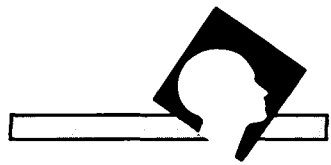
Worldwide Disasters and Moon Phase

I. W. KELLY, D. H. SAKLOFSKE, and ROGER CULVER

Throughout history the moon has been associated with a great many human activities. Lieber (1978), for example, reviews lunar speculations regarding murder, aggression, evolution, romance, birth rate, human restlessness, fatal traffic accidents, and civilization in general. The moon is especially hypothesized to be associated with notable crimes and disasters; and Lieber (1978, p. 12) contends that the most violent crimes have occurred at the time of the full moon. Since some advocates of lunar effects point to calamitous events that have occurred during the times of the full moon as evidence of such effects, one would expect to observe a strong relationship between the full moon and an increase in the frequency of notable or great disasters. The reasons for this supposed correlation or even causal relationship are not always clear (Culver, Rotton, and Kelly 1988).



An empirical investigation shows no relationship between moon phase and disaster occurrence.

We have conducted a small-scale exploratory examination of this possibility. Since we are dealing with "notable" disasters or those that involve a great number of deaths or receive a large amount of media coverage, the sample sizes in this study are smaller than those typically used in investigating lunar effects. By definition, a notable disaster does not occur very often. Given the small sample sizes, only a relatively large lunar relationship would be expected to come out of this study. However, while small effects may be of interest to the scientist and theoretician, the average person is more interested in relationships that have a predictive value in everyday life. This study

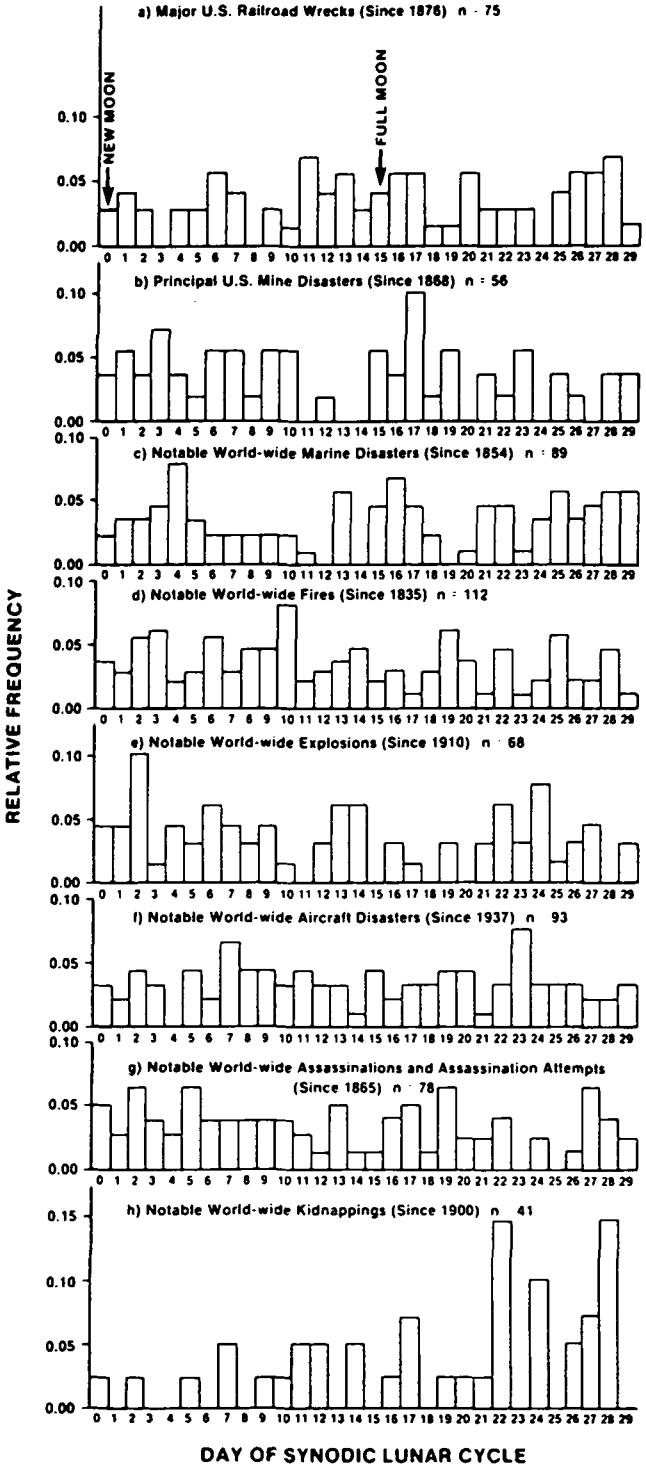


FIGURE 1. Histograms of notable disasters according to day of synodic lunar cycle. (Source: *The World Almanac and Book of Facts 1989*. World Almanac, New York.)

focuses on the belief that there is a practicable relationship between lunar phase and disaster. Our source for the disasters was *The World Almanac and Book of Facts 1989*.

An examination of the relative frequency of the disasters graphed according to day of the synodic lunar cycle (Figure 1) indicates that the full moon days have no elevated frequencies of disaster occurrence. A statistical analysis (4 × 8 chi square) revealed no evidence of a relationship between frequency of type of disaster (U.S. railroad accidents, U.S. mine disasters,[1] marine disasters worldwide, fires worldwide, aircraft disasters worldwide,[2] and explosions, assassinations, and kidnappings worldwide) and five days centered on each of the four phases of the moon (new moon, first quarter, full moon, and third quarter): $[x^2(21) = 17.48, \quad p = 0.68]$, where $n = 426$.

Similarly, an analysis (one factor chi square) with disasters and five days centered on a moon phase did not result in evidence that disasters occur more often during any one moon phase $[x^2(3) = 1.51, p = 0.68]$.

Finally, an overall analysis across all disasters provided no evidence that disasters (of all types) tend to occur on any one *day* of the synodic lunar cycle more often than on any other $[x^2(28) = 30.16, p = 0.36]$.[3]

These findings are consistent with other reviews that have failed to find a relationship among psychological, physical, and sociological behaviors and the synodic lunar cycle (Kelly, Rotton, and Culver 1985; Culver, Rotton, and Kelly 1988; Martens, Kelly, and Saklofske 1988; McFarlane, Martin, and Williams 1988; Coates, Jehle, and Cottington 1989).[4]

In conclusion, in these analyses we have looked at eight types of disasters and their frequencies at the four phases and moon-day of the lunar cycle. No evidence was uncovered that supports the folklore that there is a relationship between moon phase and disasters that has a usefulness in everyday life.[5]

Notes

1. Only 56 of the 66 mine disasters mentioned in the *World Almanac* were utilized in this analysis. Prior to 1968, the *World Almanac* recorded only disasters in which 60 or more lives were lost. After 1968, all mine disasters in which five or more lives were lost were recorded. We have analyzed only data in which 60 or more lives were lost. However, the data eliminated do not affect our conclusions. On the contrary, not one of the ten dates omitted occurred on one of the five days centered at the full moon.

It should also be pointed out that where a disaster occurred over several days, the first day that the disaster occurred was the date we recorded.

2. The negative finding regarding notable aircraft disasters is consistent with Kelly, Saklofske, and Culver (1990), who found no relationship between all fatal aircraft accidents (one or more people killed) and moon phase in Canada over an eight-year period.

3. A spectral analysis would have been a more powerful statistical tool than chi square to analyze the present data. Unfortunately, the long time period covered and/or small sample sizes of our studies preclude such an analysis. The study was conducted, however, with the statistical power of the analysis in mind. The sample size for the 4 × 8 contingency table was $n = 426$. We decided that an effect size described by Cohen (1977) as "moderately small" ($w = 0.20$, Cramer's $\varphi' = 0.12$) would be of sufficient importance for the purposes of our study. In addition, because of the exploratory nature of looking for lunar relationships in this area we adopted a less stringent significance level ($\alpha = 0.10$). The power of our (4 × 8) analysis for detecting the abovementioned effect size ($\alpha = 0.10$) is 0.74. Similarly, the one-factor chi-square across the four phases for all disasters ($n = 426$) under consideration has power = 0.97 for a noticeably useful relationship ($w = 0.20$), but this analysis would have only a one-in-two chance of picking up a weaker effect ($w = 0.10$) The one-factor chi-square across *moon-day* for all disasters ($n = 612$) under consideration has power = 0.80 for $w = 0.20$ but only a one-in-three chance of detecting a weaker effect

(w = 0.10). All analyses have too small a sample size to detect a *weak* lunar relationship with any degree of confidence.

4. For an agnostic but contrary view of the substantial issues involved in investigating lunar effects on human behavior see Cyr and Kalpin (1987).

5. We would like to thank James Rotton for critical comments on an earlier draft of this paper.

References

Culver, R., J. Rotton, and I. W. Kelly. 1988. Moon mechanisms and myths: A critical appraisal of explanations of purported lunar effects on human behavior. *Psychological Reports*, 62:683-710.

Coates, W., D. Jehle, and E. Cottington. 1989. Trauma and the full moon: A waning theory. *Annals of Emergency Medicine*, 18(7):763-765, July.

Cohen, J. 1977. *Statistical Power Analysis for the Behavioral Sciences* (rev. ed.). New York: Academic Press.

Cyr, J. J., and R. A. Kalpin. 1987. The lunar-lunacy relationship: A poorly evaluated hypothesis. *Psychological Reports*, 62:391-400.

Kelly, I. W., J. Rotton, and R. Culver. 1985. The moon was full and nothing happened. SKEPTICAL INQUIRER, 10(2):129-143.

Kelly, I. W., D. H. Saklofske, and R. Culver. 1990. Aircraft accidents and disasters and the full moon: No relationship. *Psychology*, forthcoming.

Lieber, A. L. 1978. *The Lunar Effect*. Garden City, N.Y.: Anchor Press/Doubleday.

Martens, R., I. W. Kelly, and D. H. Saklofske. 1988. Lunar phase and birthrate: A 50-year critical review. *Psychological Reports*, 63:923-934.

McFarlane, J., C. Martin, and T. Williams. 1988. Mood fluctuations, women versus men, and menstrual versus other cycles. *Psychology of Women Quarterly*, 12:201-223.

World Almanac. 1987. *The World Almanac and Book of Facts 1988*. New York: World Almanac.

Ivan Kelly and Don Saklofske are professors in educational psychology at the University of Saskatchewan, Canada. Roger Culver is an astronomer at Colorado State University.