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Dutch Investigations of the Gauquelin Mars Effect

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Abstract—A team of Dutch skeptics have investigated a new explanation for the Mars effect with sports champions of Michel Gauquelin. They conjectured that outstanding sports people might have diurnal and seasonal birth rhythms different from average people and that moreover the short time base of Gauquelin's observations might further enhance these effects. Essentially their findings were negative. Simulations were either not possible because of lack of data or they showed that along these lines an explanation is only possible if very implausible additional assumptions are made. However, it is argued that the Gauquelin data suffer from a bias, namely some artifact of the exploratory phase. The eminence effect of Ertel is shown to be too weak to draw firm conclusions about its existence. It seems plausible that the Gauquelins did not realize that said artifact had to be tightly controlled for.

Introduction

The Gauquelin Mars Effect consists of the finding that excellent athletes are born slightly more often than other people around the time that the planet Mars either rises or culminates. After Michel and Francoise Gauquelin had observed, around 1950, a similar effect with eminent French physicians (and other planets), the effect with Mars and sports champions attracted the most attention.

It has been conjectured that the Mars Effect is caused by an interplay between demographic and astronomical factors. When in conjunction, Mars is about five times farther from Earth than in opposition, and hence its apparent angular velocity with respect to the Sun is smaller by the same factor. This means that the planet Mars spends comparatively more time in conjunction, and therefore a Mars rise will also coincide more often with sunrise. As there are also disproportionally more children born in the early morning, one may expect that more children are born in a two-hour period following Mars rise.

The exact effect is not so easy to determine. In the first place, Mars sectors last only two hours on average. In fact, traditional astrology divides the time Mars is above the horizon into six "houses," which are more or less equal parts, and the time Mars dwells below the horizon is divided similarly. There are several house systems (methods to make these divisions), and the Gauquelin sectors are just the houses of the Placidus system.

A given Mars sector (say the first, after Mars rise), can therefore vary just as much in length as the duration of daylight. But short first sectors and long first

sectors do not occur in fixed seasons, because the Mars orbit is not an integral number of years. Likewise, the times of Mars opposition and conjunction to the Sun rotate through the seasons.

Nonetheless, the Gauquelins had taken these facts into account and had computed that it raised the percentage of people born in the characteristic Mars sectors by a half point, namely from 16.7% to 17.2%. The number of top athletes in characteristic sectors was around 22%.

The Mars Effect has been the subject of three tests. In cooperation with the Belgian Comitk Para (1976) a test was undertaken that confirmed the effect. The Comitk Para doubted the assumptions and the computations of the Gauquelins, especially the assumption of the constancy (between 1872 and 1945) of the diurnal birth rhythm. Also they questioned the assumption that all combinations of season and Mars position with respect to the Sun were adequately represented in the period mentioned.

A sequel experiment (the Zelen test) investigated the above-mentioned astro-demographic effect. Perhaps those who proposed the test expected it to yield a rational explanation for the outcome of the Para test, but as it happened, only the correctness of the Gauquelins' half percent estimate for the astro-demographic effect was confirmed.

One American test, in 1978 (Kurtz *et al*, 1979a) gave negative results. The results were disputed, and the dispute was further obscured by a similar (and quite unnecessary) dispute about the interpretation of the Zelen test result.

Recently there have been several developments. Ertel has obtained from the Gauquelins more data, including hitherto unpublished ones. He has argued (Ertel 1988) that even though some selection bias is apparent in these data, the principal claim of the Gauquelins still stands, namely that the Mars effect increases with increasing fame of athletes, the "eminence effect." An investigation by the French skeptic group CFEPP has been done, but the results are not published yet. (Incidentally, the Mars effect claim was part of a more general claim, namely that other groups of outstanding professionals such as artists, politicians, scientists and physicians were likewise associated with other planets.)

Spurious Periodicities?

A number of Dutch investigators have explored another possibility, namely that an astro-demographic effect of a different nature is at work. Their work is reported in the Proceedings of the Third EuroSkeptics Congress (1992), but much of their work was done after the congress, actually.

Their explanation was termed "spurious correlations" by the principal investigator, the astronomer Cornelis de Jager. The idea is that the Gauquelin correction of 16.7% to 17.2% may very well be correct in the long run for ordinary people, but fail in the short run for sportsmen. The sportsmen of the Gauquelin data are all born within one century of each other, and the bulk of them within an even much shorter period. If the births of sportsmen-to-be were to show seasonal or daily rhythms different from "average" people, the

interference of these births rhythms with the periodical apparent orbit of Mars might show up in the data. The idea that the time basis is too short is already part of the objections of the Comité Para, but the idea that athletes might differ from "ordinary" people is new.

Such "spurious periodicities" are not an invention of De Jager; they are a common nuisance in signal analysis in the physical sciences, and in astronomy in particular. On the other hand, only close investigation of the Gauquelin data can show what role they might play in the Mars Effect. To do so, De Jager and others (Rieks Jager, Piet H. Jongbloet, Carl Koppeschaar) addressed three questions: (1) how far, from a physicist's point of view, is the Mars effect removed from "random noise"? (2) what kind of periodicities might be specific to excellent sportsmen? (3) can these give rise to the Mars effect?

The physicist's approach in a problem like this is to isolate the purported effect in its clearest form, and try to account for that. In this case this meant concentrating on the surplus in sector 1, that is, in a two-hour period following the rise of Mars. Ertel investigated the eminence effect not only with the original 2087 sports champions of M. & F. Gauquelin (1970), but also for 2303 champions whose data were published later or not at all. However, in these later data no sector jumps out so convincingly that an explanation is warranted.

Here a remark on the methods in physics is in order. Physicists are used to dealing with data that are obtained under well-controlled circumstances. They often have a clear idea of the type of random or systematic errors their measuring apparatus can introduce. Only when "effects" of at least three (and sometimes five) standard deviations show up in data without any apparent theoretical explanation, are they considered worth the effort of investigation. The rationale for this is not so clear. There need not be any relation between the size of the known random errors and the unknown systematic errors, but only when the "effect" is somewhat larger than the known errors is there any hope of tracking it down. Of course, for an experimentalist, improving measuring technique (by locating a hitherto undetected bias) is almost as interesting as discovering a new and unknown "effect."

Whether one chooses three or five standard deviations as the investigation threshold depends on how perfect one's experimental technique is. If one doesn't know for sure whether some kind of bias is overlooked, it is rational to be careful and take five standard deviations as threshold, but if one considers the experiment to be perfect, it is a logical step to put the threshold at three.

If we apply this philosophy to the Gauquelin data, there is nothing left to investigate. We have to pretend that we have such a clear idea about whatever has produced these data, that three standard deviations already are "significant," that is, warrant further investigation.

It must be emphasized that the above is about "effects" without theoretical explanation. When scientists have a theory that predicts some effect, they are less strict about confirmation.

Ertel has disagreed with De Jager and Jager's localization of the first sector in the original Gauquelin data as the only effect needing explanation. De Jager

and Jager apparently want to start from scratch, with only the data themselves as starting points. Hence they compare the distribution of champion births over sectors with a uniform distribution, whereas Ertel argues that one should compare with the known population distribution. If one does so, both sectors 1 and 4 deviate by about the same amount from expectancy. As the Gauquelin hypothesis also treats sectors 1 and 4 on an equal footing, there is no rationale to select only sector 1, if one takes into account claims and explanations already published.

It there any reason to suppose that sportsmen show birth rhythms that deviate from average people? Yes, there is. Several investigations, collected by Piet Jongbloet and reported by him in the Proceedings of the Third EuroSkeptics Congress (1992), show that there is an annual and a diurnal rhythm. Physically extremely fit people are born relatively more often in winter and summer and less often in spring and autumn. The relative birthrate can differ by up to 30% from the average population. Furthermore, the birth hours of first-borns differ from later-borns, mostly because labor lasts longer in the case of first-borns.

The effect of these rhythms can be simulated with data resembling the original Gauquelin data. The result was that the seasonal rhythm hardly has influence after averaging over a century. The daily rhythm has some influence, but it cannot explain the great number of athletes born in sector 1 in the original Gauquelin data. To get anywhere near the effect seen in the Gauquelin data, one must assume that the diurnal birth rate of future champions varies between 80% more and 80% less than the average birth rate. In fact the Gauquelin data show only a variation with an amplitude of about 20% around the mean.

So as a matter of fact, the idea of "spurious periodicities" did not work out. Of course, even if it had, it would have faced serious problems. It offers no explanation for similar claims for Jupiter or Saturn. Since Venus is always to be found near the Sun, it would have meant that there would have been some kind of Venus effect much stronger than even a Mars effect. Since the Mars Effect claim rests on the combined excess of births near rise and culmination of Mars, explaining the peak near Mars rise would at best have been only half the work.

De Jager and Jager worked closely together with C. Koppeschaar, who performed many simulations. Koppeschaar was able to reproduce more or less the Gauquelin Mars Effect by simulation. If the daily peak of births closely follows sunrise (late in winter and early in summer), and if births in French maternity homes show a drug-assisted afternoon peak and if this effect is stronger among sports champions than in the general population, then a Mars effect, including an excess near Mars culmination might arise.

That is many "ifs," and Koppeschaar met two problems. First, his initial data base (about 900 champions) was too small to check whether his assumptions on the birth times of champions really did hold. He was not able to obtain the full data of all champions and ordinary people (including exact time and place of birth). Secondly, he and De Jager and Jager got all data that Ertel had ob-

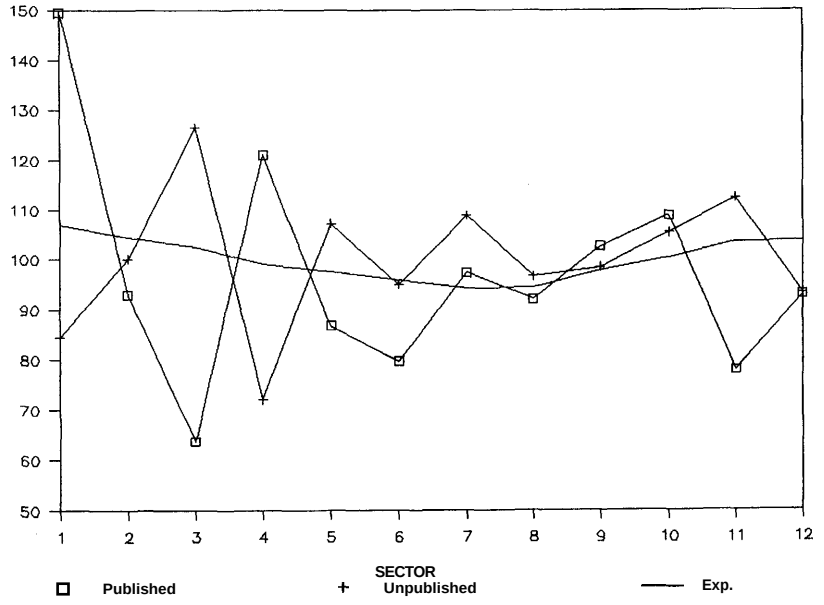

Fig. 1. The distribution of the French champions over the 12 Mars sectors. The unmarked curve shows the theoretical distribution, calculated on the basis of a very large number of "ordinary persons." Marked negative deviations in key sectors 1 and 4 are apparent for the unpublished data.

tained from the Gauquelins, and the closer they inspected these, the more they became convinced that the bias in these data would make all their efforts futile. So in the end Koppeschaar decided not to report on what was necessarily to remain a speculation.

Negative Deviations Among Unpublished Athletes

It is mentioned already that from a physicist's point of view the Gauquelin Mars Effect doesn't amount to much. Close inspection of the data provided by Ertel made the Mars Effect seem even less impressive. The data of sports champions that somehow were deemed not good enough and that were not published, showed deficits at the time of Mars rising or culminating.

This had already been observed by Ertel (1988). Maybe in an effort to remain unprejudiced, the Dutch skeptics examined Ertel's paper closely only in an advanced stage of their research.

Koppeschaar Finds No Eminence Effect

Ertel (1988) argues that nonetheless there is an eminence effect. Koppeschaar says that even this is dubious. If one looks at the French sports champions alone, there simply is no eminence effect, that is, a clear trend for higher citation classes to be born more often in characteristic Mars sectors. Koppeschaar has argued his view by displaying the data graphically, but it can be confirmed with statistical tests.

TABLE 1
Distributions of published French, unpublished French, published foreigners, unpublished foreigners, with corresponding numbers of those born in key sectors.

Class	PFr	KS	UFr	KS	PFo	KS	UFo	KS
1	460	106	176	18	871	175	764	127
2	398	88	400	55	259	50	43	6
3	310	71	63	11	152	38	10	0
4	119	25	40	4	91	21	3	0
5	34	8	4	1	62	12	-	-
6	27	4	-	-	51	14	-	-
7	8	4	-	-	25	7	-	-
8	1	0	-	-	17	4	-	-
9	-	-	-	-	3	1	-	-
Total	1357	306	683	89	1531	322	820	133

Ertel has subdivided the champions into different citation classes, depending on the number of sports directories in which the champions were mentioned. There were nine general directories and nine specialist (cycling, soccer, aviation, tennis, etc.) directories, and no athlete occurred in more than 8 of these. So there were in all nine citation classes: 1 (no citations) to 9 (8 citations).

In the following table the 4391 sports champions are subdivided into four groups: published French (PFr), unpublished French (UFr), published foreigners (PFo) and unpublished foreigners (UFo), each time followed by the total number of that class in the key sectors (KS) 1 and 4. For this computation the original key sectors of the Gauquelins have been used, not the extended ones of their later publications on heredity (M. & F. Gauquelin, 1970171, 1972). The data are derived from Koppeschaar's paper in the EuroSkeptics III Proceedings (1992).

As one can see, it makes sense to distinguish the French from the foreigners. Among the 2040 French only 636 (31%) did not occur in any of the 18 reference books, whereas among the non-French 70% did not occur in Ertel's books.

Statistical Checks of Koppeschaar's Argument

After reading Koppeschaar's paper, I tried to support his conclusions by a more formal statistical argument. One might make two models for the eminence effect. In the first model the citation class is taken into account, but also the "published" variable (by the Gauquelins). In the second model the variable "published" is omitted. In formula form the models are

$$f/n = \alpha + \beta\,\mathrm{CITCLASS} + \gamma\,\mathrm{PUBL} \qquad (1)$$

$$f/n = \alpha + \beta\,\mathrm{CITCLASS} \qquad (2)$$

In this model n stands for number of champions and f for the number that were born in one of the Mars key sectors. For example, in case of the French champions, $n = 398$, and $f = 88$ correspond (in the first model) to CITCLASS = 2 and PUBL = 1. The variable "PUBL" has only two values, 1 and 0.

Of course, the different groups of champions are not equally large. It would be not correct to count the fraction 881398 with the same weight as the fraction 011 (for citation class 8). So the different data are given weights proportional to n; in this way each individual champion gets the same weight. Then it is not necessary to fuse citation classes in order to avoid problems with small numbers.

Because such fractions can only have values between 0 and 1, it is better to take the arcsine of their root. If we examine both models for the French and the non-French we find the following.

The coefficient β does not differ significantly from 0 in the case of the French champions [model (1): p = 0.90, model (2): p = 0.58, two-sided], but γ is very clearly different from 0 in model (1). For the latter conclusion we hardly need a complicated statistical model, as a cursory inspection of Table 1 will show: 13.0% (standard deviation less than 1.5%) of the unpublished French were born in a key sector, compared to 23.5% of the published French.

Just to be on the safe side the "published" and "unpublished" French champions were also separately tested with model (2), the p-values were 0.77 and 0.38, and it should be noted that among the "published" the coefficient β is even negative.

The fact that such low numbers of unpublished French champions are reported to be born in key sectors argues against the hypothesis that something else besides an artifact is involved. These athletes may not represent the very top (even though three quarters of them were quoted at least once in one of these reference works), but they probably outperformed all but one in a thousand ordinary people engaged in their branch of sports.

In case of the non-French, matters are more complicated. In model (1) neither β nor γ differ significantly from 0 (p-values equal 0.33 and 0.055 respectively). Among the non-published non-French athletes (UFo in table 1), the Mars key sector percentage is equal to 17% for class 1, and is 11% for the remainder. If we ignore the difference between published and unpublished, in other words if we look at model (2), then β does differ significantly ($p = 0.0004$) from 0. Each extra citation increases a champion's chance of belonging to a key sector by 1.5%.

If the total collection of 4391 athletes is considered, then again the coefficient β in model (1) is nonsignificant ($p = 0.28$) and in model (2) we have borderline significance ($p = 0.033$). If we apply model (2) to the published and the unpublished athletes separately, β again does not differ significantly from 0 (p equaling 0.08 and 0.21 respectively; in the latter case β is negative again). (The above computations were performed by Dr. J. B. Dijkstra of the Computing Centre of the Eindhoven University of Technology.)

Altogether this presents a very weak support for the eminence effect: the models show it only when the difference between published and unpublished is ignored and when moreover the non-French are included. In other words, only when we assume that no bias is involved in Gauquelin's decision to publish may we say that there is some evidence for the eminence effect. In this connection it must be mentioned that one may not suppose that the citation frequency is entirely unrelated to a possible bias. Three of the reference works used by Ertel were obtained from Gauquelin.

Gauquelin's Procedures

The Gauquelins had from the outset on maintained that these planetary effects were observed with eminent professionals only. It is quite plausible that they tried to find a proficiency level beyond which the effect was clear. Initially they were quite liberal in their judgment about what constitutes eminence. They collected, for instance, 268 Italian aviators. Now given the total number of aviators (not exactly a sport for the millions), one can hardly maintain that they represent the very top of an extremely competitive branch of sports.

Bicycle racing is a much more strenuous and competitive sport, but all the same the 2087 champions of the Gauquelins of their 1970 publication contained 228 Belgian bicycle racers, which seems high for such a small country. Belgian schools are not in the habit of forming racing teams to compete with each other, quite unlike baseball, basketball and football in the U.S.A., which are almost like a national religion, or soccer in The Netherlands (the Dutch national soccer association counts about one in four young males as playing soccer in a recognized soccer club). So we also maintain that in the matter of bicycle racing the standards for what constitutes eminence were rather liberal.

But Gauquelin also went to the trouble of getting birth dates of 599 (or 600) Italian soccer players of the first division of the Italian football league (M. & F. Gauquelin, 1979180; M. Gauquelin, 1988; Ertel, 1988). These constitute a smaller fraction of the total number of players than the aviators. Moreover, one doesn't get into the highest division without being selected several times for ability. So there was ***apriori*** good reason to regard these 599 soccer players as a good test of the hypothesis. Gauquelin reported that these 599 did not show the Mars Effect: about the predicted 17.2 percent were born in a key sector. Only when one took out the 98 soccer players that had achieved international status was a Mars effect found.

If one collects data, and if one determines what is a "good" athlete after knowing the data, then one is still in the exploratory phase. One should not be surprised if the aggregate result of this exploration shows deviations from chance expectation. It is a different matter when one puts one's ideas to the test. In that case it won't do to claim "if one takes care to select the very best, they will show an effect." The test should formulate criteria for eminence that are objective, not in the sense that personal judgment should play no role, but

in the sense that the choice of the criteria is demonstrably independent of knowledge of the Mars sectors of the people in the test.

This distinction between exploration and formal testing was not kept clear by the Gauquelins. From Ertel (1988) one can infer that prior to the Belgian test 203 of the 535 champions of that test were already in Gauquelin's files. The eminence criterion for soccer players in that test was twenty international games, not just at least one, as in the Italian case. The files of the Gauquelins even contained birth times of 76 Belgian soccer players that did not reach the twenty-games eminence criterion. Another 165 Belgian soccer players were in the files, but their birth dates had not been obtained. Did knowledge of the Mars sectors of those 203 sportsmen play any role in the choice of the criteria?

After the Belgian test was over, the Gauquelins lumped the results of a formal test together with their exploratory results. Moreover, after the American test they entered a detailed discussion about what constitutes a champion. On the basis of their results with French basketball players (there are only 33 in their 2087 champion list of 1970, of which 3 were born in key Mars sectors) they argued that basketball players should not have been taken from a source listing 1000 U.S. contemporary basketball players. Then they started listing various subsamples that favored their view: 31 "Notable Sports Personalities," 20 Olympic Gold medallists, 73 from two specific directories. They objected to the "first selection" of 128 containing 10 people born after 1950. Altogether they extracted 192 people from the 409 of the American test, and these 192 were found by Ertel in their files.

Now the overall Mars percentage in the American test was 13.5%, but in the material the Gauquelins extracted it was 17.9%, and they made it look as if the Americans deliberately had managed to select 217 anti-champions that collectively showed a Mars Effect of only 8.8%. Later the Gauquelins collected more American champions. It is quite surprising to find in their files birth dates of 19 (published) American champions born after 1950, of which 5 (26%) were born in a Mars key sector. Apparently the restriction that one should not consider champions born after 1950 was only valid some of the time.

If this is what they did after a formal test, then what were they prepared to do with the data they collected themselves in the exploratory phase?

In science the results of exploratory research are often discussed in terms more suitable for formal tests, for example by mentioning "significance." This is not correct. "Significance" only means something when the hypothesis demonstrably is framed independently from the data collected.

In practice independent replication (usually of similar but not exactly the same hypotheses) is warranted after exploratory findings. The planetary effect of the Gauquelins seems to be mainly results of the exploratory research phase and artifacts of the data treatment process. No meaning can be attached to the reported significance levels.

A Simulation

Anyone who doubts the effects of choosing the champion level can program the following simulation. Let "sportsmen," namely pairs of random numbers (a, *m)* come in batches of 25 each. The number ***a*** is a random number between 1 and 100, representing a one-dimensional "ability." The number *m* is a random number between 1 and 6, representing "Mars sector." Let about a dozen proficiency levels be given between ability 20 and 80. For each batch, choose a separate proficiency level from that dozen, namely the level that maximizes the "Mars effect" for that batch, or rather for the portion of the batch above that proficiency level. Almost half of each batch will be retained, on average, and in the aggregate of many such "champions," the "Mars effect" will be 4% or 5% percent more than the 16.7% expected without any setting of champion levels.

Of course there are differences between a simulation like this and what might have happened with the Gauquelin data. Gauquelin's batches varied in size, and many batches were larger. Moreover, in real life, athletes are not distributed uniformly over ability classes. On the other hand, there are many different ways to judge the abilities of sportsmen, not just a single number. Also, setting champion levels may not be the only exploratory artifact. If one selectively double-checks Mars sector computations of well known champions who are just outside of a key sector (but not those who are just inside), one may introduce a further bias. In this connection it must be remarked that Michel Gauquelin (1984) has reported results of computer recomputations of all his data. The total number of athletes in key sectors was decreased by 17, from 452 to 435. The present discussion relies on data received by Ertel from Michel Gauquelin, and these do not contain the results of this recomputation.

Notes

Mrs. Gauquelin has commented on the findings of the Dutch Skeptics (also in the same Proceedings). She finds many scientific and moral errors with them, but many of her remarks are not clearly related to the text of the papers she comments on. What is needed in the discussion about findings of the Gauquelins is more clarity about the choice of the criteria for championship. Maybe it is difficult to convincingly prove anything about that now. But the fact that one of the main investigators still does not grasp that this is a main issue, or rather does not spend a single word on it in a paper almost twice the length of this article, is telling. It supports the conjecture that the Gauquelins did not know that this mattered at all. How Michel would have reacted to this observation will remain unknown.

De Jager and Jager added a few remarks about Ertel's eminence effect in the proof stage of their contribution to the EuroSkeptics III Proceedings. These remarks confuse the 2088 athletes published in 1970 and 2888 athletes ever published. By an oversight Ertel was not informed about these extra remarks, and

therefore his comment in the same Proceedings that De Jager and Jager did not consider the role of eminence (intended as: "did not think relevant") seems now a mild euphemism for "did not bother to read my 1988 paper carefully."

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