Philosophical Aspects of Interstellar Exploration

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Figure: The New Frontier
Interstellar Missions

Some really rough Estimates - from way back then

- Nearest Exoplanet roughly 4 ly away.
- Accelerating to significant fraction of LS takes enormous power and time.
- A starship needs to decelerate at the end of the trip.
- Estimated Cost between 0.1 and 1 GNP US depending on mission type and fuel. (Freeman Dyson 1968, similarly Robert Zubrin 2000)
- Travel time between 10 to 1000s of Generations.
- Communicating from other stars takes a lot of power.
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Interstellar Missions

Pick one!

- Speed
- Size
Interstellar Missions

Pick one!
- Speed
- Size
- Sense of Purpose
Interstellar Missions

Pick two!
- Speed
- Size
- Sense of Purpose
Sleeper Ships
Generation Ships / World Ships / Space Arks
Seed Ships
## Interstellar Mission-Types

<table>
<thead>
<tr>
<th>Mission Type</th>
<th>Max Speed</th>
<th>Payload</th>
<th>Purpose</th>
<th>Perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Ship</td>
<td>High</td>
<td>Small</td>
<td>Survival</td>
<td>Message</td>
</tr>
<tr>
<td>Sleeper Ship</td>
<td>High</td>
<td>Medium</td>
<td>Discovery</td>
<td>Pioneers</td>
</tr>
<tr>
<td>Generation Ship</td>
<td>Low</td>
<td>X-Large</td>
<td>Emigration</td>
<td>Migrants</td>
</tr>
</tbody>
</table>

Table: Mission-Type Comparison
Generation Ships / World Ships / Space Arks
How on Earth...

- Cathedrals are an excellent example for religiously motivated multi-generational endeavours:
  - Cologne Cathedral — 1248 - 1880 (with interruptions)
  - Canterbury Cathedral — 602 - 19th century in different architectural styles
  - Basílica i Temple Expiatori de la Sagrada Família — 1882 - today

- Rendering an interstellar voyage as a voyage of faith, a pilgrimage or any other form of religious endeavour might be a good idea
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Seed Ships
Seed Ships
Ethical Problems:

**Sending unborn life**

Is “survival of humanity” a good enough argument to send unborn life into the unknown?

- Survival of humanity.
- Predetermining (individual) human life.
- Philosophical evaluation of human life.

*It’s complicated*

What really makes a human being?
Ethical Problems:

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What really makes a human being?
Should we not...?

Interstellar Exploration Scenarios
Socioeconomical Grounding
Motivational Aspects
Obligations
Earth first!
Yes We Can

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Sure, but why not do both?
We really should!
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Representation
Legal Framework
Meeting ET

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Research shows that the tardigrade can survive freezing, boiling, extreme pressure, ionizing radiation, starvation, dehydration, and the vacuum of deep space...

Pray they have short memories.
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Planetary protection rules
A binding legal set of rules that is enforced for solar system missions

- Rules for contamination of other Moons and Planets (forward contamination)
- Rules for contamination of Earth (backward contamination)
- 'all of the planets, all of the time'
Rule for forward contamination

Limit to $10^{-4}$ the probability that a single viable Earth cell is introduced into a potential habitat, defined as liquid water or warm ice.
## Comparison of probabilities

<table>
<thead>
<tr>
<th>Probability</th>
<th>Event 1</th>
<th>Event 2</th>
<th>Event 3</th>
<th>Event 4</th>
<th>Event 5</th>
<th>Event 6</th>
<th>Event 7</th>
<th>Event 8</th>
<th>Event 9</th>
<th>Event 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 in 15</td>
<td>Admission to Yale, 2016</td>
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<tr>
<td>1 in 20</td>
<td>Lifetime death from injury</td>
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<td>1 in 133</td>
<td>Admission to RuPaul’s Drag Race, 2017</td>
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<td>1 in 606</td>
<td>Lifetime death from vehicular injury</td>
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<td>1 in 1525</td>
<td>Admission to the NASA astronaut class</td>
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<td>1 in 1615</td>
<td>Yearly death from an injury</td>
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<td>1 in 9737</td>
<td>Lifetime death from aircraft accident</td>
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<tr>
<td>1 in 10,000</td>
<td>One Earth organism into a potential habitat</td>
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<td>1 in 11,207</td>
<td>Yearly death from assault with a gun</td>
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<td>1 in 141,571</td>
<td>Yearly death from falling down stairs</td>
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<tr>
<td>1 in 13,744,732</td>
<td>Yearly death from lightning</td>
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<tr>
<td>1 in 13,983,816</td>
<td>Winning 6-number lottery from pool of 49 numbers</td>
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Extraterrestrial brothers and sisters?!

- Gabriel Funes: "... just as there is a multiplicity of creatures on earth, there can be other beings, even intelligent, created by God."
- No limits to God’s creative freedom
- Humanity may be the 'lost sheep' of the universe.
- There may be other beings 'who remained in full friendship with their creator'.
Problem: Human nature

Figure: Can we fly into outer space and risk taking original sin with us?

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Problem: Redemption

Figure: Can Christianity deal with a race of possible redeemers?