Seasonal Birth Rate Variations in the Gauquelin Professions provide further evidence of Geomagnetic Influences

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Abstract : Evidence of a Semiannual variation in birth frequencies was briefly reported in an earlier publication. Such variations are well-established features of the occurrence of geomagnetic storms and have been explained in terms of the geometry of the earth's magnetic field in relation to that of the Interplanetary Magnetic Field (IMF) emanating from the sun. A subtle detail of the geomagnetic semiannual cycle is its relation to the 22.2 yr Hale cycle of solar activity, and this has now been investigated in birth rates in the Gauquelin professional database. It is found that when the seasonal variations in birth rates are quantified for the Gauquelin professional subgroups they form an ordered pattern retaining their classification by Key Sector planets. This is interpreted as strong circumstantial evidence for solar effects in the Gauquelin data. Such effects may be constituents of the Gauquelin Effect or they may be independent and therefore novel patterns. Further study shows that the JU-SA synodic cycle may be involved, as it is in the timing of the 11.1 yr. Schwabe sunspot Cycle.

Comment on Present state of research on cosmic factors influencing birth.

Up to now most of the important work done in this field has come from psychologists and statisticians, including Michel and Francoise Gauquelin, Suitbert Ertel and Hans Eysenck. But the progress that was being made in the 1980s has stagnated and I suggest that one reason for this is the lack of geophysical theory in new research. Although Percy Seymour published a ground-breaking theoretical analysis back in 1992 he has showed no interest in developing its implications for empirical investigation, and recently has not engaged in discussion of his proposals, (as noted earlier, Douglas 2008).

In such circumstances it seems that the default approach to astrological research has taken over, which is simply to test piecemeal claims derived from bits of astrological theory and to use null-hypothesis statistical testing to give the thumbs up or down on results. This approach can only lead to insightful results by accident, and does not allow the development of hypotheses based on established geophysical analysis, of which there is a great deal in print due to the growing interest in space weather and its effects on telecommunications as well as in ground based weather predictions.

Research on geomagnetic activity developed through the constant dialogue between geophysical theory and new results. But in the field of astrological research there is no agreement on whether the phenomena being investigated even have a physical basis, as indicated by Ertel's concluding remarks in his 1989 paper. In this circumstance and with the enormous obstacle of lack of funding it is predictable that research will get nowhere very slowly.

We may note that it took 30 years of research by many well-funded university groups to settle the mechanism of magnetic storms after Russell and McPherron's paper in 1973, and the semiannual cycle itself had first been described in 1852. I draw the conclusion that it is premature to dismiss solar/geomagnetic effects as contributing causes of the Gauquelin Effect, simply because Michel Gauquelin found effects in some periods of time and not in others. This is actually what is expected in geomagnetic data, as I pointed out earlier (Douglas 2007). The work cited there described cycles of about 25 yrs period in which the phase of the correlation between solar activity cycles and geomagnetic cycles varies.

To emphasize the point, it is worth quoting from a paper by Georgieva and Kirov (2002):

'*One of the much debated problems of solar terrestrial physics is the instability of the relations found between the solar activity and climate. Different authors have found positive,* *negative or missing correlations between solar activity and the surface air temperature in the 11 year solar cycle. A compilation of all published results, and a study of all available climate records from meteorological stations worldwide has shown that the correlation between the two depends on the period studied and not on the location, and changes sign in consecutive secular (Gleissberg) solar cycles. Moreover it has been noted that the sign of the correlation depends on solar activity asymmetry, being positive with predominantly more active Northern solar hemisphere and negative when more active is the Southern hemisphere……*

……The same conclusion has been reached based on the phase change of the semiannual variation of geomagnetic activity (Georgieva and Kirov 2000)'

Although these authors were more interested in climate the connection with geomagnetic activity is made, and it seems quite implausible that the Gauquelin phenomena should be an exception.

The work of Russell and McPherron, referred to below, is more specific than that which I quoted in an earlier article, because it refers to findings that the periods between alternate peaks in the 11.1 yr. Schwabe cycle (commonly known as the sunspot cycle) are able to modulate the semiannual cycle in geomagnetic storms, (Wilcox 1970; Wilcox and Scherrer 1972; Rosenberg and Coleman 1969). It also suggests a novel possibility: if birthrates are modulated by the geomagnetic field then the *direction* of the IMF may be important as well as the intensity of storms. Such a possibility is another reason to suggest that Professor Ertel's conclusion that solar activity is not involved in the Gauquelin Effect (Ertel 1989) is premature.

There is also direct evidence of the presence of a variety of solar and lunar cycles in birth data from Brazil, (Mikulecky and Lisboa 2002), and other human phenomena have been linked to solar activity, (Juckett and Rosenberg 1993, see the extensive publications by Franz Halberg's group at: www.msi.umn.edu~halberg/).

In another paper Decourt (2003) also studied birth data directly and established seasonal variations which depend on the phase of the sunspot cycle, the profession of the person and, importantly, did not change phase in the southern hemisphere.

Introduction.

In their important paper on the semiannual variation of the Geomagnetic field Russell and McPherron (1973) discussed a number of possible mechanisms, and it has recently been accepted that the principal one is based on variations in the ease of coupling of the earth's magnetic field with southward components of the IMF, (O'Brien and McPherron 2002). The magnetosphere does not respond to northward components of the IMF, and is therefore often described as a rectifier. This effect peaks twice during the earth year at the equinoxes, but there is also a modulation by the 22.2 yr Hale cycle, such that in Zurich [(1)] even-numbered cycles (these are the 11.1 yr Schwabe cycles) the second half of the cycle has more time in which the IMF has an inward component in March and outward from the sun in September; and in the odd-numbered cycles the reverse is true, (Russell and McPherron 1973). Thus there are runs of approximately 11 yrs following an even-numbered peak as far as the following odd-numbered peak, in which the IMF has a stronger inward component in March and outward in September. Alternating with these periods are those following an odd-numbered peak where the reverse IMF polarity occurs..

Thus it is important to understand that the difference in magnetic storm conditions in the Spring and Autumn is not just a matter of intensity. Both seasons are at the semiannual peaks in storm activity, but the spring peak occurs when the IMF is more often pointing towards the sun, while the autumn peak is due to times when the IMF is pointing away from the sun.

The IMF does not switch polarity completely in each 6 month period, it does this 4 times (sometimes only twice) in every 27 day solar rotation period, and magnetic storms arise only when the southward component of the IMF is present because this can couple with the geomagnetic field. Due to the changing tilt of the earth's magnetic dipole relative to the sun during the year the coupling with a southward field is more effective at times when the IMF is towards the sun in the spring, or away from the sun in the autumn.

We do not need to understand the detailed mechanism in order to proceed to use the results, but the essential cause derives from the varying angles between the solar oriented SGEQ coordinate system and the SGM coordinate system based around the earth's magnetosphere. In the SGEQ coordinate system the IMF is mostly inwards or outwards radially in the equatorial region of the sun, and as the angle between the coordinate system and the SGM coordinate system changes so the *southward component* of the IMF varies in strength in the SGM system. There are also subsequent effects on the internal dynamics of the magnetosphere, but it is generally accepted now that the key to geomagnetic disturbance is the presence of southward IMF at the orbit of the earth.

The interest of this is that in Russell and McPherron's earlier paper (RM) they deduced theoretically and confirmed experimentally that when a long run of data was separated into times when the IMF is outward or inward (based on space craft measurements) the semiannual variation should disappear and be replaced by two annual cycles peaking at just one equinox each. The observation of just this feature was interpreted by them as strong circumstantial evidence of the correctness of their proposed mechanism, the major part of which, now, in the light of another 30 years of research, is accepted as the major explanation for the semiannual variation.

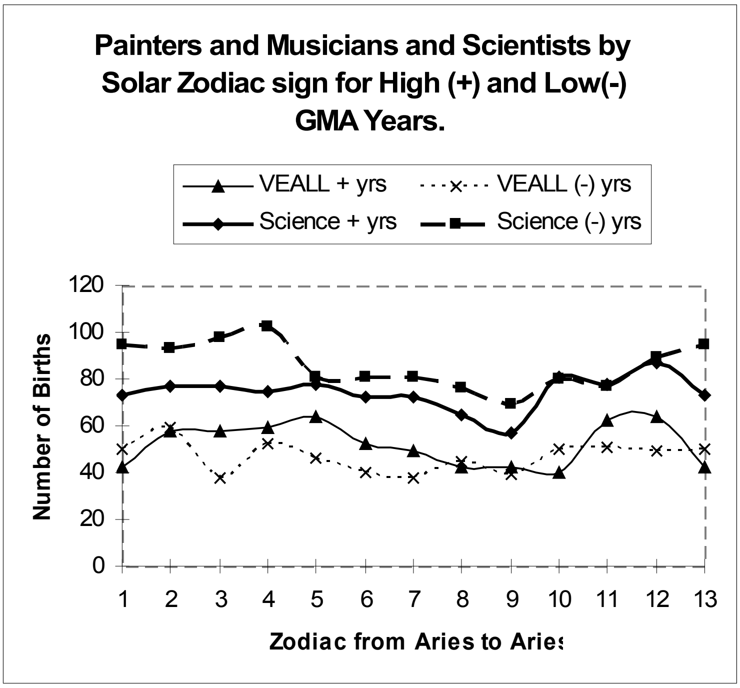
RM noted that the fraction of time in which the IMF is inward or outward *at the distance of the earth's orbit* also varies annually by about 18% (Rosenberg and Coleman 1969) which is carried over into a synchronous variation in the southward component of the IMF in GSM coordinates. This is due to the fact that the earth is at southern heliospheric latitudes between Dec 7 and Jun 7, and therefore experiences the dominant magnetic polarity of the solar southern hemisphere, which is always opposite to that of the northern solar hemisphere, (Echer and Svalgaard 2004). Finally RM used other published observations that there is a 22yr variation in the polarity of the solar field which switches direction about 2 yrs after each Schwabe Cycle peak. Thus during the period from the peak of an even numbered cycle to the peak of the following odd-numbered cycle there is more southward field and in the following period until the next even-numbered peak there is less southward field, changing the amplitude of the semiannual cycle in GMS.

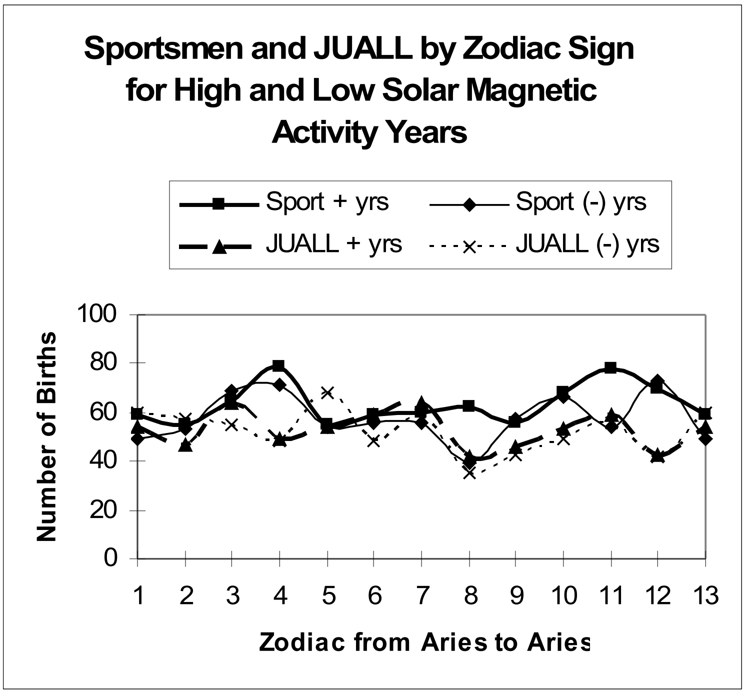
<u>What Predictions can be Made about Birthrates ?</u>

It is important to state that *we do not know how to predict any possible differences between different professions*, because no-one has provided a theory for how different planets come to be so associated. However, if *some* professional groups show variations in the semiannual cycle from the most active periods (from the peak of a Zurich-even-numbered cycle to the following odd-numbered peak), to the less active periods, then, like Russell and McPherron we shall be able to claim strong circumstantial evidence for solar/geomagnetic effects in the Gauquelin professional data. We may also gain another valuable prize if there seems to be a *systematic* variation according to the planet associated with each profession.

It should also be noted that we cannot predict the direction of any deviations in birthrates at particular phases of a geomagnetic cycle, because there is no theory that suggests that birth would be triggered by high or low field strengths, much less how such an effect might vary with either professional success or personality.

The first thing to examine is the seasonal variation in birthrate for each subset of the Gauquelin Professions. There is already a hint that a semiannual cycle is present, as shown below in Figs 1 & 2, which have been taken from data used in an earlier publication (Douglas 2007, see Figs 2 & 3). It is important to use subsets because it will allow us to see if seasonal variations in birthrates create the same kind of groupings of professions as do Gauquelin Sector planets. There is no *a priori* reason to expect this, but if they do it could suggest that the Gauquelin Effect has a seasonal component.





Figs 1 and 2 showing the variation of birthrates with solar zodiac sign for 4 professions, at high and low values of the Schwabe sunspot cycle.

In the graphs shown the data was only filtered according to the regions of the Schwabe cycle near the peaks and the troughs, as a general attempt at looking for solar effects in the Gauquelin data. There are clear signs of a semiannual variation peaking at the solstices or about 2 months later depending on profession. Russell and McPherron's findings are useful since they make very specific predictions about how the semi-annual variation in magnetic storm indices is modulated by the 22.2 yr Hale cycle in solar activity. They suggest that there may be differences in the semiannual variations in birth numbers between periods during the high and low activity periods in the Hale cycle described above.

Two measures of the effect of the Hale cycle on seasonal birthrate variations.

Russell and McPherron's paper found that the two equinoctial peaks correspond to opposite polarities of the IMF, so the first experiment will be to compare the monthly birthrates for each subgroup during the high and low activity phases of the 22.2 yr. Hale cycle. This can be most economically accomplished by scaling one set of data to the same total number of births as the other, and then calculating the monthly differences between them. This compares the seasonal patterns between high and low activity sets

A second approach condenses the data further to allow all the subgroups to be plotted on one diagram. In this method the fractional differences (FD) in spring and autumn births are calculated, (using the formula (months (2+3+4) – months (8+9+10))/ (months (2+3+4) + Months (8+9+10)). This calculation is conveniently supplemented with another of the same form for the summer and winter months, so that each subgroup receives 2 scores which can be plotted on the x,y axes of a Cartesian graph. Thus a separate 2D scatter diagram is produced for the high and low activity periods separately.

Data Collection.

Data was downloaded from the CURA website (http://cura.free.fr) in text file format and the explanatory notes and other material was removed. The data for each professional subgroup was copied into a new Excel file, where all columns were masked except the month and year of birth and sorted in order of year. Using the list of sunspot peaks the data was then split by cutting and pasting into two separate columns for each phase of the cycle starting from an Odd- or an Even-numbered peak. Each column was then sorted by month disregarding year of birth and the monthly totals counted.

Methods of cycle Division.

The method of division according to sunspot cycle peaks requires some elaboration.

First, the peaks are generally identified in the literature as accurate to 0.1 yrs, but since we are comparing seasonal variations within each year it is preferable to use complete years in each data period, so that the boundaries used here have been taken at the nearest end of year to the peak.

The sunspot peaks in even-numbered cycles were taken to be in years: 1816,1837, 1861,1885,1908,1930; and the odd-numbered peaks: 1806,1831,1849,1872,1895,1919,1939, (see http://articles.adsabs.harvard.edu/full/gif/1992SoPh..141..181D..)

Second, although peaks in geomagnetic activity (GMA) are often taken to occur 2 years after the sunspot peaks, it has also been claimed that their timing is subject to quasi-cyclic variations on a timescale of about 25 yrs (and see discussion in Douglas 2006), which may cause them to shift back to 2 yrs before the Schwabe cycle peak. Another report (Gonzalez et al 2002), shows a split peak with highs both 2 yrs before and after the Schwabe peak. It was decided therefore to examine 5 different data sets in which division markers were placed successively at: -4, -2, 0, +2 and +4 yrs from the Schwabe peak. This also allows a clearer picture to be obtained of any grouping patterns of professional subgroups and how they depend on choice of peak boundaries.

Thus to clarify: for the PK set the data was split into 2 runs composed of all the intervals following respectively an odd or an even numbered sunspot peak up to the following peak year. The same procedure was repeated for the others after moving the division point 2 or 4 years backwards or forwards from the peak year. With all this in mind, it was decided that it would be sufficiently accurate to use published graphs of sunspot activity to identify the peak years by eye. These were obtained on the internet (http://articles.adsabs.harvard.edu/full/gif/1992SoPh...141...181D Page 183).

It is also necessary to explain the effect of varying month lengths, which bias the FDs. Taking account of the leap year the mean length of February is 28.25 days, so the spring group adds up to 89.25 days while the autumn set is 92 days so the FD for spring-autumn is biased towards the autumn end of the scale. By making trial calculations for the range of FD values here it was found that in all cases the correction required was a constant of + 0.015 to be added to each score on the spring-autumn factors, (but not added in the tables shown here). Thus the pattern is shifted as a whole and the internal relationships between the points are unchanged. In the case of the summer-winter factor both terms have 92 days each so no correction is needed.

Before we examine the data I want to mention an important new analysis of the effects of planetary cycles on solar activity (Wilson, Carter and Waite 2008). In their paper their main concern is to put forward evidence for the coupling of solar *orbital* angular momentum (about the Centre of Mass of the solar system) with solar *spin* angular momentum. In developing their analysis they focus on the 2 planets JU and SA, and are able to show that the most active sunspot periods are those in which a syzygy (a conjunction or opposition in heliocentric coordinates) of these planets *follows* the solar maximum of the Schwabe cycle. They summarize their findings as showing that a resonance exists between the 22.2 yr period of the Hale cycle (determined by purely internal solar dynamics), and the 19.86 yr synodic period of JUSA, such that 8 of the former and 9 of the latter fit into one long cycle of 178.7 yrs. Thus the 22.2 yr. and 19.86 yr. cycles slip progressively out of phase for about 90 yrs., until the next syzygy produces a new phase locking.

This work ties in with that done earlier by Fairbridge and Shirley (1987) and by Landscheidt, and the timing effects of JUSA have since been refined by considering the effects of UR and NE (for this and Landscheidt's work see http://landscheidt.auditblogs.com).

It was thought useful therefore to make similar studies of the seasonal variations, after dividing the data according to the phases of the JUSA synodic cycle. Any patterns remaining would then be defined by purely solar and planetary coordinates without the need to employ measures of GMA: the months of the year and the JUSA phase.

RESULTS.

A: Features of the Difference Graphs.

In the case of the graphs for cycle division at the PK year, the most striking parallel to Russell and McPherron's discovery is found with the five categories, Painters, Musicians, Physicians, Politicians, Writers and. In the first two cases (which have higher frequencies of VE than expected in Gauquelin sectors), there is a peak in the autumn and a trough in the spring, indicating that a shift from low to high activity phases of the Hale cycle correlates with a shift in peak birth frequencies from spring to autumn. In the latter two cases (both having raised JU frequencies in key sectors) the reverse shift occurs. This pattern is also found in the actors group however, while the first pattern occurs with Physicians (MASA).

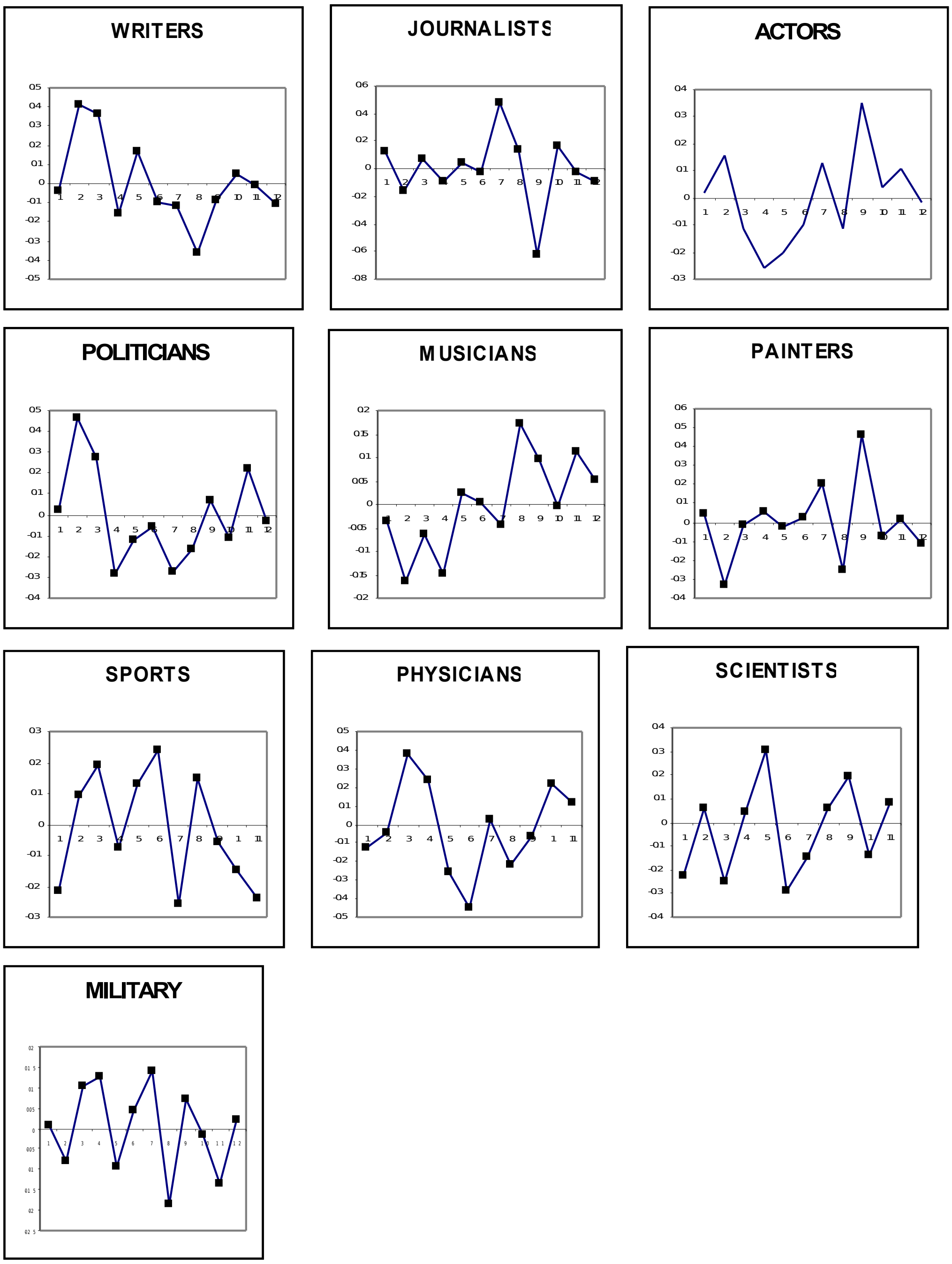
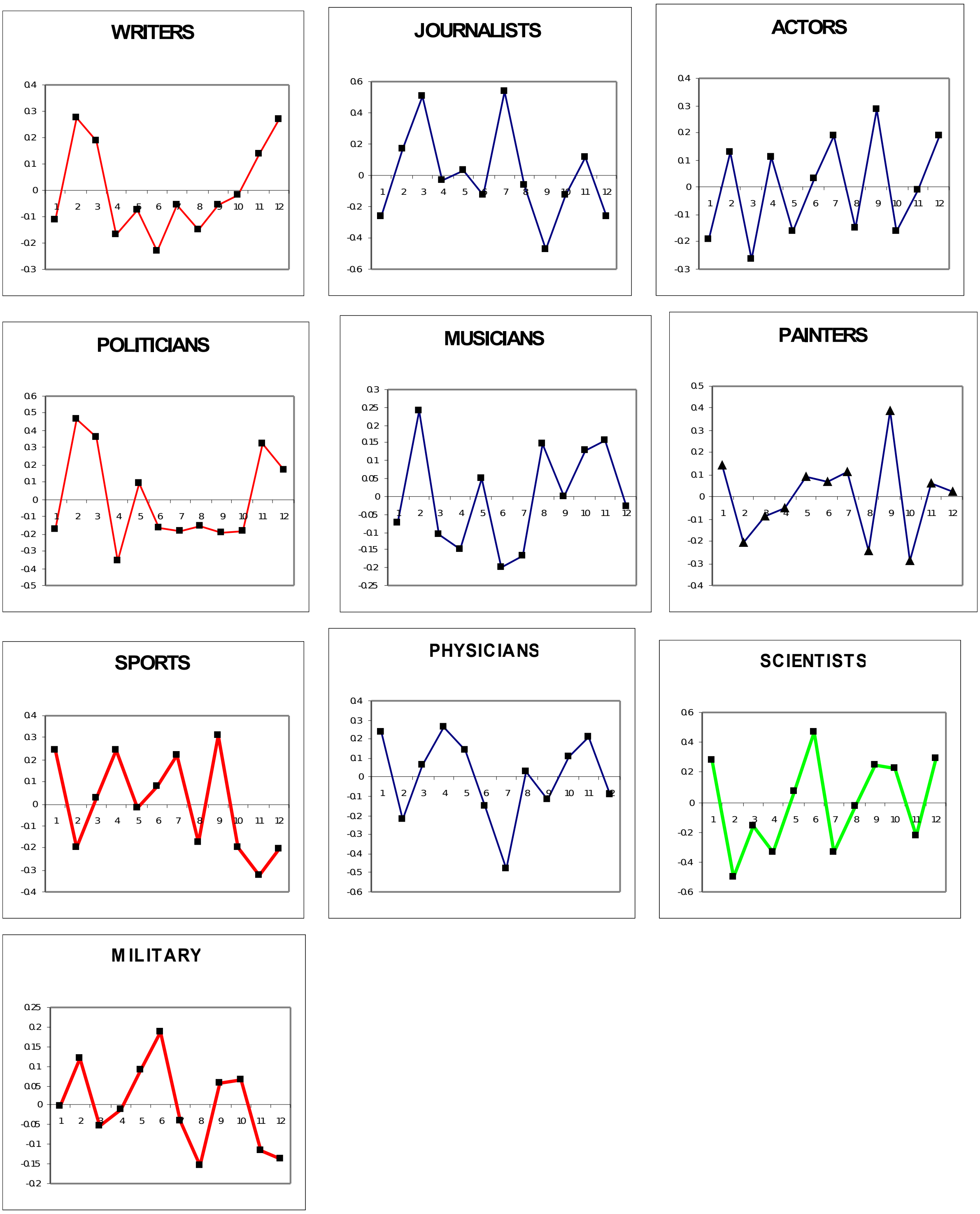


Fig.2A. The runs of birth data were divided into two sets : those made up of all periods following and even-numbered sunspot peak, and those following ann odd-numbered peak. .Fractional Monthly Difference (FMD) Graphs for each of the 10 professions.

After scaling to the total number for the smallest population the birth frequencies for the Odd to Even phase were subtracted from those for the Even to Odd (high solar activity)phase, and divided by the monthly mean frequency.



<u>Fig. 2B: As 2A but dividing the data relative to points 2 years before each sunspot cycle peak.</u>

So, in these 6 cases out of 10 there is a shift from Spring to Autumn or *vice versa* when the phase of the 22 yr. Hale Cycle changes from high to low activity, and from *anti*parallel to parallel orientation of the solar field with respect to the geomagnetic field. This suggests that eminent births are correlated either with high or low solar activity phases, but there is no simple preference of one pattern for a given Gauquelin planet.

A final point of interest is the 4 peak pattern in the military group, which is most clearly visible with a circular format.

In the case of the graphs in Fig. 2B there is much less sign of a clear cut shift of peaks from one equinox to the other, suggesting that a division of the cycle at the PK or perhaps 1 year either side is the one which captures the mechanism best. The 4 peak pattern in the sports and military graphs is also less clear when the cut is at PK-2.

B: Variation of the FDs with boundary of cycle division.

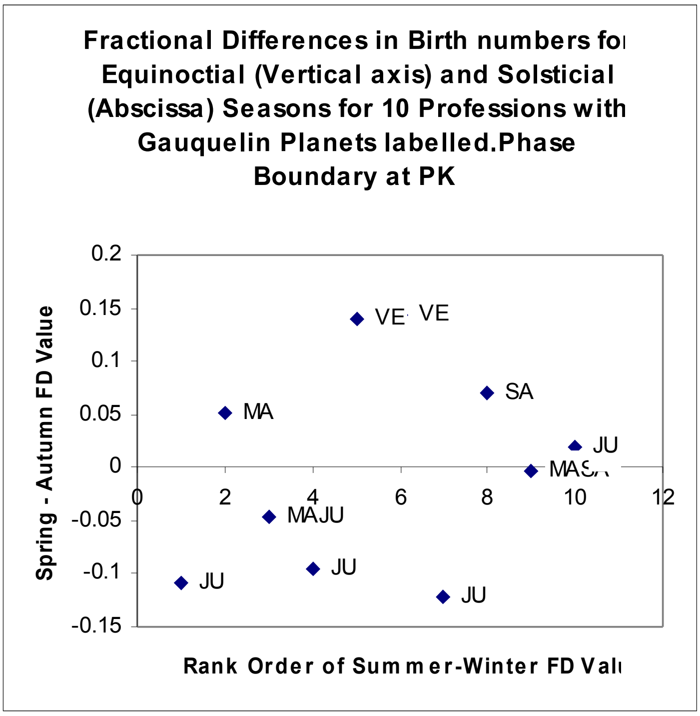
Cycles were divided at 5 different places including the peak year (PK) taken from tables: PK-4, PK-2, PK, PK+2 and PK+4, and the spring autumn FD values for the *less* active phases of the 22 yr. Hale cycle are shown in Table 1.

A: The Hale half-cycles from the peak of a Zurich Odd-numbered sunspot cycle to the next Even numbered peak.

PK – 4	PK – 2	PK	PK + 2	PK + 4
0.129 PT VE	0.130 SC SA	0.143 PT VE	0.155 PT VE	0.101 SP MA
0.109 SC SA	0.109 PT VE	0.139 MU VE	0.116 SP MA	0.085 PT VE
0.060 MU VE	0.080 MU VE	0.071 SC SA	0.084 MU VE	0.078 MU VE
0.042 SP MA	0.056 SP MA	0.052 SP MA	0.043 SC SA	0.040 PH MA(SA)
0.023 AC JU	0.025 PH MA(SA)	0.019 AC JU	0.030 AC JU	0.017 AC JU
0.020 WR JU	- 0.003 AC JU	- 0.003 PH MA(SA)	0.012 PH MA(SA)	- 0.021 SC SA
0.013 PH MA(SA)	- 0.020 WR JU	- 0.046 MI MAJU	- 0.056 PO JU	- 0.024 PO JU
- 0.058 MI MAJU	- 0.022 MI MAJU	- 0.095 WR JU	- 0.061 JO JU	- 0.032 WR JU
- 0.079 PO JU	- 0.121 PO JU	- 0.108 JO JU	- 0.068 WR JU	- 0.069 JO JU
- 0.120 JO JU	- 0.178 JO JU	- 0.120 PO JU	- 0.087 MI MAJU	- 0.093 MI MAJU

Table 1. Showing the Spring-Autumn FD values for all 10 Gauquelin Professional sub groups in rank order for each of 5 points of Hale Cycle division. These are the values for the less geomagnetically active half cycles where the IMF is parallel to the geomagnetic field. The Professions have been coded: PT = Painters; MU = Musicians; SC = Scientists; SP = Sports; PH = Physicians; AC = Actors; WR = Writers; MI = Military; PO = Politicians; JO = Journalists.

The data can be displayed graphically within the limits of Excel as shown in Fig.2 for two columns from Table 1. It should be noted that the SA effect for Physicians is very small compared to that for Scientists, whereas the MA and JU effects for Military are both quite strong.



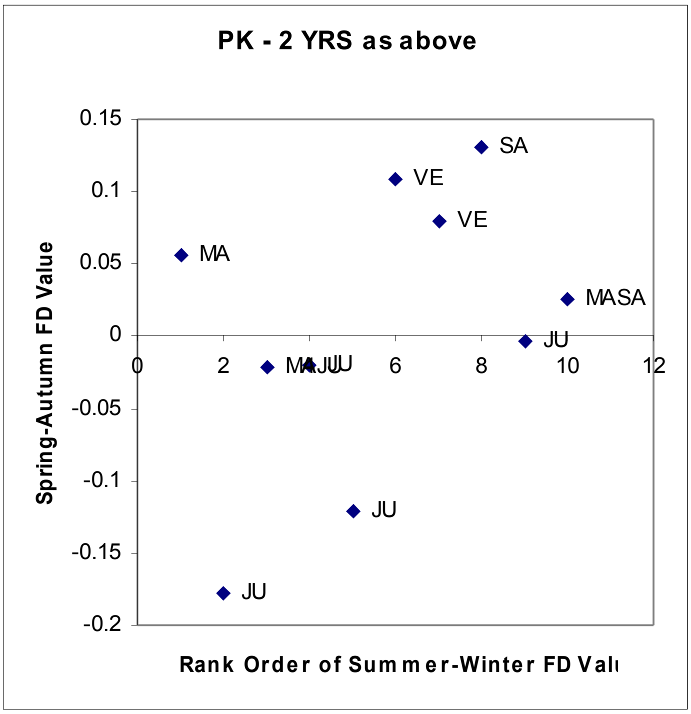


Fig.2 Showing the data for boundaries at PK and PK – 2 yrs in graphical form. Due to the limitations of Excel graphic software the Solstitial data on the horizontal axis have been rank ordered by their FD values in order to retain the facility for labelling the points.

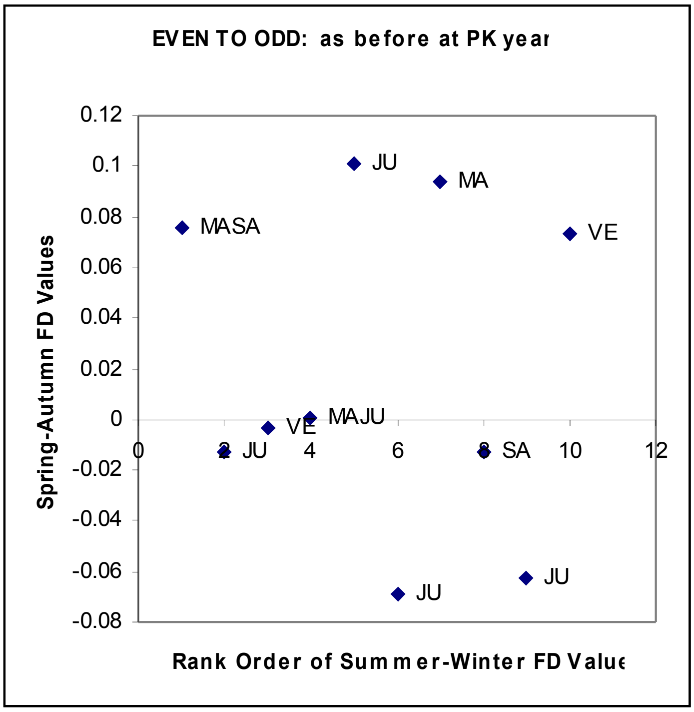
It can be seen that in both cases the points are grouped by their Gauquelin planets , most strongly on the Equinoctial axis, with SA,VE at the Spring end, JU at the autumn end and MA in the middle. The main difference between them is the switching of the order of SA, VE points and the overall larger range on the vertical axis in the second graph. It is worth noting that the years chosen as PK years of sunspot activity have mostly been included in the counts for *Even to Odd* half-cycles, so that it could be argued that the switchover occurs a year earlier. It is interesting that these two graphs (see Table 1for the other divisions) show the most coherent clustering of points with similar Gauquelin planets.

In the PK graph there seem to be two axes of planetary contrast: VE-JU on the equinoctial axis and MA-SA solstitially. The polarites are less clear in the PK-2 graph.

We can now look at the corresponding data for the more active halves of the Hale cycle (Going from Zurich Even to Odd numbered Schwabe cycles) with the same 5 points of division.

PK – 4	PK – 2	PK	PK + 2	PK + 4
0.091 SP MA	0.083 PT VE	0.101 WR JU	0.124 WR JU	0.103 PT VE
0.061 PT VE	0.079 SP MA	0.094 SP MA	0.063 PT VE	0.095 WR JU
0.056 MU VE	0.066 WR JU	0.076 PH MASA	0.052 PH MASA	0.068 SC SA
0.050 PH MASA	0.040 PH MASA	0.073 PT VE	0.032 MU VE	0.040 MI MAJU
0.032 WR JU	0.036 PO JU	0.001 MI MAJU	0.036 MI MAJU	0.034 MU VE
-0.018 PO JU	0.034 JO JU	-0.003 MU VE	0.021 SC SA	0.026 PH MASA
-0.023 AC JU	0.033 MU VE	-0.013 PO JU	0.005 SP MA	0.025 SP MA
-0.025 MI MAJU	-0.003 AC JU	-0.013 SC SA	-0.047 AC JU	-0.021 AC JU
-0.041 JO JU	-0.010 MI MAJU	-0.063 AC JU	-0.051 PO JU	-0.081 PO JU
-0.054 SC SA	-0.103 SC SA	-0.069 JO JU	-0.120 JO JU	-0.108 JO JU

Table 2. As in Table 1 but using the opposite phases of each cycle division.



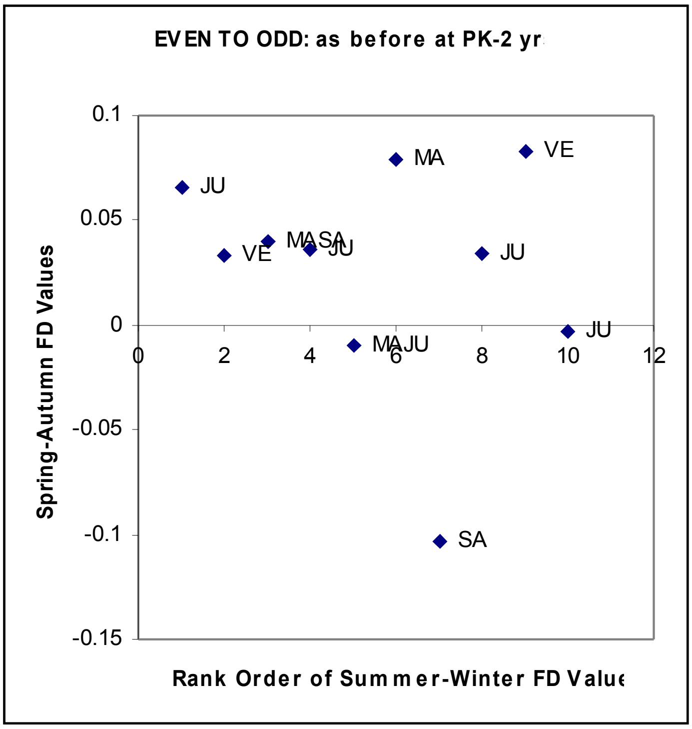


Fig. 3 : As Fig.2 but now for the Even-to Odd years, i.e. the more active halves of the Hale Cycle.

It is clear that the clustering in Fig. 2 has now disappeared. One further point of interest is that in both cases the JU group moves up while the SA point moves down in passing from the low to high activity phases. This suggests that the antagonistic relation between JU and SA in Gauquelin Key sectors also exists in these solar factors in some way.

In order to provide readers with a full set of data the FD values corresponding to those in Tables 1 and 2 but for the Summer-Winter polarity are presented in Tables 3 and 4.

Prof and GQ planet	PK - 4	PK - 2	PK	PK + 2	PK + 4
MU VE	0.040	0.007	-0.004	-0.024	-0.008
PT VE	0.083	0.070	0.057	0.065	0.077
PO JU	0.048	0.063	0.067	0.004	0.036
AC JU	0.096	0.086	0.122	0.104	0.147
JO JU	-0.026	-0.075	-0.059	-0.079	-0.035
WR JU	0.037	0.051	-0.018	0.006	0.008
SP MA	-0.010	-0.049	-0.050	-0.043	-0.003
MI MAJU	-0.058	-0.070	-0.034	-0.008	-0.009
SC SA	0.073	0.081	0.084	0.068	0.087
PH MASA	0.037	0.087	0.097	0.080	0.070

Table.3 As Table 1 but with Summer-Winter FD values for the Odd to Even half cycles.

Prof and GQ Planet	PK – 4	PK – 2	PK	PK + 2	PK + 4
MU VE	-0.088	-0.055	-0.037	-0.025	-0.041
PT VE	0.070	0.072	0.099	0.100	0.069
PO JU	-0.020	-0.004	-0.052	0.005	0.004
AC JU	0.088	0.096	0.077	0.078	0.009
JO JU	0.007	0.070	0.026	0.074	0.013
WR JU	-0.032	-0.057	0.00	-0.003	0.003
SP MA	0.007	0.044	0.030	0.059	0.002
MI MAJU	0.010	0.014	-0.001	-0.040	-0.043
SC SA	0.015	0.049	0.046	0.047	0.020
PH MASA	0.007	-0.053	-0.063	-0.047	-0.035

Table 4: as Table 3 for Even to Odd half cycles.

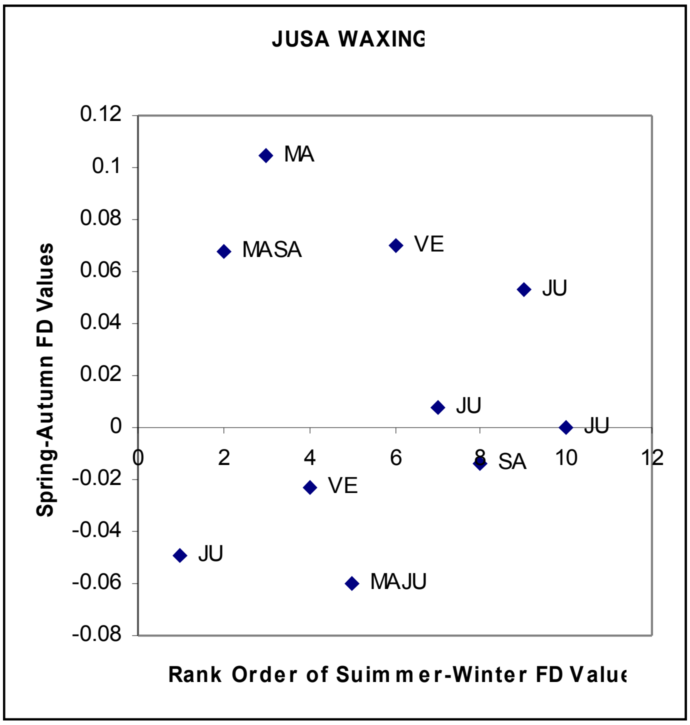
Moving on, we can look at the data when divided according to whole years closest to the conjunctions and oppositions of the JU-SA conjunction cycle. These have been taken as occurring in 1801, 1821 etc for the conjunctions and 1811, 1831 etc for the oppositions and the differences in exactness between heliocentric and geocentric coordinates has been neglected. The total unfiltered data have been analysed in the same way for comparison. The data in Tables 5 and 6 for the waxing and waning halves of the JUSA cycle has then been used to prepare the graphs in Fig.4, in a similar way to Figs 2 and 3.

Waxing JUSA Cycle	Waning JUSA Cycle	Total Unfiltered data
0.105 SP MA	0.126 MU VE	0.097 PT VE
0.070 PT VE	0.119 PT VE	0.067 SP MA
0.068 PH MASA	0.077 SC SA	0.053 MU VE
0.053 WR JU	0.030 SP MA	0.035 PH MASA
0.008 AC JU	0.025 MI MAJU	0.028 WR JU
0.000 PO JU	0.003 WR JU	0.027 SC SA
-0.014 SC SA	-0.005 PH MASA	0.000 AC JU
-0.023 MU VE	-0.016 AC JU	-0.017 MI MAJU
-0.049 JO JU	-0.099 PO JU	-0.051 PO JU
-0.060 MI MAJU	-0.130 JO JU	-0.087 JO JU

Table 5. Showing the data divided according to the waxing (from conjunction to opposition) and waning half cycles of JUSA, and the total data unfiltered.

	Waxing JUSA Cycle	Waning JUSA Cycle	Total Unfiltered data
MU VE	-0.012	-0.045	0.027
PT VE	0.066	0.083	-0.072
PO JU	0.086	-0.034	-0.021
AC JU	0.066	0.112	-0.089
JO JU	-0.049	0.024	0.018
WR JU	0.080	-0.079	-0.004
MI MAJU	0.003	-0.050	0.027
SP MA	-0.001	0.015	0.002
PH MASA	-0.036	0.083	-0.028
SC SA	0.069	0.044	-0.060

Table 6: Same as Table 5 but for Summer-Winter FD values



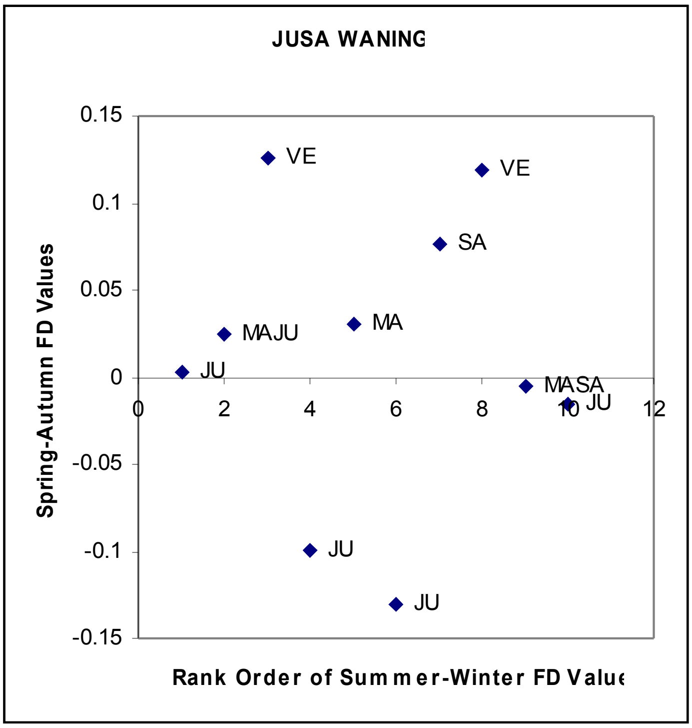


Fig. 4: Showing the same as in Figs 2 and 3 but now for the waxing and waning half cycles of the JUSA cycle.

There is a close similarity in the positioning of the points of the JUSA Waning graph and the top one of Fig.2, even though the boundary years differ much more than between PK and PK-2. It is interesting to note that the point for SA (scientists) moves in the opposite direction to the JU points from the waxing to waning graphs in Fig.4. This recalls the oppositional semantic nature of the two planets, (see articles by Douglas and by Ken Irving on Irving's website www.planetos.info/).

DISCUSSION

Although no theory has been suggested for the particular ordering of Fractional Differences by profession it is interesting that quite coherent groupings appear in Table 1 when the data are selected by dividing the sunspot data into two phases with boundaries at the PK and at PK-2 yrs respectively. The other three divisions are less coherent and in Table 2 the opposite phases in all cases show heavy overlapping of the professional groups when labelled by their Gauquelin planets, and the range of values in the opposite phases are a good deal more limited. It is interesting too that the most extreme values of the Spring-Autumn FDs are shown by either JU and VE when the division is at PK, and by JU and SA when it is 2 years earlier. VE and JU are the two planets (together with the earth) identified as having the largest tidal effects on the sun, and it has been shown by Grandpierre (1995) that the 11.1 yr sunspot cycle can be generated as a combination of the three heliocentric synodic periods of these planets. On the other hand JU and SA have the largest effect on the motion of the sun about the solar system barycentre, and recently it has been shown that they are involved in transfer of angular momentum from their orbital motion to the spin of the sun (Wilson *et al* 2008). This has been suggested as a means by which the planets may time the Hale and Schwabe cycles of solar activity, (see Fairbridge and Shirley 1987, Wilson et al 2008, Juckett 2000, Jaravaiah 1996). Thus it is interesting that in Table 5 the waning phase of the JUSA cycle is also seen to correlate with coherent groupings similar to those in Table 1, while the waxing phase does not, suggesting that the mechanism planetary angular momentum changes which time solar activity cycles may be what is being registered in seasonal birth rate variations. If so this has practical use for research, because it allows investigations of birth data using only planetary positions, without reference to magnetic data.

The range of GMA values that can influence the birth process is not clear. From what we have seen here it is exclusively the lower activity halves of the Hale cycles that correlate with an ordering by Gauquelin planets, but this does not fit easily with the graphs of FMD values, which seem to show that some groups prefer higher and others prefer lower solar activity ranges, since some shift from Spring to Autumn as the GMA increases and others go in the reverse direction, while the rest show more complex patterns. On closer examination it can be seen that the professions showing the largest equinoctial shifts in the FMD graphs are also those which shift most in their FD values between higher and lower activity phases of solar activity, while their starting and finishing points are not always extreme.

The shifts in the FMD graphs are more striking than what is predicted by RM, and suggest another line of inquiry. RM found such clear contrasts only when they separated the data into times when the IMF was known from spacecraft data to have either an inward or an outward polarity, but it is known that the sector structure of the rotating solar field that produces the IMF changes polarity 4 times in every 27.0 days. This suggests that the Gauquelin professional data might contain variations of this period or harmonics, as has already been found by Mikulecky and Lisboa (2002).

It seems clear that in this data there is no simple connection of the qualities of a Gauquelin planet and a given seasonal preference. However there is an opponent relation between changes in seasonal birthrate variations in the JU and SA professions when the solar activity period shifts from low to high, which is apparent in Figs. 2, 3 and 4. This systematic relationship between the SA point and the JU points as a group is also evident when a series of graphs are compared for divisions at PK-4 , PK-2 etc years, which suggests that random variations are not sufficient to account for the patterns described.

This might suggest that the solar variations are an integral part of the Gauquelin Effect, or equally that other parallel solar effects tend to accumulate with the Gauquelin Effect at the birthtimes of eminent professionals.

The possibility that Fig. 2 top graph shows a real polarity of planetary pairs VE/JU and MA/SA needs to be followed up.

The fact that the waxing and waning periods of the JUSA cycle are contrasted, while the conjunction and opposition phases are not (data available on request) is also interesting in the light of the variations of solar system angular momentum identified by Wilson *et al* (2008). They have demonstrated that JU and SA exchange angular momentum with the solar spin motion in such a way that at the first square of JU-SA the sun is decelerated and then accelerated at the last square. In contrast, both the conjunction and opposition phases produce a zero torque of the planets on the sun.

This study has focused on the 22 yr Hale cycle, but it is worth noting that Decourt (2003) also found variations in birth rates with solar activity in the 11 yr Schwabe cycle, so that while painters were born more often near the peak sunspot years, musicians, athletes and mathematicians preferred the minimum activity years, and politicians preferred an intermediate phase.

The possibility that these patterns are part of the mechanism of the Gauquelin Effect can be most easily tested by examining them for subsets of data with a given planet in each of the key Gauquelin sectors.

The most important observations however are A): the occurrence of equinoctial shifts in FMD values in 6 cases out of 10 when cycle boundaries are drawn at the PK year, and B): the clustering by Gauquelin professions in the FD scatter diagrams. Together these seem unlikely to be coincidence, and argue for a re-opening of investigation into solar and geomagnetic influences in the Gauquelin data.

The possibility that social factors are involved in seasonal birthrate variations cannot be excluded, but it is difficult to explain how social factors could account for the *changes* observed in these seasonal cycles on a time scale of 22 yrs.

I am grateful to Professor Suitbert Ertel and Dr. Jan Ruis for some improvements to clarity.

Notes.

1. The Zurich system of numbering sunspot cycles begins with cycle zero which peaked in 1750. Before this date and for the four previous cycles, sunspots were counted annually not monthly, so the monthly variations have to be inferred from other data.

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