

Teleportation

"Scientists in Copenhagen took one more step toward the Star Trek transporter, figuring out how to teleport groups of billions of atoms from one place to another using light, quantum mechanics, magnetism and a concept they call 'entanglement.'"

Gizmodo, 5 Oct. 2006

Teleportation has been commonplace in science fiction for a very long time. In fact it has been used so often that we are almost inclined to wonder what is taking science so long to get it to work in real life. In the mean time, TV shows and movies such as the Star Trek and Stargate series routinely use teleportation (Transporters or a Stargate) to get our heroes to or from the destination of the week.

In most cases the thin explanation of how the teleportation system works is something along the lines of disassembling the person, converting them to some kind of energy stream, transmitting them to a remote location where they are converted back into matter and reassembled. There are two primary variations of teleporters that we see rather often. There are those that don't require a reassembly mechanism at the remote location (a la Star Trek) and others which do require a receiving and reassembly mechanism (a la Stargate).

While entertaining us, sometimes these programs touch on some of the more esoteric aspects of teleportation as well as the technical challenges and possible problems. Sometimes teleportation devices have caused: two entities to fuse into one (Tuvix from Tuvix and Neelix, as well as "The Fly"), have caused one person to be split into two (Good/Bad Captain Kirk, Will/Thomas Riker), have trapped people for extended periods in limbo (Scotty), and in at least one case has dealt with the possibility that teleportation actually involves killing the original person and simply producing a copy at the other end (Outer Limits). When you begin thinking about this you can begin to sympathize with Dr. Leonard (Bones) McCoy of Star Trek fame who had an aversion to Transporters and could often be found muttering something about "...scattering my atoms all over empty space.."

So what about the technical issues?

Clearly taking a person apart painlessly, quickly, and with extreme precision and fidelity and converting them to some form of transmittable energy is no small problem. Standing there while a machine takes me apart atom by atom simply does not sound like a particularly attractive prospect. The fidelity of the process is also troubling. I would certainly want to be put back together exactly the way I was before, but that's not easy either.

The Heisenberg Uncertainty Principle tells us the very act of measuring something (such as the atoms of my body) will disturb them in a way that makes it impossible for me to tell their normal condition prior to the measuring process. So the "me" that gets reassembled will be a slightly "disturbed" version of me. Frankly, I think I am already disturbed enough, but will further disturbance be important? That's very hard to tell, but we do know that very small disturbances

in the DNA of a single cell can lead to death by a variety of genetic diseases. In Star Trek this problem is even acknowledged when they make mention of the Heisenberg Compensators that get around this issue by some unknown feat of magic. But after all, Arthur C. Clarke said, "Any sufficiently advanced technology will be indistinguishable from magic."

Is there perhaps an easier way than delicately ripping our bodies apart?

One of the modern theories in physics is that all the mass particles we have come to know are really made up of energy strings vibrating at different frequencies and perhaps in different modes. In this theory, vibrating strings express themselves as fundamental mass particles which combine in various ways to be quarks which combine into protons, neutrons and electrons which combine to be atoms that in turn combine to be the physical us.

Albert Einstein said that matter is really just an expression of energy. In fact that is exactly what the famous $E=mc^2$ equation tells us. This has also been noted by people who deal in the metaphysical realm who sometimes refer to our physical representation as "solid energy."

So, if we are in fact "solid energy" could we perhaps just get our body to be converted to some non-solid form in a manner that is easily transmitted and at the receiving end get it to re-convert to its normal physical mode of expression. I suppose we can hope this is possible, but generally getting matter to convert to a non-solid form can be a little difficult to control. Fission and fusion bombs immediately come to mind. The problem here is that there is actually an amazing amount of energy tied up in our body (our mass times the square of the velocity of light is a lot of energy).

So, the technical challenges are formidable, but how about the non-technical issues?

Many years ago I heard a story related by someone who mentioned that a person had FAXed them a letter and in this letter the sender asked, "Can you please FAX this letter back to me because it is my only copy?" This seems silly to us in regard to a FAX, but what about when teleporting a person?

When someone is teleported to a destination is it the original person that arrives (like mail), or is it just a copy of the original that arrives (like a FAX)? With our FAX machine it is pretty clear that the original doesn't actually go anywhere at least so long as our FAX machine doesn't try to eat the original. However, with a teleportation system it is quite likely that the original gets disassembled or in some way ceases to exist in the process of being teleported. So did the original person actually arrive at the destination or is it merely a copy with all the memory history of the original?

If the person at the destination is perfectly identical to the person who entered the transmitting end it might be an irrelevant issue to the arriving person, but it just might make a whole lot of difference to the sender. From the sender perspective entering a teleportation device might really be no different than walking into a disintegration chamber and being killed. This is not exactly a pleasant prospect even if you know a copy of you will be around afterward.

Perhaps this is only a small psychological stumbling block and people would eventually find it acceptable or convince themselves that it really is they themselves who walk out of the other end of the system. Can we trust this to be true?

The bottom line here is, "What makes me me, and what makes you you?" One school of thought is that we are simply the sum total of our physical bodies and the experiences we have had throughout life. If this is true then the "me" that walks out of the other end of a teleporter is just as much me as the "me" that walked into the sending end. I have indeed been teleported and maybe there are no issues in this area.

However, there is another school of thought that says there is a distinct personality that came to the birthday party when I was born and it is the real me which is the driving force behind this aging body of mine. This leads to a possible problem that might best be explored with an analogy.

Let's assume we are a strange alien life form that has come to visit the earth. Let's further assume that we have a rather unusual sensory system that only perceives metals, plastics, and certain minerals. We can also assume we effectively have RF vision. As a result of our rather strange sensory situation we can't even see people or animals.

While exploring earth we conclude that the intelligent life form here is the automobile. After all, they autonomously travel all over the planet. We've seen automobiles extract nourishment through strange hoses attached to tanks that are replenished by other vehicles. We've also seen dead vehicles being crushed, transported and reborn into new vehicles with the help of other vehicles and machines. Of course it never occurs to us that there might be more to the automobile than meets our eye. Some of our research team keep claiming they detect the presence of ghosts and some strange activities that seem inexplicable, but these researchers are mostly laughed into silence.

Now, being highly advanced we decide to teleport an automobile up to our mother ship in orbit. In a very clever way we trap a moving automobile and teleport it directly to the mother ship. Everything should be perfect because we know that our teleporters transfer absolutely everything we see, but every automobile that arrives on the mother ship acts dead. The engines are still running when they arrive, but they never move autonomously. Eventually they deplete all their nourishment and simply cease all activity.

In the mean time there are a number of news reports on earth of people who claim that while driving their cars they suddenly found themselves sliding down the road on their backsides with no car to be seen anywhere.

No analogy is perfect, but let's apply this one to the prospect of teleporting human beings. Do we really know what makes a human being a human being any more than the aliens understand an automobile?

To date, every attempt by science to explicitly define what makes a human being a human being has eventually failed. Invariably such definitions have been based upon what we can do much

the way we, as aliens, might have tried to define the automobile. One of the more recent attempts was the claim that humans make and use tools. It seemed like a pretty good definition because in archeological digs one of the prime things that are searched for are the tools used by our possible ancestors. Then a problem cropped up.

Certain present day hominids broke off sticks to the right length and used them to extract yummy termites from rotting logs. Some tried to claim these were not really tools and just breaking off a stick didn't really constitute "making" a tool. Then insult was added to injury.

A crow was presented with a problem. Food was placed into a tiny bucket that was lowered into a clear tube. The bucket was too low for the crow to reach it with his beak so there was no obvious way to lift the food bucket out of the tube. On top of the tube the researchers placed a straight piece of wire. There was no way for the bird to use the straight piece of wire to extract the bucket. In relatively short order the crow took the piece of wire, used leverage against the side of the cage to bend a hook on the end, lowered the hooked end into the tube and neatly lifted out the bucket. The scientists were astounded. Surely this was a fluke, so they tried it again. Time after time the crow repeated the process. Even "bird brains" can make tools and use them. So much for yet another definition of what makes humans unique.

Is it possible that what makes humans unique has nothing to do with what we can do and everything to do with who we are? If so, is who we are detectable, measurable, and teleportable or is it just as elusive as the automobile driver is to the aliens in our analogy?

Instead of a lot of answers, this question prompts still more questions. Do out of body experiences suggest a separate physical and spiritual "self?" Are Electronic Voice Phenomena just a way for an energy form of an unembodied spirit to be able to interact with our physical reality? How do we account for spontaneous and provably accurate recollections by 3, 4, and 5 year old children of previous lifetime details they could not have "learned" anywhere? What is the "reality" people see in death bed visions? Where does our "personality" come from? Is our personality somehow holographically associated with our body in a way that might explain how transplant recipients sometimes acquire unique personality traits of dead donors?

I think we have a lot to learn.