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**Jews in Space from an Astronaut's Perspective © Judith Abrams, David Hilmers, 2003**

Judith Z. Abrams and David Hilmers

When the first Israeli was scheduled to fly in the Space Shuttle, questions about the practice of Judaism in space took on a practical tenor. In order to understand how Jewish rituals and customs might be observed in space. Rabbi Judith Z. Abrams interviewed David Hilmers, M.D.. Dr. Hilmers. is a retired Marine Colonel, a NASA astronaut from 1980-1992, flew on four space shuttle missions and is currently a physician living in Houston, Texas.

Rabbi Abrams:

*The question that really bothers decisors is how one defines a day in space.*

Dr. Hilmers:

The controversy over what constitutes a day in space is blown up out of proportion. In space, everything runs on mission elapsed time (MET) or the time from liftoff. So, when MET = 1/00:00:00.00, a space traveler feels and acts as if he have been in space for one day, because he has. Internally, an astronaut's body is still on a 24-hour circadian rhythm, based on the sleep cycle established at off. Sleep periods may be adjusted slightly from that cycle, but they essentially remain the same throughout the mission. So MET is the clock and astronauts sleep every 24 hours or so, just as one would on earth. The astronaut does not care about local time zones, except to occasionally wonder what his family is doing at that moment.

Time on a space shuttle mission is measured by a different reference system: i.e., lift off rather than earth-time. But time is still the same, and is measured the same way. The reason that NASA uses mission elapsed time is because it is impractical to do otherwise. All preflight planning is based on the time of liftoff. By doing so doing, it doesn't matter exactly when lift off occurs. Otherwise, it would be necessary to change all of the flight

plans if the launched were delayed (which it frequently is). Just think of MET as one would think of a race. When the gun goes off, the watch starts. It doesn't matter what time of day it is. Another way of thinking of the space shuttle is by comparing it to a very fast Concorde that crosses a different time zone about every four minutes. A traveler on such a Concorde could keep changing the time zones on his watch, but it would be quite impractical. Instead, one could set one's watch to whatever time one wanted: destination time, departure time, anything.

Rabbi Abrams:

*Is MET on Houston time, Greenwich Mean Time or some other time?*

Dr. Hilmers:

MET is based on launch time, not to any particular earth time. The mission clock starts at liftoff and continues until touchdown. I don't know what they do on the Space Station but I imagine that they have a clock set on GMT (London Time) since MET is not as important after an astronaut has been up for a long time. But again, any time frame could be utilized. I am sure that they have lots of timers counting up or down to major events such as space walks, housekeeping chores, cooking dinner, or observing interesting sights on the ground, just as we did when I was on the shuttle.

Rabbi Abrams:

*If you go strictly by MET, then is the seventh day in space Saturday? Or do normal calendar ideas go out the window?*

Dr. Hilmers:

Calendar ideas are not of much use in space. On longer flights, there may be a planned lighter day than usual to give the crew a little break, but it may or may not be the seventh day in space. As I have already mentioned, a spaceflight, the day of the week on earth is much like time of day on earth. We sometimes think about it just to have an idea of what our families might be doing but as far as the mission goes, the day of the week is meaningless.

Rabbi Abrams:

*What if someone did not want to work for a 24-hour period? Would that endanger the rest of the crew?*

Dr. Hilmers:

An individual who does not want to work the whole time would not be on the crew.

There are one hundred or so astronauts who have not flown yet who would jump at the chance to work twenty-six hours per day to go. It probably would not endanger the rest of the crew, but it would certainly anger them.

Rabbi Abrams:

*Do astronauts have any "discretionary" time? Let's say someone wanted to pray twice a day for about a half-an-hour at a time. Would the time be available to do it? Or is everything so scripted that there is no "discretionary" time?*

Dr. Hilmers:

There definitely is enough time during the "presleep"/"sleep" periods once the work is done, or perhaps right after getting up. Finding time during the rest of the day would be tough, but it depends on the mission. Some flights have a fair amount of slack in the schedule while others are jam-packed. There is usually time built-in for meals. I often found that I had to work through meals to finish experiments and/or planned activities if I fell behind. However, I suppose you could use this time to pray if not otherwise occupied. Mealtime was also a bit of a social occasion and was also used as a time to coordinate activities and to discuss problems. So, taking the time off to pray for thirty minutes might be considered a bit disruptive to normal crew functioning.

Rabbi Abrams:

*I'd like to more fully understand what living in space is like and what Jewish traditions could be observed in space and which could not. For example, I was under the impression that each astronaut is allowed to take one pound of personal things into space, so would that prevent an astronaut from taking, say, a Bible along?*

Dr. Hilmers:

This is the way it used to work and probably hasn't changed: we were allowed twenty items in the PPK (personal preference kit). These items were supposed to be "small" like pins, but there was no specific weight limit on them. Small flags, medallions, or family heirlooms were quite popular items to fly. Small Bibles have also been popular items.

Rabbi Abrams:

*What role, if any, do singing and /music have in space?*

Dr. Hilmers:

All of the crews that I was on did not want to have people singing. When you are trying to listen to the ground controllers over a speaker, it is really hard to hear them if someone is singing or even talking. Sometimes when I was on a wireless headset and working alone in the Spacelab, for example, I might sing softly to myself. Music is also very individualized. Everyone brought his own music and carried a Walkman with headphones. It was especially nice to have music when trying to go to sleep. My crews generally had a rule that we did not play the music out loud on a speaker without the permission of everyone else. Again, it makes it difficult to hear the ground controllers.

Rabbi Abrams:

*Could an astronaut light candles in space? Is the shuttle considered a temporary dwelling as opposed to the space station? Is the space station considered a "permanent residence"? Could wine, matzah and horseradish be taken into space?*

Dr. Hilmers:

Lighting a candle in space would be a really bad idea. Fire is one of the most feared problems in space. So, it is only done under the most carefully controlled circumstances in specially designed enclosures.

I suppose that one could say that the shuttle is a temporary dwelling since astronauts cannot stay up for more than a couple weeks at a time. I've never thought of it in those

terms, however. The space station is more permanent and hopefully will be in orbit for several decades.

Pretty much any kind of food can be taken into space and consumed. Foods that produce a lot of crumbs, like cookies and bread, can be problematic. Wine would need to be taken in a container that prevents spillage. I believe that a French astronaut took wine on board with the approval of the proper authorities. I'm sure that it was for medicinal purposes only!!!

Rabbi Abrams:

*What about bringing vegetation into space? I think here of the palm, myrtle, willow, and citron which are an integral part of the observance of Sukkot in the Fall. They're pretty big: usually about 2-3 feet for the palm leaves and the etrog is the size of a very large lemon.*

Dr. Hilmers:

I think that this would be a problem. Anything that big would have to be formally cleared. It would probably have to pass all sorts of testing for combustibility, toxicity, outgassing and so forth. Then you would have to find space for it. The palm leaves might not fit into a locker. It could be done, but it would be pushing the system.

Rabbi Abrams:

*Jews frequently use the mikveh for purifying themselves and/or objects. I imagine that amount of water, 12 liters, of which some must be rainwater, would be pretty bulky to take into space. Am I correct in assuming that the whole idea of dunking in water doesn't make much sense as the water would slosh all over the place?*

Dr. Hilmers:

Right. You could probably carry a little bit, maybe 12 ml, not 12 liters of rain water into space. The rest of the water you could get from the fuel cells. But any kind of splashing or an open font would be out of the question.

Rabbi Abrams:

*Cosmology plays a very important role in most religions: theologies of the sun, moon and stars. Do astronauts experience the cosmos differently than they do when they are on earth?*

Dr. Hilmers:

That is a very individualized question. The cosmos did not really look much different from low earth orbit than it did from a mountaintop on a clear night or from the cockpit of a T-38 when I was flying back from El Paso at night. In fact, most of us did not spend much time looking at the stars at night because it was not really any different. The forty-five minutes of daytime during an orbit were much more interesting because you could look at the earth.

Rabbi Abrams:

*How do you experience Earth from outer space? Do you see new moons the way we might see them down here?*

Dr. Hilmers:

The earth views, of course, are the best part of the flight. That is why you see so many pictures of the earth from space. How many pictures have you seen of the stars or the moon from the shuttle? Not many. Again, the moon looks the same from the shuttle as it does on earth. However, on an extra-planetary flight it would look much different.

Rabbi Abrams:

*Is sexual intercourse possible in space?*

Dr. Hilmers:

This is a question that has been the source of much speculation over the years. To my knowledge there has never been any research on the subject. Although technically feasible, there are a number of barriers to sex in space. Privacy is a big problem and sex drive can be reduced, particularly in the early part of the flight when people aren't feeling

well. There is also the logistical problem of zero gravity: some sort of restraint would be necessary. There was one married couple that went into space together (they have since divorced), but they were on different shifts of a 2-shift mission. In short, it isn't likely that this sort of thing is going to happen anytime soon.

Rabbi Abrams:

*Would the process of gestation and birth in space be different from that here on earth?  
How could a woman push, really?*

Dr. Hilmers:

There should not be any physiological reason that it would be any different. Strapped into stirrups, a woman could push just as well in space. The problem would be all the blood; births are messy.

Rabbi Abrams:

*How does one draw blood or make incisions in space? I am thinking about circumcision here.*

Dr. Hilmers:

Blood draws and IV's don't seem to be a problem as long as you're careful. Having done some circumcisions on earth, I don't think that I'd like to do them in space, but I'm sure that it is possible, given the right restraints and instruments. Incisions would be the same as on earth...again the problem of containing blood and so forth is the big roadblock.

Rabbi Abrams:

*What happens if an astronaut becomes ill? How might one bury a person in space?*

Dr. Hilmers:

Right now, an ill astronaut is taken care of on board if possible. Although it has not yet happened, I imagine a mission would return to earth if it became impossible to care for a critically-ill astronaut. I'm sure if someone became ill enough to die or there was an

accident causing a death, there would be an immediate de-orbit. If a mission was far enough away from earth to preclude a return, then one might resort to the practice of mariners for thousands of years--a burial in the deep sea of space.