


Date : 07/06/2006	
	<p>Involving the uninvolved: audience development and local history. Developing audiences for local history</p> <p>Elizabeth Anne Melrose North Yorkshire Libraries, Archives and Arts Northallerton, North Yorkshire England</p>
Meeting:	153 Genealogy and Local History
Simultaneous Interpretation:	No
<p><i>WORLD LIBRARY AND INFORMATION CONGRESS: 72ND IFLA GENERAL CONFERENCE AND COUNCIL</i> 20-24 August 2006, Seoul, Korea http://www.ifla.org/IV/ifla72/index.htm</p>	

Abstract

This paper discusses the current emphasis on audience development within the field of local history. Museums, libraries and archives have evolved as separate entities, individually orientated to preserving their unique source material. However in recent years there has been financial and government pressure for these institutions to work very closely together to share their resources and to encourage not only the public that already use their services, but also those sections of the community who do not. To seek partnerships with schools, local societies and other community groups, outwardly uninvolved in local history projects, is a useful investment. The effort can create new audiences and can encourage museums, libraries and archives to form new associations and collaborative ventures connecting students, no matter their ability or age, to their local heritage.

Conference Paper

WHAT IS AUDIENCE DEVELOPMENT?

The Canada Council for the Arts defines audience development as the identification, engagement and retention of audiences, and the building of their commitment to, knowledge of and appreciation of specific arts disciplines and art forms. Activities within this sphere can include public lectures, panel presentations, discussion groups, workshops and demonstrations, and the distribution of printed material. (1)

Audience development in the field of local history is a current management driver that brings a modern focus to museums, libraries and archives, the compulsion to improve services for regular users and to encourage new people to investigate and use the resources. It is about all the heritage industries exploring opportunities and bringing local history not only to new audiences, but to a more all-inclusive section of the public than heretofore. And it is about

these institutions collaborating with the public, the local history and community groups and with their colleagues when promoting their individual public collections and their common expertise.

HISTORICAL BACKGROUND

The study of local history in Britain is not a modern phenomenon. County archaeological and antiquarian societies have systematically preserved the historical writings of 18th and 19th century scholars and country parsons. In London, the Guildhall Library from 1824 began to actively accumulate the chronicles of the City.

In Warrington Library and Museum, opened in 1848 as '*the first public museum in a manufacturing district*' and '*the first rate supported public library in the country*', (2) a 'topographical', local history, collection was established with a donation of books from William Beaumont, the town's first mayor. Two years later, William Ewart told the House of Commons that the '*One great advantage which might be hereafter derived from such institutions [ie. public libraries]... was that... They would be most valuable to the future historian, as furnishing not only works illustrative of the locality in the libraries, but as preserving in the museums samples of the natural curiosities of the neighbourhood*'. (3)

So it has been that the dedicated local historian has, where he can, used the services of the three institutions, museums, libraries and the record offices, to progress his research. In present times, however, there are too many alternative diversions available to the public and little essential funding. Cultural institutions cannot flourish independently, and for the benefit of the select few. They must collaborate and open up their collections in more organised and co-operative ways, creating new partnerships between themselves and people of all ages and dispositions, many of whom might not normally consider using their services.

In the spring of 2000 the government recognised that although many individual local history resource centres were co-operating in making their collections more readily available to the public, more could be achieved. A new strategic body, the Museums, Libraries and Archives Council, was created to advocate collaboration between museums, archives and libraries. The Heritage Lottery Fund awarded grants for one hundred and fifty collaborative digitisation proposals – each had to include heritage partners on the project board. The Unnetie Digital Archive (4) was one of these projects, providing the new internet audience with illustrative material on the county taken from the collections of the North Yorkshire Library Service, the Dales Countryside Museum and the County Record Office.

Meanwhile public interest in genealogy and local history has increased in the past decade, encouraged by television programmes such as '*Timewatch*' or '*Who do you think you are?*' recounting the search of celebrities for their roots. The challenge is to translate this spectator interest into participation and personal involvement.

THE AUDIENCE FOR LOCAL HISTORY

There is an audience for local and social history. Attendance at museums and galleries increased between 2000/01 and 2002/03. (5) Six out of the top ten visitor attractions in the United Kingdom are museums. (6) The British Museum, for example, attracted over 4 million visitors in 2002. (7)

The Museums Association Yearbook lists 2,500 Museums in the United Kingdom. Many come under the banner of local authorities and some are independent. Most are accredited by the Museums, Libraries and Archives Council as meeting its required minimum standards. (8)

The number of libraries is equally impressive. According to CILIP (Chartered Institute of Library and Information Professionals) there are around five and a half thousand libraries in this sector including the National Libraries and those in the University and Higher Educational library system, many of which hold local history collections. (9)

The A2A (Access to Archives) website lists the historical records from 403 record offices and associated repositories. (10)

These institutions function with experienced specialists, but buildings stand in fixed locations and staff can be hampered by an academic mind-set. Change is inevitable. Local history professionals in Britain are having to adapt to the aspirations of the local communities. Local history is no longer the preserve of the educated graduate working in a repository, but is at the heart of the village or town association.

The year 2000 saw the formation of many community history groups investigating parish histories or collections of historic local illustrations as a commemoration of the Millennium. Individuals used their computer skills to set up community archives or distinctive village websites to promote this research. These neighbourhood studies were initiated, not by the heritage experts, but by the community members themselves, conceivably under the direction of an enthusiastic local resident. In one North Yorkshire village, a retired history teacher set up a local history group. This *'jolly activity for one winter'* has now resulted in a local history exhibition, a published history of the village and a computerised Village Archive held at the village hall. *'The community is changing; a few years ago village history was common knowledge. Today people come from all over the place and the thing that binds them together is the place... What we need is help and support, help with ICT [Information and Communication Technology], and sympathy with communities, no snobbery about expertise.'* (11)

Oral history has become a community activity. Some more traditional historians have little regard for the taping of recorded memory, commenting on the fallibility of personal recall, but volunteer bodies are using the recorder to register this sense of place and family. *'Our project Village Voices has kick-started other work across our 5 villages; people lend photos, do interviews....Everybody's got a story... The project really helps communication between people.'* (12)

The demand for co-operation between the holders of the records and these community groups has grown, partially through the need to tap into funding streams, but also to bring together and promote material dispersed in the collections. The National Archives has recognised this situation: *'Community-archive projects have an important role to play in the United Kingdom communities....community archive projects can contribute greatly to community development, skills development and the preservation of 'unofficial' history, and are a means of encouraging non-traditional users to become involved with archives.'* (13)

There is also the underlying perception that if the professionals do not make the effort to collaborate they could be sidelined and the quality of local history research could be compromised for future generations. To increase and diversify audiences for local history or to attract more groups to the carefully preserved source material, they must work to promote their role in the community. They must welcome and encourage new visitors. They must go out to support community projects. And they must show what can be achieved when heritage professionals work alongside members of any neighbourhood.

WHAT IS IT THAT STOPS PEOPLE FROM COMING TO MUSEUMS, ARCHIVES AND LIBRARIES?

There can be many stumbling blocks and explanations:

- Many younger people have responded badly to education and consider historical study irrelevant. Others feel, if they think about it at all, that local history has no bearing on their lifestyle or that of their friends
- There are too many leisure opportunities competing for the attention of the public, quite apart from the lure of shopping, television and other media
- Others lack finance to pursue these interests or have difficulties connecting with public transport
- Many members of the community have no concept of what museums, libraries and archives have to offer and find these buildings daunting or institutional. They need to be reassured and made comfortable in these environments. Preferably they would like to hear about the resources and how these connect to their lives on their home ground
- Some, such as the first and second generation immigrant communities, may feel under-represented and sidelined by the resource material. Work on many past historical projects will be irrelevant and non-inclusive

In Britain, in the Museums sector, the 'Collections for the future' report, (14) together with the Government Department for Culture, Media and Sport report 'Understanding the Future' (15) asks: *How do museums make collections accessible, particularly for those communities for whom visiting museums and galleries is not part of their life experience or cultural background... and how do museums get the right balance between use and preservation?*

Two major Local Authority inspections are to be carried out this year (2006). The Corporate Assessment will test the effectiveness of Council departments in improving the quality of life in our communities and a Joint Area Review will examine how the directorates are working towards improving the lives of children and young people.

Many more members of the public could be using the museums, libraries and archives and the institutions are aware of this. If they could promote equal access to their services and to their source material they would show their senior management that they are accommodating social accountability and lifelong learning in their programmes, engaging even hard-to-reach groups. Visitor numbers would increase, a case could be made for improved funding and services would be improved. New experiences and opportunities would be offered to people of all ages in every community.

Local history professionals need to be co-operative, and not patronising in any way. For many, any local history project can eat into their leisure time so the work has to be interesting and fun. One venture showcased at a recent local history conference was the Community Map. This is not a new concept, since there are many beautifully embroidered commemorative village maps produced by Women's Institutes and hanging in village halls. However this map, based on a digitised version of JL Carr's illustrated 'Historical map of Yorkshire', was, as a community exercise, filled by the delegates with images and stories of the places that had a relevance for them. They marked a spot on the map with a 'Statement of significance', a note explaining why the site they had chosen had a significance for them. They also pinned on photographs and illustrations of their stories. One result of this exercise was a commitment in one village to begin the restoration, not of any obvious building, but of a forgotten milestone that had previous meaning for several of the inhabitants. The fact that everyone was engaged with the idea of recording their own memories of the local place was important to them.

The intention of audience development has changed over the last decade and the concept now includes more than marketing, or bringing in audiences through promotion of events and presentations. Resource institutions must actively seek out audiences, change unresponsive attitudes amongst those who are not engaged in local history, and alter the

communities' understanding of museums, libraries and archives by positive collaborations. Opening up the behind the scene activities in the institutions has fascinated the public will give these groups a greater understanding of the work of the institutions. Professional staff can make their presence known as facilitators in community groups, not just to explain what resources are available but also to attract new visitors to the institutions in a continuing circle of knowledge and practice.

Co-operation between museums, archives and libraries, local history societies, local media and the public is essential to create programmes that will bring resources together with a relevance to students of all ages. Many collections are being maintained at public expense, so by engaging with projects devised by communities in the field, large or small, staff can encourage present-day audiences and thereby use these collections in the most open way. Community history can be promoted to schools, in village halls and health centres, to people who would not otherwise relate to any study of their surroundings. Added benefits include the ways that members of the group, while gaining new knowledge and skills, can connect with other people, leaving them less excluded and less apart.

WHAT STEPS HAVE WE TAKEN IN OUR COUNTY?

In this cycle of changing perceptions and engagement, the community is subject to many distractions. Museums, libraries and archives are taking a fresh look at their audiences and the prospect of collaboration.

In 2004 York and North Yorkshire launched their first joint Cultural Prospectus setting, among other issues, an agenda for finding economic alternatives to *'reinterpret our heritage, making it relevant to a new generation'* and *'to drive forward the development of culture in York and North Yorkshire'*. The published document has been agreed by the local authorities, the cultural agencies and our two national parks. It blueprints the prime cultural strategies, to be funded initially by the regional Investment Plan, which could have an essential economic impact within the county. One is the impending bid to the Heritage Lottery Fund for the development of a new *'Discovery Centre'* to be developed around the existing local history and genealogical holdings of North Yorkshire Libraries and Archives. Other large-scale projects include the revitalisation of St Mary's Abbey Precinct and the Yorkshire Museum in the centre of the City of York and an annual county-wide programme of festivals and cultural events.

At a more operational level a Cultural Officers' Heritage Sub-Group and Heritage Partnership was formed. This forum includes representatives from all the services, from English Heritage, the local English Tourist Board, the National Parks, the Council Heritage Unit, the Libraries, the Archives and the Museum Service alongside the independent museums. The forum meets around three times a year and reports to the County Council. At meetings the partners share information about heritage activities and future funding and try to put synergies together whereby alliances can operate within planned programmes and small projects be instigated through these personal contacts. Out of these discussions has come a project proposal, *'Changing the Picture'*, whereby two independent museums in the county will collaborate with the County Record Office, the Libraries' Local Studies Service and volunteers to use existing digital historic resources and re-purpose these as learning resources for local schools. The group is also discussing the common use of the Libraries' database of societies and organisations for the promotion of local history ventures.

In a sense the Group is trying to emulate Renaissance North-East, a government programme in the north east of England. The North East Regional Museums Hub partnership is developing a comprehensive service to schools, promoting museum collections to the wider community while encouraging more people to visit museums and art

galleries, and committing its members to the care, management and conservation of collections. (16)

Like the North-East partnership, our members have to question what makes North Yorkshire people come to the history centres and what stops them coming. No amount of promotion in the local press will be successful if we do not discover what is important to the customers that the cultural institutions are trying to attract.

Librarians in North Yorkshire have always had a tradition of going out into the community, giving talks and being present at local history fairs. The County Record Office staff had had a background of caring for the historical records and it must be emphasised that little of the present outreach work could be accomplished without this background work over the years. However, with the appointment of a new Archives Development Officer a programme was slowly put in place to make these collections much more accessible, particularly for those people and communities who had had little previous contact with the Office. Two examples show how, in a small way, our Service is attempting to involve the previously uninvolved in our county, schools and students. To connect with this new audience, the Office had to ask how the resources could relate to teachers and to the education syllabus in schools.

THE REACHING THE TEACHER PROJECT

The Record Office and the Library Service worked together with representatives of the teachers in North Yorkshire to produce a CD-Rom with a case study, compiled to inform schools and the education department about the local history documentation held in their local studies collections.

Co-operative work of this kind had been achieved in other regions, but, for us, seriously assessing such measures was a new departure for recently restructured departments. For many years the Record Office has been a very enigmatic building, and its vast collections have remained largely unknown to most of the public. Over time, a microfilming programme had allowed access to the more popular source material. There are 35mm copies of the well-used resources such as family archives or the county's historic newspapers, once stored as original newsprint in the main libraries' local studies departments. However this process of committing original sources to microfilm was slow and painstaking, fostering the impression amongst the public that standard documents were only available in the Record Office searchroom once microfilm copies had been produced. The County History Advisor had in the past tried to initiate collaboration between Record Office, the libraries' Local Studies departments, the Education Directorate, and the schools with little success, inertia on one side and lack of time and enthusiasm on the other. This project aimed to reach a new audience, the teachers.

There are guides to the holdings of the Record Office, but these are scholarly listings hardly likely to appeal to either teachers, who want information that is related immediately to their curriculum subjects, or to first-timers who need to have a less academic approach to the records. The recently appointed Archives Development Manager wished to open up the archives and to dispel the view that the collections are only available to the few. He is eager to develop new audiences and to encourage students and schoolchildren to regard the documents and information as a support for inspiring learning.

Archives staff realised that they could only understand what documents or illustrations teachers might need to access for their class-work by working with North Yorkshire schools to develop material to support teaching across the syllabus. They had to improve access to their resources and make these more useful, especially for teaching in the classroom. There is a curriculum requirement for a module in local history at primary school level.

On this basis the Record Office successfully bid for funding and won a regional grant for a proposal, *'Reaching the Teacher'*. This project emphasises collaboration with teachers and the Library Service (including the School and Children's Library Service) in the production of an CD-Rom to contain around 150 digitised items of source material on the social, economic and political history for the period 1750-1900. Alongside this there was to be an appropriate text and introductory pages about the facilities provided by the partner-providers, plus their contact details.

The CD was aimed at teachers, not to be used verbatim, but to give them an indication of how real material from the county collections can unlock the imagination of any number of relevant classroom scenarios. The information was chosen and analysed by a representative teachers' group, meeting regularly with archives and library staff. The showcase documents that were digitised are local to the county and although they have a historical bias, there are deliberate links to many areas of the school curriculum. There are two specific lesson plans on the CD, compiled by two advanced skills history specialists working in schools in North Yorkshire. One is aimed at primary school teachers delivering primary history at Key Stage 2 (for children aged 7-11 years) and the other is directed at those teaching Key Stage 3 (for children aged 11-14 years).

The first lesson plan is based on a Police Charge Book of 1869-1878, showing mug-shots of those unfortunates due to appear at the Court of Quarter Sessions. Children at this stage of their education are used to a wide range of picture sources but this lesson plan encourages the teacher to see how additional documentary evidence will support subject findings. The other lesson plan, for teachers of pupils at Key Stage 3, explores the theme of poverty and the problems brought by the industrial revolution. It introduces the teacher to a family, victims of the industrial and social changes of the day, who were forced into a workhouse in the early 1840s, breaking up the household and risking separation one from the other.

The enthusiastic teacher-representatives ensured that the material met the real needs of the school curriculum and was worded in language that suited their colleagues. Project meetings were lively and informative, demonstrating the fact that teachers, archivists and librarians can work and learn from each other.

Between them, the teachers' representatives and the project team from the Record Office and the Library Service have shown that the *'Reaching the Teacher'* project can unlock the resources available to schools through the North Yorkshire County Record Office and Local Studies Service – and can reach what is a fresh audience for libraries and the Record Office in our county. Most of all, all teachers in the county will be made aware of how access to these resources could benefit their lesson preparation and make real local documents in digital form a valid source of study in schools, teaching young people in the classroom. The project is ongoing as the project team is working towards the web-enablement of the material with an update facility. A new and appreciative audience has been found.

AUDIENCE DEVELOPMENT AT THE COUNTY RECORD OFFICE

The success of this project has meant that more teachers are aware of the resources and classes of pupils have come to the Record Office to use the local history material. The Archives Development Manager then applied for funding to appoint an Audience Development Officer for another grant-aided project *'Enjoying North Yorkshire's Archives'*, aimed at bringing the treasures of the Office to as many North Yorkshire residents as possible, attracting new users to these records and creating new ways of enjoying the collections. Winning the grant for the post secured the internal support at management level and the understanding of the importance of this imperative for seeking new audiences. This particular post was to proceed to make partnerships with museums, libraries, archives and other historical institutions pivotal to a programme of small individual projects using the

expertise of the county archives and libraries, the school libraries and a museum. One of these was the Cayley Project.

THE GEORGE CAYLEY PROJECT

This project, '*George Cayley: The Father of Aeronautics*' was part of a county-wide Creative Minds programme, funded by the Regional Development Agency working for the economic regeneration of the Yorkshire and Humber region. The aim of the programme was to link museums and archives in North Yorkshire with different schools for a range of learning activities. These would show that there was a gain for all the institutions. A new audience of school pupils would be motivated as they realised the links between the school curriculum and the resource material applicable to their studies. With this project, the audience were sixth-form physics pupils and students with special needs, not those following a traditional history curriculum. The Audience Development Officer was engaging with their teachers, but more important, with a younger, different audience learning about web design and information technology. (17)

This project involved using the expertise of the Record Office staff, the school libraries and museum professionals alongside IT support. It was based on the life of Sir George Cayley (1773-1857), who was born in Brompton-by-Sawdon, near Scarborough in North Yorkshire and who has been described as the true inventor of the aeroplane. Though he was also the pioneer of a new type of telescope, artificial limbs and a caterpillar tractor, his main claim to fame was that he led the way in air engine design, inventing and experimenting with a series of gliders and flying machines. He designed his first aircraft as early as 1799, some years only after the Montgolfier brothers had successfully sent the first hot air balloon flight across Paris in 1783. Cayley continued to trial any number of airships. In 1853 he succeeded in building a glider that could carry the weight of a man and he persuaded John Appleby, his coachman, to fly this machine, the *New Flyer*, 275 meters across Bromptondale, the first recorded manned glider flight. It is said the John Appleby, the coachman, exclaimed to his employer after this startling experience: '*Please, Sir George, I wish to give notice. I was hired to drive and not to fly.*' In 1902 the Wright brothers acknowledged the work Cayley achieved in the field of early aviation saying that they owed their own success to him.

North Yorkshire County Record Office keep source material relating to George Cayley's life and work, so staff took an active part in involving the sixth form students from Northallerton College as they researched his life and the physics of balloon flight, glider flight and aeroplane flight. Other relevant material was requested from the archives of the Royal Aeronautical Society in London. The history of flight in the local setting held the attention of these students, especially those who were interested in careers in aeronautics and engineering, and who previously would not have considered an archive repository as a place to study.

A challenge for the students was to investigate the history of Cayley's achievements, balloon flight, and how gliders fly. They then used their IT skills to translate their findings into Powerpoint and Flash presentations. One group of physics students from the College designed and practised a series of experiments, building large two metre hot air balloons to illustrate aspects of flight together with a group of post-16 pupils at the nearby Dales School, a co-educational special school for children with severe and complex learning needs. The College students worked in small groups with the Dales School students and coached the younger pupils. Together the two groups built hot air balloons, which were flown in the afternoon and recorded on camera and video.

The Record Office staff found that this project connected them with another audience, students outside the traditional history curriculum. It also showed that with lateral thinking, resource material from the archives and the local studies collections in libraries could have a

relevance in many other subject areas. They were promoting local history but linking the historical records to other subject areas and demonstrating to pupils and teachers that museums, libraries and archives are valuable associates in developing resources for the classroom. Archivists and students learned more about partnership working and, as with the community groups, the response from a teacher was: ‘...everyone has worked really well together. All our students from the Dales School have really worked hard... and it’s been a wonderful experience for them...’

CONCLUSION

A balance has to be drawn up. Forming collaborations does take time and effort that must be integrated into the Annual Service Plans along with the myriads of other tasks of day-to-day operations running busy local history institutions. Finding and developing new audiences requires a different mindset but it is very satisfying. Members of the public who have had no regard for local history come upon the subject from a different angle and suddenly see its relevance. Community groups flourish with some input of professional expertise to their gatherings and into their research. Partnerships can be formed between libraries, archives, museums and other institutions and societies, essential to the principal that all aspects of heritage can work together in a more positive manner when the professionals work for and with their public. Co-operation between museums, archives and libraries, schools and education, historical and other unspecified groups is crucial, along with the imagination to see new horizons and opportunities. We can all be involved in creating projects that are relevant to the community. We can encourage students of all ages and all interests to abandon some of life’s other distractions. We can find out their backgrounds and interests and tailor resources to these concerns. Local history professionals can inform, co-operate and promote to colleagues and new audiences the understanding that a study of the local history around them is as important and relevant to them, no matter how they wish to approach the subject.

- (1) www.canadacouncil.ca/help/lj127228791697343750.htm retrieved May 2006
- (2) *150 Years of Public Libraries*. Warringtonview [nd]
www.warrington.gov.uk/entertainment/libraries/history/ retrieved May 2006
- (3) Hansard. *Parliamentary debates*. 3rd series. Vol. 108, 1850, col. 762 quoted in: Ansell, R. The historical development and present structure of public library local studies provision in the United Kingdom. In: *Local Studies collections: a manual vol 1* edited by M. Dewe, Aldershot, Gower, 1987, p.29
- (4) The Unnetie Digital Archive
www.northyorks.gov.uk/unnetie retrieved May 2006
- (5) National Statistics. *Attendance at cultural events: Social Trends 34*
www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=7188&More=Y retrieved May 2006
- (6) Department for Culture, Media and Sport. Museums and Cultural Property Division. *Understanding the future. Museums and 21st century life. The value of museums*. (2005) p.10
www.culture.gov.uk/NR/rdonlyres/31419198-35C1-4A00-8C12-CB0572EC9B57/0/UnderstandingtheFuture.pdf retrieved May 2006
- (7) National Statistics. *Visits to selected tourist attractions*. Social Trends 34
Last updated: February 2004
www.statistics.gov.uk/StatBase/ssdataset.asp?vlnk=7207&More=Y
retrieved May 2006

- (8) Museums' Association. *Frequently asked questions*
www.museumsassociation.org/faq&_IXSESSION=inj0SL08BTs&_IXPOS=mahead7
retrieved May 2006
- (9) *How many libraries are there in the UK?*
www.cilip.org.uk/enquiryandsearch/enquiries/topfiveenquiries/numberoflibraries.htm
retrieved May 2006
- (10) A 2 A Access to Archives
www.a2a.org.uk/ retrieved May 2006
- (11) Halse, Betty. *Levisham*: from: Whose Heritage is it Anyway? The Castleford Conference 2005
- (12) Lyz Turner. *Seaside Radio*: from: Whose Heritage is it Anyway? The Castleford Conference 2005
- (13) Midgley, Frieda. Community Access to Archives Project Manager
The National Archives. 2006.
www.nationalarchives.gov.uk/partnerprojects/caap/team.htm retrieved May 2006
- (14) Museums Association. *Collections for the Future*. 2005
www.museumsassociation.org/asset_arena/text/ns/policy_collections.pdf
retrieved May 2006
- (15) ibid see (6)
- (16) Museums, Libraries and Archives. North East. Renaissance in the regions.
www.nemlac.co.uk/nemlac/page.php3?p=403&fp=371 retrieved May 2006
- (17) Creative Minds. Case Studies. *George Cayley : the Father of Aeronautics at North Yorkshire County Record Office*
www.creativeminds.org.uk/docs/George_Cayley.pdf retrieved May 2006