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Two Small Astronomical Catalogs Available In Hypertext

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Abstract. The *Third Catalog of Emission Line Stars* (Herbig & Bell 1988) and the *General Catalog of Herbig-Haro Objects* (Reipurth 1994) have both been translated into hypertext and linked to other on-line material. As a byproduct of this work, a method for displaying subscripts and superscripts using Mosaic has been found.

1. Introduction

In recent years astronomical catalogs have disappeared from the archival literature. A few years ago, these could be found among the Observatory publications (see the *Third Catalog of Emission Line Stars,* Herbig & Bell 1988). Today catalogs are issued in electronic form only (see A General Catalogue of Herbig-Haro Objects[1], Reipurth 1994), usually via anonymous FTP.

For the past two years astronomers working in star formation have been kept abreast of developments in their field by the *Star Formation Newsletter*, edited by Bo Reipurth of ESO. This newsletter is distributed monthly by e-mail to over 800 astronomers worldwide. A LaTeX form is used, into which astronomers enter abstracts of their recently accepted papers. These are e-mailed to a central collection point and assembled into a monthly newsletter. The recipients strip off the e-mail header and process the LaTeX file to read the newsletter. The newsletter eliminates the previous hit-and-miss circulation of preprints, especially for younger workers.

2. Catalogs

This spring I received a request from Bo Reipurth of ESO to review his preliminary *General Catalog of Herbig-Haro Objects* (Reipurth 1994) before it was made available via anonymous FTP from the ESO FTP server. The imminent appearance of a new catalog of objects associated with the star formation process, solely in electronic form, motivated me to think of making another database, the *Third Catalog of Emission Line Stars* (Herbig & Bell 1988), available in electronic form as well. I elected to create hypertext documents, linking them not only internally, but also to the on-line database of abstracts of papers in astronomy journals and to each other.

[1] ftp://ftp.hq.eso.org/pub/Catalogs/Herbig-Haro/

2.1. The Herbig-Bell Catalog of Emission Line Stars

The *Third Catalog of Emission Line Stars* (Herbig & Bell 1988, HBC) was distributed as a Lick Observatory Bulletin. It is a catalog of pre-main-sequence stars which have had slit spectra taken to confirm their nature. Included in this catalog of approximately 750 objects is the complete coordinate information, magnitude, color, and variability in bands from the X-ray through the radio (less the *IRAS* data), spectral type and emission line data, both radial and rotational velocity information, references for all of this information, and the identification of the molecular cloud in which the star is found. A few copies of the catalog were distributed as 80 column card images on 9 track tapes, but the paper version of the catalog has been the basic format used.

The HBC has always been somewhat awkward to use because the data for an individual star is spread over two pages bound one above the other. There are large gaps across any line, except for the most frequently observed stars, making it difficult to follow the correct line across the page. In making the electronic version[2], I have linked the catalog number of the object to the corresponding entries on the second page so that the top of the window will act as a guide line across the columns. An asterisk in the notes column is linked to the note for that object. The references were linked to the abstracts contained within the database of journal article abstracts used by the ADS Abstract Server[3].

Because of the difficulty in reading the table, and the unlikelihood of the need for *all* of the information spread across the two pages, I also provided a forms-based access[4] to the data. This form requests the catalog number of the object desired and then returns all of the most commonly desired data for the object, as well as any other data requested, in a nicely formatted page.

2.2. The Reipurth Catalog of Herbig-Haro Objects

Upon release of the public version of the *General Catalog of Herbig-Haro Objects*, I began the process of its conversion to a hypertext document.[5] The Catalog was formatted in LaTeX and consisted of a table of the basic data and extensive notes on each object. The catalog contains approximately 250 objects, and for each object lists the catalog number, any previous designations, the best available positions, the source of the outflow (if known), the name of the star formation region in which it is found, and the best distance to the object. Each catalog number was linked to the notes for that object. When the suspected source of the outflow was listed in the HBC, the source was linked to its entry there.

The notes for each catalogued object are heavily referenced. The majority of the references are available in the ADS Abstract Server, and the notes have been linked to those abstracts. Because this field is extremely active, there were a large number of papers (25–30% of the references) not yet available in the abstract database. Many of these abstracts were available in the *Star Formation*

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[2]http://www-astro.phast.umass.edu/latex/HBC/tab1a0-5.html

[3]http://adswww.harvard.edu/abs_doc/abstract_service.html

[4]http://www-astro.phast.umass.edu/latex/HBC/HBCform.html

[5]http://www-astro.phast.umass.edu/latex/HHcat/HHcat.html

Newsletters [6]. Therefore we placed the entire archive of the *Newsletter* on line, using LaTeX2HTML[7] and Perl scripts described later. I then linked the catalog references to these abstracts. This procedure allowed us to provide abstracts for almost 90% of the references, leaving only those papers which are still in preparation and the papers published before 1975. Since the papers which were still in preparation appear in the *Star Formation Newsletters*, the catalog references are linked to them.

2.3. The Star Formation Newsletters

The hypertext versions of *Star Formation Newsletters* were placed on line in order to have immediate, searchable access to abstracts of the most recent papers. We found it necessary to integrate into the text a large number of symbols for the proper display of the content of the abstracts. We constructed the table of contents for these newsletters in two forms:

1. a single document containing all of the papers found in the newsletters; each title is linked to the corresponding abstract (this document is large but allows a search through the entire database).
2. individual table of contents files for each issue of the newsletter. These documents are much smaller but require knowledge of the publication date to be used effectively. The titles are also linked to the abstracts.

When a new issue arrives, it is added to the available database. When papers are published, the final references are added to the newsletters.

3. Symbol Library

In response to the practical and perceptual problems of displaying mathematical symbols using the Mosaic browser[8], I developed a library of transparent GIF images of the most commonly used subscripts and superscripts in astronomical manuscripts. This library was designed with several considerations in mind:

- The symbols should blend into the text as inconspicuously as possible.
- The total size of the images to be transferred should be as small as possible, to minimize load time and network traffic.
- The reading of an entire paper should be accomplished without the need to discard and reload either symbol or figure images, if at all possible.

When an entire expression is captured as an image, the expression may look out of place in the rest of the text displayed by Mosaic, no matter which font is selected. However, if only the sub- and superscripts are generated as images, this

[6] http://www-astro.phast.umass.edu/latex/sfnews/no1/toc2.html

[7] http://cbl.leeds.ac.uk/nikos/tek2html/doc/manual/manual.html

[8] http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/helpabout.html

problem is greatly alleviated. Since sub- and superscripts are always generated in a different font and are much smaller, few differences in the structure of the character are possible or noticeable.

The second and third items take into consideration the default image cache size of Mosaic—2048 kB[9]—and the fact that the least recently accessed image will be the first discarded. The typical size of a 2–5 color image used as a figure in a preprint is 4–8 kB. The typical size of an image to be used as a sub- or superscript is 0.06 kB.

These three considerations work in concert to provide a clean-looking, easily readable paper, taking minimal time to load each page, thus allowing browsing as well as reading in depth.

This library includes the Greek letter set, numerals positive and negative, the entire alphabet (both capital and lower case), and some special symbols and letter combinations of common use in astronomy. To implement this set of transparent GIFs, Perl scripts were written to preprocess the manuscripts, inserting the in-line images as required. LaTeX2HTML was used to convert the manuscript to HTML format, and a post-processing Perl script was used to clean up the few things that may have been affected by LaTeX2HTML. The manuscript is then ready for the insertion of the images, tables, and reference links.

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References

Drakos, N. 1994, LaTeX2HTML manual[10]

Herbig, G. H. & Bell, K. R. 1988, Third Catalog of Emission-Line Stars of the Orion Population, Lick Observatory Bulletin No. 1111

Reipurth, B. 1994, A General Catalogue of Herbig-Haro Objects[11]

The *Star Formation Newsletter*, ed. Bo Reipurth, is available as PostScript files[12], or as hypertext[13]

[9] http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/d2config.html

[10] http://cbl.leeds.ac.uk/nikos/tex2html/doc/manual/manual.html

[11] ftp://ftp.hq.eso.org/pub/Catalogs/Herbig-Haro

[12] http://http.hq.eso.org/star-form-newsl/star-form-list.html

[13] http://www-astro.phast.umass.edu/latex/sfnews/no1/toc2.html