Selecting Astronauts

The Role of Psychologists

Kelley J Slack  Al Holland  Walter Sipes

NASA – Johnson Space Center
Behavioral Health & Performance

Presented at the 122nd Annual Convention of the American Psychological Association on August 8, 2014, in Washington, D.C.
A Snapshot of Astronaut Demographics

Who becomes a US astronaut?

US astronauts selected
Number, by year

- 1959: 7
- 1962: 9
- 1963: 14
- 1965: 6
- 1966: 19
- 1967: 11
- 1969: 7
- 1978: 35
- 1980: 19
- 1984: 17
- 1985: 13
- 1987: 15
- 1990: 23
- 1992: 19
- 1995: 19
- 1996: 35
- 1998: 25
- 2000: 17
- 2004: 11
- 2009: 14

Military or civilian?

- Civilian: 134
- Military: 199

Hours of space flight time
Cumulative hours and year astronaut selected

- Michael Fincke: 9,159 hrs, 1996
- Peggy Whitson: 9,048 hrs, 1996

Which ones have flown the most
By total number of flights and year selected

- Franklin Chang-Diaz, 1980: 7
- Jerry Ross, 1980: 7
- Michael Foale, 1987: 6
- Curtis Brown Jr., 1987: 6
- Story Musgrave, 1967: 6
- John Young, 1962: 6

Sex of astronauts

- Male: 286
- Female: 48

Source: NASA
Application Status

Your application materials have been submitted for consideration to the Johnson Space Center for Astronaut Candidate.

Make sure that you have read the announcement carefully and submitted all required documentation and application materials. Please note that submitting your resume and documents from USAJOBS may not be the only step in the process.

You may monitor the status of your application for Astronaut Candidate on the Application Status page on USAJOBS.
## Milestones in Selection 2013

<table>
<thead>
<tr>
<th>Milestone</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications received</td>
<td>6113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After review for basic qualifications, etc.</td>
<td>4552</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating panel review</td>
<td>483</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six initial interview weeks-ASB</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five final interview weeks-ASB</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASB recommendations to JSC director</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>ASB recommendations to NASA Administrator</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Notify interviewees and announce Class of 2013</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>ASCAN Class of 2013 reports for training</td>
<td></td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

ASB = Astronaut Selection Board  
JSC = Johnson Space Center
### Milestones in Selection 2013

<table>
<thead>
<tr>
<th>Event</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applications received</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>After review for basic qualifications, etc.</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Rating panel review</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Six initial interview weeks-ASB</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five final interview weeks-ASB</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASB recommendations to JSC director</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASB recommendations to NASA Administrator</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notify interviewees and announce Class of 2013</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASCAN Class of 2013 reports for training</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ASB = Astronaut Selection Board  
JSC = Johnson Space Center
What is the goal of BHP?

• To weed out those not qualified to be astronauts due to medical psychopathology (Select-Out)
• To identify those best suited to being astronauts (Suitability)
What Makes Selecting Astronauts Challenging?

- Predicting behavior so far in the future
- Job likely to change before those selected fly
- Differentiating amongst a homogeneous pool
- Constrained by culture, ethics, law

---

**Basic Training**
~ 1.5 – 2 years

**Advanced Training**
~ 1.5 – 2 years

**Refresher Training**
As Required

**Increment-Specific Training**
~ 2.5 years

**Flight**
~ 6 mos – 1 yr

**Certification**

**Flight Assignment**

**ISS Crewmember**
Simplified Overview of the BHP Role
In Astronaut Selection

Round 1

SUITABILITY
- Psychological Testing
- Test Brief
- Team Exercises

SELECT-OUT
- Select-Out Interview

Round 2

- Suitability Interview
- Clinical Staffing
- Competency Based Summary
- Clinically Qualified/Disqualified
- Astronaut Selection Board
- Astronaut Medical Board
The Select-Out Process

• What does it mean to be considered qualified (Q) or disqualified (DQ)?
• Why is this a binding decision?
• What criteria are used to determine medical psychopathology?
• Once DQ always DQ?
Generalizability of NASA BHP’s Select-Out Process

- Greatest generalizability to public safety occupations
- Safety and ethics can be an issue at work for most any job
- More common methods for psychological select-out
  - Alcohol/drug screening
  - Situational judgment tests
  - Integrity/honesty tests
  - Counterproductive work behavior personality tests
Suitability

What it is … What it isn’t

Chris Hadfield of Bowie’s Space Oddity fame on YouTube
Simplified Overview of the BHP Role In Astronaut Selection

**Round 1**
- Psychological Testing
- Test Brief
- Team Exercises
- Suitability Interview

**Round 2**
- Clinical Staffing
- Competency Based Summary
- Clinically Qualified/Disqualified
- Astronaut Medical Board
- Astronaut Selection Board

**SUITABILITY**

**SELECT-OUT**
Suitability: Sample Competencies

1. Mental/Emotional stability
2. Performance under stressful conditions
3. Group living skills
4. Teamwork skills
5. Family issues
Team Exercises

• **Goals of team exercises**
  - To assess an applicant’s ability to perform in a team
  - To assess performance in terms of a subset of our competencies

• **Development of team exercises**
  - A lower fidelity simulation
  - Require applicants to work together to solve a series of tasks requiring physical and mental agility
Team Exercises
Evaluation and Generalizability

• Does it work?
  – Favorable feedback from astronauts, applicants, and assessors
  – Elicited a range of behaviors
  – Used BARS to assess on a tablet-based app

• Could it be applied to other jobs requiring problem-solving in the field?
  – Public safety occupations
  – Chemical and refinery plant and rig occupations
The Future of Psychological Assessment at NASA

- Remain a clinical process
- Revisions in response to updated competencies
- Little change to basic flow expected
- Continue to explore methods of gathering data
  - Situational judgment test
  - Biodata
Thank You