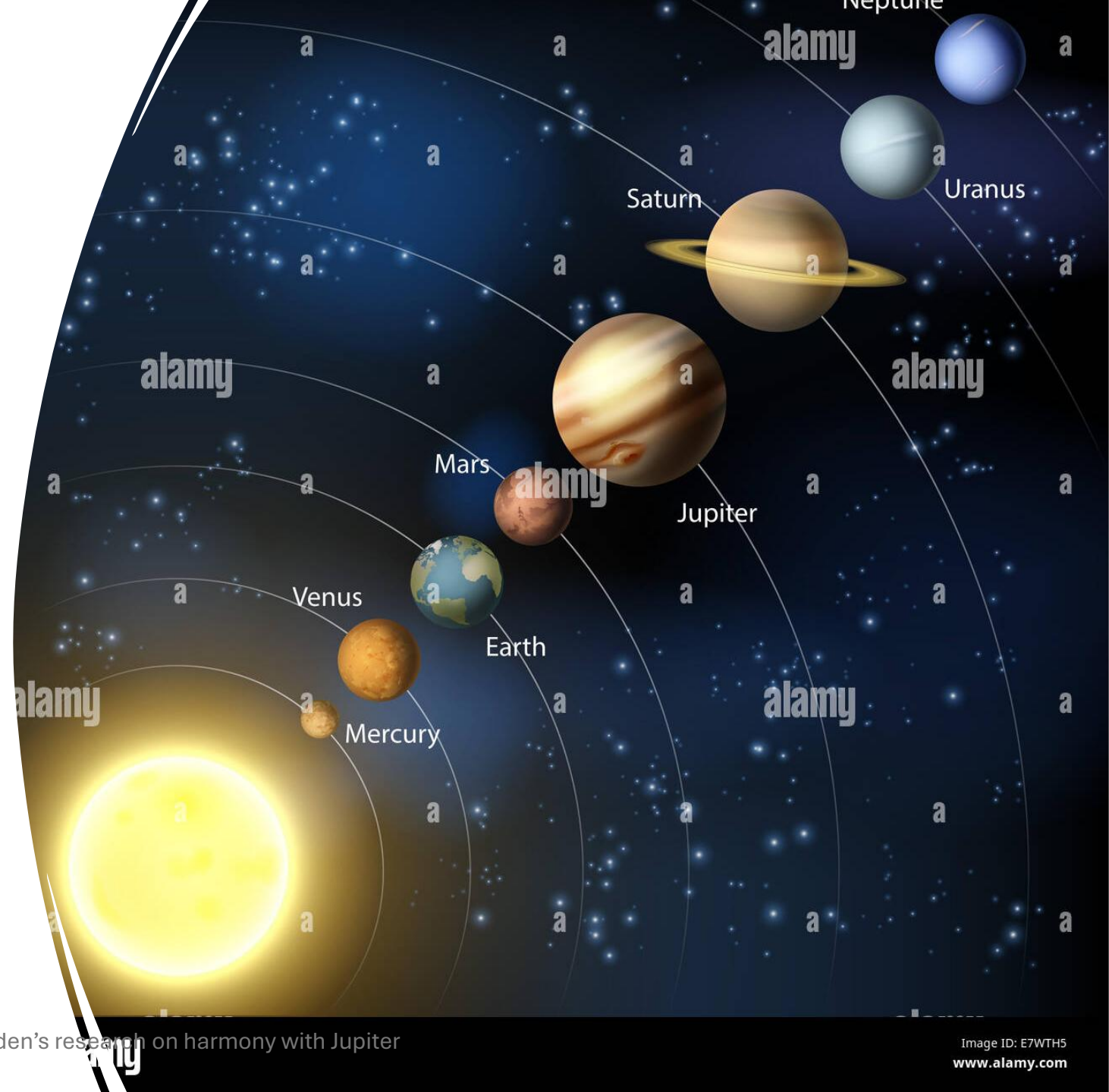


Planet Orbit Times are Tuned to Jupiter's Orbit

By Paul VanRaden



Pairwise vs. Overall Harmony

- Several planets have orbit times close to harmonic ratios
 - Known since Kepler in 1621
 - [Who synchronized the planets? The mystery of orbital resonances](#)
- Nearly all studies test simple pairwise ratios
- Close neighbors with similar mass may affect each other most
 - Orbit ratios among many planet pairs may be near integers by chance
 - See: [Orbital resonance - Wikipedia](#)
- But Jupiter has 71.2% of the total mass of planets
 - Planetary masses and orbit times were as [published by NASA](#)
 - I tested the hypothesis that Jupiter is more important than neighbors
 - Divide all planet orbit times by Jupiter's orbit time
 - Jupiter also moves the Sun in a circle $1/1000^{\text{th}}$ as large as its own orbit
 - Planets near the Sun need to synchronize with the Sun's "orbit"

2018 orbit research

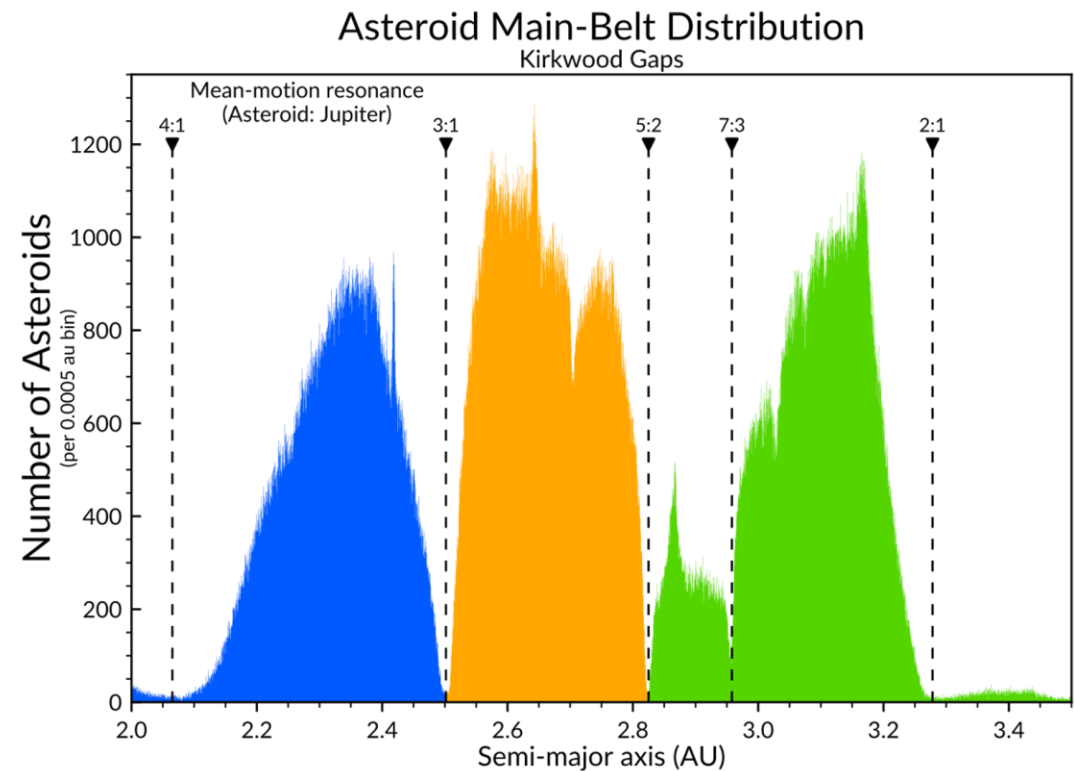
- Aschwanden, M.J. 2018. [Self-organizing systems in planetary physics: Harmonic resonances of planet and moon orbits](#). *New Astronomy* 58:107-123
 - Research from Lockheed Martin compared harmonic ratios to orbit times
 - Tested only pairwise ratios with some good fits for planets and moons
 - Also included Pluto as outer planet and Ceres from asteroid belt
- “We conclude that the two-body interactions of neighbored planet-planet systems are more important in the resonant stabilization of orbits than the influence of the largest giant planet (Jupiter), except for planet–asteroid pairs.”
 - But the study tested only numbers 1-5 in their resonance ratios
 - Planets distant from Jupiter must have larger numbers and wider ratios!

My previous research on harmony

- My piano tuning research from year 2002 is at:
 - [Music and Math in Harmony](#)
- For music, the best harmony uses an overall set of frequencies instead of simple ratios among sequential pairs
- Linear harmony or jointed linear harmony
 - Increment the numerator while holding the denominator constant
 - Example numerators 4:5:6:7:8 with denominator 1, or 2, or 4, etc.
 - Piano is missing note 7 but has ratios 4:5:6:8 for keys C1:E1:G1:C2
- Reciprocal harmony or jointed reciprocal harmony
 - Increment the denominator while holding the numerator constant
 - Example denominators 4:5:6:7:8 with numerator 8, or 4, or 2, etc.

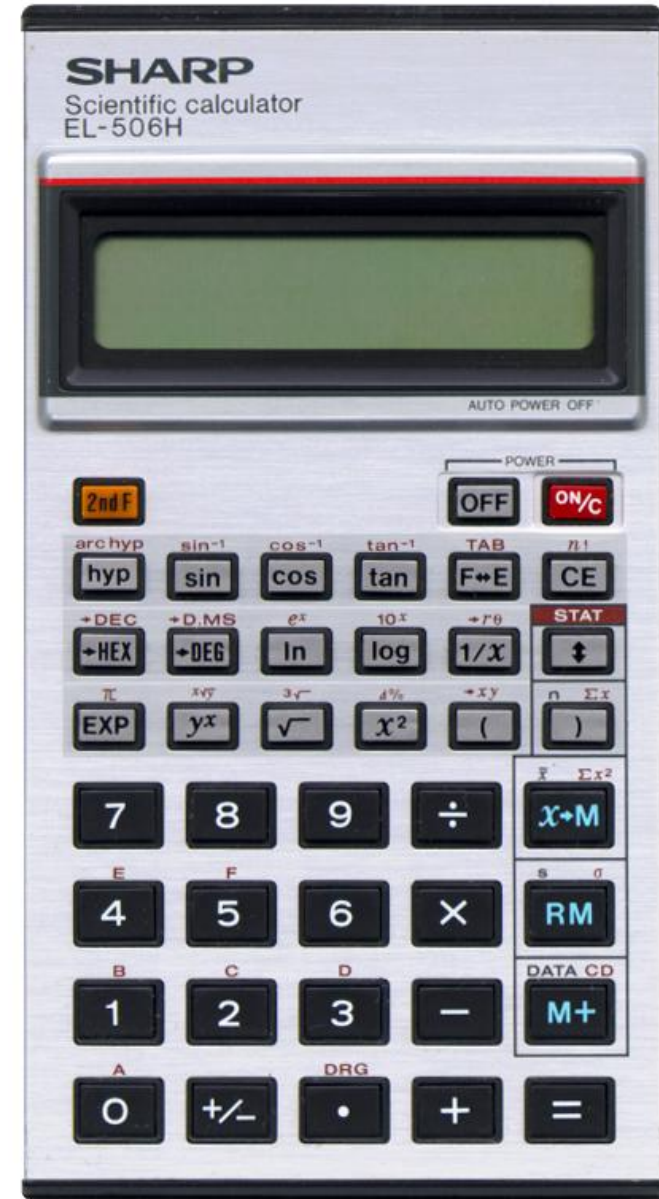
Use Jupiter's orbit as common denominator

- Jupiter's mass is 71.2% of the total of all planets
 - All other planets may be tuned to Jupiter
 - Held by eccentricity of orbits
- Kirkwood gaps in asteroid belt
 - Graph by Thunkii, based on previous version by Alan Chamberlain, JPL/Caltech - Own work, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=192090799>
- Ceres stays below the 5:2 gap



Computation

- All calculations for this research took me about 1 hour using only my SHARP EL-506H Scientific calculator.
- It is solar and has generated its own electricity since 1983 when it was manufactured.
- During those 43 years, Jupiter went around the Sun $43 / 12 = 3.58$ times.



Ratios of orbit times relative to Jupiter

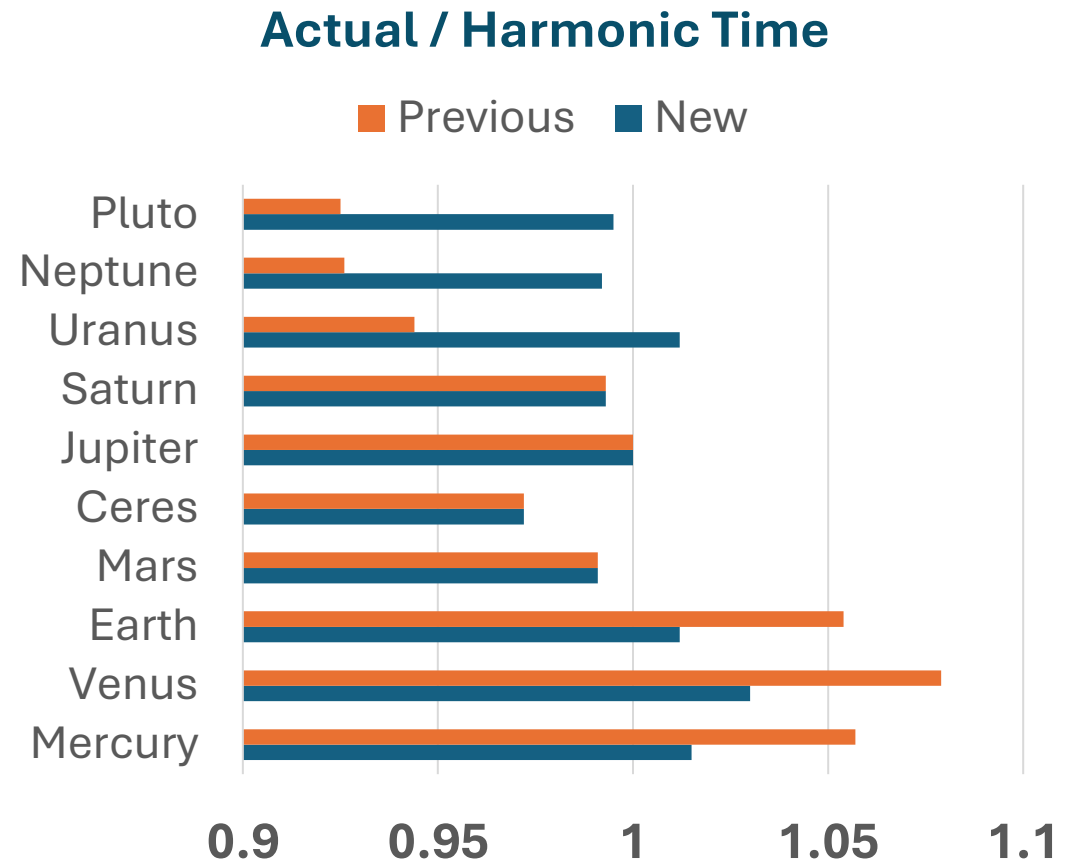


Planet	Mass %	Orbit time	Harmonic time		Harmonic ratio		Harmony sequence	
			New	Previous	New	Previous	New	Previous
		Observed						
Mercury	0.01	0.0203	0.0200	0.0192	1 / 50	12 / 625	2 : 5	2 : 5
Venus	0.18	0.0519	0.0500	0.0480	1 / 20	6 / 125	3 : 5	3 : 5
Earth	0.22	0.0843	0.0833	0.0800	1 / 12	2 / 25	25 : 48	1 : 2
Mars	0.02	0.1586	0.16	0.16	4 / 25	4 / 25	2 : 5	2 : 5
Ceres	0.00	0.3886	0.40	0.40	2 / 5	2 / 5	2 : 5	2 : 5
Jupiter	71.2	1.0000	1.00	1.00	1 / 1	1 / 1	2 : 5	2 : 5
Saturn	21.3	2.4824	2.5	2.5	5 / 2	5 / 2	5 : 14	1 : 3
Uranus	3.3	7.0825	7.0	7.5	7 / 1	15 / 2	1 : 2	1 : 2
Neptune	3.8	13.8917	14.0	15.0	14 / 1	15 / 1	2 : 3	2 : 3
Pluto	0.00	20.8993	21.0	22.5	21 / 1	45 / 2		

Ratios of Actual to Harmonic Orbit Times

(Should be close to 1.0)

Planet	New	Previous
Mercury	1.015	1.057
Venus	1.030	1.079
Earth	1.012	1.054
Mars	0.991	0.991
Ceres	0.972	0.972
Jupiter	1	1
Saturn	0.993	0.993
Uranus	1.012	0.944
Neptune	0.992	0.926
Pluto	0.995	0.929



Conclusions

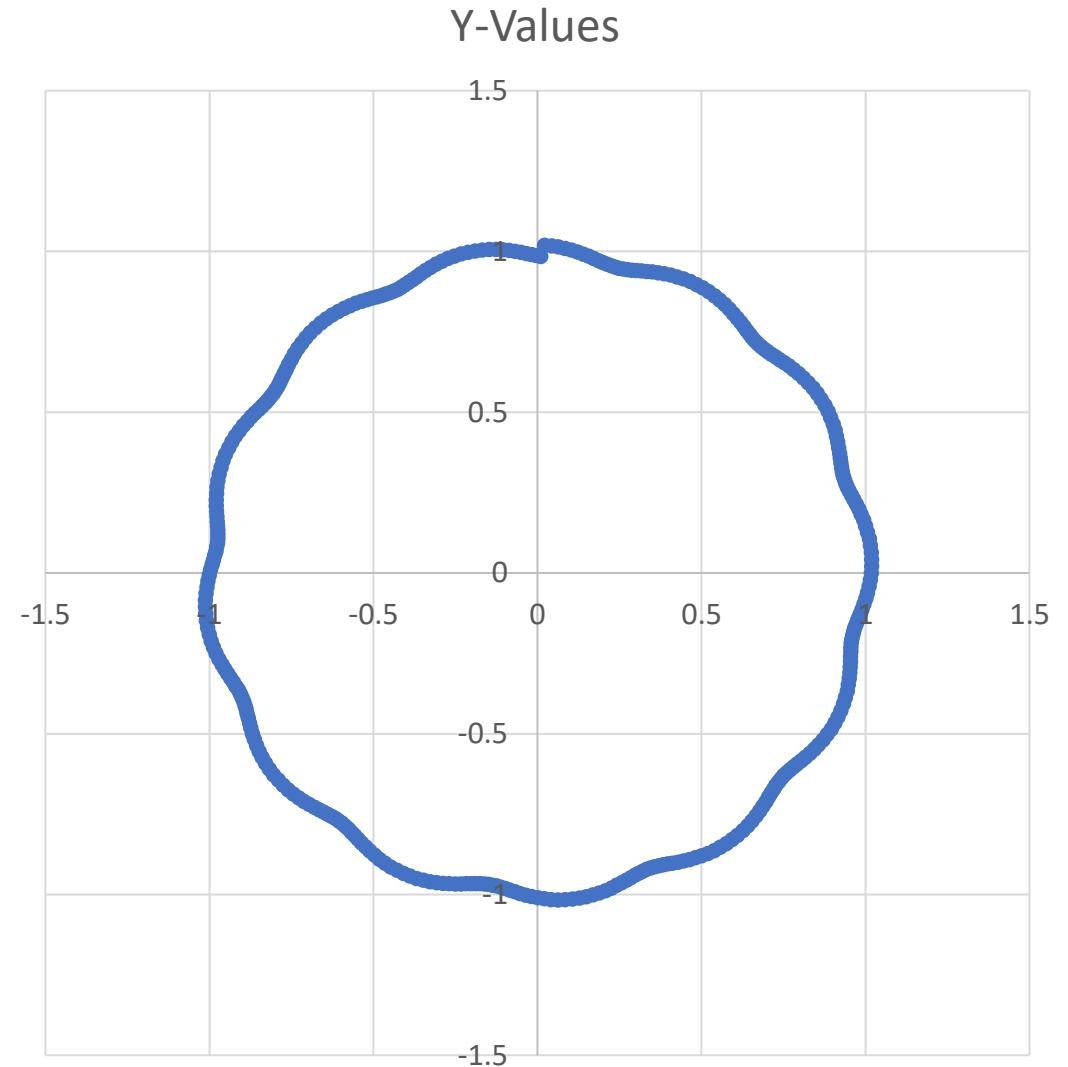
- Most planets have near harmonic ratios with Jupiter's orbit
 - While Jupiter does 1 orbit, Mercury does 50, Venus does 20, and Earth does 12 orbits
 - While Uranus, Neptune, and Pluto each do 1 orbit, Jupiter does 7, 14, and 21 orbits, respectively
 - I was happy to see ratios of 1:7:14:21, which my piano tuning also uses
- Jupiter harmony gives simpler ratios and fits actual orbits better
 - Largest planet acts as common denominator for smaller planet orbits
 - Better fit for inner and outer planets but same ratios for middle planets
- Simple pairwise ratios multiply to give poorer distant ratios

Further explanations

- Why do asteroids avoid simple ratios with Jupiter while planets stay near simple ratios?
- Elliptical orbits with different angles and distances at different times during their orbits can explain how harmony is maintained
 - See: [Who synchronized the planets? The mystery of orbital resonances](#)
 - Read: [Physics in orbital resonance](#), by Y. Jiang, 2007
 - Or pay \$35 (I did not pay) to read: [Orbital Resonances in the Solar System](#) by S. J. Peale, 1976, Annual Review of Astronomy and Astrophysics 14:215

Lunar orbit around earth and sun

- “This was not Newton’s mode of philosophizing. Very few general propositions are just in application to a particular subject.
- The moon is not kept in her orbit round the earth, nor the earth in her orbit round the sun, by a force that varies merely in the inverse ratio of the squares of the distances.
- To make the general theory just in application to the revolutions of these bodies, it was necessary to calculate accurately the disturbing force of the sun upon the moon, and of the moon upon the earth;
- and till these disturbing forces were properly estimated, actual observations on the motions of these bodies would have proved that the theory was not accurately true.”
- Malthus, T.R. 1798. *An essay on the principle of population.*



My report under Neptune: February 1, 2026

- I went to a Rock and Roll concert / laser light show only 5 km (3 miles) away.
- The stage and the excellent band [FireFly](#) were under a full moon with Neptune shining brightly a few degrees away to the south, just as planetary math had predicted.
- A 49-second video of my grand finale drum roll using colorful, lighted drumsticks is [posted here](#).

