

A fascinating adventure: astronomical activities for people with disabilities during IYA 2009

**A. Ortiz-Gil¹, P. Blay², A. T. Gallego Calvente³, M. Gómez Collado¹,
J. C. Guirado¹, M. Lanzara¹, and S. Martínez Núñez⁴**

¹ Observatori Astronòmic, Universitat de València

² Laboratorio de Procesado de Imágenes, Universitat de València

³ Instituto de Astrofísica de Andalucía - CSIC

⁴ Departamento de Física, Ingeniería de Sistemas y Teoría de la Señal, Escuela Politécnica Superior, Universidad de Alicante

Abstract

Here we give a brief outline of the activities developed during the International Year of Astronomy specifically addressed to people with various disabilities, both physical and/or intellectual. Among the different activities that we carried out we wish to highlight the publication of an astronomy book in Braille, astronomy talks for the intellectually disabled, a software for people with motor disabilities, and a planetarium show for the blind and visually impaired.

1 Introduction

As we celebrated worldwide the International Year of Astronomy in 2009 [2], we felt that it was a once in a lifetime opportunity to reach to social groups which are not usually so well attended by the regular astronomy outreach and popularization efforts. We focused on groups of people with disabilities, for which there is currently a lack of didactical astronomical material.

2 A “fantasy” world coming into reality

Our story has many of the ingredients of a good fantastic adventure: storytelling, books only for the initiated, and some “magical” tools.



Figure 1: A star cluster (*left*) and a protostar (*right*) as seen by two persons attending the “The life of stars” talk.

2.1 Storytelling: “The life of stars”

We developed a talk, “The life of stars”, about the formation and evolution of stars which was addressed to people with intellectual disabilities. Every step of the evolution was connected to some human experience, like being born, feeding, growing, etc., in order to establish a link and interest between the public and the subject to make it more understandable.

The talk would be developed in two parts with a break between them. During the break the public goes to observe the closest of the stars: the Sun. They would also draw their impressions on star formation and evolution from what they have heard so far in the talk. The complexity of the works is in some cases really impressive, with protostars shining inside their gas and dust cocoons (see Fig. 1).

2.2 A book for the initiated: “Volver a ver las estrellas”

In 2000 the Astronomical Observatory of Padova published a website (see [1]) with a comprehensive astronomy course for blind people (<http://www.touchthesky.eu>). We contributed to the project by translating the website into Spanish, and printing about 50 copies of the contents into a book in Braille (see Fig. 2). It has been distributed to the libraries of blind people associations, and astronomical outreach organizations and individuals, both in Spain and America.

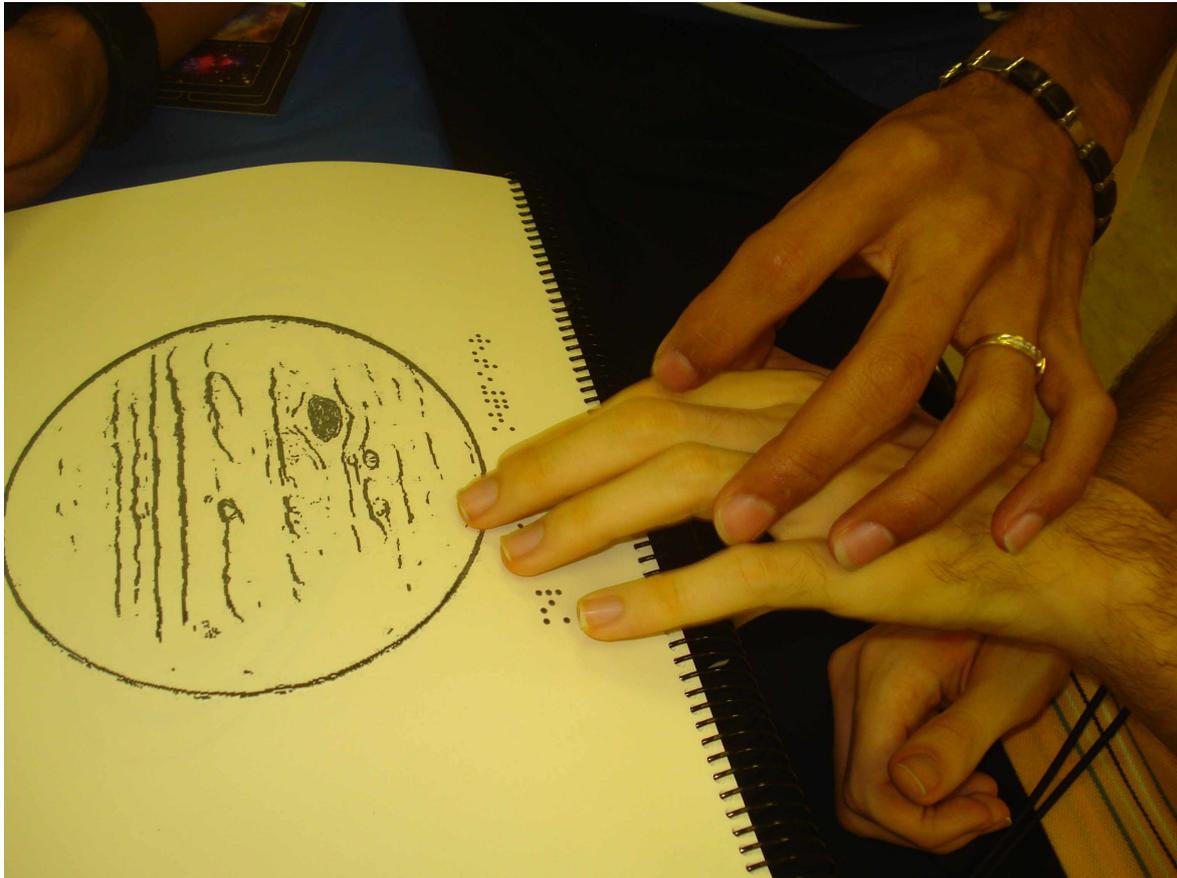


Figure 2: A book in Braille about astronomy, “Volver a ver las estrellas”, was printed from the contents of the “Touch the sky” website.



Figure 3: The planetarium show “The sky at your hands” was premiered in October 2009 at the *Hemisfèric of the Ciutat de les Arts i les Ciències* in Valencia, Spain (*left*). Detail of the hemisphere (*right*).

2.3 A “magical” artifact that opens the mind’s eyes: “The sky at your hands”, a planetarium show for the visually impaired

Based on work done by Sebastian Musso in Argentina, we developed a planetarium show for the blind. An original soundtrack was composed, with particular sounds associated to each of the objects covered by the script. We designed a hemisphere with constellations engraved in a way such that the person holding it could touch the shape of the constellation and follow the script throughout the sky (see Fig. 3). For this we used different sizes of “stars” and kinds of lines engraved on the spheres. The sounds of the astronomical objects were played through the loudspeaker on the dome which laid closest to the projected image of the object to give an indication of its location on the dome. Meanwhile a narrator is guiding the public through the hemispheres.

The hemisphere has been selected to make part of the IYA 2009 Legacy collection at the Museum of Sciences in London.

2.4 A powerful gift: “Astroadapt”, an astronomical software for people with motor impairment

We have created a GNU-licensed software to be used by people with motor disabilities, who are able to understand and reason normally, but cannot move, not even speak. They use a special software to communicate with the rest of the world by using the computer attached to their wheelchair.

Based on the functionalities of this kind of software we have created a free software called “Astroadapt”, which can be used for communication purposes, but where we have also included astronomical contents like images and brief explanatory texts for their users to enjoy (see Fig. 4).

The software is extremely easy to use, highly adaptable to the peculiarities of every user. The different topics and sections can be selected by just one click on any key. Texts can be read by the computer voice synthesizer, and the program is available in three languages: Spanish, English and Italian.

3 Sharing this educational material

Our main goal with this project was somehow to pave the way for other persons involved in outreach and education to work with groups of people with special needs. We have created this set of tools to make the start a bit easier and therefore all these materials are freely available.

The talk “The life of the stars” (Spanish version only) and the software “Astroadapt” can be downloaded from the Observatory webpage: <http://observatori.uv.es>, in the section “Divulgación” under “Actividades divulgativas”.

The soundtrack of the planetarium show is freely available upon request to A. Ortiz-Gil, although only a version in Spanish is available.

EL UNIVERSO
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AÑO INTERNACIONAL DE LA ASTRONOMÍA 2009

Astroadapt

Un proyecto de software libre realizado con el patrocinio de:




Observatori Astronòmic UNIVERSTAT ID VALÈNCIA

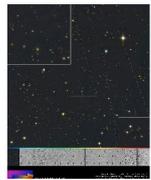
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Astroadapt

 <p style="font-size: x-small;">The ALHAMBRA project is taking images of several regions in the sky in 23 different colours. This will allow astronomers to study up to 50% of the history of the Universe.</p>	 <p style="font-size: x-small;">An image from the ALHAMBRA project. ALHAMBRA is a survey that covers a large region of the sky to study the formation history of galaxies and how they evolve with time. The redder and smallest galaxies in the image are usually those which are also farther away.</p>	 <p style="font-size: x-small;">Spiral galaxies. In deep sea images, like those from the ALHAMBRA survey, we can see billions of stars belonging to our galaxy the Milky Way, and in our galaxy and other galaxies we can see billions of spiral galaxies.</p>	 <p style="font-size: x-small;">A spiral galaxy, M74. Spiral galaxies are galaxies with a pinwheel shape. The arms are made of gas and dust, and they are dotted with newly born stars and star clusters. In the images of ALHAMBRA we can find many galaxies belonging to this class.</p>
 <p style="font-size: x-small;">An elliptical galaxy. Another class of galaxies that we can find in ALHAMBRA is the football shaped galaxies. They are called elliptical galaxies and are basically gigantic spheroidal blobs of stars, gas and dust.</p>	 <p style="font-size: x-small;">NGC 4442, an irregular galaxy. Irregular galaxies do not show a particular shape like the pinwheel one of spirals, or the football one of elliptical. Some of them form through the collision between two or more galaxies, giving as a result a disordered mixture of gas, dust and stars without a clear shape.</p>	 <p style="font-size: x-small;">NGC 4676: The Mice. In this image we find two galaxies which are colliding: the gas and dust from each of them mix up, therefore giving rise to new bursts of star formation whenever they meet. The stars in the galaxies do not orbit directly, but their orbits mix up. In ALHAMBRA we find examples of colliding galaxies that allow astronomers to study how the galaxy shape changes with time, moving from spirals to ellipticals or irregulars.</p>	 <p style="font-size: x-small;">Stephan's Quintet of galaxies. In the images we sometimes see several galaxies living very close together. This proximity is sometimes real, but in other cases they are close just by chance and they are physically very far away from each other. In Stephan's Quintet four of the galaxies are truly colliding. Large sky surveys, like ALHAMBRA, allow the astronomers to find many examples of galaxies which are interacting.</p>
 <p style="font-size: x-small;">Galaxy cluster Abell 370. The galaxies are not floating alone in the middle of space, but they rather find themselves in groups of galaxies, attracted by the gravitational pull of a gigantic elliptical galaxy located at the cluster core. The space between the galaxies in a cluster is filled up with hydrogen gas at millions of degrees that shines in X-rays. The large field covered by ALHAMBRA allows for the discovery of new galaxy clusters, some very far away from us.</p>			

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Figure 4: Introduction window of “Astroadapt” (top), and an example of the astronomical menu (bottom).

The “Touch the Sky” website is on line, at <http://www.touchthesky.eu>, under different languages, and we can still provide educators with a copy of the book (only in Spanish, though), upon request.

Acknowledgments

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- [2] Russo, P., Cesarsky, C., & Christensen, L. L. 2009, *Highlights of Astronomy*, 15