Re: microgravity − I stand corrected <− WARNING! ~CT Troll Thread! Killfile Accordingly!

Source: http://sci.tech−archive.net/Archive/sci.space.history/2006−11/msg01307.html

- *From*: "Stuf4" <tdadamemd−spamblock−@xxxxxxxxxx>

- *Date*: 20 Nov 2006 07:51:00 −0800

<snip>

> Likewise I am confident that some future generation will get a
> good laugh at how the terms "zero gravity" and "microgravity" are used
> today.
>
> How is it that I post to ssh, and the vocal majority attacks me. I
> post the very arguments to Wikipedia and they are embraced? By this
> very forum even!
>
> That is a clear sign to me that this forum is broken.

For documentation, here is that Wikipedia entry on Weightlessness in
its entirety:

==========

Criticism of the terms "Zero Gravity" and "Microgravity"

It is important to note, as stated at the beginning of this article,
that there is plenty of gravity pulling on a spacecraft in orbit around
the Earth. Gravity is the very reason why the spacecraft is orbiting.
Therefore it is totally inaccurate to say that astronauts are
experiencing "zero gravity" or "microgravity". What orbiting astronauts
experience is zero−g, a measure of acceleration relative to their
spacecraft, which results in weightlessness. But zero−g is not "zero
gravity". If there were "zero gravity" or "microgravity", their
spacecraft would not be pulled into an orbit around the Earth. It would
go in a straight line.

As a thought experiment, imagine a spacecraft that had the ability to
rise up to orbital altitude by going straight up like a helicopter and
hover over one spot on the Earth. The astronauts inside would not
experience weightlessness. Their ride inside this hovering spacecraft
would be similar to riding an elevator up an incredibly tall building
and stopping at the top floor. While hovering above Earth's atmosphere,
their weight would be very close to what they weigh on the surface of

the Earth, even as a space shuttle goes zinging by them. So astronauts in a hovering spacecraft are being pulled by strong gravity just as space shuttle astronauts are pulled by strong gravity. The difference between them is that the orbiting shuttle is freely being pulled toward the center of the Earth. The lack of relative acceleration between the orbiting shuttle and its astronauts inside (who are also being freely pulled toward the center of the Earth) result in them being weightless. But the hovering spacecraft (as with an elevator at the top of an incredibly tall building) is not freely falling. The pull of gravity it is experiencing is being opposed by the hovering force. This force gets transfered to the astronauts within (along with everything else within the spacecraft) resulting in weight. This example illustrates the fact that there is plenty of gravity out in space. If you were to take any object that is orbiting the Earth and stop it dead in its track and then release it, the Earth's gravity would pull it straight down back toward the Earth's surface.

To use confused terms like "zero gravity" and "microgravity" is to mistake the general concept of acceleration for the concept of gravity. "Zero−g" and "micro−g" are perfectly accurate terms referring to the lack of acceleration (in the frame of reference of the spacecraft) that cause weightlessness, even while gravity is strongly pulling the trajectory of that spacecraft into an orbit.

The specific point of confusion is that "g" does not mean "gravity". The designator "g" is an arbitrary scale of acceleration not to be confused with gravity itself. "Zero−g" means zero acceleration, not zero gravity. "1−g" is the acceleration experienced on the surface of the Earth due to gravity, but it is not gravity itself. This scale is widely used because it is easy to relate to from common experience of acceleration due to gravity. But any other scale of acceleration can be used to describe the condition of weightlessness. It could be described using a scale that has nothing to do with Earth's gravity. Similarly, a distance can be measured in feet as well as meters, where a meter has nothing to do with the length of a human foot. For a weightless astronaut to say that they are in zero gravity is the same type of error as saying that an object that has a length of 0.3048 meters is identically one human foot in flesh and blood. "1 foot" is an arbitrary scale for measuring length that was (at some point in history) based on a person's foot, but not to be confused with an actual human foot. "1−g" is an arbitrary scale for measuring acceleration that is based on gravity, but not to be confused with actual gravity. A zero−g environment is also a zero−meters/second^2 environment and a zero−feet/second^2 environment. Any arbitrary scale of acceleration can be used, and none of them have any exclusive relationship to gravity.

Another illustration of this type of mistake is when people erroneously speak of a jet pilot blacking out as a result of "gravity−induced Loss Of Consciousness". The proper term is g−induced Loss Of Consciousness. It is the acceleration produced by their maneuvers that is the culprit for g−LOC. It is clearly "g−induced" and not "gravity−induced", because

gravity obviously remained constant at 1−g the whole time for the pilot. Likewise, the purpose of NASA's " Reduced Gravity Aircraft" is not to reduce gravity, but rather to fly in a parabolic arc that brings relative acceleration to zero. "g" is reduced while gravity stays essentially the same. So clearly it is possible to experience zero−g without going into space. Any aircraft can do this by pushing it over into a parabolic arc. Even any car that hits a bump fast enough to leave the ground will experience zero−g for the time that the wheels are not in contact with the road. The easiest way to experience zero−g is to bend your legs and jump off the ground. For the time that you are in the air, you are experiencing weightlessness. The difference with astronauts is that the experience is not momentary because their spacecraft is continually getting pulled toward the Earth. It is possible for non−astronauts to experience longer durations of weightlessness by cliff diving, bungee jumping, freefall parachuting, barrelling over a waterfalls or more safely by riding many types of modern amusement park rides that put the occupant in a freefall. What is common for the astronauts as well as these other examples is that it is not gravity that is changing, but rather the acceleration in their falling frame of reference goes to zero−g.

As it stands today, NASA itself is one of the biggest promoters of the erroneous terms "zero gravity" and "microgravity" (along with the similarly erroneous term "reduced gravity"). Astronauts themselves have been quoted as having experienced "no gravity" while in space. Surely they are aware that there was plenty of gravity throughout every orbit they made, with gravity being the very thing that pulled them into an orbit.

==========

An advantage that Usenet has over Wikipedia is that it is easy to search for the exact words that a person has posted. This is the most durable means of sharing information that I know of.

....and that's another reason why I don't use nasty language here, no matter how much I get "flamed". If any of my arguments turn out to be deficient in logic, I'm ok with having made a factual mistake. But I strive to maintain civility because I post with an awareness that great−great−grandkids will have direct access to your character.

~ CT

.