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THE SELECTION
OF TENURED ASTRONOMERS IN FRANCE

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Abstract. The organization of the recruitment of tenured astronomers and astrophysicists in France is presented and compared with the setup in other countries. The ages for getting tenure have increased from 27-28 in 1980 to 31 today. Foreign scientists constitute at least 11% of the recruits and the delay in their hiring is quantified. The large reliance on national tenure committees is justified, while the increased targeting of positions is questioned and a compromise proposed.

1. Introduction

The international reputation of various nations in a particular scientific domain is not simply proportional to the total money spent on it. Among other factors, one could list: the organizational setup, the focus on the field by the national instances, the spirit of competition between different laboratories. But perhaps the single most important factor leading to the success of a nation in a given scientific field is how it trains and selects its scientists.

In this article, I will describe how the tenured scientists are selected in the fields of astronomy and astrophysics in France. I will limit myself to scientists, and not discuss the recruitment of engineers, technicians and administrative staff. By astronomy and astrophysics, I will span the fields of solar physics, space physics (solar wind and magnetospheres including terrestrial), planetary physics, stellar physics, high-energy astrophysics, interstellar and circumstellar physics and chemistry, galactic structure and

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extragalactic science, cosmology (from the local universe to the cosmic microwave background), and physics (e.g. calibration of atomic and molecular parameters of astronomical relevance).

I will describe the three major corps of scientists in Sec. 2 and the selection committees and procedures in Sec. 3, illustrate the evolution of the hiring in Sec. 4, compare with other countries in Sec. 5, and finally list and attempt to answer the outstanding questions in Sec. 6. A summary is provided in Sec. 7.

2. The Three Major Corps

The French scientists in the fields of astronomy and astrophysics are subdivided, in roughly equal numbers, among three separate corps listed in Table 1: the Centre National de la Recherche Scientifique (hereafter, CNRS), the Observatories and the Universities.

Among the approximate total of 750 French tenured astronomers and astrophysicists, 44% are CNRS scientists, 30% have been hired by the Observatories, 19% are University faculty, and another 7% were hired by other institutions (almost all at the Commissariat à l’Energie Atomique, hereafter CEA, which has its Service d’Astrophysique). Table 1 illustrates the similarities and differences among the three major corps: roughly equal sizes, national tenure committees for two (the CNRS and the CNAP for Observatory positions) of the three corps, but different attributes, and varying difficulties for promotion and mobility.

Note that there are two entry levels for CNRS positions (Chargé de Recherche 2nd class and 1st class – CR2 and CR1 respectively), and similarly two upper levels (Directeur de Recherche – DR2 and DR1). Whereas two upper levels exist both for the Observatories and the Universities, the rule of law only allows hiring to 2nd class levels. Moreover, the Universities and Observatories have both merged their two entry level classes. Finally, all three corps have exceptional-class upper levels, for scientists with exceptional careers, and the Observatories and Universities have a higher paying entry-level for older scientists.

3. The Selection Process

3.1. THE TENURE COMMITTEES

The members of French national tenure committees (CNRS and CNAP) are mostly elected with a minority (1/4 to 1/3) nominated by high-level administrators. The elections are usually based upon lists of candidates (as required by rule of law), where for the past 10 years, the tradition has been to have typically three lists affiliated with national labor unions, and
TABLE 1. The three major corps of astronomers and astrophysicists in France

| Corps             | CNRS               | Observatories | Universities |
|------------------|--------------------|---------------|--------------|
| Hiring agencies  | CNRS (Section 14)  | CNAP\(^a\)    | CNU\(^b\)    |
|                  | (Section 34)\(^c\) | (Astronomy Section)\(^d\) [national] | (Mainly local) |
| Title of entry-level | Chargé de Recherche | Astronome-Adjoint | Maître de Conférences |
| Title of upper-level | Directeur de Recherche | Astronome | Professeur |
| Total number     | 320                | 230           | 145\(^f\)    |
| Number at entry level | 171                | 116           | 85\(^f\)     |
| Number at upper level | 149                | 114           | 60\(^f\)     |
| Annual hirings\(^g\) | 8.2\(^h\)         | 7.0           | 5.6\(^h\)    |
| Fraction of targeted positions\(^g\) | 28%              | 0             | 60%          |
| Service          | –                  | observational\(^i\) | –            |
|                  |                    | (large projects) |             |
| Teaching load\(^j\) | 0                  | 64            | 192          |
| Median age\(^g\) for promotion to upper-level | 45               | 42            | 39           |
| Mobility         | very easy          | easy          | difficult    |

\(^a\) Conseil National des Astronomes et des Physiciens
\(^b\) Conseil National des Universités
\(^c\) Solar System and Distant Universe (http://dasgal.obspm.fr/~section/)
\(^d\) (http://wwwsr.obspm.fr/commissions/cnap/CNAP.html)
\(^e\) Astronomy, Astrophysics (http://www-obs.cnrs-mrs.fr/cnu/)
\(^f\) four Maîtres de Conférences and four Professeurs managed by Section 34 of CNU are outside the field
\(^g\) last five years
\(^h\) another 0.2 hired by CNRS and 1.0 hired by the Universities are outside the field
\(^i\) roughly 1/3 time
\(^j\) in equivalent hours of recitations per year

One independent list. Many of the candidates on labor union lists are not personally affiliated with these labor unions, and it appears to this author...
(who served at different times on all three tenure committees) that there is little collusion between members of a given list (unionized or not) on important votes. The specificity of unionized lists is that they can rely on advice from active union people that are either not on the committees or in other scientific fields, especially for establishing their platform and for negotiating with the government on proposed reforms.

The CNRS, CNAP and CNU committees also handle promotions within the different levels, and the CNRS committee is also involved in formulating policy and strategic planning, as well as in the analysis of entire laboratories and national subfield networks (Groupements de Recherche).

With the exception of the CNRS, junior scientists do not participate in the recruitment of upper-level scientists, while all upper-level committee members participate in the promotion of the sparse exceptional classes.

3.2. CNRS AND OBSERVATORY POSITIONS: FILLED BY NATIONAL COMMITTEES

The CNRS and Observatory positions are filled in a similar fashion. All candidates are assigned two referees from the tenure committee, who study their CV in detail, and the first referee provides a few minute report to the committee, while the second referee adds information in a much shorter intervention. All entry-level candidates pass a short audition (20 min + 5 min questions at the CNRS; 15 min + 3 min questions at CNAP), as well as the candidates for promotion to the upper level at the Observatories (the CNRS astronomy section stopped auditioning its upper level candidates in 2001). The very large number of candidates (of order 100) forces the committees to split up into two to three auditioning sections, and an unsuccessful candidate will be generally rotated to a different auditioning subsection on his/her new attempt in the following year. The committees then discuss and vote to narrow down the list of candidates from typically over 100 to the final number typically less than 10.

The principal selection criterion is the excellence of the scientific research as estimated by the publication record, the analysis by the referees, and the audition. There is also an increased use of citation statistics, although there is fairly little correlation between the chosen candidates and their publication and/or citation rates, even normalized to the number of authors and rank of the candidate among the authors (in part because the committees are very careful not to discriminate against scientists who publish less, such as instrumentalists and people working in pure theory).

Additional criteria are the pertinence of the candidate’s research topics, his/her autonomy, ability to work in teams, perceived usefulness to the laboratory (s)he suggests to work at, general dynamism, student supervision, teaching ability for the CNAP (see Sect. 3.3), educational background
(being an alumnus of one of the French *Grandes Écoles* is a plus, and a detail rarely forgotten by the referees), and possible awards and distinctions. Moreover, the CNRS and CNAP often strive to maintain a balance between the different laboratories throughout the country, as well as between the subfields of the candidates. In some instances, two scientists are hired in a given subfield and none in another subfield, while in other cases, the committee will build its short list by requiring at most one candidate per subfield (there are usually fewer positions than subfields).

The selection of Observatory scientists is more complex than that for their CNRS counterparts, as, in addition to the standard requirement of scientific excellence, a successful candidate must imperatively be attached to an observational service task (simulation of observations through the instrument; design, assembly, or calibration of the instrument; systematic observations; pipeline development; data archival), and this service task must be for one of the dozen or so observational projects that is considered top priority by the astronomical funding agency (*Institut National des Sciences de l'Univers* or *INSU*). For example, a brilliant theoretician without any proven track record for the service task he proposes stands no chance of entering the corps of Observatories. Unfortunately, the CNAP has little leverage on Observatory scientists who do not perform their service tasks, given the recent merger of the two entry-level classes.

The discussions are tricky as committee members refrain from being negative on candidates. Some committees discuss more, while others resort more often to votes. In a blocked situation, one often displays a *mute histogram*, without names attached (except for the person counting the votes), and one can then place a new rejection threshold at some local minimum in this histogram. The advantage of discussing more is that more useful things are said, and decisions can be made almost by consensus. The disadvantage of too much discussion is that a few charismatic and forceful committee members have an undue influence on the other committee members.

The CNRS hiring committee provides a list that can be modified by a high-level administrator at the CNRS (such changes are extremely rare), while the list provided by the CNAP is final.

### 3.3. UNIVERSITY HIRING: NATIONAL QUALIFICATION THEN LOCAL HIRING

The University positions are filled in a different fashion. The positions are all targeted to specific subfields of astronomy and astrophysics, although roughly 1/4 are as vague as *Astrophysics*, while roughly half are fairly narrowly targeted. The committees are local to their universities, with roughly one-quarter of the members nominated from outside institutions. But these local committees can only consider candidates that have been previously
qualified by a section (usually Astronomy) of the CNU.

There are three criteria for qualification: research activity, teaching activity, and proficiency in the French language. Roughly 2/3 to 3/4 of all entry-level candidates are qualified by the CNU. The qualification is good for four years. Less than half of the candidates for qualification to Professorship are qualified by the CNU (given the high fraction of foreign candidates, many of whom are not proficient in the French language).

The local tenure committees then make a short list of typically 5 candidates or less, and audition them for typically a half-hour, and then discuss and vote to select a candidate. They emphasize the scientific record, as well as the teaching ability of the candidate as judged by recommendation letters and the clarity of expression (the latter is also used, albeit to a lesser degree, by the CNAP).

The chances for promotion of a Maître de Conférences to Professeur are randomized by the requirement that a position of Professeur opens up at his/her University, with a description that meets his/her work.

4. Evolution Since 1980

4.1. HIRINGS PER SECTION

Fig. 1 shows the evolution of annual hirings in the different corps of scientists. Since 1989, the rate of hiring has been higher than in previous years, thanks mainly to increased hirings at the Universities, the CEA, and to some extent at the Observatories, to reach a total annual rate of 22 hirings per year. Part of this increase is related to the rise of the field of astroparticles.

4.2. PRESSURE

The first half of the 90’s saw a greater than doubling of the number of candidates for tenured positions (from 35-40 to 80), associated with only a 50% increase in the total number of positions (see Fig. 1). This dramatic rise in the number of candidates is believed to be associated to the time when scientists with French doctorates began pursuing their careers with postdoctoral fellowships in other countries, and with the slight rise in the median age of hiring (Sec. 4.6 and Fig. 4 below).

Since the mid-90’s, the number of candidates for Observatory positions has only risen slightly (< 10%) for observatory positions. Indeed, at this time, the CNAP began to place strong emphasis on observational service tasks as a necessary (but insufficient) selection criterion, so that many candidates (often theoreticians) with no obvious service tasks, have censored themselves with respect to Observatory positions. On the other hand, the
number of candidates to CNRS positions has continued to rise since the mid 90’s, to typically 100 today. Given the increase in pressure on tenured positions that occurred in the early 90’s, the graduate schools in France began, in the late 90s, to reverse their policy of increasing the number of graduate students.

It is interesting to follow the candidates to a given corps for a given year. Among the 37 candidates to Observatory positions in 1989, 16 (43%) were hired that year in one of the four corps, 8 (22%) the following year, and another 7 (19%) in the subsequent 3 years, so that within 4 years, all but 5 (14%) had found tenured scientific positions. But, by 1994, only 50% of the 82 candidates to the Observatories were eventually hired in one of the four corps.
The pressure on positions is quantified in Table 2. The median pressure on targeted positions is 9, whereas the median pressure is 25 on non-targeted CNRS positions and 12 on Observatory positions (double the pressure on Observatory positions during the late ’80s). In 1996 and 1997, the median pressure on University positions was 23.

4.3. HIRINGS PER FIELD

Fig. 2 shows the variations with time of the fields of the new recruits. The fluctuations in the fraction of hiring per field do not appear to be statistically significant, except for the field of high-energy astrophysics, albeit marginally so (the probability, from binomial statistics, of having as few High Energy positions in the first period combined with as many High Energy positions in the third period, assuming the actual mean rate of 9.0% over the three periods, is 5%).
4.4. HIRINGS PER METHODOLOGY

Fig. 3 presents the evolution in the principal methodologies of the recruited astronomers and astrophysicists since 1982.

The trends are fairly stable, except for a statistically significant increase in the fraction of scientists mainly involved in modeling, and a significant decrease of scientists involved in theory.
4.5. FRACTION OF WOMEN RECRUITS

In the last 21 years, the fraction of women recruits (in all four corps: CNRS, Observatories, Universities and CEA) has remained essentially constant at 20%: 20% in 1982-1988, 22% in 1989-1995, 19% in 1996-2002 (the latter decrease is not statistically significant). However, the fraction of women hired in 1965-1975 was significantly higher, at over 25%. The fraction of women hired by the four corps since 1980 are statistically identical (19%, 22%, 20% and 15% for the CNRS, Observatories, Universities and CEA, respectively). The success rate of female candidates for entry-level CNRS positions is virtually the same as their male counterparts (Durret 2002).
4.6. AGE OF RECRUITMENT

Are French scientists recruited increasingly later in their career? Fig. 4 shows the age of recruitment (the age at the end of the year when the recruitment is pronounced) for scientists in the major three corps (CNRS, Observatories, and Universities – no age data was available for the CEA staff).
Fig. 4 shows the rise with time in the age of the recruits, with the relation (straight line in the Figure)

\[ \text{Age} = 27.8 + 0.15 (\text{Year} - 1980). \]  

This increase is statistically significant. For example, subdividing the scientists into three 7-year periods: 1982-1988, 1989-1995, and 1996-2002, the distribution of recruitment ages is statistically higher through the Kolmogorov-Smirnov test from the 1st to the 2nd period (93.7% confidence) and from the 2nd to the 3rd period (99.5% confidence). Also a Spearman rank test gives a probability of \(3 \times 10^{-11}\) of such a rank correlation (0.36) by chance. The parabolic fit suggests that this increase in the age of tenured scientists is currently flattening. In fact, the rank correlation test yields a significant rise in hiring age during 1980-1991, but an insignificant rise since 1992. The overall rise in recruitment age is significant for both CNRS and Observatory positions (whose age patterns are very similar), but not for University positions.

An increase of 1.5 years of age every 10 years constitutes a strong rise. Since 1980, the typical recruitment age has thus risen 3 years, which represents 10% of the age of the scientist. In 2002, the typical recruitment age (parabolic fit in Fig. 4) is 30.6 years. This corresponds to 3-4 years after the PhD. In contrast, around 1980, scientists were typically hired by the end of their PhD, and in the 60's and 70's some scientists were granted tenured positions before starting their PhD, even at the young age of 22!

5. Comparison with other Countries

In comparison with other countries, France can boast one of the highest rate per capita of hiring tenured scientists in astronomy and astrophysics. The advantage is that this attracts highly qualified foreign scientists. The disadvantage is that the quality threshold is perhaps lower than in countries with few positions.

Another originality of the French system is its reliance on national hiring committees (see following section). In comparison with other countries, the assessment of candidates by experts outside the committees (recommendation letters) have little impact on committees (but they can have a great impact on the candidate’s two referees).

In the United States and many other countries, a short list is made, based upon the publication record, the recommendation letters, the perceived dynamism and the academic background, and only the candidates on the short list are interviewed both in private and through an hour-long seminar. In France, the CNAP is forced, by rule of law, to conduct auditions on all the candidates, which, even after splitting the committees in
two or three sub-jurys, and limiting the presentations of the candidates to 15 or 20 minutes, still requires a few days full time.

As in most systems, the candidate to the French system must play by the rules of the game. In a system with national hiring, this includes not only making strong contact with the laboratory where one wishes to work, but also making presentations of one’s work across the country, because as is usually the case in any country, a candidate with a known face has more chances of being hired than an unknown face (the CNAP now has photographs of the candidates and in general a fraction of the members have seen the candidate during an audition or seminar). A candidate to the Observatories must moreover develop a credible observational service task with the staff at the laboratory where (s)he wishes to settle.

One drawback of the French system is that it is fixed by rules of law, hence very rigid. This prevents the rapid hiring of outstanding foreign scientists (e.g. during the demise of the former Soviet Union). Nevertheless, a few outstanding foreign individuals have been hired (see Sect. 6.3 below).

6. Recurrent Questions

6.1. LOCAL VERSUS NATIONAL HIRING

In most countries, the hiring of tenured faculty is conducted by the local institutions. For French astronomy, roughly 1/3 of astronomers are hired locally (through the Universities and the CEA), while the remainder are hired through the national CNRS and CNAP committees. Having myself pursued my graduate studies and postdoc in the United States, I first found this situation quite strange. In hindsight, I now believe that national hiring works better for France.

While local hiring has the advantage of developing a healthy competition between the various laboratories, it has the drawback of leading (≃ 1/4 of the time) to the hiring of less-qualified “locals” instead of more qualified “exteriors”. In other words, some (probably a minority of) French scientists sitting on local tenure committees lack the free-market spirit to strengthening science, but prefer instead to favor former students, and national committees prevent such abuses.

6.2. BIG SCIENCE VERSUS CREATIVE INDIVIDUALS AND THE ISSUE OF TARGETED POSITIONS

Another important question is how to maintain the best balance between the wish to hire the brightest individuals and the need to supply manpower to the large high-priority observational projects in which France is investing heavily in equipment. In the last three years, 37% of the CNRS
positions were targeted to either a particular field of astronomy (sometimes a pluridisciplinary field at the boundaries of astronomy), and/or a particular international observatory (see Table 2). The question of supplying manpower to the important observational programs is also addressed in detail by the CNAP, which, since the mid '90s, has been considering service tasks on large observational projects as a prime and necessary criterion for hiring (although there are no specifically targeted Observatory positions).

The advantage of targeting positions for specific fields or projects is obvious: to fill an important need at a given time. Moreover, given persistent rumors, over the last dozen years, on the intentions of the French government to merge the Observatories into the Universities, the aspect of service tasks performed by Observatory astronomers is considered to be the prime motivation for keeping a specific status for Observatory positions. However, in most cases, the pressure on the targeted positions is considerably lower than on the non-targeted ones: Table 2 indicates that none of the CNRS targeted positions since 2000 had pressures above 40% of those of their non-targeted counterparts of the same year, and most had a pressure 1/4 less than for Observatory positions. One is therefore led to wonder whether the targeted positions are attributed on average to individuals of lower competence than are the non-targeted ones.

In the author’s opinion, the pendulum is swinging a little too far in the direction of supplying the big science projects, given that all the Observatory positions (through the observational service task) and nearly 40% – see Table 2 – of recent CNRS positions are targeted to projects, and moreover, over half of the University positions come with narrowly defined targets. What is worse, the French government recently proposed (but then withdrew in face of the clear opposition of the astronomical community) a reform of the CNAP that would have made all Observatory positions targeted both by field and by location (to conform with the targeting of university positions). It would make more sense to stop targeting CNRS positions, except in rare instances for specific interdisciplinary fields (the CNRS has partially solved this problem by just creating a special committee separate from Solar System and Distant Universe called Astroparticles). To provide manpower to the large projects, the INSU should release an official public list of top-priority observational programs, that would contain roughly twice the number of annual Observatory positions available, and that would be renewed every year. The CNAP would then be required to hire Astronomers proposing service tasks with one of these listed programs. With such a system, the CNRS would hire the more creative individuals, while the CNAP would hire the team players. Both sets of scientists are necessary to make a country like France thrive in the international arena.
6.3. THE HIRING OF FOREIGN SCIENTISTS

Overall, since 1980, roughly 11% of all scientists hired at the entry level were from foreign countries or French nationals who (like this author) had left France before graduate school, and both are hereafter referred to as “foreign”. Table 3 shows the numbers and fractions of foreign scientists per corps (these are lower limits, as some may have been missed).

|                        | CNRS | Observatories | Universities | CEA | Total |
|------------------------|------|---------------|--------------|-----|-------|
| Foreign                | 21   | 15            | 2            | 7   | 45    |
| Total                  | 169  | 121           | 79           | 33  | 402   |
| Percentage             | 12%  | 12%           | 3%           | 21% | 11%   |

The Table indicates a statistically significant low fraction of foreign scientists hired at the Universities (given a predicted foreign-hiring rate of 11%, there is 0.6% probability that two or less foreigners would be hired out of 79 University recruits). This low fraction of foreign University recruits presumably arises because foreign accents are deemed a hindrance to good teaching, and also because foreign scientists are often aware too late of the prerequisite of qualification by the CNU. On the other hand, the CEA has a strong tradition of hiring foreign scientists (21% of their hirings since 1980, which is statistically significantly high).

The origins of the foreign recruits are Western Europe (58%), South America (10%), North America (9%), North Africa (7%), Middle East (7%), Former Soviet Union and Eastern Europe (5%), East Asia (2%), and Australia (2%).

Fig. 4 helps answer the question of the openness of the French system to scientists from outside France. Overall, the median delay for the hiring of foreign scientists, relative to their French counterparts (excluding those older scientists directly hired at upper-level positions) is 2.9 years. The age of arrival in France makes a crucial difference. Scientists arriving before the age of 28 are hired 1.0 year (median) after their French counterparts, while scientists arriving at 28 or after are hired 5.5 years (median) after their French counterparts. Only three (late arrivals) out of 31 foreign scientists (10%) were hired directly from abroad. In addition to that, 7 foreign scientists were directly hired (in the last 23 years) to upper level positions, among which 2 directly from abroad (both for positions of head of their
Figure 5. Left: Time interval for hiring, measured from time of arrival in France or the age of 27, whichever comes later, as a function of the age of arrival for foreign astronomers or French expatriates. Right: Normalized cumulative histograms of time interval of hiring (defined above) for French nationals (solid histogram), foreign scientists arriving before (dotted histogram) and after (dashed histogram) the age of 27.

Since the time of arrival is essential, one can wonder whether late-arrivals of foreign scientists lead to longer or shorter time intervals to tenure in comparison with earlier arrivals.

The plot on the left of Fig. 5 shows no correlation between the age of arrival and the time interval for hiring measured from the age of arrival if greater than 27 (corresponding approximately to the year of the PhD thesis), or else from 27 years of age. With this definition of the time interval, foreign scientists wait globally 0.8 year more (mean) than their French laboratory), and one only one year after his arrival (again for a position of head of a laboratory).
counterparts for securing tenured positions (this difference is significant to 94% confidence). In fact, the plot on the right of Fig. 5 shows the 1 year delay for foreigners arriving early (99% significant with a KS test) with only 17% hired by the age of 29, in comparison with the 48% of their French counterparts. On the other hand, foreigners arriving after 27 typically wait 2.5-3 years, slightly less (but not significantly so) than it takes French nationals counting from the age of 27.

The penalty on the foreign astronomers who arrive young in France may be due to cultural differences. This is even more pronounced for foreign scientists arriving later in France, but although they are hired at older ages, they wait the same (once in France) then do their French counterparts (now counting from the age of 27).

6.4. HOW IMPORTANT SHOULD BE THE CRITERION OF INTEGRATION WITHIN A LABORATORY?

In France, the perceived integration of the candidate to the laboratory where he wishes to work is considered an essential selection criterion. The heads of laboratories are asked by the CNAP (but not by the CNRS committee) to present an ordered list of their preferred candidates, and this information is very influential: in the last two years, among the 14 scientists that the CNAP has hired at entry-level positions, only one had not been at the top of the list by the laboratory he was applying to work at.

The advantage of such a system is that it enables the heads of laboratories, often with the help of the scientists working in their lab, to plan the recruitments and allows them to strengthen (or weaken) particular research teams within their laboratory. The drawback is that, just like in the case of targeted positions, the overall quality of hired scientists will not be optimal. For example, the most brilliant candidates may not be high-priority in their laboratories, either because their subfield of work is not well represented in their laboratory, or because they are applying to an outside laboratory (not one where they performed their doctoral thesis work) and the laboratory head is prioritizing one or more candidates from his/her laboratory. This is a likely occurrence when excellent foreign scientists seek a laboratory where to apply for tenure.

In this author’s opinion, a brilliant scientist who settles in a laboratory with nobody else in his/her particular subfield of work, will manage, in time, to attract others in his/her subfield, some of whom may be former students. It is not important if, during his/her first years of tenure, such a scientist does not publish with other scientists in his laboratory. In this age of electronic mail and cheap telephone rates, long-distance collaborations are easy to implement. The long-term benefits outweigh the lack of early collaborations.
6.5. IS RECRUITMENT GOVERNED BY CHANCE?

One would certainly hope that chance is absent in the recruitment procedures of French astronomers. Unfortunately, there is indeed an element of chance in the French tenure system, as there is on any tenure (or telescope allocation) committee. Indeed, the forcefulness of the candidate’s referees is an important element of the decision making in any system that does not rely too strongly on bibliometric quantities such as the rates of paper production and/or citations.

Another element that could be considered chance is the competition that the candidate might suffer in a given laboratory and/or field of work. However, if the candidate feels overshadowed by another candidate to the same laboratory, (s)he may well apply to a different one.

Finally, in the competition for positions at the Observatories, the candidate must make the right choice of an observational service task that is in a large observational program prioritized by the national funding agency (INSU). If an official list of such prioritized programs (as advocated at the end of Sec. 6.2) were publicly made available roughly half a year before the season of tenure committees (usually Spring in France), candidates would then be able to begin work on a publicly listed observational service task before launching their candidacy.

One can ask why did some of the best candidates fail to obtain a tenured position in France after many tries. The best known few cases involved scientists (who usually find permanent astronomical positions outside the country) with important gaps in their publication record. Although the committees in France avoid basing their decisions by simply counting papers, they are often strongly tempted to pass on a candidate with a large gap in his/her publication record, in favor of other candidates of similar overall perceived competence with large publication records, and hence considerably more numerous noteworthy scientific results.

6.6. HOW MUCH MOBILITY SHOULD BE ALLOWED BETWEEN LABORATORIES AND BETWEEN CORPS?

Another question concerning the human resources of a given country, is whether the decision makers should strive to strengthen the strongest laboratories and abandon the weakest, or on the contrary provide a minimum human workforce for all laboratories.

This question affects the decisions of the national tenure committees (CNRS and CNAP), and the second viewpoint is probably at least as well followed as the first. This question also affects the rules regarding the mobility of French scientists. Some believe that scientists should be free to change laboratories, if they are accepted by a new one. Others believe that
mobility should be made more difficult, to prevent numerous departures from a given laboratory.

In this author’s opinion, the first viewpoint is to be favored, as leading to optimal scientific productivity. If a scientist feels frustrated enough to want to leave his/her laboratory, which entails a loss of a few weeks in negotiations, moving and settling in the new laboratory and location, this must mean that (s)he senses a considerable increase in his/her scientific productivity in the new laboratory. Moreover, some scientists will want to move for family reasons.

If the situation in a given laboratory is serious enough to lead to many scientists wanting to leave, should they be forced to stay? Would all the good scientists flock to the most reputed laboratories? Some would indeed, but only up to some point, when the laboratories will have filled their office space. And the national tenure committees (CNRS and CNAP) can attempt to prioritize the hiring of scientists in the laboratories that have recently lost scientists, which makes more sense if this loss is caused by premature death than by retirement, or especially voluntary leave.

7. Summary and recommendations

The French tenure system is probably unique in the world, with a high rate of hiring per capita, its combination of local and national hiring tenure committees, the young age at which its scientists reach tenured positions, and its governance by state rules and decrees.

The balance between the free-market and organized/planned approaches is also unique to France. The strong reliance on national tenure committees is justified as preventing abuses of favoring local candidates. On the other hand, although the increased targeting of tenured positions by subfield and/or laboratory is obviously helping France provide manpower in its large priority projects, it is also leading to a corresponding decrease in the hiring of the brilliant and creative scientists. This situation can be remedied by a public list of $2N$ priority projects set by INSU from which the CNAP committee will select the service tasks of its Observatory positions, and a reduction by at least half of the fraction of targeted CNRS positions. Moreover, one should be careful not to prevent the mobility of scientists in the name of laboratory planning.

The French system, although rigid by virtue of its being governed by government decrees and ruling, is nevertheless flexible enough to hire a substantial fraction (11%) of foreign scientists. Young arrivals in France are hired typically one year after their French counterparts, while those arriving after their PhD typically wait 2.5-3 years before being given tenure.

Still, astronomers and astrophysicists working in French laboratories
are at least as influential as scientists working in other Western countries (Bertout et al. 2003). In some respects, the French system is slowly converging to the other western systems, in that most young scientists now go for postdoctoral positions outside the country, and, in general, now publish almost all their works in English, are more present in international conferences and committees, and are now more experienced (typically age 31) when they are granted tenured positions. Nevertheless, *vive la différence!*

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