INDETERMINATE

**Reflective Environmentalist**

You are torn between a cosmic perspective and Earth-bound emergency. On one hand, a large view of the environment includes the full universe. We need to care for other planets as much as our own. On the other, are we going to talk to advanced intelligences when we are not even close to having our own act together? For that matter, are we really *intelligent*?

Don't let the others lose the philosophical questions in the debate over probabilities.

***Objective:*** *Ask the others about how SETI impacts both our planet and its people. Keep asking until you are completely satisfied with the answers.*

INDETERMINATE

**Convener/Moderator (Peter Pearman)**

You have brought together nine scientists to discuss the possibility of communicating with life on other planets. You’ll discuss four pieces of an easy equation to predict it: *N = 10 • np • fp • fl • L.*  (NOTE: This is a simplified version of the Drake equation.)

Number of Civilizations in our Galaxy = 10 stars per year

x (number of planets per star)

x (fraction of planets that have life)

x (fraction of life that can communicate)

x (lifetime of a civilization)

***Objective:*** *You must keep the speakers on task, stepping them through discussion of one variable at a time. Try to get consensus on the value of each variable and write it on the board. At the end of the discussion, you should multiply the four numbers you discussed to calculate the total number of civilizations on the board.*

INDETERMINATE

**Amateur Astronomer and Philanthropist (Dana Atchley; donor for parts of Project Ozma)**

By day, you are a success in the world of finance. By night, you are an amateur astronomer. You are looking to donate a large sum of money to an astronomy project but aren’t yet sure who to give it to. During this debate, you must decide if you will give funding to SETI or not based on the arguments presented.

***Objective:*** *If the number of alien civilizations on the board at the end of the game is less than 1, you will give your money to some other astronomers. If it is greater than 1 million, you will give your money to SETI. If it is somewhere in between, you must make a judgment call.*

BIG-N FACTION

**Stellar Astronomer (Otto Struve; billions of planets…some must have intelligent life)**

In your observations of the stars, you see the evidence for planets around many of them. You believe there must be billions of planets in our Milky Way Galaxy. If so, at least some of them must have intelligent life.

***Objective:*** *When the debate turns to the number of planets per star (np), you should argue that* ***np is very big*** *and convince the others this is true.*

LITTLE-N FACTION

**Planetary Astronomer (Su-Shu Huang; coiner of the term, “habitable zone”)**

Astronomers use the word “planet” to mean a lot of different things. While there may be a lot of mega-Jupiters or mini-Plutos in the galaxy, there are relatively few planets the size of Earth. In fact, the only planet discovered so-far that is the same size is Venus. Even if there is an “Earth 2” out there somewhere, you believe that only some small fraction of planets are at the right distance from their star for life to exist.

***Objective:*** *When the debate turns to the number of planets per star (np), you should argue that* ***np is a very small number less than 1*** *and convince the others this is true.*

BIG-N FACTION

**Astronomy Graduate Student (Carl Sagan; thesis on origin of life)**

You are a young and optimistic astronomer, convinced we are not alone in the cosmos. Based on the spread of life on Earth, you think life must also take root on any planet where the conditions are fertile.

***Objective:*** *When the debate turns to the fraction of planets with some form of life (fl), you should argue that* ***fl is very large*** *and convince the others this is true.*

SMALL-N FACTION

**Chemist (Melvin Calvin; Nobel-winner for the carbon cycle in photosynthesis)**

Your research on the chemistry of biology shows that life is really very complex. You believe that life is extremely hard to make and only occurs under very rare circumstances. It may not happen at all, even on a planet suited for life. We are likely the only “living” planet in the Milky Way Galaxy.

***Objective:*** *When the debate turns to the fraction of planets with some form of life (fl), you should argue that* ***fl is very small*** *and convince the others this is true.*

BIG-N FACTION

**Radio Astronomer (Frank Drake)**

Based on papers you’ve read, you believe that all intelligent life would use a simple, radio signal to communicate with each other using the language of math. In fact, you’ve spent some time actually looking for these signals. You think it is only a matter of time before we uncover the “needle in a haystack” and begin communicating with an intelligent alien civilization.

***Objective:*** *When the debate turns to the fraction of living planets with communicative life (fc), you should argue that* ***fc is very large*** *and convince the others this is true.*

SMALL-N FACTION

**Animal Neuroscientist (Greg Lilly; interspecies communication with dolphins)**

You have studied the brains of sophisticated mammals for years. You believe that even if we found aliens, we couldn't have meaningful communication with them; we can’t even communicate with smart animals yet!

***Objective:*** *When the debate turns to the fraction of living planets with communicative life (fc), you should argue that* ***fc is very small*** *and convince the others this is true.*

BIG-N FACTION

**Computer Scientist (Barney Oliver; founder of HP)**

Based on your career as founder of a major computer company, you believe that technology is ultimately a force of good. You have a somewhat utopian view of civilization and believe our technology will allow our species to prosper, and search for aliens, for a very long time.

***Objective:*** *When the debate turns to the lifetime of civilizations (L), you should argue that* ***L is very big*** *and convince the others this is true.*

SMALL-N FACTION

**Government Lab Physicist (David Morrison; Manhatten project scientist)**

Based on your lifelong involvement with the nation’s nuclear weapons programs, you believe civilizations like ours don’t last long. More likely, they blow themselves up with nuclear weapons (or something worse) within a century or so after discovering radio technology.

***Objective:*** *When the debate turns to the lifetime of civilizations (L), you should argue that* ***L is very small*** *and convince the others this is true.*