WHO'S BEEN UP THERE?
A LOOK AT ASTRONAUT AND PAYLOAD SPECIALIST DEMOGRAPHICS

Jacobs, Samuel, PhD[1]; Charvat, Jacqueline, PhD[1]; Wear, Mary, PhD[1]; Reitzel, Ruth, PhD[1]; Van Baalen, Mary, PhD[2]; Keune, Jessica, PhD[2]

1 KBR, Houston, TX 77058

2 NASA Johnson Space Center, Houston, TX 77058

Purpose: As spaceflight continues to advance, understanding who has been to space in the past and what occurred during those missions can help us better create a contextual foundation for the data that has been collected. This foundation can in turn guide how data may be generalized and applied to future crew selections and mission programs.

Who They Are

Breakdown of astronauts and payload specialists by sex and status as of 12/31/2023

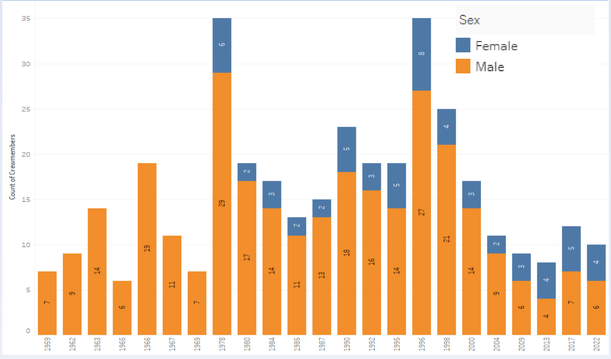
	Astronaut		Payload Specialist		Grand Total
	Male	Female	Male	Female	
Active	29	20			**49**
Former	194	34	22		**250**
Deceased	76	7	4	2	**89**
Grand Total	**299**	**61**	**26**	**2**	**388**

NASA began selecting crewmembers in 1959. Since then, 22 additional selection classes have identified 381 more individuals to be astronauts or payload specialists.

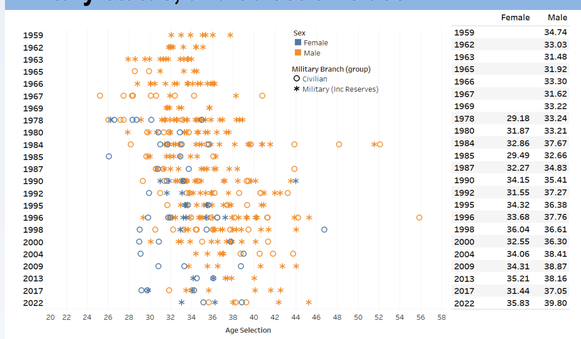
The first female crewmembers were selected in 1978. Selection of females has ranged from 11% to 50%. Since 2009, all classes selected were at least 30% female.

The average age at selection for each class has trended older over time, in both male and female crewmembers.

Sex of crewmembers by selection class

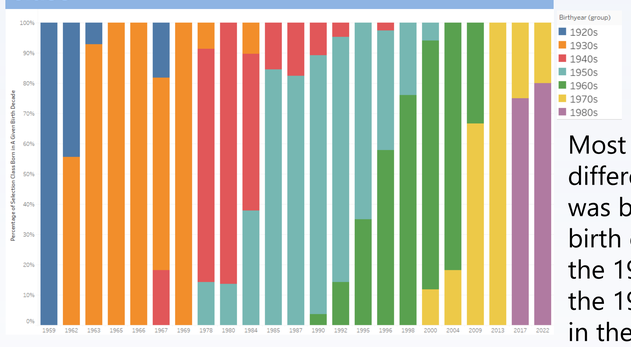


Average age of crewmembers at selection by sex, military status, and selection class



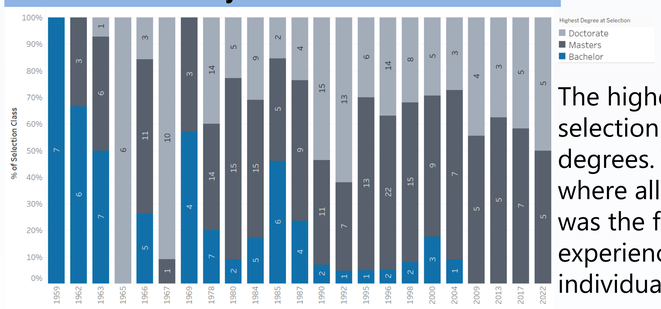
	Female	Male
1959		34.74
1962		33.03
1963		31.48
1965		31.92
1966		33.30
1967		31.62
1969		33.22
1978	29.18	33.24
1980	31.87	33.21
1984	32.86	37.67
1985	29.49	32.66
1987	32.27	34.83
1990	34.15	35.41
1992	31.55	37.27
1995	34.32	36.38
1996	33.68	37.76
1998	36.04	36.61
2000	32.55	36.30
2004	34.06	38.41
2009	34.31	38.87
2013	35.21	38.16
2017	31.44	37.05
2022	35.83	39.80

Birth cohort breakdown of each selection class



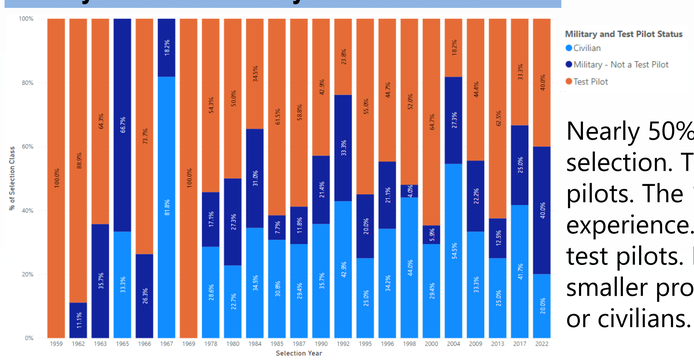
Most selection classes contained between two to three different birth cohorts, or the decade in which someone was born. Five other selection classes contained only one birth cohort. Everyone in the initial 1959 class were born in the 1920s. Three classes contained only individuals born in the 1930s and one class only contained crewmembers born in the 1970s.

Education status by selection class



The highest education ascertained by crewmembers at selection has shifted to include more masters and doctorate degrees. The 1965 selection class was the only class to date where all those selected had doctorates. Further, this class was the first class without a requirement for pilot experience. The last four classes have all only included individuals with a masters or doctorate degree.

Military and test status by selection class



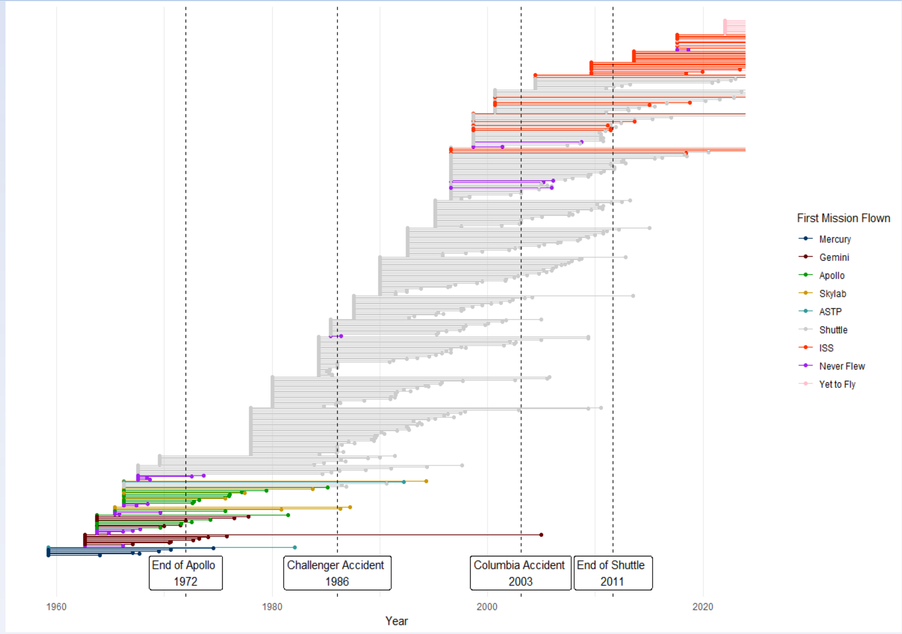
Nearly 50% of astronauts were military test pilots before selection. Two selection classes (1959 and 1969) were all test pilots. The 1965 and 1967 classes did not require pilot experience. All other classes included a large proportion of test pilots. Military astronauts who were not test pilots were a smaller proportion of most selection classes than test pilots or civilians.

What They've Done

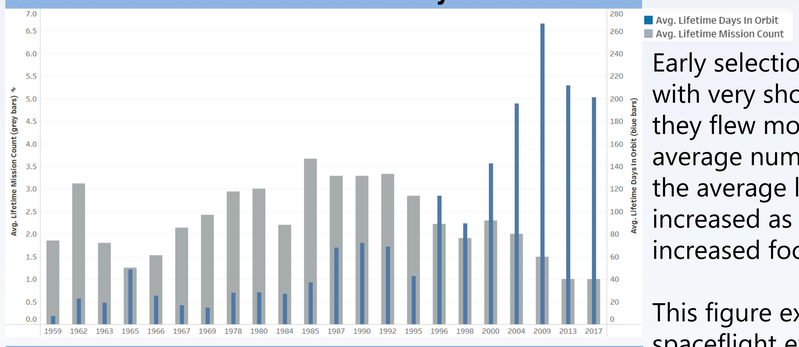
This figure looks at the career lengths of the selection classes to find potential clustering of retirements around mission breaks and the end of programs.

The mission break due to the Challenger accident appears to result in a disproportionate number of retirements. Similar effects do not seem to appear after the Columbia accident. With crewmembers whose first mission was on the Shuttle, clustering occurred at the end of the Shuttle program due to several individuals not continuing with the ISS program.

Career length from selection to retirement in years by first mission program



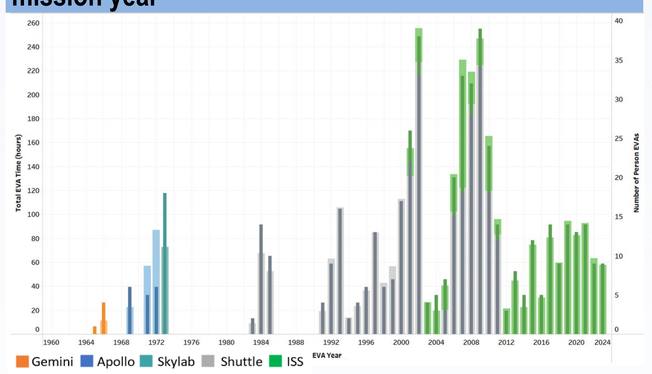
Cumulative mission time and count by selection class



Early selection classes were selected for missions with very short durations (blue bar), but on average they flew more missions (grey bar). While the average number of missions never exceeded four, the average lifetime days in space has greatly increased as long duration missions have become an increased focus.

This figure excludes individuals who had no spaceflight experience.

Number of Person-EVAs and total time of EVAs by mission year



Each bar represents the number of Person-EVAs and the shading represents the total EVA time by year.

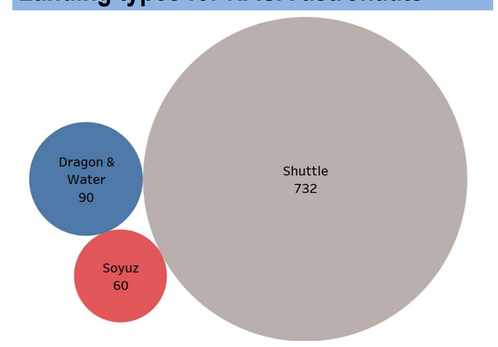
The first EVAs were conducted during the Gemini program. However, the height of historical EVA usage in terms of number and time, came during the concurrent ISS and Shuttle programs, as ISS was being built.

Why Is This Data Important

As NASA exploration and commercial Low Earth Orbit (LEO) efforts expand, understanding who has been a part of the history of space flight is imperative. Tools like IMPALA can help with understanding this historical data and provide context to our research and surveillance efforts, such as the Human System Risks.

An example of one area this shift will occur is within landing types. To date, Shuttle landings make up most landings that have taken place. However, current mission efforts are a return to water landings. Information gleaned from Shuttle landings may need to shift.

Landing types for NASA astronauts



Acknowledgments: This data was pulled and generated using the IMPALA platform; effort funded by NASA Crew Health and Safety.