

TOPIC # 17... Postscript Choices Related to Modes of Transportation & The Laws of Motion



plus more info for GLOBAL CHANGE
Savvy Consumer Choices!

CLASS NOTES: pp 86-99

QUOTE FOR TODAY :

*Mathematical and
mechanical principles are
the alphabet in which
God wrote the world.*

~Robert Boyle



ANOTHER QUOTE FOR TODAY:

*“If I have seen farther
than other men,
it is by standing on the
shoulders of giants”*

Sir Isaac Newton (1642-1727)



Isaac Newton

(1642-1727)

“If I have seen farther . . . it is by standing on the shoulders of giants.”



Reminiscent of

“SCIENCE IS A CUMULATIVE ENTERPRISE”



1st Law of Motion

(Law of Inertia)

A moving object will continue moving in a straight line at a constant speed . . .



. . . and a stationary object will remain at rest



. . . unless acted on by an unbalanced force.

Other ways of stating Law #1:

Every body continues in its state of rest . . .

. . . or in uniform motion in a straight line



**unless it is compelled to change that state
by forces impressed upon it.**

Newton's
Laws in
everyday life:

1st LAW =

The LAW
of
INERTIA!

REAL LIFE ADVENTURES/Gary Wise & Lance Aldrich



Every so often, Newton's Laws of Motion
rear their ugly heads.



EASY WAY of remembering the 1st Law:

The key word is **“CONTINUE.”**

If a body is at rest,
it **continues** to stay at rest;

if moving,
it **continues** to move
in a straight line.

2nd Law of Motion $F = ma$

(Newton's Law of Motion)

The **acceleration (a)**

. . . produced on an object by a **force (F)**

. . . is proportional to
the magnitude of the **force (F)**

. . . and inversely proportional to
the **mass (m)** of the object.

$$a = F / m \quad \text{or} \quad F = ma$$

GLOBAL CHANGE LINK:

For every gallon of gas you use, you add
~ 22 pounds of CO₂ to the atmosphere.

Recall Newton's 1st and 2nd Laws.

Now consider the mass
(and acceleration capabilities)
of a large SUV (sport utility vehicle)
vs. a small "econo-car" . . .

An SUV and a small econo-car are both at rest at a stop light. Which vehicle has a **greater inertia**?

Choices:

1 = The **SUV** has a greater inertia because it has a greater mass and resistance to acceleration.

2 = The **econo-car** has a greater inertia because it has a greater ability to accelerate.

3 = Since **both** are at rest,
their inertia is the **same**.

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2nd law reminds us that
MASS is involved!

Econo-car vs. SUV!!



LARGE Acceleration
(due to small MASS)

SMALL Acceleration
(due to larger MASS)

$$\frac{F}{m} = a$$

$$\frac{F}{m} = a$$

3rd Law of Motion

(Law of Force Pairs)

For every action there is an equal and opposite reaction.

3rd Law = “Law of Force Pairs”

**Forces always occur in pairs;
an action and a reaction.**

**To every action force there is an equal
and opposite reaction force.**

**Whenever one body exerts a force on a
second body, the second body exerts an
equal and opposite force on the first body**

“Understanding Car Crashes: It’s Basic Physics”

As you watch the video,
fill in the blanks on
pp 98 -99 in CLASS NOTES.



NOTE: This 20 –minute video can be viewed in D2L
under: **Videos > “Films & Videos Shown in Class”**



Epilogue: YOUR CAR & GLOBAL CHANGE

(Being a GC Savvy
Consumer)

SAFETY vs. ENVIRONMENT??

What kind of car do you
drive???





www.iihs.org

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific, and educational organization dedicated to reducing the losses — deaths, injuries, and property damage — from crashes on the nation's highways.

New YouTube Channel for IIHS:

youtube.com/iihs

Watch the IIHS test for The Smart Car !

December 2, 2010

The New York Times

SUV Fender-Benders Can Lead to High Repair Costs

By THE ASSOCIATED PRESS

Filed at 12:10 a.m. EST

WASHINGTON (AP) — A minor fender-bender in a sport utility vehicle can lead to expensive repair bills, the insurance industry has found in new crash tests.

The Insurance Institute for Highway Safety estimated Thursday that repairing damages to SUVs — and passenger cars involved in low-speed crashes with SUVs — could cost anywhere from about \$3,000 for two vehicles to nearly \$10,000. The tests were conducted at 10 miles per hour and meant to simulate crashes in bumper-to-bumper traffic involving pairs of small cars and small SUVs from the same automaker.

A Toyota Corolla compact striking the rear of a Toyota RAV4 small SUV incurred more than \$6,000 in damages to the RAV4 and nearly \$4,000 in repairs for the Corolla. A Nissan Rogue hitting a compact Nissan Sentra led to more than \$2,800 in damages for the Rogue and more than \$4,500 in repairs for the Sentra.

In a crash scenario involving a Ford Focus hitting the back of a Ford Escape SUV, the Focus got a repair bill of more than \$5,200 while the Escape tallied more than \$2,200 in damages.

On the less expensive end, a Hyundai Tucson SUV hitting a Kia Forte cost \$850 to fix the Tucson. A crash simulating a Honda CR-V SUV into a Honda Civic caused nearly \$3,000 in total damages for the two vehicles.

SUVs tend to ride higher off the ground compared with passenger cars, meaning cars can sustain damage to hoods, headlights, engine cooling systems and fenders in low-speed crashes with SUVs. But institute staff said the damages could be minimized by changes to federal regulations.

The government requires all cars to have bumpers that protect an area of 16 to 20 inches from the ground. But the bumper rules do not apply to SUVs, pickup trucks or minivans, making SUV bumpers a few inches higher than those on cars.

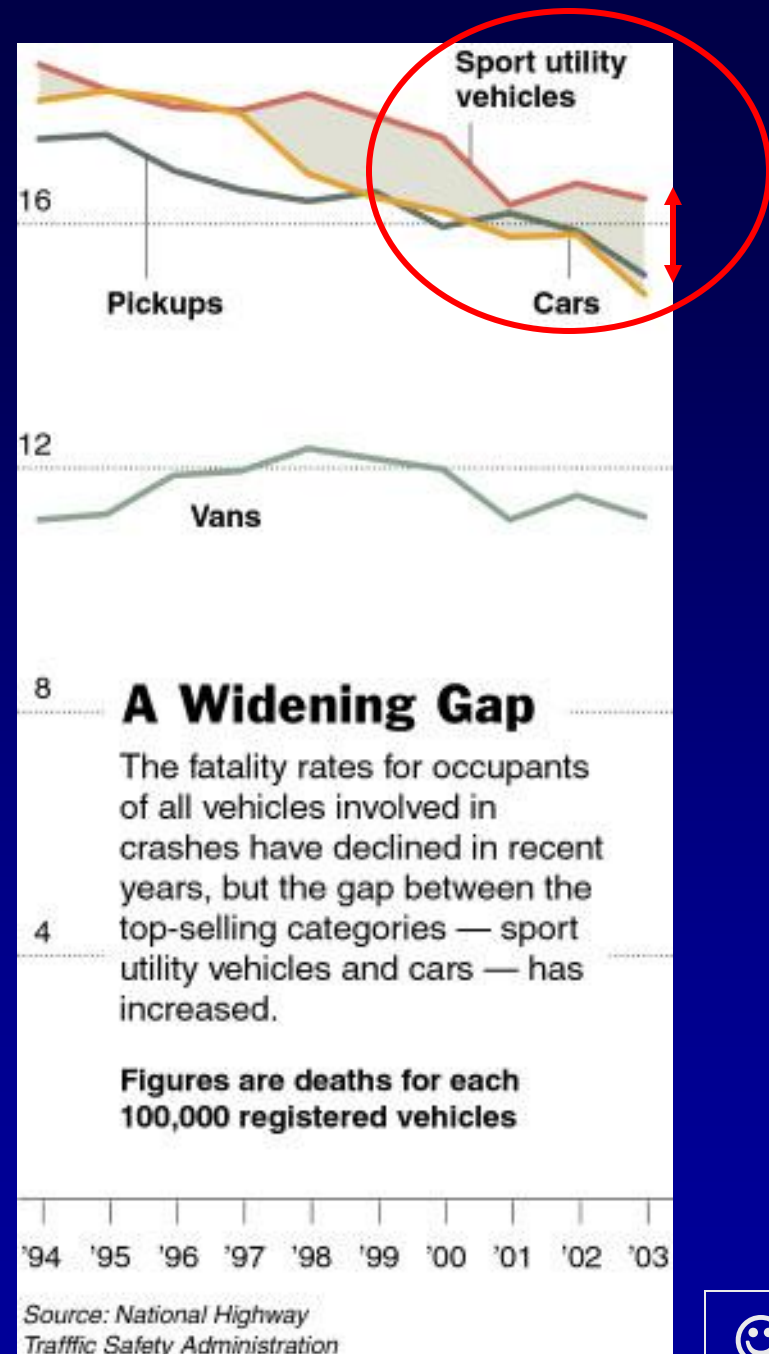
"SUVs and cars share the road. The problem is they don't share the same bumper rules, and consumers end up paying the price," said Joe Nolan, the institute's chief administration officer.

Your CAR & GLOBAL CHANGE

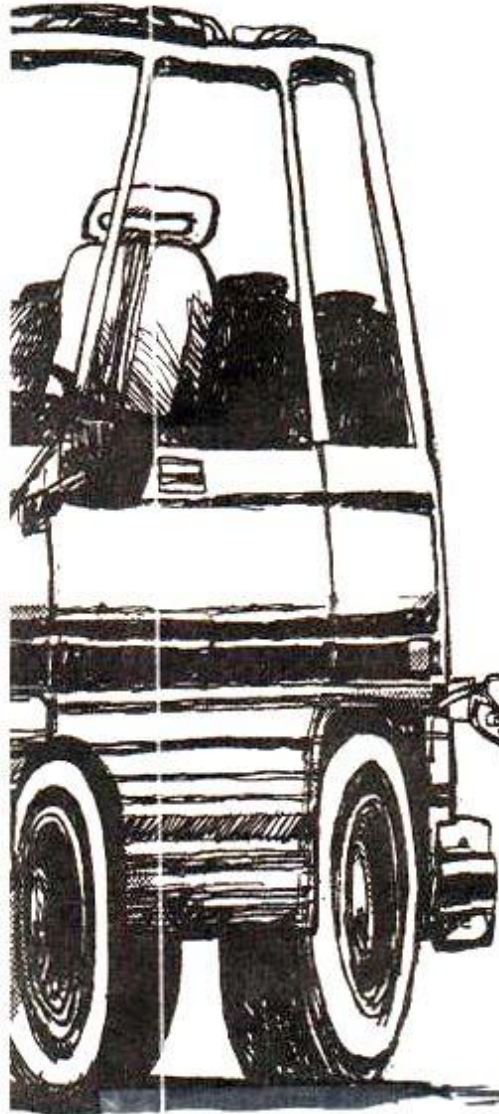


Fatality Rates
for occupants
of all vehicles
involved in
crashes

(deaths per 100,000
vehicles)



V. BREYMAN
CINCINNATI
ENGINEER © 2005



SELECT PRICE YOU'RE WILLING
TO PAY:

DEEPER
INVOLVEMENT
IN MIDDLE
EAST



IRREPARABLE
DAMAGE TO
PRISTINE
WILDERNESS



TAKE
PUBLIC
TRANSPORT-
ATION



DOWNSIZE
TO FUEL
EFFICIENT
VEHICLE



... more
(or less?)
SAFETY



QUESTIONS TO PONDER!

-- Are large SUVs & Pickups safer just because of their size and mass ?

--- Now that we have hybrid SUV's will that solve the problem of their notoriously low gas mileage and larger contribution of CO₂ to the atmosphere – compared to smaller cars?

Suppose the traffic accident mortality rate goes up because cars are made smaller to preserve fuel.

Is that a good trade-off ?

Is it environmentally irresponsible or a good safety practice to own a large SUV or pickup truck that gets mileage of LESS than 20 mpg?

**What else is important to
consider???**

HAVE A GREAT WEEKEND

**See you next Tuesday for our
LAST CLASS!!**

Go CATS!