

## COMMUNICATING IN ASTRONOMY

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**Abstract.** This chapter is an essay introducing the general communication process related to astronomy and structured essentially in two parts: on one hand, the intra-professional communication, typically but not exclusively, of scientific information and, on the other hand, the communication towards the outside world (other scientific communities, decision makers and takers, news media, public and society at large, including amateur astronomers). Some issues are more specifically touched, such as the language usage and the image of the scientific community. The need for training astronomers to adequately prepare professional communications (talks, 'papers', graphism, ...) and to handle news media is emphasized.

### 1. Introduction

Communicating is one of the basic processes of life.

And, as astronomers, we communicate all the time, with colleagues of course, but also with managers and administrators, with decision makers and takers, with social representatives, with the news media, and with the society at large including our family, our friends and amateur astronomers (cf. Fig. 1). Education is naturally part of the process.

And we communicate nowadays via a large variety of means: voice and print, phone and fax, as well as via the now omnipresent electronic tools, both active (e-mail) and passive (web), in addition to the various graphical arts (including movies, videos, ...).

A number of books and papers (see *e.g.* Meadows 1997 & Nelkin 1987) have been devoted to the science-related communication in general. Is communication in astronomy different from what it is in other communities? Basically not, with perhaps two significant differences though:

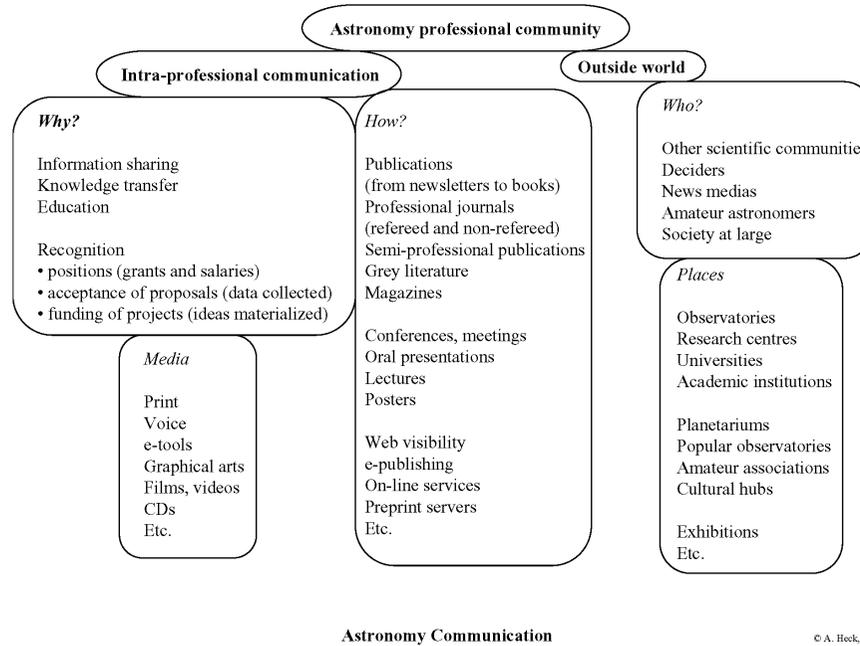


Figure 1. A schematic view of the astronomy-related communication process.

- the astronomy community is rather compact and well organized world-wide;
- astronomy has penetrated the general public remarkably well with an extensive network of associations and organizations of aficionados all over the world.

Accessorily, as a result of the huge amount of data accumulated, but also by necessity for their extensive international collaborations, astronomers have been pioneering the development of distributed resources, electronic communications and networks coupled to advanced methodologies and technologies often much before they become of common world-wide usage.

Most astronomers have never been trained to communicate optimally, either orally (*e.g.* professional communications and lobbying), in writing (*e.g.* professional ‘papers’) or graphically (*e.g.* web sites). Dealing adequately with the news media can be a perilous exercise, not only for the individuals involved, but also, beyond them, for the astronomy community itself.

The more general concept of *information handling* in astronomy, including some aspects of communication, has been dealt with extensively in another volume (Heck 2000a). The approach angle here is different.

This chapter is basically a first essay opening the way to possible subsequent dedicated publications and meetings. It will quickly review the professional communication procedures, emphasizing the need for *ad hoc* training for talking and writing adequately. We shall also discuss the language issue, the importance of which is often exaggerated and which is sometimes confused with other effects.

Communicating with amateur astronomers, with the news media and with the public will be also quickly reviewed, putting forward some caveats and identifying directions for improvement.

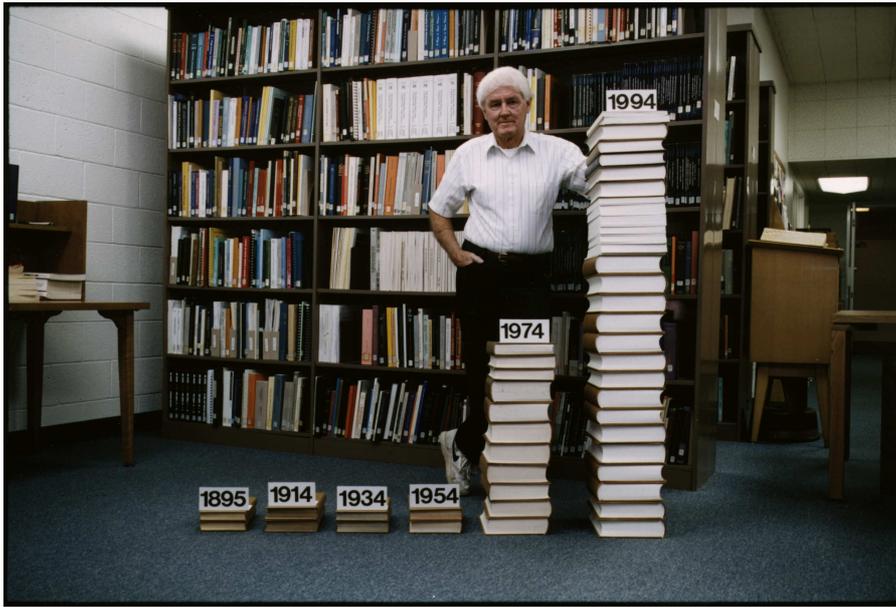
The communication with decision makers and takers is largely unorganized, except in the USA, and we shall come back to this too hereafter.

## 2. The intra-professional communication

### 2.1. GENERALITIES

This is certainly the aspect most commonly practiced among professional astronomers because not communicating would be equivalent to isolation and to stagnation of career, if career at all.

Indeed the professional communication in astronomy – as in other sciences – is not only motivated by the noble aims of educating and information sharing, but also strongly conditioned by career constraints involving *recognition*, a necessity that should not be underestimated. Recognition is sought for getting positions (*i.e.* grants and salaries), for obtaining ac-



*Figure 2.* An illustration of the dramatic increase of astronomical literature over the past decades. Helmut A. Abt, Editor-in-Chief of the *Astrophysical Journal*, is standing next to stacks of that leading professional publication (courtesy the *National Optical Astronomy Observatories, NOAO*).

ceptance of proposals (*e.g.* leading to data collection), and for achieving funding of projects (allowing materialization of ideas).

The pressure for recognition has contributed to the strong increase of professional papers (see Fig. 2), together with other factors such as the expansion of the professional astronomy community itself (especially after the beginning of the space age<sup>1</sup>), the multiplication of large instruments and spacecraft equipped with always faster, more diversified and more efficient detectors, and so on. Commercial publishers have also put on the market more journals which are as many additional communication outlets.

The major professional journals use the peer-review procedure ('refereeing') for accepting, amending or rejecting submitted contributions (see *e.g.* Pottasch 2000). Albeit a matter of regular debates (on its principle itself as well as on the way it is conducted), the refereeing process has been so far the best one (or the less questionable one) to publish contributions with validated content, *i.e.* an assurance of good quality, novel results obtained by reproducible experiments, calculations or analyses on which enough details are provided.

<sup>1</sup>See for instance Figs. 10 & 11 of Heck 2000c in this volume.

## 2.2. CLASSICAL PROFESSIONAL COMMUNICATION

The most important general professional journals constitute what is sometimes called the ‘gang of four’ including the *Astrophysical Journal*<sup>2</sup> (founded in 1895) and the *Astronomical Journal*<sup>3</sup> (first founded in 1849, revived in 1896) published by the *American Astronomical Society*<sup>4</sup>, the *Monthly Notices<sup>5</sup> of the Royal Astronomical Society*<sup>6</sup> (UK, 1827), and *Astronomy and Astrophysics*<sup>7</sup> resulting from the merging in 1969 of several European professional journals (Pottasch 1999).

Other journals should however be mentioned such as the *Publications<sup>8</sup> of the Astronomical Society of the Pacific*<sup>9</sup>, *Astrophysics and Space Science*<sup>10</sup>, *New Astronomy*<sup>11</sup>, the *Publications of the Astronomical Society of Japan*<sup>12</sup>, *Icarus*<sup>13</sup>, *Celestial Mechanics and Dynamical Astronomy*<sup>14</sup>, *Solar Physics*<sup>15</sup>, and so on.

Astronomers communicate also via a whole spectrum of publications ranging from informal newsletters to books gathering together review papers by the best specialists on specific topics. Conferences, colloquiums, workshops and meetings of all kinds provide also efficient ways of exposing oneself to both excellent review talks and presentations of works in progress. The corresponding proceedings are published by commercial publishers, by learned societies, by research institutions, or even by individuals, reasonably soon after the events.

Professional astronomers are also contributing substantially to less specialized publications, mainly directed towards amateur astronomers and the public at large. Many countries have their own such national journal, but *Sky & Telescope*<sup>16</sup> is probably the magazine with the larger audience world-wide.

<sup>2</sup><http://www.journals.uchicago.edu/ApJ/>

<sup>3</sup><http://www.astro.washington.edu/astroj/>

<sup>4</sup><http://www.aas.org/>

<sup>5</sup><http://www.blacksci.co.uk/products/journals/mnras.htm>

<sup>6</sup><http://www.ras.org.uk/ras/>

<sup>7</sup><http://www.aanda.org/>

<sup>8</sup><http://pasp.phys.uvic.ca/>

<sup>9</sup><http://www.aspsky.org/>

<sup>10</sup><http://www.wkap.nl/journalhome.htm/0004-640X>

<sup>11</sup><http://www.elsevier.nl/locate/newast>

<sup>12</sup><http://www.tenmon.or.jp/pasj/>

<sup>13</sup><http://astrosun.tn.cornell.edu/Icarus/Icarus.html>

<sup>14</sup><http://www.wkap.nl/journalhome.htm/0923-2958>

<sup>15</sup><http://www.wkap.nl/journalhome.htm/0038-0938>

<sup>16</sup><http://www.skypub.com/>

### 2.3. ELECTRONIC COMMUNICATION

Most professional astronomers are intensive users of the electronic medium, either actively (e-mail) or passively (web sites).

Publishing is also increasingly done electronically nowadays. Or, better said, there is more and more of *diversified publishing*, *i.e.* of information available on different media (paper, CD-ROM, web sites, and so on). These media are not excluding, but completing, each other.

Several journals have an electronic counterpart, but no astronomy journal is practicing electronic publishing in the full sense of the medium. What they do is to put on line digitized files still basically along the lines of linear structure of a document on paper, since the first thing most users of such ‘electronic’ journals want is ... to print the ‘papers’! And what we still have largely is a system equivalent to TV bulletin news zooming on newspapers (on paper) or showing people reading magazines.

A fully electronic resource would make use of all the degrees of freedom of the medium, such as the hypertextual structure, the colors, the sound and motion, the applets and whatever might come next.

Certainly some e-peculiarities have been introduced in electronizing the journals, such as advanced integration in databases and forward referencing, not to forget the possibility of shipping quickly the papers forth and back between authors, editors and referees, as well as exactly that flexibility for quick download from the web sites. See more on this issue in Heck (2000b).

Web sites and on-line services have become of common usage. Among the latter ones, it is appropriate to mention here

- the *Strasbourg astronomical Data Center (CDS)*<sup>17</sup>, a long-time pioneer nowadays recognized as the world leader;
- the *NASA/IPAC Extragalactic Database (NED)*<sup>18</sup>;
- the *Astrophysics Data System (ADS)*<sup>19</sup>;
- the *National Space Science Data Center (NSSDC)*<sup>20</sup>.

Yellow-page services such as the *StarPages*<sup>21</sup> complement the previous resources, being also an example of diversified publishing (Heck 1997a) with their equivalent also available on paper (Heck 2000d&e).

Before moving to another area, it is worthwhile to point out that authors are more and more responsible for their end product in the communication processes (writing, typesetting, graphism) which often means a significant amount of time spent struggling with macros and/or languages with re-

<sup>17</sup><http://cdsweb.u-strasbg.fr/CDS.html>

<sup>18</sup><http://www.ipac.caltech.edu/>

<sup>19</sup><http://adsabs.harvard.edu/>

<sup>20</sup><http://nssdc.gsfc.nasa.gov/>

<sup>21</sup><http://vizier.u-strasbg.fr/starpages.html>

stricted capabilities. There has been indeed so far a large failure in getting user-friendly tools and *ad hoc* training from publishers.

#### 2.4. GREY COMMUNICATION

Grey literature has never really been identified as an important issue in astronomy, perhaps because of the small size of the community and the rather fast publishing procedures (compare to other disciplines).

The number of observatory publication series has been dramatically decreasing over the last decades, as did the stacks of preprints, reprints and irregular newsletters that were often sources of headache for our librarians. Most of this material is now available electronically.

However, and with all the consideration and appreciation due to preprint servers such as the LALN one<sup>22</sup> (see *e.g.* Ginsparg 1996), one must recognize that the system is somehow heavy and little time-efficient (files need often to be compressed, possibly to be uuencoded, plus ftp-ed and/or e-mailed before the paper is up and available).

Again for all its value at the time it was set up, such a system could certainly be simplified nowadays by taking advantage of the web structure and by pointing to papers residing at the authors' sites. The maintenance would be lighter (especially in case of paper upgrade) and the validation procedures could remain very similar to the current ones. An abstract and a bibliographical reference could always be included in the main database together with the paper URL.

#### 2.5. EDUCATION

No astronomer will question the need to increase astronomy teaching at all levels. The field has been recently well covered by Percy (2000) and by Norton *et al.* (2000) and it is therefore not necessary to be long here on his matter.

The difficulties encountered in some countries with lobbies such as the creationism-related ones should not be underestimated, but they should also be carefully treated to avoid that actions taken backfire through some propaganda in favor of such groups.

Describing what is the best communicator as educator is out of the scope of this note, so different are the educating systems round the world. However one cannot but be worried by the significant devaluation of educational values and degrees, even at higher levels, in some countries. Highly regarded until a couple of decades ago, educating is now becoming a per-

<sup>22</sup><http://xxx.lanl.gov/>

ilous profession because of the violent context existing in some places. Let's hope that such a society phenomenon is only transitory.

## 2.6. MANAGERIAL COMMUNICATION

The professional communication also includes that dialog between managers and people of their groups, departments, institutions, ..., as well as the dialog between those managers and their predecessors in the position, always advisable, but not always achievable – depending of the feelings on either side.

There are all kinds of managers: open, secretive, pure researcher, administrative freak, hierarchical bootlicker, public-relations maniac, cocktail-addicted, permanent traveller, Pontius Pilate (leaving all decisions to council meetings), and so on<sup>23</sup>.

Discussing this issue in details is again out of the scope of this chapter, but, in the same way astronomers are not necessarily born communicators, they quite legitimately might not be the best administrators or the best managers either. Again here organizations might be well inspired to plan for some adequate training.

On a more general level, the relationships between administration and research would deserve to be carefully reviewed. Especially the heavy burden put sometimes on research by ever growing administrative empires should be denounced. Additionally, and although we are definitely welcoming the participation of all bodies and categories of personnel involved, the structure of some institutional councils should be questioned as they give sometimes a determinant say on the selection and conduction of research programmes to a large fraction of their membership largely incompetent in assessing research.

## 3. Communicating with the outside world

### 3.1. OTHER SCIENTIFIC COMMUNITIES

The interactions with other scientific communities are multitudinous and generally based on collaborations between individuals or groups in a number of fields ranging from physics and chemistry to space law and biology via instrumentation technologies, computing and information handling.

As mentioned already, the astronomy community is rather compact and is well structured within the *International Astronomical Union (IAU)*<sup>24</sup>.

<sup>23</sup>Or should we rather parody that famous comment on orchestra directors? Then there would be managers getting people to work, others letting people work, and those preventing people to work ...

<sup>24</sup>See Andersen (2000a&b) and <http://www.iau.org/>

IAU itself belongs to the *International Council of Scientific Unions (ICSU)*<sup>25</sup> together with some 95 multidisciplinary bodies and 25 other scientific unions.

ICSU is a non-governmental organization set up to promote international scientific activity in the different branches of science and their applications. It supervises a number of interdisciplinary scientific committees such as the *Committee on Data for Science and Technology (CODATA)*<sup>26</sup> (where IAU is also represented) and the *Panel on World Data Centers*<sup>27</sup>.

The *Committee on Space Research (COSPAR)*<sup>28</sup> is furthering, on an international scale, the progress of all kinds of scientific investigations which are carried out with space vehicles, rockets, and balloons.

Such organizations and others are forums where astronomers can officially be heard and share experience, as well as concerns, with colleagues from the whole spectrum of fields.

On another level, and to be complete in this section, it is fair to say that, because of the general reduction of funding for fundamental research, astronomy round the world is increasingly competing for pennies with disciplines currently more favored.

### 3.2. THE PUBLIC AND THE SOCIETY AT LARGE

As stressed by Durant *et al.* (1989), “common sense suggests that the scientific community would be unwise to presume upon the continued backing of a public that knows little of what scientists do”. The same authors revealed that, at the time of their survey, “only 34% of Britons and 46% of Americans appeared to know that the Earth goes round the Sun once a year”. Only roughly half of the population is convinced that the universe is larger than the solar system, the galaxy, etc.

Astronomical public outreach can be carried out through a number of outlets ranging from news media and popularizing magazines (paper, broadcast, TV, etc.) to well-maintained web sites via more specific tools such as public observatories and planetariums (on these, see for instance Petersen & Petersen 2000). Large astronomical organizations are increasingly developing specific public outreach policies. See for instance Madsen & West (2000) for a detailed description of the complex and long-term plans at the *European Southern Observatory (ESO)*<sup>29</sup>.

<sup>25</sup><http://www.icsu.org/>

<sup>26</sup><http://www.codata.org/codata>

<sup>27</sup>See e.g. <http://www.ngdc.noaa.gov/wdc/>

<sup>28</sup><http://cospar.itodys.jussieu.fr/>

<sup>29</sup>See also the page <http://www.eso.org/outreach/>. Another example are the multifaceted activities developed at the *Space Telescope Science Institute* (<http://www.stsci.edu/>).

As explained in Andersen (2000b), the IAU has a number of undertakings towards the public, not only through its divisions and commissions, but also more directly as debunking spurious news (threatening near-Earth objects, poisonous comet tails, etc.), stating facts on object naming, maintaining a FAQ on the web, and so on. This could be a full-time job today to answer all the genuine requests and questions (not to speak of the weird messages, fantastic new theories, and crackpot lucubrations) received electronically every day.

In the same vein, astronomers should also be encouraged to become more involved in organizations debunking pseudo-sciences such as the *Committee for the Scientific Investigations of Claims of the Paranormal (CSI-COP)*<sup>30</sup> and its world-wide affiliates. Amateur astronomers can also be usefully involved in such actions.

As already pointed out earlier when speaking of electronic astronomy, there are still large portions of some of our continents where astronomy is almost inexistent<sup>31</sup> and where help is dramatically needed. Refer also to Andersen (2000b) for the various actions undertaken by the IAU in this respect.

Because of its immense philosophical impact, astronomy is also well present in arts and literature. Refer for instance to White (2000) for an interesting initiative bringing people from these areas together with astronomers.

### 3.3. THE NEWS MEDIA

There are not many papers on the relationships between the astronomy community and the news media. The excellent reviews by Maran (1999) and Maran *et al.* (2000) describe the press activities developed at the *American Astronomical Society* (and thus in an American context).

In Europe, to the exception of the *Royal Astronomical Society* (see *e.g.* Sect. 12 of RAS 1999), things are much less well organized and, as Pfau (2000) emphasizes, services of professional press and/or PR agencies are too expensive for standard astronomical organizations. Therefore such activities are regularly taken over by a board member, a staff member or a volunteer with some experience.

In this case of course, objectivity and neutrality must be the rule, as it already happened that such individuals were sometimes more tempted to give priority to their own advertizing (and/or to their friends' work).

<sup>30</sup><http://www.csicop.org/>

<sup>31</sup>See the maps reproduced in Heck (2000c) in this volume.

Well-trained and/or experienced press officers are however not a luxury. Media can be used, not only towards the public, but also directly and indirectly towards deciders.

Accuracy of press reports could be a concern. In this respect, Schaefer *et al.* (1999) draw two main conclusions:

- reporters should be rehabilitated in to the good graces of astronomers, and
- a distinction must be made between reports dealing with textbook science (reliability near 100%) and those on front-line science (with a reliability only near 70%).

The basic problem faced by astronomers is the lack of training in order to appropriately prepare and handle encounters with the news media – especially when meeting them after some tiring observing run and/or trip during which took place some unexpected and attractive discovery. Again here a couple of basic training hours would benefit any astronomer, be it only to avoid some terms and/or expressions which – used out of context by scoop-seeking newsmen – could be damagable to those individuals and, beyond them, to the community as a whole.

Let us conclude this section by reproducing the last paragraph of Maran *et al.* (2000):

“In the future, it seems likely that primary trends in coverage of astronomy meetings will revolve around decreases in the cost of producing broadcast-quality video animations and “visualizations” of scientific data. The television networks are much more amenable to covering astronomy stories when good video releases are available, but in recent years, only well-funded organizations have been able to provide such material. Better graphics of every type will increase the coverage of astronomy stories as most newspapers begin to publish editions in color, and as web sites grow in importance as news providers for the average person and those who are scientifically inclined.”

#### 3.4. THE DECISION MAKERS AND TAKERS

The *American Astronomical Society (AAS)*<sup>32</sup> not only established a dedicated news media service (see *e.g.* Maran 2000), but also opened years ago a bureau in Washington, DC. As recalled by Boyce (1999), “as the last quarter of the twentieth century approached, it was clear to the forward-looking officers and councilors of the AAS that the traditional ways of funding science had changed and that the astronomical community could benefit from maintaining a closer contact with the government in Washington.”

<sup>32</sup><http://www.aas.org/>

The AAS is thus lobbying directly the US Congress while instructing also adequately its membership via its newsletter and its electronic announcements for concerted actions at appropriate times with adequate arguments.

Each decade in the US too, an *Astronomy and Astrophysics Survey Committee (AASC)*<sup>33</sup> surveys the fields of space- and ground-based astronomy and astrophysics, recommending priorities for the most important new initiatives. The publication of the next report (addressing the decade 2000-2010) is expected in Fall 2000 (McKee & Taylor 2000). As emphasized by Lawler (2000), such exercises ‘pay off handsomely’. See also Bahcall (1991) on the previous decadal exercise.

We are still waiting for such undertakings in Europe, even at the national levels as political lobbying is largely left to individual initiatives and to short-sighted personal promotions and political connections. International institutional coordination is largely left to European organizations such as the *European Southern Observatory (ESO)*<sup>34</sup> or the *European Space Agency (ESA)*<sup>35</sup>, or to international consortia such as the *Institut de Radioastronomie Millimétrique (IRAM)*<sup>36</sup> or the *Nordic Optical Telescope (NOT)*<sup>37</sup>.

### 3.5. AMATEUR ASTRONOMERS

Some aspects of the relationships with amateur astronomers have already been dealt with elsewhere in this volume (Heck 2000c, Sect. 2.5) and therefore we shall be rather short here. Specific colloquia have also been organized and could be usefully referred to (see *e.g.* Dunlop & Gerbaldi 1987).

Amateur astronomers are generally classified in two categories: the active and the armchair amateur astronomers. While the latter ones have generally a passive interest in astronomy (reading magazines, attending lectures, and so on), the former ones carry out some observing, often with their own instruments, and such activities can be useful to professional astronomy. For instance, Mattei & Waagen (2000) beautifully exemplify how a well-organized and hard-working organization can efficiently contribute to the gathering of data and thus to the expansion of cosmic knowledge.

Inversely the sharing of knowledge with more passive amateur astronomers and with the society at large has many facets. Professional astronomers should also be encouraged to share their work more often with

<sup>33</sup><http://www.nas.edu/bpa/projects/astrosurvey/>

<sup>34</sup><http://www.eso.org/>

<sup>35</sup>See *e.g.* the chapter by Volonte in this volume and <http://www.esa.int/>.

<sup>36</sup><http://iram.fr/>

<sup>37</sup><http://www.not.iac.es/>

the open world. Beyond the world-wide audience of a journal such as *Sky & Telescope*<sup>38</sup>, there are many national journals which deserve more attention from our community.

Public observatories and planetariums are other outlets where professional astronomers should be seen more often.

More generally, professional astronomers should be encouraged to better communicate and ‘coach’ amateurs (possibly within public outreach activities) with a number of possible benefits:

- improving dissemination of correct scientific information,
- focussing on effective scientific aims<sup>39</sup>,
- participating usefully to professional activity (observational campaigns, public outreach offices, light pollution control, debunking pseudo-sciences, and so on).

Our own experience of interacting with amateur astronomers has generally been a gratifying and human-enriching one, even if it is definitely time-consuming. One must however be prepared to handle an unavoidable fringe of weird and crackpot characters attracted by our science.

## 4. Additional comments

### 4.1. IS LANGUAGE A CRITICAL ISSUE?

#### 4.1.1. *Obertura*

Language is regularly put forward as a source of difficulties in professional exchanges, be it for oral or written communications. As a practicing astronomer and as an observer of what has been going on within and outside the astronomy community over the past four decades, our personal experience is rather different (less dramatic and more nuanced) of what can be sometimes read elsewhere.

Perhaps this is resulting from our approach of language, not as a fatality, but as a vector of communication, for sharing knowledge, for advertising results of research, for operational and colloquial exchanges where efficiency and human contacts take precedence over facility and national pride. This has of course a price: the necessity to learn a working minimum of foreign languages<sup>40</sup>, in the same way scientists are learning programming languages

<sup>38</sup><http://www.skypub.com/>

<sup>39</sup>Even if they make no harm, there are still too many romantic deviations in amateur astronomy. Too many young students still approach us with flights of poetic celestial oratory and are then really disappointed when they realize what actual research is.

<sup>40</sup>This author, never considered at school as specially gifted for languages, ended up learning more than a dozen of idioms (including even an artificial one), and is still fluently and daily speaking several of them.

or graphic packages – the bottom line being that, in order to best advertize one’s work, one has to use the most widely accepted communication tools.

#### 4.1.2. *Oratorio*

Let’s face it: astronomers have *de facto* adopted English as their current *lingua franca* and, at international meetings, we do not hear anymore communications in French and German that were still taking place not so long ago (definitely in the seventies).

There are nowadays few people unhappy with the current situation and everybody with the feet on the ground realizes that the astronomy community in general and the astronomical institutions in particular are too poor to hire interpreters (an expensive system surely, but also a heavy and often an unsatisfactory one with specialized terminologies). And even a country sometimes fuzzy about language usage such as France is nowadays accepting English be used without French equivalent at scientific meetings<sup>41</sup>.

It is out of the scope of these lines to discuss the political context of the prevalence of some languages in scientific exchanges over time (Latin, French, German, English, ...), but astronomy-related people dealing with the issue often omit to point out that, if French and German are definitely on the way out, Spanish is progressively coming up. A phonetical, logically structured and gramatically simple language, Spanish is more and more practiced among astronomers (especially in working context and restricted meetings) – be it only because of the increasing number of large facilities already operational and to be installed in hispanic countries<sup>42</sup>.

Instead of arguing about subtleties (for non-anglophones) such as the differences between American or British English (perhaps relevant for purist circles, solemn lectures and/or prestigious papers), shouldn’t we rather concentrate on more down-to-Earth issues? The real difficulties encountered by attendees at meetings (listen to the conversations at coffee breaks) are essentially: speed of speech, heavy accents and slang words. Improving this, plus a few indications on how to structure and focus a talk while retaining

<sup>41</sup>We still remember that distinguished Parisian scientist giving a seminar at the ESA IUE Observatory in Spain around 1980, being obliged to speak French (while fluent in excellent English) because the French Ministry of Foreign Affairs was partially supporting her trip, apologizing for it and somehow compensating this ludicrous situation with transparencies in English and by answering questions in English ...

<sup>42</sup>Spanish is also definitely progressing world-wide. Fernando Henrique Cardoso, President of the Federal Republic of Brazil, was selected on 14 June 2000 as the next recipient of the prestigious prize *Príncipe de Asturias de Cooperación Internacional*. One of the stated reasons was his action in favor of the teaching of Spanish in his (Portuguese-speaking) country, thus helping the exchanges with the (Spanish-speaking) rest of South America. So might be progressively smoothed out the consequences of the 1494 *Treaty of Tordesillas* settling a dispute between Portugal and Spain under the patronage of Pope Alessandro VI Borgia ...

attention of the audience, would significantly improve communication more than considerations on the difference between *colour* and *color*, *maneuver* and *manoeuvre*, *elevator* and *lift*, and so on.

What really matters is to be consistent. And, in this respect, we agree with Mitton (1996) that linguistic traditions of authors should be respected as far as possible and, considering all the English-speaking countries round the world, there is probably more than two English (American and English) used in practice<sup>43</sup>.

In fact, the *lingua franca* used by non-anglophones at international meetings (in astronomy, at the European Commissions, or elsewhere) is a kind of pidgin fairly remote from the Shakespearean language. But is that really an issue as long as we have a tool that works? Do not be mistaken: certainly a language as perfect as possible has to be favored, but there is always a compromise to be reached between efficiency and an ideal situation.

#### 4.1.3. *Literario*

Many of the considerations of the previous section remain valid for ‘papers’ or books in general. English is also the adopted language for contributions to the leading journals and most other publications. French and German have virtually disappeared from the European journal *Astronomy and Astrophysics*.

If it is of course a basic wisdom to get the texts carefully checked by an anglophone, authors should always have the last word, even towards institutional editorial services such as the one described by Mahoney (2000) at IAC<sup>44</sup>.

Regarding the allegedly more serious issue of referees being potentially biased against non-anglophone authors, our experience is again different in the sense that we found that some of them are rather biased according to the country of residence or of work appearing in the affiliation. Such a behavior is regularly pointed at in the literature (see *e.g.* Rumjanek 1996 & Umakantha 1997).

Some authors claim that language discrimination is a poor excuse and that other effects should be blamed, such as the geographical location just mentioned or the non-membership to a large or prestigious institution, or

<sup>43</sup>If not in spelling, certainly regarding the words used themselves, *isn't it mate?* The same is actually true for the variants of Spanish from the Rio Grande to Cape Horn in spite of the efforts by the *Academias de la Lengua Española*.

<sup>44</sup>We still remember those times when A&A was employing a corrector for English in Meudon. That person was not an astronomer and was not used to some basic mathematical terminology, which led to misunderstandings and then to unfortunate, if not ludicrous, corrections to the manuscripts.

again the imperfect coverage of abstracting and indexing service providers (Fewer 1997).

Lequeux (2000) who has been A&A Editor in Chief during a total of 15 years, expresses general satisfaction with the refereeing system in astronomy, even mentioning that he saw some referees rewriting completely papers originally in poor language. He also hints at the fact that this could reflect, not an imperfect knowledge of a foreign language, but a complicated mental structure of authors resulting in confuse ways of expressing themselves (in whatever language they use). And here we come back again to this necessity of training astronomers for better communication.

#### 4.1.4. *Final*

The heavy burden put on language seems to be greatly exaggerated. The astronomy situation is simply in line with what is going on in the rest of the world. There are regular calls for a neutral (artificial) working language, especially in the context of the current intensive discussions on the usage of languages at the numerous EU meetings and in the resulting proceedings (see *e.g.* Giraud 2000).

From our own extensive experience with one of the artificial languages<sup>45</sup>, we doubt however such a language could be adopted by official bodies in a near future in spite of its intrinsically top qualities. Factors such as the politico-economic context, the lack of pragmatism of the proponents, sometimes the sectarianism of the supporters, could deter the adoption and usage of such a language still for a long time.

We wish it or not: English is currently our working language, and this should be accepted by non-anglophones. Conversely anglophones have to appreciate the efforts made by non-anglophones to express themselves in a way basically understandable by everybody. It is true it takes time to write a paper or to prepare a talk in a foreign language and this should be understood and accepted by everybody too.

It is a basic law of communication that the best vector, in specific conditions, should be used to publicize one's product – and this is also of application to language and scientific information<sup>46</sup>.

<sup>45</sup>This author has co-organized, about thirty years ago, a couple of university Summer sessions (not of, but) in Esperanto of maths, logics, chemistry, medicine, biology, pharmacology, etc., with all the characteristics of university sessions with *ad hoc* esperanto-speaking professors (and students). It worked perfectly well – simple linguistic exercises as communication vectors with everybody on linguistically neutral grounds.

<sup>46</sup>There is an argument heard occasionally: if a paper is important and not published in English, it will be read anyway because people will feel obliged to read it. Experience shows this is wrong (see *e.g.* Sanberg *et al.* 1996). Also apart from being pretentious and contemptuous towards the potential audience, such an argument is ill-defined in the sense that people must first be able to understand the paper before deciding whether it is important or not ...

#### 4.2. THE IMAGE OF THE SCIENTIFIC COMMUNITY

Not so long ago, a paper in the *International Herald Tribune* (Pollack 1998) described how scientists were becoming really tired of being portrayed in movies “almost invariably [as] mad, evil, antisocial, clumsy or eccentric” characters. A immediate question might then be: should we blame only movie directors or do scientists bear also some responsibility in this?

Einstein probably started it all with his clever manipulation of the rising media and the new hype fashion, especially in the US – with his more than relaxed way of dressing and behaving, together with the funny pictures he allowed of himself<sup>47</sup>. But we are not all new Einsteins and we should be careful of not making more harm than good in the consideration of the public (and therefore in its support).

In some intellectual circles in this part of the world, it has become fashionable to go around poorly dressed and not so well kept, people claiming that what matters is the brain. This is certainly arguable and is definitely not the best way to impress the public favorably.

We have seen quite a few places where the image issue was deliberately ignored, visitors and media representatives being rushed around and definitely leaving with the feeling of having gone through a weird place. The only thing they could do subsequently was to echo this.

Now, do not be mistaken with what we are trying to say as we definitely do not have to exaggerate in that sense either. We certainly go along with those colleagues claiming that the most important thing is the work we do and the scientific results we produce, but isn't it inconsistent to complain about insufficient public support and, at the same time, not to pay attention to the way the world around us is functioning?

An ambassador with important responsibilities in international organizations told us recently of his embarrassment between, on one hand, his own interest and wishes to support fundamental scientific activities and, on the other hand, the difficulties he was meeting to find out ‘presentable’ scientists in various disciplines, including ours, people able to get out of their crystal spheres and to explain their work and needs while taking into account the values of the outside world.

In other words, “a better image of scientists and engineers could lead to more people entering those fields and to greater public support for projects ranging from space exploration to particle accelerators” (Pollack 1998).

<sup>47</sup>At the prestigious *Singapore Science Centre*, a dummy (or is it a monkey?) disguised as Einstein goes continually up and down a rope in front of the *Astro Shop*: a saddening representation of the scientist unanimously hailed as the genius of the XXth century ...

## 4.3. FINAL REMARKS

First of all, it seems appropriate to emphasize again the role played by the International Astronomical Union (Andersen 2000a&b) in various issues mentioned above. It is up to all of us, professional astronomers, this role be reinforced in the future.

There are however some caveats in order here. If we can usefully learn through international platforms from the experiences of others and especially from other countries, it is not obvious that blind extrapolations are automatically of application, be it only because the socio-cultural contexts may be different. This could also be true within countries with several ethnic, linguistic or cultural communities.

We insist once more on the fact that, as there is currently virtually no training in communicating nor in interacting with news media, any improvement in that direction would make a significant difference.

Astronomers need to learn how to communicate properly and it is true that, in general, this is not part of their education. And narrow-minded, often personally-motivated, initiatives have sometimes ended in disastrous results for our community because outsiders generally believe that we are all talking with the same voice.

However fascinating it can be, the communication process needs to be carefully planned: the formulation of a message (*i.e.* an information set), its conveyance, and its reception by targets who will each perceive it differently.

In a scientific context, the matter is not only to deal with ‘true’ information (*i.e.* authenticated, verified and validated), but also for each scientist to get the recognition he/she deserves among his/her peers, as well as for a scientific community to position itself adequately compared to other disciplines and to society at large.

And in astronomy, as already mentioned, we are not only ‘selling’ products (our research results) or ourselves, but also the fundamental understanding of mankind’s position in the universe.

Innovations and assertive attitudes, in other words creativity, towards society at large should probably be put more often into practice, for instance when it comes to countering the problematic practice of selling stars by offering instead cosmic objects for adoption while educating people adequately (see *e.g.* Heck 1997b).

There are not many deviations noted so far<sup>48</sup> to the noble aims of our scientific communication. It is however to be hoped they will remain exceptions and that professional astronomers will resist the ‘tyranny of communication’ increasingly denounced nowadays (see *e.g.* Ramonet 1999).

<sup>48</sup>For instance, unfounded scoops towards the news media surprizingly[?] just before critical votes on budget or approvals of big projects.

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