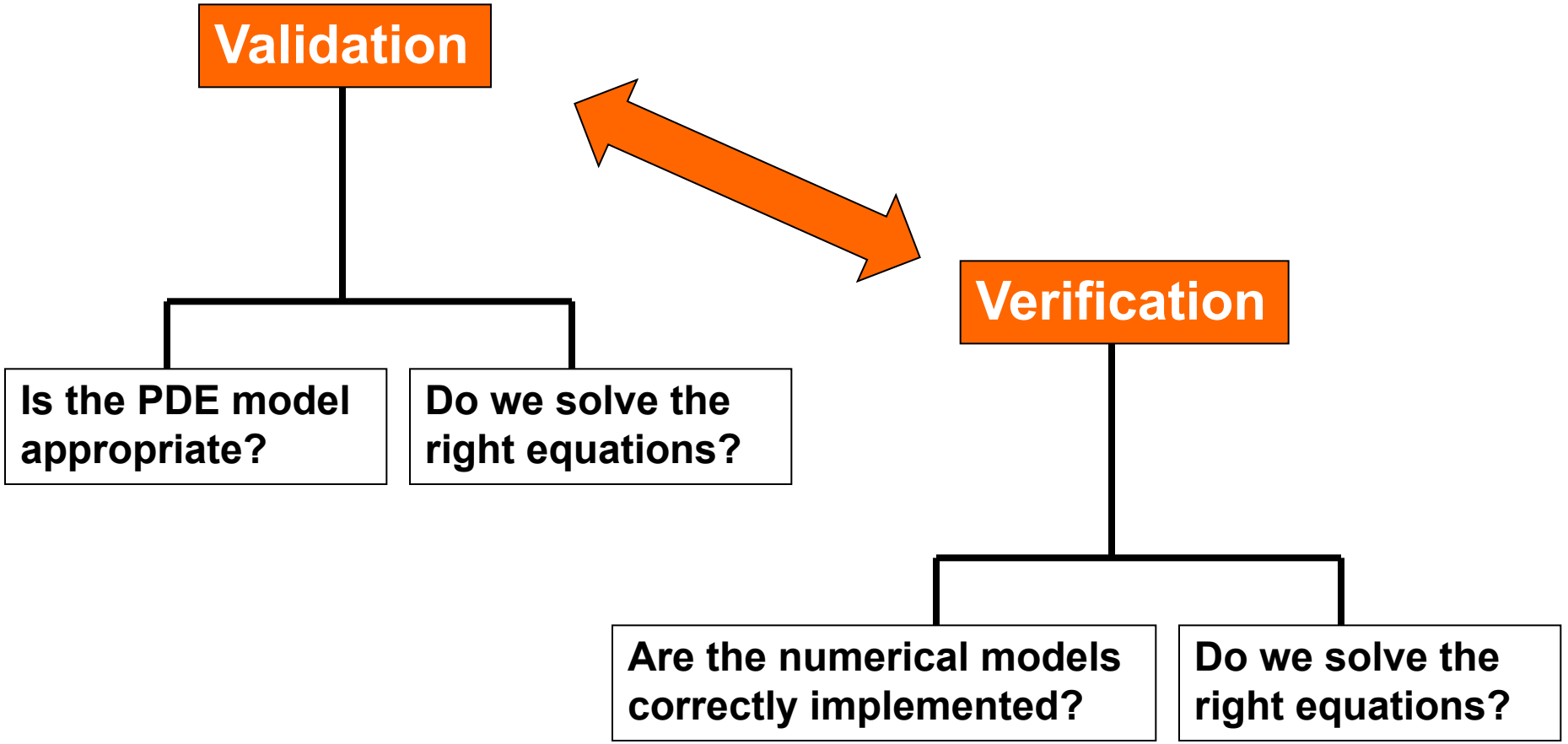
- Is the PDE model appropriate?
- Or: Do we solve the right equations?
- Core interest among scientists and engineers

Verification:

- Are the numerical methods correctly implemented?
- Or: Do we solve the equations right?
- Attracts much less interest than validation
- Validation requires successful verification

Before

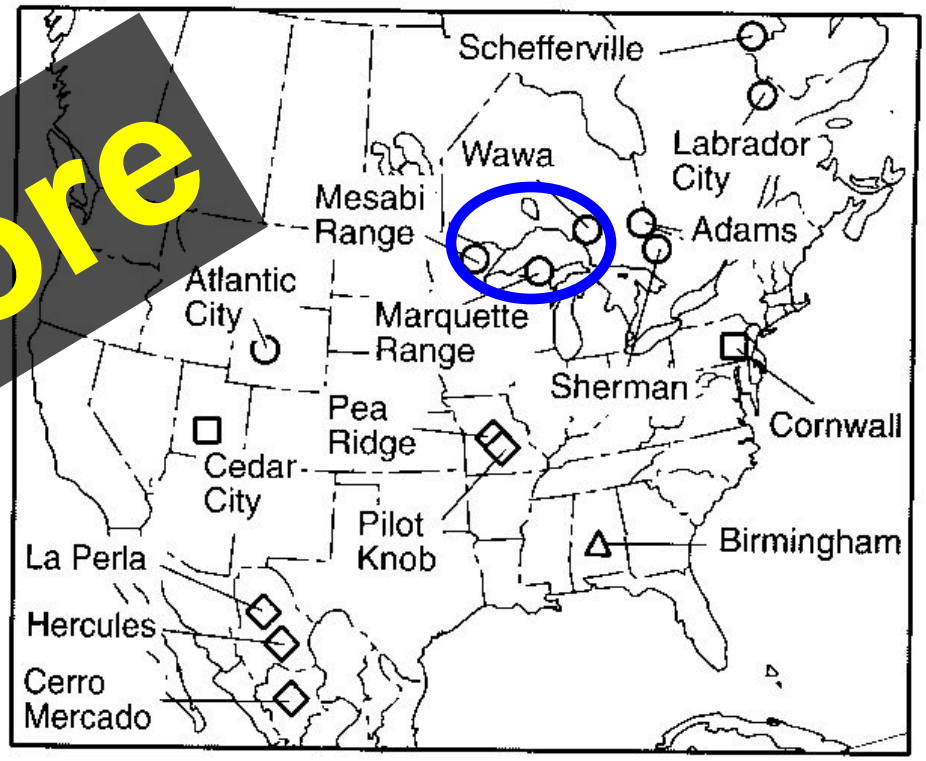
Although researchers give validation more attention, validation requires successful verification



Iron

- An abundant metal, makes up 5.6% of earth's crust
- Properties:
  - shaped, sharpened, welded
  - strong, durable
- Accounts for >95% of metals used
- Iron ores discovered in 1844 in Michigan's Upper Peninsula
- Soon found other ores in upper Wisconsin and Minnesota

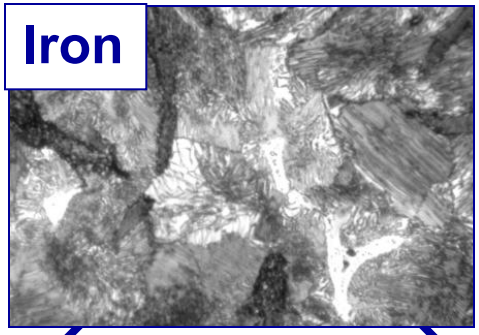
Iron Ore Distribution

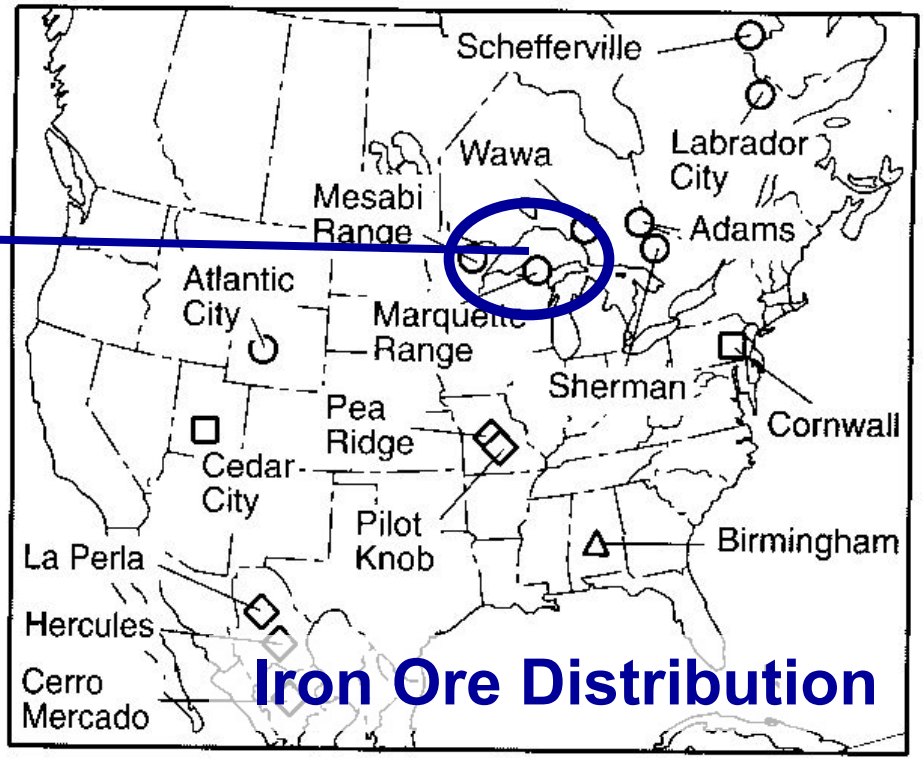


Before

Kesler 1994

Iron ores make up 5.6% of the earth's crust and account for 95% of the metals used





Is strong and durable

Can be shaped, sharpened, and welded

[Kesler 1994]

Students learning from the transformed slide scored higher on an identical test question

Q: How abundant is iron in the earth's crust?

Iron

- An abundant metal, makes up 5.6% of earth's crust
- Properties:
  - shaped, sharpened, welded
  - strong, durable
- Accounts for >95% of metals used
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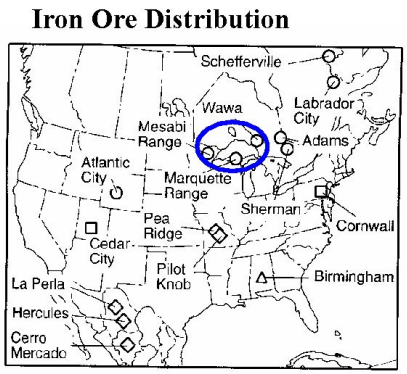
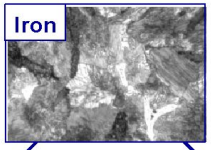
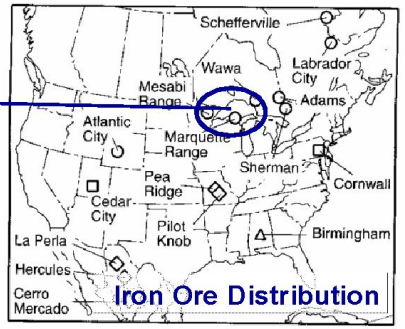


Kesler 1994

Led to 59% recall

Iron ores make up 5.6% of the earth's crust and account for 95% of the metals used





Is strong and durable

Can be shaped, sharpened, and welded

[Kesler 1994]

Led to 77% recall

$p < 0.001$

[Alley et al., 2006]

U.S. Resource Use

- The United States uses:
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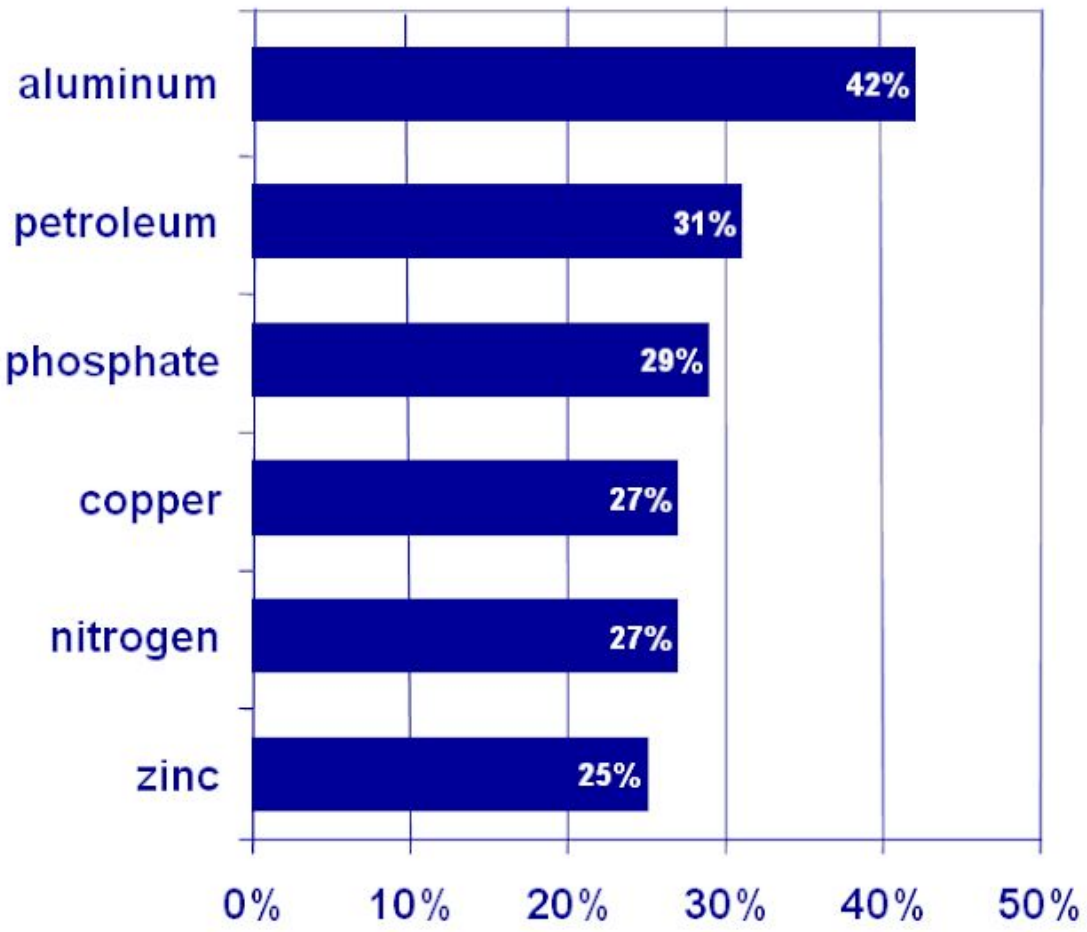
- Approximately 30% of all resources worldwide

Before

Although the U.S. has 5% of the world's population, we use an average of 30% of all resources



United States use of specific resources (percentage of worldwide use)

Students learning from the transformed slide scored higher on an identical test question

Q: Percentage of world's resources that the U.S. uses?

U.S. Resource Use

- The United States uses:
  - 42% of all the aluminum produced worldwide
  - 31% of all the petroleum
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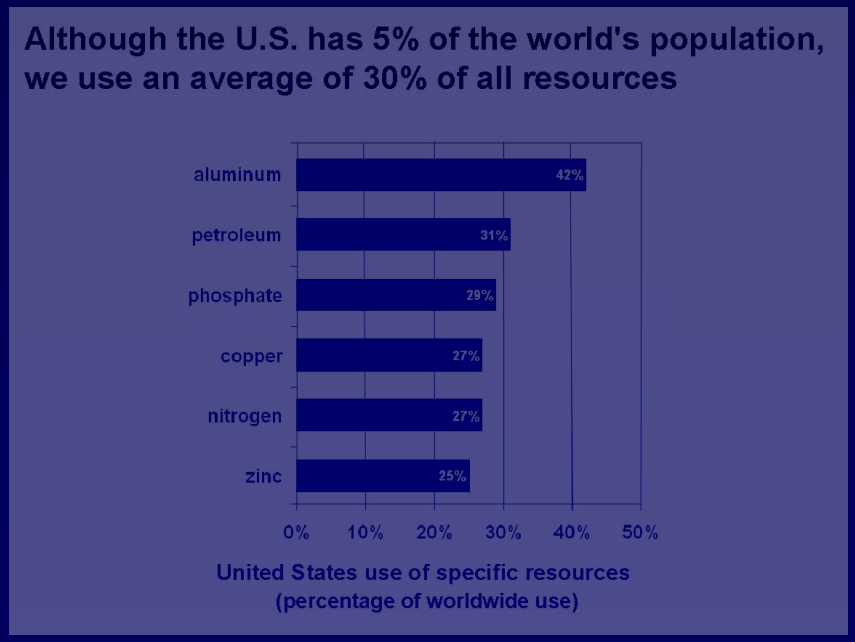
  - 27% of the nitrogen
  - 25% of the zinc
- Approximately 30% of all resources worldwide

Led to 71% correct



Led to 82% correct

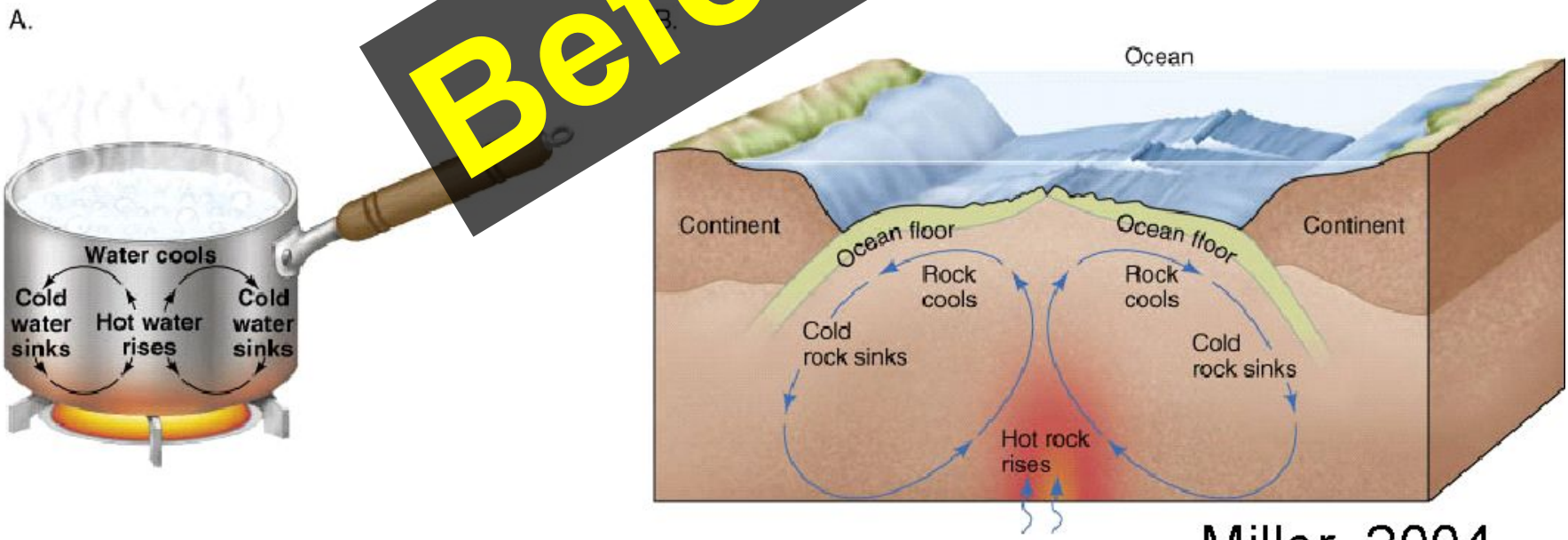
$p < 0.025$

[Alley et al., 2006]

Why do the plates move?

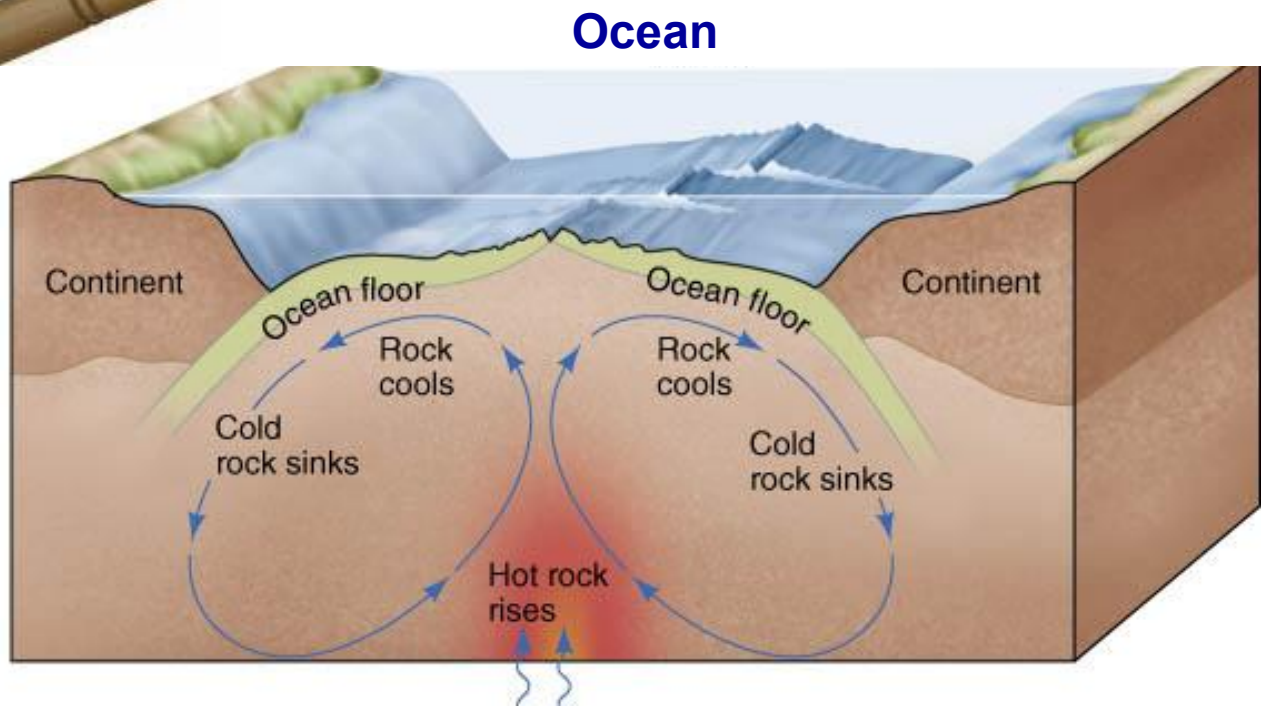
- Convection
- Heat is from nuclear fission.
  - Uranium, Thorium, are large "unstable" atoms which break down to produce, smaller atoms, heat, and radioactivity

Before



Miller, 2004

Plates move because of convection caused by heat from decay of radioactive elements in the mantle



Uranium and Thorium are large "unstable" atoms

break down to produce smaller atoms, heat, and radioactivity

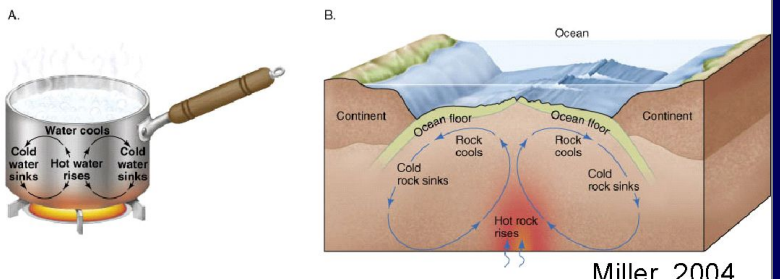
[Miller, 2004]

Students learning from the transformed slide scored higher on an identical test question

Q: Heat source for movement of lithospheric plates?

Why do the plates move?

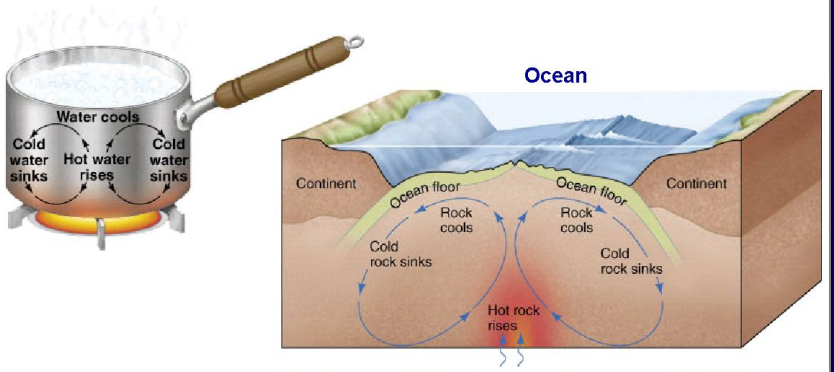
- Convection
- Heat is from nuclear fission.
  - Uranium, Thorium, are large "unstable" atoms which break down to produce, smaller atoms, heat, and radioactivity



Miller, 2004

Led to 54% correct

Plates move because of convection caused by heat from decay of radioactive elements in the mantle



Uranium and Thorium are large "unstable" atoms

⬇

break down to produce, smaller atoms, heat, and radioactivity

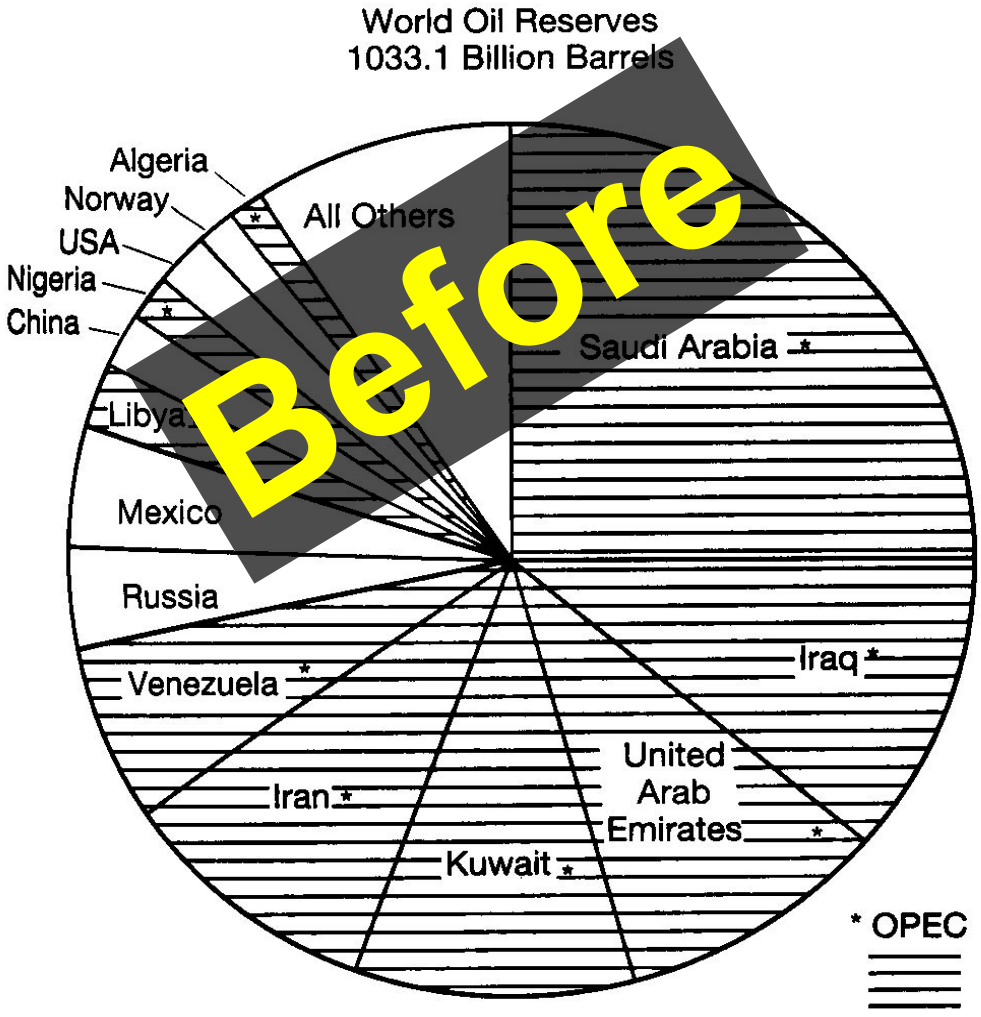
[Miller, 2004]

Led to 86% correct

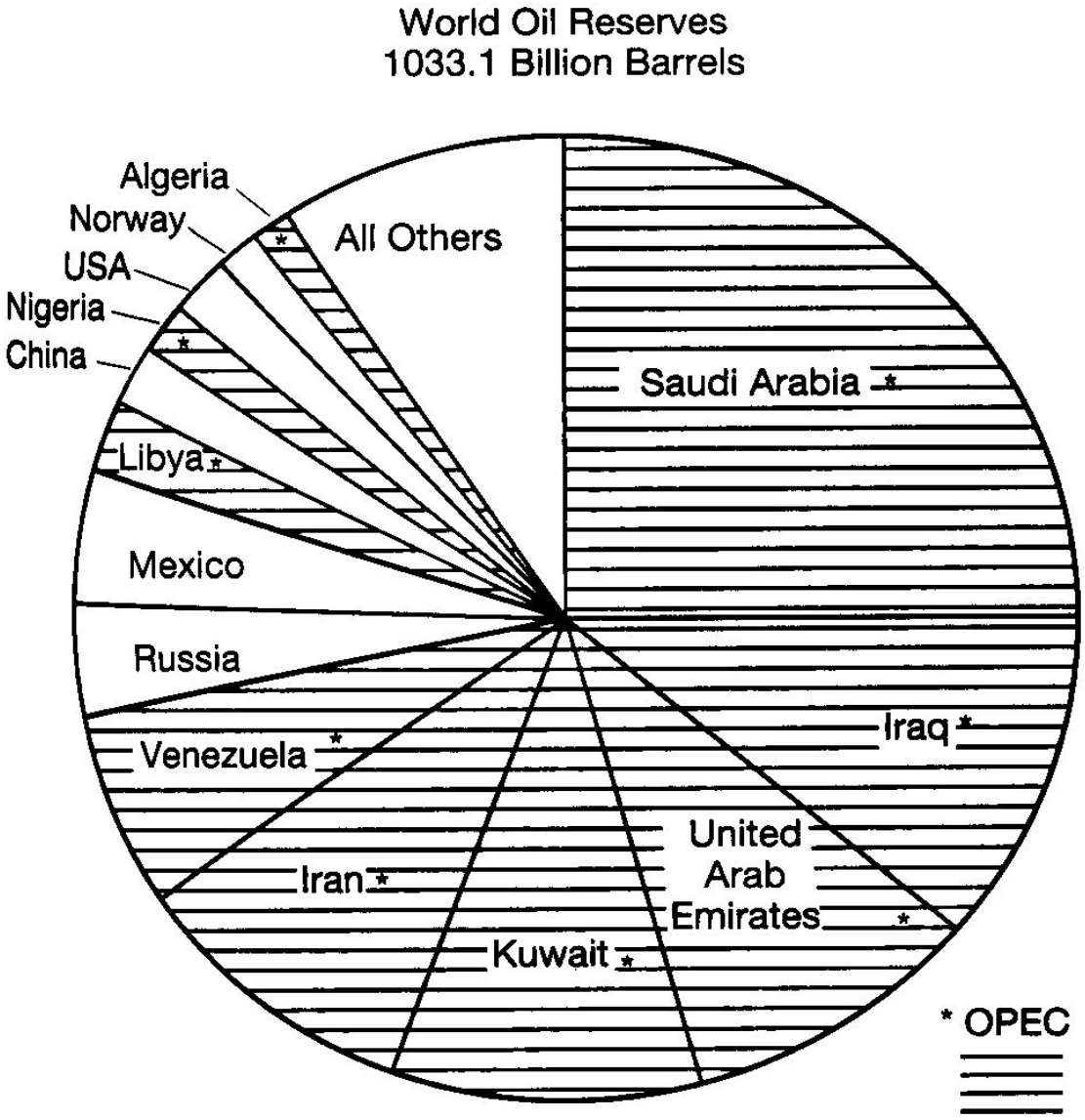
$p < .001$

[Alley et al., 2006]

Fossil Fuels: Who has what?



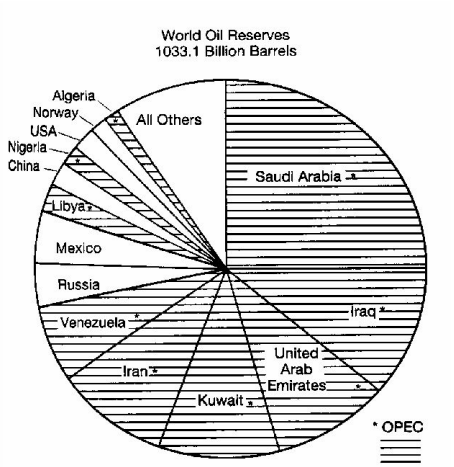
OPEC countries control about 75% of the world's oil



Students learning from the transformed slide scored higher on an identical test question

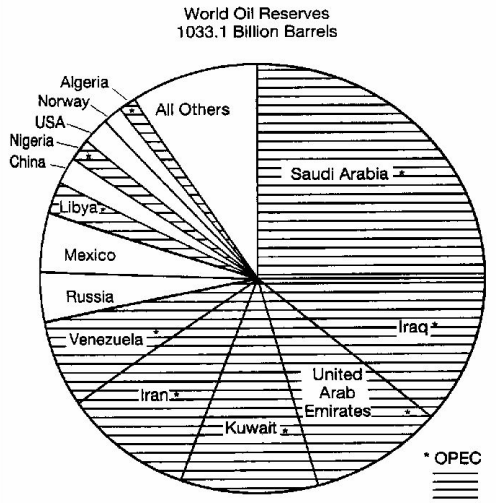
Q: Percentage of oil that non-OPEC countries control?

Fossil Fuels: Who has what?



Led to 63% correct

OPEC countries control about 75% of the world's oil



Led to 81% correct

$p < .001$

[Alley et al., 2006]