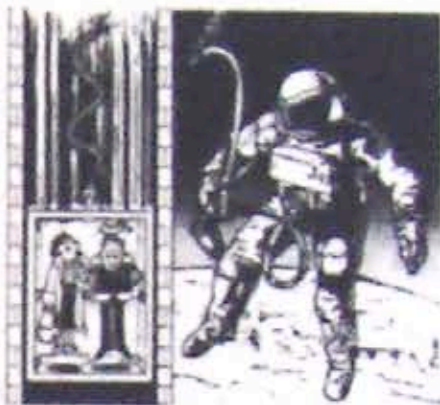


STARBOUND

THE FRONTIER OF
KNOWLEDGE AND ADVENTURE

by Dr. Eugene F. Mallove



Weightlessness

You don't have to go into space to experience sensations of weightlessness, but it's much easier if you do! An astronaut in space feels weightless because there is no ground beneath his (or her) feet to push against him with a force equal and in the opposite direction to the force of gravity pulling his body toward the center of the earth. A common misunderstanding is that "out in space" there is no gravity, hence weightlessness. Not true at all! Earth's gravity acts strongly on all objects anywhere near it, but free falling bodies—that is, those in orbit, or simply falling—lack a planetary surface to push against them causing the sensations of weight.

Do you recognize that "light feeling" in an elevator going down? If so you have experienced a reduction in weight caused by the elevator and you falling—partial weightlessness. If the elevator cables were cut and the cabin were truly falling, you would experience real weightlessness during the fall.

Because spaceflight involves orbiting (falling in space) scientists have been interested in simulating weightlessness on Earth to find out its effects on people and also as a training aid. True weightlessness has been routinely simulated for up to 50 seconds inside an airplane which plunges along a specially shaped path. Another way is to immerse space-suit clad astronauts in tanks of water—a floating condition which is not true weightlessness but which gives some of the same physiological effects.

For a long time before spaceflight there was a real concern for the possible physiological hazards of weightlessness. We know now that people can safely be weightless for many months and perhaps indefinitely. Russian cosmonauts have been weightless for as long as 196 days and American astronauts in Skylab were in orbit for 89 days with no permanent ill effects.

Weightlessness during spaceflight may have many benefits in the future. Large structures such as antennas and solar cell arrays can be built delicately and thus less expensively in orbit. There may be beneficial medical effects of weightlessness for some illnesses. Orbiting factories would be free of the distorting effects of weight on chemicals mixing and crystals growing. There is more to weightlessness than heavenly, freefloating feelings!

Dr. Mallove encourages readers to send in questions and will occasionally devote a column to them. He lectures on topics involving astronomy and the space program to groups and organizations. He can be reached at 429-7727.

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