Update on the "Mars Effect"

SUITBERT ERTEL

The following article reports on a long-standing controversy about the so-called Mars effect hypothesis of the late Michael Gauquelin. The author, Professor Suitbert Ertel, cooperated with Gauquelin in evaluating certain aspects of Gauquelin's work. The article has been several years in preparation, review, and revision. Following it we publish a brief note by Paul Kurtz criticizing one key aspect of the analysis. Another study of the Mars-correlation claims, this by a French group that worked totally independently from Gauquelin, has just recently been completed. We plan to report on its conclusions when they become available. — Editor

Recent work on Gauquelin's alleged planetary effects reveals further puzzles.

The "Mars effect" is the most provocative claim of astrological descent because it is based on immense statistical research. It was launched in 1955 by Michel Gauquelin, who until his untimely death in May 1991 expanded with formidable energy what he thought would eventually release a Kuhnian revolution. Gauquelin was born in Paris in 1928. His interest in astrology began early. At age ten he could calculate a birth chart. At school his chart readings were so amazing that his friends called him Nostradamus. But were the claims of astrology true? Unconvinced by the success of his readings, and by the opinions of astrologers, Michel Gauquelin decided to find out for himself.

After graduating with a major in psychology from Sorbonne University in 1949, he began testing astrology nearly full-time, assisted in later years, until 1982, by Francoise Schneider-Gauquelin. His data and results comprise a dozen books (many translated into several languages) and about 150 scientific articles and monographs. During the first stage of this huge effort the results were negative for nearly

every hypothesis he tested, from simple ones like zodiac signs to more complex ones like planetary aspects and transits. He also tested astrologers to see if they could match birth charts to people of opposite characteristics, such as long-lived vs. died in infancy. But "astrologers regularly fail these tests and are sometimes so disillusioned that they accuse me of rigging the cases" (Gauquelin 1983:139). These negative findings have been amply confirmed by others. (For a review, see Eysenck and Nias 1982;

also Dean 1986, for an update on tests of astrologers.)

However, when Gauquelin tested planetary positions relative to the horizon, to his surprise the results were positive. At the birth of eminent people, some planets (not all of them) seemed to concentrate in some sectors of the sky more than they should. (See Figure 1.) When expressed as a correlation the effect was typically 0.05 (Kelly et al. 1990:64), where 0 is no correlation and 1 is perfect correlation. So the deviation from what was
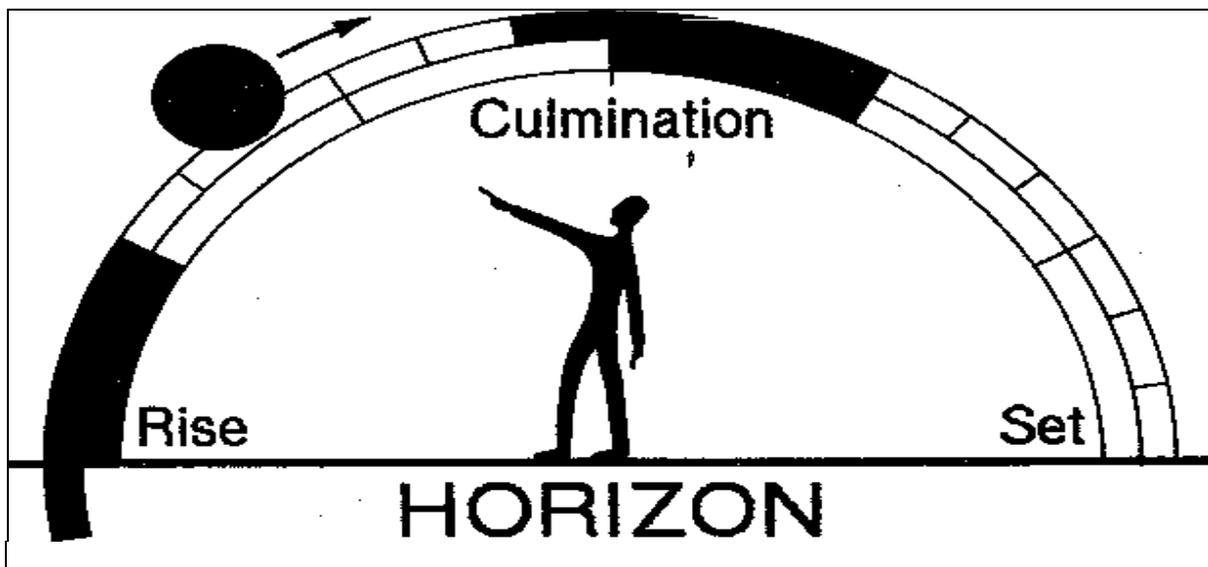

Figure 1: The "Mars effect"

At the birth of eminent people, Gauquelin found that certain planets seemed to be in the sectors shown in black (called "key sectors") more than expected by chance, or in some cases *less* than expected. The planets movement was divided into 12 sectors (inner circle, 6 above horizon, 6 below), or 36 sectors (outer circle), in which case the proportion of key sectors was slightly increased. Astronomical and demographic influences were carefully controlled to avoid attracts, i.e., spurious effects. The surplus or deficit varied between 9 and 28 percent of the expected frequency, mean 14 percent, and was statistically too significant (typically p = .0001) to be a statistical artifact even when adjusted for the number of tests. Sample sizes varied between 866 and 3,047, mean 1,650.

Gauquelin tested 11 professions, and in each case he found a relationship with one or more of five bodies, namely, Mars (after which it is named), the moon, Venus, Jupiter and Saturn, but not with the other planers or the sun. Different planets "favored" different professions; for example, the planet preferring key sectors was Jupiter for actors, Saturn for scientists, the moon for writers, and Mars for doctors, military leaders, and sports champions. It was also Mars for painter, writers, and musicians, but here Mars *avoided* key sectors. No effect was observed at the birth of ordinary people. The figures quoted ore from Gauquelin 1984.

expected was very tiny. But it replicated when tested on new data and was statistically too significant to be ignored. A readable account and a later update, both essential reading for anyone interested in this work, are given by Gauquelin (1983; 1988b).

Gauquelin Hypotheses. For sports champions and Mars the relationship became known as the "Mars effect." It became famous, not because it was the only effect, but because it was the first to be independently tested. It illustrates two general hypotheses that Gauquelin formulated in 1960, based on a total sample of 20,396 cases, which guided his work from then on:

— Different professions are linked to different planets.

— The relationship increases with eminence and disappears for noneminent persons.

His subsequent work supported both hypotheses, although the effect size remained very tiny. Please note that I use the term *effect* in the sense of statistical correlation, not to imply that planets actually cause something.

A Fascinating Puzzle. Gauquelin's results have created a fascinating puzzle. His negative results pleased skeptics but upset astrologers, who Found them hard to explain. His positive results pleased astrologers but upset skeptics, who found them equally hard to explain.[1,2] The outcome of this uneasy balance has been 40 years of attack from both sides. Skeptics will not, of course, share with astrologers any problem in explaining the negative results. But what about the positive results?

The positive results raise many questions. Are they genuine or due to artifacts? Why only with eminent people? If eminent people are related to the moon and four planets, why

not the sun and other planets? Why do sector positions count and not zodiac signs or planetary aspects? If planet-birth relations are genuine, what could be the cause? Since 1985 I have been investigating these puzzles using trustworthy tools of analysis. The rest of this article is a nontechnical summary of what I found.[3] Full details are available elsewhere (Ertel 1986-1991).

Factor Analysis of 36 Sectors. The crucial question guiding my first seductive involvement with the planets was simple but vital: Is the Gauquelin data trustworthy? To answer it I submitted his total data to multivariate analyses, for unclean data, although possibly supporting a particular idea, should not give rise to any clean overall pattern. The outcome was two tests reported in detail in Ertel (1990).

In the first test I factor-analyzed the planetary frequencies in 36 sectors for births in each of the 11 professions. Differences between sample sizes and between sector expectancies were first removed by a statistical procedure known as z-transformation. The actual analysis was of difference values (eminent people minus ordinary people) to control astronomical and demographical influences, both of which were a concern for early Gauquelin critics.

Factor analysis looks at otherwise perplexing amounts of data to see if there is a small set of underlying dimensions that explain most of the surface variation. For example, factor analysis of behavior in a restaurant might reveal two underlying factors, namely, talking and eating, which together would account for most of the variation in behavior. If planets are unrelated to professions, then factor analysis should fail to reveal factors underlying the variation of

birth frequencies across 36 sectors. Instead, it should reveal only random variance, i.e., noise. But from 11 X 36 birth frequencies obtained from 11 professions (a total of 20,396 eminent people), a clear factor was extracted, on which Gauquelin's key sectors showed appreciable positive loadings of 0.5 to 0.8. In other words the key sectors explained most of the variation in birth frequencies.

Thus factor analysis confirmed the idea of planet-birth correlations largely independent of particular Gauquelin observations. Nevertheless it could be argued that I was merely analyzing data that had been selected in the first place. My second test avoided this problem.

Cluster Analysis of 11 Professions. In the second test I subjected the 11 professions to hierarchical cluster-analysis based on sector frequencies. This clustered the professions according to similarities in their planetary relationships.

As a control I had 30 students group the professions by conceptual similarity, following which I repeated the cluster analysis on their grouping frequencies. This clustered the professions by similarities as perceived by the students.

Comparing planetary and student clusters yielded a breathtaking result: The planetary and student clusters showed a near-perfect match (Ertel 1986; 1990). For example, at the first level of clustering, both planets and students divided the professions into fantasy-driven (e.g., actors, painters, musicians) and reality-driven (e.g., scientists, doctors, soldiers). Politicians provided the only disagreement—students preferred reality-driven and planets preferred fantasy-driven, although it might be difficult to argue with the latter.

Whatever the planets were saying,

they seemed to make sense.

But this did not solve the remaining problem. What could mediate a link between planets and the birth of eminent people? Before we consider this problem, we must ask whether planetary relationships can be independently replicated.

Replication. Does the Mars effect replicate? Gauquelin's original finding was based not on sports champions, but on 576 French doctors. It was replicated on a further 508 doctors, and was also found for 570 sports champions and 676 military leaders, all of them French (Gauquelin 1955). It was subsequently replicated on 1,940 doctors, 915 sports champions, and 2,466 soldiers, and this time the births were Belgian, Dutch, German, and Italian (Gauquelin 1960). All cases were eminent. This convinced Gauquelin that the Mars effect was not an illusion.

That was the situation in 1960. Since then, three independent tests on new data have been published, two positive and one negative (respectively, Comité Para 1976 with 535 cases, Müller 1986 with 1,288 cases, and Kurtz et al. 1979 with 408 cases). A further test by Gauquelin on new data was positive (Gauquelin 1979 with 432 cases). So the results are not totally consistent.

One might suspect the inconsistency could be due to variations in method. Was Gauquelin's method faulty? Careful checks revealed no fault with the Gauquelin method of analysis (Eysenck 1975; Scott 1978; Rawlins 1978, 1979; Abell et al. 1983). What about calculation errors? Gauquelin (1984) checked by computer all his original hand calculations, but the outcome was essentially the same.

What about nationality? The two Gauquelin studies and the two positive replications involved European

births. The negative replication involved U.S. births. Was there something special about being born in the U.S.? The ensuing controversy provided no clear answer.[4] Nor was it resolved when a new Gauquelin sample of 349 U. S. champions showed positive results (Gauquelin 1982). So I decided to test the data in a new way by focusing on Gauquelin's second hypothesis, which was stronger than his first hypothesis (see above), but which he had investigated less thoroughly.

Grading the Eminence. Fortunately, reference books on sports are numerous. This means we can assess eminence by counting the number of books that cite a given champion. Other things being equal, a person of high eminence will be cited in more reference books than a person of low eminence.[5]

I took both sets of U.S. sports champions, i.e., the 408 cases with no Mars effect and the 432 new cases from Gauquelin, excluding births after 1950, looked up their names in 21 reference sources, and divided them into low eminence (no citations), medium eminence (one citation), and high eminence (two or more citations).[6] Then for each group I calculated the percentage born with Mars in key sectors. The results are shown in Table 1.

In Table 1, as the eminence of U. S. sports champions increases, so does the tendency for Mars to appear in key sectors in both sets of data. Furthermore, the 408 champions are generally less eminent than the 349 champions, a point confirmed by fewer mean citations per champion (1.04 vs. 1.99).[7] In other words, the overall eminence of the 408 champions is too low to show a Mars effect, but when graded it shows a trend in line with Gauquelin's hypothesis.

TABLE 1

Number of U.S. sports champions and percentage with Mars in key sectors.

Eminence	N = 408		N = 349	
	#	%	#	%
Low	216	18.1	98	21.4
Medium	107	21.5	89	21.3
High	85	25.9	162	30.2
Expected*		22.2		22.2
p of trend		.06		.05

*For 36-sector division

Thus the previous inconsistency disappears.

Surprises. Using the same approach, I graded the eminence for other large samples, obtained by combining the original Gauquelin data collected by Gauquelin and others. The same upward trend appears for Mars and 4,391 sports champions, for Mars and Saturn and 3,060 artists, and for Jupiter and 1,397 actors (Ertel 1987; 1988b). The increase in planetary effect with increasing eminence is remarkably regular, and could not have been produced by Gauquelin's selecting the data—the measurement of eminence requires citation statistics and a computer, neither of which were available to Gauquelin in the 1960s. To me this rules out the possibility of data manipulation.

But there were surprises in store. The planetary effect for Venus and 866 musicians, 1,381 painters, and 813 writers decreased with increasing eminence. It also decreased for Saturn and 1,193 scientists and less clearly, for the moon and 813 writers (Ertel 1987; 1990). These deviating results are statistically too significant to be dismissed as random fluctuations, and

they are clearly exempt from any suspicion of data manipulation. But do they make sense?

Negative eminence effects tend to be associated with Venus and the moon. Positive eminence effects tend to be associated with Mars, Jupiter, and Saturn-but not always, as with scientists where the negative trend for Saturn is especially significant. Some groups, such as artists, even show both positive (Mars) and negative (Venus) eminence effects. So the situation is now more perplexing than ever before, and an explanation for opposite eminence effects seems a long way off. But we might hope that the general consistency of the opposite eminence effect would eventually reveal some meaningful pattern, as was already the case for planets vs. professions. However, irrespective of where this new challenge will lead, the primary problem remains: How to explain planetary effects in the first place?

Explanations. To date, six approaches have been advanced to explain, on a physical basis, the Gauquelin findings, most of them not mutually exclusive: (1) The fetus reacts to planetary signals and triggers birth (Gauquelin 1960; 1983; 1988a). (2) The signals are sensed by the pineal gland (McGillion 1980). (3) Men's beliefs have become genetically imprinted (Halbronn and Hutin 1986). (4) The signals are due to resonance between planetary tides and the magnetosphere (Seymour 1990). (5) Planets emit psychic signals sensed by the soul (Roberts 1990). (6) Men born under prominent planets were given high status and were expected to have more offspring. This biological advantage became naturally selected (Müller 1990).

All these explanations are incomeplete because they require unknown energies or implausible links. In effect, they invoke one mystery to explain another. Nevertheless, we know that possible intervening variables, such as geomagnetism, can influence terrestrial life (e.g., Dubrov 1976; 1989; and Tomassen et al. 1990). If there is a physical basis, then it should be detectable by appropriate tests. I decided to find out.

A Physical Basis? At first sight the prospects are encouraging. There is no effect if the planet is too small (Mercury) or too far away (Uranus, Neptune, Pluto). But this prospect is immediately spoiled by the sun, which displays no relaxation despite being the first candidate for extraterrestrial effects that could conceivably lead to birth-time modulation.

No matter. I took a combined sample of 3,766 sports champions born from 1900 to 1965 and determined whether astrophysical variables had any influence on the Mars effect. For this purpose the sample is ideal—it is large, it shows a strong Mars effect, and Mars has much astrophysical variability. For example, the maximum Mars-earth distance is about seven times the minimum distance, the largest variation for any planet.

Does the Mars effect vary with Mars-earth distance? Does it vary with angular size and apparent magnitude? With declination and right ascension? With orbital position and distance from the sun? Does it matter if Mars is behind the sun? Does the effect vary with the prevailing geomagnetic activity on earth? If the Mars effect has any physical basis then the answers should tend to be yes. But in every case I found the answer was no. The Mars effect was stubbornly independent of all physical variations (Ertel 1989).

I then looked at the influence of geomagnetic activity on planetary

relationships for two very different groups of eminent people. Group A consisted of 6,058 professionals born with the respective planet in key sectors, for example, sports champions with Mars in key sectors and actors with Jupiter in key sectors. Group B consisted of 8,837 professionals born with the respective planet not in key sectors, for example, sports champions with Mars not in key sectors and actors with Jupiter not in key sectors. Thus the typical planetary association was present for every birth in Group A and for no birth in Group B. If geomagnetism has an effect, its variation across the 20 days preceding the birth day, the birth day itself, and 20 days succeeding it should show a significant difference between A and B, with the greatest difference occurring around the birth day itself. But no difference was discernible. Geomagnetism was without effect.[8]

So overall the results showed no evidence whatsoever that the Mars effect has a physical basis. But two possible clues still remained, namely, induction and aspects.

A clue from induction? Gauquelin held that the Mars effect was diminished for births after 1950. He attributed this to the increased prevalence of induced births and surgical intervention, and concluded that planetary relationships apply only if the birth is natural, which of course also supported his physical explanation. In his view, subtle stimulation of the fetus by planets could be expected only for births occurring under natural conditions.

However, his only published data are for 113 sports champions born in 1946 or later vs. 319 born earlier, so his sample size is very small (Gauquelin 1979). Worse, I found that the difference between the 319 earlier births and the 113 later births exists only for 12-sector division. For 36-

sector division the difference disappears-as it happens many of the later births have Mars in the initial key sectors cut off by 12-sector division. (See the outer ring in Figure 1 [Ertel 1989].) So Gauquelin's ideas about induction are greatly in need of support from an appropriate test on a large sample. But having found no evidence so far for any other physical link, I would almost bet that his ideas resting on physiological assumptions will not be supported.

A clue from aspects? If the angle between, say, Mars and the earth's horizon is important, then the angle between Mars and, say, Jupiter might also be important. This idea is basically consistent with the astrological doctrine of aspects.[9] And, if true, might help to illuminate our planetary puzzle. Gauquelin had already tested his data for aspects, but his results were at chance level and showed no significant correlation with planetary effects. So he concluded that "any apparent aspect effects are in fact due to sampling fluctuations" (Gauquelin 1985)

Two years later Françoise Schneider-Gauquelin tested the same data. Despite getting the same observed frequencies as Gauquelin, she concluded that there was "a conspicuous aspect effect" (F. Gauquelin and Shanks 1987). Both Gauquelins compared observed frequencies with expected frequencies, but they calculated the latter in different ways, getting different answers and thus grounds for different conclusions. The problem got stuck in procedural dissent.

Planetary motion is nonuniform. For example, as seen from the earth, Venus is never farther than 48 degrees from the sun, and Mars spends five times longer in conjunction with the sun than in opposition. So the expected frequencies of particular

aspects are difficult to determine. I overcame this problem by avoiding expected frequencies altogether. Instead of comparing observed vs. expected frequencies, I looked at the distribution of births in calendar time. If sports champions tend to be born with Mars aspects, a plot of births vs. time should show a peak during those periods when Mars aspects occurred. But it did not. There was nothing special in the curve of birth frequencies during aspect episodes that might have distinguished them from random variation (Ertel 1988c).

Because the same data had shown a clear Mars effect, I could not blame the data for a negative aspect result. My hoped-for illumination of the Gauquelin puzzle did not occur. I did not much care that this result also denied a conceivable link between the Gauquelin effect and traditional astrological doctrine.

What Next? As I see it, the present state of empirical research on Gauquelin planetary relationships is more baffling than ever before. On the one hand, the eminence results support their reality, but the astrophysical results do not. When faced with this dilemma the usual reaction is to invoke some as-yet-unidentified statistical or psychological explanation. After all, the effect size is so small that an otherwise quite trivial factor would suffice. But likely contenders have been fully debated in the literature, and so far none is convincing (e.g., Ertel 1986-1991).

So what next? Skeptics have been reluctant to see any truth in Gauquelin's astrologylike claims, but they might eventually have accepted them as just an oddity of nature if they had fitted in familiar frameworks. Now, with all physical anchors for comprehension removed, a proper understanding of these astro-correlations is

probably further away than ever. Nevertheless a few researchers, including myself, are still working on it. Indeed, the evidence is challenging enough for me to propose a new test, and to invite the collaboration of others.

A New Collaborative Test. My proposed collaborative test looks at the reality of the Mars effect, and at the influence of induced births. It needs three new samples of high-eminence persons as follows:

   C   200 female champions—natural births

   M   200 male musicians—natural births

   C   200 female champions—induced or surgically assisted births.

The sample types have been carefully chosen to test specific hypotheses about the Mars effect. Based on previous results, the sample sizes are the minimum required to reliably detect the predicted effects. The hypotheses being tested lead to the following predictions:

   Mars effect for C will be positive.
   Mars effect for M will be negative.
   If zero, or nearly so, the Mars effect hypothesis is disconfirmed.
   Mars effect for Ci will be negligible. If not, and C and Ci are positive, induction effects are disconfirmed.

I invite the participation of skeptics in this test, particularly in establishing criteria for selection and in the collection of data.[10] Michel Gauquelin

was always ready to put his life's work to the test, so the willingness of skeptics to participate will ensure credibility on both sides. We can then hope for progress by whatever the results may eventually teach us.

Notes

1. The most common explanations are statistical bias (shoot enough arrows and some are bound to hit), procedural errors (two and two make five), selection bias (use only data that work), and fraud. Over the years, each has been minutely examined by impartial experts, even to the extent of people like myself examining Gauquelin's files, and convincingly refuted in what is now an extensive literature. Unfortunately, this does not prevent hostile critics like Garrett (1988) proceeding as if these detailed examinations and refutations did not exist—his brief one-pager assures us that "the real explanation of Gauquelin's results" is statistical, procedural, and selection bias. Worse still, it calls for precisely those checks that have already been implemented and published, with results supporting Gauquelin. Such ill-informed pronouncements do not reflect well on the skeptical literature.

2. The link between Gauquelin and astrology is usually overstated. Gauquelin has demolished most astrological claims, and the remaining link between astrology and planetary relationships is feeble. Astrology does not predict that only half the planets work for eminent people and none for ordinary people. Nor does it predict strength for the favored positions-in fact, it predicts the exact opposite. The effect sizes are far too tiny to be of use, so the astrologers' propaganda (that the Gauquelin results support their ideas) is misleading. Informed skeptics will justifiably see planetary relationships as an interesting hiccup but with insufficient potential to justify serious pursuit. Nevertheless, future historians of science may be thankful for this example of active interplay between an apparently immovable anomaly and the unstoppable force of science.

3. For convenience, the present summary is confined to the Mars effect. But I have also investigated related areas, such as character traits and planetary heredity, largely with negative results that are essentially consistent, in essence, with what is being reported here (see Ertel 1989; 1991).

4. For details of this debate see articles in the SKEPTICAL INQUIRER 1979-1983 and the *Zefefic Scholar* 1982-1983.

5. Citation counts are widely used as measures of eminence in orthodox research (Roche and Smith 1978; Garfield 1979; Simonton 1984). Rank orders by citations are generally highly replicable. The reference works used in the present study are given in Ertel (1988b). An alphabetical list of names and citation frequencies is available on request.

6. Births after 19,50 were excluded to avoid the increasing prevalence of induced births. In the high-eminence group, the ten most-cited names (with birth years) are as follows:

1921 Charles Ezzard	1934 Maureen Connolly
1923 Harrison Dillard	1942 Cassius Clay
1928 Richard Gonzales	1944 Joe Frazier
1929 Richard Button	1947 Dick Fosbury
1930 Robert Mathias	1948 Peggy Fleming

Many of these names will be unfamiliar today. But sports fans of an older generation would probably agree that this selection is highly eminent.

7. Most of the 408 sports champions were football and basketball players largely obtained from U.S. reference works, such as *Who's Who in . . .* and Hall of Fame books. For such sports, local popularity may often be more important than international success. However, this is not true of champions in tennis, swimming, track and field, and other major nonteam sports, whose citations in international reference books are reliable indicators of outstanding sports achievement.

8. Similarly, Gauquelin (1989) found no effect of geomagnetic activity for eminent professionals. His early work suggested that planetary relationships between parents and children were unaffected by planet-earth distance and planet-sun angular separation, but were enhanced when geomagnetic activity was high. However, later replications were less encouraging, even suggesting that such planetary heredity did not exist (Gauquelin 1988a).

9. Planets are in aspect when they are separated by particular angles, such as 0, 60, 90, 120, and 180 degrees. Astrologers claim that people born with planets in aspect will exhibit the planetary qualities in combination. Thus Mars ("energy") in aspect to Jupiter ("expansion") is said to indicate extremism, while Mars in aspect to Saturn ("control") is said to indicate persistence.

10. Professor Ivan Kelly, chairman of CSICOP's astrology subcommittee, has expressed his willingness to cooperate. Professor Paul Kurtz has given helpful suggestions. GWUP, the German society of skeptics, has so far declined to participate. Collaboration is vitally important for the collection of data, because Gauquelin's eminent professionals (amounting to only one in roughly 20,000 births) are in short supply. So help is needed from skeptics in heavily populated areas where eminent births have not been tapped by the Gauquelins, such as South America and Asia, and which have accessible timed birth records.

References

Literature on the Gauquelin work runs to several hundred references, most of them hard to obtain. Readers may contact the author if they have trouble locating references.

Abell, G. O., P. Kurtz, and M. Zelen. 1983. The Abell-Kurtz-Zelen "Mars effect" experiments: A reappraisal. SKEPTICAL INQUIRER, 7:77-82.

Comité Para. 1976. [Comité Belge pour l'Étude des Phenomenes Réputès Paranormaux]. Considérations critiques sur une recherche faite par M. M. Gauquelin dans le domaine des influences planetaires. *Nouvelles BreDes,* 43:327-343.

Dean, G. 1986. Can astrology predict E and N? 3: Discussion and further research. *Correlation,* 6(2):7-52 (110 references).

Dubrov, A. P. 1976. *The Geomagnetic Field and Life: Geomagnetic Biology.* New York: Plenum.

_____. 1989. *Symmetry of Biorhythms and Reactivity.* New York: Gordon and Breach.

Ertel, S. 1986. Wissenschaftliche Qualität und progressive Dynamik im Gauquelin-Paradigma. *Zeitschrift für Parapsychologie und Grenzgebiete der Psychologie,* 28:104-135.

_____ . 1987. Further grading of eminence: Planetary correlations with musicians, painters, writers. *Correlation,* 7(1):4-17. A small omission is restored in 7(2):34.

_____ 1986a. Gauquelin's Planetenhypothese: Stein des Antosses oder Priifstein der Vernunft? *Psychologische Rundschau,* 39:179-190.

_____. 1988b. Raising the hurdle for the athletes' Mars effect: Association covaries with eminence. *Journal of Scientific Exploration,* 2:53-82.

_____. 1988c. Relating planetary aspects to human birth: Improved method yields negative results. *Correlation,* 8(1):5-21.

_____ . 1989. Purifying Gauquelin's "Grain of Gold": Planetary effects defy physical interpretation. *Correlation,* 9(1): 5-23. Followed on 24-33 by comments from Müller, Gauquelin, and Ertel.

_____ . 1990. Gauquelin contentions scrutinized. In Tomassen et al., 1990:255-266.

_____. 1991. Scrutinizing Gauquelin's character trait hypothesis once again. *Correlation,* in press. Followed in the same issue by Gauquelin's response.

Eysenck, H. J. 1975. Planets, stars, and personality. *New Behaviour,* 29:246-249.

Eysenck, H. J., and D. K. B. Nias. 1982. *Astrology: Science or Superstition?* New York: St. Martin's Press (230 references).

Garfield, E. 1979: Is citation analysis a legitimate evaluation tool? *Scientometrics,* 1:359-375.

Garrett, A. 1988. Astrology and Gauquelin. *British & Irish Skeptic,* 2(5):17.

Gauquelin, M. 1955. *LInfluence des Astres: Étude Critique et Experimentale.* Paris: Le Dauphin. For an abridged English translation, see Gauquelin 1988b.

_____. 1960. *Les Hommes et Les Astres.* Paris: Denoël. For an abridged English translation, see Gauquelin 1988b.

_____. 1979. *The Mars Effect and the Sports Champions: A New Replication on 432 Famous Europeans.* Scientific Documents, vol. 6. Paris: LERRCP.

_____ . 1982. *Report on American Data.* Scientific Documents, vol. 10. Paris: LERRCP.

_____. 1983. *The Truth About Astrology.* Oxford: Basil Blackwell. (The title was imposed by the publisher.)

_____. 1984. Profession and heredity experiments: Computer re-analysis and new investigations on the same material. *Correlation,* 4(1):8-24.

_____. 1985. Astrological aspects at the birth of eminent people. *Correlation,* 5(1):25-25.

_____. 1988a. *Planetary Heredity.* San Diego, Calif.: ACS Publications. An abridged English translation of the 1966 French edition, with an update to 1988.

_____.1988b. *Written in the Stars: The Proven Link Between Astrology and Destiny.* Wellingborough: Aquarian Press. An

abridged English translation of Gauquelin (1955; 1960), with an update to 1988.

_____ . 1989. Reply to Ertel. *Correlation,* 9(1):26-29.

Gauquelin, M., and F. Gauquelin. 1979-80. Star U.S. sportsmen display the Mars effect: A comment on the Kurtz-Zelen-Abell experiment. SKEPTICAL INQUIRER, 4(2):31-43.

Gauquelin, F., and T. Shanks. 1987. Analyzed by decade, the aspect effect increases. *Astro-Psychological Problems,* 5(1):19-25. Continued in 5(3):7-17.

Halbronn, J., and S. Hutin. 1986. *Histoire de l'Astrologie.* Paris: Artefact.

Kelly, I. W., G. A. Dean, and D. H. Saklofske. 1990. Astrology: A critical review. In *Philosophy of Science and the Occult,* 2nd ed., 51-81, ed. P. Grim. Albany: State University of New York Press.

Kurtz, P., M. Zelen, and G. O. Abell. 1979. Results of the U.S. test of the "Mars effect" are negative. SKEPTICAL INQUIRER, 4(2):19-26.

McGillion, F.1980. *The Opening Eye.* London: Coventure.

Müller, A. 1986. Lasst sich der Gauquelin-Effekt bestätigen? Untersuchungsergebnisse mit einer Stichprobe von 1288 hervorragenden Arzten. *Zeitschrift für Parapsychologie und Grenzgebiete der Psychologie,* 28:87-103. For an abridged English version see *NCGR Journal,* Fall Equinox 1989, 17-20.

_____ . 1990. Planetary influences on human behaviour ("Gauquelin effect"): Too absurd for a scientific explanation? *Journal of Scientific Exploration*, 4(1) 85-104.

Rawlins, D. 1978. Memorandum on the relation of the Mars' solar proximity to M. Gauquelin's Mars-sports results and claims. *Phenomena,* 4(3):22.

_____ . 1979. Report on the U. S. test of the Gauquelins' "Mars effect." SKEPTICAL INQUIRER, 4(2):26-29.

Roberts, P. 1990. *The Message of Astrology: The New Vifalism and What It Means for Our Future.* Wellingborough: Aquarian Press.

Roche, T., and D. L. Smith. 1978. Frequency of citations as a criterion for the ranking of departments, journals, and individuals. *Sociological Inquiry,* 48:49-57.

Scott, E. 1978. Letter to Zelen, Kurtz, and Abell. Personal communication cited by Gauquelin 1983:107.

Seymour, P. 1990. *Astrology: The Evidence of Science,* rev. ed. London: Arkana. Additional details kindly provided by the author, May 1991.

Simonton, D. 1984. Scientific eminence: Historical and contemporary. *Scientometrics,* 6:169-182.

Tomassen, G. J. M., W. de Graaf, A. A. Knoop, and R. Hengeveld, eds. 1990. *Geocosmic Relations: The Earth and Its Macroenvironment.* Proceedings of the First International Congress on Geo-cosmic Relations, Amsterdam, 19-22 April 1989. Wageningen: Pudoc.

Suitbert Ertel is professor of psychology at the University of Goftingen. His interests are the cognitive and linguistic features underlying personal belief systems, that is, open and closed minds, including paranormal claims by open-minded proponents. Mailing address: Institut für Psychologie, Gosslerstrasse 14, D-3400 Göttingen, Germany. Electronic mail address: SERTEL @DGOGWDG1.BITNET.